GE Digital

Proficy Plant Applications

Global References & Case Studies

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Maximize overall equipment effectiveness (OEE), improve production scheduling, and ensure product quality by leveraging real-time production data.

Outcomes

Increase efficiency with customization

With a completely new UX, Proficy Plant Applications offers both operators and supervisors a personalized, modern user experience.
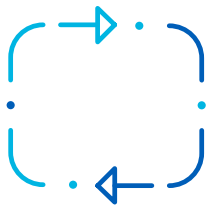
Reduce rework

With increased visibility into data and quality, you can reduce rework and the risk of errors, while staying current on recall information.

Increased product and process quality

Quality management ensures consistent quality in your products, providing real-time trends, statistics, and notifications to control quality levels while keeping up with the speed of your business.

Core Capabilities

Efficiency management

Track and monitor OEE and other critical key performance indicators (KPIs)—downtime, waste, and production counts, mean time between failure (MTBF), mean time to repair (MTTR), and more. Correlate events and reasons to production parameters to identify root causes. Utilize standard and ad-hoc reports for real-time decision-making.

Quality management

Quality Management helps your business objectives become manufacturing reality, with holistic performance management for compliance management issues. Ensure consistent quality in your products, with real-time trends, statistics, SPC, and notifications to control quality levels.

Production management and Tracking

Production management supports full traceability of individual products through every step of the manufacturing process, allowing for auditable genealogy and production reporting. Control product flow between equipment, create product genealogy reports and reduce excess inventory.

Batch analysis

Increase the overall quality and consistency of products and enable a better understanding and control of variation in both new and existing batching applications. Present a comprehensive picture of batch operations in the context of the overall manufacturing facility.

Compare your recent batches with your ideal golden batch. Batch Analysis works hand-in-hand with our Batch Execution module. The S-88-based model defined at the control level is automatically made available at the MES level.

Arla Foods improves quality
using data from golden batches

Collecting data efficiently and thereby creating documentation is an important competitive factor for companies today. Customers insist on receiving documentation to confirm that they are buying a quality product and they make great demands on their suppliers for traceability and optimized control over production.

The need for process control

Production at Arla Foods amba — Danmark Protein in Videbæk, Denmark has always been highly automated. With a large number of process lines and complex logistics, there was a great need for an efficient IT system to continually integrate process control, data collection, data registration and administrative systems. As the result of a thorough analysis, the choice fell to Proficy Plant Applcations from GE Digital and partner, Novotek.

Traceability very important

Arla Foods amba – Danmark Protein processes whey, a byproduct from making cheese at Danish and Swedish dairies. The whey is used to make protein and lactose powders, which are sold to the food industry and other divisions within Arla. The factory has a staff of 200 and produces around 42,000 tons of powder a year. *"Efficiency, quality and traceability are very important factors for us,"* says Arla Foods project leader René Nørgaard. *"The aim is to optimize the control of key parameters, the utilization of capacity and logistics within the factory at the same time as setting up an efficient system for collecting detailed data from every single batch we make."*

Less paperwork

"Data is more accessible and can quickly be used in various reports for documentation and optimization"

— René Nørgaard, Project leader, Arla Foods amba, Denmark

SUMMARY

COMPANY
Arla Foods amba, Denmark

SOLUTIONS
Production Management
   Efficiency
   Quality
   Traceability

PRODUCTS
   Proficy Plant Applications

BENEFITS
- Batch data collection time saving
- Product documentation
- Traceability
- Integrated process control
- Control of key parameters
- Better utilization of capacity and logistics

The introduction of Proficy MES not only has an effect at the process line level, it also has an administrative and organizational impact on the factory's management and the Group. It is too early to say if there have been any positive concrete effects on efficiency or quality following the implementation of the system but a time saving in data collection can already be seen. *"Paperwork in connection with the registration and interpretation of data took long time before we started using Proficy. One of the major advantages with Proficy is that it takes care of much of the paperwork and thus saves an enormous number of man-hours. At the same time data is more accessible and can quickly be used in various reports for documentation and optimization. We can put the resources freed in this way to much better use."*

Data from golden batches

"A specific aim with data collection is to define what we call golden batches, where production is optimal and the quality high. We want to use the parameters from specific successful batches to optimize the process lines so that we are able to improve quality in ensuing batches," says René Nørgaard.

"One of the reasons for choosing Proficy was that it is an open system that can be directly integrated with our other systems."

