



GE VERNOVA



Manufacturing Execution Systems Successes

MES Global References & Case Studies

- 100+ MES References & Case Studies
- Featuring Proficy® Software
- Highlights from Diverse Industries

Putting industrial data to work to solve the toughest challenges

GE Vernova and our software are known for serving the world's largest companies.

- 92% of the world's top oil & gas companies
- 90% of the top food & beverage companies
- 90% of the top metal products manufacturers
- 90% of the top pharmaceutical companies
- 81% of the top automotive companies
- 80% of the top consumer goods companies
- 75% of the top aerospace companies

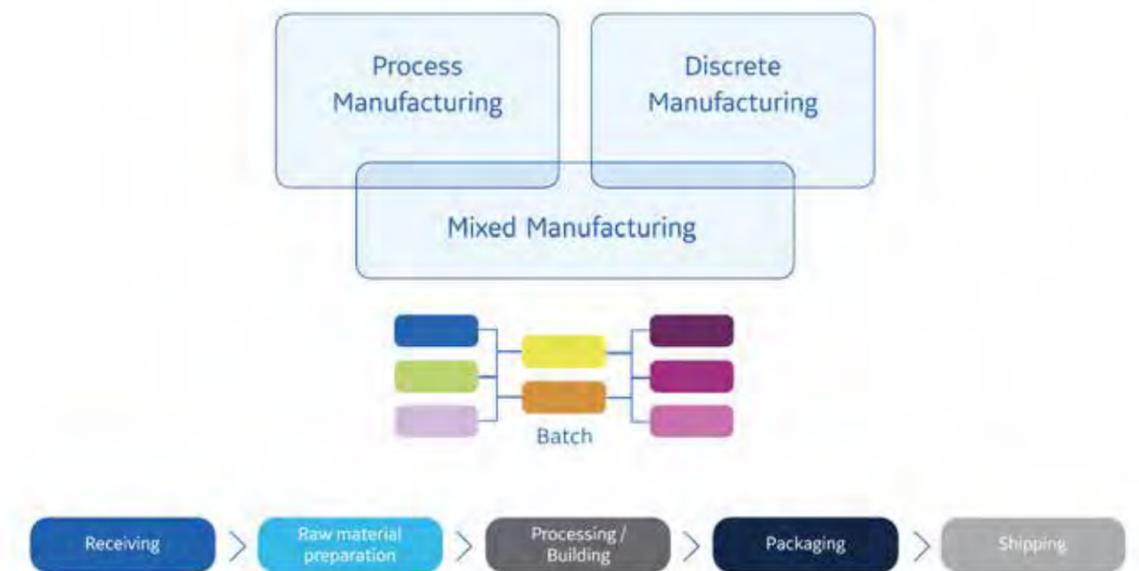


Thousands of companies use Proficy Smart Factory software around the world.

Our customers include diverse companies in:

- Aerospace & Military
- Agriculture
- Appliances
- Automotive
- Batteries
- Construction Equipment & Building Products
- Cement
- Chemicals
- Electronics & Semiconductors
- Food & Beverage
- Glass, Ceramics & Other Materials
- Metals, Minerals & Mining
- Non-Food Consumer Goods
- Oil & Gas
- Pharmaceutical & Life Sciences
- Plastics
- Power & Energy
- Pulp & Paper
- Water & Wastewater
- Wood Products
- And more

~95% of our MES customers use Proficy at multiple sites



Delivering Real Results to Manufacturers



- \$5M annual quality improvement savings
- >\$10M energy savings over 5 years
- \$500K annual waste savings
- \$200K/yr SKU cost reduction
- \$0.01/case SKU formula cost savings
- \$850K/yr production efficiency savings
- 3-month payback on MES investment
- 39% decrease in downtime events
- 10% operating costs reduction
- 10-15% energy savings improvements YOY
- 30% faster new product introductions
- 25% defect reduction
- 25% plant downtime reduction
- 80% reduced furnace emission
- 50% waste reduction
- 20% OEE improvement
- 90% waste reduction
- 35% reduction in product waste
- 90% decrease in finished goods holds & packaging waste
- 9% increased production efficiency





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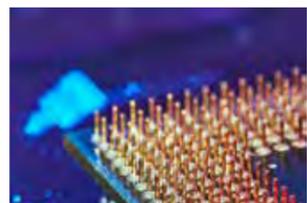
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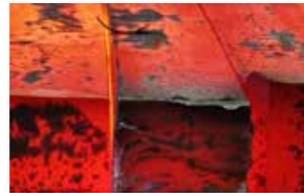
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Additional Resources:



Production Scheduling

Global case studies featuring results such as:

- 20% increase in capacity
- On-time delivery increasing from 65% to 99.8%
- 10% increase in efficiency
- 29 case studies on successes with production scheduling

[Download Scheduling References](#)



Industrial Analytics

See case studies from around the world about how companies are using industrial analytics to optimize operations.

- 10% increase in throughput
- 30-40% increased operational capacity
- 40% decrease in process variation
- Utilization higher than 98% 70 pages of rich information
- Implementations from around the world

[Download Analytics References](#)

“We have the data of a golden roll, we know the specifications needed to make a quality product, and we know we are meeting those specifications.”

— Mark Marek, IT business partner, Kimberly-Clark



Chery Jaguar Land Rover Brings Global Expertise to the Factory Floor



Zero

Downtime in 3 years

100,000

Integration points

500

Machines

Introduction

Company

Chery Jaguar Land Rover (CJLR)

Products

CIMPLICITY HMI/SCADA

Tracker

Proficy Plant Applications

Proficy Historian

Proficy Webspaces

GE Digital's Professional Services

Established in November 2012, Chery Jaguar Land Rover Automotive Co., Ltd. (CJLR) is a 50:50 independent joint venture formed between Chinese auto manufacturer Chery Automobile Co., Ltd. and UK auto manufacturer Jaguar Land Rover. With a factory in Changshu, China, CJLR produces 130,000 high-end luxury vehicles per year.



Challenge

CJLR was looking to reduce time to market while improving production and efficiency, bringing additional value to their customers. To do this, they wanted to run their manufacturing plant with zero losses or downtime and use the latest in Industrial IoT technology.

Solution

The company uses GE Digital's Proficy MES in their engine manufacturing facility in Changshu, connecting more than 100,000 integration points on a real time basis across 500 machines on the shop floor.

"GE has a very mature product in the MES. And also, GE's leading innovation space in the IIoT space. So we felt that as our partner, [GE] give us the technology foundation to achieve our business goals."

— Larry Shen - IT Senior Director, Chery Jaguar Land Rover

The Changshu power train plant is fully automated. GE Digital's MES provides real-time production data from the manufacturing floor, helping managers, operators, and machines make the right decisions at the right time. Assembly managers also use the data to benchmark the Changshu plant and an engine plant in the UK.

"With MES I can see OEE, FTT and real time production monitor and control. Also, MES gives me the consistent data I need to measure the entire production line."

— **Larry Shen - IT Senior Director, Chery Jaguar Land Rover**

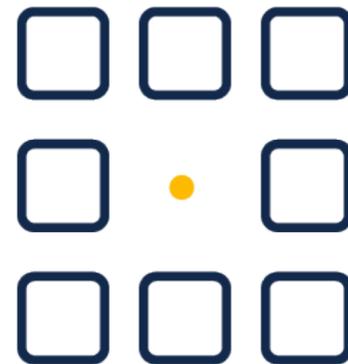
By integrating the Microsoft Holo-lens 'Mixed Reality' headsets with GE Digital's Manufacturing Execution Systems suite, CJLR frees up employees' hands, reducing operational steps, and effectively improving production takt time.

Result

Innovation is key to help Chery Jaguar Land Rover overcome the technology disruptor coming out of the automotive industry and drive values to the business. Using GE Digital's MES and Holo-Lens mixed reality has helped them not only reduce time to market and reduce costs for launch, but also helped improve the efficiency and repeatability of training new employees.

"This year is the third year that we had GE Digital MES in place for our engine facility and so far we had zero downtime."

— **Larry Shen - IT Senior Director, Chery Jaguar Land Rover**





The J.M. Smucker Company

Harvests value from data to drive process & people changes



Summary

J.M. Smucker Company

Solutions

- Production Management: efficiency, quality, traceability, and more
- Enterprise- and plant-wide monitoring, visibility, and control
- Industrial data management with enterprise-/plant-wide historian

Products from GE Digital

- Proficy Plant Applications
- iFIX HMI/SCADA
- Proficy Historian
- Proficy Workflow



Big Wins

- Saved \$500,000 a year by reducing product overfill at pet food facilities
- Expanded Uncrustables production capacity through error recognition & reduction
- Data flowing to senior-level leaders is highly relevant; no longer outdated

The J.M. Smucker Company was founded in 1897 when Jerome Monroe (J.M.) Smucker created his first product, apple butter, in Orrville, Ohio.

Guided by a vision to engage, delight, and inspire consumers through trusted food and beverage brands that bring joy throughout their lives, Smucker has grown to be a well-respected North American marketer and manufacturer.

The Fortune 500 company's brands spans pet food and pet snacks, coffee, and consumer food and natural beverage.

Two years ago, Smucker's didn't have a data analytics group.

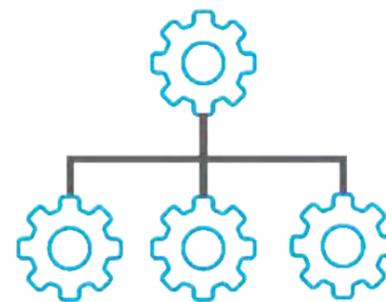
Now it has a team of four focused on how to harvest value from all the data consolidated from its production facilities. What changed? Smucker's leadership recognized the huge potential of harnessing big data to dig into production challenges such as product overfill, hidden plant capacity and equipment downtime. Plus, IS Operations colleagues John Baier and Kevin Briggs were willing to "pick a fight" by suggesting data analytics and visuals could produce real savings for Smucker's.

"We have the largest data set in the entire company, our operations data. How do you leverage that information so you can take action?" said Baier, the Senior Manager of IS Operations at Smucker's.

The Challenges

Smucker's wanted to enable a near real-time flow of information to facility operators to optimize production and spread the opportunity to make strategic adjustments from senior leaders to plant floor professionals.

Some adjustments require hours to flow through a production system. Other processes occur in batches, meaning the sooner a negative data trend is spotted, the fewer batches get rejected. Fine-tuning Smucker's ability to target hot spots and act quickly has been a focus for Baier's team. Baier said Smucker's has made huge strides in making that data available, but it still contends with messy data—data that doesn't accurately reflect production realities or is incomplete.



"We dabbled in a small portion of the business and saved \$500,000. If we keep getting organized around that, we can save even more."

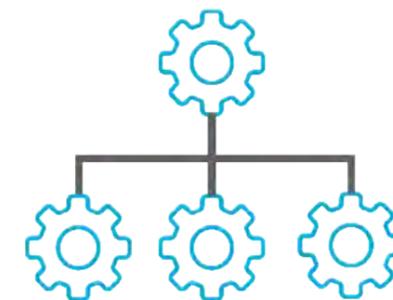
— Baier, the Senior Manager of IS Operations at Smucker's.



The Solutions

“GrayMatter was one of our key partners,” Baier said. “Our leadership trusted the IS organization enough to say, ‘You guys have a right to be at the table and speak,’” Baier said. “And we’re now into a phase where the business is saying, I want to do reliability acceleration for fiscal 2020.” Baier said Smucker’s has been able to build out its capabilities to spot issues and address them. Company leaders have also asked for those capabilities to be ready on Day 1 of a new facility that’s opening soon.

GrayMatter, a GE Digital partner, collaborated with Smucker’s to enhance its MES capabilities and equip it with powerful operations management tools that analyze data and manage fast-moving processes. Baier said Smucker’s is working to further enhance traceability of raw material that enters a facility, is transformed into a product and then leaves a facility. “It’s been an interesting two-year journey,” Baier said. This year, Smucker’s IS Operations team—the one that didn’t exist two years ago—earned an Innovation Award for its business operation analytics.





Digitization Step Change at Procter & Gamble Improves Performance

Diverse Consumer Products: shampoo, paper towels, electric personal devices, OTC medicines, and much more



Digitization is a journey, whether in a large or small organization.

Learn how P&G, one of the largest consumer packaged goods companies in the world, has deployed Proficy Plant Applications at an enterprise scale to accomplish digitization step changes and achieve critical outcomes.

Mixed Manufacturing Environment

With diverse manufacturing requirements, P&G leverages a hybrid MES for both process and discrete capabilities in one solution.

Hybrid On-Prem / Cloud Approach

Furthermore, discover how P&G has employed GE's Manufacturing Data Cloud for an on-prem / cloud approach that improves performance, reduces costs, and provides a foundation for analytics and optimization.

P&G Plant Statistics

- 2 GBS Supported MES Platforms: Proficy (94), Maple (17)
- 10 Category's (Clients: 10 BU VPs and 120+ Plant Managers)
- 39 Manufacturing Solutions
- 68 Sites archiving data in the Mfg Data Cloud (MDC)
- 101 plants
- 2000+ manufacturing lines
- 45,000+ (Users: people working in manufacturing discipline)

P&G

Products

- Proficy Plant Applications
- Proficy Manufacturing Data Cloud
- Proficy Historian
- iFIX HMI/SCADA
- Proficy Workflow

Results

- Improved performance
- Reduced costs
- Data analytics

WATCH P&G VIDEO #1



Delivering Manufacturing of the Future

Background

Procter & Gamble (P&G) is a fast-moving consumer goods company that's made up of several different business units that touch the entire spectrum of a person's life stages.

Challenges

Keeping up with consumer demand

The company's technicians were often tasked with re-entering the same data across multiple systems, causing improper utilization of time and frustration among its operation teams. P&G needed an integrated system that would allow technicians to interact with data in real-time and at scale.

Results

Unlocking real-time operational visibility

P&G was able to visualize its operations to achieve improved process reliability, production efficiency, and operational safety.

- Improved process reliability
- Increased productivity
- Improved operational safety

[WATCH P&G VIDEO #2](#)





Somfy Increases Efficiency and Capacity Using GE Digital's MES

An industry leader in home automation



[Somfy](#) operates in 58 countries and is the world leader in automatic controls for openings and closures in homes and buildings. It offers a range of motorized solutions and control points, and is a key player in smart home systems. The company, founded more than 50 years ago, takes its industry leadership seriously with a commitment to:

- Customer satisfaction through quality and on-time delivery
- Consistent, efficient manufacturing
- Sustainability with a focus on the eco-design lifecycle

To better serve customers, Somfy developed a digital strategy to meet increasing capacity needs and drive consistency across its eight main manufacturing sites, each with 100-200 production lines. This strategy is part of its global “[2030 Ambition](#)” plan, which in terms of digital transformation focuses on the successful implementation of MES and ERP across [Somfy Group](#).

The company partnered with GE Digital representative [CP Solutions](#) and integrator [Premier Tech Digital](#) to deliver a [Manufacturing Execution System \(MES\) solution](#) based on industry-leading [Proficy Plant Applications](#) and [Proficy Historian](#) software.

The company expects to see gains of:

- Increasing efficiency
- Decreasing breakdown rate by at least 2%
- Increasing capacity with better productivity
- Supporting on-time delivery with real-time overview planning
- Improving quality and reducing waste through improved reactivity and faster analysis
- Enabling improved decision making with real-time data
- Supporting time-to-market goals with product creation/modification workflows integrated into MES
- Achieving a modern technology infrastructure that appeals to a changing workforce

Piloted at the company's headquarters manufacturing plant in Cluses, France, the MES solution is providing value toward meeting goals in Somfy's assembly manufacturing environment.



Supporting Sustainable Growth and Customer Expectations

While Somfy has long enjoyed high growth and market leadership, the company saw acceleration in home renovation and demand that started during the COVID pandemic. Home automation including motorization systems for smarter homes are in high demand, offering greater comfort, safety and energy efficiency.

“To meet the growing demand of our customers, we need to better use our existing equipment,” explained Yannick Mace, Vice President of Manufacturing for Somfy. “Through real-time management, MES helps us to reduce our production cost and improve product traceability and reaction rules in case of failure. With this tool, we will also standardize manufacturing processes across our eight main manufacturing sites.”

Somfy also looked to an MES solution as, with growth and increased internationalization of sales, the company saw more complex product flows and the requirement for monitoring and traceability. Additionally, international competition drove a need for a way to further ensure Somfy could continue to meet its unique brand commitments of highest quality, innovation and reliability. Lastly, like most companies around the world, Somfy faced a changing workforce, which underscored the need for robust, simplified and automated processes based on modern technologies.



Commitment to Digitization

According to Stanislas Dupouyet, program manager for Somfy's Digital Manufacturing, Somfy's Digital Roadmap helps to tackle all of these issues with the MES as a critical component. **The roadmap features three axes including:**

- **Axis 1:** The Lean Factory > Standards, fundamentals, modernization of production tools
- **Axis 2:** The Smart Factory > Digitization of processes and procedures
- **Axis 3:** The Intelligent Factory > Dynamic and predictive analysis of industrial data

"With the MES, we can improve the performance and efficiency of our operations, removing non-value added tasks and increasing reactivity with real-time data," Stanislas Dupouyet said. "We can standardize and digitalize our production processes around one unique manufacturing tool. Also, MES is one key to the overall data management challenge to meet our business goals such as customer delivery and stock optimization."

MES Selection and Pilot Deployment

Emmanuel Carmier, lean and change director at Somfy, explained, "We had experience with Proficy and the flexibility and capabilities of the software. Every production environment, every factory is different, and we needed a solution that could adapt to our requirements but also provide reliability and sustainability for long-term use. It is the right balance of software capabilities and company strength."

In selecting a partner for the MES, Somfy benchmarked software solutions available in the industry. The company chose GE Digital's MES based on previous experience with Proficy manufacturing software as well as GE's reputation, product reliability, and company sustainability.

Unlike other companies that implement MES line by line, Somfy implemented Proficy at its Cluses plant across several lines at one time, as the lines are interconnected. This methodology has worked at Somfy in conjunction with carefully managing the project step by step. The team created an "MES school" with simulation of production using the MES, which has supported training workers in the software and how to react. The pilot site is proving that the MES offers a tool to help measure and implement a performance approach.

The software solution provides data management, facilitates real-time reactivity to deviations and faster intervention, and allows the Somfy team to spend less time collecting and formatting data and more time analyzing and managing improvement actions.



From Product Creation to Performance Management

Somfy's manufacturing is an assembly process, bringing together subassemblies. The Proficy solution provides Somfy with functionality in four main areas: product creation and modification, scheduling, production, and performance management.

"We were able to take a specific solution and configure it to our needs and cover a wide range of MES functionalities," Stanislas Dupouyet said. "It's provided a solution capability for our entire complex assembly process. It encompasses our operators, line management, maintenance, quality, and supply."

The Proficy solution supports Somfy's manufacturing with:

- **Product creation and modification**

- Workflow: control and validation by department until production validation + test mode management
- Manufacturing data management: Product and process recipes

- **Scheduling**

- Available production time management and planned activities management (quality control, self maintenance, meetings, etc.)
- Production order list management
- Scheduling of work orders (automatic scheduling, manual optimization, send to production, real-time follow up, issues management)

- **Production**

- Gantt visualization / start-end production / declare production to ERP (SAP)
- BOM check for component and subassemblies
- Declare downtimes / manage planned activity
- Declare defects
- Component replenishment
- Modus operandi display
- KPI display
- Maintenance / quality alert

- **Performance management**

- Real-time production dashboard and alerts
- Data transfer to data lake for business intelligence(BI) reports



Visualization for Supervisors and Operators

Somfy's solution features two types of graphical user interfaces on the production lines, visualizing real-time information:

- Supervisor screens to manage production activity
- Operator screens at workstations with work instructions, data entry, alarms, notifications, etc.

The easy-to-use Proficy screens enable the team to manage production and visualize KPIs, capturing production start and end, planned and unplanned downtime events, quality controls, defects, and more. The team can track reasons for downtime such as breakdowns or part/component inventory issues. Proficy Historian captures all of the OT data, making it available for real-time and historical analysis.

Real-Time Intelligence for the Right Actions

Real-time data and reporting available through Proficy are critical to driving the right actions. As an example, the team has improved quality management and reduced scrap rates using the software for better root cause analysis. However, as Yannick Mace notes, "people won't react because of the information. We have to train them to use the system and to react."

Stanislas Dupouyet agreed, stating, "The challenge is not to use the tool. We needed to reorganize and change the processes to use the tool and drive improvements."

Fortunately, operators are quickly learning the changes and new processes as well as the software solution. According to Stanislas Dupouyet, they have found the new processes and system easy to use and have reduced non-value added tasks – with less paper and manual input and tracking. Operators and supervisors also like the availability of real-time data including KPIs in dashboards such as OEE, yield, defect rates, and changeovers.

With many innovative product specifications, Somfy's manufacturing has frequent line changeovers. Operators perform a changeover every 30-60 minutes. Rapid line changeovers are critical to improved productivity, and the MES solution tracks and reports on changeover times and reasons for delays, providing an opportunity for performance improvement.

Helping to Support Sustainability

In addition to improving production, Somfy expects to use the MES to help support the [company's sustainability efforts](#). Somfy has a deep commitment to eco-design as an overarching process that impacts each stage in the lifecycle of a product – reducing the product's impact on the environment, from the extraction of raw materials to manufacturing, shipping, usage, and even its destruction.

"Somfy is by far the leader in its market, and we have a strong belief that we should transform our industry," Emmanuel Carmier said. "As a whole, the building industry represents one-third of global CO2 emissions. Being a leader, we have a role to play in driving our sustainable development transformation, not only with our product offering but also with our own footprint."

"Digitalization should help," Emmanuel Carmier continued. "For example, the MES solution is designed to reduce waste, as one benefit. As of today, we are investigating and assessing all of the ways that digitalization can help bring us in the right direction related to sustainability."



Next Steps



What's next for the team at Somfy? Overall, the team is looking to drive performance and create more value with data. Following a successful first deployment, the team is gathering experience feedback from the Cluses deployment and starting to deploy at its next sites. Somfy will integrate the MES seamlessly into its businesses and processes. Stanislas Dupouyet said the project will ramp up from an MES scale to a Manufacturing Operations Management (MOM) level, integrated with the production ecosystem. Also, the team will better define ISA-95 levels.

“What we have seen is that it’s not only an MES project. It’s really a transformation project of the company,” Stanislas Dupouyet concluded. “It impacts a lot of the organization, connecting the IT and OT worlds. It’s an opportunity to define a new way of working and new responsibilities. It touches all professionals in the company, quality, maintenance, and so on. It truly is digital transformation.”



Stanislas Dupouyet's Recipe for Successful MES

- Start small and learn as you go. Be Agile, there are too many parameters to anticipate and control everything.
- Teamwork and field mindset are the key to solve problems. The devil is in the details, and you will face issues every day.
- Have excellent knowledge of the business/operations within the project team. It's a production transformation not an IT tool.
- But ... do not neglect the IT part of the project – in particular the architecture, cybersecurity, alerting, and high availability of the solution.
- Spend time in anticipation on overall data structure of the company to plan for the future. Define the data governance between systems.
- Then anticipate work by building standards (Golden rules) and guaranteeing the accuracy of data (data cleansing workshops).
- Testing the process is long but necessary. Invest time on it! Dedicated environment, data set, test definitions, automated tests, test campaigns with key users, non-regression tests, performance tests, crash tests, release tests, etc.
- Plan in detail the data migration organization and data freeze to not impact your product development and production business.
- Do not underestimate change management – especially at the company level. MES is a bridge between systems and interconnects different worlds / departments which implies new roles and responsibilities (new RACI).
- Plant key users (the doers) are the critical factor for a successful deployment. Onboard them, integrate them into project decisions, create a community.
- “MES school” is a powerful tool. Change presentation, POC demonstrator, use case validation, users training. It is our deployment basecamp.
- It is a terrifying project in its scope, but know that by your action you will fundamentally and profoundly change your company. Don't be afraid one step at a time, it's going to happen!



Whirlpool Achieves Benchmark Digital Factory in Four Months with Proficy®



Building a Digital Factory

Whirlpool (China) Co., Ltd. produces refrigerators, washing machines, kitchen appliances, and small appliances. Working with GE, Whirlpool wanted to build its new dishwasher plant as the digitization benchmark of the company.

Whirlpool China meets the needs of product quality and on-time delivery with an MES / automation / SCADA solution from Proficy, developed and implemented on a tight four-month timeline by the Proficy Professional Services team.

The solution provides operations management, data traceability, collection of key information on components and processes, and automatic material system traceability.

Products

- iFIX
- Proficy Plant Applications
- Proficy Historian

[Watch the video](#)

Meeting the needs of global consumers, this modern plant is 80% automated and includes stamping, parts manufacturing, final assembly, and intelligent warehouse.

4

Month timeline

80%

Automated factory

300+

Machines connected

45s

Job rate



Results

- On-time project delivery, leveraging cloud MES for rapid deployment
- Manufacturing optimized for greatest efficiency and quality in a continuous flow design
- GE Digital solution supports on-time delivery to Whirlpool's customers
- Modern Smart Factory as a model for other plants and leverages Industry 4.0 concepts
- Ability to expand the system to other Whirlpool plants

- Enterprise-wide visibility for improved decision making
- Integration across equipment for plant-wide monitoring and control, including 25 six-axis machines
- Quick response and tracking: The response time of all machining is less than 200ms. The response time is less than 500ms for any cloud functions shown on the on-site clients.
- Mass production: Support for one assembly line, three subassembly lines, and five automatic component lines. The current job rate reached 45s or 80 Jobs Per Hour (JPH), and the design rate is 35s or 103 JPH.

Digital Plant Requirements

Requirements of the project included:

- Hybrid cloud architecture
- Short project implementation schedule
- Data acquisition from 30+ different equipment vendors
- High demands for visualization
- Quick response to any equipment status changes
- Quick response to the web-based clients from cloud servers

"We chose GE mainly based on the concept of strong cooperation on both sides. Whirlpool has relatively mature experience in implementing MES systems globally, and GE is also a leader in global digital projects. Through our cooperation, the intelligence of the dishwasher factory is improved by leaps and bounds. This means we have built an intelligent factory."

Ray Zhang - Dishwasher Factory Manager, Whirlpool (China) Co., Ltd.



Whirlpool's Manufacturing Execution System (MES) solution

The new MES functionalities across Whirlpool manufacturing include:

- Tracking and genealogy
- Material management
- Quality management
- Electronic Standard Operating Procedures (eSOPs) across 50 stations
- BI reports and dashboard
- Label printing management

Cloud MES and Rapid Deployment

The solution applies the hybrid cloud architecture. Proficy Plant Applications in the cloud ensures the flexibility for the extension of the group company.

The cloud architecture supports the flexibility and low-cost extension to the whole Whirlpool China group. Additionally, cloud MES supported rapid deployment, allowing the team to meet the pressing project timeline of May to September.

System Integration and SCADA

GE worked with Whirlpool to define the standard address form for data acquisition from the various equipment and finalize all data interfaces with surrounding systems via Restful interface. The iFIX HMI/SCADA is local and ensures stability for the on-prem data acquisition.

The iFIX HMI/SCADA connects with more than 300 machines/equipment with 2,000+ real-time points. Furthermore, the system integrates with 20+ surrounding systems with 50+ REST interfaces.

Visualization at Whirlpool

GE provided the multiple forms of reports and dashboards to support the requirements for visualization. It covers reporting, eSOPs, quality dashboard, efficiency dashboard, production monitor center.

- 1 production monitor dashboard
- 5 equipment dashboards covering OEE, energy analysis and processing analysis
- 15+ production and quality dashboards

Partnering with GE

GE worked together with the Whirlpool business team to conduct an in-depth investigation and provide the solution using our discrete manufacturing industry experience and MES methodology.

The Proficy Professional Services team helped Whirlpool formulate the equipment communication protocol between MES and PLCs to achieve the data acquisition and production control with various equipment.

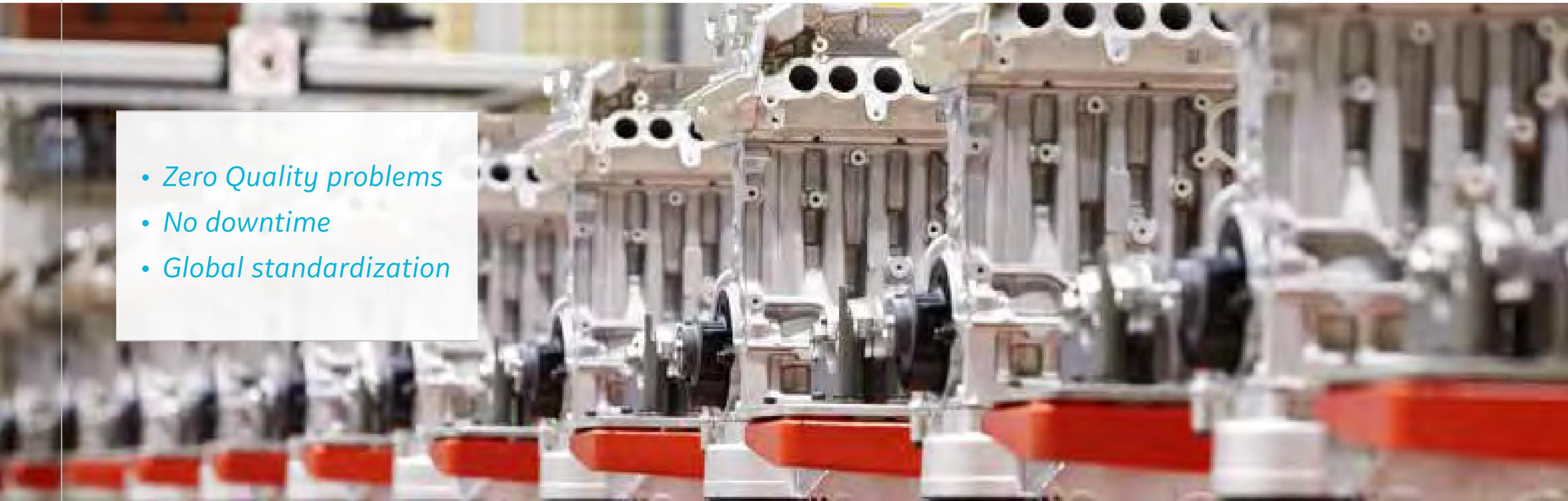
The project team learned and reused the functionalities from previous projects to fulfill the requirement for rapid development and deployment in just four months.





Volvo Car Engine: Our MES Journey – Building for the Future

- *Zero Quality problems*
- *No downtime*
- *Global standardization*



Summary

Company

Volvo Car Engine

Production Plants

- Skövde, Sweden
- Zhangjiakou, China

Products

- Proficy Plant Applications
- CIMPLICITY
- Proficy Workflow
- Proficy WebSpace



Building for the future was the intent when Volvo Car Engine started the development of a new MES, built on GE Digital Proficy solutions, for the new engine plant in China.

Learning from the first experiences, the solution and the way of working were developed, and the software was then deployed in the Swedish Engine plant. Shortly after, the improvements were rolled back to the China plant and deployed with zero production downtime.

Learn more about how the business targets, teamwork and involvement from the shop floor played important roles on the way to a global solution and how Volvo Car Engine looks upon the future.

Note: Volvo Car Engine worked with the GE Digital Professional Services team for a solution that includes: Proficy Plant Applications, CIMPLICITY HMI/SCADA, Proficy Historian, Proficy Workflow, and Proficy WebSpace

About the speaker:

Oscar Svensson, Global Program Manager for MES Solutions, Volvo Car Engine

Oscar Svensson is the global program manager for the MES solutions at Volvo Car Engine. With plants operating in China and Sweden, one of the responsibilities is to drive standardization and common solutions as well as supplying a platform for quality assurance, data collection and traceability. With a background in logistics, Oscar has been a part of the MES Journey within Volvo Cars Engine since 2016. He holds a diploma in economics and logistics from the University of Gothenburg.



Kimberly-Clark

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Visibility into global operations for cost out and process optimization

Challenge

Promote MES as an infrastructure so that the company can gain better visibility into global operations, including all machines and existing applications.

Action

- Partnered with GE and Gray Matter Systems (GMS) leadership to create and present MES infrastructure strategy and funding request
- Rapidly deploying both GE Digital's Proficy Plant Applications including Quality as a focused first step with GMS and Cognizant across 62 sites (7+3+52) with 38 more to come globally
- View and use data to quickly make product decisions, understand basic downtime, and be more reactive about improvement opportunities within their processes

Results

- Delivered cost out and optimized and controlled manufacturing processes in highly competitive market
- GE and GMS serve as part of leadership strategy team for rapid deployment and continued MES infrastructure innovation



Tissue at issue

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At Kimberly-Clark, a manual quality system had been used back in the 1990s to monitor the company's football field-sized machines that manufacture enormous rolls of toilet paper.

“Samples were manually taken, manually plotted on the wall and manually compared to control charts,” said Mark Marek, IT business partner. “Adding new equipment provided the opportunity to expand and automate the quality systems in the plant. GE Proficy now works across all our lines for manual and automated tests.”

“The whole definition of quality is continually adapted depending on our customer,” Marek noted. “We work with marketing to continuously improve our product. It’s always changing—it’s never static. And with access to actionable data, we make adjustments on the fly. We can stop the production if necessary and change the process as needed to make good product.

“We can also ‘run to quality’ knowing that the roll will successfully meet the quality parameters of one of our downstream converting lines,” Marek said.

“We have the data of a golden roll, we know the specifications needed to make a quality product, and we know we are meeting those specifications.”

— Mark Marek, IT business partner, Kimberly-Clark





Toray Plastics (America), Inc. Optimizes Manufacturing Operational Performance with Big Data Analytics

World leader in high-performance films and other products



Background

If you've ever indulged in a bag of chips or munched on a breakfast cereal bar, then you're probably more familiar with Toray Industries than you think. Toray Industries, Inc. is behind the manufacturing of many of the shiny metallized packages that protect a variety of food products, from snack food to cookies, prepared meals, candy, crackers, and granola bars. Toray Industries—headquartered in Tokyo, Japan—is the world leader in high-performance films, synthetic fibers and textiles, carbon fibers, plastics, chemicals, and pharmaceuticals. Today, the organization operates 254 facilities in 26 countries with more than 45,000 employees—with annual sales exceeding \$19 billion.

Toray Plastics (America), Inc., an American based subsidiary of Toray Industries, is responsible for manufacturing the Torayfan Polypropylene Film, Lumirror Polyester Film, and Toraypef Olefin Foams across its Rhode Island and Virginia facilities. Within its facilities, Toray Plastics operates through a bi-modal approach—a combination of standard operations mixed with agile and cutting-edge techniques—that is fueled by technology. With a keen focus on lean activities, the company's strategy goes beyond the standard “mode one” of keeping a business up and running. Instead, Toray Plastics consistently strives to integrate innovation, creativity, and experimentation into all of its processes.



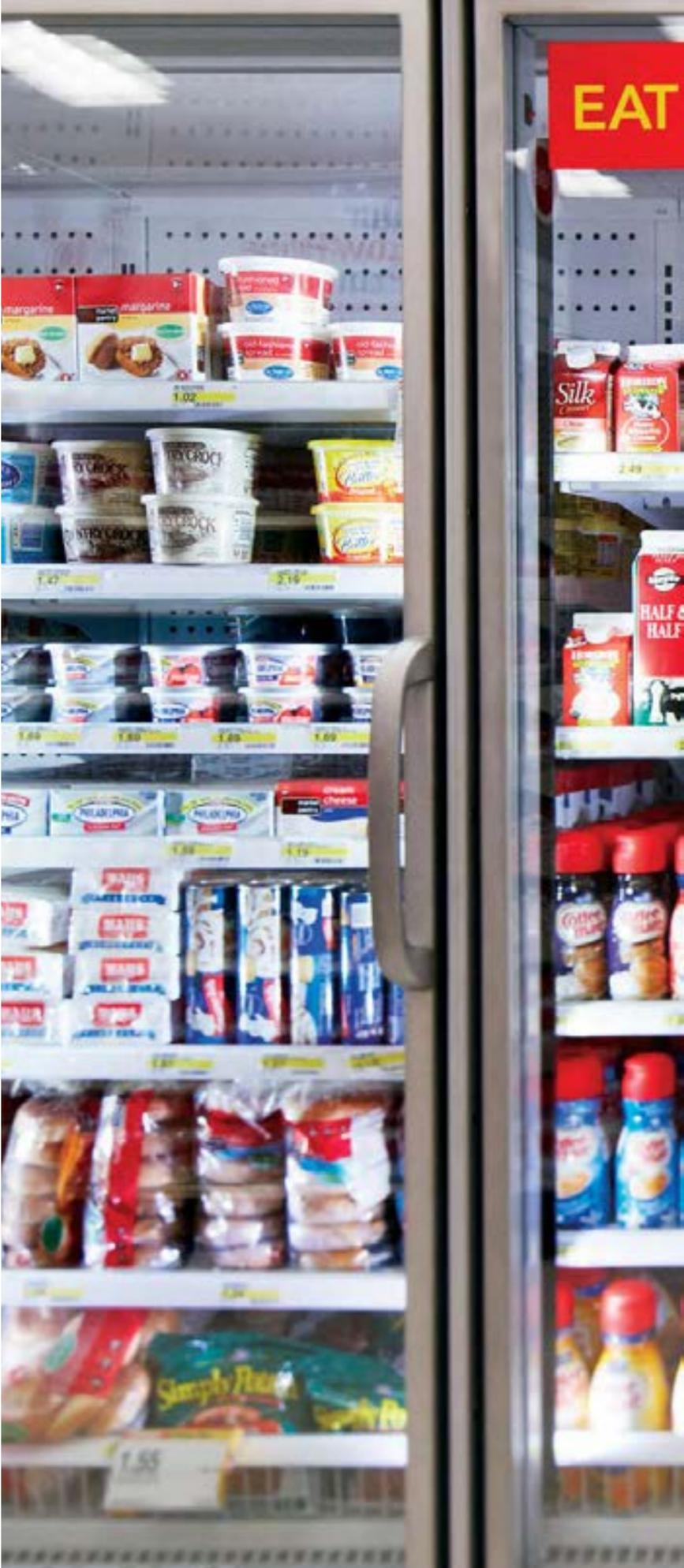
Keeping it fresh

The diversification of today's “food-on-demand” culture has led to an increasing need for keeping food products safe and fresh for extended periods of time—all while preserving its original flavor. Consumers expect their food products to maintain a relatively long shelf life without compromising quality. And as a result of this growing demand, Toray Plastics was faced with producing better food packaging film than ever before.

Food packaging film is composed of very unique components for protecting against oxygen and water, and producing these films is no easy task. It requires very tight production processes that are examined with the utmost scrutiny to ensure the highest quality. So, in order for Toray Plastics to meet its vision to remove waste across the organization and remain competitive, the company implemented a new integrated system that allowed it to monitor its film manufacturing much more closely to ensure exact quality standards in every unit.

Results from GE Digital Solution

- Over \$7 million in cost avoidance per year
 - 37 siloed systems eliminated
 - Best practices driven across divisions
 - Removed costly manual processes and limitations – example, product traceability in seconds versus hours
-



Undergoing a digital transformation

Don M. Cormier, Vice President of U.S. Information Systems and Quality Assurance for Toray Plastics, knew that the company needed to change its processes in order to remain an industry leader. By embracing its bi-modal approach, Cormier geared up to accelerate innovative "mode two" through digitization. He sat down with his fellow executives to establish a holistic vision for Toray Plastics. The vision was simple—to drive extreme efficiencies out of its assets by becoming standardized, simplified, integrated, and secure. In order to make this vision possible, Cormier teamed up with various business groups within the company to conduct a robust discovery. This discovery phase was intended to reveal current hurdles each business group was facing, and to identify the gaps in information or operational siloes that caused these problems to exist.

Once these problems were identified, the hunt for the right data-driven solution began. Cormier and his team developed a criteria list to evaluate various commercial off-the-shelf MES solutions. And after performing various in-depth assessments amongst 20 vendors, GE Digital and AutomaTech, a GE partner, were chosen as the right organizations to meet Toray Plastics' needs—with Manveco providing support and implementation services during this transition.

We found that as the years went on, we were collecting more and more big data. And we were able to utilize a lot of tools from GE Digital to analyze that data and turn ourselves into an algorithmic-type organization.

Don M. Cormier, Vice President, U.S. Information Systems and Quality



Data-driven operations

Keeping high-quality film production at the heart of its operations, Toray Plastics started leveraging Proficy Plant Applications from GE Digital, part of the Proficy Smart Factory suite. As an on-premises solution, Proficy Plant Applications allowed Toray Plastics to collect real-time data directly from edge devices and assets for critical key performance indicators, as well as perform batch analyses to optimize operations. Proficy Plant Applications enabled operators to oversee manufacturing on a more granular level and reduce the production of defective film (first pass quality), which improved overall equipment effectiveness, quality, and reduced material waste, thus helping to increase efficiencies and decrease costs.

Toray Plastics also tightly integrated Proficy Plant Applications with its SAP software, which made it extremely cost effective and scalable globally. The two systems continuously pass about 30,000 pieces of information a day between one another—covering everything from inventory status to bill of materials, customer specifications, and production order status. This alignment between GE Digital and SAP allowed both systems to utilize the same number of assets and labor while significantly increasing productivity.

In addition, Toray Plastics began managing production with a “by-the-numbers” philosophy. This philosophy focuses on having accurate and visible measurements across operations to mitigate issues and allow better decision-making.

By implementing other edge solutions—such as iFIX from GE Digital and Proficy Workflow from GE Digital, Toray Plastics utilized data-driven information to gain visibility into potential production interruptions and downtime. Toray Plastics also leveraged Proficy Historian from GE Digital to optimize asset performance through its data archive and reporting capabilities. The company further developed its by-the-numbers approach by creating a downtime dashboard—which tracked each line by shift, downtime percentage, and cost of downtime—to better align plant floor metrics to executive level goals.

And it paid off. Toray Plastics yielded some big results, such as significant savings in film recovery, increase in film productivity, and improving uptime. Toray Plastics also drove significant quality improvements by decreasing the amount of time for product traceability as well as lowering film defective rate.

“We further developed our by-the-numbers approach by creating a downtime dashboard—which tracks each line by shift, downtime percentage, and cost of downtime—to create friendly competition amongst factory operators and encourage production efficiency improvements”

Don M. Cormier, Vice President, U.S. Information Systems and Quality Assurance



Moving to the next level

So, what's ahead for Toray Plastics? Chris Roy, Senior Vice President and General Manager of Toray Plastic's Torayfan Division, continues to play an instrumental role in accelerating Toray Plastic's digital transformation. He believes that continuing the momentum for improving efficiency, effectiveness, and responsiveness will help sustain the company's competitive edge in the market.

Being a digital industrial company that prides itself on innovation, Toray Plastics is looking to continue its digitization journey by leveraging artificial intelligence (AI) to transform its continuous processing operations. This will enable the company to generate more predictive analytics through placing sensors on machine assets to forecast process failures.

The company is also continuing to work with GE Digital's Advisory Services to uncover which business outcomes will be the most critical to their Industrial Internet of Things (IIoT) initiatives.

By utilizing an edge-to-cloud solution with GE, the operating system for the Industrial Internet, Toray Plastics will be able to collect condition, material, quality, and machine processing data in real-time. Capturing this data will create a high probability for correlating asset, process, and product information through machine learning and algorithms—and successful execution could reap significantly more per year to the Torayfan division's bottom line.

“By implementing GE Digital’s iFIX HMI/SCADA and Workflow products, we were able to utilize data-driven information to gain visibility into potential production interruptions and downtime. This improved visibility allowed us to identify problems and their causes quickly, and prevent mistakes from happening, which ultimately led to reduced downtime and increased productivity. GE Digital’s HMI/SCADA software products provided a strong foundation for our digital transformation journey”

Don M. Cormier, Vice President, U.S. Information Systems and Quality Assurance



Proficy Plant Applications from GE Digital, part of the Proficy Smart Factory suite, has allowed Toray Plastics to maintain its high-quality control standard and keep each machine running smoothly.

Toray Plastics drives production efficiencies through edge solutions within GE Digital's Proficy suite:

- iFIX provides operational visibility to enable better decision making
- Proficy Workflow drives more consistent operations with dynamic electronic formats
- Proficy Plant Applications optimizes operations and ensures product quality with real-time data
- Proficy Historian helps improve asset performance and production through data collection and aggregation



Spomlek Improves Manufacturing Line Operations

Efficiency

Increased packaging line efficiency

Scheduling

Increased accuracy in scheduling employees' shifts

Less Downtime

Better predict potential downtime

Introduction

Founded more than 100 years ago, Spomlek Dairy Cooperative is one of Poland's largest manufacturers of hard cheese, specializing in premium cheese and manufacturing nearly 21,000 tons of Dutch and Swiss-type cheese per year. The cooperative also processes more than 300 million liters of cow's milk annually. Spomlek has four production branches located in Radzyń Podlaski, Parczew, Młynary (Elbląg Branch), and Chojnice. Radamer. The company is the first dairy in Poland to manufacture mature, long-ripened cheese and is one of the few dairies to use traditional methods to produce the "dry rind" cheese.

Challenges

Spomlek was looking to optimize its manufacturing operations by increasing packaging line efficiency, accurately scheduling employees' shifts, and monitoring its manufacturing equipment in real-time to better predict potential downtime.

Solutions

Spomlek leveraged GE Digital's Manufacturing Solutions to implement a flexible, scalable, and custom MES system across all lines at its main plant, Radzyń Podlaski.

Products

- Proficy Plant Applications
- iFIX HMI/SCADA

Results

- **10% increase in efficiency**
- **Paperless system greatly accelerated and facilitated work**
- **Intuitive operation**
- **Easy integration and configuration**





SAGW Reduces Inspection Costs by 40% using Proficiency and Process Digital Twins

20%

Improvement in
equipment utilization

40%

Reduction in Inspection
costs

30%

Reduction in inventory

80%

Reduction in required
storage space

Introduction

Company

SAGW

Products

- CIMPLICITY HMI/SCADA
- Tracker
- Proficy Plant Applications
- GE Digital's Professional Services

Summary

SAGW has transformed their manufacturing processes by using GE Digital's Proficy Plant Applications to create a "Process Digital Twin" improving equipment utilization by 20% and reducing inspection costs by 40%. The availability of real-time data has led to a 30% reduction in inventory and an 80% reduction in required storage space.

Challenge

China's SAGW (Shanghai Automobile Gear Works) is a subsidiary of state-owned SAIC Motor Corporation. The company manufactures, markets, and exports automotive transmissions and key components for passenger and commercial vehicles. With 7000 employees across 5 heating treatment lines, SAGW produces more than 3.8 million units annually.

Like many companies in the automotive industry, SAGW has used GE Digital's CIMPLICITY HMI/SCADA and Tracker for plant-wide connectivity, visualization, and control for years.

However, SAGW's production was encumbered by several manual processes that were leading to long, cost-prohibitive lead-times, production disruptions and a lack of actionable data. Several steps of production depended on manual inputs from operators, which led to inconsistencies of output and quality control challenges. Destructive inspections, where operators must sacrifice valuable materials on the product line, took six hours to complete, leading to product waste and costly downtimes.

Paper-based processes made extrapolating meaningful and accurate data difficult. Storage facilities were overloaded with inventory and there was a general lack of shared information between manufacturing and warehousing.

Solution

Data Models Optimize Multiple, Fast-Moving Processes

The software creates a "process digital twin" that helps SAGW operators to operate, analyze and optimize their production processes. Taking digital transformation to the next level, SAGW implemented Proficy Plant Applications. Part of the GE Digital Proficy Manufacturing Execution Systems (MES) suite, Proficy Plant Applications helps process manufacturers manage highly automated, fast-moving processes.

By creating data models of five production lines, the SAGW team was able to use a simulation solution to optimize the work order list to help reduce lead-time for daily production. An operation sciences team used machine learning and big data analysis solution to build a quality prediction model to speed production and reduce costs. And the real-time sensor data collected to GE Digital's MES helped clean up previously cluttered communication between SAGW's warehouse and production lines.

Results

Improve Equipment Utilization, Reduce Inspection Costs and Streamline Inventory Management

Since implementing Proficy Plant Applications, SAGW has documented a significant return on investment on key performance indicators, including a 20% improvement in equipment utilization, and a 40% reduction in inspection costs. In addition, the availability of real-time data has led to a 30% reduction in inventory and an 80% reduction in required storage/warehouse space. SAGW is using their success with Proficy Plant Applications to illustrate their smart factory digital journey and plans to expand to additional factories.

Ranked seventh in the global automotive market, SAIC Motor Corporation is the largest automotive company in China, with annual revenue exceeding 136 billion USD. SAIC and GE Digital have partnered to deliver Digital Transformation blueprints employed at the primary SAGW heating treatment plant in Shanghai.





T. Marzetti

Saves Millions with Digital Transformation



Manufacturing Execution System (MES) Solution

- Proficy Plant Applications
- Proficy Historian
- Industrial Gateway Server (IGS)



Predictive analytics and connected kitchens unlocked millions of dollars in savings at specialty food producer, T. Marzetti Company. T. Marzetti Company, a subsidiary of Lancaster Colony Corp., is based in Westerville, Ohio.

Marzetti began in 1896 when Teresa Marzetti, an immigrant from Florence, Italy, opened a small Italian restaurant in Columbus, Ohio, which grew into a four-star dining establishment with an upstairs factory that produced the restaurant's popular salad dressings.

At Marzetti, data analysis wasn't part of the routine.

Information wasn't easy to find and standards for relating data to its supply chain didn't exist.

Beginning with a single plant in Kentucky, GrayMatter, a GE Digital partner, recommended digitizing data connectivity

The goal is to help Marzetti view its operations in new, compelling ways.

among key floor assets and then contextualizing the data gathered so they could be used to accelerate the Marzetti Operational Excellence (MOE) initiative.

Organizationally, most of the decision-making was confined to a few key leaders at the company.

Marzetti sought GrayMatter's help because executives said they wanted to build on the company's success and

reputation around products including health-conscious salad dressings, dips, bread and products for restaurant chains such as Chick-fil-A and Olive Garden.

Empowering more employees to improve the business was among the major, early initiatives to emerge from Marzetti's partnership with GrayMatter.

For the first time, people at all levels of the company had the connected, data-driven tools to spot opportunities to improve efficiency that might have otherwise gone unnoticed.

Digital Roadmap

Key statistics from GrayMatter's analysis of Marzetti's plant in Horse Cave, Kentucky revealed major opportunities to eliminate waste and save money.

One involved overfill. For every 100 pounds of packaged product, about four pounds were being given away for free because packages were being overfilled.

Those tiny, excess amounts of sauces, dips and dressings were escaping as stowaways.

Over time, it added up to large quantities.

Based on data insights, the following recommendations came into focus:

- Reducing variability and identifying reasons for overfill to improve material utilization
- Improving coordination and understanding of upstream delays that impact packaging
- Eliminating manual data entry practices that produced a misleading perception of plant performance

Marzetti provided GrayMatter access to electronic data from its cryovacs, machines that seal food in airtight packaging; checkweighers, which weigh packaged products without needing to pause a conveyor belt carrying products; and kitchens.

GrayMatter created a digital model or twin of the flow of products through the plant including raw materials, batching and packaging.

Once the new system was configured, GrayMatter began having daily meetings with Marzetti employees onsite to track operations as the system monitored raw materials, batching in the kitchens, storage tank levels and packaging.

It also tracked activities including employee crew configurations and shift schedules, process orders, product runs, batches and production intervals, downtime and waste.

The system enables performance comparisons by product code, equipment, order, reason and other contexts. It automatically emails personnel when exceptions are detected.

Among other insights, the daily review helped reveal how overfills increase during restarts.

The system began comparing the accuracy of fills during the “restart” period to when the filling system was at “cruising speed.”

GrayMatter provided GE Digital's MES (manufacturing execution system) solution featuring Proficy Plant Applications and Proficy Historian as well as the expertise to digitize their operational excellence program, and Marzetti made the necessary adjustments to take advantage of what the data revealed.

The Savings

Marzetti has saved millions of dollars a year at just one of its facilities and anticipates that the savings could grow three-to-four-fold when the improvement program is expanded to other facilities, which Marzetti plans to do.

The initial success has come from reducing the amount of product waste by 50 percent or more.

"Now we're trying to be more proactive with the planning – making data available across the supply chain is a big deal, and I think we're at the very beginning."

– Jeff Woodard, T. Marzetti, VP of Operations



A Note

From T. Marzetti

**By Jeff Woodard,
VP of Operational Excellence, T. Marzetti**

Marzetti continues to benefit from lighting up and digitizing their supply chains. Expanding visibility across our supply chain and making waste and losses more visible continues to add value to our bottom line.

Pilot project learnings that began a little over a year ago are being reapplied in numerous areas. The visibility of data is empowering our people to help us become the *Better Food Company*.

We're able to make better decisions every day.



Electronic log sheets with statistical tools are helping to create better problem-solving teams on the factory floor every day.

The integration of better tools with passionate leaders equipped with problem-solving skills, like our lean Six Sigma program black belts, are helping to grow our capability to incorporate continuous improvement as a natural expectation within our culture.

I'm not saying we are there. But I am saying seeds are being planted, and soil is being tilled.

Benefits from better weight control have enabled learnings for broader use of the tool while delivering savings to the bottom line well within the first year of deployment.

