



Integrated Data Improves Operational Manufacturing Performance at McCain Foods Limited

McCain Foods Limited is an international leader in the frozen food industry, employing 20,000 people and operating 55 production facilities on six continents. A privately owned Canadian company, McCain generates annual sales in excess of \$7 billion.

While potatoes are at the heart of McCain's offerings, they also produce many other food products, including pizza, appetizers, oven meals, juice and desserts. The company's products can be found in thousands of restaurants and supermarket freezers in more than 160 countries around the world.

Customer: McCain Foods Limited

Location: Toronto, ON, Canada

Industry: Consumer Goods

Annual Revenue: Over \$7 Billion

Challenges

In 2009, with an emphasis on supply chain optimization, McCain embarked on a three-year initiative to improve the operational performance of its global production facilities. At the time, operational performance was measured in accordance with Overall Equipment Effectiveness (OEE) at the plant level using multiple data sources/systems and various OEE definitions. Based on the initial findings of McCain's performance improvement team, global OEE was believed to be approximately 60% against a benchmark industry average of 85%.

McCain's performance improvement team developed an extremely rich list of analytic requirements and established two primary objectives related to people/processes and IT enablers; 1) institutionalize a standard definition/calculation of OEE; and

2) leverage a single/enterprise system for deployment. While McCain developed a proprietary version of OEE, there are three main factors or metrics that make up the OEE calculation—**Availability, Performance, and Quality**.

The calculation for Availability (expressed as a percentage) is the actual production time (including set-up) divided by the planned production time (example, 7.0 Actual Hours / 8.0 Planned Hours = 87.5%). Factors that impact Availability (up-time) include machine/equipment failure, lack of material input (shortages), unavailable operators (labor/skill shortages), etc.

The calculation for Performance (expressed as a percentage) is the actual run rate divided by the ideal run rate (example, 925 Actual Run Rate / 1,000 Ideal Run Rate = 92.5%). Factors that impact Performance or constant/consistent output include heat, cold, pressure, vibration, or any number of machine/equipment-related variables.

The calculation for Quality (expressed as a percentage) is acceptable (good) product divided by total product (example, 850 Good Products / 900 Total Products = 94.4%). Factors that impact Quality are: acceptable/good product output, unrequired downgrade product, product requiring rework, out of grade product and finished product waste.

The final calculation for OEE (expressed as a percentage) is Availability times Performance times Quality (example, 87.5% Availability x 92.5% Performance x 94.4% Quality = 76.4%).

Upon determining a standard enterprise calculation/scoring criteria for OEE, McCain leveraged the practices

McCain Plant Dashboard



Figure 1. FVL - Line 1 - Pack



and processes of its best production facility to replicate/ deploy OEE around the world, starting with production assets that provide McCain's greatest source of revenue (potato products). In addition to determining a scope with nominal variation and greatest value impact, the OEE performance improvement team developed an exhaustive set of "business questions" for defining analytic requirements and supporting data elements.

These questions assisted in establishing a hierarchy of analytic granularity: Live OEE Scores; Summary OEE Scores; and Drivers of OEE Scores. Live OEE Scores provided the near-term snapshots of OEE scores and trends for particular production lines.

Example business questions included:

- What is the OEE score in the last hour?
- What is the hourly trend for the OEE score for today?
- What is the hourly trend for the OEE score in the current rolling 24 hour period?
- In the same periods, what is the Availability, Performance and Quality scores that make up the OEE score?

Summary Scores provided period based snapshots of OEE scores, trends, and comparisons for particular production lines aggregated to the plant, region, and global levels over a three year period.

Example business questions included:

- What is the OEE score for a particular plant this year to date?
- What is the OEE score for a particular region this month to date compared to the previous month?
- What is the monthly trend for the OEE score for a particular line in the current fiscal year compared to the same months in the previous fiscal year?
- What are the primary losses (types of downtime, performance and quality issues) for a particular type of product in a particular region this year to date?
- Are we progressing towards "World Class" OEE scores on a yearly basis? Which regions are making the most progress? Which plants need further attention?
- Based on the information available, what are the common opportunities that we should focus our resources on at the regional and global levels?
- What capacity do we have in our plants at a regional and global level?
- Is there scope for overall asset rationalization?
- Possible improvements to run strategies?

Drivers of OEE Scores provided details of particular downtime, performance, and quality related events. They facilitated granular visibility/disaggregation (drill-down) for root cause analysis of OEE scores.