— René Nørgaard,
Project leader, Arla Foods amba, Denmark
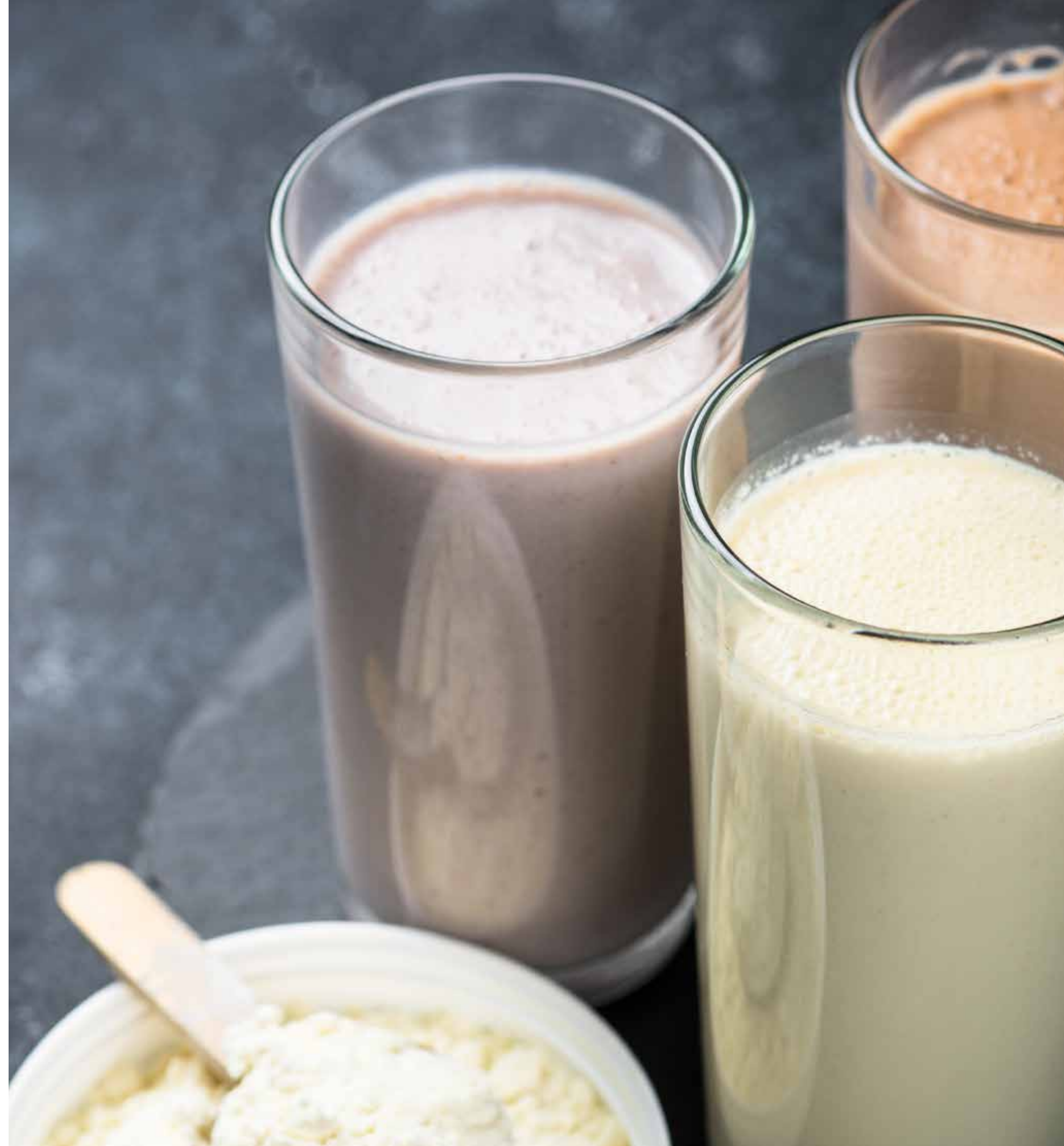
Browar Warka Increases Bottling Line Efficiency with GE Digital