The cross-functional teams within Marzetti and strong partnership with GrayMatter have created strong project teams to engage aggressive deployment and reapplication schedules.

Cross-functional teams are highlighting duplicity of work between departments that can be consolidated and thus simplify the role of the associates by sharing electronic log sheets on work stations.

Building self-sufficient teams with great leaders and problem-solving tools is critical to our mission of becoming the Better Food Company.

I continue to be reminded that equipping and coaching our organization as a leader is a big part of my role to ensure the success of our company. Our people are hungry for coaching and development. Everyone wants to play with the belief and intent to win every day. It's our job to provide the environment and foundation for those daily wins.





Next Level Manufacturing Technology: The thinking and technology behind General Motors' MES 4.0

General Motors



The future of automotive manufacturing is changing, becoming technologically smarter, more streamlined, and more sustainable. It's both exciting and challenging in ways never seen before. At General Motors (GM), manufacturing is viewed as a core competitive advantage, one that will ensure we launch 30+ electric vehicles by 2025. We'll be eliminating tailpipe emissions from new light-duty vehicles by 2035 and becoming carbon neutral in our global products and operations by 2040.

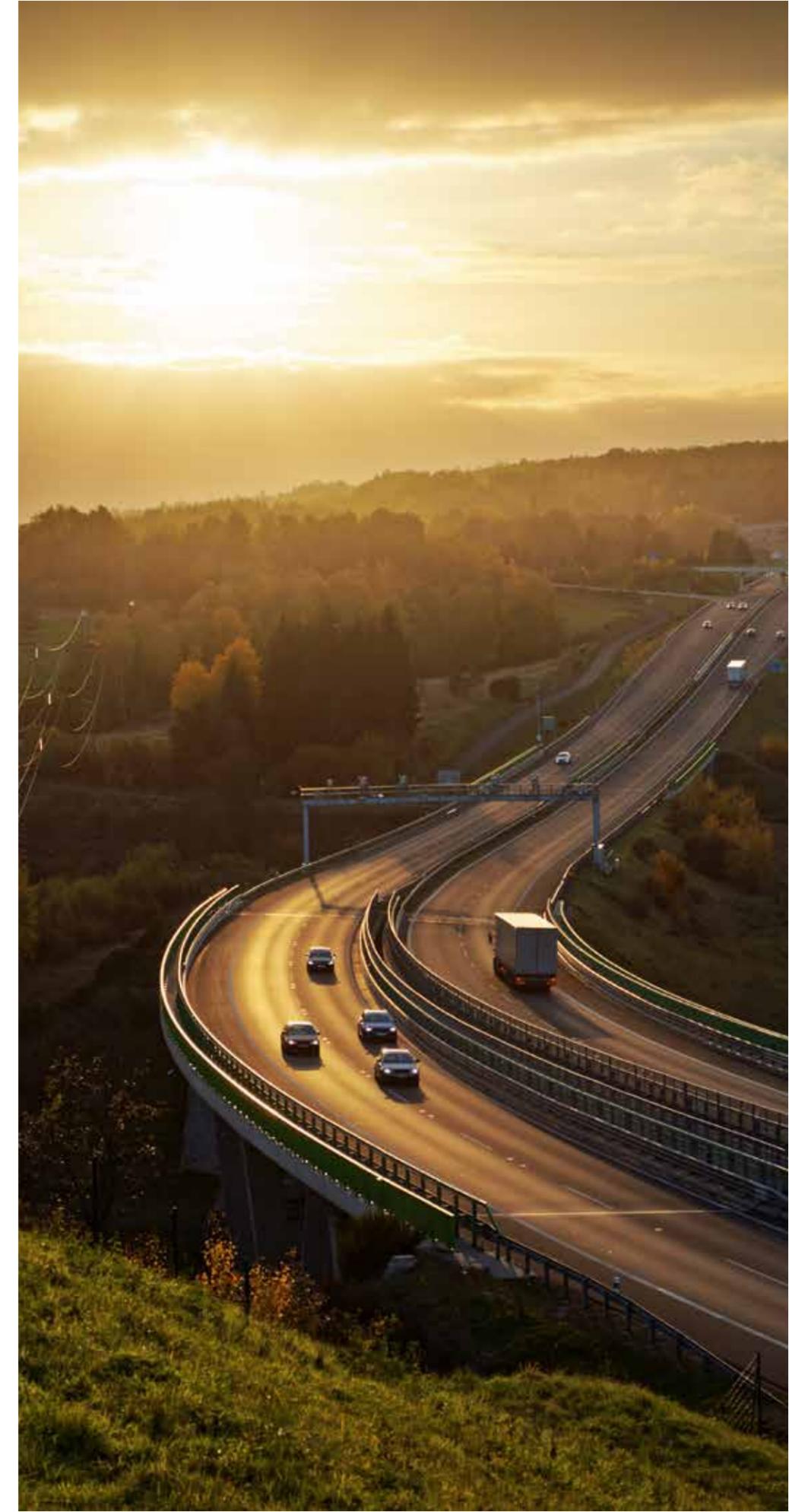
To meet these goals, our manufacturing technology is becoming more flexible—with concurrent production and engineering. We're improving quality with better test automation and virtual design, development, and validation. And we're taking advantage of the increase in data from industrial IOT devices, and artificial intelligence and machine learning at the edge.



Dr. Mano Rao
IT Director – Global Manufacturing
General Motors

[WATCH VIDEO](#)

As GM's IT director for global manufacturing, my job is to explore how we can exploit concurrent engineering and operational technology (OT) and information technology (IT) subsystems, so we can achieve the speed, quality and flexibility needed to meet the challenges ahead.



How we are bridging the chasm between IT and OT

In a typical GM plant, we have about six thousand OT devices—anything from cameras and PCs to robots and various controllers. That plant can also have more than 50 manufacturing execution systems (MES) applications and because the ecosystem is connected, that means more than 100,000 connections between the OT and IT layers of the software stack.

For example, consider a torque operation, which is common in an assembly plant. This operation needs to interact with several other systems—the auto management system that tracks parts, the SCADA system that monitors the assembly line, an IT system that tracks the vehicle’s genealogy, and more. It may need to store the torque value in a trace management system or store the torque curves into a telemetry system for detailed analytics and machine learning. And if the torque operation fails or is unsuccessful, for whatever reason, a defect needs to get logged into the quality management system.



Bridging the chasm will result in over 100,000 connections between the OT and IT layers of the software stack.

But despite today’s technology-rich environment, this OT-IT boundary continues to be managed with manual and paper-based processes. At GM, we’re working with GE Digital to change that. We call the work to bridge the gap between OT and IT “MES 4.0.”

Wouldn’t it be great to have a single system that manages and learns from these kinds of activities? We think so too. But the reality is that, like other manufacturers, we’ve struggled to stitch together disparate data and turn it into valuable, real-time insights.

Model-Based Systems Engineering

It’s common for manufacturers to take an *application-centric* approach to solving data management, but this approach can vary in how it is structured and deployed. Instead, at GM we’re now taking an *operation-centric* approach by formally modeling all the interfaces between operations. We built “catalogs” of operations—including IT interfaces, OT tools, equipment, and OT interfaces—which give us the context necessary to analyze data transmitted from IOT devices because the raw data alone is insufficient for drawing actionable insights.

This common understanding of context helps us stitch the data together across the various MES applications through to the entire manufacturing engineering process. From there, we can start to define the actual layout and the actual operations and the actual sequence of events, including creating the bill of process, bill of material and bill of equipment.

Virtual Design, Development & Validation

Traditional web applications have two sources of input—users (via UI) and other systems (via API). Manufacturing software has a third source—plant floor devices. That’s a lot of connection and communication. One of the key capabilities needed for the development of distributed systems is the ability to test and perform as much of the engineering work as possible in the virtual domain.

At GM, we developed a Virtual Factory Testbed to provide the tools and environment needed to test all manufacturing process variations that are necessary to support build-to-order manufacturing, as well as all permutations of outcomes that can result from each operation. We employ a process digital twin to mimic plant-floor behavior and test the integration of OT and IT systems—without requiring the physical lines to be deployed, and without requiring physical products flowing down the line. Not only does this help GM’s competitive advantage, but it brings us closer to our sustainability commitments.



One of the key capabilities needed for the development of distributed systems is the ability to test and perform as much of the engineering work as possible in the virtual domain.

MES Ops

While Model-Based Systems Engineering helps us eliminate paperwork, and our Virtual Design, Development and Validation system enables us to test OT and IT subsystems, MES Ops helps us eliminate the manual work needed to wire up these subsystems. MES Ops is the term we are using to represent the tools and processes to automate the configuration of various IT applications and the 100,000+ connections between IT and OT endpoints, once the code (application/model) is deployed to production.

DevOps is the set of tools and practices to automate the packaging and deployment of traditional code into production environments. ModelOps is the evolving set of tools and practices to automate the packaging and deployment of AI/ML models into production environments.

Working with GE Digital

GM has a longstanding relationship with GE Digital, with more than 30 years of leveraging their manufacturing software technology. We have several manufacturing IT applications based on GE Digital's software platform, so as we started thinking about our MES 4.0 architecture, we naturally had discussions with GE Digital to get their perspective and advice.

From these discussions we realized that GE Digital's CIMPLICITY / Tracker platform and industrial data historian, Proficy Historian, could support our vision of MES 4.0 and become a key layer in our architecture. With it, we've created a library of reusable templates. These "device twins" are digital analogs of OT devices, and serve as communications proxies between OT and IT.

As we move closer to smart manufacturing in the automotive industry, the immediate need to redefine today's manufacturing technology to meet our future customers' needs is becoming



GM uses several manufacturing IT applications based on GE Digital's software platform to support their vision of MES 4.0.

more and more important. As software footprint in OT solutions continues to grow it is essential that we make the synergy between OT and IT as seamless and powerful as possible.

In the words of Gerald Johnson, GM's EVP of Global Manufacturing and Sustainability: "Manufacturing is our strength and our competitive advantage." For us that means faster, safer, cleaner manufacturing throughout our systems and operations.

Mano Rao has over 29 years of experience in the IT industry. He joined GM as the leader for Global Purchasing and Supply Chain IT applications development organization. He took on his current role as the leader of the Global Manufacturing IT applications development organization in Jan 2020.



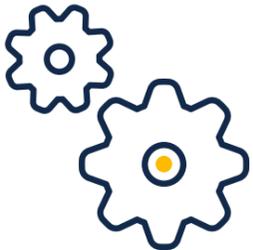
General Motors: Redefining Today's Manufacturing Technology for Tomorrow's Customer

On-demand webinar

Automotive manufacturers continue to face extreme disruption on multiple fronts and time horizons. A global pandemic resulting in component shortages, demand for personalization, the shift to electrification and the resulting race for market share, as well as sustainability expectations, will shape which brands dominate the future and which fade into history.

Learn from General Motors as they embark on a path to secure their future, by redefining its manufacturing technology today. This shift involves designing a converged architecture spanning

OT and IT systems, driving simplicity and better visibility across operations with a unified technology stack, and a focus on building a digital thread across operations.



WATCH TODAY





Pfizer Newbridge drives business value with integrated automation



Pfizer Newbridge created outstanding business value by moving away from islands of automation using an integrated automation strategy from GE Digital.

Solutions

- iFIX HMI/SCADA
 - Proficy Batch Execution
 - Proficy Plant Applications
 - Proficy Historian
-

Challenges

Pfizer Newbridge pharmaceutical products treat and help to prevent some of the world's most prevalent health issues. The product portfolio includes innovative treatments across a wide range of therapeutic areas.

The Newbridge facility produces 80 different product formulations packaged in approximately 650 different pack-to-market presentations, covering:

- Hormone Replacement
- Oral Contraceptives
- Central Nervous System

The site was established in 1992 and covers 120 acres at Newbridge, County Kildare, Ireland. As an organization, Pfizer is committed to applying science and its global resources to improve health and well-being at every stage of life. To support this commitment to delivering products of exceptional quality, the engineering team at Newbridge has put in place a world-class Batch automation scheme from GE Digital across both of its facilities for MHTs (Menopausal Health Therapy) and OCs (Oral Contraceptives).



Results

- 25% reduction in expansion lead-time
- 23% reduction in resources
- 20% reduction in investigation time
- Reduced time to maintain
- “Plug and Play” flexibility
- Increased scalability
- Automated “OEE for Batch”



Solutions

A Technical Approach to HMI/SCADA, Batch Execution, and MES

At inception, the project team made a fundamental decision to provide capacity in the project for upfront, low-level technical customization. This was done in order to drive future high-level flexibility. The team invested in strong controller and supervisory control and data acquisition (SCADA) standards as the guiding principle, which provide a structure that proved, during the course of the project, to give greater flexibility and agility.

The controller and SCADA standards are closely coupled to truly realize the power of the Batch Engine used to control production. The team selected iFIX HMI/SCADA and Proficy Batch Execution from GE Digital as they deemed it the best-in-class technology platform.

Another guiding principle was centralized, single point recipe management and execution, across all unit classes. This approach provides the ability to create, store and maintain control recipes within a controlled environment.

“Having all of our Master Recipes in one location, and the use of class-based recipes, reduces my time in maintaining and changing recipes and cuts down greatly on our paperwork. Our class-based approach has also led to greater repeatability.”

— Eoin McMahon, Automation Engineer,
MHT Pfizer Newbridge



The Technical Journey

iFIX HMI/SCADA and Proficy Batch Execution in Pharmaceutical

Once this project phase was complete, the Thick clients were obsolete and moved over to a centralized, thin client architecture within the control room. One Proficy Batch Execution and iFIX engineering thick client was kept for automation and maintenance activities.

This now provides for:

- Creation, monitoring, and execution of the control recipes
- Standardization of graphics across multiple vendors and a single source of alarm management while minimizing customization
- Unexpected process excursions alarmed for operator response
- Reduction in Paper Method through Electronic Batch Records (EBR)
- Real-time monitoring of exceptions occurring during the manufacturing process

“During the design and project phases every skid was tested off site and brought to a fully functioning state using localized iFIX SCADA and Batch recipes at our vendors’ facilities. Once on site here at Newbridge, thanks to the ‘Plug and Play’ flexibility, it was connected to our central Batch and SCADA systems and commissioning could begin. Due to the level of activity and number of resources involved during this phase, each vendor team utilized a fully functioning and secured development node local to their process cell. This allowed speedy validation with teams working side by side but without crossover.”

— Alan Shefflin,
Automation Site Lead



Support

On-Site Services for HMI/SCADA and Batch Pharmaceutical Implementation

The site also understood the benefit of having GE on the ground. From early on in the project phase, Pfizer involved GE's services and contracted an embedded GE engineer to work full time with the automation team.

This allowed issues to be addressed on site as they arose, and now this relationship is helping Pfizer define its automation vision as they start to optimize and extract real value from the automation layer.



Secure-by-Design Data

Plant-Wide Historian for Pharmaceutical Manufacturing

The site puts a very high value on the data collected. This is held in a centralized data historian system (DHS) to 21CFR11 standards using GE Digital's Proficy Historian. The site DHS incorporates iFIX alarms collected through the iFIX Alarm Open Database Connectivity (ODBC) service, Batch event data archived into the Batch Journals and Process data is collected in Proficy Historian. This provides standard historical and real-time trending independent of equipment type or data source, which enables production staff to take insightful decisions across apparently disparate operations. The information is displayed and made available for analysis through one central Data Historian Server for all functions.

“By up-skilling our operations team through automation ‘on the job’ training, they were able to interact effectively with all technical systems for day-to-day operation and to aid troubleshooting,” said Michael Howell, Operations Lead, MHT Operations, Pfizer Newbridge, Ireland. “This combined with the centralized control room has great benefit.”

— **Michael Howell,**
Operations Lead, MHT Operations, Pfizer Newbridge Ireland

Balancing People and Automation

The old school, heavy industry philosophy of “Hand-Mode” even found its way to a high tech facility like Newbridge. The engineering team understood the importance of allowing controlled, secure-by-design and safe manual control of equipment when required either for maintenance functions.

To support this, the manufacturing control system is able to perform direct control of local controllers if required through standard phase and control module level manual modes. This can be carried out from any one of 60 iFIX thin clients across the floor deployed with Citrix Technology.

Building Management

Building Management Systems in Pharmaceutical Manufacturing

To support environmental conditions for containment alongside all “non GMP” parts of the plant, the Building Management System (BMS) was divided into two portions: a non-qualified BMS and a qualified BMS.

Manufacturing Execution

MES and EBR in Pharmaceutical Manufacturing

To gain the most value from the highly integrated automation system, a Manufacturing Execution System (MES) solution was incorporated into the plant design to:

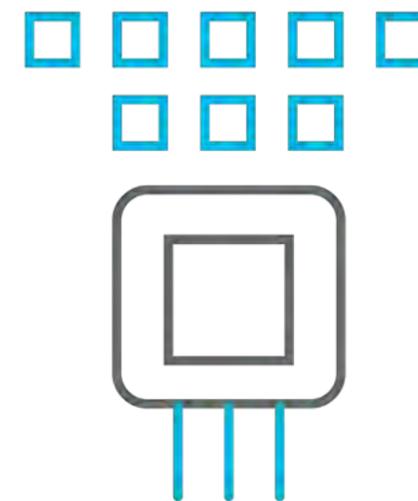
- Provide functionality through Electronic Batch Records (EBR) to guide the production in conformance to the batch record
- Ensure acknowledgement and commenting of Level 1, Good Manufacturing Practice (GMP) alarms during batch processing

Across both the MHT and OC facility, a Self-Guided Vehicles (SGV) system was installed, including standard intermediate Bulk Container (IBC) sizes across all units to reduce human interaction for material handling. This system interacts with all equipment through the Proficy Batch Execution system-enabling the process equipment to automatically request a load or unload during a recipe cycle.

With a standardized controller footprint along with one SCADA solution, a centralized software management system was used. This is responsible for maintaining oversight and management of the software versions of applications within the control system. Seeing the value in one storage location and moving away from “fire-safe” syndrome has led the automation team to expand this system to cover all automation related design documents.

“Because access control is managed using the site Active Directory and process data is managed automatically in the integrated automation environment, more time is available to the automation engineer for plant optimization.”

— Eoin McMahon, Automation Engineer,
MHT Pfizer Newbridge



Learning

Batch Execution Adds Manufacturing Capacity

One of the biggest lessons learned was in the area of controller and phase logic. Proficy Batch Execution offers excellent integration using either full PLI phases or Direct Phases where required. Although Direct Phases offer a simplified and flexible phase/equipment interface, they were found more suitable for smaller systems that do not require a PLI. For greater future flexibility, where a higher degree of integration is required, the site will now use full PLI Phases.

This approach of low-level customization offering high-level flexibility was applied to all systems from controller and SCADA through to Batch.

“The standards we have invested in, and evolved, can now be used to scale up our existing facility. We have an estimated 80% additional capacity, and I estimate a 25% reduction in the FAT-IQ stage of the project lifecycle thanks to the flexibility of an integrated batch system like this.”

— **Fergal McTiernan**
Engineering Manager, Pfizer Newbridge

The Future

OEE for Batch Execution and Batch Analysis in Pharmaceutical Manufacturing

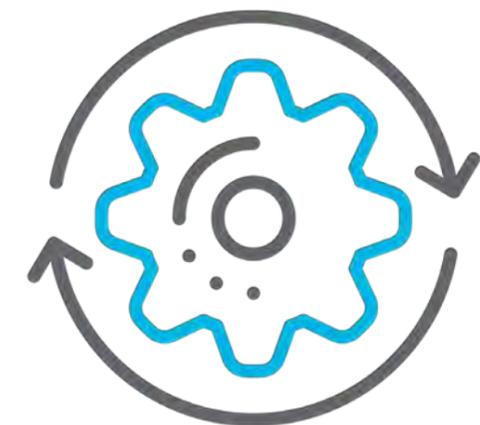
“We are now looking to take the next steps with our N-SmarT (Newbridge System of Manageable Automated Results for TPM) program and are piloting an Overall Equipment Effectiveness (OEE) for Batch on our coater using Proficy Plant Applications in partnership with GE,” said Paul Conroy, MHT OE Lead. *“The largest challenge here was breaking down a complicated batch process like coating into its discrete components and then applying standard OEE rules. GE was able to provide real insight with this. We are now reviewing further OEE requirements site wide and are also seeing the value in process understanding through the Batch Analysis reports within Proficy Plant Applications.”*

A number of site-wide projects including the PWCAMS (Plant Wide Critical Alarm Management System) project are also being reviewed to see if a link to Proficy Plant Applications could be made and the information collected in PWCAMS could be used to trigger Work Instructions into SAP. The site is currently planning to pilot this concept.

“We also aim to leverage our investment made with GE and Proficy Plant Applications to aid in the site-wide water reduction program,” Howell concluded.

“We are now working with GE to really understand how to gain the most value from all of our data. At the early stages we were data rich but knowledge poor. Understanding all of the data collected and how we can use it, both at the Enterprise and Quality layer, is enhancing our knowledge base and demonstrating ROI for our automation and engineering efforts.”

— **Claire Comerford,**
MHT PPU Director, Pfizer Newbridge





DuPont chooses GE's Proficiency Production MES for complex, discrete manufacturing processes



Background

DuPont, a global leader in creating sustainable solutions essential to a better, safer, healthier life for people everywhere, named GE's Proficy Plant Applications suite of Production Management products a solution-of-choice for complex manufacturing systems.

Operating in more than 70 countries, DuPont offers a wide range of innovative products and services for industries including agriculture and food, building and construction, communications, and transportation.

Released for use by DuPont businesses worldwide

GE's Proficy Plant Applications Production Management solution and its Proficy dashboard/portal software were evaluated by the Process Information Management (PIM) team within the DuPont Engineering and IT organizations, as well as by project teams from the company Safety and Protection business platform.



Scalable, configurable MES solution

The Proficy Plant Applications software suite is made up of scalable, configurable modules to help companies effectively manage their plant operations and deliver results.

Results

Proficy Plant Applications allows DuPont to efficiently manage its plant processes in a unified, easy-to-configure "plant model" that gives the company clear insight into their operations.

"DuPont evaluated products that would enable us to globally strengthen our manufacturing and operations competitiveness. We selected the GE Proficy application suite as the preferred Manufacturing Execution System solution for complex, discrete manufacturing processes."

Salvatore Grasso - Corporate Process Owner, Manufacturing for DuPont Information Technology & Services

Worldwide

Globally strengthened manufacturing

Competitiveness

Increased operations competitiveness

Reporting

Plant-wide reporting





Browar Warka Increases Bottling Line Efficiency with GE Digital

Results

- The total number of mechanical and electrical downtime events decreased by 39%
- Access to accurate information on breakdowns and stoppages
- Potential for elimination of losses and stoppages
- Support of the TPM (Total Productive Management) system
- Increased the availability of machines, equipment, and workers

- Optimized the beer bottling process
- Web access to a variety of reports
- Elimination of time-consuming paper recording
- Ease of use

"What is of greatest significance is that we now know what is wrong with the line. Thanks to automatic registration of stoppages, we know their causes and how much time they actually consume."

Krzysztof Żyrek
Production Director, Browar Warka

Companies operating in the food industry face stiff competition and customer satisfaction is of the utmost importance, creating a need for constant improvement in production techniques. To be able to remain ahead of their competitors, companies have to shorten both the launch time of new products onto the market and the time for processing orders. This requires increased production line efficiency.

Grupa Żywiec SA - Browar Warka, the second biggest brewery in the Żywiec Group in Poland, sells more than 2.7 million hectolitres of beer per annum.

“Increased effectiveness of bottling lines is one of the priorities for our brewery,” explained Krzysztof Żyrek, Production Director at Browar Warka. “In order to attain this goal, we must be able to accurately describe all events that cause stoppages and slow-downs in line production. Thanks to the automatic online monitoring of our machines, our new manufacturing execution system (MES) is able to collect detailed data about the time and reason for each breakdown as well as to provide up to date information on line productivity to the management plus the line operators. It also enables analyses to be carried out later, which help to eliminate causes of the stoppages and aid engineers in their every day work.”

Proficy Plant Applications from GE Digital provides information in real time about the bottling lines, enabling a quick reaction to potential problems. Supplied and developed by the local systems integrator, Bonair, the MES software solution used for the KHS (KHS AG, Dortmund, an international manufacturer of filling and packaging systems for the beverage, food, and non-food industries) bottling lines has improved its effectiveness, helping to eliminate stoppages and losses in the bottling process.

Prior to the implementation of Proficy Plant Applications, data on bottling line stoppages was entered manually into the Microsoft databases by operators. “The system was less accurate than the current one, and it did not register ‘micro-breakdowns,’ i.e. those under five minutes,” continued Żyrek. “It also took a lot of the line operators’ time.”



Proficy Plant Applications includes modules such as Fault Analysis, Shift Analysis, and Location Analysis



Measurement and analysis

The Proficy Plant Applications Efficiency module measures and analyzes parameters of efficiency and the degree of use of production resources—tools, machines, and people. Targets are set in production plans on how many thousands of bottles should be filled during an hour and over the entire eight-hour shift. In the event of the targets not being met, the Efficiency module shows the reason for the lower productivity of the line. Using analysis of micro-stoppages and breakdowns on production lines, the module reveals if the problem was caused by planned stoppages, machine breakdowns or defects in containers or caps. It could also be caused by a given personnel's inefficient handling of the line or slow reaction to machine jams or stoppages, or that certain label types cause the machines to jam more frequently.

The Efficiency module's ongoing monitoring of the production line enables up to date verification of whether a shift of employees have met their target, if the realization of the monthly plans are on track, and if any of the parameters are threatened.

Implementation on time and within budget

At the beginning of the implementation process, technical infrastructure was installed and configured. Connections were made to interfaces at automation controllers on production lines, mainly the necessary devices for data collection. The data comes from sensors on the bottling line machines. It is recorded by Proficy Historian from GE Digital data collectors in real-time. The next stage of the implementation was the configuration and analysis of the data in Historian.

The bottling lines include a range of machines used, for example, for washing bottles, verifying their cleanliness, pasteurisation, filling, verification of the amount of beer poured into each bottle, capping, labeling, and unpacking and packing of crates. A key task was modeling all these machines together with a description of every state they could be in. A corresponding electrical signal in Proficy Historian was linked to each such description (stoppage, shortage, lowering/raising of forklift, etc.).

The software can then determine if a machine has stopped, released a faulty product, performed its operation incorrectly, or transferred to another machine a set number of items.

“The biggest challenge was to link the new MES to the original control system on the bottling line and this aim was fully achieved,” added Żyrek. “We wanted an application that would be able to pinpoint the culprit machine from amongst a series of machines stopped at the same time. It was also important for us to enable operators to comment on given breakdowns and add planned stoppages—such as breaks, refittings and overhauls.”

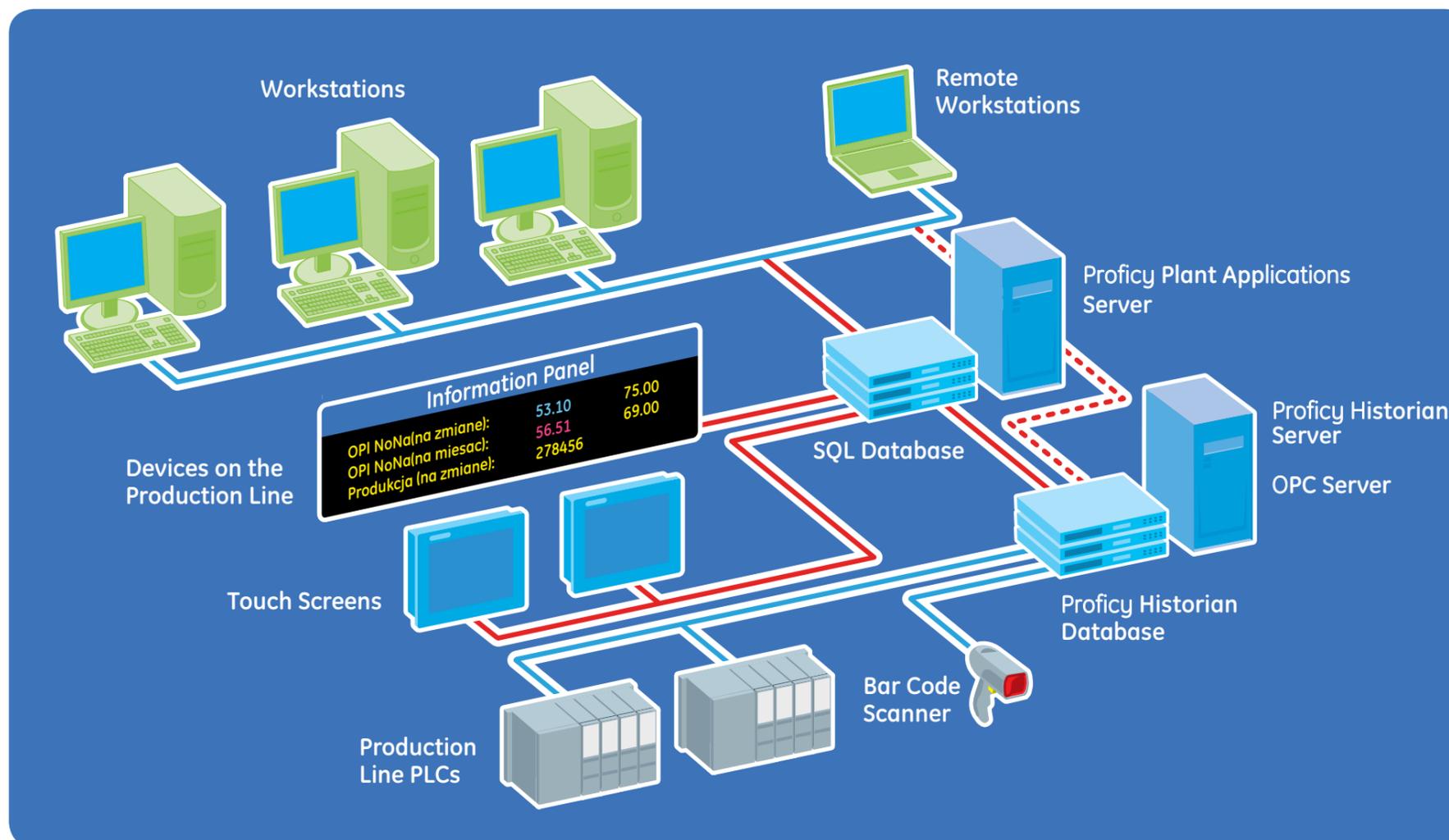
In order to meet the client’s expectations, Bonair altered the concept during the implementation phase and created an additional application enabling machine operators to add more data on production line events. When stoppages occur now, operators can choose the appropriate reason from a list shown on the operator’s touch-screen panel.

“Despite all these modifications, Bonair was still able to meet all the objectives and carried out the full implementation within the specified time,” emphasised Żyrek.

Automated reporting

It was determined at the modeling stage what type and form of reports the system was to generate. This request was facilitated by a GE Digital web-based solution that provides reports in real time. This capability provides a ready package of over 20 out-of-the-box reports, which in effect reduces the cost of implementation and also subsequent maintenance and development of the MES.

Browar Warka management has ongoing access to overall weekly and monthly statistics. On the basis of reports and



analyses, they are able to check each shift’s productivity, pinpoint machines where stoppages occur, and verify the duration and causes of the stoppages. Production line employees also benefit from automatically generated reports.

“Previously, employees monitored machine productivity by manually recording data on stoppages,” explained Żyrek. “Now they are able to obtain this data automatically. Basic percentage parameters, such as the set plan for each shift and the current state of the plan’s realisation,

are all shown on a big screen located in the plant.”

Experience decisive in system choice

At the competitive bid stage, the decisive factors in the ultimate selection of the solution were the wide functionality and open architecture of Proficy Plant Applications, and the experience and customer-friendly implementation approach of the local integrator. “Bonair has adapted the solution to the needs of our brewery,” emphasised Żyrek.

Żyrek also pointed out other advantages such as the easy to use touch-screen panels on production lines, which enable operators to enter comments for each breakdown, convenient access to detailed reports that can be viewed on any computer by using an internet browser, plus the system's flexibility, enabling analysis of the collected data not just in the application created for this purpose but also in Microsoft Excel, for example.

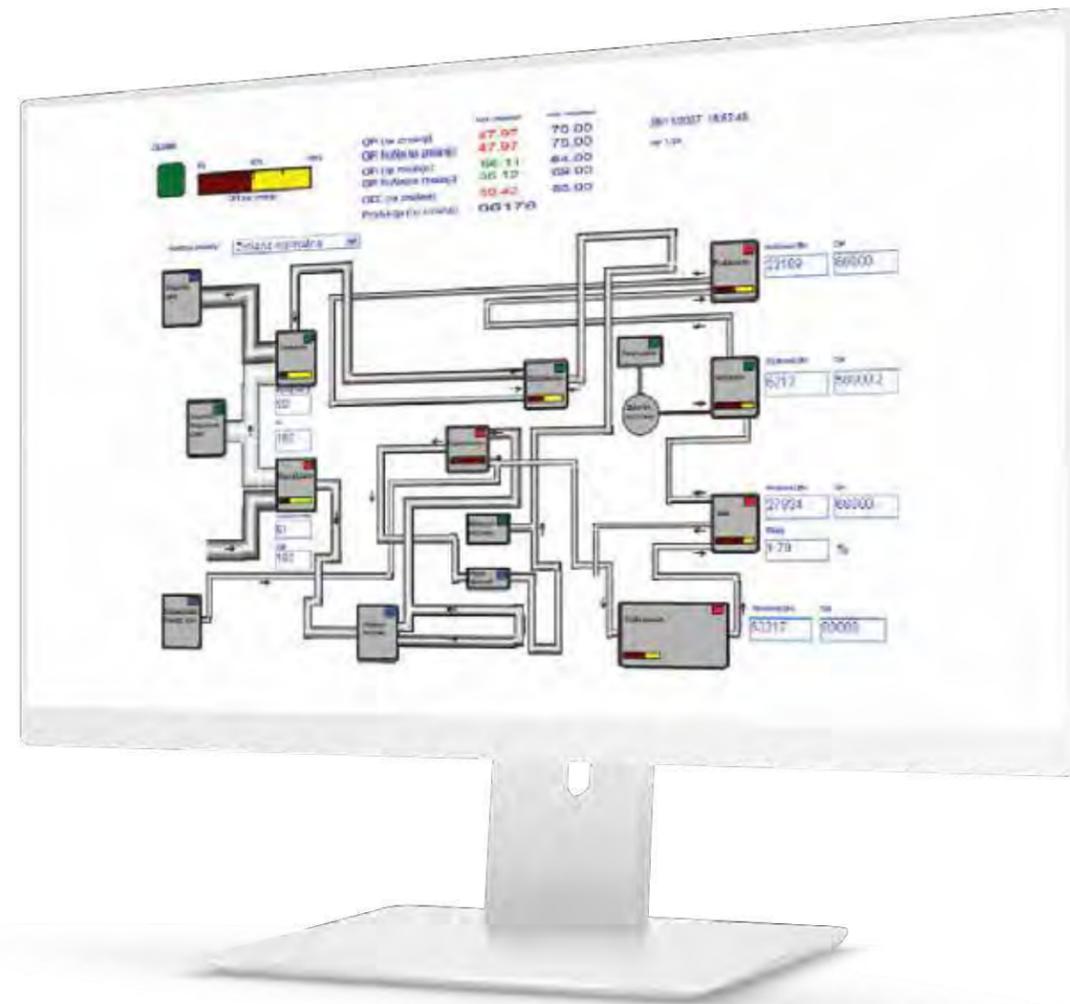
What's next?

The system can point out bottlenecks but it cannot remove them. Żyrek continued, "What is of greatest significance is that we now know what is wrong with the line. Thanks to automatic registration of stoppages, we know their causes and how much time they actually consume."

Increased productivity is only the beginning. Browar Warka is considering implementing other modules of Proficy Plant Applications, including the Quality and SPC (Statistical Process Control) modules. "We know which direction we are heading in. We know that we have to focus on more automatic and precise control of the production process," added Żyrek.



Production, downtime and waste events timelines provide flexibility through clickable events displaying more information.



The software reports the actual state and efficiency parameters for every machine.



Cascades Tissue Group Achieves Reliable and Predictable Manufacturing Performance

GE Digital's software enables real-time production insights



A blast into the siloed past...

It's 5 a.m., and Sarah Smith is starting her shift as an operator at Cascades Tissue Group in Memphis, Tennessee. As she begins to look at the work from the previous shift, she realizes they didn't produce the amount of tissue products they were supposed to because one of the lines went down. But she doesn't have the visibility or analysis to understand what caused the downtime. Sarah also knows her plant continually faces quality issues compared to Cascades' other plants, but she isn't sure where to make improvements to ensure better consistency. These types of hypothetical scenarios were not uncommon at Cascades before the company implemented powerful manufacturing execution system (MES) capabilities. Today, Cascades has a real-time pulse on its operations to make fast informed decisions across its various sites—ensuring quality and consistent production.

About Cascades

If you're a consumer who buys environmentally friendly products, Cascades is likely a name you trust. As a well-known North American tissue manufacturing and conversion company, Cascades produces paper hand towels, paper towels, bathroom tissue, facial tissue, napkins and wipes, and also designs dispensers for its tissue products. Headquartered in Canada, Cascades is the fourth largest tissue paper manufacturer in North America today.

The company is known for its strong environmental practices and offers a complete range of products that are made from recycled fibers and carry certification seals, including PCF (Processed Chlorine Free), EcoLogo, Green Seal and Green-e®. Environmentally friendly Cascades products are made with less water than the Canadian industry average, and they are compostable and biodegradable.

Along with sustainable green manufacturing, quality is core to the Cascades brand value. Understanding that there is no compromise when it comes to consumer expectations related to quality, Cascades has invested in equipment, processes, and a culture that enable it to manufacture a higher quality product with a smaller ecological footprint.



The challenges of business growth and disparate systems

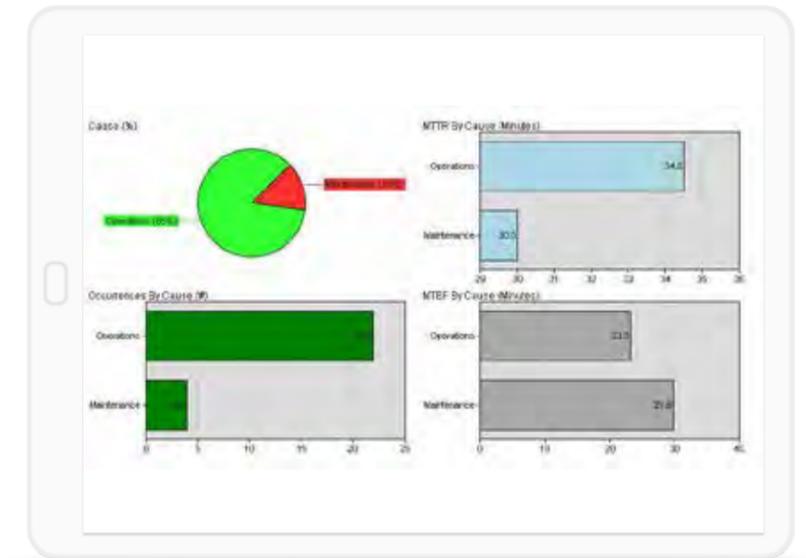
As part of its growth strategy, Cascades Tissue Group, a division of Cascades, acquired several manufacturing sites, which resulted in disparate automation infrastructures. Some of the plants were 100 years old and without a lot of data or sensors on machines, making it difficult to effectively monitor them and gain operational visibility.

Lack of consistent visibility, reporting, and performance metrics hindered the ability to effectively assess production downtime, efficiency, and quality characteristics. The company could not compare the operational performance of its individual sites to make informed decisions about how to allocate new resources across its operations. It needed a common platform whereby different systems could connect and talk to each other using real-time information and analytics.

GE Digital's solution: Real-time decision support on a common platform

With GE Digital's Proficy software, Cascades Tissue Group embarked on a phased approach to upgrade the automation infrastructure of the paper line across its key manufacturing sites.

- For phase one, the goal was to identify key process parameters and to ensure that data was collected uniformly across all sites. GE Digital's Proficy Historian provided a site-wide platform for consistent data collection, archiving, and distribution. The solution allowed Cascades Tissue Group to aggregate its data in a central place and quickly extract value from it through data analysis to drive better, faster business decisions.
- In the second phase, it installed GE Digital's Proficy Plant Applications, part of the Proficy Smart Factory suite. The solution's powerful manufacturing execution system (MES) capabilities provided a common platform to track real-time production, manage quality, monitor downtime, and gather genealogy information.
- To facilitate continuous improvement, the company also integrated a web-based tool with sophisticated trending and reporting capabilities to access, analyze, and visualize production data.



GE Digital's Proficy Plant Applications software helps track real-time production.

Results

- Reduced production downtime
- Better quality tracking and management
- Increased operational efficiency
- Faster responsiveness to issues
- Smarter decisions based on data-driven insights

"Data is really important to us to improve stability of the operation. GE provided the most complete software suite for our needs."

Benoit Lapensée, MES Director, Cascades Tissue Group

Continued competitiveness by tracking downtime and quality

A critical goal for Cascades Tissue Group was to track production downtime. Using sensors and signals on the machines, it sought to understand where downtime was occurring by starting with a common basis for all of its lines. While machines may be operating, they could be running dry and thus not driving productivity or profitability. By understanding which machines had production issues, it could adapt to that equipment to avoid downtime.

Quality was also a top priority for the business. Being in a very aggressive retail market with many different brands, Cascades Tissue Group wanted to ensure its quality stood out from competitors. To provide the level of quality that consumers expected, it needed a way to track quality and drive consistency across its products, no matter which plant or line produced it.

Process improvements through better data visibility and analysis

With Proficy software, connected data has been a key enabler of better business performance, providing Cascades Tissue Group with deeper insights into its operations. The solution collects and analyzes data, and automates and integrates the information-related activities for performance optimization holistically. With these capabilities, operators can make objective business decisions related to efficiency, downtime, and quality.

In the past, machines could run or set up however the operator chose, only to have the next operator change everything back to “his or her own way.” Now data provides a single version of the truth of machine behavior, and through analytics, users can see the trends and understand the impact of making changes.

Understanding how the machines work enables users to make the best decisions for improvements. For example, operators can see how changes to the speed of a machine will impact the softness of the paper by monitoring the output, quality specs, and data points related to the product itself and track those against the process setup. Data analysis brings deep operational insights that were previously untapped.



Using data analysis to understand machine performance allows for better decisions.



Higher Overall Equipment Effectiveness (OEE)

Before implementing GE Digital's Proficy software, operators had to wait until a report came out at the end of the month and try to figure out what happened and fix it. Now, they can see in real time if there's a problem, where it is, what it is, and inform the right people to address it. This level of responsiveness helps increase quality and efficiency and improve key performance indicators (KPIs).

For example, operators can quickly and easily access real-time KPIs such as OEE. This capability helps drive efficiency because when operators see the metrics, they understand what they are and how to make adjustments to ensure machines are running at peak performance. Furthermore, the way OEE is calculated is now centralized and standardized, whereas before, operators had their own ways to calculate the metrics, causing inconsistent views and results.

GE Digital's Proficy software leverages the power of the Industrial Internet, enabling Cascades Tissue Group to optimize its production performance for a competitive edge.

Powerful business outcomes help drive continued competitiveness

With Proficy software, Cascades Tissue Group can ensure quality and consistent production with critical insight into quality information and process performance. The solution delivers an integrated approach that accelerates information delivery and enables product reliability—increasing consumer confidence and brand loyalty.

Furthermore, to drive sustainable manufacturing, the software helps uncover data from systems and sensors, and makes it available for both usage analysis and the process or equipment tuning that eliminates excessive usage. It provides intuitive visibility into resource consumption in areas controlled by operators, technicians, and management, empowering them to drive savings as events occur.

With a single view of production data powered by GE Digital's software, operators at Cascades Tissue Group can make informed decisions that help drive quality improvements and increase manufacturing efficiency across the various sites—critical for sustainable growth and a competitive edge.



Cascades Tissue Group can now keep a real-time pulse on operations, whether it's the speed of a machine in Toronto or in Memphis. If there's a problem, everybody knows in real time what's occurring on the production floor. And this makes for rapid response times—driving faster problem solving and optimized performance.



GE Aerospace Achieves Maximum Efficiency with a OneMES Roadmap

Enabling the Smart Factory - Globally



Overview

Learn how the team at GE Aerospace is deploying their next generation MES that will reduce the number of applications across 50+ manufacturing shops, allowing for maximum efficiency of the shop floor works while tracking the engine build genealogy to the final bolt put on an engine. GE Aerospace's OneMES roadmap leverages Proficy Plant Applications and its ability to handle mixed manufacturing environments – for one solution with MES, quality, and machine connectivity. Also, discover how the team is working with Proficy Operations Hub as the next step in new generation visualization.

Products

- Proficy Plant Applications
- Proficy Operations Hub
- Proficy Historian

-
- *50+ Manufacturing sites*
 - *Greater efficiency - End-to-end visibility*
 - *Fewer applications - Simplified software on the shop floor*
-

WATCH GE AEROSPACE VIDEO #1

Challenges

- Obsolete systems
- Multiple systems/point solutions
- Low machine connectivity
- Inability to analyze end-to-end manufacturing dataset

Action

- Proficy Plant Applications for modern MES platform that is multi-modal (handles mixed manufacturing environments)
- One system: MES/Quality/Machine Connected
- Proficy Operations Hub for visibility
- TCO reduction and P&A improvements via moving to AWS

Outcomes

Next generation MES solution that:

- Reduces the number of applications on the shop floor
- Maximizes efficiency of the shop floor works
- Tracks engine build genealogy to the final bolt put on an engine
- Provides a modern scalable architecture



Improving Manufacturing Productivity in Cheltenham, UK

The plant faced siloed manufacturing cells, process variation across campus, inefficient labor vouchering, paper-heavy shop floor, no insight into real cost, and manual WIP tracking.

GE Aerospace in Cheltenham, UK manufactures power management systems for 777 aircrafts. These power management systems control everything from the heated cockpit seats to entertainment systems and navigation lights.

Combatting Siloed Manufacturing

GE Aerospace was operating six different manufacturing cells in silos, making it very difficult to track where a particular unit or units are. This caused variation across its manufacturing sites. The company also had a very paper-heavy factory floor, making build instructions and drawings hard to manage.

MES Implementation

- Deploy GE's MES at Aviation Systems facility in Cheltenham, UK

- The discrete manufacturing software tracks labor in real time and enables up-to-date and operation-specific manufacturing instructions to be accurately transmitted to the shop floor
- Heightened visibility down to routing level, allowing data-driven decisions to motivate improvements in productivity

Results: Better Control of Factory Floor Operations

- 1.95% increase in overall productivity
- 10-point improvement in on-time delivery vs. last year's baseline
- 20+ pillar integrations to simplify end-to-end processes
- Improved operational safety

By leveraging GE Digital's Proficy Smart Factory MES, GE Aerospace is now able to accurately lay out its manufacturing processes and have better control over what's happening on the shop floor. The company has also automated many of its manual processes, including directly delivering operator instructions in real time.



WATCH GE AEROSPACE VIDEO #2

Reducing Costs with Proficy Historian for Cloud

GE Aerospace uses Proficy Historian to manage OT data in 32 manufacturing plants.

"Managing this amount of data is costly," said Bill Andrews, Technical Product Manager, Aerospace. "By moving from 32 distinct deployments to a single deployment of Proficy Historian on AWS, we can dramatically reduce management costs and downtime while improving value, scalability, and reliability."

The company expects to:

- Reduce costs by more than 20%
- Decrease annual hardware resources by \$185K

The team will also improve system availability by:

- Eliminating more than a month of planned downtime
- Enabling a common data store accessible by thousands of enterprise-wide employees.



Reducing costs by 20% with OT data in the cloud

Improving Machine Health with Real-Time Insight & Predictive Maintenance

A lack of real-time insight into machine health was preventing a shift to predictive maintenance, required to support growth in new engine production, while having personnel constraints and an increased fleet of machinery to maintain.

Action

- Modeled machine data with maintenance history from 260 connected machines, to diagnose health conditions and provide predictive maintenance recommendations
- Enabled operations, engineering and maintenance to shift towards predictive & prescriptive actions

Result

- 5% cycle time improvement
- 260 machines are now connected
- GE Digital's software supported teams to accelerate first-time yield improvement and loss reduction



25% of preventive maintenance activities shifted to condition based from schedule based





**CONTROL
ENGINEERING**

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Pfizer – Vega Baja, Puerto Rico

Building Manufacturing Efficiency



ARTICLE BY:

**Jose Marrero Diaz, Latin American & Puerto Rico region
IT Director/Team Leader, Pfizer**

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CFE Media & Technology.**

Today, many pharmaceutical plants typically operate at somewhere around 30% efficiency, with a few world-class operations reaching the 70% range. However, even these stars fall below the levels that other well-run conventional process manufacturing operations achieve, where efficiencies of over 90% are routine.

Globalization is forcing all companies, and especially pharmaceutical industries, to develop competitiveness strategies and deploy them quickly if they expect to remain in business.

All this tells us that we must not only look aggressively for ways to make our manufacturing operations competitive, but also deploy the technologies that will allow us to measure and substantiate that competitive advantage. Pfizer has found a way to put such processes into practice, with exceptional benefits.

Overall equipment effectiveness (OEE) is a key metric that many companies are using to measure plant or line efficiency. OEE calculation results can be used for many operational diagnostics:

- Understand how well we are performing with an objective yardstick;
- Identify and eliminate constraints;
- Define target areas for improvement; and
- Align those targets with larger business strategy.

OEE measurements allow managers to make more effective, more objective, and more informed decisions in real time.

In November, the Pfizer facility in Vega Baja, Puerto Rico formed a cross-functional team to focus on creating more competitive costs through implementing an OEE data gathering and reporting system.

This important initiative, a collaborative effort between the regional manufacturing engineering and technology (ME&T) team, IT, and Vega Baja packaging teams, set out to improve data collection and visibility for determining OEE for packaging lines in the Puerto Rico region. This initiative was identified as critical and imperative to manufacturing success in today's dynamic business environment.

Crude but effective

Experiences with OEE in the Vega Baja facilities started out as manual processes developed by Juan C. Figueroa, a packaging technical specialist, and Xavier Schlienger, a packaging team leader, when they implemented it successfully at two blister lines.

While the manual system was cumbersome, the value of the information it generated was clear, so the next step was to move the process to the next level and see how data collection could be automated. That process began with automating the forms but still having operators enter data manually into the terminals. This reduced the amount of data entry, provided OEE metrics much sooner, and generally improved the quality of the process.

In December, Figueroa joined Jose Santos, Mark Poham, Vik Sharma and Edwin Rivera in an effort to develop and implement a still more user-friendly system to collect additional OEE data that would provide visibility of the results

to the shop floor operators and also to management. One of the major long-term requirements of the project was building in capabilities for the system to gather real time data directly from the equipment and be expandable to other areas of the manufacturing process.

Pfizer global manufacturing (PGM) corporate IT had worked on the development of a manufacturing data reporting system called PfindIT (Pfizer factory intelligence network dashboard-IT), but the system lacked a user-friendly graphical interface and OEE reports. A team consisting of colleagues from PGM IT, regional IT, and packaging was assembled to define user requirements and work with the system vendor to develop the graphical user interface and reports required.

The team brought in long-time vendor partner GE to assist with the project. GE's production management software system, Proficy Plant Applications, has an efficiency module that seemed to fit the bill. This module is able to identify and monitor all areas of manufacturing for inefficiencies, perform root cause analyses, compile historical data summaries, schedule reports, and control OEE.

The biggest challenge was to complete the development and deployment by the first quarter. Working over the year-end holidays, the team completed a pilot system in one of the packaging lines in Vega Baja which was working in January. Deployments then continued with the rest of the 12 packaging lines. The tool was accepted by the shop floor operators immediately, setting off a wave of friendly competition between operators to demonstrate whose line was the most efficient.



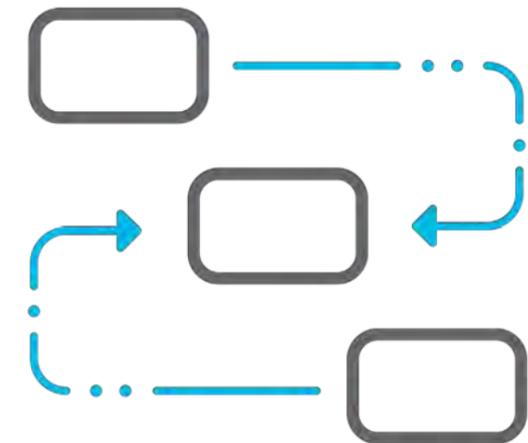
Implementing the new system brought a higher level of measurement consistency across the business. Different departments and sites had created their own techniques which made for results that could not be compared directly. With the new system in place, data collection was restructured for uniformity and aligned with the goals of the business. For the sake of consistency, the global packaging team with the help of Pfizer global engineering (PGE) defined two standard OEE calculations that are currently integrated into the system.

