



AVEVA™

# UNCOVER HIDDEN POTENTIALS TO ACHIEVE OPTIMAL LINE PERFORMANCE

Food and Beverage / Consumer Packaged Goods

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# INTRODUCTION



# Introduction

Tight margins, global competition, brand protection. How do you as a F&B/CPG processor take advantage of new technologies while maintaining critical operating and financial conditions?

In this ebook, we strive to help you uncover hidden potentials in your production plants that will maximise your line performance in terms of equipment uptime, line throughput, product changeover and meeting regulatory compliance through process genealogy. We'll also provide you a list of key elements to consider when monitoring day-to-day operational activities and ways to identify areas for plant operation improvements.

These are the critical factors most likely to affect your profitability in today's market conditions and set you ahead of your competitors.



# Value Drivers

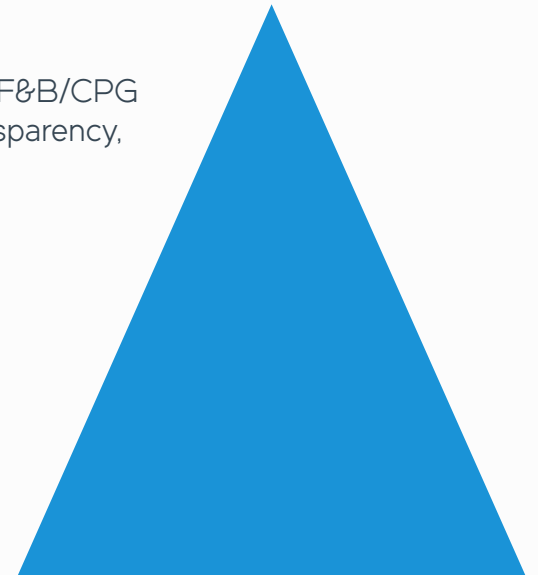
F&B/CPG companies face multiple challenges which require continuous improvements in operational efficiency and sustainability to meet their business targets. At the same time, manufacturers need to be responsive to changing consumer preferences and meet tougher standards for regulatory compliance.

## Improve Profitability and Reduce Rejections

The F&B/CPG industry is extremely competitive with low product margins. In order to increase profitability, F&B/CPG manufacturers need to improve asset utilisation, control inventory, minimise waste, increase production transparency, and enable real-time planning and scheduling.

### Manufacturing Execution Systems Help:

- Monitor key performance indicators (KPI's) in real-time
- Reduce unplanned downtime and improve operational efficiency
- Identify root causes for rejections from poor capping, mislabeling or contamination
- Synchronise production and business needs by exchanging information in real-time





# Value Drivers

## Reduce Downtime

F&B/CPG manufacturers can increase production capacity by reducing stoppages on their packaging and bottling lines. Stoppages can be caused by bottle bursts, jammed machines, contamination from escaped liquids, among other reasons. F&B/CPG manufacturers need to identify and reduce sources of downtime to ensure that their lines operate at full capacity and that they can meet production targets.

### MES solutions can:

- Track running time for line, capturing even short stoppages
- Capture reason codes for stoppages
- Identify root causes for line stoppages
- Track equipment utilisation and schedule preventive maintenance

## Changing Consumer Preferences

F&B/CPG manufacturers know that consumer preferences change quickly, and successful companies must constantly innovate new products and develop product and packaging varieties that appeal to existing and new customers.

### MES solutions can:

- Handle production changeover with reduced amount of time
- Enforce consistent quality
- Reduce the time-to-market for new products



# Value Drivers

## Safety and Regulatory Compliance

Increasing consumer concerns about food safety has caused government agencies in many countries to impose tougher regulatory standards.

### MES solutions can:

- Ensure that production equipment is set up with the right parameters and operators get the right instructions and use the right ingredients to run production or packaging operations.
- Capture all consumption and production events, and quality sample data for product genealogy and for full traceability of materials used. Detailed electronic records allow for quicker identification of the source and expiration date of raw materials, the equipment used, the time and shift of production, outliers in product and process quality and other internal or external compliance relevant information about the product and the related production process.
- Reduce the risk of recall with notifications of non-conformance and quality limit violations in real-time.
- Trigger preventive actions based on statistical process control rules for keeping quality under control before it costs time and money.
- Reduce the cost of compliance with data collection automation and electronic record keeping – this frees operators from distracting and difficult coordination tasks, assuring quality documentation and control.



