



Systemch International™
OEE Position Paper

OEE – Delivering on the Promise to Improve

Integrated OEE provides actionable insight into pharmaceutical packaging line operations – empowering manufacturers to bypass bottlenecks and optimize line efficiency.

Bottom-line pressures are mounting in pharmaceutical manufacturing. Competitive influences, regulatory changes, expiring patents, dwindling pipelines and increasingly sophisticated consumers are combining to change the face of the market. All areas of the industry are under mounting demand to lower costs and boost productivity. Manufacturing is no exception, with supervisors and managers spending more and more time finding new ways to cut costs.

Particularly important in a manufacturing environment is the overall effectiveness and efficiency of operations. These factors are increasingly scrutinized, but there is still much progress to be made. According to research published in *Pharmaceutical Engineering*, a typical pharmaceutical plant operates, on average, at about 30 percent efficiency, while “winning” pharma plants operate at 74 percents and world-class levels are considered to be 92 percent.¹

Pharmaceutical companies lose revenue each year due to manufacturing line inefficiencies such as downtime, waste, startup and production rejects, and reduced speed. The good news is that many of these losses can be minimized, if not completely avoided, by focusing on methods to monitor, track, and correct issues as – or before – they arise.

To increase overall efficiency, reduce costs, and maintain competitive position, pharmaceutical manufacturers must perform at optimal rates, while maintaining consistently high product quality. This means operating with minimal breakdowns and bottlenecks and, when problems do occur, having the ability to rectify production issues and get back up to speed quickly.

Overall Equipment Effectiveness (OEE) has emerged as a ‘best practices’ methodology for translating the figures from myriad data sources into a simple set of numbers that enable manufacturers to direct resources toward issue resolution and improved output. This document outlines the challenges of implementing OEE in packaging, a critical operation at the end of any production process, and addresses the considerations in selecting a stand-alone system for reporting, versus an OEE system designed to work with existing line management and inspection devices.

OEE Overview

Today, most packaging line equipment has at least some information gathering capability. This capacity can range from a simple sensor counting bottles as they exit a filler to alarms that sound when a jam occurs or a machine fails, to more complex inspection systems that gauge the readability of bar codes or otherwise monitor product quality.

This information is valuable only when used – in a timely manner – to improve the effectiveness of the entire process. By routing the information through an OEE system for analysis, the efficiency of individual machines, manufacturing cells or assembly lines – even entire plants – can be monitored, and resources directed to fine-tune operations. As a result, OEE empowers manufacturing organizations to systematically improve processes and in turn, ensures consistency, maximum quality, and productivity – all resulting in measurable and direct bottom line savings.

OEE targets the most common and critical sources of manufacturing productivity loss and places them into three primary categories – Availability, Performance, and Quality. Availability compares the amount of time a machine or line should ideally be available with the actual amount of time it is up and running. Performance statistics compare the ideal and optimal operating speeds of line or components. Quality quantifies products that do not meet quality standards. All three factors, and OEE itself, are generally expressed as percentages reflecting efficiency – allowing for ease of comparison and improvement measurements.

By using OEE to identify inefficiencies and boost capacity on existing lines, manufacturers often find that additional planned lines are unnecessary. By making lines more efficient and freeing up existing staff, a manufacturer might be able to bring on new lines without hiring additional staff. For example, an operation that posts a fairly typical OEE rating of 55 percent, and then brings that number up by 10 to 20 percent, will realize dramatic, measurable bottom line improvements.

Not all parts of a manufacturing operation will benefit equally from the implementation of an OEE system, and so the first step in implementing OEE is to determine which parts of the operation would most benefit from OEE reporting. This could be an individual line, a group of equipment in the facility—for instance, all the labelers, or all the fillers—or even an entire manufacturing plant. The packaging line serves as the final ‘destination’ in the manufacturing process – the end of the value creation chain, and the point where the most value is added. Components and costs compound as a product moves along the chain, culminating at the packaging line, so improving the OEE rating of the packaging process brings more value than at any other production stage.

Data Sources

Feed Insight Today, many packaging operations gather key information to provide efficiency ratings. OEE systems allow such companies to further refine the process with a detailed analysis of the factors that impact production efficiency. By detailing the sources and causes of downtime, pinpointing production bottlenecks, and identifying quality issues, OEE arms organizations with the information they need to make timely and lasting improvements in the packaging process.

Typically however, even the more sophisticated tracking systems do not go far enough. An ideal OEE system receives input from all control signals and other intelligent devices. This comprehensive view allows potential trouble points to be identified and production totals analyzed for performance assessment.

Inspection systems are another key element of OEE recording. A typical set of inspection tools include Optical Character Verification (OCV, OCV2), Optical Character Recognition (OCR), bar code verification, print quality verification, and general quality inspection. OEE reporting provides an effective means to interpret, display, and store data, so that it can be most efficiently understood and put to use. Ideally, data is presented in a user-friendly manner (e.g. fishbone diagram, pareto charts) and permits easy exporting to other databases for scenario analyses.

When a manufacturing line achieves a strong OEE rating, it is an excellent indicator of highly productive processes, but continual optimization is paramount to realizing longterm value. A comprehensive, and truly useful, OEE system will provide operators with continuous line notification and control, so that actions can be taken in time to preempt events that could result in downtime, poor product quality, and lost revenue. It should also provide the means for operators to capture comments and remarks on critical production events, so that this information can be reviewed during root-cause analysis sessions.

Stand-Alone vs. Integrated OEE Solutions

There are two basic types of OEE systems – stand-alone and integrated. Each presents its own set of benefits and challenges.

Automated OEE systems gather information from the operation’s equipment and deliver it back to the OEE system. On most packaging operations, vendor-specific subpackaging stations are controlled by their own PLC that controls operation and reports downtime and other information.