Real results, OEE

Watching improvements from these efforts is very rewarding. OEE numbers were only around 30%. But after, we were hitting 50% consistently, which is more than a 50% overall improvement. Perhaps that doesn't look like much, but an OEE of 30% is equal to 2.4 hours of productive time, while an OEE of 50% equals 4.0 hours of productive time, an improvement of 1.6 hours. The OEE monitoring system provides a tool for operators and supervisors to target areas of improvement continuously. We expect even higher savings since standard hours required to operate two packaging lines were reduced by 40% per line per shift. This is an example of the type of continuous improvement possible and achievable once you have visibility of your process and operations.

The development of the system has been such a success that the global packaging team has adopted it as the official tool for OEE measurement. Other Pfizer sites in Latin America, including Puerto Rico, Mexico, and Brazil have evaluated how they can implement the system as a way to build the competitive advantages within the Pfizer network.

The team next worked on Phase II of the project to collect data automatically, directly from shop floor PLCs and SCADA systems. The collaboration in this project has proven to be an excellent demonstration of what "One IT" is all about.





GE HealthCare Accelerates Pace and Enhances Rigor of Data-driven Decisions with Proficiency Software



Challenge

The Ultrasound Probe manufacturing facility builds ultrasound probes that plug into ultrasound consoles and also manufactures transducers included in probes.

Lack of plant production visibility and manual data collection slowed manufacturing processes, deterring data-driven decision making.

The plant faced very complex manufacturing processes, made slower by manual data collection (using whiteboards) and an onerous data analysis process (using Excel).

Took 3 hours to gather process data each morning with which site leaders would set manufacturing strategy for the day. This amount of time could be reduced.

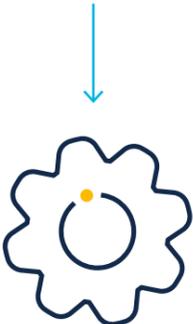
Action



Ultrasound Probe manufacturing facility adopted GE's Proficy software



The Proficy software affords real-time manufacturing data visibility and analysis, including output, yield and WIP measurements



Proficy enables rapid inventory counting and data-driven root cause analyses of manufacturing process issues

Results

The solution helped the team progress beyond manual, reactive data analysis to rapidly identify process issues and enhance overall production quality.

Site leaders to take quick snapshots of how the plant is running, giving them broad + clear oversight of plant operations. Site leaders no longer make process decisions based on hunches of how the plant is running, as they dig into data provided by Proficy to prove where manufacturing process improvements could occur.

- Reduce time taken to collect weekly inventory data from ~3 hours to <1
- Reduce time to prepare for Tier 2 gemba walks by 20 min per supervisor per shift
- 75 days saved in staff time per year, leveraged to solve problems and instituted leaner manufacturing process improvements





'Digital thread' unifies discrete manufacturing at Eaton

Reprinted with permission from Control Design magazine.



Improving document management in complex discrete manufacturing

"We started our Proficy journey on the aerospace side of our business with 50 pages of documents for each of our 30,000 components," noted Mark Tudor, vice president, information technology, Eaton. Eaton was trying to solve several problems in turning to GE's Proficy software platform, number one being document management.

- Document management was being done in their ERP system where engineering information was stored in text fields, Tudor related.
- The design and quality information was scattered, and data was collected manually.
- Quality management couldn't perform global revisions if a common part changed, making change management difficult.
- The need for the operator to access several plant systems complicated training as well.

"Before this software upgrade, if we built something wrong, it was difficult to know; training costs were huge, as were the problems," said Tudor.

In the past, complex discrete manufacturing required a large amount of information that was managed manually or in multiple systems that were tied together by the operator and production process.

Today, there are methods to enable a "digital thread" throughout these complex manufacturing operations.



Mark Tudor

Vice President, Information Technology, Eaton

Products

- Proficy Plant Applications
- Proficy Historian
- CIMPLICITY
- HMI/SCADA
- Proficy Workflow
- ROB-EX Scheduler
- Dream Report for Proficy

"Compliance relied on paper-based traceability methods and analytics were not seeing root causes. We had to store data manually, and there was a huge amount we needed to keep for as long as the plane was flying, 30 years or more."

Mark Tudor - Vice President, Information Technology, Eaton

Quality

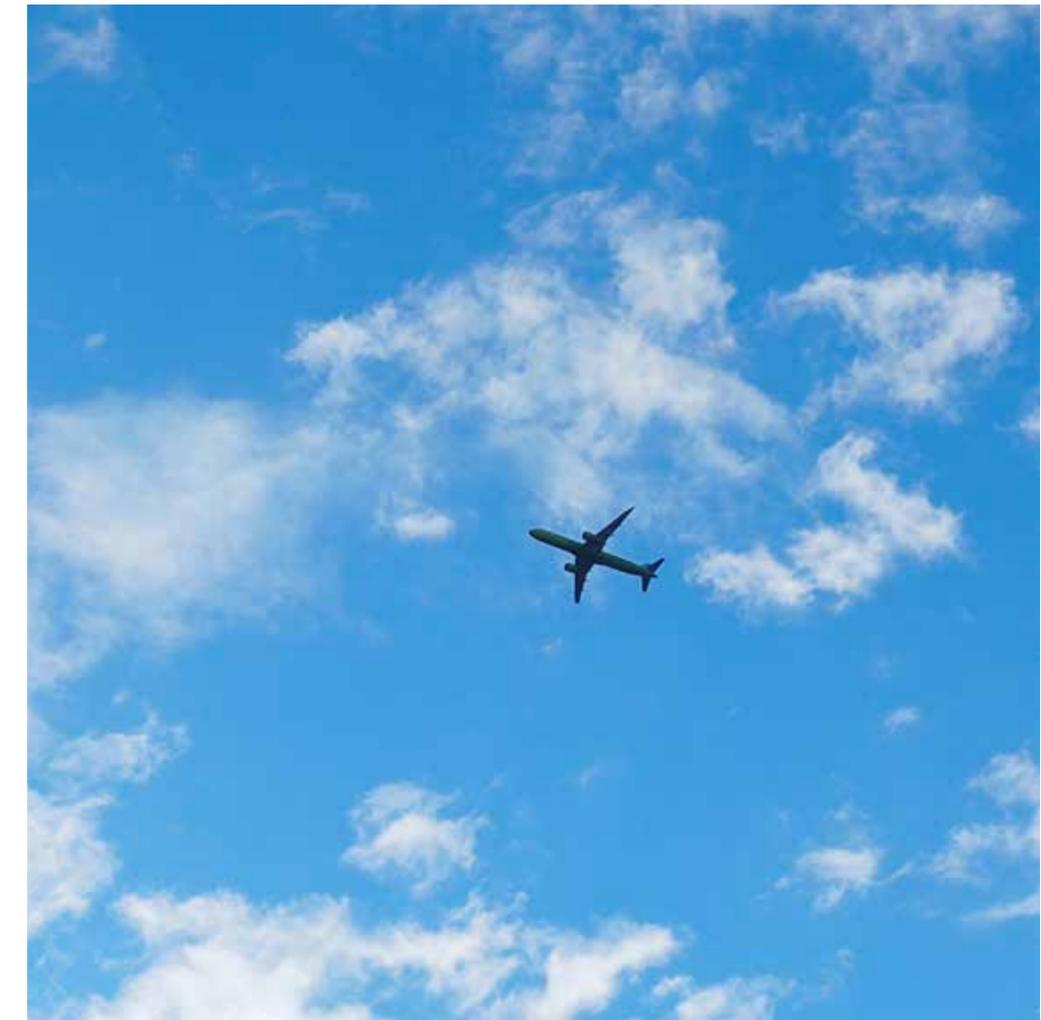
Right first time

Training

Reduced training time needed

Traceability

Improved traceability



A persistent digital thread

Better production decisions are enabled when data flows between systems and this digital thread stretches from engineering, through operations to shipping.

At Eaton, GE Proficy software is now connecting data to people, machines and processes. It is being used to pull everything together in this and other large, discrete manufacturing applications.

"The paperwork issues went away. We also leveraged standard work instructions and best practices across all sites. At the start we had 458 standard processes and reduced it to 87 with the new system in place."

Better control of and access to the documentation made record retention a built-in function, and global changes could be readily made.

"As the Proficy software was deployed, visual work instructions helped reduce training time and helped ensure it was done right the first time."

Mark Tudor - Vice President, Information Technology, Eaton

Focus on early wins

Tudor noted some important lessons learned. One was to not underestimate how long it will take to pull design and production data out of ERP and into Proficy. He recommended a modular approach instead of doing it all at once.

"Break it down into small pieces and do it in phases," Tudor said. "Good definition of these phases is also important to 'box in' the work and to know when you are done."

"Focus on early, quick wins," he added. "We didn't have enough quick wins because we bit off more than we could chew at the start. However, once we cleaned up the data, manufacturing and engineering loved it. And the operators, once they learned the new system, were strong supporters."

Tudor also recommended that when starting out and scoping out what you are going to do, involve all parties including quality, operators, manufacturing, engineering, IT and the front office.

"Get all the folks involved so they understand the impact and benefits," he said.





Keurig Green Mountain Drives Operational Efficiency and Captures Downtime with Proficy



WATCH VIDEO

Keurig Dr Pepper Inc., formerly Keurig Green Mountain, is a leading beverage company in North America and the first to bring hot and cold beverages together at scale. Formed in 2018 with the merger of Keurig Green Mountain and Dr Pepper Snapple Group, Keurig Dr Pepper holds leadership positions in soft drinks, specialty coffee and tea, water, juice and juice drinks and mixers, and markets the #1 single serve coffee brewing system in the U.S. and Canada.

Driving efficiency

To boost operational effectiveness, this beverage leader started their digital journey with Proficy Plant Applications' Efficiency package and realized their return on invest quickly. They were able to pull information that was output from the machines and run reports in real time, allowing their teams to make actionable decisions. Keurig worked with GE Digital's partner AutomaTech to implement their MES solution.

Success with Data

**Joel Trudeau, Automation Engineer,
Green Mountain Coffee:**

"We've had it out there now for about four years, so I think there's really a growing user community that appreciates the data and is doing well with it through mostly building a good infrastructure of reporting and having a good team of a couple of people that do maybe 75% of their job as to servicing customers and building these reports. A lot of what the initial intent was to get this OEE set up in a scorecard environment so that each of the plants knows how its performing and for the senior management to be able to evaluate how the plants are performing."

Partnerships

"We ended up choosing the GE solution and partnered with AutomaTech. I think we are really benefiting from having an established partnership where there is a lot more interaction and exchanging of ideas. In the second phase of our project now, it's much more complicated, more connected, more integrated, up through into the ERP system and down to the systems on the floor."

"We started off small, and we decided that the most important thing as far as what the focus was to sustain this growth was to go into our packaging lines and collect OEE and downtime, mainly the OEE was more of a scorecard for how each of the plants were doing or how different vendors equipment was doing across the enterprise and then the second piece was capturing downtime, which is directly related to OEE but was another source of a lot of information that we can get on how things were performing or where the issues were to maximize the use of all the equipment out there."

— Joel Trudeau, Automation Engineer, Keurig Green Mountain Coffee.



Christopher Carlins, Application Engineer, AutomaTech:

“Green Mountain selected GE software because of its capabilities. They saw that it provided the full solution for them. GE is a large company, they’re going to be around for a long time, they are going to be able to support the global customers and so is AutomaTech. We are the right arm of GE in this region, and there is a large commitment by GE and the employees of AutomaTech to support those customers throughout their implementation and beyond.”

“When we went to Green Mountain, we were able to tour the facility and see how the K-Cup® pods were being manufactured through the filling lines. It’s a very high-speed system, very demanding as far as making sure that it’s working properly. Using products like Plant Applications Efficiency, they were able to pull that information that was already being output from the machine and quite easily, provide the reports in real time to supervisors and operators, so that they can make actionable decisions.”

Christopher Carlins, Application Engineer, AutomaTech

Results

- Boosting operational effectiveness by understanding OEE and downtime
- Empowering the teams with reports in real-time for actionable decisions
- Keurig Green Mountain gains insight in their equipment to make data-driven decisions

Products

- Proficy Plant Applications
- iFIX HMI/SCADA
- Proficy Historian
- Proficy Workflow

About AutomaTech

[AutomaTech](#) is a leading provider of industrial technology solutions focused on improving your operational performance. By harnessing the power of data, we enable significant gains, visibility across your entire organization, and increased profits for a competitive edge. Our product offering includes a flexible and scalable mix of hardware and software solutions to solve your toughest challenges while providing a roadmap for future improvements and growth.





Yuria-Pharm

Implementation of Manufacturing Operations Management (MOM) System in the Pharmaceutical Industry

With the support of the Association of Industrial Automation Enterprises of Ukraine



About Yuria-Pharm

Yuria-Pharm is an international specialized pharmaceutical corporation founded in 1998. Yuria-Pharm specializes in the production of infusion solutions, medicines and medical devices. The headquarters is located in Kyiv, Ukraine.

Yuria-Pharm is one of the ten leaders of Ukraine in terms of sales and is a member of the Association of Manufacturers of Medicines of Ukraine (AVLU). The company produces more than 110 million units of products per year.

Yuria-Pharm maintains its leadership among hospital distributors in Ukraine. The company accounts for 60% of sales of infusion solutions, which are equal to about 100 positions in the portfolio of Yuria-Pharm. The company also holds the leadership in the sale of medical devices – syringes, infusion systems and more.

One of the important directions of the strategy is compliance with international quality and production standards. The company has quality certificates: Ukrainian State Standard – ISO 9001-2001 (ISO 9001: 2000, IDT); Ukrainian State Standard – ISO 13485: 2005 (ISO 13485: 2003, IDT); ISO 13485: 2003 (BSI); GMP (Ukraine), GMP (EU). For achievements in the development of the pharmaceutical industry, Yuria-Pharm has received numerous awards at the national and international levels.

Project Context

Operational dispatch management systems have been the focus of managers for more than 20 years. Despite the stable interest, they are not very common in Ukraine. The reason for this condition is the complexity of the systems (at full

implementation of functionality), their cost, as well as the combination of availability in the local market with appropriate service support. In modern design, manufacturers seek to install more complete production management systems (MOM – Manufacturing Operation Management), capable of performing not only operational and dispatch control of the state of production, but also of ensuring the performance of quality control functions, inventory, production planning, maintenance, etc.

The management of Yuria-Pharm expressed interest in similar systems. The main motivation was the following issues in the enterprise:

- The lack of full operational and dispatch control in real time made it impossible to react quickly to stops and changes in production.
- It was necessary to establish continuous processes to increase production efficiency by achieving the planned productivity of production lines, minimizing the number and duration of downtime and increasing product quality, and minimizing the number of shortages.
- With a large number of different lines and machines, it was difficult to understand the details and causal links of equipment failures and deviations of process modes.
- People play a significant role in the consideration and processing of production data – a lot of data was entered by operators manually.
- As a result, different services had different interpretations of the information received and, accordingly, there was no trust in the reliability of the data. This, in turn, did not contribute to teamwork to improve KPIs.

"To see all production in the palm of your hand, to understand the state of each line and the reasons for its shutdown, to control every important KPI and all this in real time – today, it is no longer a dream, but just standard requirements for managers and engineering

management in the pharmaceutical industry. The lack of information on current offers or the cost of these systems is often troubled to meet these requirements. When we heard about the availability of such systems in our industry, we immediately organized a meeting with Indusoft-Ukraine, began discussions and joint development of a detailed Terms of Reference."

- Volodymyr Shevchuk, CEO, Yuria-Pharm

Systems such as ASODU (Automated Systems of Operational Dispatch Control, as a low-end segment in the category of MOM systems) have long been known in the market. At the same time, the quality of these systems does not always satisfy the customer. For example, grassroots automation at Yuria-Pharm includes a large number of controllers from different manufacturers – Siemens, Vipa, Omron, Owen and others.

The problem was that this logic of the controllers solves the problem of direct control of the machine only. Machine developers did not anticipate that data on the operation of major components, performance parameters, system errors, etc. will be needed by someone. Therefore, the main problem



was to highlight useful information and interpret existing data. For example, Yuria-Pharm set a task to determine the causes of downtime automatically. But how to do it when the machine control system generates a lot of opaque errors that are difficult to interpret?

In other words, if the data systematized in the PLC were not important for higher level KPI accounting, it would not be systematized in a user-friendly form. That is, they need to be found, "extracted," aggregated and systematized in the appropriate databases, accounted for and further – displayed, or transferred to other algorithms for further processing. When there are many such controllers (lines and machines), this task of automated real-time accounting is quite complex, including the difficulties of establishing a network connection. And without such a collection of accurate information "from below," it is impossible to establish accurate accounting of equipment and KPIs at the upper level.

"The issues of Yuria-Pharm were quite familiar to us. We have been specializing in similar tasks of KPI scheduling and accounting for more than 15 years. Here we immediately saw that one of the main reasons for the inefficient accounting of OEE was the manual input of data. Actually, as the customer pointed out. That is, data on downtime were entered manually and often, quite subjectively.

At the same time, during the priority audit, we realized that the task of data collection will be non-trivial. The number of different grassroots controllers, different networks, unsystematized data and parameters, as well as insufficient level of automation on individual machines – all together, this complicated the task of collecting and processing information from the automatic process control system for issuance to MOM. As the course of work later showed, this aspect of the project was one of the most difficult ones."

- Volodymyr Patrakhin, CTO, Indusoft-Ukraine

Another aspect important for understanding this project is the balance of contractors on the part of the customer and the contractor. As always, close engineering or high-tech projects require close collaboration. Looking ahead, it should be noted that this was the case with Yuria-Pharm and Indusoft-Ukraine. At the same time, the number of available industrial automation specialists from the customer side was limited. This imposed additional requirements on the contractor in terms of implementing the tasks of collecting and dispatching grassroots information.

Summing up, setting tasks for Yuria-Pharm was quite classic in terms of the introduction of operational supervisory control as the main functionality of modern MOM systems.

At the same time, the variety of grassroots automation and networks, the limited availability of local staff were significant additional issues for Indusoft-Ukraine in implementing this project.

The process of manufacturing ampoules at Yuria-Pharm



Decision and Progress of the Project

The proposed MOM system is a typical solution of the Ukrainian OT-IT integrator Indusoft-Ukraine for industrial enterprises, and which is based on its own developments and software and hardware from GE Digital.

The system is designed to increase the efficiency of production of the company, increasing the efficiency of equipment use, its productivity, product quality, reducing downtime and material losses, improving the transparency of efficiency and quality of decisions. The goal is achieved by increasing the efficiency of process and production processes of the company, the transition from manual to automated mode of tracking the work of equipment and

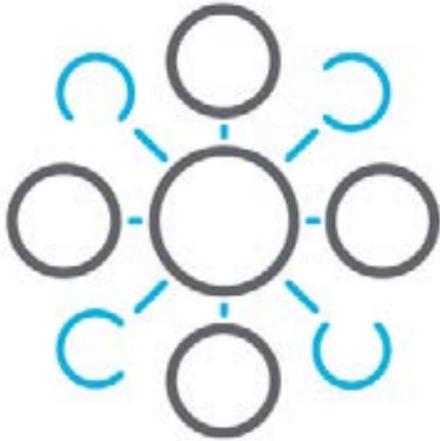
personnel in real-time and further analysis of the state of KPIs and causation, with appropriate recommendations for managers.

For the pilot project, the decision to implement the MOM system was made at the site of the plant Yuria-Pharm in Cherkasy, and which included 2 production lines: 1) production of drugs in glass bottles, 2) production of drugs in ampoules.

After the audit and specification of the terms of reference, five main objectives of the project were defined:

- Implementation of a full-fledged system of scheduling and calculation and control of OEE in the production in a real-time mode.

- Tracking real-time downtime, performance and materials. Provision of access to operational information for all personnel of the company.
- Automatic tracking of important production events by signals from automation systems.
- Automatic receipt of orders for the production of ERP products, tracking the production process of individual batches and products.
- Provision of display of data on the efficiency of equipment use through the calculation of OEE in the intranet of the company with access through browsers and mobile applications.



Dispatching office at Yuria-Pharm



System Architecture

The solution has three levels. The first level – the level of local control and automation of process sections of the company, based on programmable logic controllers (PLC), operator panels (OP) and industrial computers (iPC), which perform the tasks of managing individual units and process sections. The purpose of the system at this level is to conduct the process. Within the project, the issue of data collection from the most important equipment of these local automation systems to the upper levels of real-time control was solved at this level.

The second level – the level of supervisory control, based on software and hardware of the process server of history and the computer of the dispatching workstation. The purpose of the system at this level is the automatic collection of real-time data, calculation of complex indicators, as well as the accumulation of production history. All important information from local equipment automation systems, automatic meters and terminals is stored in a single production data storage cell and provided to the dispatcher in a convenient and accessible form.

The third level – the level of analytics, based on the analytical server and the means of thin clients, which are involved in the implementation of tasks for the analysis of production data and are responsible for the efficiency of processes. The purpose of the system at this level is the visualization and analysis of production data.

Indusoft-Ukraine used the following from GE Digital:

- Analytical module Efficiency from the world-class MES software package, Proficy Plant Applications. It was used to create production models and identify production events of downtime, productivity losses, quality degradation, process alarms and product losses.
- Proficy Historian, best-in-class process historian archive of real-time data. It was used as an integration platform for automation systems (SCADA and others) and a tool for calculating current KPIs and their components.
- iFIX HMI/SCADA, also part of the Proficy family, as the software of the production management workstations.
- Production analytics display system based on a thin universal web client. It allows you to build a modern analytics display system using dashboard, customizable HTML5 and UAA technologies.
- Industrial Gateway Server(IGS) as a set of interfaces for access to production equipment management systems. ORS servers were used to connect to PLCs, operator panels and digital meters of products from different manufacturers.



*Yuria-Pharm
facility*

Implementation Steps

- Determining the composition, characteristics and features of the implementation of control systems for each individual unit, which was planned to calculate the OEE. To do this, it was necessary to obtain information about the code running in the PLC / HMI / iPC, tables of variables in their memory with descriptors and parameters of access and unpacking (addresses, names, types, etc.). In turn, this task required the definition of a possible interface for data collection, selection of ORS servers for communication, and so on.
- At the level of SCADA nodes, work was carried out to determine the content of the Database (DB) parameters, which contain useful information about the equipment operation. At this level, it was decided to install ORS servers in the SCADA database to transfer information to the upper levels. Useful information was considered to be the parameters of the control systems, which indicate the operation or shutdown of the unit or its important components, performance, speed, number of defects, operating data or calculation of operating time, as well as alarms / messages / errors in the equipment operation, which can automatically determine the causes of stops or duration of loss of performance.
- Work has been carried out to install additional meters for products and shortages. According to the Terms of Reference agreed by the customer and the experience of Indusoft-Ukraine, the ideal situation is when there is a meter at the entrance and exit of each work center (unit) and a separate shortage meter.
- Data from ORS servers of SCADA nodes were transferred directly to the archive of real-time data collection (Proficy Historian) through the installed ORS collectors. For data from individual PLCs / HMIs / iPCs, additional data collection nodes were installed on the basis of an industrial computer with the Industrial Gateway Server software installed. This tool is a set of ORS servers and drivers for the most popular industrial controllers, interfaces and other means of automation systems. Proficy Historian OPC collector is installed on the same node.
- Based on the calculation core of Proficy Historian, validation was performed, primary indicators were calculated and logical data from the process equipment were processed. For example, the noise of discrete triggers of events is eliminated, indicators of counters of production and shortages are synchronized, current data of operating time of machines, integrated indicators of operating time, etc. are calculated at this level.
- Then it became possible to deploy the dispatcher's workstation, on the screens of which operational information about the production process, important production events, productivity, equipment loading, data from meters of finished products and shortages was displayed. The interface was developed in accordance with the requirements of the international standard – ISA101 in terms of information aggregation, graphics processing, structuring data on the model. It is important that the KPI of the dispatcher should be such that it can directly make an effect, and it is not OEE but the performance or speed of equipment operation, unit operating time, number of alarms by levels, shortage counters, plan / fact ratio and so on.
- Accumulated and processed through Proficy Historian, real-time data on the equipment operation became the basis for creating and debugging a system of models for detecting production events in Proficy Plant Applications. It is here that the general production and organizational model of the company is created; it is possible to analyze the data in the production context (in terms of the line, individual unit, product, batch, change, that is what). The normative and reference information database is developed (product specifications, content of hierarchical trees of causes of downtime and losses, levels of alarms by priorities, etc.).
- Then the task of integration with the existing ERP system was solved. At a minimum, ERP should provide the planned performance of equipment and orders for production (product, volume, time, production routes, etc.). If the ERP provides for it, it is necessary to transfer data on the progress of the manufacturing process, the transition of the batch from one unit to another, production parameters (products, production and loss, operating time and equipment hours in service, events of loss and downtime alarms, KPI values, etc.) back from the MOM. This can be in real time, or when the order is fulfilled and depends on the configuration of production control functions at the business level.
- Data on the status of KPIs (OEEs) and their components were derived for analysis by key specialists and management. For this purpose, it was necessary to develop the convenient interface so that it could be convenient to make parametric inquiries on sections of the separate equipment, products, performers, etc. Thin web client applications that are convenient to use not only on computers, but also on mobile applications are the best ones. Proficy Plant Applications HTML5 universal client was used within the project for the purpose.

The main challenge in the implementation of the system was the task of obtaining information from equipment automation systems in an objective production context. Control systems based on the PLC and SCADA were supplied by different manufacturers at different times as part of various equipment and did not provide for the transfer of information to external systems. It was necessary to find opportunities for connection,

interpretation and retrieving useful information at each of the data sources. The decision was in a joint work with the customer's specialists to develop a technical solution in each case. These solutions included the installation of additional interface means of communication and sensors, modernization of existing control systems where possible, adjustments to the logic, careful analysis of the contents in the memory of controllers and SCADA databases of the engineering systems.

Separately, the solution of the MOM and ERP integration issue should be noted. The feature was in the need for integration with ERP class software that does not support database structures, models, methods and interfaces for data exchange in accordance with the requirements of the international standard – DSTU IEC 62264. The implementation took place through the use of web-services that use SQL-queries.

Packaging line at Yuria-Pharm



Features of Technical Implementation from Indusoft-Ukraine

As a result of the project implementation, Yuria-Pharm received numerous benefits and new production management opportunities.

1. Fast, full and independent integration of all devices of grassroots automation

"Zoos" (very diverse grassroots automation), difficulties in servicing various controllers and devices, as well as issues of integration into a single control system – a traditional issue of Ukrainian companies, was also present at Yuria-Pharm.

The solution used by Indusoft-Ukraine's specialists is based on three elements. First, the distributed Proficy Historian architecture allows the installation of remote archive collectors on data sources (Windows computers), automatic support for communication with the server and the provision of various interfaces (to ORS, SCADA, database, etc.), implementation of local buffering and data compression.

Second, the contractor has installed additional data collection nodes on the basis of an industrial computer with a data collection system directly from sensors and meters that are not included in the standard control systems of work centers. It also includes interface modules for communication with individual controllers over fieldbuses.

Third, the project uses Proficy Industrial Gateway Server (IGS) software, which is a set of almost 100 protocols, drivers and ORS servers to the most popular and used automation tools on the market.

Uniquely, IGS is the comprehensive driver set that can be configured to communicate with different devices.

That is, after the setup, the customer received a single IGS ORS server for the entire production line, in which, as separate channels, separate interfaces to production equipment management systems are configured. Otherwise, the integrator would have to install more than one industrial computer and a set of drivers, and then install a separate Historian collector for each one.

Accordingly, the customer has received significant benefits in performance, flexibility in expansion and ease of use

2. Highly efficient database, fully compliant with MOM requirements

Numerical production management modules (scheduling, quality, maintenance, inventory, etc.) are usually based on their own control subsystems and their own data. But a single management of all production at the MOM level requires the collection, archiving, coordination and uniform accounting of all data and their further processing!

Traditional approaches to relational database integration are not the best approach for industrial companies – they are slow, cumbersome and consume a lot of computer resources. Such technologies are not suitable for the modern MOM.

The solution for Yuria-Pharm is to use a professional product for similar tasks – Proficy Historian software. This software is a historical archive of real-time data – a real integration platform and, at the same time, a tool for calculating current KPIs and their components. The speed of data collection and processing, reliability, built-in data processing tools in

"This project stood out for its innovation, we already had experience in implementing ERP systems in production, but the implementation of the MOM system is the first experience for us, and I think it is successful. One project manager from each side was involved in the project, we constantly coordinated our actions or delays where connection, penetration and help was required. We helped Indusoft-Ukraine understand our difficult infrastructure, they in turn helped us understand the software products that were recommended according to the developed TOR.

As part of the project, we managed to build a MOM system that we can scale to the entire production; the system is currently giving good results to improve efficiency. At the first glance, the system looked complex, but it facilitated our work to collect the necessary process parameters with each day of work with it. We got the opportunity to form trends in critical parameters of production in real time.

In general, the project was not easy, but we learned a lot of new things within the project. In this case, I would like to note the high level of technical training of Indusoft-Ukraine's specialists and the level of their customer orientation. There were cases when we had new requirements and changes – the company always made advances. We will continue to be partners."

- Olexander Katrenko, Business Process Analyst, Yuria-Pharm



Proficy Historian are an order of magnitude higher than these parameters in traditional databases.

At Yuria-Pharm, this product is responsible for combining all important production data from various sources and qualitatively converting of raw data into economically significant information by calculating secondary indicators in real time. A real discovery for Yuria-Pharm was when the team saw how easy it is to work with Proficy Historian to connect and perform an archivation of data with its high reliability and performance. Therefore, it was decided to entrust the work with Historian specialists of Yuria-Pharm's own automation team in the subsequent stages of expanding the system to other lines and production.

3. Modern SCADA system as reliable basis for operational production management

The MOM as a management system of the entire production solves problems of the top level and for engineering managers of the company. But for operative management of technological sites, the traditional SCADA system is required.

It is a management tool for operators and dispatchers. At Yuria-Pharm, the dispatcher's workplace was developed with iFIX HMI/SCADA. This standard product from GE Digital has quickly created an easy-to-use and efficient tool for operational production management.

It was agreed with Yuria-Pharm that the development of control screens should provide for a use of the recommendations for a modern high-performance HMI (international standard ISA 101). According to this standard, control screens use less distracting graphics, contain only

important aggregate data, and switch between screens according to a hierarchical multilevel production model. Now the dispatcher has all the necessary information about the progress of the manufacturing process and the results of the calculation of KPIs in real time.

Analysis of the system application has shown that it is important to display only those KPIs to dispatchers, which they can directly influence. For example, OEE was not very informative for them. It is more important for dispatchers to display data on operating and idle time of each unit of equipment, their current performance, speed, number of defects, promptly report important production events (alarms, stops, speed losses, data of engineering systems, etc.).

4. Modeling, full integration with ERP and advanced analytics of production process

Collecting, processing and displaying important production data in a timely manner is not sufficient to make important management decisions. Today's complex production requires high-quality, efficient and in-depth analysis of deviations from target indicators, failures and other unplanned situations.

In the implementation of the project at Yuria-Pharm, the stage of developing a set of production models, the logic of identifying important production events and the synthesis of databases of regulatory information was the most difficult and long. This work formed the basis of the application of



Sampling of screens from the dispatch system at Yuria-Pharm

analytics to improve the efficiency of equipment based on Proficy Plant Applications. Working with this MES software provided a detailed description of the production process. In essence, we are talking about a model of a virtual enterprise, which describes all the equipment, all production branches, the manufacturing process itself.

Due to the binding of system data (collected or calculated) to the parameters of the models, it is possible to analyze information in the production context, in terms of equipment, products, orders, personnel, etc. The joint careful work of Yuria-Pharm's and Indusoft-Ukraine's specialists allowed to adjust the models of detection and calculation of downtime and losses, calculation of components for availability, productivity and quality of OEE. In accordance with the existing system of accounting and analysis of KPIs at the company, the base of regulatory documents was synthesized, for example, the methodology of KPI calculations, the tree of causes and actions on downtime, losses, alarms.

Also, the issue of integration with the existing ERP system was addressed at this stage. Summarizing these points, it should be noted that the level of integration always depends on the implementation of production accounting tasks in the business system in general. For batch production, the planned performance of equipment and current orders for production (product, volume, time, production routes, etc.) should at least be transferred from the ERP.

If the ERP provides for monitoring of the production process and requires data of the "information loop," then it is necessary to transfer data on the progress of the manufacturing process, batch transition from one unit to another, production parameters (products, production volumes and losses, operating time and service time of the equipment, events of alarms, losses and downtime, the KPI

value, etc.) back from the MOM to ERP. This can be done in real time, or when the order is fulfilled. In this project, Yuria-Pharm decided to concentrate the tasks of order management within the responsibility of the dispatcher. ERP orders are received automatically, the manager can manage the status of the order (active, pending, etc.), can edit parameters, combine or divide orders into parts, determine the process route and generate a final report.

5. Visualization and convenient dashboards in different monitoring and control modes

The availability of KPIs in real time and their high-quality visualization for a wide range of system users, ideally for everyone who needs it and remotely is another specific aspect of such projects. Quality criteria here: cost, convenience but also safety.

For tasks in this category, Indusoft-Ukraine offered a product of thin web client applications to Yuria-Pharm – Proficy Plant Applications HTML5 universal client. This does not require pre-installation of any software but uses a standard web browser of the OS. This solution allowed providing specialists with a convenient interface for generating inquiries about the status of OEE and its components in terms of individual equipment, products, orders, personnel, etc.

Dashboards (or visual panels) of the system have a hierarchical model, provide for a certain logic of analysis from a general to a specific one, some of them can be customized by users to their needs.

Work with the analytics system begins on the user authentication, determining the list of equipment units and the viewing period of interest. The root screen displays the OEE values and its components within the selected constraints.

"We installed 1 collection node on each line. The total number of connected data sources is 13, only about 350 parameters that are collected in real time with a frequency of about 1 sec, or per shift. In general, once the collection nodes were installed and physically connected to the data sources, the integration work took only 2 weeks. Prior to that, Yuria-Pharm performed extensive preparatory work to identify useful information in each data source, determine connection parameters (controller addresses, port parameters, etc.) and access to variables (name, address, type, range of changes, etc.)."

The solution on Proficy Historian, collection nodes and IGS turned out to be very successful, clear and convenient for the Yuria-Pharm automation team.

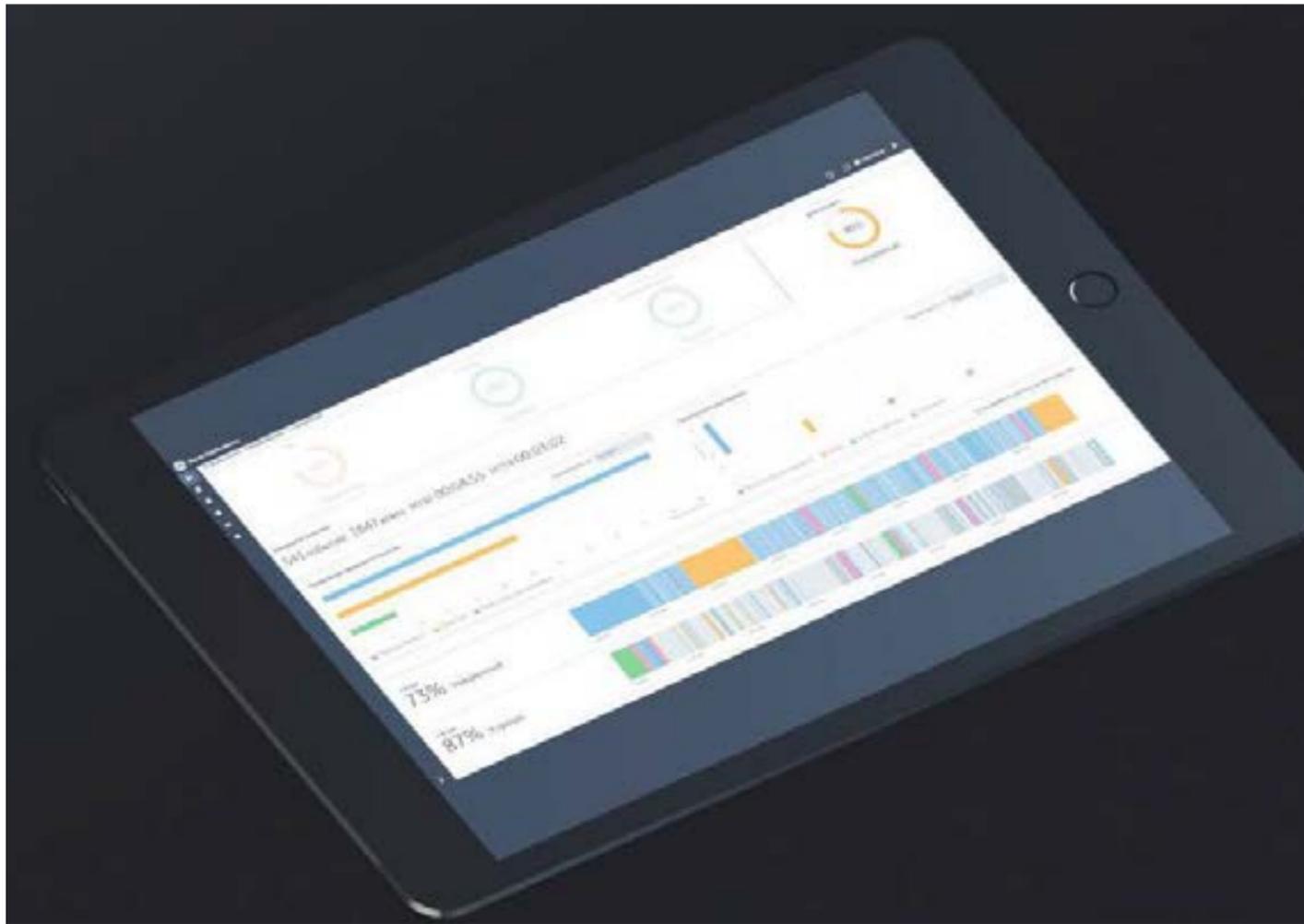
Although at the beginning of the work, at the stage of the TCP protection, it was not easy to convince Yuria-Pharm to invest, but after they gained experience connecting individual machines with us, studied the detailed instructions provided to them, saw the high performance and reliability of the solutions used, they decided to do all further expansion of the lower level on their own. We are very proud of that. Because it is a confirmation of our technical solutions and a guarantee that our system will continue to live and develop."

**Volodymyr Patrakhin,
CTO, Indusoft-Ukraine**





Generalized OEE screen on a line consisting of two units



Availability Screen, part of OEE

The user can select the OEE component that interests him or her and see more detailed information. The "Availability" screen allows you to determine the root causes of downtime and their distribution by category. Statistics on the total number of downtime events, their total duration, mean downtime period (MTTR) and period between downtimes (MTBF) are displayed here. The horizontal Gantt chart shows the availability history of the selected equipment for the user-selected time period. When you hover the cursor over the chart, a tooltip appears that shows detailed information on the selected segment and the idle event recorded at that time. Very conveniently, with the mouse wheel, you can zoom the display of history data to take a closer look at the time period of interest.



Performance Screen, part of OEE

The "Performance" screen is designed to analyze the reduction in the efficiency of equipment use due to loss of performance.

Here are the root causes of productivity losses, their distribution by category and statistics on the ideal and actual number of products for the selected time.



Event Review Sequence Screen (left)

Batch Data Review Screen (right)

The Quality screen is used to analyze the amount of shortages. Here are the root causes of shortages, their distribution by category and statistics on the number of products produced and the resulting shortage for the selected time. The combination of these products from GE Digital together with their skillful adaptation by Indusoft-Ukraine specialists to the specific needs of Yuria-Pharm created a scalable, flexible and deeply integrated production management system, one of the best ones in the pharmaceutical industry of Ukraine.

Results of the Project

- Launch of a modern, unified system of production scheduling with MOM functionality per Terms of Reference. The customer received scheduling, equipment monitoring and management of the main process modes, with advanced analysis of downtime and other deviations from process regulations.
- Significant improvement in key operating indicators – in particular, the improved OEE indicator increased by 20%, particularly due to the reduction of productivity losses (by 70%) and downtime (by 80%).
- Qualitative changes in the production culture. In particular, the chief technology officers record a more responsible attitude of the plant's operators and technical services to the information from the dispatching system, which leads to more efficient and faster management decisions.
- A new level of flexibility and ability to respond to change. In the COVID-19 era, the capability of such a rapid response is ultimately reduced to the availability of certain functionality (such as remote monitoring – control, rapid reconfiguration of lines to new products, effective management of all KPIs, etc.) and training of plant personnel. The plant has reached a new level of production flexibility thanks to the new system.
- New knowledge and prospects for development. Accumulated experience and new knowledge allow us to see new perspectives. In particular, the management of Yuria-Pharm plans to scale the technical solutions obtained on 2 project lines to other sections of the plant. We are also talking about the unification of software solutions at the level of all production management.

"I am completely satisfied with the results of this project. We have received a modern production management system that complies not only with our Terms of Reference, but also with the best technical level that we see in Europe and other developed countries. From now on, our production is 'in the palm of your hand,' and it is easy for me, as a manager, to see what is going on and why, where the bottlenecks are and what the real reasons for the deviations are.

It is also difficult to overestimate the contribution of the system to the growth of production culture. Accurate and relevant data, ease of analysis, the ability to see everything in the dynamics – it not only leads to better management decisions. This significantly reduces the time spent by managers, but importantly – increases the responsibility of all staff."

- Volodymyr Shevchuk, CEO, Yuria-Pharm

*Project partners at
Yuria-Pharm*



"During the project implementation, the entire stack of the system was built, including the ACS - MES and MES - ERP integrations, thanks to which there were reliable data for making correct and timely management decisions at each level. Well-established MES-ERP integration allows you to receive orders from the ERP, track their status, performance parameters in MES in real time, and transmit the necessary information to ERP.

Separately, the impressive results in improving the efficiency of production lines should be noted. Main issues that are present in any production where there are production lines include a large number of small downtimes lasting 3-8 minutes, they reach several dozen cases per day in some cases; in the absence of an automated system, they are not recorded or monitored. Another issue is the line productivity deviation from the planned one in a direction of a smaller indicator, which is also quite difficult to measure, and this leads to a significant reduction in production. After the introduction of the MES system at the company and calculation of the OEE indicator (the overall efficiency of the equipment) at once, specialists of Yuria-Pharm analyzed problem issues and operational actions allowed to significantly increase the productivity of lines with the approach to the planned values, and significantly reduce the number of short downtimes. This has led to increased production efficiency and a faster return on investment in the implementation of the system.

To date, managers and key specialists of the company have received an effective tool for monitoring, control and promotion of production efficiency in general, in terms of individual lines, units, as well as directly the work of operators and specialists involved in the production process.

We express our thanks to the management and specialists of Yuria-Pharm for good joint work on this interesting project, which turned out to be very useful for both parties and the pharmaceutical industry at large."



*Sergey Yevtushenko,
CEO, Indusoft-Ukraine*



Premier Foods

20% overall equipment effectiveness improvement



Premier Foods is among U.K.'s largest food producers. Premier manufactures a series of well-established food brands, including custards, cake snacks, bouillon cubes, ramen noodles, and a diverse spectrum of other foods.

Challenge

Aging systems, lack of operational insight. Understand root causes of issues and generate data-driven insights to improve critical processes



20%

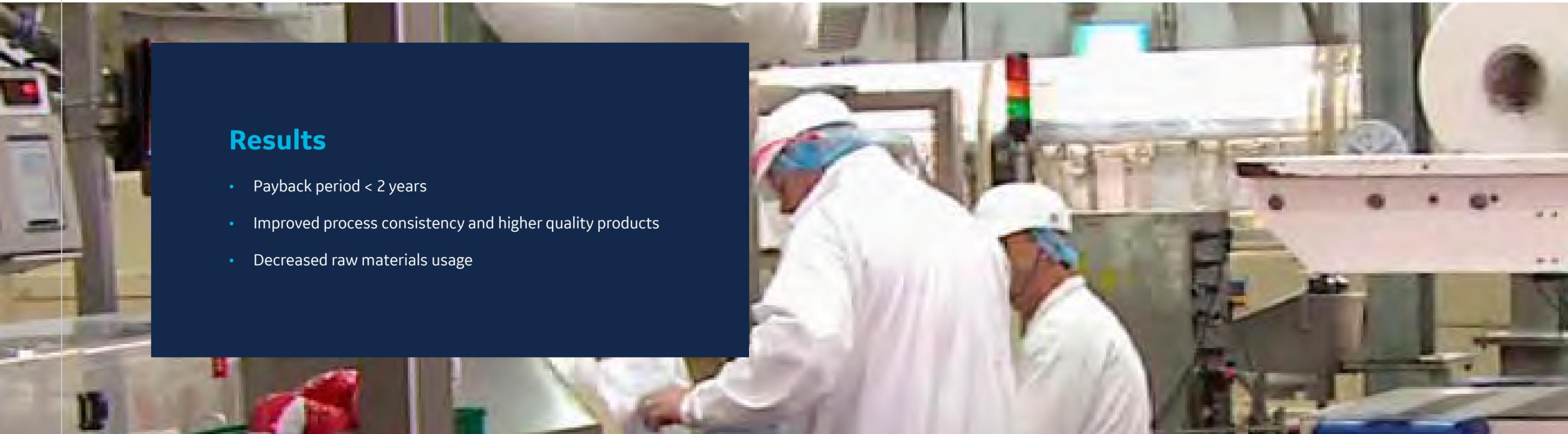
overall equipment effectiveness improvement

Action

- Implement GE's manufacturing software solution including
 - Proficy Plant Applications, Proficy Historian, iFIX HMI/SCADA, Proficy CSense analytics
- Deploy enterprise industrial data management
- Model the processes to visualize what was happening on Premier's production lines
- Perform analytics to understand the correlations and root causes of issues for continuous optimization

Results

- Payback period < 2 years
- Improved process consistency and higher quality products
- Decreased raw materials usage





GE Lighting, a Savant Company

Cutting order-to-ship time by 33% using Proficy to streamline production

Reprinted with permission from Control magazine



Visible Data Means Operations Excellence

Seeing is believing, and bringing operational information into the light makes it usable by everyone in an enterprise—allowing them all to make faster, more productive decisions.

This enhanced awareness was especially useful at GE Lighting, which reinvented itself to transition from manufacturing millions of homogenous, incandescent light bulbs to developing tailored, LED lighting solutions for its many customers.

These experiences were described by Craig Platt, IT director at GE Lighting, in his presentation “Operational Excellence: Improve Data Visibility Across the Enterprise” at a GE users summit.

“Incandescent bulbs were our bread and butter, but now it’s going to be unlawful to manufacture them. Fortunately, we’re prepared on the LED side, but we also had to combine a 75-year-old business with what is basically a start-up organization,” Platt said.

“Where lighting used to be a replacement business at the back of the supply chain, we had to move further up into the supply chain because LED is a fixtures-and-solutions business. So instead of making 3.5 million of the same bulb per day at one plant, we had to move to configuring LED solution for individual users. We also had to reduce our order-to-ship (OTS) cycle time from 30 days to 10 days and improve our OTS fill rate from 70% to 90%.”

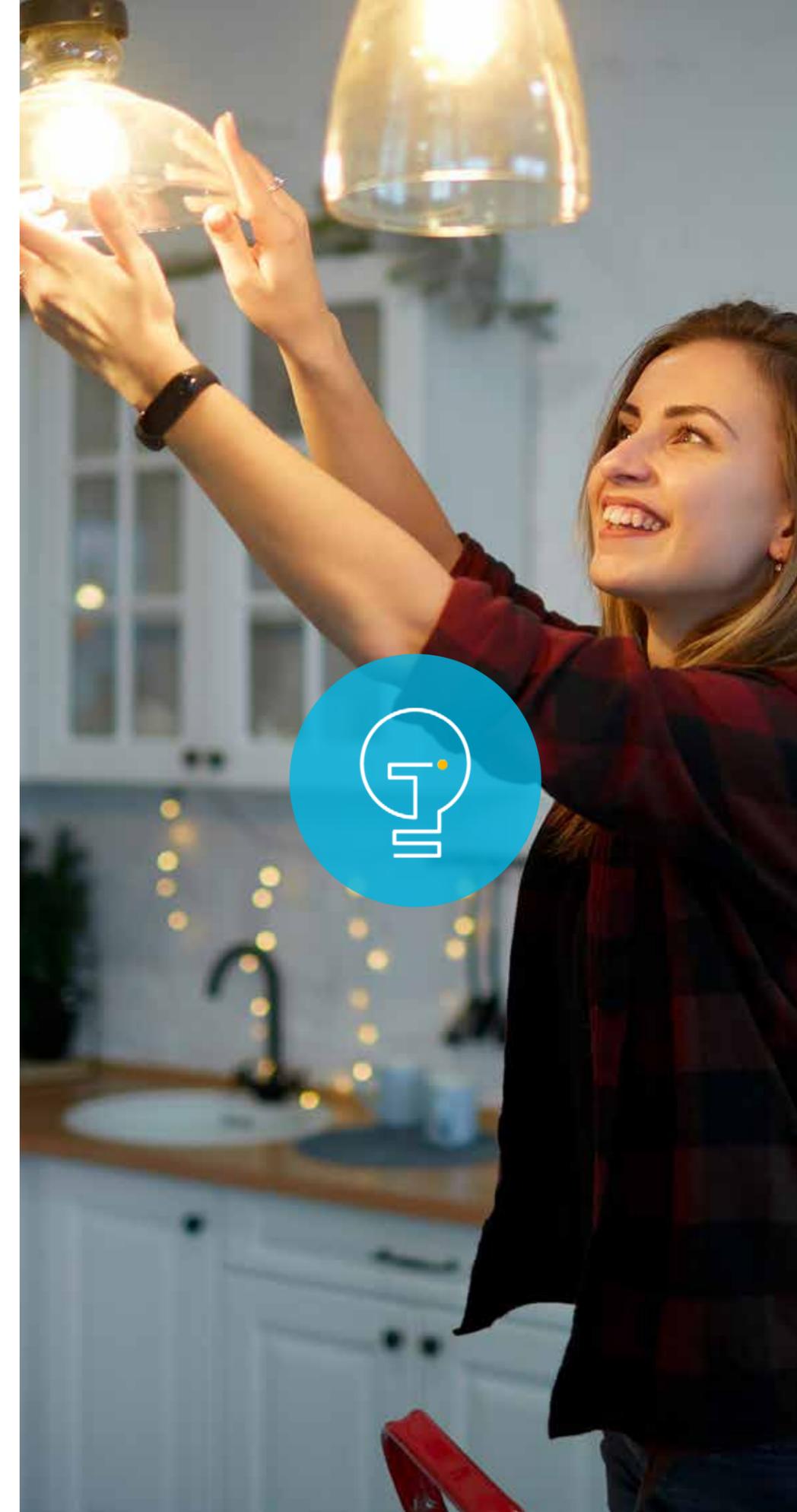
With help from its reorganization and GE's Proficy software, Platt reported that GE Lighting:

- Streamlined its assembly and OTS processes
- Reconfigured and integrated its manufacturing lines
- Improved its raw material flows
- Implemented a visual material management system

“We created a supermarket and mini-market approach, used Kanban cards and flow, adopted on-demand label printing and got down to 10 days for one product line and then added others.”

In fact, our mini-market picking is done with wearable, on-wrist PCs that are all controlled by our overall MES system. Now customers can see their units as they're manufactured, and this gives everyone more confidence.”

— **Craig Platt, IT Director
GE Lighting**





Mohawk Fine Papers

Production management at acquired paper mill unlocks company-wide gains



Mohawk Fine Papers

Challenge

Needed to improve order entry and scheduling, interface seamlessly with existing systems, and provide the agility to support changing grades on its paper machines, including several times a day, to maintain nimble customer response

Action

Long-term user of GE Digital's Proficy Plant Applications including Production, Efficiency and Quality modules – as well as Proficy Historian.

Results

- Documented savings of \$4 million in just one year
- \$1.25 million in savings from a waste reuse application
- Less variability in production
- Reduced downtime and “broke” by tracking key parameters
- Detailed reports for better decision making on electricity usage, steam consumption, and other significant costs



\$4 million
in savings in one year



Michael Cargioli, Mohawk Fine Papers' director of Ohio operations, gets up-to-the-minute reports and metrics on every key parameter important to him, including output, downtime, energy usage, and chemical consumption.



David Krupp, Enterprise Manufacturing Systems Manager, Mohawk Fine Papers



"We reuse waste more consistently, but also see less variability in production."



McNeil in Sweden chooses Proficy to increase OEE of its packaging lines



Improving OEE in the Nicorette® gum production plant in Sweden.

World Leading Product

At a location that has been manufacturing pharmaceuticals for over 90 years in Helsingborg in the south of Sweden, McNeil AB specializes in the manufacture of over-the-counter healthcare products. It is the only plant producing the world leading Nicorette family of nicotine replacement therapy products.

"We have been able to develop a customised solution, paying only for the elements we need."

— **Annette Cederhag,**
Project manager Engineering Maintenance Utility, McNeil

Introduced in 1978, Nicorette gum provides the user with a source of pure nicotine while avoiding the harmful effects of tobacco smoke. By 2005, around 18 billion pieces of gum had been produced. Current production at Helsingborg is on a 24/7 basis of between 2 and 3 billion pieces per year, exported to around 80 countries worldwide.