# Key Success Factors

Raw material costs, costs of production, logistics, quality and regulatory compliance - all are critical to your competitiveness. At AVEVA, we are your partner in optimising your production processes:

- Line performance/OEE management
- Asset uptime and maintenance
- Production and Inventory operations management (MES/MOM)
- Flexible Batch and Recipe management
- Securing quality and regulatory compliance





# ENSURE OPTIMAL LINE PERFORMANCE



# What is OEE?

Overall Equipment Efficiency (OEE) is a Key Performance Indicator (KPI) which has become the de facto industry standard to measure and monitor the operational efficiency of production machines and lines. In simplest terms, OEE tells a ratio of actual production results (good production) to the maximum possible production results within planned or scheduled production time.

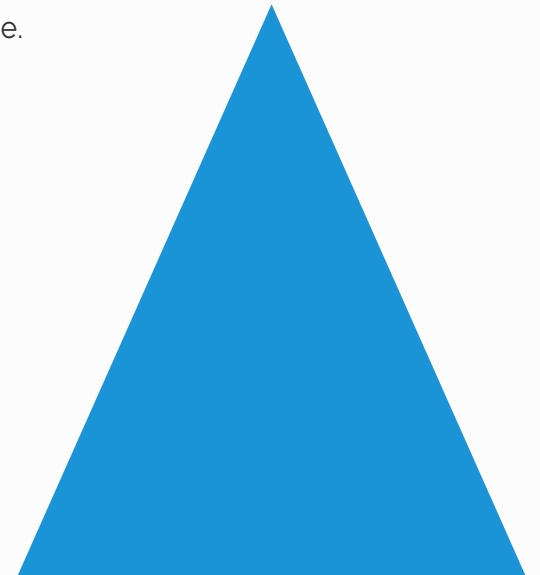
OEE of 100 % = producing only good product, as fast or as much as planned within scheduled operating time.

OEE is calculated by multiplying three factors: Availability, Performance and Quality.

- Availability (%) = Operating Time / Available Time
- Performance (%) = Total Production / (Rated Speed x Operating Time)
- Quality (%) = Good Production / Total Production

## where:

- Available Time = Time period of interest excluding planned equipment downtime such as breaks
- Operating Time = Available Time excluding unplanned equipment downtime
- Total Production = Amount of bulk material or product items produced
- Good Production = Total production excluding rejects or scrap (product(s) defined as not meeting target quality)



# What is OEE?

To accurately calculate OEE on a production line, a set of equipment used in order of product flow, the current line bottleneck and the location of good production count have to be taken into specific considerations.

For line OEE calculations, the bottleneck availability defines the line availability and the bottleneck target production rate needs to be used to calculate line performance. The line quality value needs to take the line good production count and the sum of quality losses along the whole line into account.



# What is OEE?

## Overview of process metrics for filling and pack

During filling and packaging, KPIs focus on throughput and waste. The table on the right shows common KPIs considered in the Filling and Packaging area. Utility KPIs such as energy and water consumption are becoming increasingly important to give visibility into sustainability efforts.

- There are many additional benefits beyond OEE tracking that manufacturing execution systems (MES) can provide. Automatic electronic record keeping of all production events, material flows, quality data and resources used provides the foundation for additional insights to further improve operational efficiency.
- Integration to equipment control systems is essential to enable automatic data collection in fast moving consumer goods manufacturing for root cause analyses and a detailed electronic record of the production processes.