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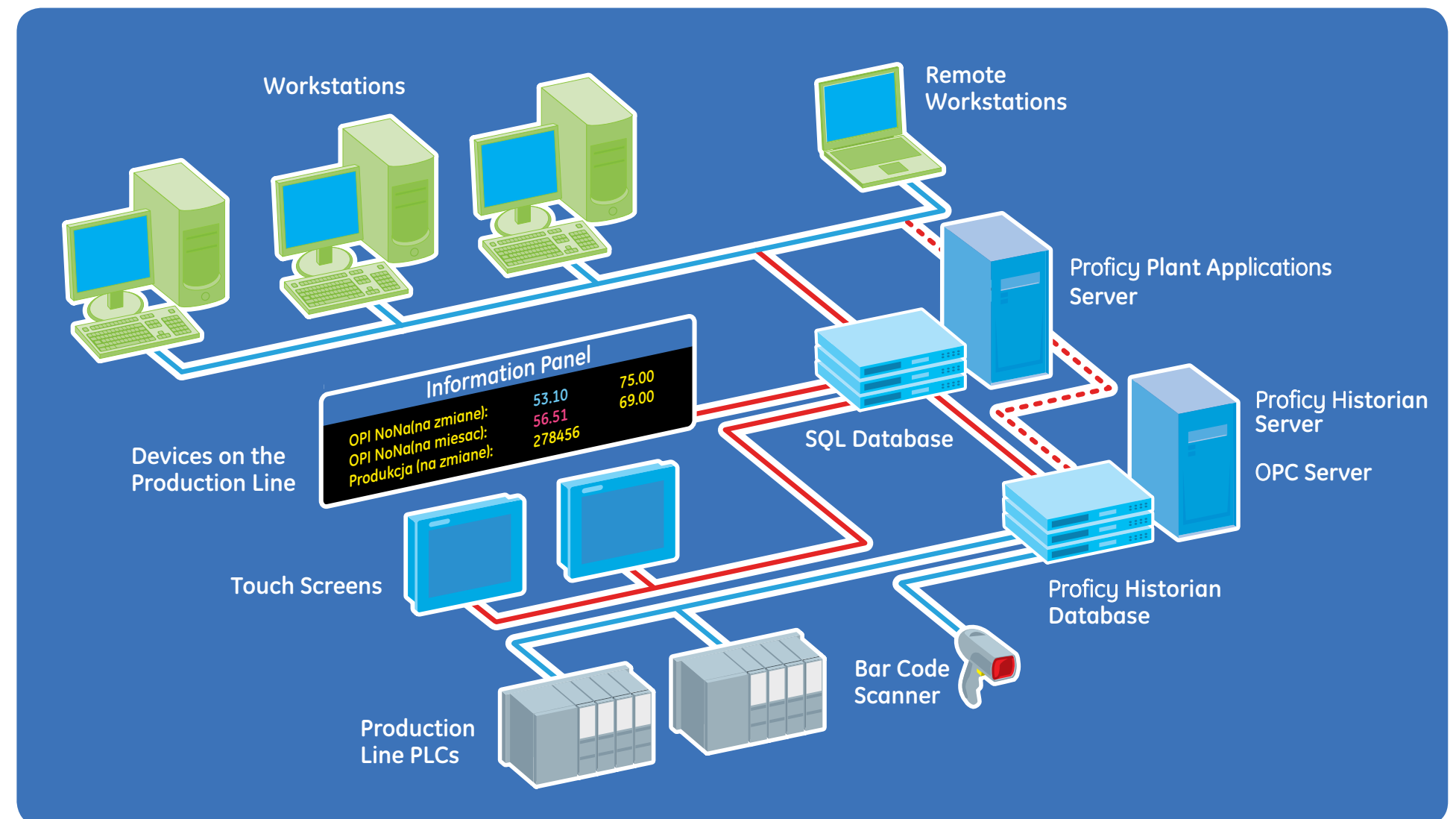
analyses, they are able to check each shift's productivity, pinpoint machines where stoppages occur, and verify the duration and causes of the stoppages. Production line employees also benefit from automatically generated reports.

"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.

Workstations

Remote Workstations

Proficy Plant Applications Server

Devices on the Production Line

Information Panel

	53.10	75.00
OPI NoNa(na zmiane):	56.51	69.00
OPI NoNa(na miesac):	278456
Produkcja (na zmiane):