Research and development takes place at the Helsingborg plant. In order to satisfy differing consumer demands, Nicorette has been developed into different formats which are also produced there. As examples, Nicorette Patch entered the market in 1991 to provide a continuous nicotine supply throughout the day; 1994 saw the introduction of Nicorette Nasal Spray for quick absorption of a nicotine dose; a Nicorette Inhaler was developed in 1996 which satisfies some users' demand to have their hands occupied; in 1998 Nicorette Microtab with a slow release profile for placement under the tongue was put on the market, and in 2004 a crisp coated, sweeter and softer mint gum was added to the Nicorette family, Nicorette Freshmint Gum.

OEE Under the Microscope

McNeil is continually looking at its working practices in order to improve the way it works. This comes under its 'Right First Time' concept. Small 'Right First Time' teams are looking at a number of the processes in Helsingborg to see if they can be improved, and the Overall Equipment Efficiency (OEE) of the packaging lines has come under the microscope. This includes packaging of all the products in the Nicorette family, as well as for other products manufactured on-site, which include Microlax, an enema, and for Treo, the long established Swedish effervescent pain relief tablets. Annette Cederhag, Project Manager in the Engineering Maintenance Utility at McNeil, Helsingborg, explained: *"For many years we had used a hand-written logging system of faults on the 32 automated packaging lines for all the healthcare products we manufacture here. As we operate 3 shifts 24/7, it is very important that we minimise downtime. The packaging machines were not designed to provide a sufficient variety of error code data to give us the detailed information we needed."*

Solutions

- Production Management
- OEE
- Management reporting

Products

- Proficy Plant Applications
- Proficy Historian
- iFIX HMI/SCADA

Results

- Accurate downtime logging
- Data 'released' to improve OEE
- Downtime data available in real time
- Management reporting via intranet
- Open Proficy software enables future system enhancements

Benefits

- It helps to identify and improve areas that are causing operational inefficiencies
- It allows analyses of root causes to make data-driven decisions
- It manages operations in real-time through comprehensive reporting, which can be made accessible via the web
- Gradual implementation of new lines

“Inevitably it was very difficult to try to obtain any true analysis of downtime, so we approached several automation suppliers in Sweden for a system that would give us the capabilities we were looking for.

“The pilot projects ran in parallel for 8 months. Right from the start we consulted with our packaging operators. We have worked with them all the way from initial investigations, through the pilot projects, and through the eventual conversion to our new system. The operators’ input was invaluable and, of course, they have to operate the new technology so it was important that we developed a system they understood and that they felt they could work with.”

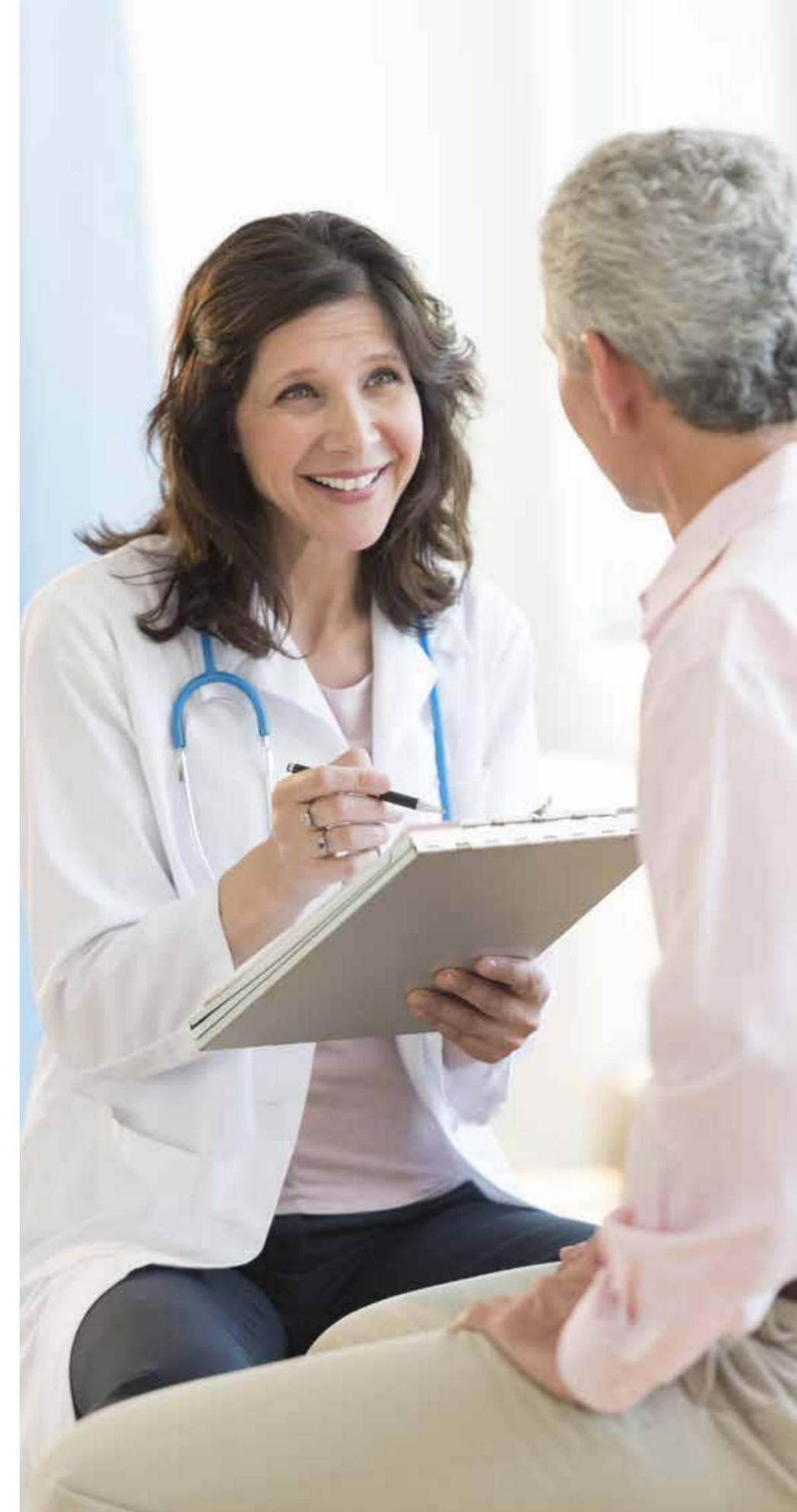
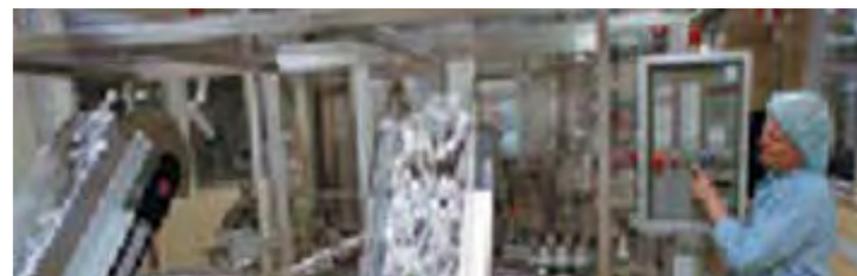
Downtime information "released" by Proficy Plant Applications

The Downtime Information Reporting System (DIRS) that was eventually developed is based on the Efficiency module of GE Digital's Proficy Plant Applications plant performance analysis and execution software. Explaining the decision Annette Cederhag, commented: *“The local Systems Integrator, Novotek Sverige AB, proved to be an excellent partner throughout the pilot project and during the conversion to the live system. They had many good ideas which we were able to implement throughout the pilot scheme as it developed. Proficy Plant Applications provides the data analysis capability we were looking for, together with the ability to interrogate the system in real time via the McNeil intranet from any authorised location.”*

The DIRS provides a tool that helps the organisation to identify the source of breakdowns, problems during shift changeovers, and other disturbances that impact the OEE, and hence productivity, of the healthcare product packaging lines. Cederhag continued: *“The packaging systems are very diverse. Over 1000 different items are used for packaging.*

They include encapsulation of Nicorette gum, Nicorette Freshmint Gum and Treo tablets, followed by boxing and wrapping. Other processes include boxing of inhalers and spray dispensers. Boxes are date stamped, etc., and encapsulated in larger batches and put in boxes for bulk delivery to locations throughout the world.” At the time of writing, 15 lines had been converted to the new DIRS. With pilots originally running on 5 lines, modifications had gradually been implemented and good practice acquired so that transfer to the live system was straightforward. New lines have been going live at 5-week intervals, with plans to accelerate the changeovers to 2-week intervals for the remaining 17 lines.

The Downtime Information Reporting System was added to the existing LAN which links into the company’s intranet. The operators’ terminals, usually one per packaging line except where the line is particularly long when there may be two, act as thin clients to a terminal server. A second terminal server provides redundancy for immediate back up should there be a problem with the first server. Mats Blohm, Automation Engineer in Engineering, Maintenance & Utilities, explained: *“This system runs under iFIX HMI/SCADA. The thin clients act as HMI inputs with a selection of on-screen buttons appropriate to the packaging line. These touchscreen buttons provide rapid input options for logging faults on the packaging line. This data, together with time stamping provided via the packaging machine’s PLC, is captured and logged on the Proficy Historian database used by the whole production facility.”*



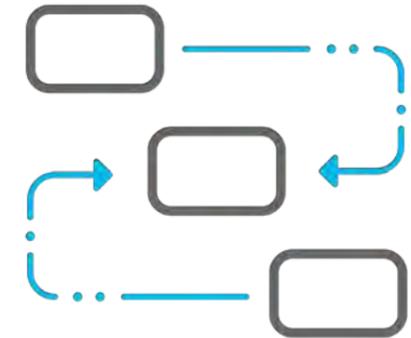
Real-time data on the intranet

"The Efficiency module of Proficy Plant Applications is now able to access this data and share it in real-time or as historical data with users at all levels on the intranet," he continued. "Each operator screen, for example, displays a table of the recent interruptions on that packaging line. Management reports can be accessed on the intranet by any authorised person. A wide range of analyses and charts is possible. For example, by packaging line, by fault type, by downtime length. From this, it is now possible to get an accurate picture of what are causing inefficiencies on each line so that the appropriate actions can be taken to increase Overall Equipment Efficiency."

As a pharmaceutical and health-care product manufacturer, McNeil follows the Good Manufacturing Practice (GMP) code of working. This ensures the overall quality of its products and is based on the positive effect, the purity, identity, strength, the production flow and procedures adopted. Standard Operating Procedures ensure that every batch of products at Helsingborg is sampled randomly, at the beginning in the middle and at the end. Stringent quality control tests have to be passed for purity, packaging, labelling, etc., before that batch is allowed to leave the plant. GMP also ensures that the company works well within the local and national environmental and health and safety requirements.

Proficy Plant Applications

The Efficiency module enables users to better utilize plant assets by providing a comprehensive view of Overall Equipment Efficiency (OEE). It is the ideal solution for managers trying to increase throughput without adding equipment, people or material costs.



"By choosing GE's software we have the reassurance of long term product support. We have been able to develop a customised solution, paying only for the elements we need. But it offers much more. Looking to the longer term, the package we are using is just one element in the complete Proficy intelligent production management suite of open programs. We can now look at our manufacturing lines with a view to easy integration using other parts of the suite."

— **Annette Cederhag,**
Project manager Engineering Maintenance Utility, McNeil



AkzoNobel (Nouryon) Connects People, Plants, and Data with GE Digital



AkzoNobel (Nouryon)



The AkzoNobel (now called Nouryon) Pulp and Performance Chemicals plant in Columbus, MI manufactures and sells expandable microspheres around the world.

A need for better traceability and scheduling

The chemical site was still managing its raw material information, processes, and finished products on paper, and didn't have a system that was able to trace what batch number each customer delivery was associated with.

Results

A vision for global planning

By leveraging Proficy Plant Applications and ROB-EX Scheduler from GE Digital, AkzoNobel was able to transform its operations.

- 20% Increase in capacity
- Decreased lead time to customer delivery
- Increased traceability of batch-to-customer
- Increased ability to spot key production trends

Global Solutions for Nouryon

- Proficy Plant Applications
- ROB-EX Scheduler
- iFIX HMI/SCADA
- Proficy Historian
- Professional Services (Production Management, Quality, Efficiency; Certificate of Analysis; SAP Integration)



Watch Video



Chewing Gum Manufacturer Unwraps Savings of \$850,000 Per Year



Results

- 10% increase in production efficiency
- Documented \$850,000 savings annually
- Significantly less waste and downtime
- Return-on-Investment (ROI) in less than three months
- Empowered key business initiatives and new business model
- Faster time-to-volume on New Product Introductions with improved manufacturing flexibility and scalability
- Increased operational visibility with real-time metrics and KPIs to drive OEE and other business improvements
- Less manual data collection - for greater time savings and accuracy
- Quicker response - with maintenance engineers automatically alerted via a text message

“We measured an increase in production efficiency of 10%, which represents \$850,000 per year savings. With pay-back in three months, we have been delighted with the ability to monitor KPIs such as OEE using the GE production management software and drive our productivity improvements.”

— Project Manager, Major Chewing Gum Manufacturer

Chewing Gum Manufacturer Increases Packaging OEE by 10% with GE Digital's Production Management Software

When this major chewing gum manufacturer decided several years ago to sell its famous chewing gum brands and instead manufacture products for other companies - which was a significant change in business model - the production and automation teams helped to drive the transformation. Manufacturing for business customers requires a greater degree of flexibility and efficiency to handle many different gum products and packaging. This transformation to a B2B focus demanded an accompanying change in production philosophy.

With a taste for innovation, the company's Automation Group focused on real-time visibility of Overall Equipment Effectiveness (OEE) to optimize production performance - and support the company's leadership in the B2B market for chewing gum. The company chose GE Digital's MES software to support its packaging line transformation. The resulting solution - featuring Proficy Plant Applications and Proficy Historian - has helped the gum manufacturer to access key metrics for improved decision-making, increase production efficiency by 10%, drive the flexibility and scalability needed to introduce new products quickly as well as new production equipment, and achieve payback in less than three months.

Fresh Ideas

More than 100 years old, this chewing gum manufacturer has always been known as an innovative company. It now has a world-class R&D center and an extensive and highly flexible annual production capacity of 35,000 tons—which

enables the company to react quickly to bring new products to production volumes and supply important customers among retail chains and owners of internationally known brands. The company's corporate vision is to lead within the development and production of innovative, private-label and private-brand chewing gum concepts. Packaging, the final step in the company's production, is extremely important to ensure customer product freshness, branding and commercial appeal. The company has expertise in a wide range of flexible packaging options. Additionally, the team can provide special, tailor-made packaging to meet customer specifications.

Today, this manufacturer packages over 100 chewing gum variants with a very high number of different product-package combinations on a number of different lines. To meet customer needs - which regularly vary in type and quantity - careful planning and efficient procedures are vital. The packaging team operates on three shifts per day, five days per week, and each shift can have several changes in product and packaging per shift, with one run carrying over from one shift to the next. With the large number of lines, individual machines, product changeovers, operators and change of shifts, the company required a means to automatically monitor the packaging process at a detailed level and analyze the operations information to significantly improve efficiency.



Bubbling with Innovation

The company's Automation Group decided to first work on a performance measuring system for the packaging lines to support the new company model - beginning with a small-scale implementation.

“We set up a pilot project with the aim of making a significant optimization increase but without getting into too much detail in the first stage,” explained the Project Leader at the company. “We defined what our OEE criteria would be, how we could reliably put a new system into practice, and how we would provide clear and meaningful visualization for those on the floor and in management. It was very important to work with the operators who would be using the system, explain the benefits it would bring to them, and seek their input.

And, finally, we needed a way to validate the results and measure clear financial gains.”

Each packaging line is almost fully automated and involves several machines. At the start of the project, the information and capabilities requirements included:

- Current machine status,
- Length of line downtime,
- Quantity of Loss of product by station,
- Production total by line, and
- Ability to produce reports and carry out analyses based on historical and ‘per shift’ data.

The project team chose a clearly under performing packaging line that offered high-volume throughput with a mix of manual and automated procedures - and began a process to review Production Management suppliers and products. The team wanted to ensure that the selected software was easy to configure and could scale up to include additional lines. They did not want to invest in a lengthy customized programming cycle, which would then leave them with challenges for long-term maintenance.

“We evaluated Production Management solutions and suppliers in terms of ease of development and implementation, price and long-term support,” the project manager elaborated. “It was very important to us that the software would be well supported by the manufacturer, and that it was ‘open,’ so

it would integrate easily into our existing software and hardware infrastructure. Furthermore, we wanted to provide enterprise access to the metrics, so ‘Web-enabled’ was also a key feature.

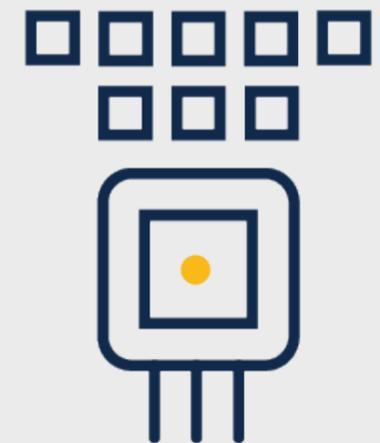
“At that time, we were not using any GE software or hardware, and the Efficiency module of Proficy Plant Applications scored highly in all respects,” he continued. “After detailed review, we selected GE’s Proficy Plant Applications and Proficy Historian as the basis for the pilot project. Proficy Plant Applications is a Production Management solution that meets all our requirements.”

Local distributor, Novotek, supplied the GE software, and the company called in a local system integrator. First, the team connected the islands of machines on the pilot line - creating a network to a new front-end PLC, which caused no disruption to ongoing production. Next, an Ethernet link from the front-end PLC to the existing OPC Server

provided a data route to Proficy Historian. Proficy Plant Applications accesses the data in the historian and delivers a ‘Scoreboard’ to a 42" plasma screen on the line. The team found the GE MES software easy to use with exceptional out-of-the-box functionality.

“Proficy Plant Applications and Proficy Historian proved to be straightforward to configure and install,” the chewing gum manufacturer's project manager noted. “Additionally, being object oriented meant that it would be easy to roll out to other packaging lines after we had proven the first.”

In the pilot - and today - the Scoreboard charts the shift productivity curve and displays key information such as the current productivity, the line stoppage time, total production per minute and wastage. The software also produces reports showing the productivity curve and stoppage times.



Results that Stick

As a result of the pilot project, the team was able to show that OEE could be measured - and significantly improved. The Scoreboard and reports helped to demonstrate overall improvements on the line.

“We obtained return from the pilot project that justified investment in additional new hardware and software across eight other lines,” he explained. “Production line leaders used the software to determine key areas to intervene and raise productivity. Operators are also pleased to have recorded documentation to explain their actions and point out ways of improving production.”

A second generation of the pilot Scoreboard now features an efficiency bar - which changes color as line efficiency moves in and out of target ranges. When the rate falls below a certain percentage, the GE MES software automatically alerts maintenance engineers via a text message to attend immediately to the particular packaging line. The Scoreboard also provides visualization for:

- Overall shift production efficiency
- Current efficiency
- Shift downtime
- Production
- Shift efficiency history

While local visualization is extremely valuable, enterprise-wide availability of Key Performance Indicators (KPIs) has been critical to success of the project. Production leaders and other management personnel can now access KPIs over the web to

monitor each packaging line in real time and call up the same Scoreboard that appears at the individual lines. Managers can also drill down into specific historical points on the OEE graph to discover more detail about causes for decreases in efficiency. Furthermore, the company's Automation Group has developed plant-wide visualization for management that immediately shows each production element and its current OEE - complete with real-time drill down capabilities.

Sweet Success

After completing nine packaging lines, the company assessed the full effect of the OEE project. “When comparing before and after introduction of the Scoreboards, production efficiency has increased by 10%,” the project manager noted. “With this increase in OEE, we achieved return on the investment in less than three months.”

With the success of the pilot and expansion to eight additional lines, the team is now expanding to seven more lines in its continuing initiative to improve OEE. The team has a goal to increase OEE further and close the efficiency gap by 50%, understanding that some packaging line stoppages to accommodate changes in product and package are necessary. The company will continue to modify working practices and improve the effectiveness of individual machines and lines, based on input from the GE MES software. Reporting will convert from statistics based on individual shifts to product batches. The team will also increase the ability of operators to enter fault-reporting data through Operator Interfaces on every line. And, the team will integrate the data from the GE MES software solution into the company's ERP system to enable enterprise-wide communication for transformational results across the business.

Just as this chewing gum manufacturer turned to GE as its first choice for MES software, the company's customers can stick with this successful manufacturer as their first choice for development and production of innovative private-label and private-brand chewing gum concepts - with the efficient, fast and flexible manufacturing to exceed their needs.

Proficy Plant Applications - Efficiency Module

The Proficy Plant Applications Efficiency module allows the gum manufacturer to better utilize plant assets by providing a comprehensive view of overall equipment efficiency. With drill-down capabilities to identify and monitor areas for improvement, Efficiency is the ideal solution for managers trying to increase production throughput without adding equipment, people and material costs.

Proficy Plant Applications Efficiency can:

Identify and improve areas that are causing operational inefficiencies.

- Minimize scheduled and unscheduled downtime events
- Reduce waste and rework
- Improve machine run-time effectiveness



Perform root cause analyses to make data-driven decisions

- Gain insight into production operations by shift, equipment and products
- Evaluate operations over any period of time — from real-time to annual summaries
- Link capital expenditures to expected plant profitability improvements

Manage production operations in real time through comprehensive reporting

- Track uptime, downtime and overall plant and machine efficiencies through web-based KPIs
- Schedule reports for all decision-makers - from operators to plant managers
- Notify on exceptions to desired operations to make real-time changes





Jaguar Land Rover Improved Ability to Handle Complexity and Variability in Demand



Challenge: Increase output to meet rapidly growing global demand. Develop robust MES to serve as the new standard across expanding network of global facilities.

Action

- GE and its Professional Services team was chosen by the customer to build out the global blueprint for the MES system
- New MES was designed using CIMPLICITY and Tracker and deployed in a new production facility in Brazil. The MES was extended to a new site in the Middle East and 4 existing sites in the UK

Results

- 6 customer sites operating on new MES using CIMPLICITY and Tracker
- Increased total output and revenue





Leading Computer and Peripherals Manufacturer Reduces Costs by \$40+ Million with Proficy Software



Savings estimated at \$40+ million, rollout across 12 factories

Challenge

This major computer manufacturer saw the number of custom applications used in its factories spiraling out of control and decreasing efficiency. Complex products on high-speed production lines.

- Common manufacturing environment at all facilities adaptable to the dynamic needs of the PC market
- Maximize Lean manufacturing principles
- Support Build-To-Order business model, producing computers at a rate of up to 1 per second
- Eliminate several out-of-date disparate systems
- Control costs of system deployments

Action

The Proficy solution integrates with the manufacturer's world-class Build-To-Order practices, supporting Kitting, Assembly, Burn-In, and Shipping operations with highly automated conveyor systems. The system routes orders to the most effective Kitting, Assembly and Burn-In stations, based on the company's business rules, and allows for Continuous Improvement through modification of these business rules versus disrupting production.

- Planning and implementing a single, standardized applications layer
- GE Digital's Proficy software deployed as a supervisory standard SCADA and MES for production tracking and order execution management
- Mobility for easy access and real-time data on the go
- Dashboards/portal and industrial data management

Result

- ROI estimated \$40+ million and Estimated \$3.7 million US savings per year at a single factory
- Expansion to 11 other factories
- 20% reduction of inventory
- 2% efficiency improvement
- Waste reduction through improved genealogy tracking in upstream processes
- A repeatable solution that is centrally supported and maintained and easy to deploy in new factories
- Metrics including units per hour, total units produced, cycle time, and work-in-progress levels in different areas – in real time – and with much greater detail and accuracy





SEPR Italia optimizes production with Proficy[®] Software and Services



Background

In line with its continuous commitment to boost its digital performance, SEPR Italia, SEFPRO's plant in Mezzocorona, Italy, has considerably accelerated its digital transformation journey through GE Digital's Proficy Plant Applications, a proven solution which leverages real-time production data to optimize operations.

Automating data collection to improve on-site efficiency

At the Mezzocorona plant in northern Italy, a significant amount of time was spent collecting production data on paper. It became crucial for SEPR Italia to step up its digital strategy and automate its data collection process to improve on-site efficiency. In order to speed up this digital transformation while meeting glass makers' ever-growing expectations regarding quality, service, responsiveness and innovation, SEPR Italia turned to the Proficy solution.

Working with Proficy Professional Services team, SEPR Italia implemented a comprehensive solution in a four-tier Proficy architecture featuring:

- Automation with iFIX HMI/SCADA
- Manufacturing Execution Systems (MES) with Proficy Plant Applications
- On-prem data management with Proficy Historian
- Cloud-based data management with Proficy Manufacturing Data Cloud (MDC)

Products

- Proficy Plant Applications
- Proficy Manufacturing Data Cloud
- iFIX
- Proficy Historian



95%

Plant production data collected through Proficy

Higher quality

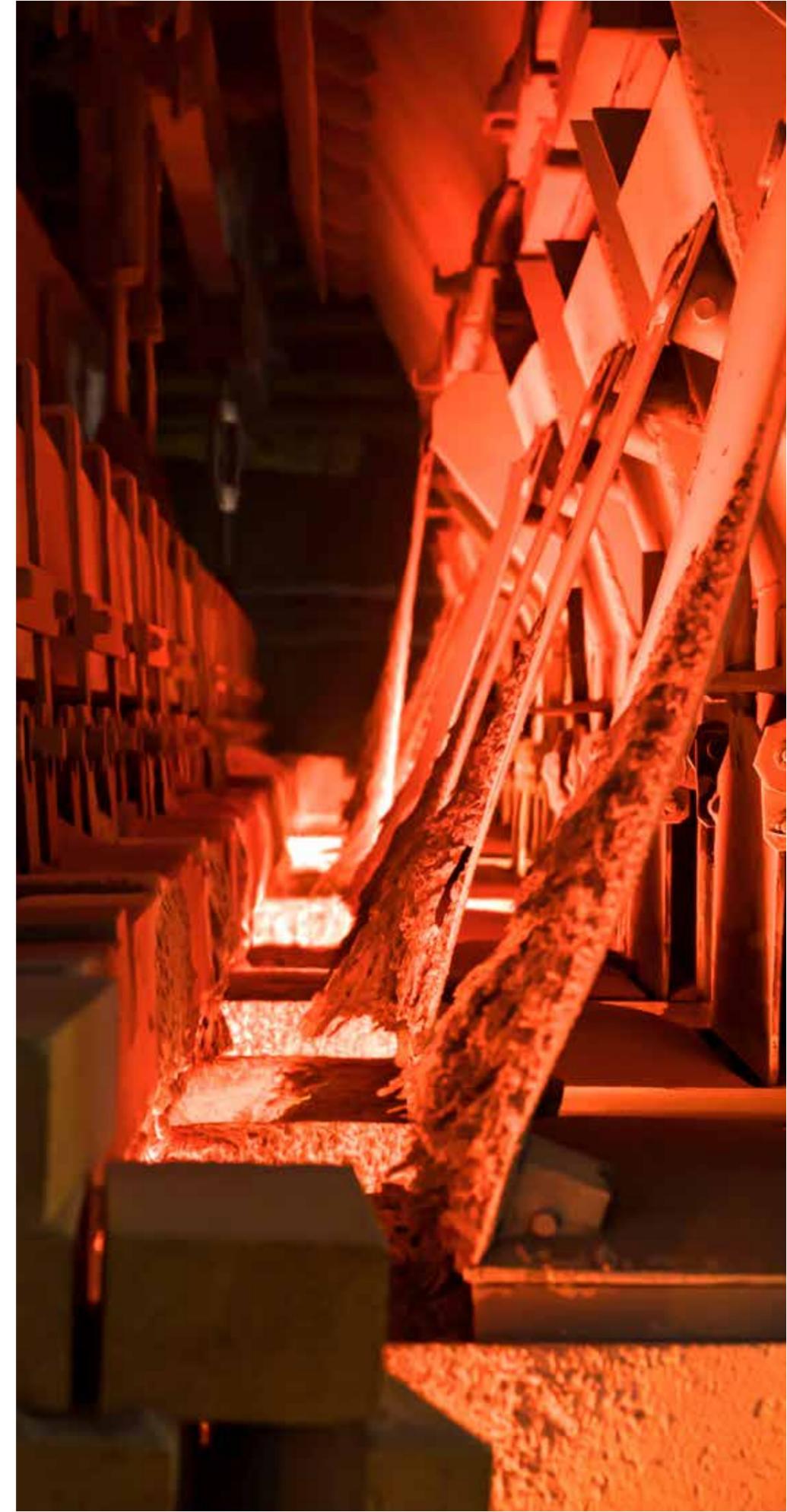
Full data traceability

Enhanced plant safety

Improved monitoring and detection

Lean

Optimized plant performance



Increased skills, expertise and visibility through Proficy solution

The first step towards digitalization was to roll out an effective staff training in using the Proficy software solution. Once this was successfully completed, all plant operators based in the production workshops were equipped with dedicated computers which are now essential tools in their daily data collection.

In addition to significantly reducing the time spent collecting production data, the Proficy software solution has driven successful change management through all levels of the Mezzocorona plant organization by putting into effect these new data collection methods and processes.

More important still, full data traceability enabled SEPR Italia to set even higher quality and reliability standards. This enhanced

As of now, up to 95% of the Mezzocorona plant production data is collected through the Proficy automated solutions. And with these new automated processes and lean manufacturing approach came extremely significant and positive impacts on the plant's performance.

data traceability also allows our Mezzocorona operators to have a quicker response to tenders and to benefit from an improved monitoring of the plant's performance and a higher mid-term and long-term visibility.

Last but not least, the Proficy software has contributed to enhanced plant safety by allowing closer monitoring and better detection of potential complications which could affect on-site safety.

Global digital transformation journey

SEPR Italia's success towards full digitalization marks only one of the first milestones of SEFPRO's efforts to accelerate its global digital transformation.

Each plant having its own area of specialization and expertise, SEFPRO has now undertaken the challenge to upgrade its production data collection processes in every plant it operates across the world, in line with its long-standing commitment to provide all glass makers with the best refractory solutions.





Global brewer increases capacity while reducing costs



Challenges:

- Downtime and waste
- Losses and cycle inefficiencies
- Inability to monitor and analyze variations between brew streams

Results

- *10%-15% improved OEE*
- *3%-5% increased yield at seven breweries due to reduced process variations*
- *Automated identification and analysis of top reasons for downtime*



Proficy improves process consistency and uptime across lines and plants.

Products

- Proficy Plant Applications
- iFIX HMI/SCADA
- Proficy Historian
- Proficy Workflow
- IGS





Zilor Energy and Foods

Continuous Innovation = Continuous Improvement



The Zilor Energy and Foods company, a global sugar, ethanol, renewable electric power, and natural ingredients manufacturer headquartered in Brazil, has experienced a step-wise journey as a Digital Transformation leader, investing and continuously improving its operations for 20+ years, making data-driven decisions, and benchmarking against peer manufacturers.

Partnering with GE Digital and regional representative Aquarius Software, Zilor Group started with CIMPLICITY HMI/SCADA, IGS, and Proficy Historian. Their next implementations included Proficy Plant Applications, Proficy Batch Execution, and Proficy Workflow.

In 2021, Zilor's natural ingredients division - Biorigin unit implemented self-serve analytics with quality engineers and technicians, using Proficy CSense for AI and data from Proficy Historian resulting in an increasing to 7% in their fermentation area after five months from project start.

Challenges

- Diverse production operations – including sugar, ethanol, electric power, and natural ingredients
- Plant locations in multiple countries
- Continuous improvement: quality, throughput capacity, yield, efficiency, etc.

Results

- 7% increase in fermentation area
- Greater throughput and productivity
- Better quality control
- Ability to track product genealogy





Improving Tobacco Products Manufacturing with Sigma-Level Assessment and Optimization



Challenges

- This manufacturer sought to improve real-time quality control through Sigma-level assessment
- Time-consuming test processes
- Operators apt to make errors when estimating results

Actions & Results

- Adopted Proficy Plant Applications for real-time data collection and analysis
- Data storage uses Proficy Historian, collecting data every 6 seconds and carrying out the acquisition of frequency and phase for each tag point. Historical data is archived using GE's efficient compression algorithms
- Steady-state process control with digitization as the core
- Sigma level improved from 3.05 to 4.03 for higher quality and reduced raw material usage
- Key Performance Indicators (Complex Process Capability index)
- Solution includes: evaluation model management, data preprocessing, process standard management, silk workshop model management, roll package calculation model management, formula library management, results display, and more
- Calculates defect quality inspection statistical process, using the number of defects per million opportunities DPMO (Defects Per Million Opportunities) then synthesized according to the three-layer relationship of process, workshop, and enterprise





Leading American Dairy

50% decrease in the time taken for quality control audits



Reducing time taken for quality control audits by half

Challenge

This leading American dairy produces and distributes cheese, yogurt and other products. It faced lengthy processes to ensure high-quality food production and a lack of data-driven visibility.

The customer needed to reduce quality control process time and streamline ERP systems. Strict quality control standards enforced by FDA drove the customer to spend significant time testing food safety. The company needed to accelerate these quality control processes. Furthermore, the company also needed to gain visibility into root causes of unplanned downtime.

Action

- Implemented GE's Proficy Plant Applications to get connected, drive a modern manufacturing execution system (MES) across its enterprise, and launch a digital transformation journey
- Streamlined ERP systems and automated quality reporting on production floor
- Enabled incisive, root cause analyses of unplanned downtime



Working with GE Digital, the company deployed Proficy Plant Applications, initiating a Smart Factory digital transformation journey. For the customer, this technology enables automated quality control reporting on the production floor and messages with the company's ERP systems. The Proficy MES solution also enables root cause analyses of unplanned downtime. Once explanatory variables of unplanned downtime are identified, they can be isolated, and processes can be put in place to ensure that type of downtime doesn't recur.

Results

- 50% decrease in the time taken for quality control audits
- Ability to disseminate root cause analysis of unplanned downtime to plant and operations leadership.
- Ability to record and track process improvements
- Culture change driven by digital transformation

The company underwent a culture change as it took full advantage of the MES technology and digital transformation journey. The customer engaged plant personnel with the digital technology enhancements, and the operations teams are now inspired to fully leverage the gains realized by harnessing data.





Packaged Kitchenware Manufacturer

Saves Nearly \$1M Per Year Replacing Obsolete Plant Floor Reporting System



Overview

This Kitchenware Manufacturer produces packaged bakeware, dinnerware, kitchen tools, range-top cookware, storage and cutlery that's sold in stores across America, as well as high-end retailers in parts of Asia, Europe and South America. With around 3,000 employees, they have major manufacturing and distribution operations across North America and the Asia-Pacific regions.

Challenge

The Kitchenware Manufacturer's legacy plant floor reporting system had become obsolete. The outdated system was difficult to operate and required multiple personnel to manage and support. The system lacked real-time data and analytics

and had an inefficient manual input process – data had to be printed out and manually entered into a spreadsheet for analysis.

Proficy Plant Applications identified micro stops as the biggest cause of downtime.

Solution

GE Digital partner AutomaTech analyzed the Kitchenware Manufacturer's process and worked to understand the financial implications of implementing Proficy Plant Applications. With thousands of success stories around the world, Proficy Plant Applications automates and integrates information-related activities for managing production execution and performance optimization.

With data from Proficy Plant Applications, dashboards were created that provided real-time feedback – allowing real-time changes and greatly simplifying the quality change process.

Plant performance data is automatically uploaded into the corporate business information warehouse using Proficy Plant Applications, giving high-level management more visibility into plant operations.

"One of the best parts about working with AutomaTech is getting that 24/7 support. Whether it's AutomaTech or GE, I have a large support network, so I never feel like we're left alone on an island trying to figure it out."

Plant Manager, Packaged Kitchenware Manufacturer



Results

Quality issues were caught earlier, and specification and recipe management improved with better product quality because of access to real-time data.

With higher visibility of downtime and machine underperformance, behavior is different on the plant floor —resulting in reduced downtime and improved machine performance.

Decisions have become more data driven and the savings have been significant.

Unscheduled downtime reduced by more than 30%, with estimated savings of \$700,000 per year.

Proficy Plant Applications also eliminated numerous paper documents because it automatically creates reports with no additional labor – including Excel add-on tools for greater insight of anomalies in the process.

The automated reporting functions are estimated to save them more than \$100,000 per year.

About AutomaTech

[AutomaTech](#) is a leading provider of industrial technology solutions focused on improving your operational performance. By harnessing the power of data, we enable significant gains, visibility across your entire organization, and increased profits for a competitive edge. Our product offering includes a flexible and scalable mix of hardware and software solutions to solve your toughest challenges while providing a roadmap for future improvements and growth.





Global Personal Paper Manufacturer

\$649K per year savings due to increased OEE



Global Personal Paper Manufacturer

Challenge

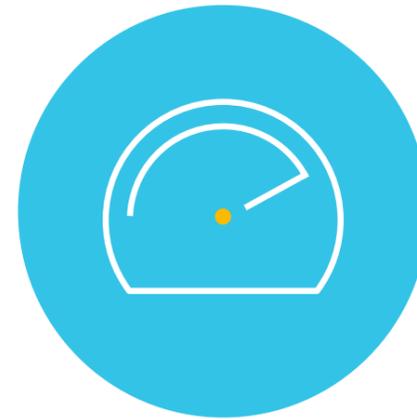
- Lack of understanding into production downtime
- Product quality issues
- Need for increased profit margins on high-volume products

Action

- Implemented GE's Proficy software including Plant Applications and Historian to collect and analyze the manufacturer's operations data in the proper context for greater operational insight
- Analytical tools resolved downtime issue on Line 1, driving corrective actions
- Identified that quality issues on Line 2 were due to the line running too fast

Results

- \$295K annual savings due to increased OEE on Line 1 by 1.55%
- \$354K annual savings due to increased OEE on Line 2 by 5.93%
- Reducing the line speed enabled decreased quality issues and increased OEE for optimized inventory stock levels and improved profitability



Consumer
Packaged
Goods |
Global

\$649K

per year savings due to
increased OEE





Symeta Hybrid Achieves Higher than 99% Delivery Reliability



Symeta Hybrid is the specialist in personalized customer communication. Thanks to a unique printing technology and creative possibilities with paper carriers, they provide a personal message tailored to the customer - even when it involves millions of unique documents. The company is a leading service provider in customer communication.

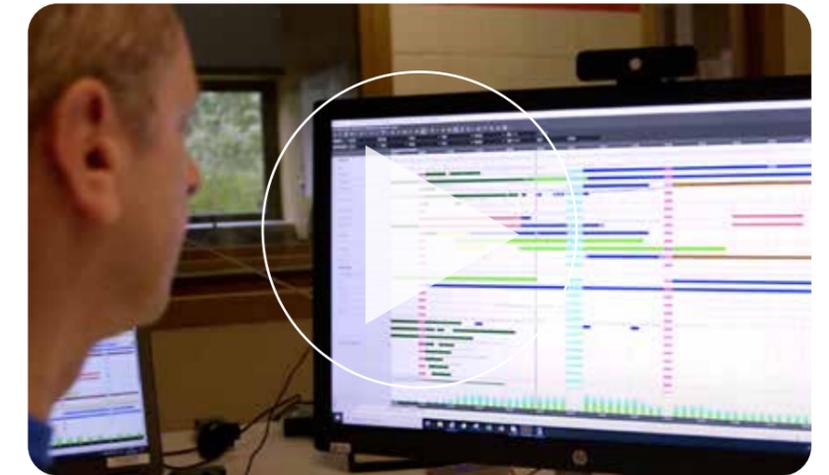


To optimize operations, Symeta Hybrid took the step toward full digitization of production control in order to further guarantee delivery reliability and monitor machine efficiency in real time.

Today, Symeta Hybrid prints and mails 1,800,000 personalized pages for its customers every day, leveraging an innovative solution featuring Proficy Plant Applications, ROB-EX Scheduler, and CIMPLICITY HMI/SCADA from GE Digital's partner, Novotek.

Assignment of orders and insight into line performance

Symeta Hybrid came to Novotek with the question of how to optimally allocate production orders to the lines and follow them up in real time, building on a foundation of CIMPLICITY HMI/SCADA. In addition, they wanted better insight into line performance by preferably automatically registering the stoppages and reasons for stoppages.



Watch Video

Solutions

Implementation of the software for production planning, order execution and OEE registrations

After mapping the requirements and wishes, system integrator Ordina set to work on the implementation of ROB-EX Scheduler for the detailed scheduling part and Proficy Plant Applications for the order execution and OEE registration part. By placing a screen on each line with up-to-date order information and real-time line performance, the operators know exactly what is expected of them and whether they need to make adjustments to meet the planned delivery time.

Real-Time Visibility and Actionable Information

With the new system, the planner has an up-to-date overview and assigns the orders to the lines. Operators know at any moment which order they need to start at which production line.

Each downtime event is recorded with detailed reason information as a basis for improvement. Furthermore, for each line, the actual performance is calculated.

The planner sees the actual status and progress of all orders in real time and can take action where needed. Additionally, management is provided with insights into production yield and potential improvements.

Results

Maintaining a delivery reliability of >99%

Partly due to this digitization, Symeta Hybrid has managed to achieve a delivery reliability of greater than 99% - including at a time when more and more and smaller orders were being processed. In addition, the system provides input to improvement processes, such as optimizing the line speeds. With a digital production control system, Symeta Hybrid can look to the future with confidence.

Products

- Proficy Plant Applications
- ROB-EX Scheduler
- CIMPLICITY HMI/SCADA



Minimal downtime saves Coloplast vital resources



At Coloplast, the innovative and world-renowned provider of healthcare products and services, the need for an efficient packaging flow for its wide range of wound care products is ever increasing.

By installing new Proficy OEE software on all its packaging machines and working with GE Digital partner Novotek, Coloplast is gaining unrivalled insight into the various causes of operational downtime. Simultaneously, automated production data analysis can speed up downtime diagnosis, providing production managers with more knowledge of what action to take to keep the vital packaging process up and running.

"Tried-and-true technology from Novotek has given us the flexibility and transparency we need to maintain superior quality in our dynamic packaging process."

— Birger Andersen, Project Manager, Coloplast, Denmark



Fast Response Times

As packaging is at the end of a highly specialized production process, flexibility is vital if Coloplast's round-the-clock packaging operations are to keep running smoothly. Naturally, when short-notice shifts and unscheduled production halts occur during packaging, operators must respond immediately. With Proficy software automatically surveying every packaging step on every machine, problems can be identified and solved when they first arise, cutting response times to a bare minimum.

High Transparency

A detailed overview of several hundred downtime causes provides Coloplast with a fully transparent packaging process. Both scheduled and unscheduled stops are registered and analyzed, and numerous analytic options are presented. Management can then quickly isolate variables, detect downtime patterns and draw detailed downtime profiles for each machine and packaging step.

Solutions

- Production Management
- Global downtime analysis
- Plant information

Products:

- Proficy Historian
- Proficy Plant Application—Efficiency
- iFIX HMI/SCADA

Benefits

- Increased line and machine efficiency
- Fast response times
- High transparency
- Realistic predictions
- Web-based reporting

Realistic Prediction

With the detailed historic data from each machine, combined with the in-depth downtime knowledge, management can also accurately predict future packaging capabilities. The Proficy data computation forecasts are accurate right down to number of units on a day-to-day and individual machine basis, so manpower is allocated most effectively and the budgeting process is enhanced. Predictions are no longer based on feelings and hunches but on facts and indisputable data.

Common Standards

By introducing the Proficy OEE machine downtime analysis to several packaging processes, Coloplast has reaped the benefits of having a single knowledge base. Comparisons of packaging quality between product lines and divisions reveal the causality needed to optimize every step and component of the packaging process, on single machines, at product-type level and on a company-wide scale.

More User-Friendly

Coloplast wanted to provide its production crew with easy to-understand functionality, so a tailor-made front-end user interface was integrated into the iFIX SCADA package. By way of a logic and intuitive control environment, operators know exactly where and why production has stopped. And as the touch-screen user interface resembles the familiar manual touch-button environment, operators can instantly report and correct OEE problems.



“Before we installed Proficy OEE software, it could take two weeks to manually pinpoint downtime problems from perhaps ten known causes. Today, we have a clear knowledge of over 200 possible causes from one day to the next.”

— Birger Andersen, Project Manager
Coloplast, Wound Care Div.



Snack Producer Bags Productivity Gain



Challenge

- Difficulty maintaining delivery schedules
- Poor understanding of line efficiency
- Inconsistent holds management
- Excess costs due to batch loss



Results

- Reduced waste up to 90%
- Significant capacity recovery
- Reduced labor in production and supporting activities for reassigning to higher value tasks



Rich Data for Downtime and Waste Analysis

GE's Proficy Plant Applications Efficiency module provided a non-intrusive way to interpret machine data related to downtime and waste. Seamlessly integrated with existing control and HMI solutions, Proficy Plant Applications provides the firm's continuous improvement teams with rich data that guides loss analysis and equipment troubleshooting.

Products

- Proficy Plant Applications – Efficiency Management and Batch Analysis modules
- iFIX HMI/SCADA
- Proficy Historian
- IGS

Success Brings Global Rollout

The ability to easily expose relationships between machine performance, material performance, and quality enabled this producer to “engineer out” many causes of loss. Because of the outstanding financial and operational results achieved, this firm is now expanding its usage of Proficy to cover batch operations and will roll out a standardized solution to all of its facilities.





Jotun increases efficiency with fully-automated paint manufacturing process

About Jotun

Jotun develops, produces and sells cost-effective paint and coating products, and provides customer service and technical support to residential, marine and industrial markets worldwide.



Facts

COMPANY

Jotun

SOLUTIONS

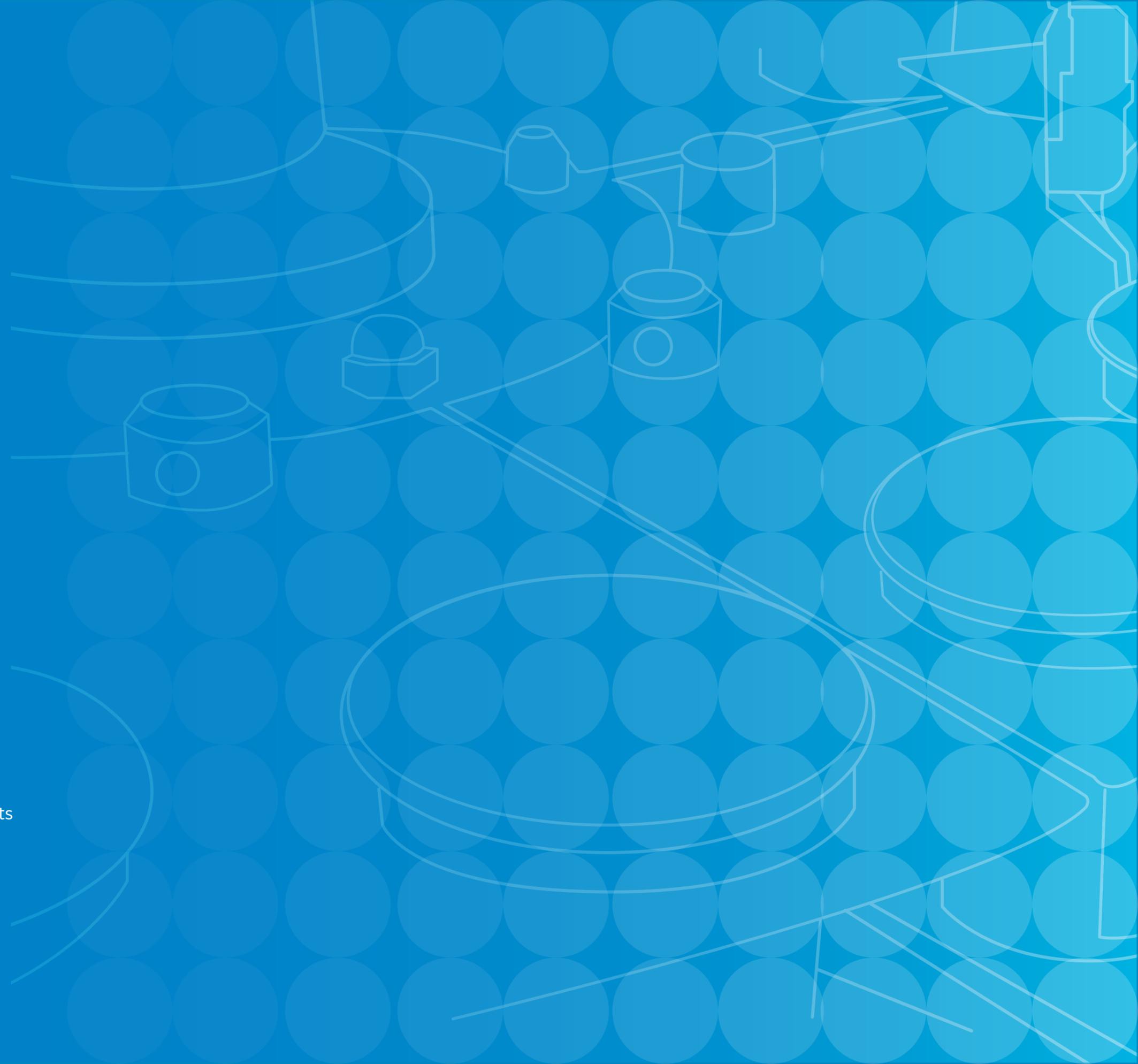
- Production management
- S88 batch execution
- Business system integration
- Plant / enterprise historian for data capture and analysis
- HMI/SCADA
- Work process management

PRODUCTS

- iFIX HMI/SCADA
- Proficy Batch Execution
- Proficy Plant Applications
- Proficy Historian
- Proficy Workflow
- IGS

BENEFITS

- Produce 5 times as much per person as other plants
- Fully automated S88 batch production
- Recipes stored in database
- Production tracking and tracing
- Raw material status reports
- Integration with business system



When Jotun modernized one of its Norwegian production plants, it chose a system based on GE Digital's Proficy Batch Execution.

The fully-automated plant manufactures as much as a plant with five times the labor force.

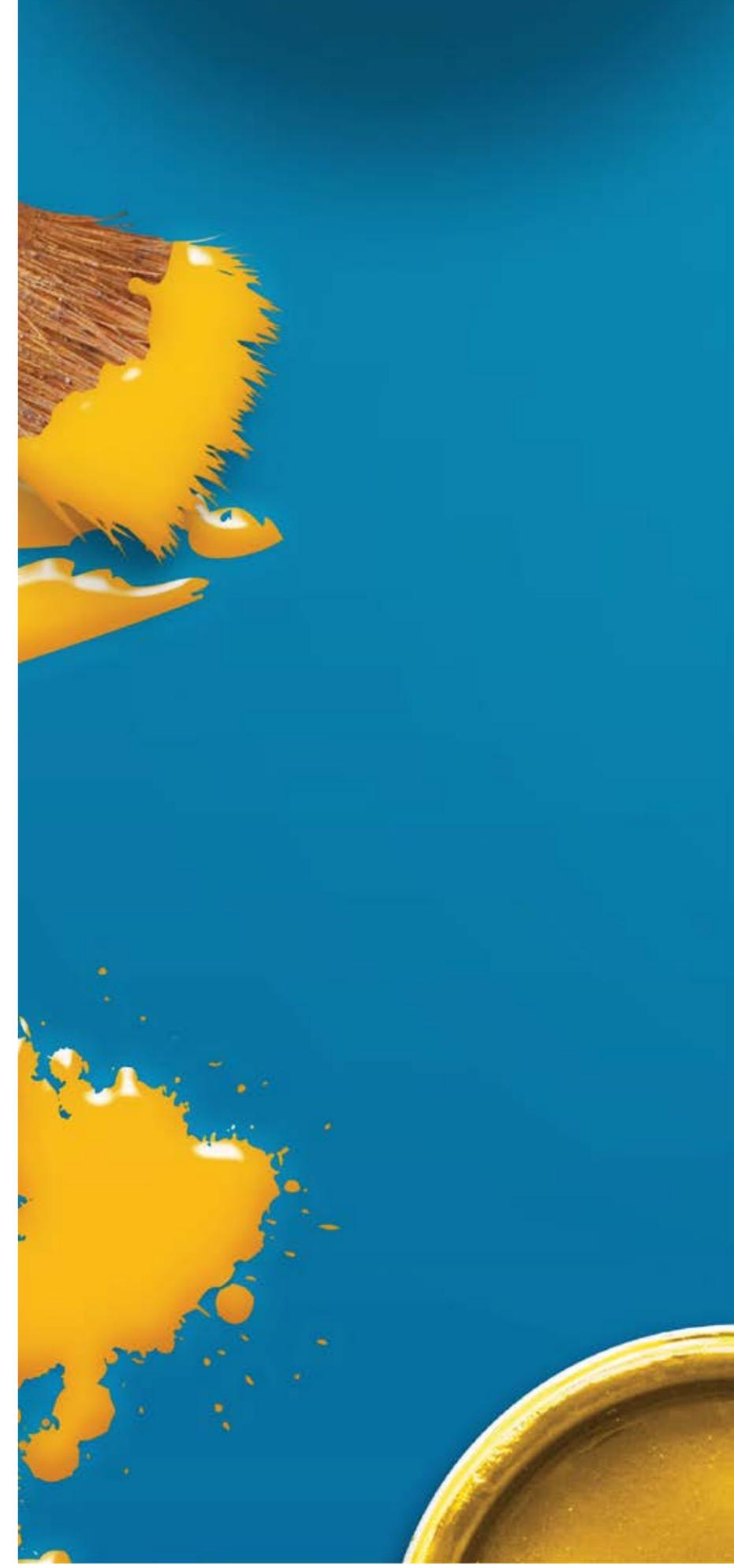
Jotun is a Norwegian Group with 4,500 employees and 36 production plants in Europe, the Middle East, Southeast Asia, Australia, South Africa and the USA. The Group has an annual turnover of about NOK 5.5billion.