	Filling	Packaging
Production KPIs (mostly asset-focused indicators to show efficiency by stage)	<ul style="list-style-type: none"> <li>• OEE</li> <li>• Production - Bottles filled</li> <li>• Downtime/Short Stop</li> <li>• Efficiency/Utilisation</li> </ul>	<ul style="list-style-type: none"> <li>• OEE</li> <li>• Production - Cases/ Cartons Packed</li> <li>• Downtime</li> <li>• Efficiency/Utilisation</li> </ul>
Yield KPIs (mostly material-focused indicators to show waste and throughput by stage)	<ul style="list-style-type: none"> <li>• Filled Qty.</li> <li>• Spillage/Loss - Over filling or under filling</li> <li>• Leakage</li> <li>• Bottle yield Crown/</li> <li>• Closure yield</li> </ul>	<ul style="list-style-type: none"> <li>• Packed Qty.</li> <li>• Bottle Breakage</li> <li>• Label Yield/Usage</li> <li>• Bottle Yield</li> <li>• Printer Ink Yield</li> <li>• Defects</li> <li>• Carton Yield</li> </ul>
Utility KPIs	<ul style="list-style-type: none"> <li>• Energy Consumption</li> <li>• Water Consumption</li> </ul>	<ul style="list-style-type: none"> <li>• Energy Consumption</li> </ul>

# The First Step to Ensuring an Optimum Line Performance

To ensure your plant is operating at its peak level, you need to have visibility of your operational efficiency by measuring and monitoring KPI's such as OEE and capturing production and equipment performance history data. With real-time visibility of OEE, you will be able to make ad hoc corrective actions. With historical data of line performance, you will be able to conduct root cause analysis of capacity losses to determine the areas for improvement:

1. Increase equipment utilisation
2. Reduce equipment unscheduled downtime
3. Increase line throughput
4. Minimise the impact of product changeover
5. Improve schedule adherence and customer satisfaction

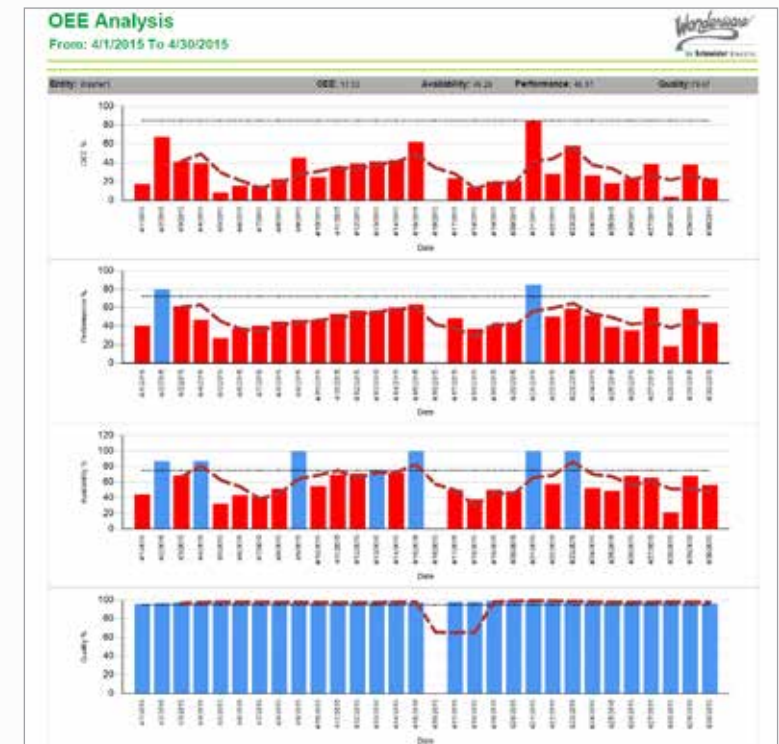


Dashboard displays real-time visibility on performance, availability and quality levels.



# Avoid Swimming in Pools of Data

We understand that fast moving consumer goods manufacturing lines can generate large volumes of data on a daily basis. This data has to be collected, stored and transformed into accurate and timely information to enable facts based operational decision making in real-time by different stakeholders in a plant. Effective root cause analysis and interactive reporting from large volumes of data additional require a well-defined information model.



OEE Report





# Avoid Swimming in Pools of Data

To achieve this, keep the following recommendations in mind:

1. Collection of production data automatically or from manual input with the use of software
2. Standardise KPI calculations, information models and reports across all lines and equipment
3. Ensure work order context information is captured with your systems either automatically from ERP or manually



Modeling of packaging lines by material flow. Data collection automation in work order execution context.