SQL Database

Proficy Historian Server

OPC Server

Touch Screens

Proficy Historian Database

Bar Code Scanner

Production Line PLCs

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.
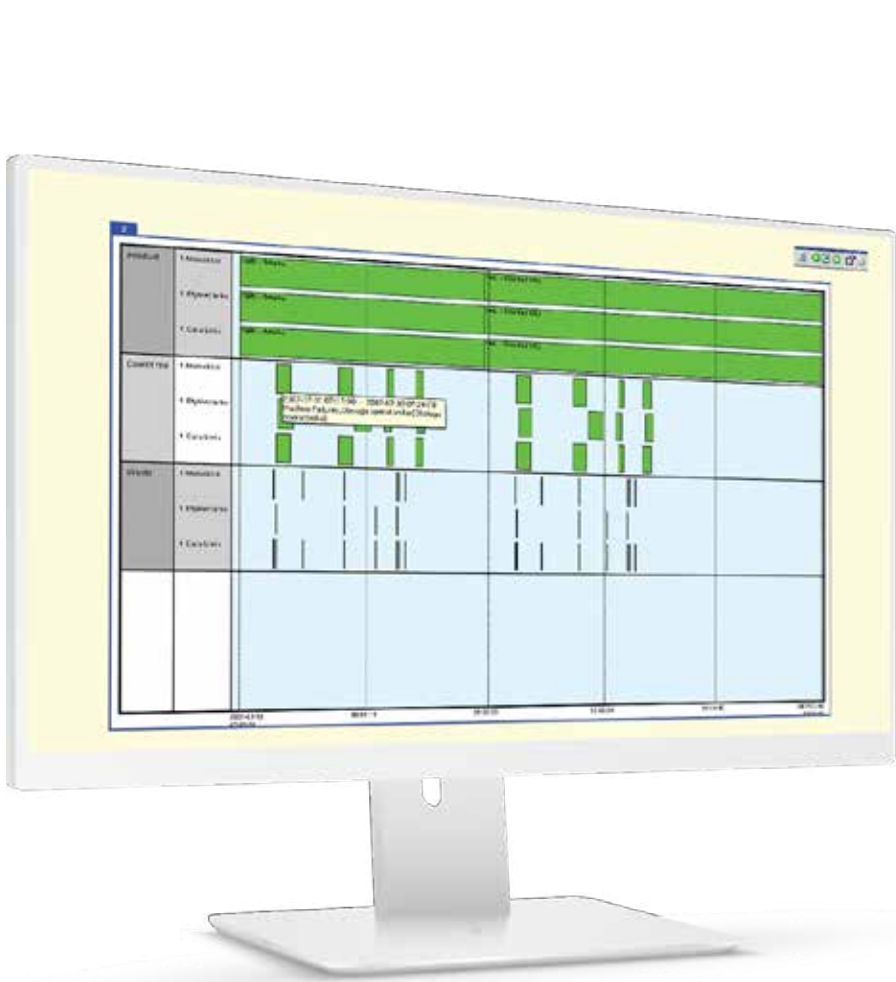
Production, downtime and waste events timelines provide flexibility through clickable events displaying more information.
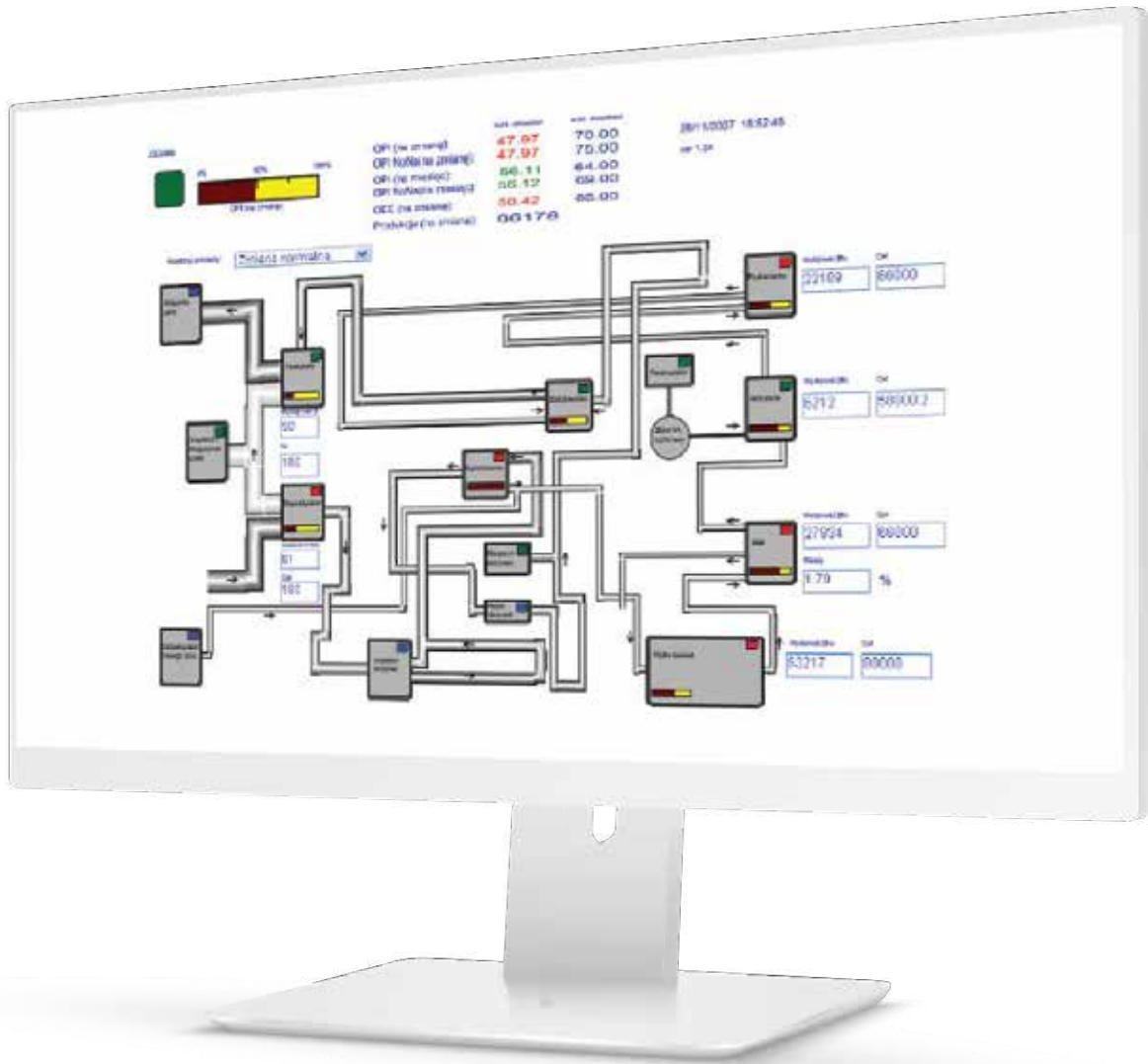
The software reports the actual state and efficiency parameters for every machine.