"Our largest product area in the Scandinavian countries is decorative paints - interior and exterior house paints," says Jan Lorentzen, Senior Engineer in charge of evaluating and buying automation services. "The decorative paint segment answers for most of the turnover in the Middle East as well. We are the market leader in marine coatings for the shipping industry in the rest of the world."

There are four production plants in Norway, two of which are in Sandefjord, home to the Group's head office. One of the plants in Sandefjord, Vindals plant, was converted into a fully-automated batch plant, built around Proficy Batch Execution, iFIX HMI/SCADA and other GE Digital products, in conjunction with GE Digital partner, Novotek.

"The operators run the entire production process from a control room," explains Jan Lorentzen.

No one is present in the rooms where the paint is manufactured. Production is recipe-controlled, and the recipe for each batch is transferred from a master database. Novotek not only supplied the software for the batch system at the Vindals plant, but also handled all programming and commissioning.



Twenty can do the work of one hundred

At the Vindals plant, 12-13 million litres of paint are manufactured every year, and about 20 people work at the plant. Compare this with the second plant in Sandefjord, which is not as automated and manufactures several products which, in terms of volume, correspond approximately to the same volume of paint but require about 100 employees.

“Full automation allows a small staff to handle production,” notes Jan Lorentzen.

The Vindals plant manufactures large batches every time, and this batch system has proven to be quite profitable. Proficy Batch Execution is used as a control system that is part of a master system and is integrated with, among other systems, Jotun’s business system. Raw material status reports are produced continuously, for instance, which makes things easier for the procurement organization.

Longstanding Partnership

Jotun’s partnership with Novotek began many years ago. Today, the company has GE Digital software solutions from Novotek at several production plants. In addition to Jotun’s plants in Sandefjord, GE Digital products are used in Frederikstad, Dubai, Thailand and at the plant on the outskirts of Shanghai in China.

“The main reason for using Novotek as our supplier so often over the years is their ability to understand our needs and collaborate,” concludes Jan Lorentzen. *“Obviously Novotek’s products are good, but the deciding factor is the people at the company - their flexibility and customer orientation.”*





Neenah Paper Improves Quality with Proficy Software



For more than 100 years, Neenah Paper has been a market leader in specialty papers for premium writing, text, cover, digital, packaging and label applications.

At Neenah Paper, quality standards are of utmost importance. They use GE Digital's [Proficy Plant Applications](#) to ensure quality in their manufacturing. They verify and test the caliper, which is the paper's thickness, along with the porosity and weight, among others. If the paper is not up to specification, they do not ship it to their customers.

With GE Digital's Proficy Plant Applications Quality module, Neenah Paper's operators and the Quality Assurance Department are able to visualize the data. If something is out of specification, an alarm will notify the operator.

IT's role at Neenah Paper is to provide support to the business, focusing on software systems that can improve their operational performance. By harnessing the power of Neenah Paper's data, they can help with continuous improvement.

Garrity explains how he wants to take the manufacturing process to a different level and provide business users with the ability to get the data on their mobile devices, so they can make decisions anywhere. He reached out to GE Digital's partner AutomaTech to help with this project. He says that he values their customer service, professionalism, and expertise.

WATCH VIDEO

Results

- Ensuring quality in manufacturing
- Increased visibility for continuous improvement
- Information anywhere, anytime to support decision making

Products

- Proficy Plant Applications
- iFIX HMI/SCADA
- Proficy Historian

About AutomaTech

[AutomaTech](#) is a leading provider of industrial technology solutions focused on improving your operational performance. By harnessing the power of data, we enable significant gains, visibility across your entire organization, and increased profits for a competitive edge. Our product offering includes a flexible and scalable mix of hardware and software solutions to solve your toughest challenges while providing a roadmap for future improvements and growth.

“Software in manufacturing helps us out for decision support. We do need quality and timely data to understand how our product is performing and if our customers are satisfied.”

—James Garrity - Senior IT Analyst, Neenah Paper





Mouthwash Manufacturer

30% faster new product introductions



Mouthwash Manufacturer

Challenge

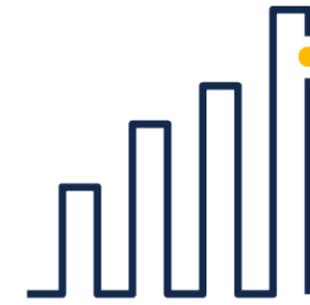
- Increased pace of product launches – need for equipment and recipe flexibility
- Optimization: analytics and reporting – yield comparison, set up raw material tracking, batch analysis for process optimization

Action

- Implemented GE Digital's easy-to-deploy, high-availability Proficy solution including HMI/SCADA and MES software
- Scalable, flexible solution that plugs and plays for efficient production reporting and process analytics

Results

- 30% faster new product introductions
- Improved scalability – easy to expand as the site grows
- 12% increased yield due to reduced process variations
- 5% reduced waste due to better process visibility
- Increased capacity and quality
- Easily adapts to the requirements of new product launches and recipe changes, increasing productivity and lower total cost of ownership



Consumer Packaged Goods | Americas

30%
faster new product introductions





GE: Multi Modal in Pune, India Sees 25% Increase in OEE



45% to over 70% overall equipment effectiveness (OEE) in connected machines

Challenge

Cost overruns, limited real-time visibility, lack of unified system to access technical information and quality data. Lacked sufficient sensor enablement and digital tools to support predictive maintenance of critical machines.

Action

- Connect 26 CNC machines to GE Digital's Manufacturing Solutions
- Analyze machine data and create plan to reduce machine downtime and enable operators to view 3D instructions
- Modelled machine data with maintenance history
- Diagnosed health conditions providing predictive recommendations

Result

- \$4MM investment avoidance for 3 CNC machines
- Connected machines across processes for real-time tracking
- \$170,000 expected annual savings through MTBF improvements
- Payback period of 1.2 years





Australian brewery improves scheduling accuracy and inventory tracking





Challenges

- Difficulty adhering to scheduled quantities, over-runs and under-runs of orders in packaging
- Inventory and material consumption inaccuracies
- Coordination of changeovers and material waste

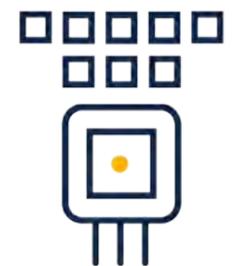
Results

- **35% reduction in product waste**
- **5% increase in packaging productivity**
- **90% decrease in finished goods holds and packaging waste**
- **Tighter schedule adherence**

By linking plant and business systems, Proficy enables more precise coordination and control.

Products

- Proficy Plant Applications
- iFIX HMI/SCADA
- Proficy Historian
- IGS



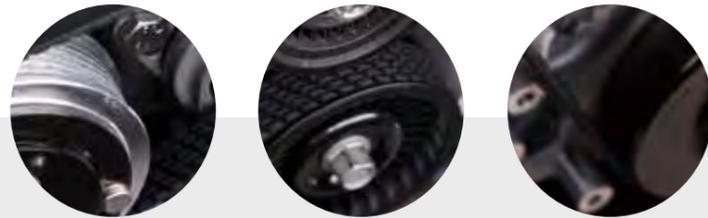


Industry-Leading SUV, Truck, Sedan and Minivan Plant Accelerates Production



Challenges

Accelerate North America production capacity to support brand image. Maximize the intelligence on the manufacturing floor for production management control.



Action

- GE, its Professional Services team, and a Global Automotive company expanded their existing relationship (now 25+ years) to build one of the most productive plants in North America using CIMPLICITY, Tracker and Proficy Historian
- Enabled the auto manufacturer to achieve flexible manufacturing
- Tracker and CIMPLICITY are at the heart of the OEM's Production Management Control System (PMCS) to add as much intelligence to the manufacturing floor as possible. The plant's PMCS is a critical component of the OEM's integrated manufacturing strategy that requires a collaborative effort with the company's supply chain, providing a foundation for a Just-In-Time (JIT) environment.
- Other major plant systems, connected to CIMPLICITY, include the Energy Management and Control and the Paint Control Room
- CIMPLICITY controls all of the data transfer, and the system's flexibility allows the team to connect to and span the entire operation. The plant starts with metal for white body assembly, through the paint shop and to Trim & Chassis for final assembly. The OEM is controlling operations within the plant and also connecting to other plants as well as the enterprise systems and supply chain



With more than 1.2 million I/O points, the PMCS:

- Tracks and routes vehicles and parts through the entire manufacturing process
- Delivers information to over 150 shop floor devices
- Moves vehicles from the body shop, to paint shop, to final assembly
- Broadcasts messages to suppliers to notify them to deliver required commodities at the necessary time, in just the right quantity, and in the correct sequence
- Provides a comprehensive, easy to use, real time and web-based interface for system analysts to keep production fluid

Results

The OEM deployed more than 80 plant floor and control room systems in a fast rollout. The plant achieved a highly available and sophisticated hardware/software architecture without having to spend large sums of money and without hiring large teams of engineers to maintain the system. The key was to plan the infrastructure and implement it using a high degree of automation.

This reduced errors and accelerated the roll-out process immensely.

With the plant-wide system in place, the team has been able to:

- Meet daily manufacturing achievement numbers and keep production fluid
- Ensure system quality and uptime that is approaching Six Sigma
- Excel at implementation and production with an expert engineering team that is 25% of the size of competitors' engineering resources
- Decrease training time by 70% on maintenance alone
- Reduce engineering training time at least 50%
- Reduce scrap for improved environmental friendliness
- Meet tight environmental and safety standards for automotive manufacturing and documentation
- Collect data for improved warranty, recall, defect and hold management
- Decrease integration costs by as much as 80% for additional projects through a larger network of providers, improving the competitive bid processes





Soft drink bottler improves OEE and reduces costs

Visibility into performance helps improve capacity and inventory management.



Challenges

- Maintain delivery schedules even as brands/SKUs multiply
- Reduce impact of downtime on profits and delivery
- Support improved capital planning with accurate profile of capacity and quality performance

Improving OEE across 20+ Plants

This bottler implemented a complete Line Information System using GE's Proficy software suite including iFIX HMI/SCADA, Proficy Historian, Proficy Plant Applications, and IGS. This approach ensured a design that supports operators in managing their regular work as well as off-line stakeholders concerned with continuous improvement and troubleshooting.

Value Delivered

By focusing on delivering a solution that supports line operators with visibility into performance as well as data and functions needed to manage a growing number of products, this bottler has sustained world-class efficiency ratings. Beyond reducing costs through improved capacity usage, this level of performance allows inventories to be maintained at low levels, as production is predictable and dependable.



Results

- Increased capacity leading to average paybacks of less than 10 months
- Sustained OEE ratings above 85%
- Single platform across 20+ plants provides common metrics, ability to share learnings and best practices



Products

- iFIX HMI/SCADA
- Proficy Historian
- Proficy Plant Applications
- IGS





European brewery improves production and packaging processes



Challenges

- *Production efficiency and downtime*
- *Manual measurement system, compromised data*
- *Variable packaging demands*

Results

- *9% increased production efficiency*
- *11% decreased downtime*
- *Improved data integrity, operational insight, and scheduling accuracy*

Better insight helps increase productivity without capital expenditures on new lines.

Products

- Proficy Plant Applications
- iFIX HMI/SCADA
- Proficy Historian
- IGS





Major Tier 1 Automotive Drives Greater Production Efficiency and Quality While Lowering Costs

Results

- Significant cost avoidance of \$6,000 per unit, totaling more than \$360,000 per hour
- Increased efficiency and quality while reducing manufacturing costs
- Remote monitoring and near real-time availability of production parameters and statistics for every unit produced
- Efficiently and reliably handles high volume of realtime transactions
- Completely COTS-based solution
- Delivery and implementation within tight 13-week deadline

GE Digital enabled this major automotive supplier to exceed its goals for cost avoidance related to late and out-of-sequence delivery penalties. In fact, the company has never shipped out of sequence under the production management of Tracker – which has helped to put this complex greenfield on the road to success.

CIMPLICITY and Tracker Solution Drives Greater Production Efficiency and Quality While Lowering Costs for Major Automotive Tier 1 Supplier

A major automotive Tier 1 supplier that manufactures components and serialized assemblies for automotive end users worldwide recently faced production and delivery challenges at a greenfield site in North America that would have been unimaginable to Henry Ford and his suppliers.

In order to meet stringent regulatory and customer quality requirements, the supplier needed an error-proof method for following a unit through multiple stages of assembly and testing, and creating a comprehensive history for each unit produced. Capturing all of this real-time data flawlessly and sequentially would be a difficult enough task in and of itself, but, to add to the complexity of the application, the lead time between manufacturing and delivery is a mere 120 minutes. For each assembly delivered late or out of sequence, the supplier is penalized \$6,000. With production running at one unit per minute, the company needed to avoid potential penalties totaling \$360,000 per hour.



Making a Right Turn

To ensure this greenfield plant got into gear quickly, the manufacturer contacted GE Digital to determine whether there was a solution that would meet its production needs – and could be implemented within a tight 13-week schedule for design and implementation. In addition, the manufacturer was looking for a solution that would be as cost effective as possible over both the short and long term, and, as a result, specified a COTS-based system for which replacement parts are widely and readily available. GE Digital was able to satisfy all of the manufacturer's implementation and performance criteria – and delivered a fully commissioned, fully functional solution on schedule, helping to speed production at the greenfield.

The heart of the GE Digital system - provided by GE Digital's Professional Services team - is a CIMPLICITY and Tracker software solution, which monitors the progress of each serialized item that moves through the production process. Tracker provides the detailed, continuous flow of information needed for optimizing the manufacturing process, while enabling the manufacturer to manage inventory levels and locations, and route materials efficiently and effectively to maintain the build sequence.

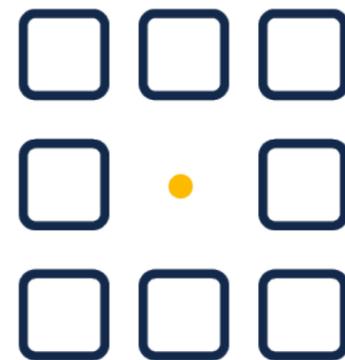
The Tracker solution provides the manufacturer with extensive capabilities, including:

- Maintaining the build sequence through the manufacturing process through automated routing
- Providing option build data to assembly stations
- Manifest Printing to provide option build data to operators at stations
- Tracking unit serial numbers from one assembly station to the next
- Counting produced and rejected units
- Monitoring and routing re-work
- Collecting product and process data associated with serialized parts
- A Shipping Management function verifying that the operator loaded the product on racks in the correct sequence for transferring them to a truck, and for subsequent delivery to the end user

- A Document Management function consisting of a shipping manifest for rack loading and another for manual backup on the assembly racks
- An Error Proofing function consisting of “pick to light” and bar code verification of parts being assembled at each station

On the Road to Success

Based on more than 30 years of automotive experience, GE Digital’s reliable, high-performance solution is proving extremely beneficial to this manufacturer. The COTS-based system ensures the sequenced delivery and collection of all required traceability data to meet end user quality and governmental regulatory requirements. Detailed production parameters and statistics are available within seconds, enabling fast and informed decision-making.





Perodua Automotive

The Shop Floor Control System provided by GE Digital has been well received by the operators, supervisors, and management of Perodua for its ease of use and for the up-to-date, extensive production information they receive.



Keeping production on track

GE Digital gives automaker and suppliers real-time window into production status

To help improve the productivity of their manufacturing operation, the management of Perodua (Perusahaan Otomobil Kedua Sdn Bhd), Malaysia's second largest car manufacturer, decided to implement a method for "just-in-time" ordering of part supplies based on vehicle orders. The team envisioned a solution that would integrate distributor and supplier systems with Perodua's ERP system to access plant floor data in real-time. Distributors would be able to track the progress of their orders vehicle-by-vehicle, and vendors would have the ability to coordinate their part supplies to the facility on a just-in-time basis.

Perodua turned to GE Digital for assistance in making their vision a reality. Perodua Information Technology personnel were impressed with GE Digital's proven experience in implementing these types of solutions and felt confident that GE Digital would be able to create an automatic data collection and product tracking solution that would enable them to meet their productivity goals.

GE Digital teamed with local system integrator, Temigas Sdn Bhd in Malaysia, to implement a phased approach solution, the first of which is a Shop Floor Control System (SFCS) in Perodua's body, paint, and assembly shops. GE Digital did

most of the system design and implementation on-site with local systems integrators working closely with Perodua to ensure that the system met their requirements.

The specific objectives for the SFCS in improving Perodua's manufacturing operations are:

- Reducing work in process (WIP) inventory
- Identifying quality problems as quickly as possible
- Reducing rework time and volume
- Identifying production bottlenecks
- Reducing operator errors

To meet these objectives, the automation team created a reliable, state-of-the-art system based on CIMPLICITY industrial automation software with a Tracker module to satisfy the following key requirements:

- Track WIP
- Capture quality defect and rework information
- Automatically generate part-supply triggers from the production lines to logistics and other subassembly areas
- Generate production and quality-related reports on the fly
- Generate tax and delivery documentation automatically
- Automatically route bodies inside the paint shop through various processes
- Ensure data integrity of the vehicle production information
- Make all the above information readily available on the desktops of management to enable real-time decision making

The system architecture consists of two high-end servers. The CIMPLICITY Tracker server implements the process logic, including WIP tracking, routing, and quality data capture. This server, which interlocks and serves data to all viewer nodes, is configured as the domain controller to which all shop floor computer nodes and PLCs are interfaced. The SFCS database, running on another server, contains such production information as schedules, model description, color code, tax ID generation, engine description, logged WIP data, quality defects, and much more.

The automation team created a reliable, state-of-the-art system based on CIMPLICITY industrial automation software with a Tracker module.

More than 30 GE Digital display stations, preloaded with CIMPLICITY software, are stationed in the body, assembly, and paint shop. The display stations are automatically updated with vehicle data as each new vehicle arrives at the station. Operators log defect data into the SFCS by clicking on the graphical image of the body parts shown on the display station screen.

Results

- Reduced work in process (WIP) inventory
- Faster identification of quality problems and production bottlenecks
- Decreased rework time and volume
- Fewer operator errors



To implement tracking, the shop floor is mapped into 120 regions, based on the process carried out at that region. Triggers for tracking in the body and assembly shops are received from 15 bar code readers located at key transition points. The bar code scanners are interfaced to PLCs. The PLCs are directly interfaced to the plant's Ethernet network and communicate with the Tracker server. In the paint shop, operators can determine the location of each vehicle by tracking the carriers (hangers and dollies) that carry the vehicle using Smarteye bar code readers and limit switch signals received from the paint shop conveyor system.

To receive vehicle tracking trigger signals from the paint shop and assembly shop conveyor systems, the CIMPLICITY Tracker Server interfaces with two PLCs via Ethernet. Tracker also sends the various interlock signals and routing control signals to these PLCs. Trigger sensors indicate the vehicle ID, time stamp of the entry of the vehicle into the region,

and time stamp of exit of the vehicle from the region. As the vehicle moves through each region, attributes such as chassis number, color, model type, customer information, defects, and engine number are also tracked. With this information, it is possible to determine in real-time how many vehicles are at a particular region, when each vehicle arrived at that region, or how long it spent in that region. Routing control is implemented at 13 locations in the paint shop. Using routing control, the SFCS automatically batches jobs based on model, color, and other parameters. Routing control also enables the SFCS to detect a defective body on the conveyor and routes it to rework areas.

Not only does the SFCS generate extensive reports based on current production status and historical data, it also continuously calculates the productivity of each shop based on the production status and line speed. CIMPLICITY viewer nodes are installed on the desktops of production engineers and management, enabling them to monitor and control production status in real-time and generate reports on-the-fly.

After going live, the Shop Floor Control System was successfully integrated into Perodua's production system. The SFCS solution provided by GE Digital has been well received by the operators, supervisors, and management of Perodua for its ease of use and for the up-to-date, extensive production information they receive. As a mission-critical application for the plant, Perodua's SFCS is envisaged to eventually be fully integrated into their Computer Integrated Manufacturing (CIM) environment as the next phase of the project.



Reckitt Benckiser Optimizes Its Control System with Batch Execution Systems



Reckitt Benckiser

Reckitt Benckiser is a manufacturer for over-the-counter health and wellbeing products. Its manufacturing facility mixes, blends, and packs an over-the-counter branded indigestion remedy into glass bottles, stick packs, and tablets in 6,000 liter batches.

Challenges

Analysis, prognosis, and prescription

Astec Solutions, a GE Digital partner, was called in to help Reckitt Benckiser improve the performance of their manufacturing control system. The facility mixes, blends, and packs an over-the-counter branded indigestion remedy into glass bottles, stick packs, and tablets in 6,000 liter batches. Unexpected system crashes cost 30-90 minutes for every batch and system restarts had to be performed in a strictly regimented way, or entire batches of product could be lost. The system, which was installed by a system integrator six years previously, used GE Digital products in its architecture.

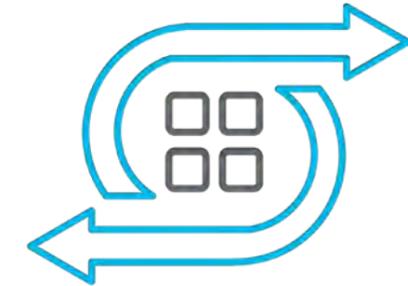
“After raw materials were mixed and blended they were transferred to storage tanks, before being sent to the packing lines,” said Chris Barlow, Technical Director, Astec Solutions. Up to seven filling lines can be connected to the storage tanks. *“The system had not had a major update since installation. It was slow, unstable, suffered from periods of unscheduled downtime and was not producing reliable data. It was becoming a risk to the profitability of the site.”*

The regular breakdowns were dealt with by giving the initial integrator the authority to call in and restart the system — a ‘sticking plaster’ solution that had been in place for three years.

The first step was to speak to the operators and gain a clear understanding of how the problems manifested. The Astec team also ensured the clear identification of the client’s objectives and ideals. Unsurprisingly, avoiding breakdowns and minimizing downtime topped the list, as they most obviously affected operations, production and revenues.

“We looked at the system’s architecture and analyzed the log files in order to identify errors in the system,” he said. Astec had to work around the needs of a facility that was still in full production, so that process took around 10 days. Its first proposal was a slight change to the system’s physical architecture. The servers were located in a control room and were subject to knocks and kicks, as well as being exposed to dust originating from the production process itself. The recommendation was to relocate them to an on-site data center, safe from accidental damage and atmospheric pollution. The next task was the software architecture.

“The previous integrator had implemented some of their own bespoke software components, in order to integrate the solution,” said Barlow. *“In effect, the architecture had been ‘bent to fit’ and it was not ultimately the best solution.”*



“Production had grown beyond the original solution, so demands were also a lot higher. The time was right to review and upgrade the whole solution. But it had to be achieved without shutting the factory down.”

— **Chris Barlow - Technical Director,**
Astec Solutions

Solutions

Astec's team recommended that Reckitt Benckiser should:

- Implement the latest versions of GE Digital's Proficy Batch Execution software as well as iFIX HMI/SCADA and Proficy Historian
- Remove the bespoke applications and configure the GE Digital solution to undertake those tasks itself
- Separate out the relational database and make them standalone, distinct from the Batch Execution software
- Implement Microsoft SQL Server Reporting Services (SSRS) in order to provide the customer with a reporting platform that was scalable, and could be enhanced and updated with additional reports as required

Implementation had to be achieved without interrupting production. Most of the work was undertaken between the hours of 2:00 am and 6:00 am, when the first daily shift arrived to start work. The process of preparation involved configuring all the hardware, then installing the software and checking connectivity.

We undertook bench testing and a lot of software preparation. When it came to the point of implementation we were pretty confident that it would work first time – and it did. It worked properly right from outset.

— **Chris Barlow - Technical Director,
Astec Solutions**

Results

GE Digital's integration, upgrade, and improvement enabled the customer to boost output and reliability. Specifically, it was able to end random offline incidents and unexplained crashes, as well as improved data collection. With the new system, the manufacturer was able to deliver accurate performance reporting, production analysis, and batch reporting.

The upgrade also extended the reporting platform with Microsoft SQL to other areas of the plant, providing a site-wide database for reporting. These new capabilities enabled the manufacturer to:

- Reduce risk, improve production stability and boost product quality, consistency, and traceability
- Immediately cut maintenance expenditure
- Minimize the cost of rebooting the system after crashes, which is estimated to cost more than £50,000 per year





Royal Agio Cigars Connects Real-Time Information to Production, Improving Efficiency and Quality



Royal Agio Cigars is one of Europe's largest cigar producers, known for brands such as Mehari's, Panter, Balmoral, and De Huifkar. The Westerlo factory in Belgium produces approximately 3,000 country-specific end product cigars with no fewer than 164 production lines.

Managing Director Johan Gebruers and Chief Operations Officer Koen van Hooft explain the role of MES and automation solutions from GE Digital partner Novotek and how they automate the data flow of the entire production process, while simultaneously responding to changing legislation.

“We have made huge improvements in efficiency. Quality and data have improved. Production now has real-time information and the administrative activities of our employees are now completely automated. This data gives us insight into the production process with which we can further optimize.”

— **Johan Gebruers, Managing Director, and Koen van Hooft, Chief Operations Officer, Royal Agio Cigars**



Products

- Proficy Plant Applications
- CIMPLICITY HMI/SCADA
- Proficy Historian
- ROB-EX Scheduler
- Proficy Workflow

Results

- Zero operator errors
- Enormous gains in efficiency & quality
- 100% failures caught
- Visibility and access to real-time information

The MES / automation solutions include:

- OEE, quality and traceability
- Centralized monitoring system
- Real-time visualization and control
- Industrial data management – real-time and historical
- Information anywhere, any time through web browser
- Scheduling and planning across plants



The Role of Automation

“The entire automation operation has been rolled out in various phases and consists of a number of steps,” Johan begins. “The first step was to fully automate the data flow to and from the PLCs. Many of our machines were already equipped with PLCs, but they were still set manually. In addition, only global information was available. At the start of the project, we only looked at the automation of production registration and some other simple things. By implementing the MES solution for operational excellence solution with Novotek, it now automates the entire data flow, including the data collection of all PLC failures. As a result, in the pilot alone, we uncovered an important difference in production. We had been working on these differences for years.”

Less Administration

“We have also made great strides in terms of functionality,” Johan continues. “We now see exactly which product will run on which machine because the data flow is now fully linked. Actually, our operators can no longer make mistakes.”

Koen adds: “We have made a lot of progress in the processing and handling of complaints. Originally these were manual procedures. For example, a complaint came in about a coil (roll of net curtain-like fabric on which the tobacco leaves are stored) from Sri Lanka. In the past, the booking voucher had to be looked up first, then that voucher went to administration, and eventually the ignition coil could be booked, and the complaint passed on. In this new situation, the ignition coil is already scanned on the machine and logged automatically. Any remarks about quality will immediately be considered. It is now fully automated and traceable online.”

Catching 100% of Failures

“Phase two included the RFID story,” says Johan. “Now if a container with bunches (semi-finished products) is placed on the wrong machine, the system will immediately display a message on the screen, and the machine is immediately stopped. In the past, the machines continued to run for a few more hours, with enormous consequences. Such an error produces 100% failure: the entire batch was then unusable. This occurred five to six times a year. That is now captured and errors prevented! Because there is a link between MES and RFIDs, we know exactly what is on the pallet and what goes into the machine.”

Linking HMI and Document Management System

Phase three is also currently running. Johan said “We have taken on the extra functionality that was not in the pilot, such as the Document Management System. All our procedures are included. Until recently, they were printed out and hung up on the shop floor. If something changed in the procedures, you had to restart all numbering and replace all versions. Now the HMI is linked to the document management system, allowing operators to immediately have access to the corrected versions.”



Changing Legislation

Koen explains that Agio Cigars also immediately deployed the real-time scheduling and planning module, ROB-EX Scheduler, in view of changing legislation. “Until now, all products were packed in Westerlo. We then put it in the Netherlands in stock, where we labelled the products country-specifically. Due to new legislation, there will soon be so many stickers on packaging, that we will switch to country-specific packaging, and therefore have to plan across factories: from ‘single-site planning’ to ‘multi-site planning.’ ‘We are also going from ‘make to stock’ to ‘make to order.’ Real-time planning is then a must.”



About Novotek

[Novotek](#) is the leading creator of innovative solutions for Automation and Industrial IT in the Nordic countries, Benelux, Switzerland, United Kingdom and Ireland. The foundation is a portfolio of great products from among others GE Digital. With a team of highly dedicated solution architects, we are able to deliver solutions that make it possible for our customers to stay ahead with competition.



Global Battery Manufacturer

Greater Efficiency in Mixed Manufacturing (Batch and Discrete) with One Seamless MES



This major battery manufacturer has plants in several countries. It needed to convert an existing manufacturing facility to enable production of a new product.

The company worked with GE Digital to successfully implement a Proficy manufacturing solution, based on Proficy Plant Applications and Proficy Historian, on time and under budget.

The solution has helped the company meet goals for:

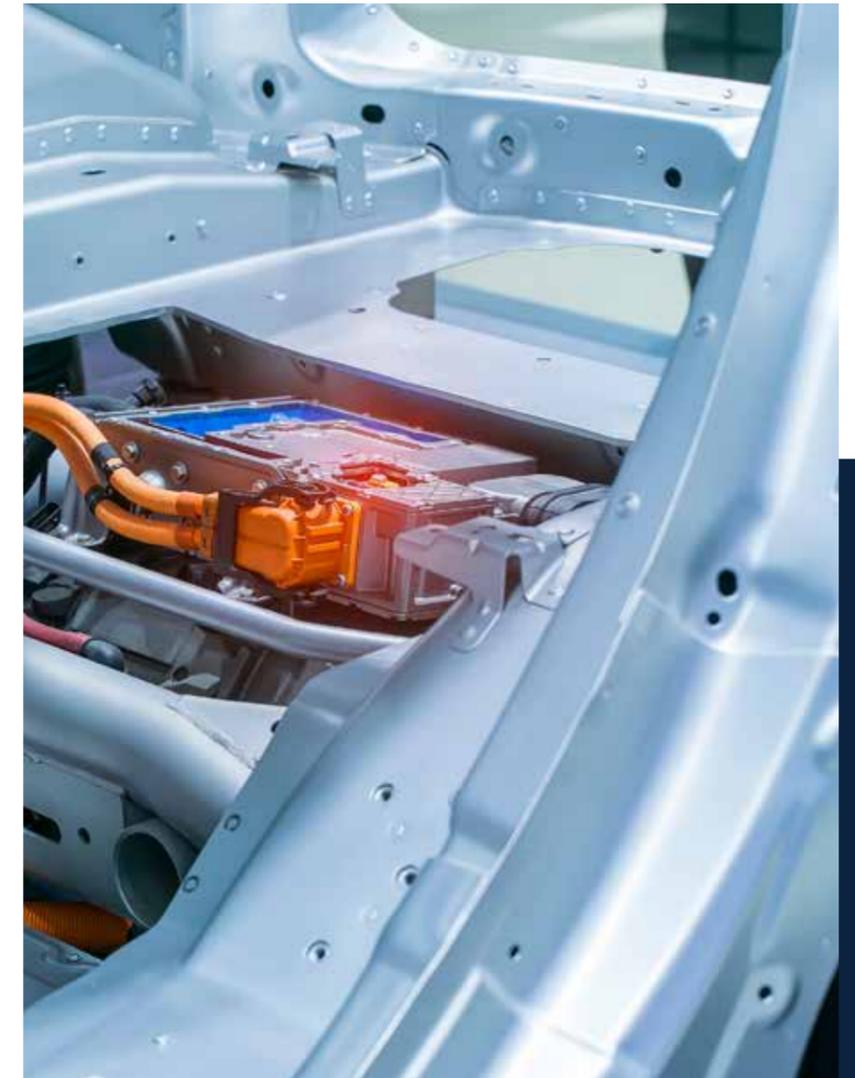
- Increased throughput
- Higher quality
- Energy goals
- Reduced scrap
- Decrease costs and increase transparency with one MES across a diverse manufacturing environment
- Minimized effects of recalls through genealogy
- Faster corrective action to non-conformance conditions

Mixed Manufacturing: Batch and Discrete

Like all battery manufacturing, this company has a diverse, mixed-manufacturing environment with both batch processes and discrete. Operations include:

- Mixing
- Coating
- Winding
- Cell Assembly

Producing more than 25 million cells, the manufacturing site includes clean/dry rooms, formation, chemical storage, and more. The company provides products in the form of: finished cells, modules, and finished systems.



With a tight Go Live schedule, the company sought an MES provider with proven software for mixed manufacturing (process/batch and discrete) along with services to support solution design and implementation.



Selecting and Designing an MES Solution

With a tight Go Live schedule, the company sought an MES provider with proven software for mixed manufacturing along with services to support solution design and implementation. The team evaluated many vendors and selected GE Digital for its analyst-recommended MES and global Professional Services capabilities.



The company worked with GE Digital to design and implement a solution that provides:

- High availability for 24/7 operation
- Integration with ERP
- Data retention to meet regulatory requirements
- Validation
- Traceability/Genealogy
- WIP inventory tracking
- Poka yoke / error proofing
- Serialization of raw material, WIP and finished goods
- Defect management
- Production tracking
- Conformance
- Process capability analysis

Operators and supervisors interact with the MES through easy-to-use graphical screens. Teams can evaluate productivity, quality, scrap, downtime, and more. Furthermore, the system offers a foundation for root cause analysis of problems and quick resolution, helping to increase uptime. The company can also link genealogy data with customer orders, which supports minimizing the effects of recalls.

MES in Action

With the Proficy system in place, the company can now verify conformance during each step in manufacturing, helping to meet customer requirements and accelerate corrective action. Operators can ensure that out-of-spec product goes into rejects for potential rework before continuing in the process. SPC capabilities can determine if a process is outside of control limits, triggering operators to adjust equipment faster and reduce scrap.

The system also tracks genealogy throughout the process. At the beginning of each step, Proficy verifies product status then continues appropriate processes.

The MES solution captures and stores data in Proficy Historian, which provides real-time and historical data for analysis and reporting. Proficy captures most data automatically, and operators can also manually enter data in Proficy Plant Applications screens.

Next Steps

Following success with the MES at this first plant, the company is looking to roll out the solution at its sites around the world. The MES offers a way to drive consistent, efficient manufacturing across its mixed environments of process and discrete operations as well as a foundation for enterprise-wide continuous improvement.



Recommendations for Success

- *Follow industry standards*
- *Leverage best practices from industry associations*
- *Design to accommodate a changing / growing organization*
- *Work across OT / IT teams and systems*
- *Simulate before going live and for training purposes*



Major Frozen Food Manufacturer

Increasing quality with visibility into manufacturing operations



Proficy Operations Hub provides modern, mobile thin client visualization with Proficy Plant Applications and Proficy Historian.

- This major frozen food manufacturer is using Proficy Operations Hub in conjunction with its existing, enterprise-wide standard MES solution featuring Proficy Plant Applications and Proficy Historian.
- With Proficy Operations Hub installed at a pilot plant, the company is now improving the consistency of its production lines – across multiple food components that build to the final frozen product.
- The team can do on-demand analysis using Proficy Historian data, identify trends, and determine the root of any problems. Rapid Application Development tools allowed an integrator partner to quickly build new widgets.
- Following the successful pilot, this major food manufacturer is rolling Proficy Operations Hub through all of its plants.

Products

- Proficy Plant Applications
- iFIX HMI/SCADA
- Proficy Operations Hub
- Proficy Historian
- Proficy Workflow



SAIC-GM

Shanghai Automotive Industry Corporation (SAIC) and GM — Designed for success



SAIC-GM Taps GE and CIMPLICITY to Drive Turnkey Automation Solution

When the Chinese government named the automotive industry a pillar industry for development, it seemed only natural that the Shanghai Automotive Industry Corporation (SAIC), China's largest passenger automobile manufacturer, and General Motors (GM), the world's largest full-line vehicle manufacturer, would team up to form SAIC-GM.

SAIC-GM's production facility in the Pudong area of Shanghai is a \$1.5 billion, 5,920,200-square-foot (550,000-square-meter) plant that includes a press shop, body shop, paint shop, general assembly shop, and powertrain shop. Considered the largest and most innovative automobile complex in China, SAIC-GM primarily supplies China's businesses and government, producing Buick mid-size sedans, the Buick GL, wagons, and luxury compact sedans.

Before the first Buick rolled off the line, SAIC-GM selected the diversified services, technology and manufacturing company



— the General Electric Company — to unlock a \$65 million turnkey communication and control and power distribution system, as well as provide process equipment and support, that would actively support GM's production practices. With GE's automation team in the driver's seat, GE Electrical Distribution & Control was soon riding shotgun, together

designing a state-of-the-art communication and control and power distribution system to operate within GE's overall communication plan.

For its part, GE's automation and MES team developed a \$15 million communication and control system guided by its renowned CIMPLICITY, manufacturing enterprise-wide software and supported by Microsoft® Windows®, and Intel-based server and workstation computers. Four subsystems — the Process Monitoring & Control (PMC) system, the Target Control System (TCS), the Automatic Vehicle Identification (AVI) system, and the ANDON system — are connected by a GE provided network to monitor and control SAIC-GM's five shops. With thousands of machines and miles of conveyor systems, GE's turnkey automation solution effectively minimizes idle equipment and personnel, maximizes uptime and productivity, and operates seamlessly within the broader scope of the GE framework.

Results

- Maximum uptime and productivity
- Real-time data reporting
- Lower inventory and reduced material consumption
- Greater quality, less rework

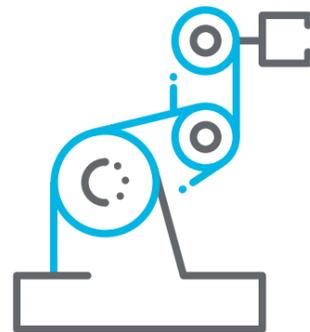


Auto Assurance: SAIC-GM's Production Monitoring and Control System

Process Monitoring & Control (PMC) System

Working to maximize equipment uptime and process productivity, SAIC-GM's PMC system employs over 400 PLCs collecting data from 60,000 I/O points. CIMPLICITY HMI/SCADA software monitors production equipment conditions, generates and logs alarms, and communicates process status in rich graphic displays. The user-friendly but powerful CIMPLICITY software allows operators to generate nearly 4000 different reports and trending charts, including production counts, WIP totals, and process cycle times. Control functions are also provided by the system to allow authorized operators to start and stop production lines.

To support troubleshooting and repair efforts, CIMPLICITY quickly detects equipment and production problems, immediately notifies the appropriate maintenance team, production manager, or process support engineer, and provides diagnostic data for speedy repair efforts. Essential to a facility of this size, SAIC-GM's PMC system minimizes production downtime that can result from mechanical or production-related problems.



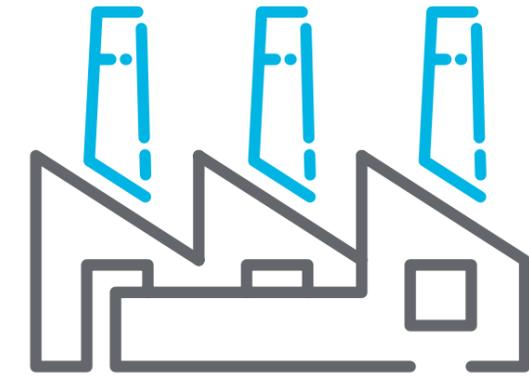
Target Control System (TCS)

SAIC-GM's TCS controls the movement of vehicle bodies into and out of the body distribution center using several modes of operation from fully automatic to fully manual. Like the PMC system, the TCS also employs CIMPLICITY software, but with the added feature of Tracker — a comprehensive CIMPLICITY option that provides tracking and routing control of the serialized vehicle bodies as they move through the production process.

With Tracker, SAIC-GM can dynamically collect and store a variety of vehicle body data, including process parameters, time stamps, and quality measurements. Operators can easily determine the location of a tracked vehicle body, display its data, and provide control commands to production equipment to process and route the body. Communication to

Automatic Vehicle Identification system and Conveyor controls is supported over the plant Ethernet network.

In addition to tracking vehicle bodies, CIMPLICITY determines where to store vehicle bodies arriving from the body shop, sequences vehicle bodies into the paint shop, decides where to store vehicle bodies returning from the paint shop, and again sequences vehicle bodies into general assembly. The TCS and similar routing control systems are used extensively in automotive facilities to efficiently and effectively control vehicle flow based on parameters such as production schedule, optimum color blocking, consistent load balancing, and material availability. For SAIC-GM, the TCS effectively optimizes production flow and productivity and, due to its efficiency, minimizes paint costs and reduces paint emissions.

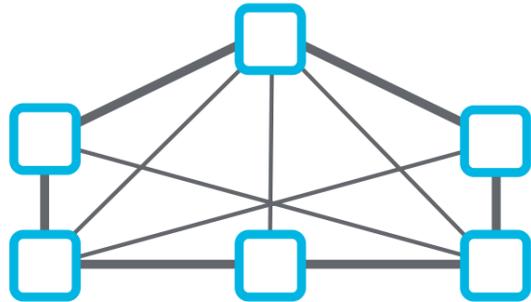


Automatic Vehicle Identification (AVI) System

The plant's Automatic Vehicle Identification (AVI) System identifies and tracks vehicles in the body shop, paint shop, and general assembly shop. Vehicles are identified by writing vehicle identification and configuration data to radio frequency (RF) tags mounted on each vehicle carrier. Vehicles are tracked by reading the vehicle data from the RF tags as they move through the production process.

There are two independent AVI systems; one is for the body shop and body distribution center (BDC), and the other is for the paint shop. The body shop/BDC system consists of one PLC networked with eight tag read/write stations located in the body shop, body distribution center and paint shop exit. Two of the stations in the body shop have automatic bar code scanners that read data from a label affixed to the body so that it can be uniquely identified by the AVI system when it enters the production stream. The paint shop AVI system also uses a PLC with 14 tag read/write stations. Each system controller interfaces with its own CIMPLICITY HMI-based operator station mounted adjacent to the associated system controller. The stations are available for system monitoring, maintenance, and supervisory control functions.

Each AVI system also communicates directly with the TCS and SGM's FLEX system via the network, reporting vehicle locations and vehicle data to both. The AVI system also receives data from the FLEX system for storage on the RF tags. This data is read from the tags by other systems and is used for controlling the production process.



ANDON System

The Quality and Material ANDON System consists of two similar but separate subsystems. The Quality ANDON subsystem enables factory personnel to request help when a product or process quality problem is identified. Help is requested by pulling cords located along the production line. The action of pulling a cord sends a signal back to the operator interface, illuminating a section of a large display called an ANDON board that indicates where the problem exists along the production line. The Quality ANDON subsystem supports the synchronous manufacturing principles of producing quality products utilizing in-station repair rather than final process repair.

The Material ANDON subsystem allows each production area to automatically or manually request material before inventory is completely consumed. Factory personnel manually request more material by pressing a button. Material can also be requested automatically by sensors that detect a minimum inventory level. The manual or automatic request sends a signal back to the Material ANDON System, which displays the request in the material storage area. Fork truck drivers then deliver the requested material to the location, again supporting the synchronous manufacturing principles of just-in-time delivery.

Both the Quality and Material ANDON systems feature built-in tracking and reporting capability that compiles the number of ANDON calls, the number of line stops, and the resulting downtime. Problems are detected and resolved quickly and inventory is minimized. As with the PMC and TCS, the ANDON system avoids the high cost of idle equipment and people due to production problems and drastically reduces the opportunity for poor quality and rework.

Driving It Home

Fitting nicely into the framework of GE's master communication and control plan, GE's automation and MES team successfully integrated a comprehensive production monitoring and control system that will allow SAIC-GM to continue breaking new ground in auto manufacturing.



A Look Inside SAIC-GM

Press Shop

The 139,931-square-foot (13,000-square-meter) press shop features two 180-inch press lines with automatic pick-and-place panel transfer systems. Each line has five fully automated presses. SAIC-GM stamps 26 external metal parts at a rate of 500 parts per hour.

Body Shop

In the 265,868-square-foot (24,700-square-meter) body shop, heavy parts are lifted and moved by manipulators while 44 robots perform quality-sensitive tasks such as welding and sealing. The shop has agile tooling and a programmable design in the framing station that allows it to produce bodies for two completely different vehicles. An Electrified Monorail System (EMS) in the underbody sub-assembly and body side sub-assembly areas maximizes the flexibility of model mixing in the production schedule.

Paint Shop

The 548,958-square-foot (51,000-square-meter) paint shop is a state-of-the-art, environmentally friendly facility. Here, for the first time in China, provisions were made for the future use of waterborne primer and paint, which will effectively reduce exhaust emissions. Also for the first time in China, color-specific primer, which improves paint quality, is applied to all vehicles.

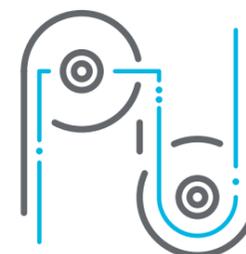
General Assembly Shop

The 452,084-square-foot (42,000-square-meter) general assembly shop features a unique T-shape layout pioneered by General Motors. A prerequisite for just-in-time production, the building shape offers three distinct advantages: docking stations permitting line-side direct delivery of parts; a centralized nerve center; and options for future expansion without interrupting production. Three automated conveyor systems complete the efficient assembly process.



Powertrain Shop

The 409,028-square-foot (38,000-square-meter) powertrain shop manufactures five major engine components for 4 and 6-cylinder engines that are used on its engine assembly line. This state-of-the-art engine assembly line can produce the mix of 4 and 6-cylinder engines required for the vehicles SGM-GM produces, as well as for other vehicle manufacturers in China. It also produces 5 major components for, and assembles, the first automatic transmission used on a production car built in China.





Global Pet Food Processor Improves Quality and Yield



Challenges

- Multi-plant manufacturer with lack of tools to understand what was happening on the plant floor
- Quality data entered on spreadsheets and operator logs leading to information gaps and errors
- Opportunity to improve system quality and efficiency

Results

- Operators able to make decisions based on real-time data and input information at the point of production
- Increased uptime, reliability and productivity
- Visibility to quality data by SKU enabled formula adjustments that resulted in cost savings of \$0.01 per case on one SKU
- The ability to make data driven process adjustments resulted in a cost reduction of more than **\$200,000 per year on one SKU in one plant**

Products

- iFIX HMI/SCADA
- Proficy Historian
- Proficy Plant Applications
- Proficy WebSpace
- IGS
- GE Digital's Professional Services





Leading juice manufacturer increases production efficiency



Background

- Leading juice manufacturer with 100+ year history
- Private label, shelf-stable beverages
- Processing and bottling in plants across the US
- 100+ blends of juices
- Private-label products in major grocery, warehouse, drug stores and more

Proficy improves running efficiency, quality and production flexibility.

Challenges

- Packaging materials direct losses of 1%
- Raw material direct losses of 1% and process variance-driven raw losses of 4%
- Labor losses and downtime
- Lack of insight into line stoppages, defects and waste

Products

- Proficy Plant Applications
- iFIX HMI/SCADA
- Proficy WebSpace

Results

- 3.1 % higher average plant line efficiency in first five months
- 157% internal rate of return (IRR) for pilot
- Increased line efficiency and optimization
- Reduced downtime and waste
- Improved production flexibility

Why this Juice Manufacturer Chose Proficy Plant Applications

- Compatible with our Networking, PLCs, ERP, Security, Support
- Easily Expanded - SPC, Lot Traceability, Maintenance
- Easily Scaled Up to Plant and Enterprise Levels
- Vendor Program fit our Change Philosophy
- Attractive Licensing Model
- Low Risk, Incremental Implementation
- Performance Pilot Implemented Quickly, Delivered Immediate Results, Did Not Limit System Growth





Major Appliances Manufacturer Achieves 20% Increase in Uptime



Tightly coordinated production reduces warranty costs by 24% with end-to-end genealogy

Challenge

- Gain visibility across disparate, disconnected systems
- Launch 10 new appliances under very tight schedule
- Need for simpler, reusable manufacturing infrastructure

Action

GE was chosen to plan, build and implement a new system featuring Proficy software including HMI/SCADA and MES. Initial implementation at pilot, then extended to all plants globally, simplifying operations and providing visibility across production.

Result

- Double-digit improvement in deployment cost and speed
- 30-40% raw and WIP reduction
- 24% reduction in warranty costs with end-to-end genealogy
- 20% greater uptime
- Improved quality and less rework





Chinese Tobacco Products Manufacturer Increases Efficiency by 4%



Real-Time Visibility for Better Decision-Making

With GE Digital's iFIX HMI/SCADA, operators can leverage real-time visibility and control for better decision-making and take proactive actions that improve production. Additionally, the MES capabilities of Proficy Plant Applications have delivered clear insight and analyses to enable real-time decisions and improve overall efficiency, quality, and reliability of the process.

Manage Process Complexity While Optimizing Production

With the challenging mix of complex recipes/specifications and high-speed processes in tobacco products manufacturing, the Proficy solution is uniquely suited to collect and correlate high volumes of quality and event data—driving improvements. GE Digital's solution has enabled the manufacturer to act on critical process information to improve productivity and manage multiple new product introductions with optimized efficiency.

Challenge

Upgrade existing automation infrastructure to handle multiple product specifications and recipes. Improve overall quality, reliability and efficiency as more complex tobacco cutting, flavoring and blending processes were launched.

Products

- iFIX HMI/SCADA
- Proficy Plant Applications
- Proficy Historian



Results

- 4% increased efficiency
- 5% reduced raw material waste
- Increased flexibility with a single platform to manage multiple product recipes and specifications





Crane Currency

Specialty paper manufacturer saved from potential financial disaster caused by 0.1 mm problem



Overview

Crane Currency, a Crane Co. company, is a fully integrated supplier of secure, durable and well designed banknotes for central banks all over the world. A pioneer in advanced micro-optics technology, Crane Currency provides a wide range of engaging visual effects in features that increase the level of security and public trust in banknotes.

Challenge

Crane was engaged by a customer to produce a new banknote to prevent digital replication and combat counterfeit issues. By introducing micro-optic security features, they will help the customer stay ahead of counterfeiting and future-proof the notes for years to come.

"AutomaTech provided really strong, effective training to help us understand the products we were using. That consultative relationship was really helpful to fix our problem and get us back on track."

Jim Schneider, Senior Manager, IT Services, Crane & Co.

During the initial printing process, Quality Control discovered a production defect, which nullified a portion of the product. Upon investigation, Crane realized that the specialized design of this banknote was causing the paper to misalign when hitting a roller during the production process. This caused random occurrences of the imperfection.

In order to complete production and meet their deadline, Crane needed to quickly analyze this highly automated, fast-moving process to determine why the defect was occurring.

Solution

Proficy Plant Applications captured data points created during production – allowing Crane to ensure the paper was being cut and printed correctly.

GE Digital partner AutomaTech worked with Crane to build numerous product and process trials and scenarios – using GE Digital’s Proficy Plant Applications and Proficy Historian solutions to gather and analyze data. With thousands of MES implementations around the world, Proficy Plant Applications automates and integrates information-related activities for managing production execution and optimizing performance.

Armed with detailed reporting, AutomaTech helped Crane determine the root cause of the defect, enabling them to implement changes and eliminate the problem. Crane was able to configure Proficy Plant Applications to provide real-time trends, statistics, and notifications of the process to help reduce rework and avoid errors.



Results

Crane quickly implemented a process change to eliminate the problem and was able to complete the order with no further errors. AutomaTech provided additional training to Crane's process engineers exposing them to additional features and benefits of the Proficy Plant Applications software.

Using Proficy Plant Applications, Crane was able to reduce costs and improve agility of their discrete process. In the future, this MES solution will provide them with real-time visibility and deep operational intelligence to quickly address any issues before they become a larger, more costly problem.

Crane successfully delivered the product to their customer while avoiding revenue loss.

About AutomaTech

[AutomaTech](#) is a leading provider of industrial technology solutions focused on improving your operational performance. By harnessing the power of data, we enable significant gains, visibility across your entire organization, and increased profits for a competitive edge. Our product offering includes a flexible and scalable mix of hardware and software solutions to solve your toughest challenges while providing a roadmap for future improvements and growth.





Global Cosmetics Company

40% reduced waste and 20% increased capacity



Global Cosmetics Company

Challenge

- Inconsistent quality
- Labor intensive – hundreds of manual inputs and adjustments – that constrained capacity and process reliability improvements
- Unpredictable cycle times
- Production efficiency dependent on experienced operators

Action

- Implemented GE's Proficy software to improve Operational Excellence of the manufacturer's complex manual batching operations
- Leveraged existing infrastructure in conjunction with Proficy to maximize previous investments
- Digitized best practices and deployed across the organization
- Operators follow electronic standard operating procedures, knowing the right actions to take



Results

- 40% reduced waste
- 70% increased operator productivity
- 20% increased capacity
- Visibility and analysis of processes that before were “black holes” in the batching process, enabling Operational Excellence improvements





Appvion

Integration boosts quality and productivity

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Papermaker demonstrates the value of quality information integrated in real time

“Integration is the key to quality,” began Bob Nelson, plant IT manager at papermaker Appvion, in a presentation at a GE user conference. “We make better paper because of it.”