# Why should you care

## Operators

What if performance data is automatically captured from production and processed as KPI's and context information which can be displayed in real-time on the shop floor?

**Results:** Your operators will now be able to quickly take the right actions to sustain or improve performance and quality of the production.

## Production Supervisors

What if insights into operational efficiency and visibility of current plant conditions and events are available readily?

**Results:** Your supervisors are empowered to make better decisions to optimise shift performance and achieve compliance to production plan.

## Engineers

What if all the information is ready by the time your engineers step into the plants?

**Results:** Your engineers will now be able to focus on analysing areas for continuous improvements to bring up production performance.

## Plant Managers

What if all the information, sorted by categories and desired periods, is readily available anytime when plant managers need them?

**Results:** Your plant managers will now be empowered to make timely decisions to optimise line performance.



# CUSTOMER SUCCESSES



# Amalgamated Beverage Industries

## South African Breweries Soft Drink Division Improves Packaging Line Performance

### Goals

- Make the plant more responsive to seasonal demand, improving overall performance
- Track machine performance
- Integrate to ERP (SAP) for order processing and reporting

### Solutions and Products

- InTouch HMI
- System Platform (Powered by Wonderware)
- Manufacturing Execution System - Performance
- Historian
- Information Server

### Results

- Significantly increased the efficiency of the production facility by elimination of manual logging activities
- Accurate counts and estimations for downtime reporting, core line process improvements

"The accuracy of the downtime reports provided by the AVEVA software solution were so good that even our equipment supplier is using them to troubleshoot its equipment at our plant instead of using manual tracking sheets normally used when servicing the equipment."

— John Cœtze

SAB Business Systems Manager, Manufacturing



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# F&N Dairies

## F&N Dairies Achieves Product Quality, Streamlined Production and Overall Customer Satisfaction

### Goals

- Achieve quality track and traceability
- Facilitate connectivity of plant operations with the plant's industrial automation devices, computers and laboratory measuring instruments
- Reduce the total cost of ownership of the overall solution by enabling easy upgrades of systems across the enterprise

### Solutions and Products

- Manufacturing Execution System - Performance
- System Platform (Powered by Wonderware)
- Historian
- Batch Management

### Results

- Reduced quality traceability time from 4 hours to only 1 minute
- The plant achieved "100% First-Time Quality," a lean metric that indicates what parts are manufactured correctly the first time without need for inspection, rework or replacement
- Manufacturing facility achieved its return on investment within one year
- Achieved production goal of 2500 cans a minute = 3 million cans a day = 24 million cases a year

"At our Rojana factory, F&N Dairies produces 3 million cans a day of sterilised milk, or 2500 cans per minute. With the integration of AVEVA software solutions to provide vital data on production processes as well as track and trace, we are able to have comprehensive control of our manufacturing operations to ensure product quality and control."

— Somchai Khwahan

Production Manager, F&B Dairies Thailand



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# Pepsi Bottling Ventures of Idaho

Upgrades Data Collection Capabilities and Obtains Insights Resulting in Significant Improvements in Changeover Performance and Quick Project Payback

## Goals

- Facilitate better decision making for cross-functional teams through consistent and reliable data which would eliminate guesswork and assumptions
- Understand payback metrics and use this data to justify future projects requiring capital investment

## Solutions and Products

- InTouch HMI
- Historian
- Manufacturing Execution System - Performance
- System Platform (Powered by Wonderware)
- Historian

## Results

- Identified cause of downtime in changeover process, leading to 50% reduction in changeover time and additional savings in raw materials and packaging
- Plant achieved an overall 10% increase in line efficiency
- Total payback for investment took less than one year

"With more detailed data available from the PLCs in real-time, we are able to cost-justify upgrade projects specifically for certain machine centers. We're able to prove the need for more capital investment."

— Chris Bacon

(previous)Project Mgr Pepsi Bottling



[Read complete story](#)

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# New Belgium Brewing Co.