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 Brüggen 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.

Brüggen 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 Brüggen bases
its operations. Production is carried out solely to order.

In its detailed production planning, Brüggen 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, Brüggen 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, Brüggen 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.
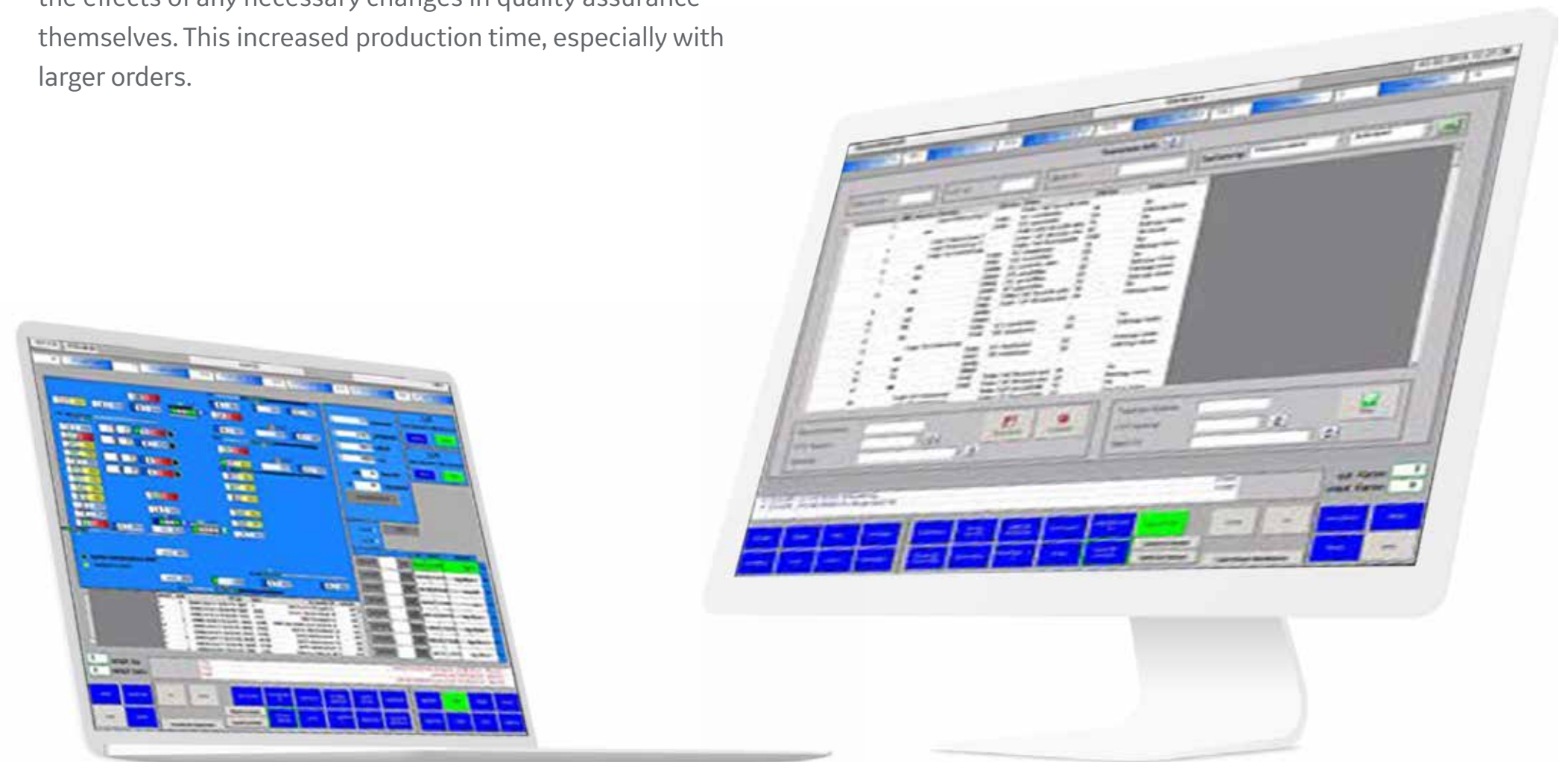
For quality and growth