Data is connected in real-time from the company’s J.D. Edwards ERP system, through its GE Proficy quality management software, its process historian, and plant-floor automation and inspection systems.

“None of the information is keyed in,” Nelson noted. “It’s all automatic and it’s all integrated.”

But Appvion’s quality management system wasn’t always so seamless. Indeed, a customer with a real-time machine vision system had been finding defects that Appvion had missed, Nelson said. “We inspected only the end of the roll, but the customer could see the defects anywhere in the roll. To up our game, we purchased a web inspection system and integrated it into our quality system.”

The inspection system now detects pin holes, streaks, insects and other defects in real time.

“Now we have more than a quality system. It is a quality assurance and product disposition system.”

— **Bob Nelson, Plant IT Manager, Appvion**

For example, the integrated system also facilitates regulatory compliance, such as volatile chemicals reporting.

“We use product summarization and web reporting, and Proficy is the integrator piece. It pretty much integrates all the systems that run the plant.”

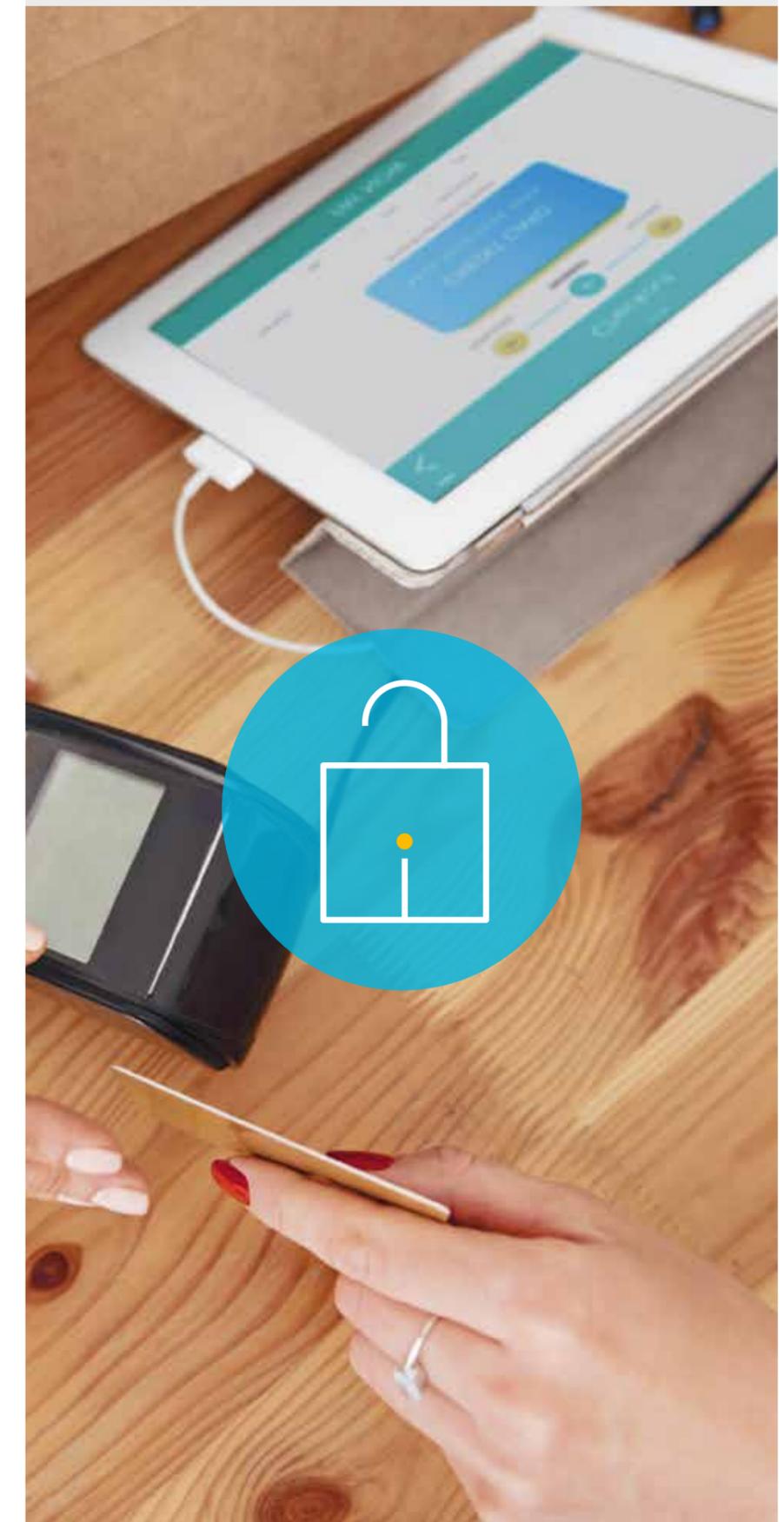


“Integration is the key to quality. We make better paper because of it.” Appvion’s Bob Nelson discussed the central role that GE Proficy software plays in maintaining the company’s quality standards.

“It was a large amount of data, but we can now keep all the quality information for a particular roll in one location.”

— **Bob Nelson**
Plant IT Manager, Appvion

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Multi-Plant Beverage Manufacturer

High quality and consistency at greenfield site



Beverage manufacturer selects Proficy Operations Hub for centralized visualization for MES solution at new greenfield site and three other plants.

This North American beverage manufacturer scaled up production of its branded and private-labeled products with a new greenfield site. With quality and consistency as its primary goals, the company selected GE Digital's Proficy Plant Applications in combination with Proficy Operations Hub and Proficy Historian.

Proficy Operations Hub offered a light front-end visualization tool as a window into the company's production lines. Accessible data improves decision making – both for operators and managers – and speeds the right actions.

Additionally, GE Digital's Proficy solution gives this beverage manufacturer the foundation to scale as their growth continues and business model further evolves.

Following success at the greenfield site, the company has begun implementation at three additional plants in the US.

Products

- Proficy Plant Applications
- Proficy Operations Hub
- Proficy Historian





Leading Timberland & Wood Products Company

Improving quality and throughput across 15+ plants



Leading Timberland & Wood Products Company

Challenge

This large, multi-plant timberland and wood products company sought to modernize their operations, including how they visualize and analyze data.

Challenges included connecting to older equipment, optimizing track and trace, and boosting quality and throughput, in conjunction with Operational Excellence.

Action

Long-term user of GE Digital's Proficy Plant Applications including Efficiency, Production and Quality modules – as well as iFIX HMI/SCADA and Proficy Workflow. Various deployments at 15+ plants.

Results

- Improved quality of processed wood products
- Increased speed of production / throughput
- Supported Operational Excellence program goals

HMI/SCADA, MES | Americas

Improving quality and throughput across 15+ plants



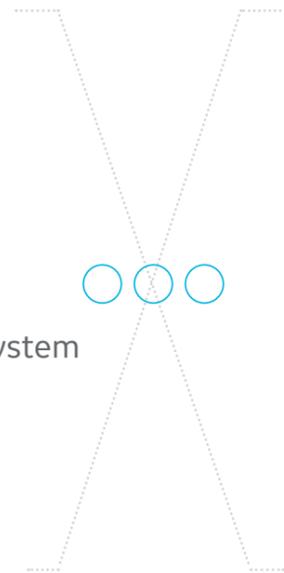


African Dairy Producer Increases Profitability



Challenges

- Milk loss and raw material costs
- Inefficient quality monitoring
- Lack of milk balancing and tracking system
- Partial process data visibility



Results

- *Reduced costs*
- *Increased margins*
- *Reliable traceability data*
- *Real-time information about quality and consumption*
- *Lower costs by leveraging existing automation infrastructure*



High Availability Solution

The producer implemented a high availability quality management and loss control system built on GE Digital's Proficy Plant Applications software. It spans across multiple production areas and leverages the existing third-party automation infrastructure to provide real-time information about milk quality and consumption.

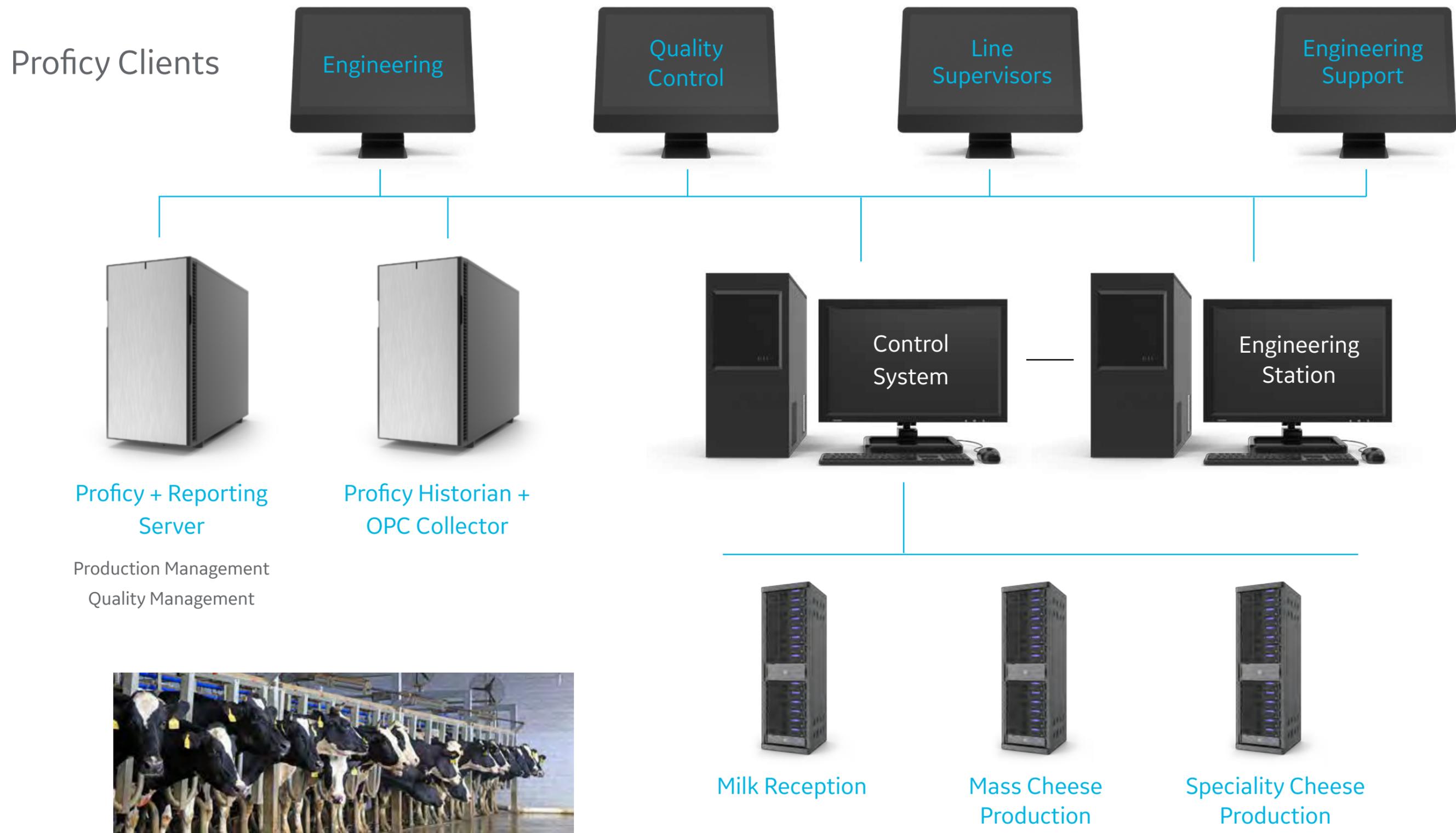
Products

- Proficy Plant Applications
- Proficy Historian

Delivering Higher Throughput and Quality

The Proficy Plant Applications software tracks milk—from delivery right through the cheese-making process—and provides the capability to develop a full mass balance of the process. With increased tracking and visibility, operators can better identify and control milk loss, thereby reducing cost and increasing margins.

African Dairy Producer





Americas Sugar and Ethanol Producer Improves Quality and Throughput



Customer Challenges:

- Increase throughput capacity and alcohol yield
- Improve existing asset efficiencies
- Improve batch efficiency and consistency
- Address increasing demand for fuel alternative



Results:

- Greater throughput and productivity
- Increased alcohol yields
- Better quality control
- Tracking of product genealogy



Products

- Proficy Plant Applications
- Proficy Historian



Monitoring and Controlling OEE

To turn sugar into ethanol, the manufacturer implemented Proficy Plant Applications software, enhancing automation with a comprehensive view of operations and managing recipes in the S88 format to protect intellectual property. The solution helped the manufacturer closely monitor and tightly control overall equipment effectiveness (OEE) of its ethanol production.

Meeting Growing Customer Demands

The solution helped improve quality control and batch consistency, linking production parameters with quality measurements. As a result, the manufacturer has been able to improve efficiency and effectiveness to meet growing customer demands for fuel alternatives, and ultimately, increase profitability.



Brüggen GmbH Improves Workflow by Optimizing Processes



As different as a heavy-weight truck and a small van may look—there's one thing they're sure to have in common: the swap systems, box semitrailers, and fixed bodies they use are very likely to be quality products from Brügger GmbH of Herzlake, in the Emsland region of Germany. Since starting up in 1990, the product quality and service competence that have turned the company into a leader in commercial vehicle construction have been its trademark.

Brügger is also a competence partner of Fahrzeugwerk Bernard Krone GmbH and operates one of the most advanced coating installations in Europe. With many years of experience and state-of-the-art systems, the company is one of Europe's leading specialists in surface coating. The quality of its products and services is the maxim on which Brügger bases its operations. Production is carried out solely to order.

In its detailed production planning, Brügger uses the benefits of GE Digital's industrial software solution to optimize its production control.



The time factor

The lead time of a Krone order for components and spare parts must not exceed a few days; for complete swap units it's slightly longer. The timeframe for actual production is therefore short and requires processes to be optimized on a continuous basis.

Throughout the company, Brügger uses SAP as its enterprise resource planning (ERP) system. In the individual production areas of Body Construction, Component Production, Coating and Final Assembly, additional IT systems are deployed for the detailed production planning.

Before GE Digital's solution was implemented, the existing IT system in Coating was unable to communicate directly with the umbrella SAP system. This meant that the SAP information had to be transferred to the IT system by hand, involving a great deal of increased effort before real production could actually get started. This change of medium between the detailed production planning IT system and SAP was not only time-consuming, but also a potential source of errors.

“Before GE Digital's solution was introduced, the change of medium between the detailed production planning IT system and SAP was always a potential source of errors.”

Dieter Burs, Head of Production Engineering, Brügger GmbH

In addition, employees had to perform the quality controls within the individual production steps manually and assess the effects of any necessary changes in quality assurance themselves. This increased production time, especially with larger orders.



For quality and growth

Aligning Brügger's growth path with its quality demands meant modernizing the IT in Coating, so a manufacturing execution system (MES) was sought by the company. In addition to the SAP integration, the prerequisites desired for the MES were visualization and simulation of the detailed production planning.

With its open, flexible, and scalable architecture and numerous visualization functions, the solution from GE Digital, which includes Workflow, fulfills Brügger's requirements exactly. What is more, data analysis and real-time data control, together with real-time data management, offer new process-control and quality-assurance options.



Delivery reliability as a matter of course

After a planning and testing phase, Dimensys, a service and solution partner of GE Digital, took charge of implementing the solution at Brügger's site.

"In detailed production planning especially, every detail in a process or production stage really does count. When a new solution is put into place, it's not only the expert knowledge, but also the team skills of all those involved in the project that's required," says Dieter, describing the challenges of changing an IT system within production.

For Brügger, delivery reliability is a matter of course. Since truck swap systems, box semitrailers, and fixed bodies are made solely to order, flexibility and a hitchfree production process are of particular importance. The new industrial software from GE Digital gives substantial support to

"Our relationship with GE Digital and its service partner Dimensys was, and is, productive and trustworthy."

Dieter Burs, Head of Production Engineering, Brügger GmbH

Brügger in achieving this goal. Thanks to the SAP integration in Coating, the orders coming from the areas of Body Construction and Component Production no longer need to be transferred and organized manually.

With GE Digital, progress and quality in the production process can be followed on monitors, and individual process changes occurring at short notice can be carried out in real time.



With precision and innovation

In Coating, it's not only paint that's applied, but also primer and lettering. Individual settings are required for these steps and must be transferred to the implementing machinery. GE Digital's software solution uses open interfaces to upload the incoming orders straight from the SAP system.

This saves time and enables production to start right away, regardless of the number of special factors in the order. As soon as production has begun, the processes under way are visualized, which also enables better management of work supplies. Material ordering can be automated in this way, too. The visualization also allows the work process to be monitored perfectly, and individual adjustments are passed straight from the system to the control units of the machinery.

In this production area, curing processes can take varying amounts of time, owing

to the fluctuating temperature in the oven. The new solution from GE Digital manages this automatically. It stops the timer for the curing process when the temperature drops below the threshold value, and restarts it as soon as the correct temperature is reached again. This means that curing is automatically terminated once the specified time has elapsed. GE Digital's solution therefore contributes to process reliability, which employees can also monitor with the visualization.

Every color changeover in Coating uses up resources and takes time—which, particularly with large batch sizes, is precious.

To reduce color changeovers, the new industrial software allows advance grouping of the parts to be painted on their way to coating, in accordance with the color required. This saves capacities all across production.





The synergies of the future

Brüggen is also planning to deploy GE Digital's industrial software solution in other production areas. In the same way as Coating has its own challenges, Component Production and Final Assembly have their own sets of emphases, too. As well as improvements specific to the individual production areas, extending application of the solution could also spawn cross-process synergies, lastingly optimizing Brüggen's entire production process.

"If it can already be established in Welding that two side panels to be painted green are coming into Coating within a three-hour interval, it's best to schedule them as a block right away," says Dieter, explaining one possible way of proceeding. "This could reduce color changeovers and bundle capacities in advance—our way into the future."

"With an open, flexible, and scalable architecture, GE Digital fulfils our requirements of a manufacturing execution system (MES) exactly."

Bernard Kok, Head of Organization and IT, Brüggen GmbH

"GE Digital's solution contributes substantially to process reliability, which is automatically guaranteed and can be monitored by employees through visualization."

Dieter Burs, Production Engineering, Brüggen GmbH





Major food manufacturer harvests low-hanging fruit with digital tools

The charge into modern food processing



The Process Engineering Manager at a major food manufacturer began his presentation at the GE Digital users conference with an apology for his “ridiculous” accent. But within a few minutes of his detailing the digitalization efforts he spearheads, any preconceived notions about this fruit processing guy and his funny way of speaking were squashed.

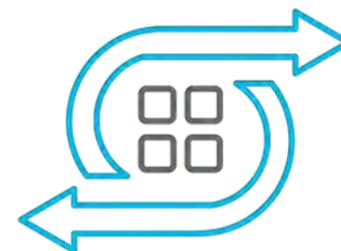
He’s doing smart things.



An agricultural cooperative with nearly a dozen manufacturing plants that produces beverages and fruit snacks, this major fruit processing company has enjoyed massive growth over the past decade, now processing 200 million pounds annually, producing 75 million pounds of dried, sweetened fruit (up from 10 million pounds just a few years ago).

The Process Engineering Manager works out of a plant in the United States. *“It’s the largest fruit-processing plant in the universe. At least I think that’s true,”* he said with a chuckle.

Like many companies, the team is on the road to digital transformation. The plant uses iFIX from GE Digital for its HMI/SCADA. The system includes more than 70 iFIX clients and collects data from more than 50 PLCs and 300 variable frequency drives. The company also adopted GE Digital’s Proficy Plant Applications software to monitor performance and capabilities with their dried fruit-packaging machines. *“We were focused on improving overall equipment effectiveness (OEE) using the software’s efficiency management module,”* he explained.



To implement Proficy Plant Applications and go beyond their existing iFIX HMI/SCADA system, the fruit processor worked with a controls system integrator, who was responsible for putting together a turn-key solution with support from AutomaTech, a GE Digital partner. The manufacturer had a small implementation team responsible for guidance on the solution.

Results

- Decreased downtime
- Greater insight on machine uptime
- Improved visibility into performance metrics
- Increased cross-team collaboration
- Digital tools to facilitate year-over-year growth



Overcoming Challenges

Throughout the process, the team learned valuable lessons. Among them, cross-team input is critical.

“Looking back, we recognized how engineers weren’t fully represented in the initiative,” the process engineering manager said. *“And three-fourths of the team was IT who didn’t understand the key outputs we wanted to measure.”*

The team also learned that partial successes were, at the end of the day, still successes. *“We got hung up on trying to find a 100% solution. Trying to solve every situation. We realized we needed to start by going after low-hanging fruit.”*

A Virtuous Cycle

To initiate a series of successes, the company focused on throughput—processing more pounds of fruit every day. He led weekly meetings to focus the team’s efforts and maintain commitment to the strategy. He developed a model in Proficy Plant Applications to map the entire production process. He utilized the iFIX add-in to generate custom SQL reports.

And...sure enough...the data began driving improvements. The team discovered excessive downtime on conveyor lines, which was quickly remedied by changing the loading process. His team developed greater insights on machine uptime. Soon enough, a funny thing happened among coworkers—they began developing what the process engineering manager labels metric curiosity. *“They wanted*

to see the data. They wanted this enhanced visualization so operators would get more interested in their performance.”

Wins prompted buy-in, which prompted more wins, which is reflected in year-over-year growth.

Currently, according to the manager, the company is processing 75 millions pounds of fruit per year. It’s impossible to maintain the growth they’ve experienced in recent years, so the collective is looking internally to

“Let operations know that this is a project for the whole plant, and they’re going to play a role in that.” The process engineering manager discussed the company’s use of GE Digital tools to ramp up OEE at its plant in the United States.

determine how to make processes more efficient courtesy of digital tools. Automated efforts mean that resources are freed up to explore ways to *“do what we do better.”*

One target—modernizing electronic data capture. With the current machine-failure-monitoring system, supervisors write the cause of failure on a whiteboard, photograph the board at the end of the day, then email that image to the group. The process engineering manager knows there’s a better, digital solution.

“I am excited to make that happen for our company,” he said. That sounds pretty smart, no matter how you say it.

Lessons learned

Throughout the adoption and implementation process, the team learned some lessons:

- When possible, stick with an out-of-the-box solution.
- Get alignment and buy-in from stakeholders. Clarify who needs the data and what roles and responsibilities team members have related to it. *“Let operations know that this is a project for the whole plant and they’re going to play a role in that.”*
- Good data is critical to success. *“It sounds simple, but people often need to be trained to develop usable data.”* (Avoid the “garbage in, garbage out” quandary.)
- Share the tools early in the process. Make data easily accessible.
- Don’t overcomplicate the solution. *“There are times when 95% is better than trying to be 100%.”*





Large Integrated Gas Processing & Petrochemical Company

Moving from siloed to streamlined operations across 25+ plants



Millions in savings through streamlined operations

Challenge

Production losses, increased risk of downtime, loss of accountability among local teams and departments, quality gaps and risk of claims from end users, limited managerial production capabilities, siloed systems at 25+ plant sites, lack of unified reporting system and reference database

Action

Moved from siloed to streamlined operations – utilizing GE Digital's Proficy software

Products

- iFIX HMI/SCADA
- Proficy Plant Applications
- Proficy Historian
- Proficy Workflow
- Proficy CSense advanced analytics

Results

- Saved more than \$180K on each of its hundreds of MTBE distilling tower units
- Identified and reduced production losses
- Minimized environmental risks
- Lowered consumption regulation thresholds
- Improved allocation of costs to production
- Increased process quality stabilization to 98%





Pfizer Cuts Downtime by Moving to Predictive Maintenance



Improving operational performance

Secure and accurate data is critical to Pfizer to ensure compliance with regulatory commitments. Pfizer has been using GE Digital's Proficy Historian for years to collect data from their manufacturing sites, building controls, and utilities, combined as one OT data set. They are using this data to improve their operational performance.

"We are able to get a lot of benefit, a lot of reduced downtime, and a more reliable system."

— **Kevin Callahan, Automation Engineer, Pfizer Inc.**

Pfizer has integrated live process data for their maintenance systems and have gone from a preventative maintenance approach to a more predictive maintenance approach. It has reduced downtime and allows the team to have access to the data for review, which has helped them to increase productivity and resulting yield.

Pfizer has been working with GE Digital's partner, AutomaTech for over 15 years to help find the GE Digital suite of solutions that fit their needs. "We've upgraded historians, we've upgraded SCADA servers and client applications. They have been key in helping us choose the right product," Callahan said.

WATCH VIDEO

"It gives us one common format to look at and collect data and provides us with the ability to compare data from multiple areas."

— **Erik Westberg, Automation Engineer, Pfizer, Inc.**

Results

- Reliable integrated system with accurate and secure data
- Data collection and root cause analysis
- Reduced downtime with a predictive maintenance approach
- Increased productivity and yield

Products

- Proficy Historian
- iFIX HMI/SCADA
- Proficy Plant Applications

About AutomaTech

[AutomaTech](#) is a leading provider of industrial technology solutions focused on improving your operational performance. By harnessing the power of data, we enable significant gains, visibility across your entire organization, and increased profits for a competitive edge. Our product offering includes a flexible and scalable mix of hardware and software solutions to solve your toughest challenges while providing a roadmap for future improvements and growth.





Kao Brands

Embarks on Operational Excellence Journey with Proficy Software



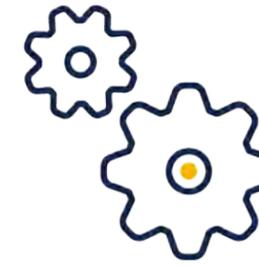
Improved quality and decreased cycle times

Challenge

- Complex batch processes and control system with many different recipes on single equipment
- Lack of comprehensive visibility into processes
- Need for greater agility to meet increased capacity requirements

Action

- Implemented GE's Proficy software to optimize its manufacturing operations and provide a foundation of reliability and predictability
- To meet Kao's need for increased capacity, Proficy enables the manufacturing agility required to accommodate many different recipes on the same equipment
- Enables Operational Excellence, critical to supporting Kao's growing operations globally



Results

- Improved product quality
- Increased flexibility to implement recipe and equipment changes in hours instead of days
- Decreased cycle times
- Greater efficiencies and reliability
- Reduced commissioning time for a competitive advantage
- With greater operational insight and flexibility, Kao can optimize many different recipes while ensuring quality



Ability to implement recipe and equipment changes in hours instead of days translates to agile solution that impacts the bottom line.

Kao Brands of Cincinnati, Ohio chose GE's Proficy software for a complex batch execution system in primary operations across its many consumer products.

The company was looking toward improved quality, decreased cycle time in the process and implementation, increased versatility, testing and reduced commissioning time for its production lines.

Global Beauty Brands Manufacturing

Kao Brands, a global manufacturer of premium beauty brands including Jergens, Ban, Biore, Curel, Guhl and John Freida, prides itself on innovation and quality. Therefore, when the company added new equipment or implemented different procedures, they realized that they needed a system that was both agile and secure to allow optimizing the manufacturing of many different recipes on the same equipment.

Over the last years, Kao expanded its operations globally, particularly in Europe and Australia. New equipment was added to accommodate the additional needed capacity. This increase in sales necessitated using outside contractors to fulfill product commitment. The company saw value in cost savings and quality improvement while protecting the confidentiality of recipes by bringing that manufacturing capacity back to the plant. Kao produces many different products and SKUs on the same equipment and packages those products on the same lines.

“This was a logistical problem,” said Andy Pickens, Engineering Manager for Kao Brands’ Cincinnati plant. “With three major production areas – making, storage and packaging – producing many products with the same equipment and having to validate cleanings between products, results in a complicated system. We needed to continue to provide high quality products but with more agility to address the increased capacity requirements.”



Interconnected Operations

Kao's control system is complex and its PLC platform was driving the operation. Many operations are interconnected and if a change in one system was made through the PLC, due to sequencing, it could have an adverse effect on another operation down the line.

The team thought that, due to the rate that things change, they needed a solution that would allow them to develop PLC code once and not have to change it with each tweak to the process.

Kao implemented Proficy Batch Execution, a powerful and feature-rich solution used to increase product quality, consistency and efficiency, and Proficy Historian to capture high-resolution process data enabling true process visibility.

The Proficy solution was implemented on the new equipment and now the team is implementing on all equipment.

“We now change recipes more quickly and more reliably. Changes that used to take days to implement are now taking hours instead.”

— Andy Pickens, Engineering Manager, Kao Brands

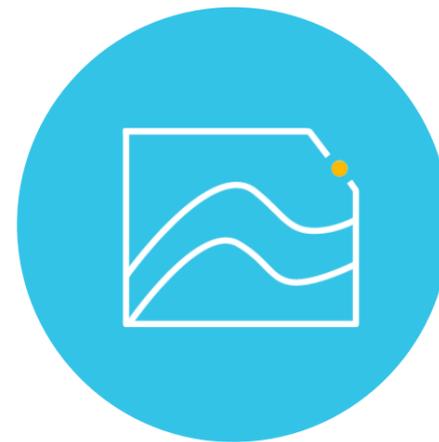
Faster Recipe Changes

Kao isn't stopping there, according to Pickens. The company would like to use the data collected by the Proficy software solution for process improvement.

“We are working to optimize what is a good time for each step of every product we make,” he said. “We would like to see what the impact any manufacturing bottlenecks have on the schedule made by the production team and adjust our schedule dynamically to compensate.”

Kao Brands is a great example of how companies achieve efficiencies by laying a solid foundation of reliability and predictability.

Operational excellence starts with visibility into operations, moves to efficiency, reliability and then, by standardizing work processes, improving planning and execution across the company results in a sustainable competitive advantage for the company in the marketplace.





Subaru: Building the Fastest Growing Car Company in America

300%

Production volume increase over 12 years

24 day

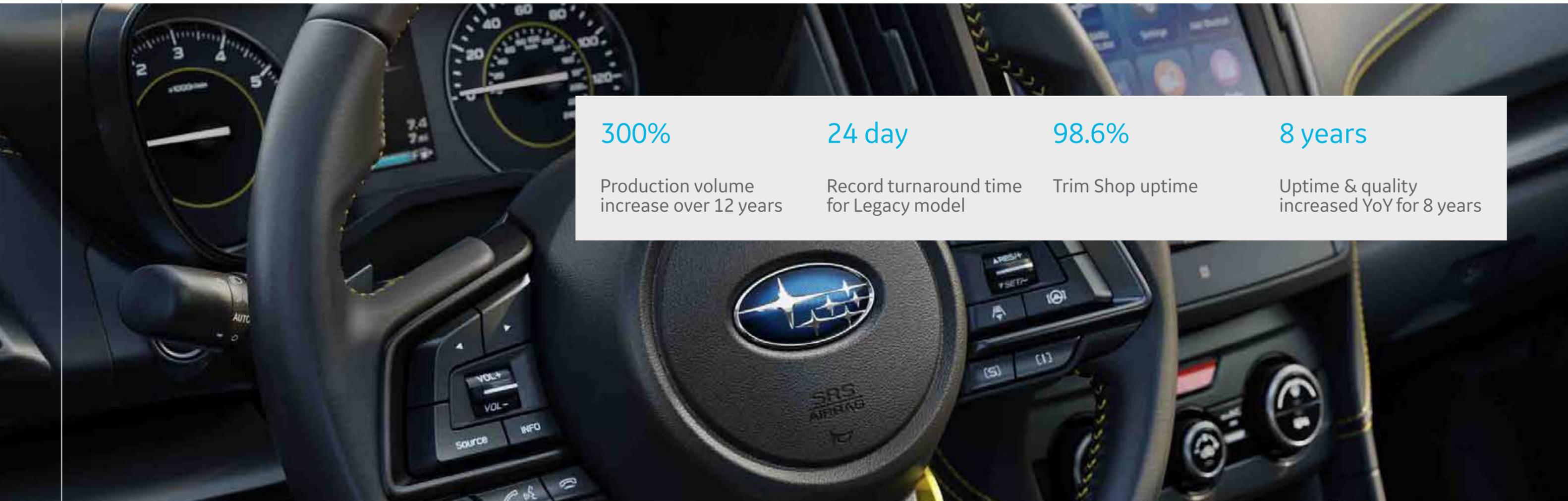
Record turnaround time for Legacy model

98.6%

Trim Shop uptime

8 years

Uptime & quality increased YoY for 8 years



Introduction

Company

Subaru of Indiana Automotive, Inc.

Products

- iFIX
- Proficy Historian
- Proficy Plant Applications
- Proficy Operations Hub
- Asset Performance Management

At Subaru, the fastest growing car company in America, uptime is critical! Discover how Subaru meets the challenges of:

- Growing demand that drives significant volume
- Quality at the heart of what Subaru does
- Flexibility and adaptability for customers



Transforming automotive manufacturing

How is the world's fastest growing automaker embracing change? By leveraging digital industrial applications, Subaru is not only increasing its production to meet customer demand—it's doing it in record time.

Subaru of Indiana Automotive, Inc. (SIA), sits on 820 acres of land in Lafayette, Indiana. The 3 million+ square foot plant manufactures four models for Subaru: Ascent, Outback, Legacy, and Impreza. In recent years, SIA produced around 342,000 cars per year. To put that into perspective, they typically roll a new car off the production line every minute. That's a lot of cars! And, with almost 17 miles of conveyor—there are literally a lot of moving parts to keep functioning properly.

Aiming for zero unplanned downtime

With this size facility and production and quality demands always increasing, the company knew it needed better visibility into real-time data in order to work toward its goal of zero unplanned downtime.

For the last 10+ years, Subaru has utilized iFIX HMI/SCADA and Proficy Historian from GE Digital in its manufacturing process to improve uptime, increase use of real-time data, leverage predictive analytics, and monitor quality. Without these industrial applications, the company says it would not be able to run at the production rates it currently does.

Take its paint shop, with 1,400 motors pushing cars around the facility—the team can now see how each motor is operating and identify issues quickly (and often remotely), which has drastically increased efficiency.

Experiencing record breaking turnaround times

Subaru is also making better use of historical data captured in the software. If a car produced 6 months ago has an issue, the team can now go back and look at that specific car to see how it was assembled and if there is any room for improvements and adjustments in the manufacturing process. This ensures new vehicles won't have the same

issues. Previously, this is the type of data that would have been near impossible to leverage, due to the production volume at the facility.

In fact, GE Digital's industrial applications are helping Subaru meet production and quality targets like never before—and delivering industry-record turnaround times between customer orders and delivery for the Subaru Legacy model— in just 24 days.

Beyond SCADA

Proficy Historian and Proficy Plant Applications

In addition to a foundation of iFIX, learn how Subaru leverages Proficy Historian for trending and analysis, and Proficy Plant Applications to identify issue events that may impact production – driving additional productivity gains.

Reducing Downtime

Putting data to work with Proficy Operations Hub

Subaru has a lot of collected data. With Proficy Operations Hub, the team will use the data better to help reduce production interruptions (downtime). Proficy Operations Hub will help Subaru:

- Identify what might become a quality issue before it does
- Achieve a centralized development tool
- Have a tool to help the team collaborate with all areas of the plant
- Provide tools to management to make educated decisions on real-time data and historical issues the team may have had to deal with

APM in the Trim Shop

Subaru's goals related to Asset Performance Management are:

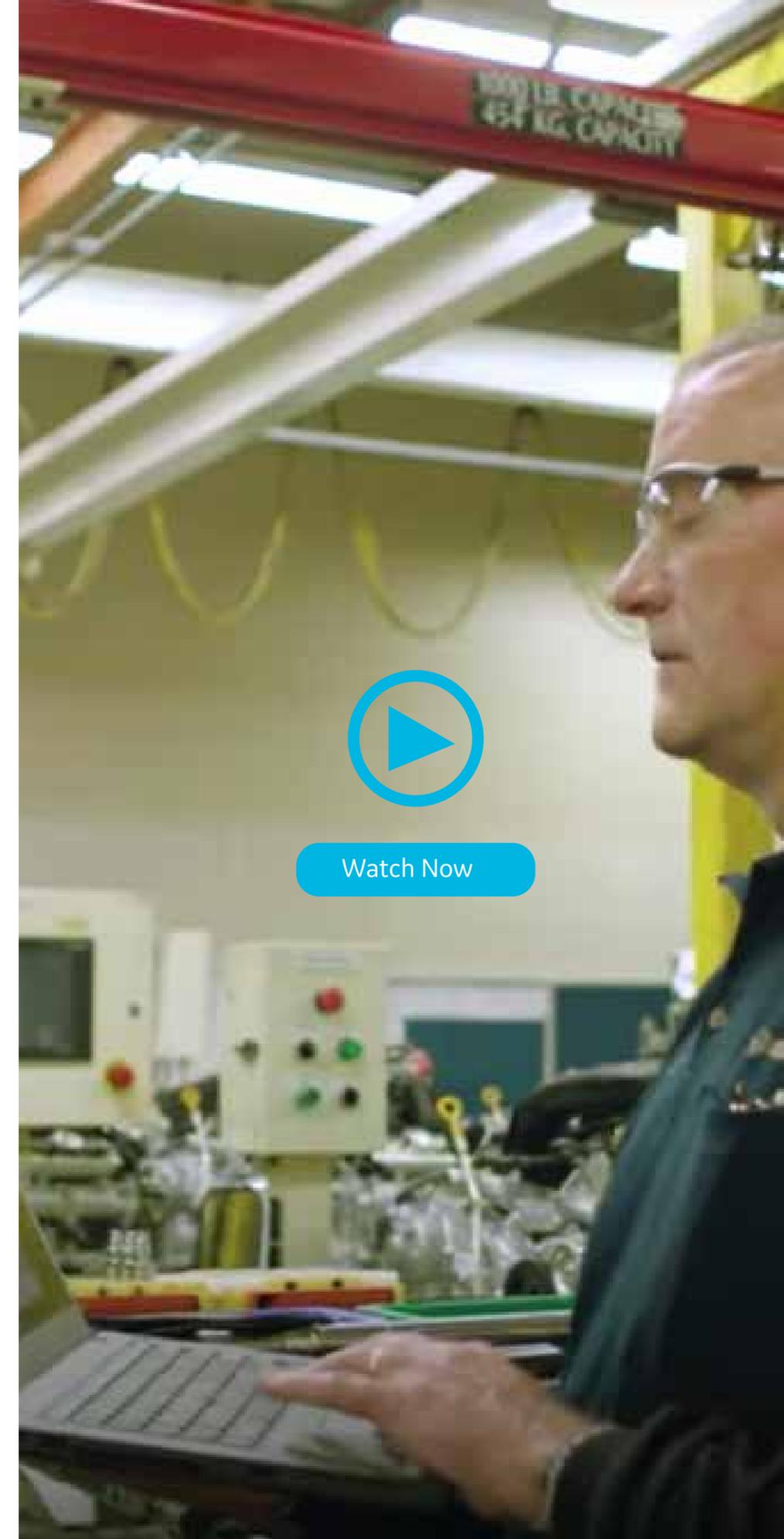
- Identify problems with equipment and be more proactive in maintenance
- Get a better understanding of the equipment's life cycle
- Improve overall uptime with different equipment

About the Speaker

Trent Lester, Group Leader for Integration of Production Control Systems, Subaru of Indiana Automotive, Inc.

Trent Lester is the Group Leader for Integration of Production Control Systems at Subaru of Indiana Automotive, Incorporated in Lafayette, Indiana. In his current role, Trent is responsible for oversight and management of numerous computer systems that facilitate, monitor and track production in an entirely virtualized environment. The Lafayette-based plant is responsible for producing five Subaru models including: the Legacy, the Outback, the 4- and 5-door Impreza and the 7-8 passenger Ascent. The principal focus of Production Control Systems is automation, data collection and machine controls through the GE Digital software suite. His more than 20 years of experience at Subaru extends beyond IT as he has worked in the production environment in many different capacities. Trent was born and raised in Lafayette, Indiana, where he resides today with his wife and three children, ages: 14, 17 and 20.

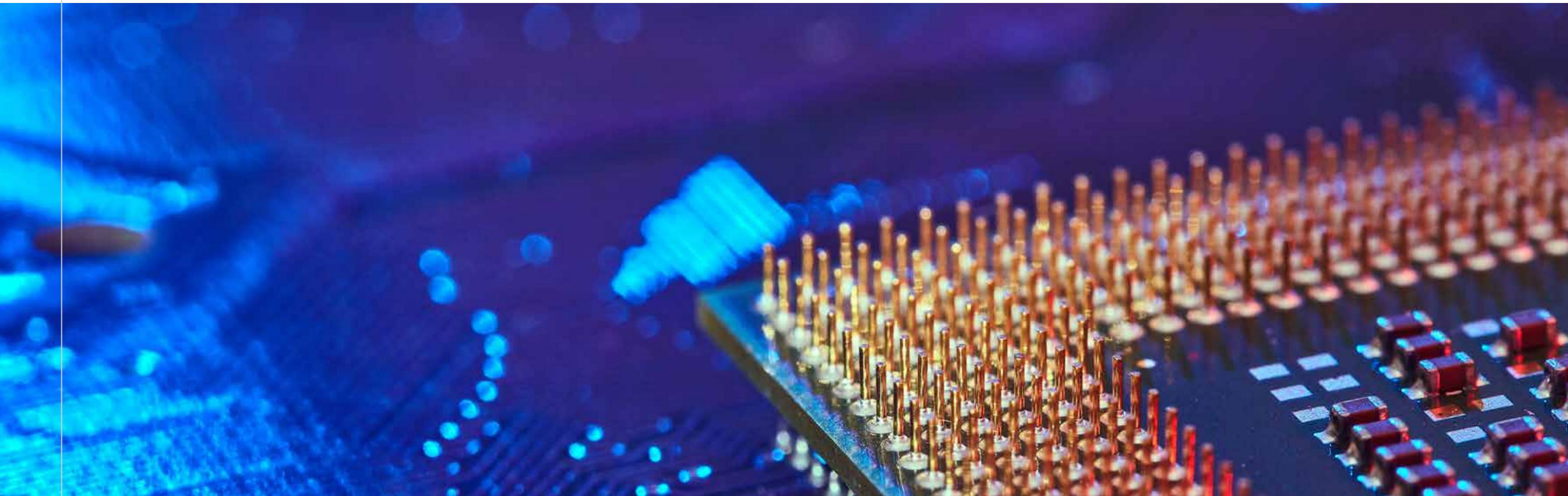
See what's next for Subaru – including Proficy Operations Hub to further deliver on key outcomes and support growth.



Watch Now



Intel Reduces Unplanned Downtime and Manufacturing Costs



Avoid defects and eliminate rework using Intel® sensors to communicate with hybrid on prem / cloud GE manufacturing software solution



Challenge

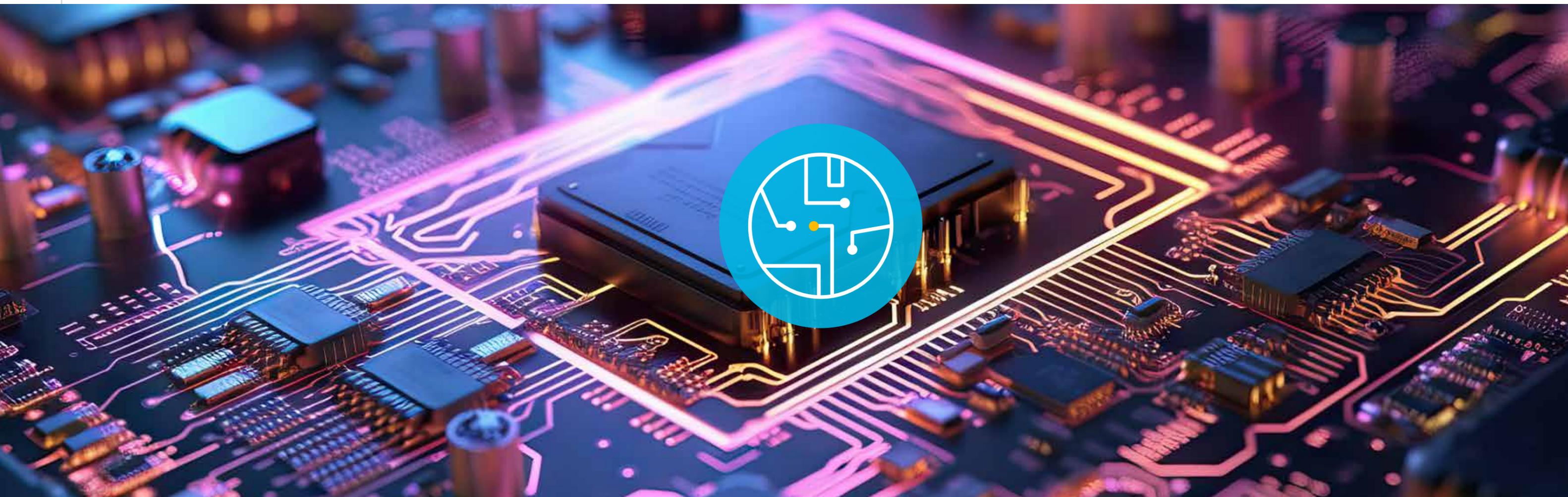
Improve asset throughput and reliability, optimize manufacturing capacity and secure data streams at Ocotillo semiconductor manufacturing facility

Action

- Deploy GE Digital's Proficy software including HMI/SCADA, MES, and cybersecurity to complement with manufacturing infrastructure
- Manage aggregate equipment data, digitize benchmarking and secure OT enablement at Ocotillo with GE Digital software

Result

- Reduce unplanned downtime, decrease inventory and increase capacity recovery with digitized processes
- Increase uptime
- Decrease costs
- Reduce operational risks
- Protect critical infrastructure





Global Tier 1 Automotive Supplier Achieves Right First Time



Tier 1 Automotive Supplier Puts CIMPLICITY and Tracker Solution to the Test for Right First Time and Sequencing Applications

Automakers are facing increasing challenges to contain warranty/recall exposure, and Right First Time applications can offer that solution – with the potential to significantly improve throughput, efficiency and quality.

Right First Time requires a powerful toolset, including in-line sequencing and error proofing, to create product birth certificates and minimize missed delivery penalties. By working together, manufacturing operations and corporate IT teams can put these systems in place to enable Right First Time, as well as develop strategies for standardization and globalization to reduce support burdens and achieve long-term success.

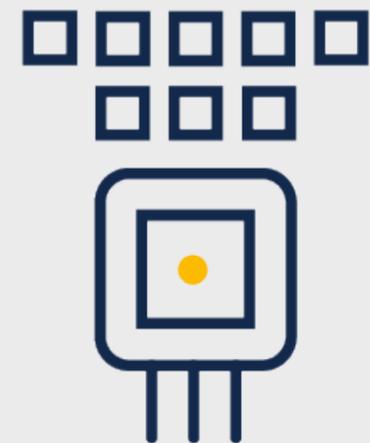
“By not building Right First Time, Tier 1 suppliers are subject to large financial penalties based on their delivery contracts with the auto manufacturers,” said GE Digital's Automotive

Industry Manager. “A switch from Build to Stock to Build to Order and Just-in-Time Sequencing is a continuing trend in the marketplace. Tier 1 suppliers now have to manufacture and deliver sub-assemblies in sequence in as little as one to five hours from the time they are notified by the automakers.”

In addition, the automotive manufacturers are tightening up the contracts with their Tier 1 suppliers to include penalties for sub-assemblies missed, delivered out of sequence, or of poor quality. As part of the contract, a complete “Birth Certificate” (i.e. genealogy and traceability records) of each sub-assembly, needs to be delivered along with the finished product.

Results

- Optimizing workflow every day of the week instead of only at longer production stops
- Products are built “Right First Time”
- Creation of Product Birth Certificates to meet contractual obligations and warranty abatement
- Changes in order sequence or part numbers do not require system changes
- Ability to implement production changes on line
- Ability to dynamically rebalance the line
- Four month delivery of the project – start to finish
- Reduction in IT team overtime expenses as system changes are eliminated and re-testing is not necessary
- No longer restricted by resources that understand, maintain and upgrade the homegrown solution



This European division of a global Tier 1 Automotive is one of those companies. The company is one of the world's largest suppliers of automotive interior systems and components providing complete seating systems, electronic productions and electrical distribution systems. The company prides itself on its dedication to provide the best possible service to the world's automakers by delivering increased value through the latest vehicle interior technologies and the continuous improvement of processes and product quality.

The plant manufactures sub-assemblies for a major automotive OEM and is therefore required to not only produce the quality product that the OEM expects, but to deliver it on time and in sequence for their production needs. The Tier supplier produces the sub-assemblies for four models with 100-plus part numbers in each and many different combinations depending on the model of car.

The OEM installs the sub-assembly in the car approximately 4 1/2 hours after the order is received. If the parts are not ready and the Tier 1 supplier shuts down the OEM's production, the company incurs large penalties. Keeping the line running and meeting production are clearly critical for success.

Changes, Everywhere

The Tier supplier began the process of interviewing vendors for an application that would give them the capabilities of Right First Time and error proofing. In addition, the company was redesigning its three existing production lines to shift production from two shifts to three. GE and its European partner Novotek were brought in to determine the best solution.

"We as a management group at the Driving Unit, decided to replace our old in-house development system," said the Tier 1's IT Manager. "The old system was unstable and inflexible."

At the same time, the OEM decided that it would start a 24-hour production schedule after that year's summer vacations, so it became more obvious to the team that they needed a more robust and configurable system to meet the needs of their customer.

"We had already started to talk with GE's local partner about the new system," said the IT Manager. "But now the timeframe was a bit tight, and we needed GE to step up and help us."

Right Place, Right Time

"We were discussing new opportunities with the European sales team," said the Customer Solutions Manager for GE Digital's Professional Services. "We were told about the opportunity and the customer's needs. By that time, my team had spent a few months gathering customer requirements to validate an Error Proofing product concept. It was applied to a clear during that meeting that my team was in the process of designing exactly what this Tier 1 supplier needed. This confirmed our assumption that our Proficy solution assembly error proofing design was right on the mark."

The basic solution idea was to use existing products where possible to shorten the development cycle and reduce new product deployment risk. The team designed new solution modules, focused on Product Genealogy and Error Proofing that plug directly into our existing products. These new modules focus the product on a particular solution, which makes the configuration quick and easy with less risk of

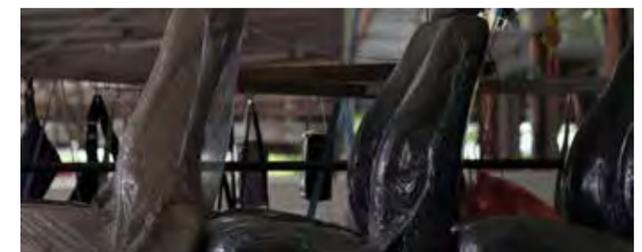
entering incorrect data. This architecture was possible since GE's Tracker product contained all of the basic functionality needed for the solution, as well as the modular design necessary to easily add the new modules.

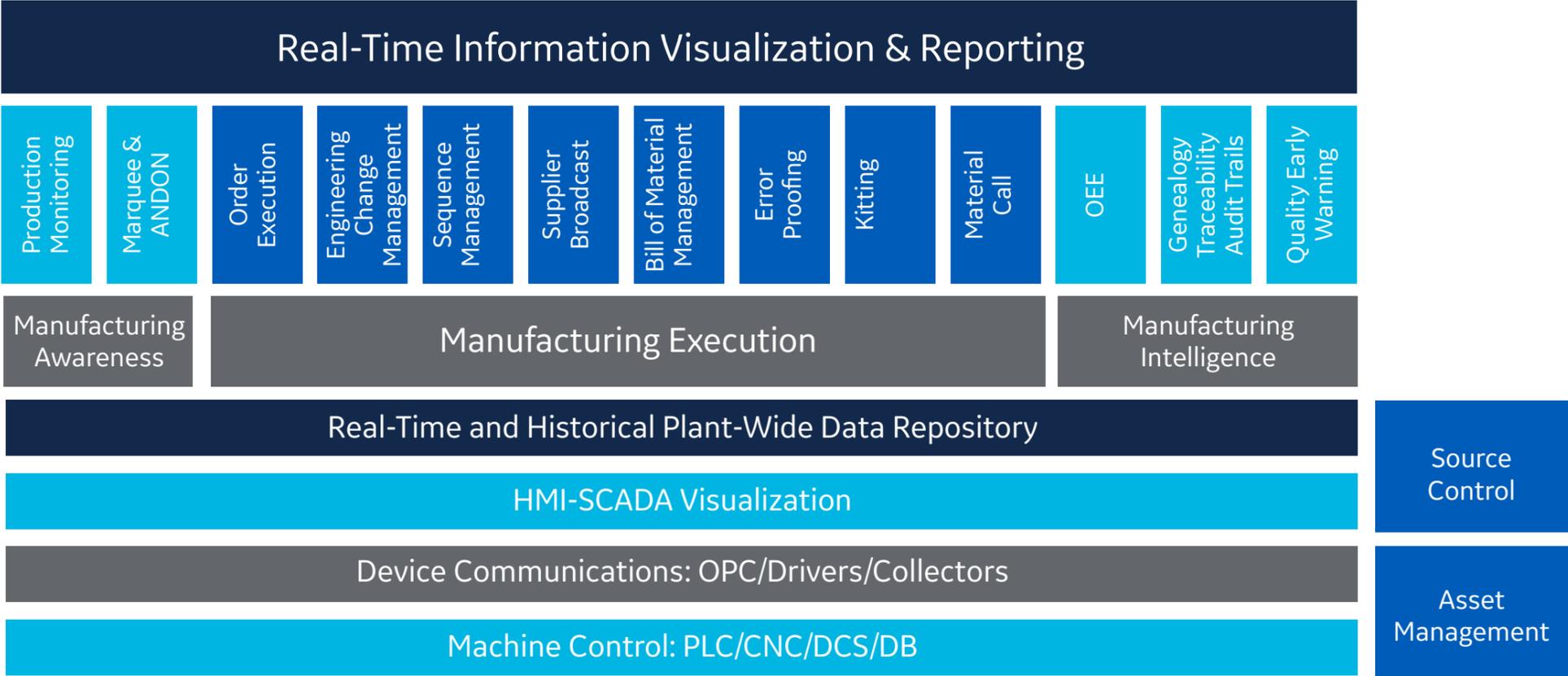
Tracker provides the ability to not only track the real time location of jobs on the production floor, but can be configured to perform routing logic on the movement of jobs through the facility. This unique capability allows manufacturers to manage the manufacturing, routing, and delivery of multiple product components into complex product assemblies.