The best OEE systems “intelligently” report the status of individual components along the packaging line. Such information may include, for example, the correlation of a downtime event with the time of the day, the production crew on the floor, and a particular equipment set-up procedure. This information, as opposed to a simple timer to monitor downtime, provides the type of “actionable intelligence” to enable proactive adjustments, rather than merely serving as an alarm to report a stoppage.

Comprehensive systems add the “why” to the “what, when” and “how often.” The quality or intelligence of these systems expedites the corrective action process by providing relevant and factual information collected from the various devices along the packaging line.

Integrated OEE solutions offer more flexibility than standalone systems, handling processes from line management and data collection through OEE analysis and reporting. This integrated approach simplifies line implementation, changes and expansion

as well. With intuitive user interfaces that allow for simplified configuration, such systems require minimum custom development, and allow user-specified parameters based on specific production requirements.

With comprehensive and modular packaging line automation software in place, users are empowered to control and improve the production process. Equipment set-up is combined with efficiency monitoring – providing procedural control and maximizing productivity. When seamlessly integrated with machine vision inspection, complete production monitoring, control and reporting can be achieved.

The data collected from each machine enables operators to assess effective manufacturing rates and expected lot completion times, facilitating process improvements through scheduling optimization. Trend analysis capability can identify problem areas, so that preventive actions can be performed before materials are lost.

A line automation system with modular design can be implemented according to existing requirements, with additional functions added as needed. Such systems also offer additional features, including component reconciliation, product serialization, advanced reporting, communication and data integration, and tight integration with supply chain systems.

Another benefit of integrated systems is scalability, which allows an OEE program to begin with a limited number of machines or lines—for instance, the easiest and fastest to configure—and then scaled up once the benefits have been demonstrated. The strategy of leading change with quick wins can be extremely effective in securing buy-in from all interested parties prior to implementing the system on a broader scale.

In the pharmaceutical industry, it can be especially important to work with a solutions provider or integrator with experience addressing the unique requirements of the pharmaceutical manufacturing process. Providers with applied experience will respond more effectively to the unique packaging needs of pharmaceutical manufacturers, and can better complement the process side of their business operations.

SYSTECH Integrated OEE with Actionable Intelligence

As a leading provider of Packaging Execution Systems for the pharmaceutical industry, SYSTECH International recognizes the value of OEE metrics. SYSTECH offers a sophisticated OEE solution that goes beyond efficiency ratings to provide detailed analyses of the factors that impact the manufacturing process and contribute to the loss of effectiveness.

This level of insight and analysis allow manufacturers to identify and isolate quickly production problems, and apply a solution. By illuminating the sources and causes of downtime from an integrated perspective -- pinpointing production bottlenecks, and identifying quality issues, SYSTECH OEE arms organizations with the information needed to improve their entire packaging process.

The SYSTECH solution allows manufacturers to leverage their existing investment in automation technologies. SYSTECH OEE is integrated as an extensible module of SYSTECH TIPS ADVISOR™ -- a robust, high performance packaging line automation and information management solution that addresses recipe management, change-over times, component reconciliation, item-level serialization, custom reports, and communication with business systems. SYSTECH's OEE is a module to its TIPS ADVISOR, allowing the company to offer a fully integrated, comprehensive solution that addresses productivity loss and requires less training, maintenance and equipment on the line.

“In-time” Monitoring Reduces Line Inefficiencies

Achieving a strong OEE rating is an excellent indicator, but continually optimizing line performance is paramount. SYSTECH's integrated solutions, unlike other offerings, provide operators continuous line notification and control, so actions can be taken in time to preempt events that would normally have a negative impact on line efficiency and the OEE index.

The SYSTECH TIPS ADVISOR OEE module integrates seamlessly into its line monitoring and control solutions. The system allows lines operators to monitor all instruments and components of the packaging line – making it easy to quickly begin realizing the benefits of OEE.

Optimized packaging line efficiency, however, cannot be achieved with OEE alone. Continuous line monitoring and control is an ideal way to stop inefficiencies before they happen. Long before a problem manifests itself in the OEE analysis, it occurs on the packaging line. Such problems will, if left unaddressed, ultimately impact line productivity. An integrated OEE system assists in production surveillance, provides alerts for incidents that can potentially impact productivity, increases operators' interactions along the line, and turns raw data into actionable knowledge that boosts overall line efficiency.

It is only this combination of big-picture OEE analysis and constant line vigilance that can deliver optimal line performance.

Cornerstone of Quality

With continued pressure on manufacturers to operate their facilities more efficiently, many organizations are aggressively seeking OEE solutions that can be easily integrated with their existing technology infrastructure. In doing so, manufacturers can eliminate issues common to stand-alone solutions while achieving business goals. OEE provides a structured approach for identifying complex production problems, and distills them into a simplified, cohesive set of actionable intelligence to optimize line efficiency. As a result, OEE empowers manufacturing organizations to systematically improve processes and, in turn, ensure consistency, maximum quality, and productivity – all contributing to maintaining a competitive position in a rapidly changing marketplace.

Integrated OEE systems provide an ideal platform for intelligent, real-time reporting of incidents, flexibility of configuration, simplified implementation and streamlined deployment. By within the entire packaging 'ecosystem' integrated OEE provides a level of clarity that supports root-cause analysis and enables nimble decision-making. As such, it serves as the cornerstone of any continuous improvement initiative in the manufacturing organization, and provides an ideal means of collecting information in support of Six Sigma or any quality-focused program.

¹ – “From Good Manufacturing Practice to Good Manufacturing Performance,” by Professor R. Benson and J. McCabe, Pharmaceutical Engineering, July/August 2004, Vol. 24, No. 4.



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