Examples of business questions included:

- How many days of planned downtime occurred this month in a particular plant?
- Which equipment is causing the most problems and why?
- Which areas of a production line are generating the most mechanical or electrical downtime events?
- Which are producing the longest periods of downtime?
- Which components of changeover downtime are contributing the most to overall changeover downtime for a particular plant?
- What is the average changeover time for a particular product and production line?
- Of all production lost to quality issues, what is the break down by finished waste, downgraded product and held product?
- What are the main reasons for product being held?
- How does the hourly instantaneous production rate compare to the budget production rate for a particular day?
- What were the last ten downtime events for a particular production line?
- Which are the top ten worst offending products in terms of downtime in a particular plant?
- Which are the worst areas of a particular production line in terms of downtime? Are they trending up or down on a monthly basis?

Solutions

Today McCain's OEE solution is linked to every production line in the world (all 55 production locations) and is a staple within their global innovations process for all supply chain initiatives.

A primary key to success was McCain's chosen methodology of developing business questions for defining their analytic requirements and supporting data elements. This exhaustive effort produced unparalleled analytic dimensions and data granularity for decision-support outputs (variations of OEE and downtime event visibility for SKU, production line, area, plant, region, and enterprise—by minute, hour, shift, day, week, month, quarter, and year—all displayed via grid/graph/time series).

In addition, McCain has augmented their solution with enhancements that include persistent ad hoc end-user reporting (supported by subscriptions and automatic generation/e-mail distribution) and notes (or unstructured data) that can be attached to transactional objects. The notes capability enables McCain to analyze downtime events that can be filtered to show specific equipment downtime cause and resolution (as reported by operators/mechanics).

Using a single global instance of the Teradata Data Warehouse and MicroStrategy's business intelligence application, McCain successfully developed and deployed a solution that robustly provides three levels of OEE (Performance, Scheduled, and Capacity), as well as four end-user Dashboards—Primary Loss (downtime), Plant OEE, Network OEE (global/regional heat-map), and Opportunities (Pareto/root cause analysis of OEE issues at a production line/SKU level).

McCain's Plant OEE Dashboards are refreshed every twenty minutes and visibly projected on the wall of every production facility worldwide.

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For example, you can display all downtime events on potato peeler areas from around the world (in 40 French fry Plants) and then filter these events to show only downtime associated with peeler asset exhaust valves.

"Such visibility and granularity has allowed us to achieve a whole new level of asset management through immediate global insight/analysis (regardless of language). Because the value of notes data has been realized by our end-users, the quality and accuracy of data inputs are continuously improving," said Rob Braddock, Director of Global Innovation Initiatives and Technical Services, McCain Foods.

Since their journey began in 2009, McCain has not only achieved industry best-in-class levels of OEE, they have already initiated the process of resetting run rate standards to reach even greater levels of operational performance. "The outputs from our Teradata/MicroStrategy OEE solution have not only generated unprecedented cost



savings, it also facilitates asset investment justifications for future growth,” said Braddock.

McCain views continuous improvement as a never-ending journey and has embarked on a project to enhance their OEE solution through telematics (equipment sensor/ PLC data capture), as well as business case-driven decision support (instantaneous monetary calculations of downtime improvement opportunities).

Expansion

The OEE Dashboards have been joined by others also using MicroStrategy on McCain's Teradata Integrated Data Warehouse. These include: Global Safety Reporting Dashboards; a number of Sales Dashboards; Marketing Dashboards (Banner Comparison, Promotional Effectiveness, Price Gap Comparison etc.). Other projects are in conception.

The ability to see a big picture, but also to drill down to a granular level when desired, allows McCain to provide the right information, at the right time, to the people that can best utilize it.

Partners

MicroStrategy is a global leader in Business Intelligence technology and provides integrated reporting, analysis, and monitoring software that enables companies to analyze the data stored across their enterprise to make better business decisions. MicroStrategy and Teradata have a long history of working together to optimize the performance and capabilities of their joint business intelligence solutions.

McCain OEE Summary



Figure 2. Performance: Global, Regional and Plant Process

As a member of the Teradata Partner Center of Excellence, MicroStrategy also operates a specialized laboratory within its Research and Development group to optimize the platform's performance on Teradata. The result of Teradata and MicroStrategy's integrated effort is higher performing, more scalable business intelligence solutions for existing and prospective joint customers.

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