Aligning Brüggen'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 Brüggen'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 Brüggen'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 Brüggen, 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

Brüggen 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.

"Our relationship with GE Digital and its service partner Dimensys was, and is, productive and trustworthy."

Dieter Burs, Head of Production Engineering, Brüggen GmbH

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."

"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

"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

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 sustainble 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 visibilty.

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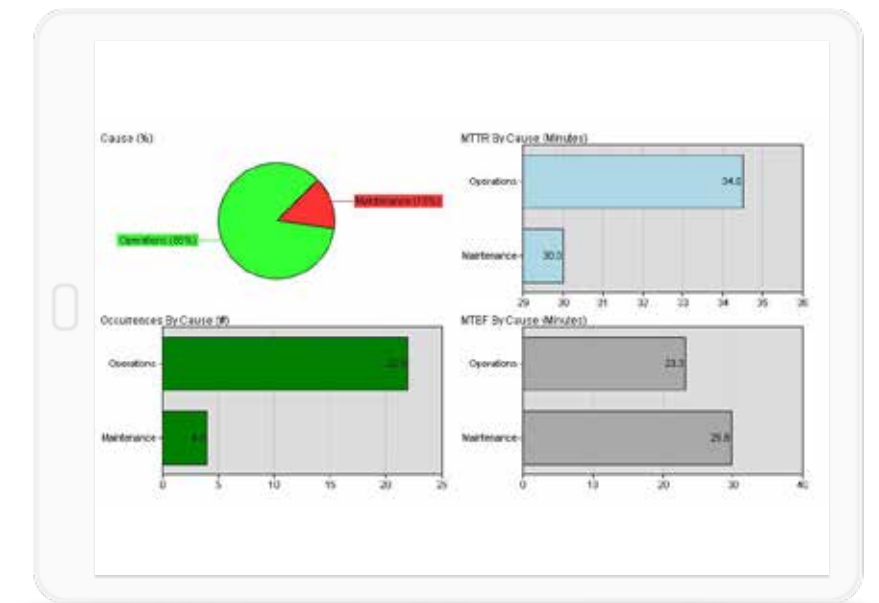
GE Digital's Proficy Plant Applications software helps track real-time production.

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 Cacades Tissue Group was to track production downtime. Using sensors and signals on the machines, it sought to understand where downtime was occuring 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 GE Digital's 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 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 qualty 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 MES 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 GE Digital's 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 occuring on the production floor. And this makes for rapid response times—driving faster problem solving and optimized performance.

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.

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.