The global GE team went back to the Tier 1 supplier and described the Proficy assembly error proofing solution from GE Digital's Professional Services. "We flew there and listened to their pain points. We then described the value of our new solution and how it could eliminate that pain. They bought it before we even left," the Customer Solutions Manager explained "They knew this was the solution for them."

GE Digital's Professional Services group works with customers before they buy their solution to scope out the project, perform technical estimations and gather the customer requirements before the sales team draws up the contract.

One of the key points in the negotiations was the ability to implement in a very short time frame. "We just started conceptualizing this application. In less than one month, we had the order, and we had to go live within four months," said the Customer Solutions Manager.





There was no time to hand this off to a local project team so the global GE team worked together to complete the project. With only a few months to get from design to production, this also meant that the customer was part of the team. "I had a very close working relationship with the team during the implementation," said the Tier 1's IT Manager. "They made sure we would have all the resources we needed to be able to implement on time."

The results

The goal of the application was to error proof every step in the product production process. It was extremely important to the Tier 1 that each step be performed correctly and in sequence; this forces the end product to be better through consistency and reliability. Correcting issues at the point they are introduced saves time and money on rework and providing traceability and genealogy for the entire lifecycle of the product helps to defray warranty and recall costs. Every activity that has been preformed, every user that has touched it, any defect

that may have been introduced, and every part that is installed is logged and available for viewing, reporting, or analyzing. What resulted is a Proficy software-based sequencing and error proofing applied solution that provides an easy-to-configure and modifiable application that meets production line requirements. Users have the ability to dynamically change the production line through a drag-and-drop interface with minimal to no product, database or IT knowledge on site.

Meeting Requirements

Basically, the GE Digital solution ensures that each product is built consistently and reliability every time. This solution also warranty and recall defense for every customer. There is never a question on what parts were included or how a product was built. In fact, it has become a mandatory deliverable in many Tier 1 automotive supplier plants. The end-user wants the assurance that the products were built according to the mandated processes.

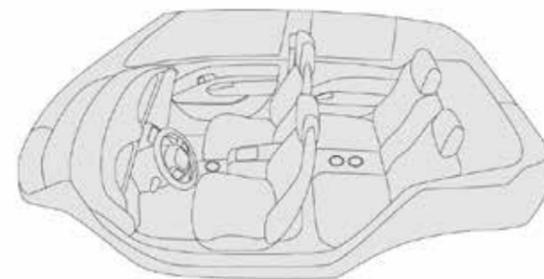
"We had already identified this application as something we wanted to do," said the Customer Solutions Manager in GE Digital's Professional Services. "And, the company was one of the Tier 1 companies we wanted to work with. It was an extremely successful project for both of us."

From the Tier 1's perspective, it is difficult to quantify hard benefits because of the change from a two-shift production schedule to a three-shift schedule. "We are now able to do line changes during production and the system is configurable. These are considerable benefits," said the Tier 1's IT Manager. "Being able to change the line and not have to pay overtime for either my team nor the operators to test the changes after production hours, is a huge benefit for us."

In addition, time is always important when you are trying to meet the same schedules as your customer. "Being able to ramp up or down in the same way as our customer is also a key benefit," she continued.

The Tier 1 now has the capability to reconfigure the line fast and easy, making this system a more stable situation than other companies in the industry that might have in-house developed software.

"This is important. If any of the IT persons leave the company, as happened before," said the Tier 1's IT Manager, "They always have GE in the background able to help out. With an in-house developed system, the knowledge always leaves with the person and it takes forever to get someone else up to speed."



The solution meets the following high-level CTQs (Critical to Quality):

- Error Proofing to deliver Right First Time and abate warranty costs
- Genealogy/ Birth Certificate of the product and the process to meet contractual requirements
- Build and Deliver to Sequence to avoid contract penalties
- Configuration templates that can be re-used across work cells, lines, and sites to decrease time to value
- Meet production schedules
- Simple to configure and modify on site
- Process Flexibility
- Mission Critical System
- Non-IT Target Skill Set for Support
- Data Connectivity
- Unique visibility of all data using standard HMI tools which is built into the product. This feature made all plant floor data visible to operators "in a click"
- Possibility to add other existing function based on the same platform (Tracker), like material pull, add-on boards, bar code label editor and shipment broadcast

The Next Generation

GE has developed several additional phases with this application. Based upon what was learned from the implementation and other general market needs, the GE team is able to keep the fundamental design but add enhancements that will add functionality as needed in line with today's manufacturing standards.

“We are excited to have this solution as part of our GE Proficy suite and Professional Services,” said the Customer Solutions Manager. “Due to the Tier 1 partnership during the implementation, we are confident in addressing customer challenges in this area with a well thought-out, market-tested solution.”

GE will also continue to work with the Tier 1 on the next iteration of their project. The company is now deciding on next steps with regard to manufacturing operations. One of the options under consideration is order management.

“They want to extend the error proofing capabilities by combining it with order management,” the Customer Solutions Manager said. “The orders and Bill of Materials (BOMs) must be 100 percent correct or a bad order fed into an Error Proofing application can stop a production line.”

The feedback from the plant has been outstanding. “The engineers in the control room have more time for other projects because the system does so much for them,” the Customer Solutions Manager reports. “That is an indication of a successful solution.”



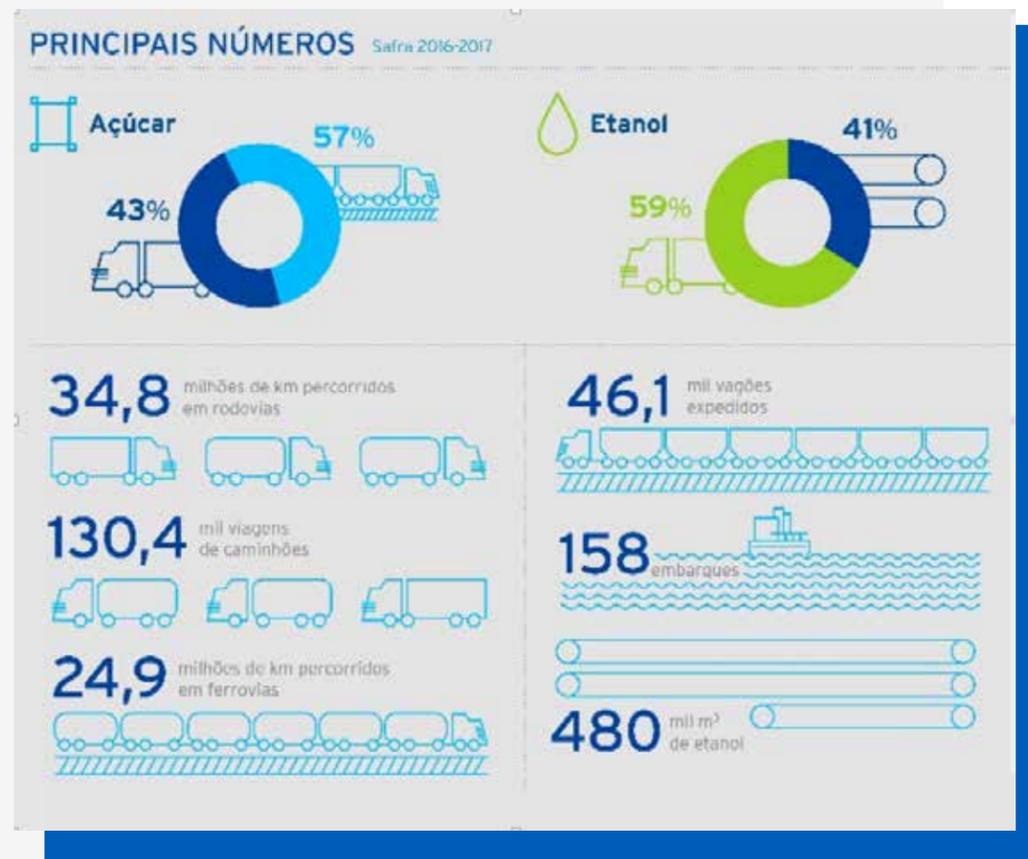


Digital Transformation at Copersucar

360° view of a Port Logistics Operation

Copersucar is redesigning their processes, reformulating their operation and facilitating decision-making, to place the company in the map of Industry 4.0.





Source:

<https://www.copersucar.com.br/release/lucro-da-copersucar-atinge-r-254-milhoes-no-ano-safra-20162017/>

Working within the sugar cane supply chain and uniting field and industry, Copersucar is the largest Brazilian exporter of sugar and ethanol with integrated logistics throughout the business value chain.

With a unique business model in this sector, Copersucar doesn't count with production assets, but with sugar and ethanol acquisition contracts, supplied mainly by the member plants.

From the joint venture with Cargill, Alvean was created, which has accelerated the global expansion of the company.

Copersucar's strategy for sugar is based on the investment in multimodal terminals for the storage and transport of sugar, like in Ribeirão Preto and São José do Rio Preto, and at the Sugar cane Terminal Copersucar, located at Porto de Santos (SP), with a capacity of movement of 10 million tons of product per year.

Crop of 5.3 million tons of sugar and 4.2 billion liters of ethanol are commercialized with a \$254 million of consolidated liquid profit, at the end of the crop year. Copersucar owns the largest capacity of sugar and ethanol storage in Brazil.

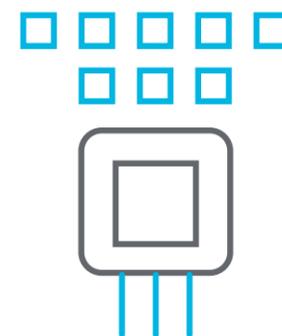
For the products to reach their customers in tens of countries, it is necessary to have a complex logistics infrastructure, integrated by their own and contracted transshipment terminals and storage, in addition to an extensive outsourced road, rain and sea transport network.

Challenge

When a major fire struck the warehouses of the company, Copersucar had the need to update the entire operation.

In the area of Industrial Automation, an audit was conducted to identify the improvement opportunities through upgrades, new technologies and new processes. The Santos terminal was operating with some level of industrial automation, but the possibility to reduce contingencies and making operation and maintenance more predictable was identified. Additionally, it was not possible to quantify the losses related to performance and efficiency problems in a detailed manner and with identification of causes.

It was in this period that Copersucar brought in Marcelo Latrova to assume the Maintenance and Engineering Management, with a mission to redesign the processes and place Copersucar in the Industry 4.0 map, through the adoption of systems with an elevated level of integration, a consensus among the different approaches that exist today for digital transformation. Soon after, he had the arrival of the Industrial Automation Specialist Eduardo Pateis to supervise and implement the new project.



One of the priorities was to identify and address aspects of the process that could compromise the safety of the operation and impact daily production, due to possible unplanned downtime and complications.

With the new Industrial Automation project underway, Copersucar operates its regular activities at the same time as it manages the necessary changes, aiming at its modernization and increased efficiency as goals. This transition process is the most challenging point for the entire team of managers and operators.

Aiming for greater effectiveness, the team made the decision to restart and redesign processes and bring new technological solutions to overcome the challenges presented. It took nearly seven months within the Operational Control Center (CCO) to configure the systems.

The Engineering and Maintenance team is fully aligned with the corporate initiative, with the conviction that the project will increase Copersucar's competitive advantage. The current scenario is changing dramatically, however, with significant improvements at each stage.

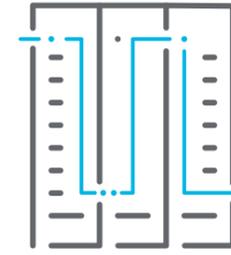


Solution

Aquarius Software was the chosen partner for this project, acting as supplier of the systems and assisting Copersucar in the solution design, software training and support for the implementation of each system.

The overall idea of the solution includes the technological upgrade of the supervisory system with revision of the architecture used, upgrade of GE Digital's iFIX HMI/SCADA system, configuration of Hot / Stand-by redundancy, server virtualization and flexible access to client interfaces, operation via Terminal Services, with access management via ACP ThinManager. Proficy WebSpace allows viewing of the HMI/SCADA screens anywhere, any time through a web browser.

In addition, increased operational safety, change management and automated backup in automation applications (PLC and SCADA programs) will be delivered by AuVersy's VersionDog software.



Finally, through the implementation of the PIMS and MES suite, also from GE Digital, it will be possible to have the entire shipment process digitized, through the ERP (SAP) connection to obtain the information on what is stored and what to ship in each ship, following the execution of the loading and returning consolidated information on each operation.

“This project once again proved that it is possible to employ new software and services on existing technological bases, resulting in extraordinary results such as increased operational safety and greater integration between automation and corporate systems, with continuity of operation and investment greatly reduced.”

— Diogo Gomes, Aquarius Software



Critical Points

Within the scope of automation, PLCs were already interconnected in a control network, but there was no digital storage of process history. The records were made on paper. It was necessary to adapt the PLCs' ladder to the norms and to create new supervision system screens, processes that are in final phase of implementation.

The VersionDog deployment - has brought improvements in the dynamic of changes and access control of these programs. "Now it is possible to follow the changes / revisions in ladder diagrams, to know who performed them, when they were performed and, through the analysis of the data, to correct all the flaws and deviations," explains Pateis.

The solution will be completed with the implementation of the PIMS and MES systems, consisting of GE Digital's Proficy Historian, Proficy Plant Applications and Proficy Workflow software, which will allow the reading and analysis of the history and efficiency of the process, as well as integration with other Copersucar systems.

The PIMS and MES systems will also be instrumental in bringing relevant information to operational decision making. Latrova points out that from the implementation of these systems it will be possible to detect with more clarity and objectivity the causes of various types of outages and improve the process in general, including those related to the definition of specific training for operators.

“Protect processes. This is one of the essential roles of Automation.”

—Marcelo Latrova

Maintenance and Engineering Management, Copersucar



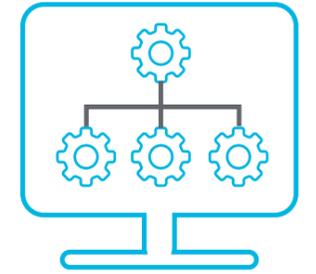
Project Highlights

- Implementation of a modern CCO, with digitalized and centralized process information, available in real time through intelligent and reliable systems, allowing the decision making with greater speed and assertiveness;
- Implementation of MES / MOM project (GE Digital's Proficy Plant Applications and Proficy Workflow software), enabling the control of ship loading efficiency and integration of process data with the ERP (SAP) system;
- Installation of change management system in automation and automatic backup systems (Auvesy VersionDog software);
- Virtualization of Automation Technology systems in IT (Information Technology) servers to increase the availability and robustness of the applications;
- Improved security and reliability of the system, with the implementation of a physical network backbone with intelligent redundancy and ring topology;
- Investment in the Lean Manufacturing methodology to make the whole operation more efficient, making the correct integration of Industrial Automation with each person involved in the operation of the terminal.

This new control philosophy also brought the need to create an Operational Manual that is in the process of being elaborated and a final training for the operators.



Figure 1. Operational Control Center of the Copersucar Sugar Terminal (TAC)



Technology employed	Main function
iFIX HMI/SCADA	Supervision and Control (SCADA)
Proficy Webspace	Viewing iFIX through a Web browser, anywhere, any time
Proficy Historian	Process Historian (PIMS)
Proficy Workflow	System Integration (Including SAP), eSOP and process automation
Proficy Plant Applications	Efficiency management of the operation (MES/MOM)
VersionDog	Automatic change management, SCADA backup and PLC programs
Thin Manager	Remote access management via remote desktop (thin clients)

Results

At the current stage, some major results have been obtained:

- With the advances in the implementation, it is notable that the number of overtime necessary has been reduced drastically, which is reflected in a higher quality of life for all those involved in the operation and in economics for the company;
- Several reports that help make decisions are now available. These reports are critical for process adjustments, as well as assist in the planning of activities, resulting in higher productivity;
- An automatic collection of historical data and the integration of the systems made the teams use their time in a more efficient way, since, with the direct and assertive visualization of the processes, the terminal operators could focus on the guarantee of operational efficiency, instead of spending their time collecting and analyzing manual data as previously required;
- Operators now work in much more organized and logical physical and operational environment. This also increases productivity and quality of life at work, in addition to increasing operational safety.

“If you solve your problems faster and more definitively, you gain operational agility. This is critical for our business.”

— *Marcelo Latrova*

Maintenance and Engineering Management, Copersucar

Next Steps

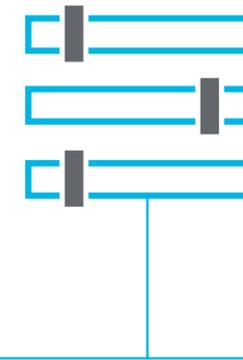
One of the next steps is the standardization of the operating interface. There will be similarity of processes and screens of the Supervisory System. This means that the operator working in one position may work in another, or in different shifts, with parity of procedures.

Another clear perspective is the continuous integration and collaboration between the Industrial Automation and IT teams. At Copersucar there is a reconciliation of the goals of continuous improvement of the two teams. This creates an extremely positive scenario for the company to follow its Digital Transformation journey and obtain solid results, in line with Industry 4.0's propositions.

Partnership with Aquarius Software

Copersucar had been a long-time user of the SCADA system distributed by Aquarius, GE Digital's iFIX, and planned the version upgrade when it entered the search process for partners for its new Industrial Automation projects. Analyzing the Aquarius portfolio, he was surprised to realize that he could solve all his challenges through a single partner, in an objective and integrated way.

Aquarius offered support beyond expectations, including expert advice for project management. One of the highlights was support in integration with IT, a subject dominated by the Aquarius team, with experience in other projects.



“ My practical view of Industry 4.0 is to reduce costs and search for operational efficiency through IIoT and the use of advanced technologies. I also see the autonomous systems, tracing routes and performing autocorrections.”



“ The experience and dedication of Aquarius' team of professionals generated a relationship of trust between companies. Our teams worked together throughout the project.”

— Eduardo Pateis

Industrial Automation Specialist, Copersucar



Food packaging manufacturer complies with the general food law with Proficy software



This food packaging manufacturer in Europe is an innovative producer of foamed plastic trays. Its extensive breadth of products offers a broad range of possibilities for the individual presentation of fresh foods like meat, poultry, fish, cheese, vegetables and fruit.

The Challenge

The General Food Law enforces producers and suppliers of food to put a system in place that enables the traceability of ingredients. As a main supplier to the food industry, this company started searching for a system that could help them with this regulation and facilitated other manufacturing requirements at the same time. Better visibility into the production process by automatic capturing of progress and quality indicators were the main drivers to start searching for a manufacturing execution system. From a shortlist of four suppliers, Proficy Plant Applications was chosen for the unique concept of separating raw historian data from interpreted information.

Recording based on events

With a large installed base of GE Digital's CIMPLICITY HMI/SCADA interfaces at the production lines, this manufacturer wanted to extend this layer rather than replacing or having to restructure it. By placing local CIMPLICITY data collectors at the SCADA nodes, it was fairly easy to capture all relevant production data into one centralized Historian database. From this historian database, events were defined that indicated the start of a production order, or the downtime of a piece of equipment. At these events, the Proficy Plant Applications system is triggered to transform data into valuable information.

Synchronizing Product Specifications

At this manufacturer, SAP is used to generate the master planning and assign a bill of materials (BOM) to individual production orders. After a detailed scheduling process, these orders are downloaded to Proficy Plant Applications. Within Plant Applications the orders are assigned to the available production lines from where the queues can be monitored within the schedule overview. These queues are pushed forward to the CIMPLICITY HMI/SCADA screens, from where the orders can be started.

Integrated User Interface

The main reason the system was accepted quite rapidly by operators was that the user interface was fully integrated into the existing HMI screens at the production lines. From there, operators can select a production order, view the required bill of materials, start the order, book the usage of materials, get the recipe parameters and monitor production progress. In the background Proficy Plant Applications is recording the necessary information for traceability, quality and efficiency. This information is then used for reporting and automated bookings back to SAP.

Automated OEE Measurements

By recording the machine downtime, speed and quality, the calculation of the Overall Equipment Effectiveness (OEE) could also be fully automated. The performance is measured against a budget indicator which can be product or even equipment dependent. Management has chosen to force operators to fill in the reason for a downtime or waste event, before being able to restart the line. With predefined categories of reasons, the downtime or waste reasons can quickly be selected from the screen. The OEE is continuously calculated per production order, showing potential differences between product type, recipe settings or shifts.

A detailed analysis of the reasons can be executed from the web-based reporting portal by any authorized personnel.

Increasing Inventory Accuracy

The installation of Proficy Plant Applications allows this food packaging manufacturer to search for materials consumed instantly for reasons of traceability as defined by the General Food Law by recording the quantities consumed. Also the inventory can be adjusted automatically. The consumption of materials used to be recorded in SAP by method of back flushing, often resulting in inventory. With automatic reporting back of material consumption, the accuracy of inventory listing will go up significantly.

Platform for Continuous Improvement

The company has chosen to implement the system by themselves, which meant they had to follow a learning curve, but at the end, internal knowledge and expertise was built up to maintain and support the system. With the ease of creating new reports now, a platform has been created that can and will be used in the future for continuous improvement of the production process.



Summary

Company

Foam plastic trays manufacturer

Solutions

- Production Management
- Tracking & Tracing
- Efficiency Monitoring
- Quality Data Collection
- HMI/SCADA for operator interface and supervisory control

Products

- Proficy Plant Applications
- Proficy Historian
- CIMPLICITY HMI/SCADA

Results

- Compliance to General Food Law
- More accurate inventory listing
- Improved quality
- Improved Overall Equipment Efficiency
- Paperless production environment





Major Automotive Manufacturer Increases Efficiency and Quality with Improved Body Weld Process

1500

Welds to verify

55 seconds

Per vehicle

Continuous improvement

Better quality and efficiency



Introduction

Company

Global Automotive OEM, North American plants

Products

- CIMPLICITY
- Tracker
- Proficy Historian
- GE Digital's Professional Services

Body Weld Data Capture and Analysis Drives Improvements

This large, global automotive OEM worked with GE Digital to help digitize the weld inspection process within the body shop. The inspection process is important to ensure that defects do not make it further down the process.

Challenges in Body Weld

The current weld inspection process was a labor intensive process. Vehicles came into the Inspection station and inspectors had 55 seconds to review a set of welds. Inspectors had trouble determining if each weld was good or bad. They did this for 400-500 vehicles per shift depending on the model.

Since there were ~1500 welds to verify, this automotive OEM had a sampling process that allowed them to cycle through all welds every 15 vehicles. The process was paper based which

meant the inspector captured any defects on a clipboard that after the shift would be manually entered into an Excel sheet for analysis. Additionally, with only 55 seconds in total, the operator had to also fix any welds while the vehicle was in station or mark the vehicle for repair. With this situation, there were a lot of opportunities for error.

Automotive Body Weld Data Capture and Analysis Solution

To address these challenges, GE Digital's Professional Services team developed an application based on CIMPLICITY HMI/SCADA and Tracker software to digitize this process. In this application, the manufacturer can read data directly from the robot welders to determine which welds are bad. The software presents the weld visually on a screen for the operators to see quickly and easily which welds need focus. Operators can then review the few bad welds and mark them as fixed in the application.

No more clipboard to fill out and a big reduction in number of welds to validate, saving time and reducing errors.

In addition the GE Digital solution is collecting diagnostic data from the robots that can be used by engineering teams for further analysis of False Negatives/Positives collected.

The GE Digital solution:

- Collects weld status (OK/No good) from the robot
- Collects weld diagnostic data for each weld
- Uses this data as background info for false negative/positive (Engineers that support process)
- Provides two screens at each weld quality station

(Left/Right), and these present welds to be inspected at the station

- Helps operators focus on problem areas faster – within their tight time
- Offers the operator three simple choices when a weld is highlighted: REPAIRED, GOOD, NO GOOD.
- Provides Defect Quarantine component (Bad Robot Programs)

Weld Quality ANDON Display

Additionally the application has an ANDON display that can show weld defects in real time by different dimensions such as by Robot, Line or vehicle. With the paper-based process, information such as this took days to accumulate. This view can help management see which robots may need maintenance and calibration. This helps improve first time quality of the welds in a real-time process.

The manufacturer can use easy-to-read Pareto Charts that can draw attention to the most critical data, which can help ensure that the right problems are being focused on. For instance looking at Defects by Robot shows an operator which robots will need attention soon based on the number of defects they have created. This Pareto is updated in real time, so as time goes on, the focus will change.



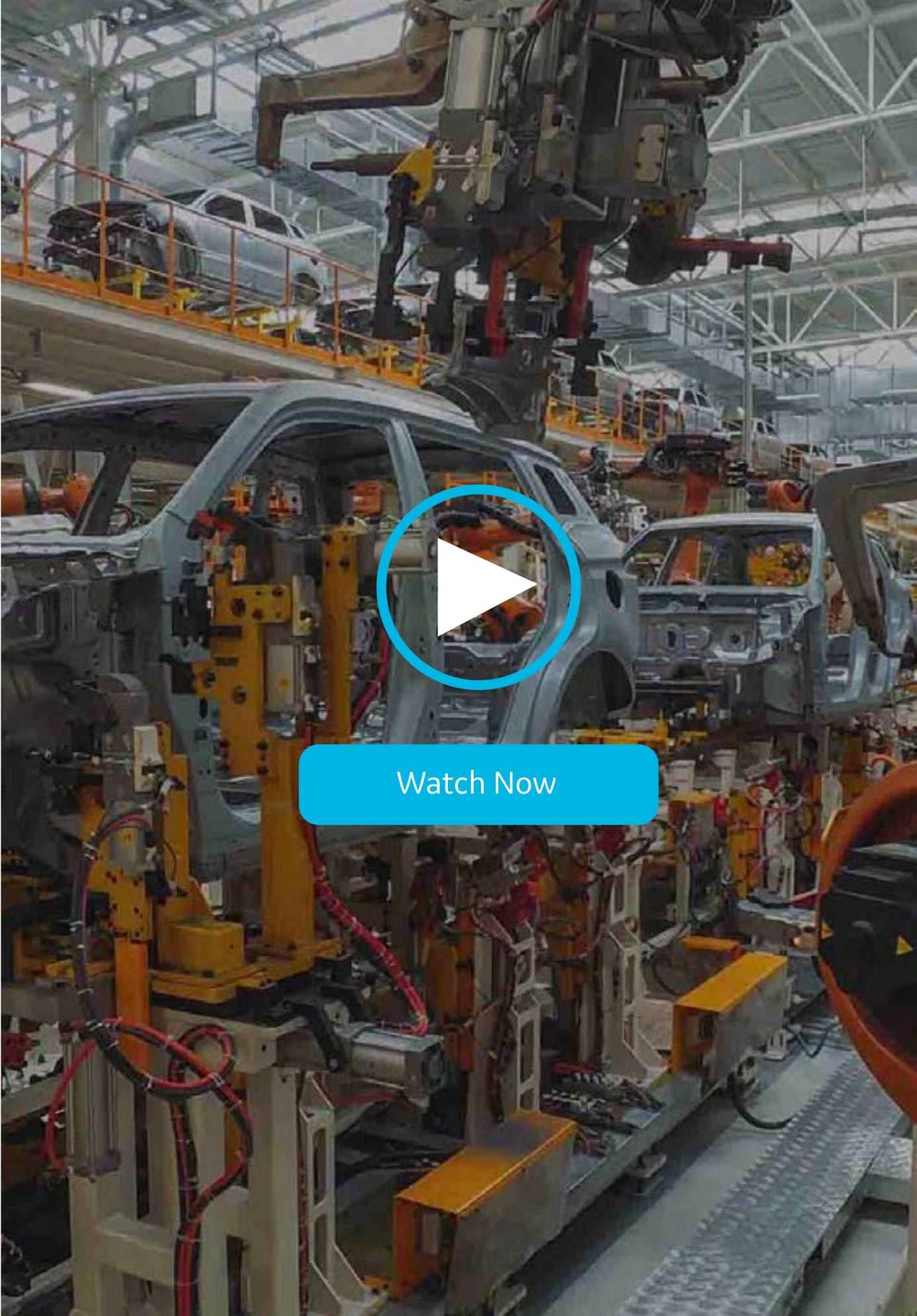
Results

As a result of using this CIMPLICITY and Tracker application and working with the GE Digital Professional Services team, this major automotive OEM has realized:

- Reduction in time and effort for inspection activities – by pinpointing where to focus and removing paperwork
- Improved the quality by focusing on the welds that need attention
- Reduction of errors by removing paper from the equation and more up-to-date information at their fingertips for real-time decision making
- Improved overall inspector efficiency as they have better quality in less time expended

Additionally by taking the first step of collecting the data, the company can look at more projects around SPC and analytics to further improve quality in the future. This could include being able to predictively see degradation of robot weld quality and reduce the number of weld defects.

With success of this project, the automotive OEM is working with GE Digital and the Professional Services team to roll out the CIMPLICITY / Tracker solution at more plants around the world.



Watch Now

Weld Quality Solution – CIMPLICITY/Tracker from GE Digital

CIMPLICITY screen
Main Body Inspection

-  Read data from welding robots to determine welds that may require rework
 - Collect weld status (OK/No good)
 - Collect diagnostic data for each weld
-  When weld is highlighted – Operator enters Good, No Good, Repaired
-  Use this data as background info for False negative/positive (Engineers that support process)





Frozen Meat and Fish Packaging Materials Manufacturer

Building a Lean production environment with Proficy Operations Hub for visualization





Challenge: *To modernize production and information technology, including ERP, MES and scheduling*

Action

- Implement Proficy Plant Applications and ROB-EX Scheduler
- Deploy Proficy Operations Hub for centralized visualization

Result

- Lean production environment
- Modern visualization across multiple plants
- Thin client for improved performance
- Mobility for readily available information – operator and managers
- Ability to mine data for trending and analysis for Continuous Improvement and optimization
- A foundation for growth and agility with a scalable solution

Products

- Proficy Plant Applications
- Proficy Operations Hub
- Proficy Historian
- ROB-EX Scheduler



Ocean Spray Increases Efficiency and Productivity with Proficy



Introduction

Ocean Spray is an agricultural cooperative owned by more than 700 cranberry farmers in the United States, Canada and Chile. Founded in 1930, Ocean Spray is now one of the world's leading producers of cranberry juices and dried cranberries.

Ocean Spray was looking for a solution for their 600,000 sq ft processing facility that could help them visualize and analyze performance metrics and could be easily maintained and managed.

Bryan Graham, Senior Control Engineer at Ocean Spray, has been working closely with AutomaTech for over 10 years to make sure they are applying best practices for their facility with their GE Digital solution.

WATCH VIDEO

“The GE product suite has been very important to our plant, basically giving us the tools to customize and build the application to what our business needs are. It offers a lot of flexibility, a lot of opportunity for recording and communicating data and information.”

Bryan Graham - Senior Control Engineer, Ocean Spray

Along with Proficy Plant Applications for MES, GE Digital's [iFIX HMI/SCADA](#) system monitors their operation, so they can make better business decisions from the data and provides them with opportunities for continuous improvement. The team is consistently querying their [Proficy Historian](#) industrial data management system, looking at trends and building relationships between variables. The software helps get the right information to the right people in their facility.



Products

- iFIX HMI/SCADA
- Proficy Plant Applications
- Proficy Historian
- Proficy Batch Execution
- Proficy Operations Hub
- Proficy WebSpace

Results

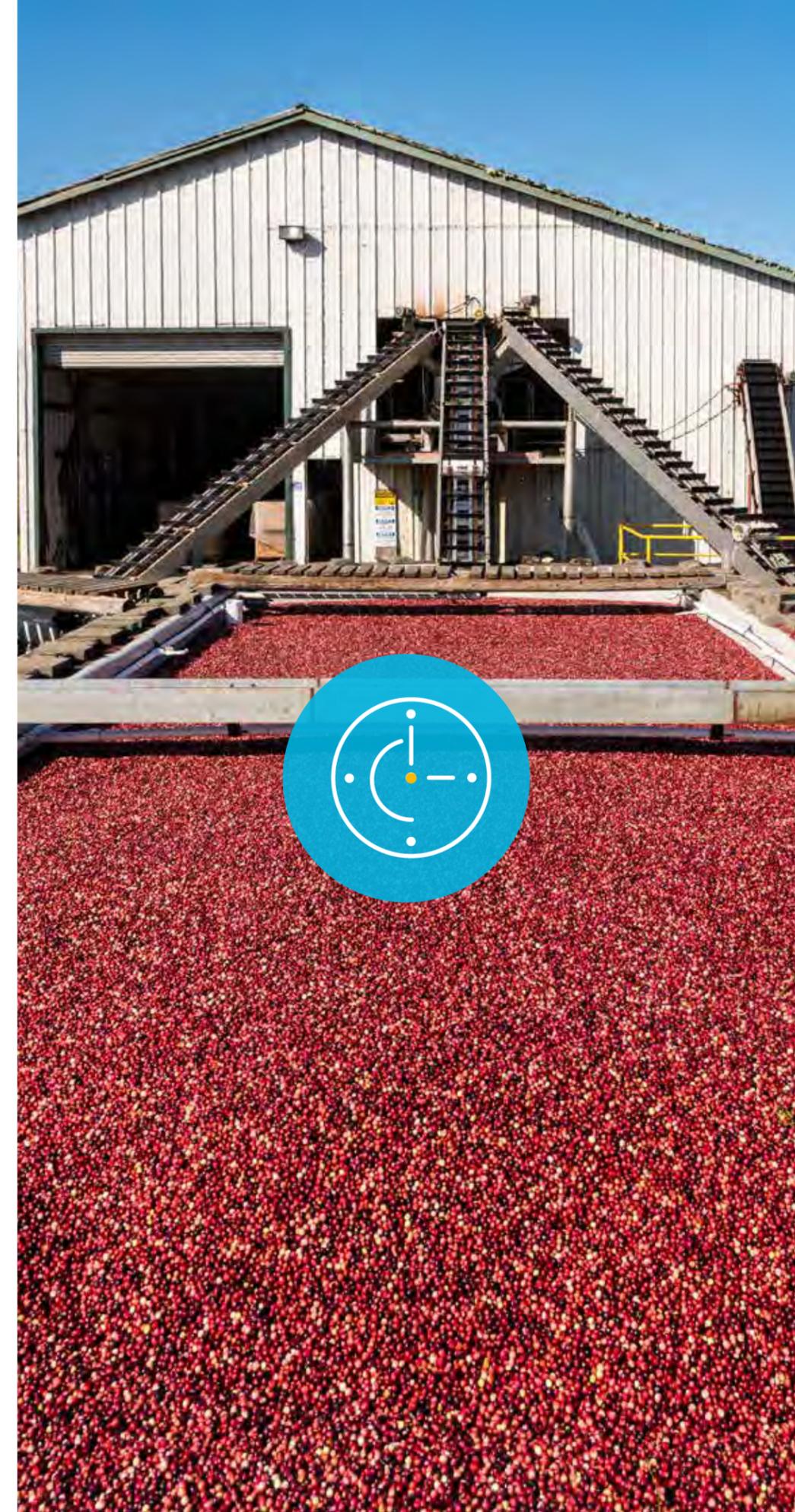
- Ability to use data for performance improvement
- Plant visualization and analysis
- Increased efficiency and productivity

About AutomaTech

[AutomaTech](#) is a leading provider of industrial technology solutions focused on improving your operational performance. By harnessing the power of data, we enable significant gains, visibility across your entire organization, and increased profits for a competitive edge. Our product offering includes a flexible and scalable mix of hardware and software solutions to solve your toughest challenges while providing a roadmap for future improvements and growth.

“I would definitely recommend GE platforms to other users. It’s been a very reliable platform for us. The software can definitely make a difference in manufacturing, your efficiency, your effectiveness, in whatever product you’re making.”

— Bryan Graham - Senior Control Engineer, Ocean Spray





Wabtec speeds operations with Proficy®



Digitizing Complex Discrete Manufacturing

No stranger to complex discrete manufacturing, Wabtec Corporation offers the world's most comprehensive and competitive locomotive portfolio. From supplying a vast array of quality electronic, mechanical and pneumatic components to customized inventory management, Wabtec's capabilities extend across all railway-industry disciplines.

In the past, complex discrete manufacturing required a large amount of information that was entered and managed manually or in multiple systems that were tied together by the operator and production process.

To improve its complex discrete manufacturing, Wabtec implemented a Proficy solution from GE Digital, featuring Proficy's MES software, CIMPLICITY HMI/SCADA and Proficy Historian for industrial data management. The solution:

- Accelerated operators' work
- Automated data collection
- Leveraged mobility for the modern Connected Worker
- Improved the operator experience by reducing the need to walk and enter data manually

Products

- CIMPLICITY
- Proficy Plant Applications
- Proficy WebSpace
- Proficy Historian

“There were thousands of operators, and we were asking them to change their work. It is a difficult environment to forecast and plan, while continuing to properly serve our customers.”

Rob Burnett - IT Leader, Supply Chain & Brilliant Factory, Wabtec

Production

Faster production

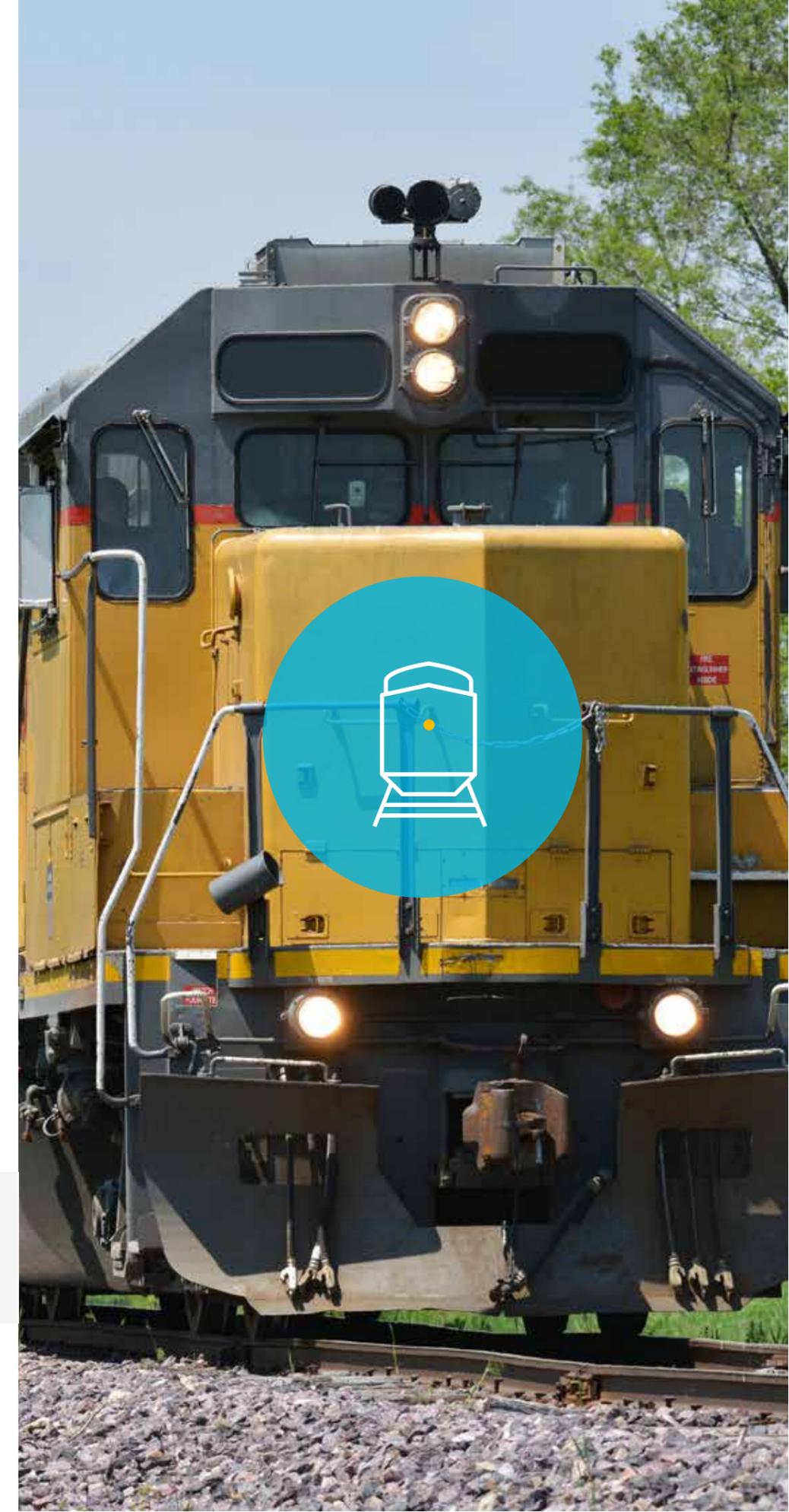
Automation

Automated data collection

Data Entry

Less manual data entry

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The Journey to Optimizing Operations

"We knew there were challenges and that it would be difficult," Rob Burnett, IT leader, supply chain & Brilliant Factory at Wabtec, explained.

With Proficy, the evolution started with process visibility and went to analytics and to the digital thread, Burnett said.

"We needed a lot more information about our parts and processes," Burnett commented. "On parts both big and small, it was significant work for our operators to answer 15 or 20 questions, and they needed to use five different data entry tools to do it."

Improving the Operator Experience

By observing and talking to operators, the team came up with creative approaches to speed the operators' work. Automated data collection approaches were identified, and mobile tablets were introduced to the shop floor. These techniques improved the operator experience by reducing walking and data entry.

"We also connected our digital thread through field services," noted Burnett. "With the field and part data, we can dynamically route the part through the shop."

The data analytics can also be used to determine what services we can bypass. For example, many of the newer devices don't need to be rebuilt. We will be focusing on expanding the dynamic routing and forecasting of parts, knowing just a few days can greatly help our customers.

Rob Burnett - IT Leader, Supply Chain & Brilliant Factory, Wabtec





Packaged Foods Manufacturer Increases Production Capacity



Visibility into Efficiency

This packaged foods manufacturer implemented GE Digital's Proficy Historian software to collect data and provide visibility into efficiency. It also implemented Proficy Plant Applications to enable increased OEE with root-cause analysis into waste and downtime—measuring KPIs by product run and incorporating quality tests.

Value Delivered

GE's solution helped this manufacturer identify opportunities for additional capacity and understand its KPIs for increased visibility into performance. The automated solution eliminates the inefficiencies of manual processes, and the business has been able to take corrective actions against the causes of downtime and waste—significantly improving OEE and reducing costs.



Challenges

- Lack of visibility into operations
- Manual and paper-based data collection
- Difficult to analyze information
- Need to minimize downtime and waste

Results

- Increased capacity and OEE
- Reduced variances on line rates
- Higher product quality
- Cost savings without capital expenditures

Products

- Proficy Plant Applications
- iFIX HMI/SCADA
- Proficy Historian
- IGS





Bolletje Drives Quality Improvements and Visibility



Challenges

- Batch-to-batch quality variations
- Inconsistent process execution
- Need for better inventory line of sight
- Training for new operators without productivity loss

Results

- *Improved materials planning*
- *Enhanced inventory accuracy*
- *Reduced waste and costs*
- *Faster, more efficient training*

Enhanced End-to-End Traceability

Bolletje, a major Dutch baked goods manufacturer, turned to GE's Proficy software solution, an integrated platform for Batch execution, MES, automation and visualization. The solution provides enhanced end-to-end traceability of ingredients, processing conditions and quality data—all linked to each production lot—enabling better control into manufacturing processes.

Improving Quality, Visibility into Inventory, and Planning

Proficy has helped the food manufacturer improve quality, gain better line of sight into inventory, and leverage traceability of its products from the bakery to the store. The solution also provides more visibility into the actual use of raw materials to improve materials planning, and deeper understanding of material costs for each product line for better planning and execution.

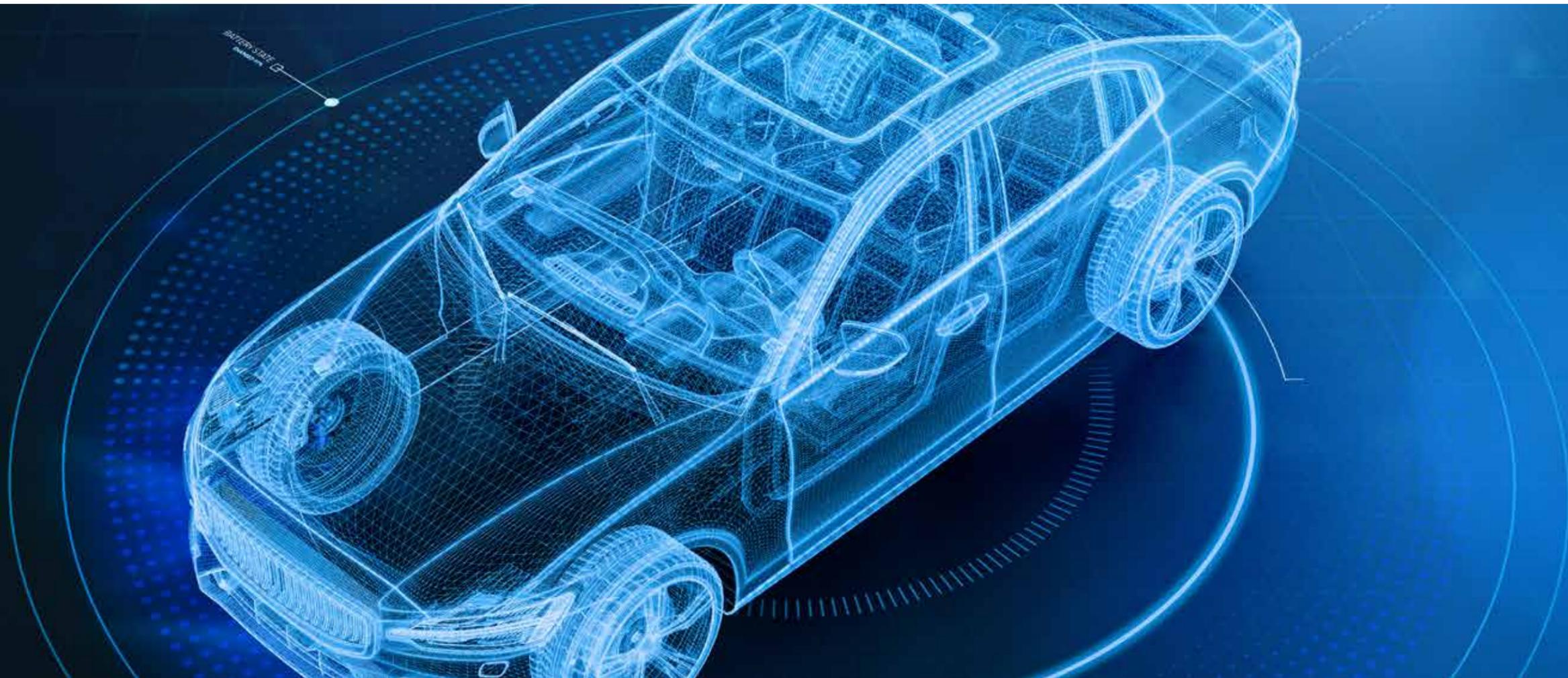
Products

- iFIX HMI/SCADA
- Proficy Historian
- Proficy Plant Applications
- Proficy Batch Execution
- IGS



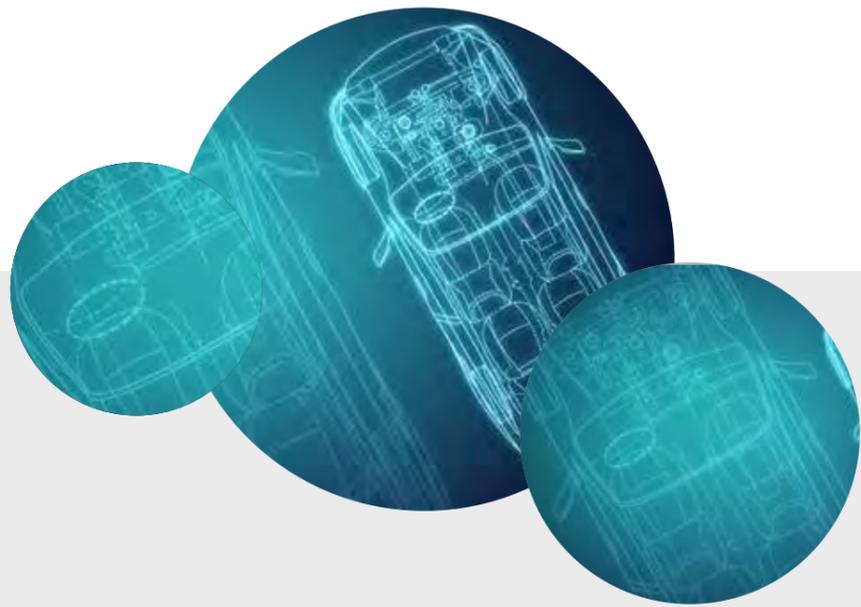


HUAYU Automotive Achieves Visibility across Plants to Support Better Business Decisions



Challenges

- No visibility of production in plants at corporate level
- Non-unified systems run independently in different plants; difficult to compare KPI plant wide
- No production system standard, challenging to build new production lines to rapidly respond to market demands
- No genealogy and tracking system



Action

- GE Digital's Professional Services team builds unified system architecture and standard KPI using CIMPLICITY, Tracker, Proficy Historian, Proficy Workspace
- Add new solutions for key plants to replace legacy systems
- Build genealogy and tracking system for quality improvements



Results

- Faster production system roll-out to different plants to support business change to meet market demand
- Genealogy and tracking record to meet auto-specific regulations



JHP Pharmaceuticals

(now part of Par Pharmaceutical)

Paperless Manufacturing Enables Repeatable Production



JHP Pharmaceuticals

Paperless Manufacturing Enables Repeatable Production

Pharmaceutical companies often manufacture more documentation than product. With Proficy Workflow, JHP, now part of Par Pharmaceutical, reduced paper consumption and operator errors by digitizing their standard operating procedures and creating an electronic master batch record.

Data is automatically populated into the forms from the plant SCADA system. Operators use E-Signature to sign off on every step, but the real value is a replicable solution that can be reused across the site with minimal retest.

“Significant opportunities exist for improving pharmaceutical development, manufacturing, and quality assurance through innovation in product and process development”

— **Mary Grow, VP ET & Business Processes, JHP Pharmaceuticals (now part of Par Pharmaceutical)**



Products

- Proficy Workflow
- iFIX HMI/SCADA
- Proficy Plant Applications
- Proficy Historian

Results

- Reduced paper consumption
- Reduced operator errors
- Improved product safety
- Real-time process data for decision making
- Reusable solution that can be applied across many different lines without full retest



YTO Group Corporation

Leading agricultural machinery manufacturer in China increased process visibility



Increased process visibility in complex production lines

The YTO Group Corporation is a Chinese agriculture and construction machinery manufacturer that is part of Sinomach, a comprehensive machinery conglomerate.

