



Cutting out the Waste in Food & Beverage and Consumer Package Goods: Reducing Site Performance Losses



Introduction

Overall equipment effectiveness (OEE) is a term that has been around since the 1960's in the manufacturing industry and is a measure of how effectively a manufacturing operation is utilized. In food & beverage (F&B) and consumer package goods (CPG) manufacturing this is a widely-adopted metric that is used to expose losses in manufacturing and help drive major savings. In fact, for some companies, even a 1% increase in OEE can result in millions of dollars saved annually. The best way to make these incremental improvements in OEE is to cut out waste in regards to the availability, performance, or quality of your plants. When considering waste in OEE, there is potential for losses in six areas:

Availability	Performance	Quality
Planned downtime	Minor/micro stops	Production rejects
Unplanned downtime	Speed losses	Start-up rejects

To eliminate these losses from a production line it is important that your organization has visibility into how each unit in the line is performing. Take a beverage line for example, from the blow molder to the stretch wrapper, visibility into how each machine is performing is critical to uncovering these losses (figure 1).

For most companies, the losses that occur in the availability of their plants is where much of the improvements can be made. One process in particular, Clean-in-Place (CIP) is critical in industries like dairy, beverage, brewing, processed foods, pharmaceutical, and cosmetics. However, this process can also account for 30% of energy and water usage and lead to excessive downtime at a huge cost to manufacturers. In addition, CIP is usually designed for “worst case” scenarios which can result in over-cleaning of production lines. Major efforts are underway throughout the industry and academia to continue to cut downtime out of manufacturing operations (see sidebar). Improvements, however, in site performance losses are still important to not overlook.