"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

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.**

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 particularily 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.
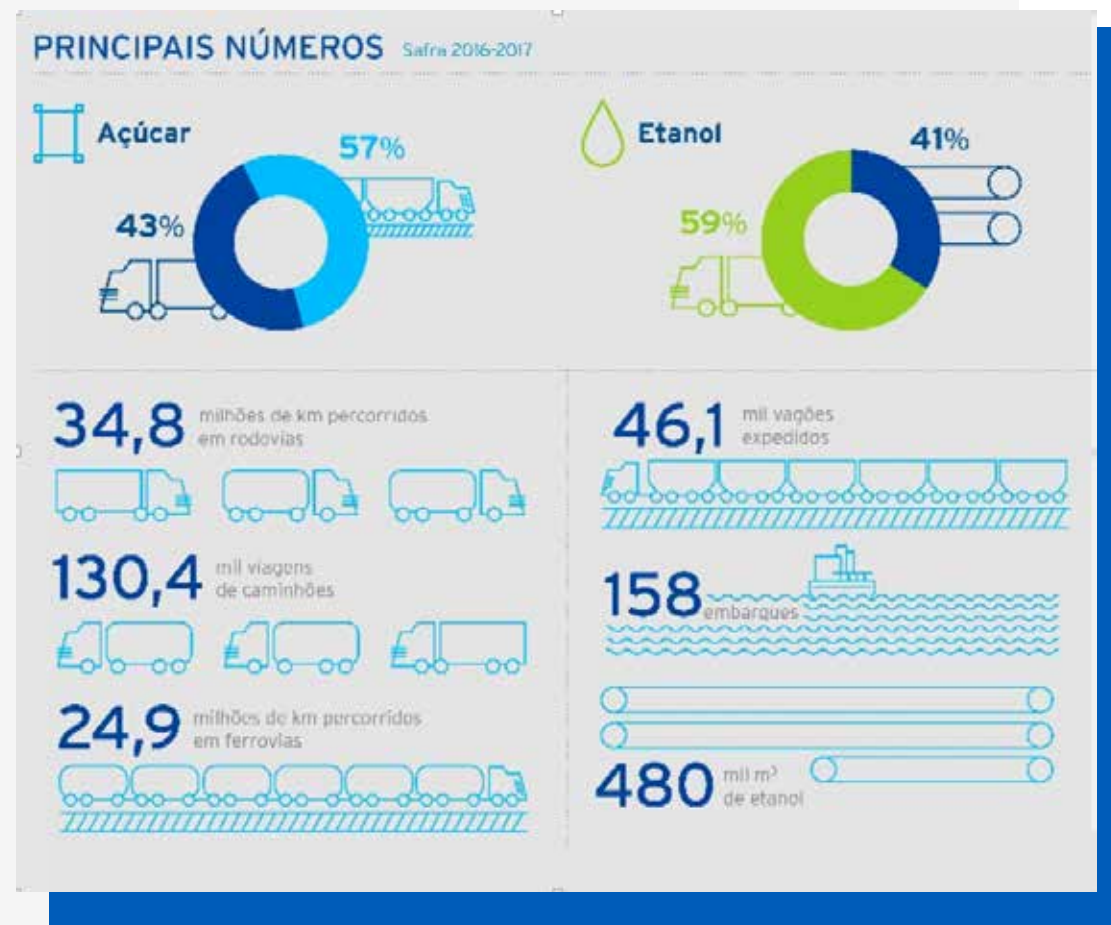
Digital Transformation at Copersucar

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.

PRINCIPAIS NÚMEROS Safra 2016-2017

Açúcar 57% 43%

Etanol 41% 59%

34,8 milhões de km percorridos em rodovias

130,4 mil viagens de caminhões

24,9 milhões de km percorridos em ferrovias

46,1 mil vagões expedidos

158 embarques

480 mil m³ de etanol

Source:

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.
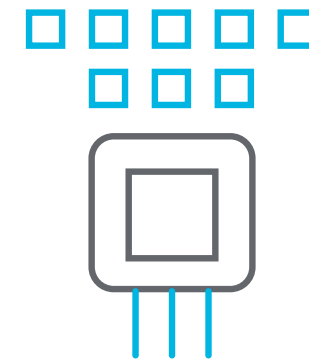
Solution

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.
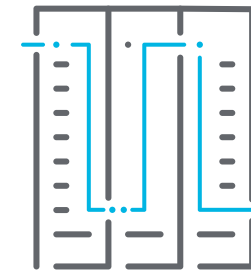
Finally, through the implementation of the PIMS and MES suite, also from GE Digital, it will be possible to have the entire shipment process digitized, through the ERP (SAP) connection to obtain the information on what is stored and what to ship in each ship, following the execution of the loading and 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)
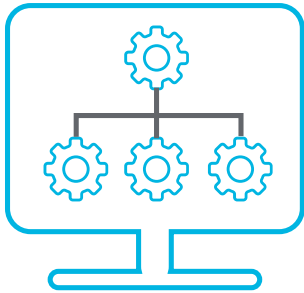
Technology employed	Main function
iFIX HMI/SCADA	**Supervision and Control (SCADA)**
Proficy Webspace	**Viewing iFIX through a Web browser, anywhere, any time**
Proficy Historian	**Process Historian (PIMS)**
Proficy Workflow	**System Integration (Including SAP), eSOP and process automation**
Proficy 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)**