Challenge

- Black box production model, production data are recorded manually
- WIP is high however unplanned downtime still occurring
- No genealogy and tracking system
- Need to enhance product quality
- System islands among PLM, SAP and Automation

Action

- Receive WO and BOM from ERP then prioritize while getting BOP and manipulating instructions from PLM, then assigned to each work center
- Prevent incorrect assembly for key parts, track the process of each WO, record all parameters, and create SPC charts
- Provide real time information and KPIs about production, machine and quality status.
- Integrated with ERP, PLM systems to enhance service capability

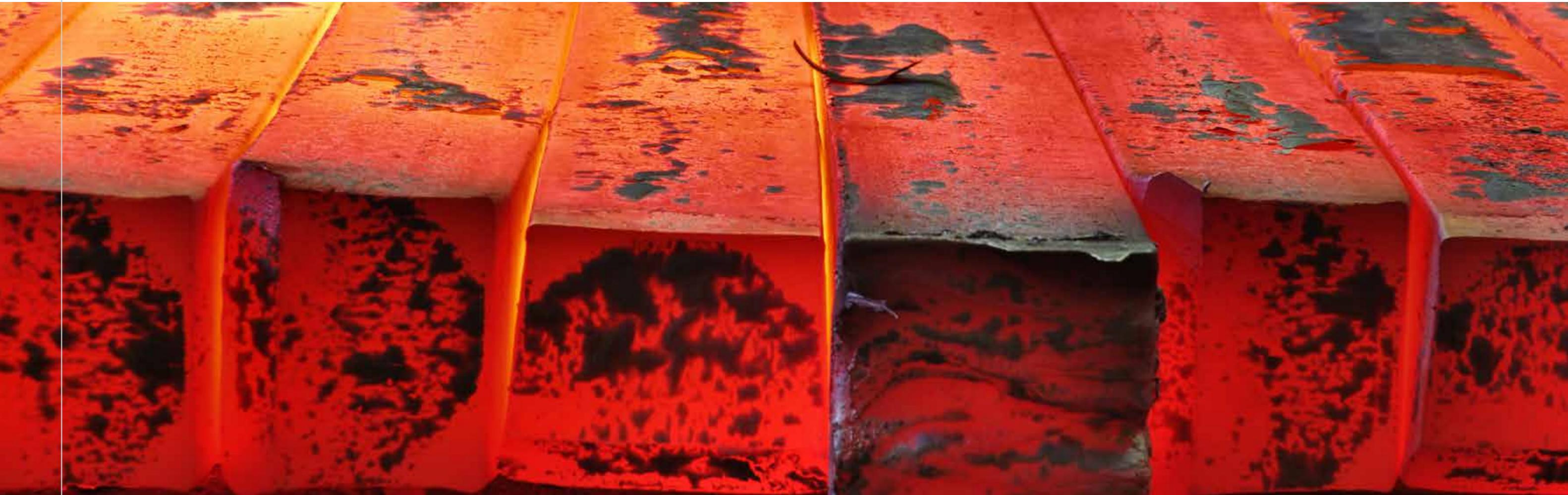
Results

- Strengthened production & response ability through process visibility
- Improved machine utilization by historical fault analysis and unplanned downtime reduction
- Reduced quality lost by determining quality risk in advance and reducing WIP quantity





Qatar Steel Implements Reliable, Optimized Production Processes



Steel company improves operational efficiency

Challenge

- Operational inefficiency and lack of reliability
- Inability to track/optimize raw material input to the plant
- Need for improved information analysis and reporting
- Manual data collection prone to errors

Action

Qatar Steel implemented a GE solution that includes Proficy Plant Applications (MES), Proficy Historian, and iFIX HMI/SCADA, enabling automatic data collection and efficient monitoring and control of Key Performance Indicators (KPIs) such as material flow, production processes, and equipment performance for improved analysis and decision-making.

Result

- Reliable, optimized production processes
- Better informed, faster decision-making
- Improved operational efficiency
- Work simplification
- Reduced errors and delays
- Real-time information in context supports decision-making





TBEA Decreases Production Costs with Proficiency MES and Automation Software



Enhance transparency of manufacturing processes

TBEA is one of the largest industrial manufacturing companies in China, producing power transformers and other electrical equipment. TBEA is working with GE Digital to improve their manufacturing processes in order to decrease their overall cost of production through our MES and Automation solutions. They are also working with us to help bring their broader digital transformation plans to life.



Challenge

- Delay in delivery due to manual planning and frequent changes
- Lack of transparency in production
- Manual tracking taking too much time
- Quality instability, leading to reworking
- Handwritten records causing errors in logistic information

Action

- Optimize production plans and schedules according to limited production capability and raw material supply
- Develop the visualization of manufacture process by work order
- Build a genealogy from raw materials to finished products
- Provide monitoring & analysis on product quality & process parameters
- Additional action involves barcode management to materials, equipment, documents, and staff

Results

- Shortened production cycle to meet customer requirement
- Improved inventory turn and money flow by inventory save
- Increased quality stability
- Improved operation efficiency in factory





North American Brewer sees millions in energy cost savings with Proficy

Visibility into consumption details drives energy conservation processes and culture





Challenges

- Rising utility costs and common energy utilization metrics
 - Delivery of timely energy information
 - 5-year energy target of \$10 million cost reduction
-

Results

- *Surpassed energy target and achieved 10-15% improvements year over year*
 - *Significantly improved energy conservation*
 - *Multi-level reporting by utility (Electricity, gas/oil, water, steam, ammonia, CO₂, etc.)*
-

Products

- Proficy Plant Applications
- iFIX HMI/SCADA
- Proficy Historian
- IGS



Major Lithium-Ion Battery Company

Meeting Strict Traceability Requirements



Meeting Strict Traceability Requirements

Challenge

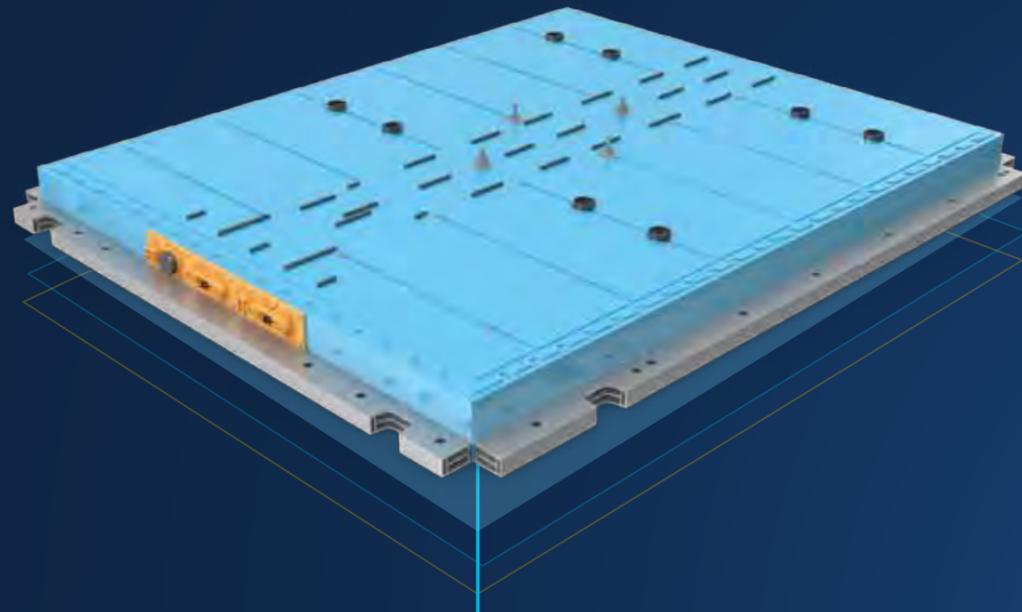
Strict traceability reporting needed for plant supplying Lithium-ion batteries for cars. Implement comprehensive MES, SCADA and industrial data management to manage production complexity and reporting requirements.

Action

- Go from design to commission on a turn-key basis as well as share in risk associated with this project
- GE Digital implemented Proficy Plant Applications, iFIX HMI/SCADA and Proficy Historian to trace every step in the manufacturing process
- Ability to meet customer shipment requirements after going live

Results

- 4x increase in product quality
- 7x decrease in energy consumption costs
- 3x decrease in inventory costs



Key Metric:
**3x increase
in throughput**





International Aerospace Manufacturing Pvt. Ltd. (IAMPL) Improves Productivity



Introduction

A 50/50 joint venture between Rolls-Royce and Hindustan Aeronautics Limited (HAL), IAMPL manufactures more than 100 different compressor parts for Rolls-Royce. Each shroud, cone and ring is unique to an engine to achieve maximum efficiency, and all parts are machined with an accuracy of a few microns.

Learn how the MES journey at IAMPL has improved productivity, Right First Time (RFT), machine capacity utilization, and cycle time while also reducing rejects and providing better tracking of parts and visibility into operations.

Key functionality – based on Proficy Plant Applications, CIMPLICITY HMI/SCADA, Proficy Workflow, Proficy Historian, and Proficy WebSpace – includes production management, efficiency management and OEE, quality management, reporting, and integration with ERP, machines, Advanced Planning and Scheduling, and DNC.

WATCH VIDEO

Products

- Proficy Plant Applications
- CIMPLICITY
- Proficy HMI/SCADA
- Proficy Historian
- Proficy Workflow
- Proficy WebSpace

Results

- Improved productivity
- Improved RFT (Right First Time)
- Improved machine/capacity utilization
- Reduced rejects
- Better tracking of the parts
- Improved cycle time
- Better visibility into operations

RFT quality

Greater utilization

Fewer Rejects



About the Speaker

Sathish Sivaraman, Chief Financial Officer & Company Secretary, International Aerospace Manufacturing Pvt Ltd (IAMPL), a JV between Rolls-Royce and Hindustan Aeronautics Limited (HAL)

Sathish Sivaraman is the Chief Financial Officer & Company Secretary, International Aerospace Manufacturing Pvt Ltd (IAMPL), a joint venture between Rolls-Royce and Hindustan Aeronautics Limited (HAL). With 25+ years of senior financial leadership, Sathish has diverse expertise across manufacturing, process, and natural products industries. His responsibilities have included international financial functions spanning finance and commercial to IT, ERP and HR with a focus on business growth and operational efficiency. Sathish holds an MBA and an Executive Advance management program from Indian Institute of Management Bangalore, he is a fellow member of Cost and Management accountants of India and an associate member of Institute of Company Secretaries of India.

About Sarla Advantech Pvt. Ltd.

Sarla Advantech Pvt. Ltd. (part of ATS Global B.V., The Netherlands) is GE Digital's Solution Partner and Software Reseller in India offering the entire product portfolio since 2002. They are automation experts having deep domain knowledge in Industrial Automation, Manufacturing integration, MES/MOM Software. They are serving manufacturing companies across industries like Pharma, Chemicals, F&B, Metals, Energy, Automotive, Aerospace, Infrastructure, etc.

They offer end-to-end services right from solution design, system architecture, proof of concept, license supply, implementation, technical assistance and lifecycle support. Sarla Advantech Pvt. Ltd. has supported International Aerospace Manufacturing Pvt. Ltd. (IAMPL) in maintenance, enhancements and upgrade of the MES application with help of rich technical and domain knowledge thereby helping IAMPL to realize the return on investment of the solution.

Their solutions enable a large number of customers to create a world-class manufacturing environment ready for Smart manufacturing and Industry 4.0.





Fast installation. Sweet results.

GB Glace implements a new production system for 45 million liters of ice cream

About GB Glace

GB Glace, part of the Unilever Group, makes 45 million liters of ice cream per year. GB Glace is Sweden's single largest ice cream manufacturer. All production takes place in the company's factory in Flen where the production system for monitoring the mixing of ice cream batches are installed.



“Novotek gave us a modern, flexible system that results in higher productivity, can communicate with our business system and allows complete traceability.”

—Karleric Idegren, GB Glace-fabrik in Flen

The computer system that monitors the batch-based mixing process has been in dire need of an update for some time. The system was based on an older platform and used an outdated recipe handling system, both in terms of hardware and software. The situation was bordering on impossible.



High precision and faster lead times provided better operation accuracy and increased productivity.





We began with a long list of requirements

Comprised of more than 4,000 I/O connection points, the system was huge. Yet one of the foremost requirements was a quick installation since GB Glace is Unilever's only ice cream factory in the Nordic region and operates 24/7. The only window of opportunity was a two week break during the New Year holidays.

The list of requirements included greater flexibility and user friendliness. The old system was complicated to operate and only a few people had the necessary skills. Furthermore, it was essential that the production system could be integrated with a new SAP business system.

GB Glace had other functions on its list of items to improve, including traceability, batch handling in line with the S.88 industry standard, logs and reports for quality and control parameters, as well as significantly better analysis and reporting functions throughout the entire mixing process.

Last but not least was the requirement for easier update and support in the future.

Advantages of a smaller supplier

Since GB Glace is a part of the Unilever Group, the company normally works with preferred suppliers. GB Glace came in contact with Novotek during the selection process.

“Novotek was the only company that could present a viable solution to the problem of the enormous amount of I/O modules that had to be replaced within a very tight time-frame. And of course, there was also the difference in price in relation to the other suppliers,” comments Karleric Idegren. “I believe that in choosing a smaller supplier, we received more dedication. The project was large and important to both Novotek and us. And they could provide references from similar assignments they had successfully completed.”

By selecting Novotek who is the distributor and partner with GE Digital they got the flexibility of a “smaller” company basing their solution on world class products.



Quick installation

By working with prefabricated and pretested modules to directly re-place the existing I/O modules, Novotek's installation team was spared the time-consuming task of laying new cables. Six minutes was all it took to switch a module. This was a must for completing the assignment over the short Christmas holiday available for the project.

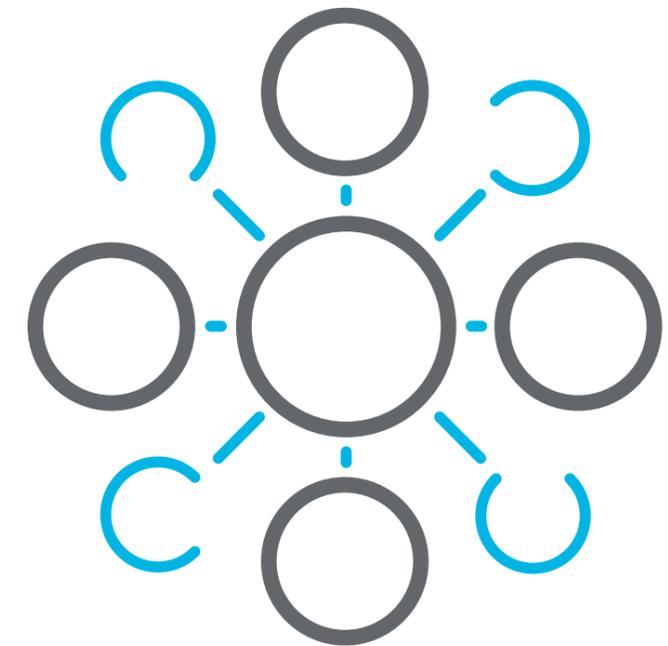
“Tempo and chaos, that’s the only way to describe it. But we got it done, even if we did have a delay of a few days since our facility was not up to the standard we thought it was,” says Idegren. “We had a very open dialogue and were able to make speedy progress.”

Well functioning, future proof solution

GB Glace now has a system for batch handling based on Proficy from GE Digital that gives considerably more exact dosages than the earlier system. An iFIX operator interface secures high reliability, scalability and future compatibility. Proficy Plant Applications web-based reporting enables the quality department to make e.g. traceability reports. The connection to the SAP business system will minimize time consuming manual data input.

“In addition to considerably higher dosage precision and quicker program cycles, we now have a system that more employees can handle. Just a few people were previously able to operate the old system,” says Karleric Idegren. “Novotek is also training staff at their office in Eskilstuna so they have the necessary skills to deal with our factory in Flen.

“We have a modern, flexible system that results in higher productivity, can communicate with our business system and allows complete traceability. Simply put, we have future proofed our production,” says Idegren in closing.



Facts

COMPANY

Unilever Sweden GB Glace, production unit in Flen

SOLUTIONS

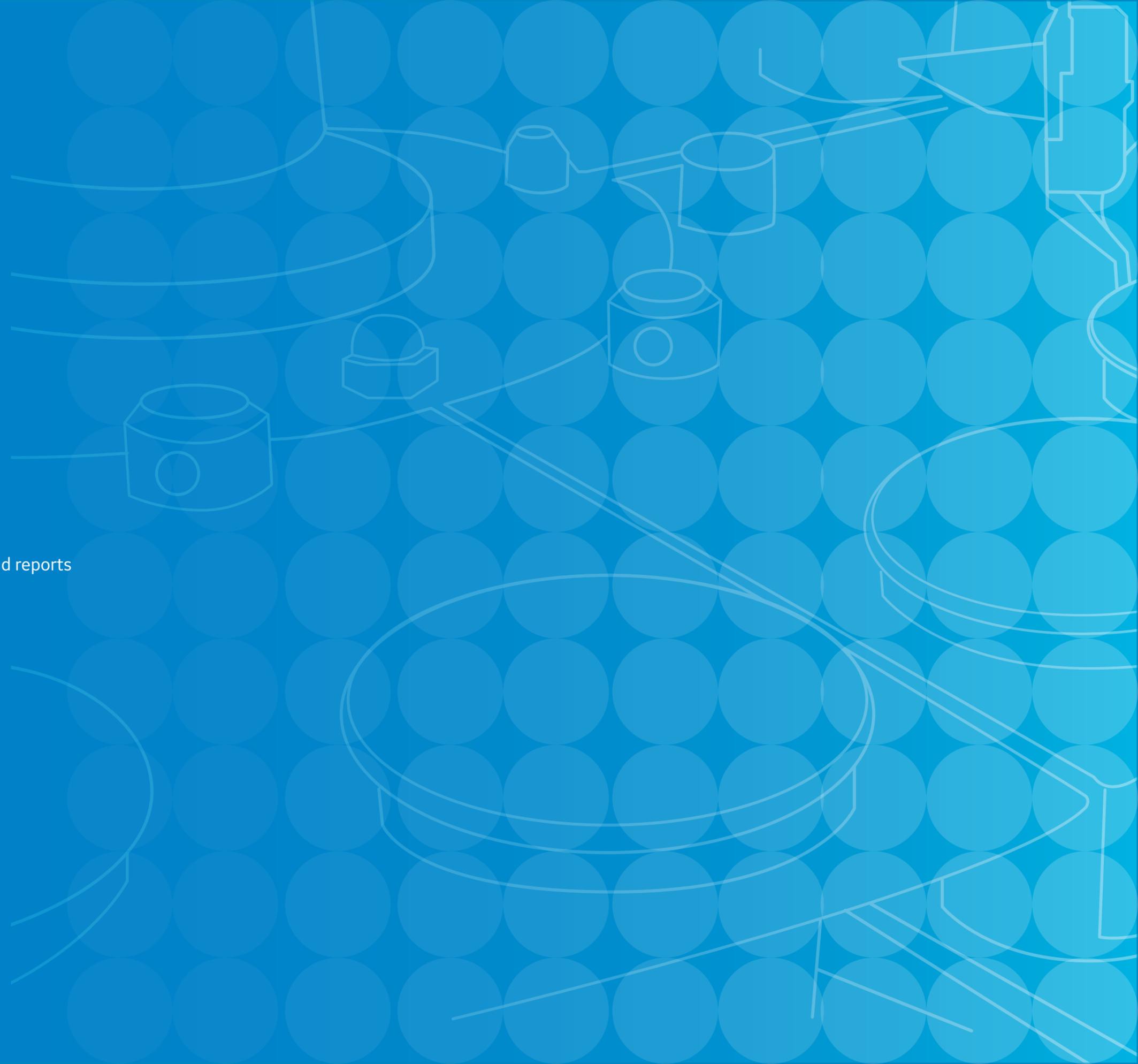
- Production management
- Automation solution
- Batch system

PRODUCTS

- GE Digital iFIX HMI/SCADA
- GE Digital Proficy Batch Execution
- GE Digital Proficy Plant Applications traceability and reports

ADVANTAGES

- Faster system with high precision
- Conforms to S.88 standard
- High reliability and scalability
- Excellent future compatibility
- Integration with SAP
- Reporting
- Traceability
- Quick installation and start-up of operations during stand-still period





KAHUER Electrical Optimizes New Factory for Increased Total Output and Revenue



New factory optimization



天津开合电力科技有限公司
KAHLER ELECTRICAL

Challenge

- Integrate all processes in a limited factory
- Connect all machines and make shop floor information transparent

Action

- Build advanced manufacturing factory in Tianjin
- GE Digital's MES and CIMPLICITY Automation Software deployed
- Lean optimized factory layout raises per unit yield

Result

- Improved ability to handle small quantity and great variety
- Increased total output and revenue





Fibo Gains Insight to Improve Quality in Just Hours through Analytics



Using Proven Analytics with MES and Historian Data

Analytics Insights in Just Hours

[Fibo](#) is a leading supplier of high-quality 100% waterproof Wall Systems. The company was looking to apply analytics to Proficy's MES data to optimize process OEE performance, throughput and product quality.

Working with GE Digital partner [Novotek](#), the Fibo team used [Proficy CSense](#) to analyze combined [Proficy Plant Applications](#) MES and [Proficy Historian](#) data. In just hours, they identified and confirmed critical process variables and thresholds, and raw material properties - highlighting or confirming multiple potential improvement insights.

These insights included:

- Which combinations of raw material vendors works best for them
- What are the optimal raw material quality thresholds, beyond which their risk of defects increase significantly
- What are the critical process variables and their thresholds to produce best final product quality

Products

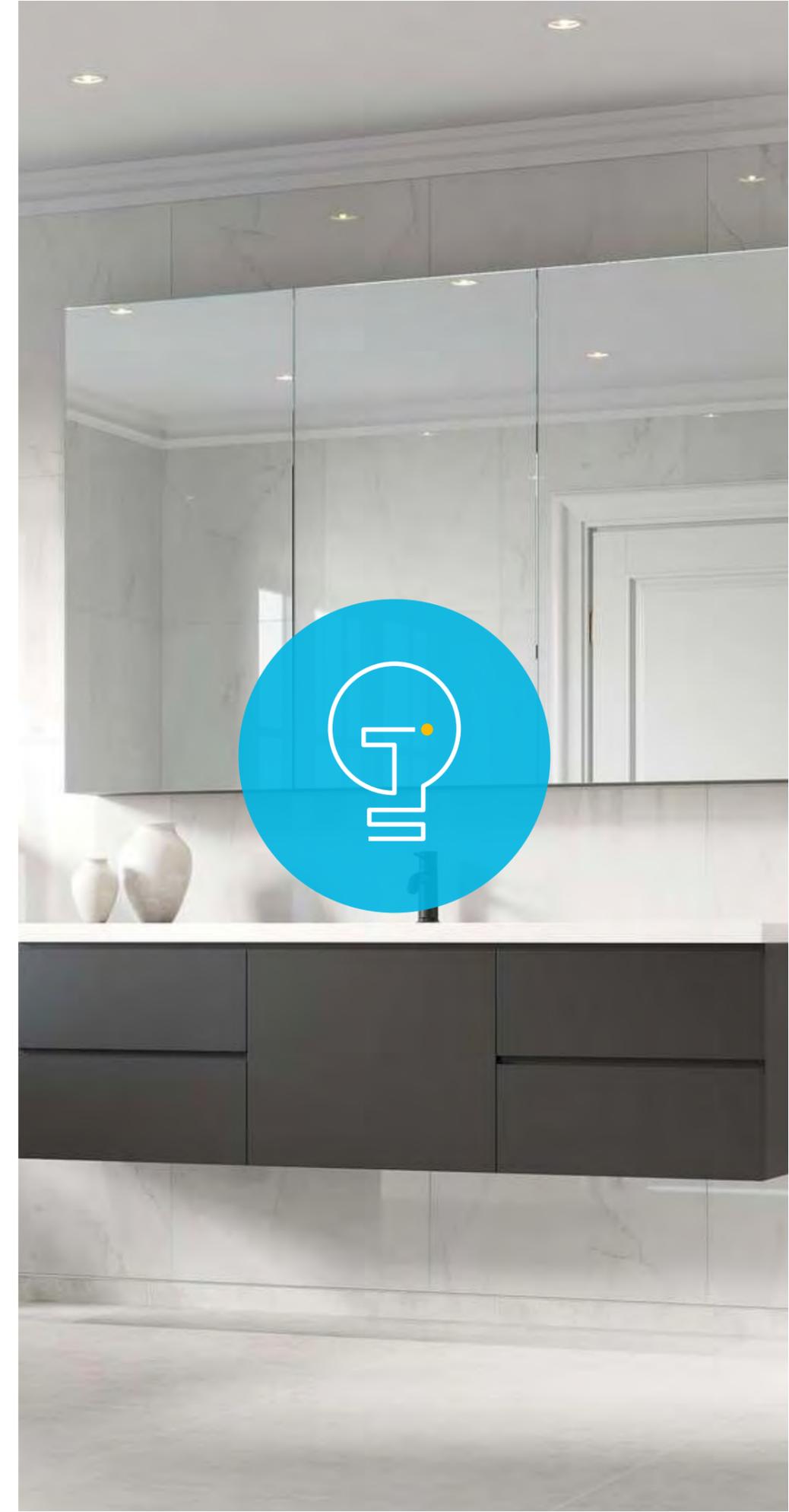
- Proficy CSense
- Proficy Plant Applications
- Proficy Operations Hub

Result

Improvement insights in hours by combining proven analytics and MES software

About Novotek

[Novotek](#) is the leading creator of innovative solutions for Automation and Industrial IT in the Nordic countries, Benelux, Switzerland, United Kingdom and Ireland. The foundation is a portfolio of great products from among others GE Digital. With a team of highly dedicated solution architects, we are able to deliver solutions that makes it possible for our customers to stay ahead with competition.





Aché Laboratórios Farmacêuticos S.A. Implementation of a Batch System

By Ronaldo Luis da Silva, Maintenance Engineer, Aché Laboratory; Moacyr Souza Júnior, Account Manager, Aquarius Software; and Sidnei Kolano, Technical Manager, Link Automação

This case study is an excerpt from an article in Portuguese that appeared in [InTech](#).

Company Background

Aché Laboratórios Farmacêuticos S.A. is a 100% national capital company. Along its trajectory of more than four decades, Aché has become a dynamic company with strategic partnerships, inside and outside Brazil, for its expertise in similar medicines, management of a mature portfolio, knowledge of the Brazilian consumer market, and for the continuous development of products and services, in order to meet the needs of health professionals and consumers, providing health and well-being to the population.



With around 3.5 thousand employees, Aché has three industrial plants. The largest of them, located in the municipality of Guarulhos, in Greater São Paulo, also houses its administrative headquarters. The second is installed on Avenida Nações Unidas, south of the city of São Paulo, and the third in Goiás, with the acquisition of 50% of the pharmaceutical company Melcon, specialized in the production of female hormones.

In its strategic direction, to operate as a complete solution company, Aché operates in the three key segments of the pharmaceutical sector: Prescription, Generics and Non-Prescription Drugs (MIP). It maintains a broad portfolio, with more than 250 brands marketed in approximately 600 presentations.

Scenario Prior to the Implementation of the System

Within the liquid unit of the Guarulhos plant, there were numerous products to be manufactured and a great variability in production times. All steps specified in the prescription of a drug were performed manually. With great difficulty in stipulating a production delivery time for a given batch, previous batches were analyzed, and a difference in execution times was found between the handlers responsible for producing batches of the same product.

In order to standardize the operating times until reaching the final product, a study was developed to verify the need to implement a tool capable of automatically managing the batch production process.

After this analysis, it was found that with the reduction of manual interventions in the process, it would be possible to achieve a forecast closer to reality regarding the delivery time of a batch.

With an implementation date scheduled, the automation system of the liquid unit had the challenge of creating a standardized platform, based on international software development standards and in compliance with the main regulatory agencies of the pharmaceutical sector in the world.

To overcome the challenge, it was necessary to obtain a software platform that was built under the norms of the pharmaceutical sector, facilitating the adaptation of the production process and the personnel involved in the production of medicines to the new system.

In addition, the characteristic of being built under industry standards would facilitate the process of validation and qualification of the new computerized system.

Solution Adopted

With the choice of the Proficy product line from GE Digital, through its distributor Aquarius Software and implementation by Link Automação, all the resources available in the S88.0 construction standards, have earned their reputation and, with the property of building libraries, the classes, phases and operations of the system, it was possible to implement a complex project, in a very short period of time and with great quality, eliminating the risk of building errors.

The first step in implementing the system had already been taken successfully, but the software platform needed to be documented according to the requirements of good manufacturing and documentation practices GAMP and FDA 21CFR part 11.

As the platform was built under the guidelines of the pharmaceutical market, the software adapted perfectly to the resources requested by GAMP and 21CFR Part 11, making

the documentation, testing and correction system a process capable of being accurately measured and with perfect adherence to regulations.

As the validation and qualification process in the pharmaceutical industry is rigorous and delicate, all settings must be documented with excellence in all stages. At this stage of the project, if the software platform is not fully compatible with the norms and good practices of the sector, construction errors or problems of adaptation of the new system to the production environment will be found, condemning the computerized system to failure.

With the second step successfully completed, it was necessary to create the recipe models (Procedures) that would be used in the new computerized system and plan the installation of the system.

The creation of the solution based on the S88 standard allowed the system to use all the physical resources installed in the production unit, transferring these resources to the drug production recipes.

At the same time as the recipes were created, another work team performed the tests of the recipes already implemented, validating the entire system in an almost parallel work format. The programming and connectivity resources with databases and objects provided by the software platform were fundamental for the success of the recipes to be achieved. In addition, the native Client / Server features and the ability to fully adapt to the operating system and the distributed architecture, with different levels of security, allowed the implementation to be carried out with several work teams at different levels of the system. With electronic work messaging resources, the construction of product recipes reached the highest quality standard and, at the same time, the operator's proximity to the system, facilitating the development and acceptance of the solution by the operation team.

In this stage of the project, the construction, documentation, testing and implementation steps had been successfully completed and the system needed to guarantee the return on investment and provide resources to optimize the process, through the analysis of the implemented revenue structure.

In order to resolve this issue, total compatibility with the S88 standard was essential, because through a detailed study of the recipe structure, it was possible to decrease the number of steps, reducing the software cycles and automatically shortening the production time for each product.

The recipes were created using the SFC (Sequential Function Chart) language, which facilitates the organization because it graphically describes the sequential execution behavior, facilitating the visualization of the actions that will be performed and the transition conditions that will be necessary for the next step to be initiated.

The availability of the system was guaranteed with a solid hardware and software redundancy structure, which offers the necessary security for the production process. With redundant database servers and supervisory systems, several process data recording locations, the system continues to operate even if many hardware items fail at the same time.

Currently, the data generated by the management system is stored and traceability reports are consulted by the supervisors of the production unit and quality assurance department, to monitor the quality of the production.

Benefits with the Implementation of the Management Tool

With the implementation of this system, which is easy to operate, where it is possible to monitor in real time all the resources that are being used and the products that are being manufactured, there was a significant increase in production capacity.

The use of electronic signature in all interventions carried out in the process with configuration of hierarchical levels ensures the registration of events and system actions, avoiding interventions by unauthorized people and ensuring that operations are being carried out consciously, with the user's confirmation and password. A typical example is the release of recipes for production that are carried out only by the Quality Assurance area.

With the reduction of human interventions, it is possible to define the start and end times of production much more effectively, considering the product and the lot size, guaranteeing precious information for an efficient and dynamic management of the production process. In addition, the possibility of human error has decreased, ensuring standardization and execution of all steps in the same sequence and time interval.

Due to the system being based on the ISA-S88 standard, its maintenance is easy to understand, saving time and technical resources, and ensuring a longer time of availability for production.

Bibliographic References

[1] ISA S88 – <http://www.wbf.org/>.

[2] GAMP (Good Automated Manufacturing Practice) – www.ispe.org.br/.

[3] FDA (Food and Drug Administration) chamada 21 CFR Part 11 – <http://www.fda.gov/RegulatoryInformation/Guidances/ucm125067.htm>.

[4] Guia de Validação de Sistemas Computadorizados – http://portal.anvisa.gov.br/wps/wcm/connect/d0dd69804745858b8f28df3fbc4c6735/Guia+VSC+ANVISA+FINAL+09_04_2010.pdf?MOD=AJPERES.

The original full article in Portuguese appeared in [InTech](#).

Source: <http://www.aquarius.com.br/wp-content/uploads/2018/05/InTech143-Batch.pdf>



Chinese Dairy Increases Quality and Yield



Challenges

- Need to maximize yields through liquid milk processing operations
- Equipment issues that affect quality, food safety and yield
- Incomplete quality records, lacking genealogy and process data

Results

- *Reduced downtime*
- *Automated quality & genealogy reporting*
- *Reporting to validate proper execution of cleaning and sanitation procedures*



GE Digital's Solution

GE's Proficy software suite delivered comprehensive quality management alongside capabilities to identify causes of yield losses and production inefficiency. The tight integration between GE Digital's HMI/SCADA, Proficy Historian, and Proficy Plant Applications supports real-time operations management while collecting data needed to serve regulators and customers as well as internal improvement teams

Products

- CIMPPLICITY HMI/SCADA
- Proficy Historian
- Proficy Plant Applications
- IGS



Value Delivered

With increased scrutiny from both consumers and government agencies, this producer is able to provide a clear quality record for the milk it receives and then extend that record with details about processing conditions, handling, etc. That same base of data has been combined with downtime and machine analytics to improve the dairy's understanding of issues that affect milk yields, allowing them to reduce solids losses – and improve profits.



European Paint Manufacturer Reduces Operator Errors by Decreasing Manual Processes



Challenge

Reduce operator errors in complex batch environment

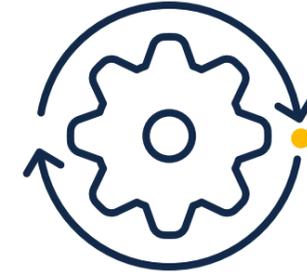
Action

Using Proficy software, a European Paint Manufacturer was able to manage recipes in an ISA-95 compliant data model and then guide operators through the execution of the recipe through configurable procedures. With integrated and interlocked machine controllers and collected data, the reliability of the process and product is ensured by reducing operator error.

Result

- Higher quality and decreased operator errors with electronic standard operating procedures
- Consistent process execution
- Standards-based Recipe management
- Adaptable application responds to changing products and quality processes

Overcome manual execution for operators

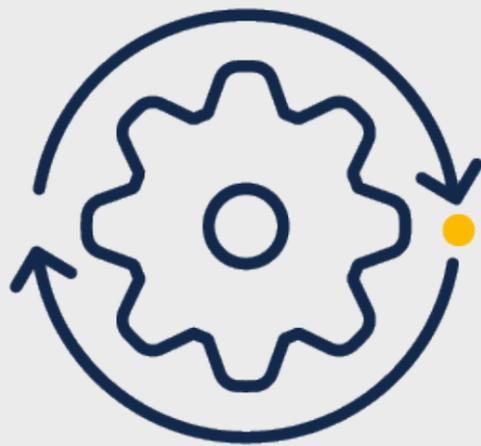




Chinese Engine Manufacturer Increases Process Reliability Through Improved Ease of Use



Challenge: *Complicated rework and line maintenance processes.*



Action

- An integrated solution involving SCADA, Quality and Production monitoring systems, the Proficy solution simplifies the execution of rework and line maintenance processes
- With integrated quality data, Proficy evaluates product specifications and directs the operators on the right corrective actions to turn bad product into good
- Similarly, Proficy guides maintenance workers on the right steps to maintaining equipment, thereby reducing unplanned downtime

Results

- Build Right First Time
 - Improved rework process
 - Reduced scrap
 - Improved product quality
 - Maintenance activity management
 - Improved process reliability
-



Global Tobacco Manufacturer Enables Just-in-Time Operations across 15+ Plants



Global Tobacco Manufacturer

Challenge

- Higher costs with multiple MES systems across global plants
- Need to improve visibility to support just-in-time manufacturing decision-making
- Need to improve efficiency, reduce costs, and improve quality

Products

- Proficy Plant Applications
- iFIX HMI/SCADA
- Proficy Historian

Achieving Just-in-Time Manufacturing

This large, multi-plant tobacco company sought to standardize its manufacturing systems and enable just-in-time decision-making across 15+ global plants.

Challenges included connecting to OPC and non-OPC compliant equipment, improving operational efficiency, reducing costs and boosting quality and throughput.

Meeting Growing Customer Demands

The company implemented GE Digital's Proficy Plant Applications, iFIX HMI/ SCADA, and Proficy Historian across 15+ plants, optimizing operations with the right data. Results include higher efficiency and less waste using the Proficy solution globally.



Results

- Maintain quality standards
- Deliver the right data for just-in-time decisions
- Identify causes of yield losses and production inefficiencies



Major Fragrance / Perfume Manufacturer Improves Product Quality with Paperless Manufacturing



Transformation of production system from paper to digital

Challenge

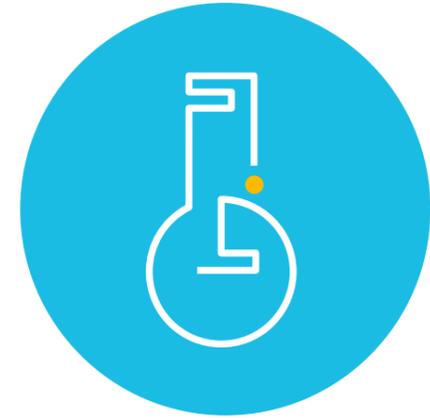
With many recipes, steps and complex BOMs, this manufacturer needed assistance managing production. The team lacked efficiency due to manual/paper processes. Data and process validation were extremely manual and subject to reporting errors.

Action

- Implemented Proficy software for Electronic Work Instructions, interfacing to Recipe Management plus existing ERP systems
- Batch weighing and mixing process

Result

- Improved product quality and consistency
- Reduced waste and cost
- Boosted production efficiencies
- Decreased paperwork





Motorcycle Manufacturer's Plant in India Speeds Identification and Resolution of Quality Issues



A leading manufacturer of motorcycles required a reliable and completely integrated Facility Monitoring and Control System (FMCS) in its plant in India. Their main requirements for the system were that it had to be able to track WIP (Work in Progress) in real time, capture quality-related data at various stages, broadcast production schedule information to the various locations, and monitor all critical process parameters in the paint shop.

The Automation Solution

GE Digital's extensive experience in implementing solutions of a similar nature meant that a complete solution could be seamlessly integrated through the use of GE's engineering and support services.

The core of the FMCS system consists of three high-end servers running CIMPLICITY HMI/SCADA and Tracker software. These servers provide monitoring and control, WIP tracking, data logging and enterprise server functions. The monitoring and control server collects data from the plant floor, through the client computers running HMI viewer software that interfaces with various plant-floor devices. The Tracker server is used to exclusively track the parts through the production process in real time. The enterprise server supports the client computers utilized by the managers and floor supervisors to monitor and control the production process. The database server logs WIP, quality and plant status data that is used for the purpose of historical analysis and reporting. FMCS draws on several barcode readers situated in engine assembly and vehicle assembly facilities to track the parts throughout the process. It also interfaces with PLCs running the conveyor system and paint shop via Ethernet. A GE redundant solution is employed to monitor and control the paint shop process parameters.

With the GE Digital solution for the FMCS system in the driver's seat, the motorcycle manufacturer can achieve the company objectives of identifying and resolving quality problems in the shortest possible time. It also improves accountability and reduces defects.



Summary

Company

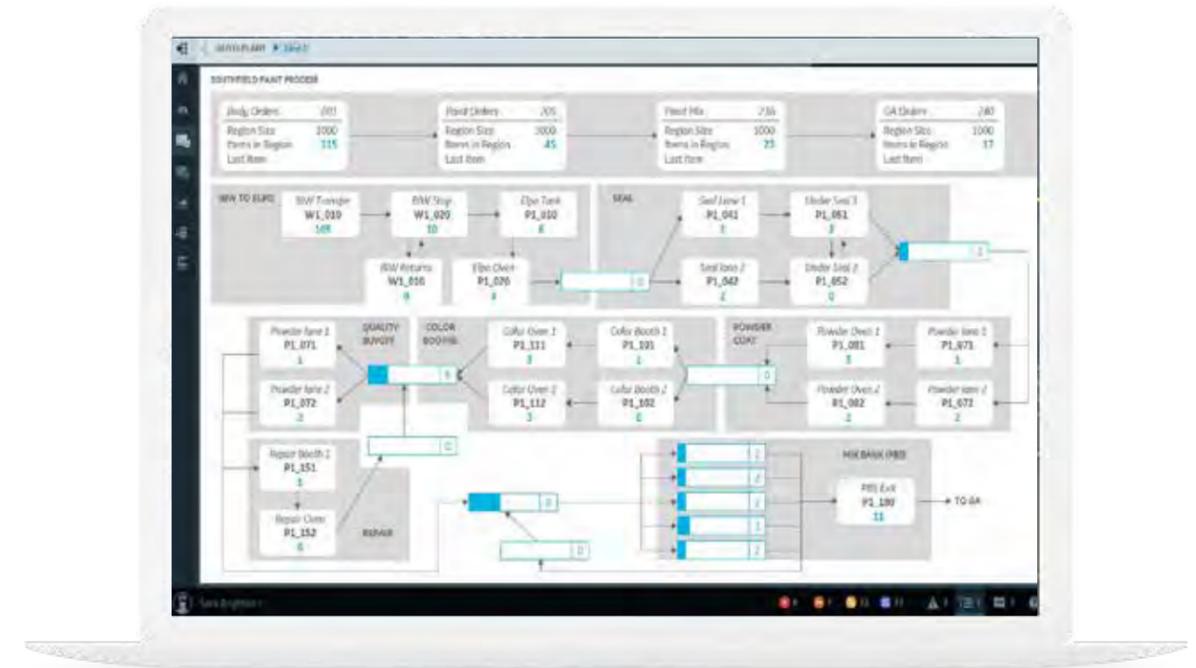
Motorcycle manufacturer plant in India

Products

- CIMPLICITY HMI/SCADA
- Tracker
- GE Digital's Professional Services
- Proficy Historian

Solutions

- Supervisory monitoring and control
- Production management including tracking and routing
- Data for real-time and historical analysis
- Redundancy for the highest reliability



Results

- Meet company goals
- Improved quality
- Reduced defects
- Faster problem resolution
- Increased accountability

With the GE Digital solution for the FMCS system in the driver's seat, the motorcycle manufacturer can achieve the company objectives of identifying and resolving quality problems in the shortest possible time. It also improves accountability and reduces defects.

North American Pharmaceutical Company

Implements Electronic Quality Checks and Corrective Actions



North American Pharmaceutical Company

Electronic Quality Check

Corrective Actions On Out-of-Spec Product

A lack of efficiency with manual/paper processes meant that the company experienced slow resolution of quality issues. Operators were doing quality checks manually with a paper grid. Proficy Workflow improved efficiency by automating the quality checks and initiating corrective action— as an addition to the company's existing GE Digital HMI/SCADA systems. Proficy Historian provides data collection, archiving, and distribution for analysis. The company also uses Proficy Plant Applications as its standard Manufacturing Execution System (MES) along with Proficy Batch Execution. Proficy CSense includes a closed-loop with analysis for process optimization.



Solutions

- Proficy Workflow
- iFIX HMI/SCADA
- Proficy Batch Execution
- CIMPLICITY HMI/SCADA
- Proficy Plant Applications
- Proficy Historian
- Proficy CSense
- Proficy Webpace

Results

- Improved efficiency
- Reduced waste and costs
- Better quality information
- Faster resolution of quality issues





Pigment Manufacturer Increases Quality and Consistency



Reduced costs and increased quality with repeatable recipe consistency

Challenge

- Legacy production system that had been developed in-house and was difficult to support
- Needed new production solution for two main pigment manufacturing processes. Pigments used in inks, paints, plastics, and textiles

Action

- Implemented GE Digital's Proficy software including manufacturing execution and HMI/SCADA with partner Novotek
- Centralized operator control
- 10 process lines

Result

- Reduced costs, increased quality, and improved profitability
- Repeatable recipe consistency
- Flexible and scalable
- Easy-to-use graphical interface for operators
- Real-time data capture and reporting





Copenhagen Airport Optimizes Baggage Sorting with Software from GE Digital

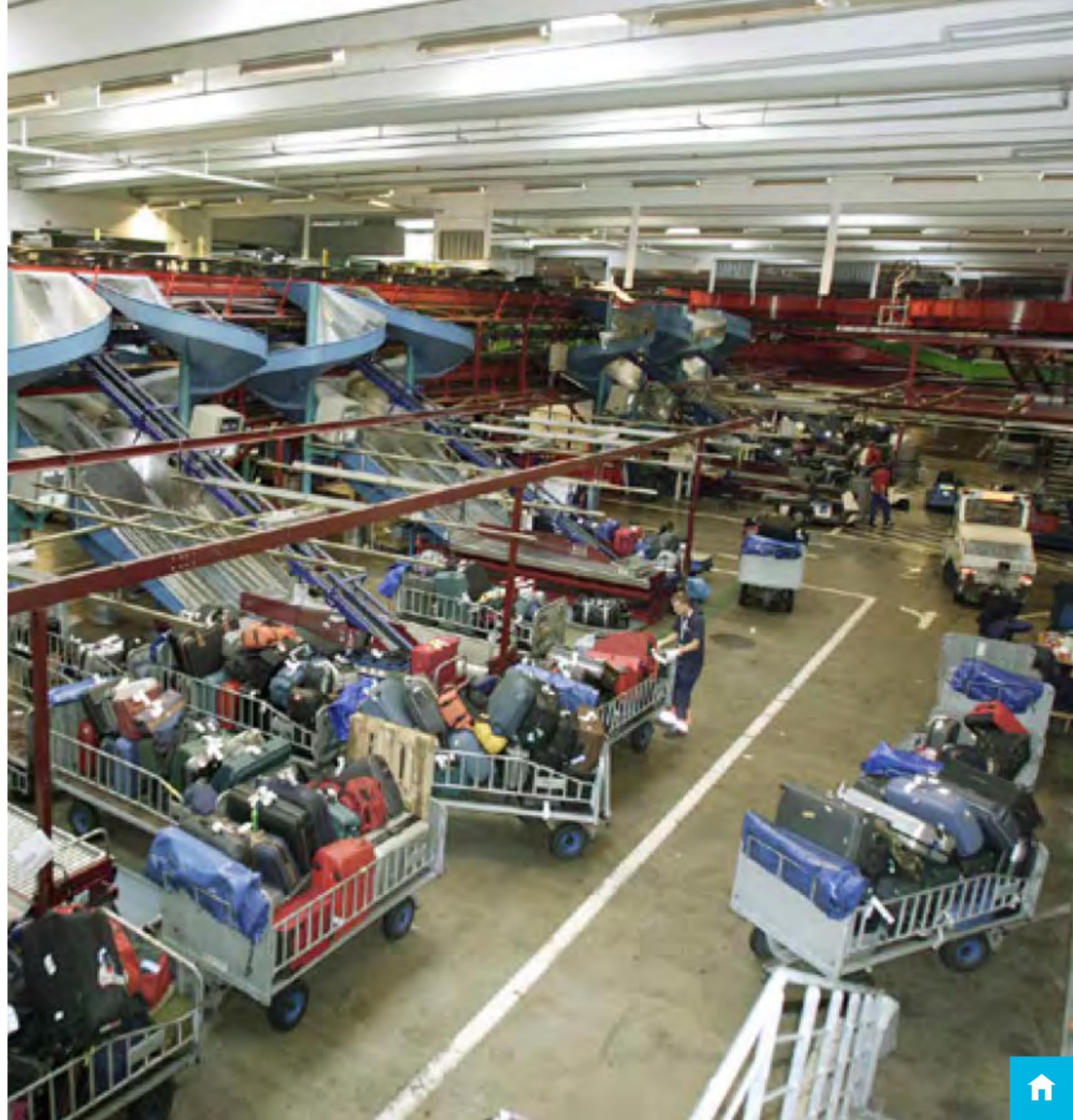


The fully-automated baggage-handling systems at Copenhagen Airport (CPH) play a central role for most of the personnel and companies either working in or using the airport.

The system, which currently handles between 20,000 to 25,000 items of baggage each day, is owned and maintained by Københavns Lufthavne A/S, CPH.

iFIX from GE Digital, which has monitored baggage sorting in the Copenhagen Airport for many years, has joined forces with Proficy Plant Applications from GE Digital. Together, these solutions can help reduce wait time and improve efficiency for CPH's business-critical baggage sorting systems.

Currently, CPH is in the process of upgrading iFIX and installing new solutions to ensure even more efficient baggage handling.



Solid and flexible

The fully-automated baggage sorting system and its numerous conveyor belts have been controlled, regulated, and monitored by iFIX since it was built. iFIX is a flexible, integrated solution that provides superior process visualization, data acquisition, analytics, and supervisory control of operations.

“iFIX has done an excellent job over the years, and continues to be one of the most solid and flexible SCADA platforms on the market.”

Lars Peter Larsen, System Specialist, Copenhagen Airport

Henning Pind, a System Specialist at CPH's baggage terminal, enjoys the flexibility and scalability of iFIX to meet the airport's ever-changing needs. "iFIX is particularly strong because it is so configurable and can talk with so many different PLCs. The specialists here in the airport have always been able to maintain the solution and set up new screen graphics, databases, and alarms when necessary," says Pind.

And over the years, there have certainly been plenty of new screen graphics. The solution has grown from two to four SCADA servers, and from around 8,000 to over 25,000 I/O points. 23 general PLCs run the main lines, along with 500 minor PLCs.

Many of the I/Os are pure digital signals, with a lesser degree of regulation. But the solution is large, and with 18 flat screens and associated keyboards on a single desk. The control room could easily be featured in a modern Hollywood production.

“We are now switching to a new iFIX version in a continuous process, in the course of which we will undoubtedly introduce new features and functionality. We are not fully utilizing the potential in iFIX to the utmost at this time, and there are sure to be lots of things we can do better,” concludes Pind.

Double-click for maintenance

Usability has been much improved as iFIX has been given more functionality. For example, it currently supplies data to SAP's maintenance module which administers the various maintenance intervals of the system.

A single double-click on an iFIX alarm sends it to SAP, which then automatically sets up a work order. That's how simple it is.

The maintenance intervals are defined by the various system vendors, but the maintenance department also uses historical data from iFIX if an error reoccurs and the maintenance interval needs to be adjusted.



OEE picture completed

Pind describes investment in the Efficiency Module of Proficy Plant Applications solution as a natural part of ongoing optimization of the baggage system. This software monitors and controls performance with a comprehensive view of factors such as OEE and equipment downtime.

CPH is very familiar with benchmarking uptime criteria, with only the conveyers behind the check-in desks not being measured.

Optimization and documentation

“Our responsibility starts when the baggage rolls onto our conveyor belt, which runs behind the check-in desks, and ends when a handling company employee loads the baggage from the box and onto a cart to take it to the plane. The handling companies, such as SAS Ground Service and Novia, depend on the efficiency of our systems, which is why it’s vital that we can improve uptime.” shared Pind.

No more queues

Once the solution is fully configured on all belt lines, it will be measured specifically on queue times. Queues have many causes, and can occur almost anywhere. During peak periods, up to 40,000 pieces of baggage per day can be handled, which means queues can form even when everything is working smoothly—just like on a motorway.

“We are now finalizing our uptime solutions, which will give a much more detailed picture of the problems and options we have. We are developing a KPI bus, on which we can collate all OEE figures in a dedicated database. And when it is ready, the solution will give a general picture of the entire system, and have the ability to be able to define a very detailed picture of a line, an error, a stop cause, and more. The Plant Applications web server included in the bundle from Novotek can be customized to meet the needs of each unique user, and instead of them calling me, they will be able to log in to their own personal OEE browser in the future, to check the figures they want,” says Pind.



Important risk management

“The Change Management solution we installed is a tool for configuration management of our PLC software. The module monitors the system and ensures that the software we have on the PLC is identical with the version we have on the server,” explains Pind. “Any changes are logged and documented, such as who’s been in and out, what’s been changed, and when it was logged.”

The baggage sorting system has to run day and night, and “firefighting” situations which arise are those that cause problems. If a technician, for example, goes into the system remotely on a Saturday evening and forgets to log changes, there will be discrepancies when a new technician arrives Monday to fix the error properly. There is always a risk of a discrepancy in such a large system as ours and the fact that most of our PLCs run in tandem as an extra safety feature does not make things any better. Discipline is needed to ensure identical changes are made in both PLCs, including the one which is not in operation,” states Pind.

Change management is a must

The solution provides, first and foremost, security and then gives us vital history and documentation of changes.” According to Pind, the control room personnel know exactly who to call for an explanation on software changes and the like. And if the technicians are also willing to write a comment to their changes, it makes things easier for everyone.

“Our change management solution was a relatively small investment, and will quickly pay for itself,” concludes Pind.





Solar PV Manufacturer Increases Efficiency, Quality, and Yield



Increasing yield and reducing costs at solar panel manufacturer

Challenge

- Need for greater visibility into manufacturing processes
- Hidden efficiency opportunities
- Increasing global competition and cost concerns
- Tight project deadlines to satisfy investors

Action

- Implement GE Digital's Proficy software for increased control and visibility of the manufacturing processes
- Complete Lean Manufacturing solution provides robust redundancy, enhanced data security, reliable information and access to critical data through web-based visualization and real-time analytics
- Rapid implementation to meet tight project deadlines

Results

- Increased operational efficiencies
- Higher yield and throughput
- Improved product quality
- Lower costs due to optimizing production processes in real time
- Compliance with strict traceability requirements
- Flexibility to add equipment to deliver scalability as the business grows





About GE VERNOVA

GE Vernova is a planned, purpose-built global energy company that includes Power, Wind, and Electrification segments and is supported by its accelerator businesses of Advanced Research, Consulting Services, and Financial Services. Building on over 130 years of experience tackling the world's challenges, GE Vernova is uniquely positioned to help lead the energy transition by continuing to electrify the world while simultaneously working to decarbonize it. GE Vernova helps customers power economies and deliver electricity that is vital to health, safety, security, and improved quality of life. GE Vernova is headquartered in Cambridge, Massachusetts, U.S., with more than 80,000 employees across 140+ countries around the world.

GE Vernova's industrial software business is focused on providing a suite of software products and services to customers aiming to accelerate a new era of energy by electrifying and decarbonizing the energy ecosystem through intelligent and efficient data analytics, monitoring, and management.

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