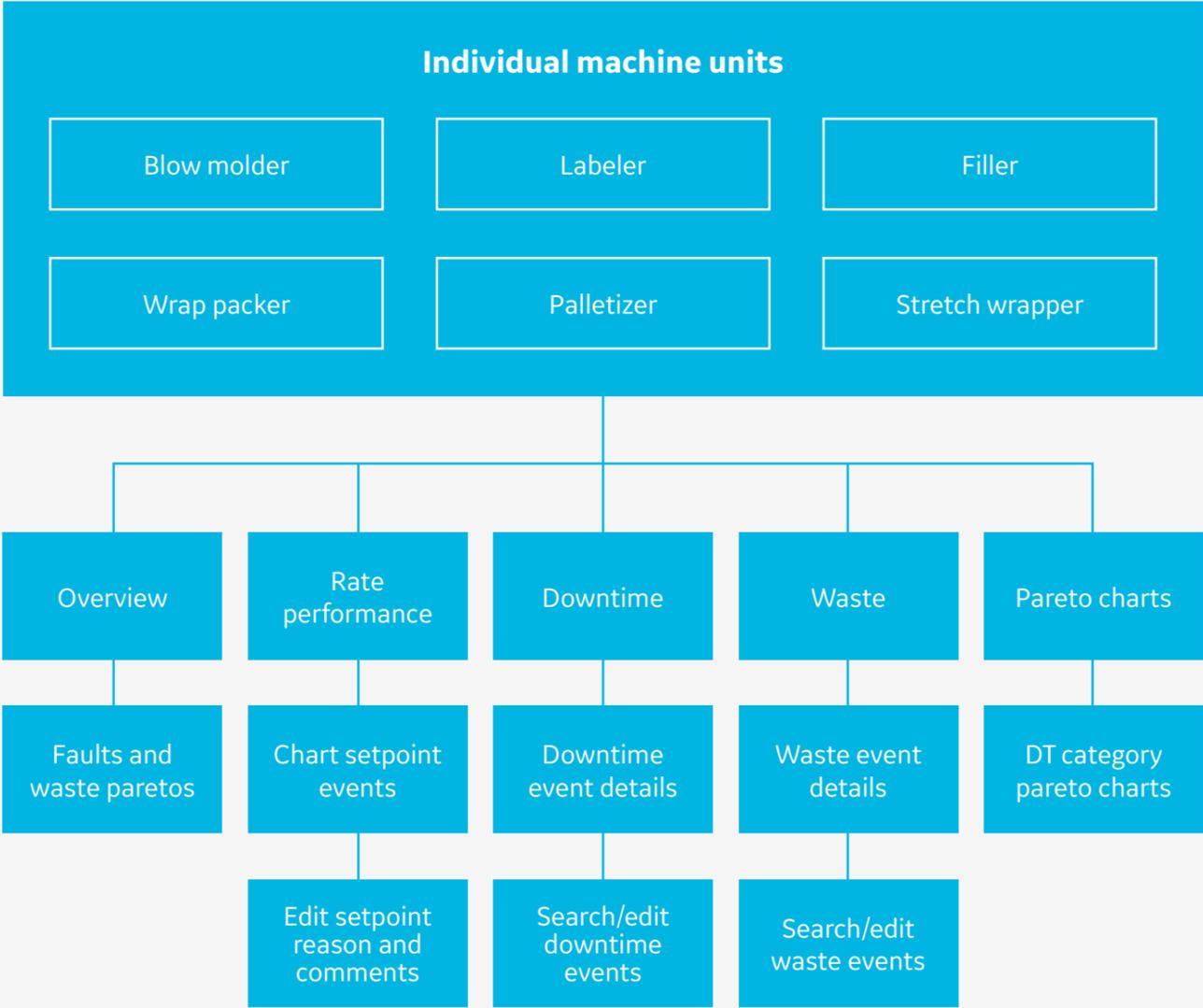


Figure 1: Line and Unit Tree Visibility

Improve site performance losses

Rate losses usually occur during ramp-down and ramp-up around machine stops, or from machine settings that differ from the target rate. The target rate is generally defined as the best demonstrated instantaneous rate that a stock keeping unit (SKU) can run through the chokepoint of the production system. A machine may run different SKUs at different rates, but there should be only one target rate for each SKU for that machine. The best way to make improvements is to look for patterns of significant performance loss (i.e., an unusual number of slow cycles or small stops). For example, performance loss may be more prevalent after a changeover, during a specific shift/operator, or even just from natural wear and tear of equipment over time.

Changeovers are events within F&B/CPG manufacturing that can have large variation. A lot of this variation can be traced back to operators and how they perform these changeovers. The issues commonly encountered are:

- Lack of standards on how changeovers should occur
- Lack of training for operators
- Difficulty in performing equipment calibration and adjustments
- Variability in sequence and work methods
- Few operators and no one assigned to coordinate the changeover

AI CIP on the Horizon?

Studies are underway to develop a self-predicting system that will be able to autonomously optimize a cleaning process in plant equipment in real-time through the use of sensors and analytics. This new approach to sanitation could have a similar impact to the shift from break-fix or reactive maintenance to condition based or reliability centered maintenance in industrial operations. Early estimates point to savings of £100m a year for the uk food industry alone.*

* <https://www.nottingham.ac.uk/news/pressreleases/2016/september/new-ai-driven-cleaning-system-could-save-food-manufacturers-100m-a-year.aspx>





One of the easiest ways a manufacturer can improve their changeover performance is through standard operating procedures (SOPs). Standardized work instructions and SOPs can function as training protocols for new hires and serve as a reminder to prevent tenured workers from taking short cuts. In certain equipment intensive process industries, like soybean oil or high fructose corn syrup (HFCS), in which a centralized control computer operates the plant, it may take months, or longer than a year, for an operator to become proficient in operating the plant. Site performance losses can sometimes go unnoticed, but with some analysis and standardization of the process improvements can be made to make a major impact on OEE.

Like any metric in manufacturing, OEE is not a perfect measure and can be misleading in some cases. Maximizing OEE without considering outside factors, like higher energy or labor costs for running a plant during certain times, can lead to more waste overall. However, that does not mean OEE should be ignored. Successful companies are the ones that have as much information on-hand as possible and use OEE performance along with outside variables to make the best decisions possible.

Are you ready to start reducing your site performance losses?

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