## New Belgium Brewing Increases Packaging Production Capacity and Decreases Downtime

### Goals

- Achieve Overall Equipment Effectiveness (OEE) to produce a quality product; manage production efficiency; and ensure production line availability through scheduled downtimes, package changes, and scheduled maintenance activities
- To operate the brewery at full production capacity and double case production

### Solutions and Products

- Manufacturing Execution System - Performance

### Results

- OEE increased from 45% to 65% in just over two years
- Decreased downtime by more than 50%
- Efficiency of scheduled run time increased by 25%-30%
- Achieved record production weeks producing 190,000 to 200,000 cases consistently, successfully meeting customer demands
- Extended packaging area capacity to about 1.3 million barrels each year

"With AVEVA Manufacturing Execution System coupled with New Belgium's continuous improvement strategy, we have extended our packaging area capacity to about 1.3 million barrels each year. At this point, our approach to higher volumes is 'bring it on!'"

— Joe Herrick

Packaging Systems Manager, New Belgium Brewing Co



[Read complete story](#)

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# THE AVEVA VALUE PROPOSITION



# The AVEVA Value Proposition

The AVEVA team understands the strategic and long-term value of an enterprise-wide MES program. Accordingly, we have aligned our Product, Services, and People-related capabilities to offer a unique value proposition to F&B/CPG Industry as follows:

**Our passion for excellence is evident in terms of our:**

- Sustained market leadership in the MES space
- Success in our global food and beverages client base
- Technology leadership and unique talent portfolio

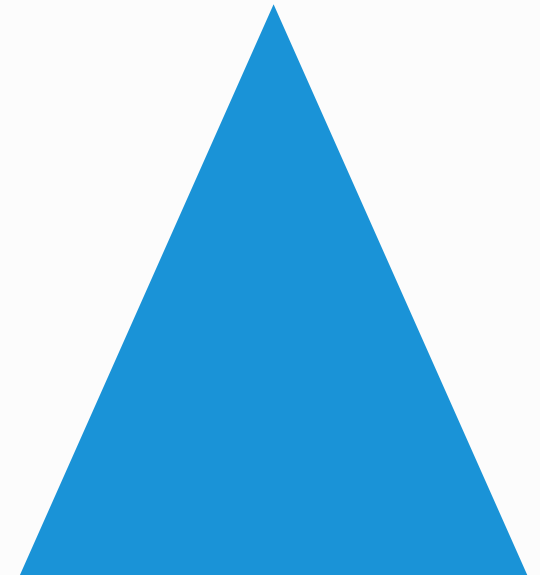
**Our expertise in terms of F&B operations:**

- Ability to quickly impact areas like line performance, traceability, quality, material logistics and energy effectiveness
- Our global network of ecosystem partners bringing in-depth experience in food and beverage MES projects
- Subject matter experts in F&B/CPG processes and metrics

**Our multi-site MES standardisation approach in terms of:**

- A manufacturing IT platform designed for multi-site deployment with adaptability
- A programmatic approach to enable global rollouts
- A unique delivery model that leverages global and local expertise while ensuring a single point of accountability for clients

Last but not least, our people are ready and excited to bring this value proposition to your operations.



# The AVEVA Value Proposition

## The AVEVA Value Proposition for F&B/CPG

- Line performance solution which rapidly captures and visualizes line equipment efficiency to achieve quicker ROI
- A platform for incremental growth in MES functionality and to execute a digital manufacturing operations transformation strategy
- Our scalable solutions allow us to address a single plant project, or global multi-site deployments
- 4,000 + partner community of organisations focused on extending value and driving innovation across industries



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AVEVA™

## About AVEVA

AVEVA is a global leader in engineering and industrial software driving digital transformation across the entire asset and operational life cycle of capital-intensive industries. The company's engineering, planning and operations, asset performance, and monitoring and control solutions deliver proven results to over 16,000 customers across the globe. Its customers are supported by the largest industrial software ecosystem, including 4,200 partners and 5,700 certified developers. AVEVA is headquartered in Cambridge, UK, with over 4,400 employees at 80 locations in over 40 countries.

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