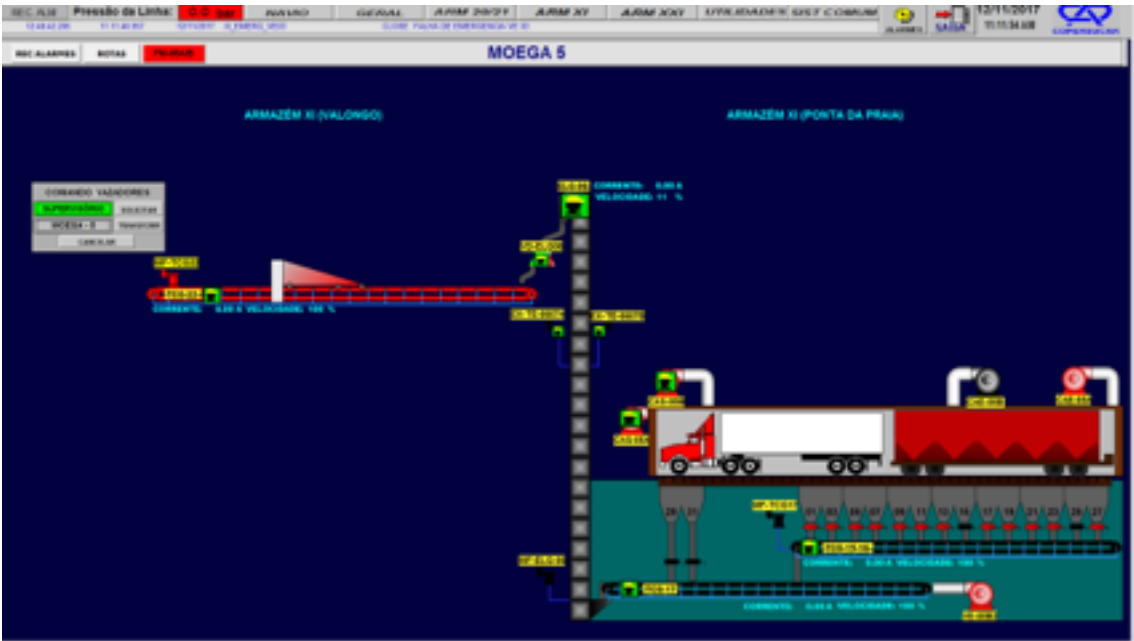# GE Digital iFIX Customized Screens

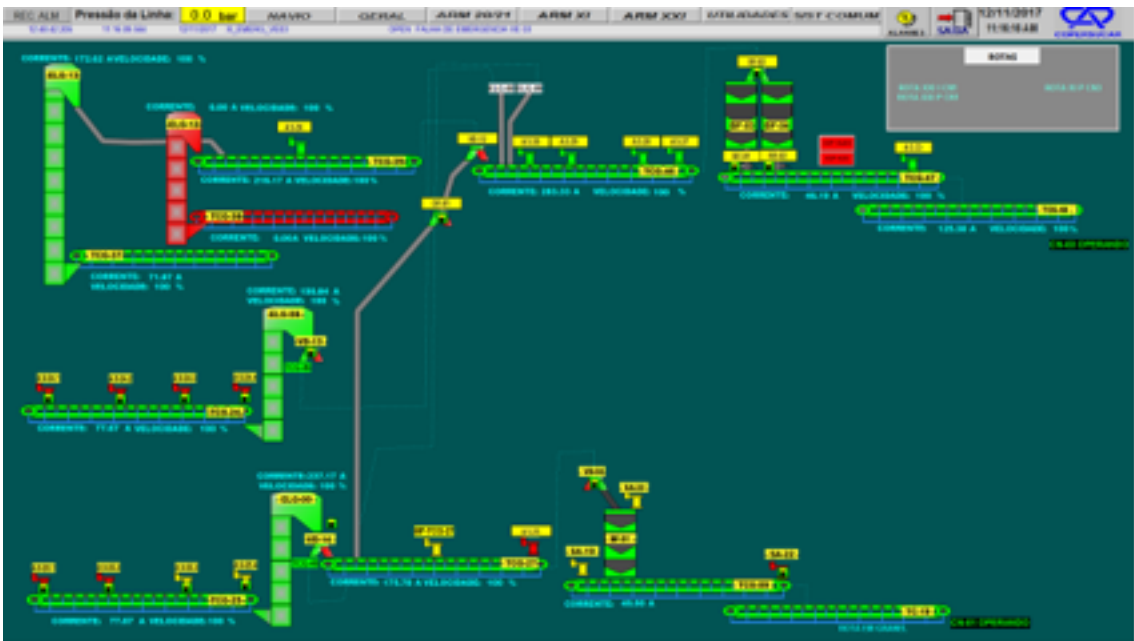Figure 2: Hopper 05 - Optimization of Routes

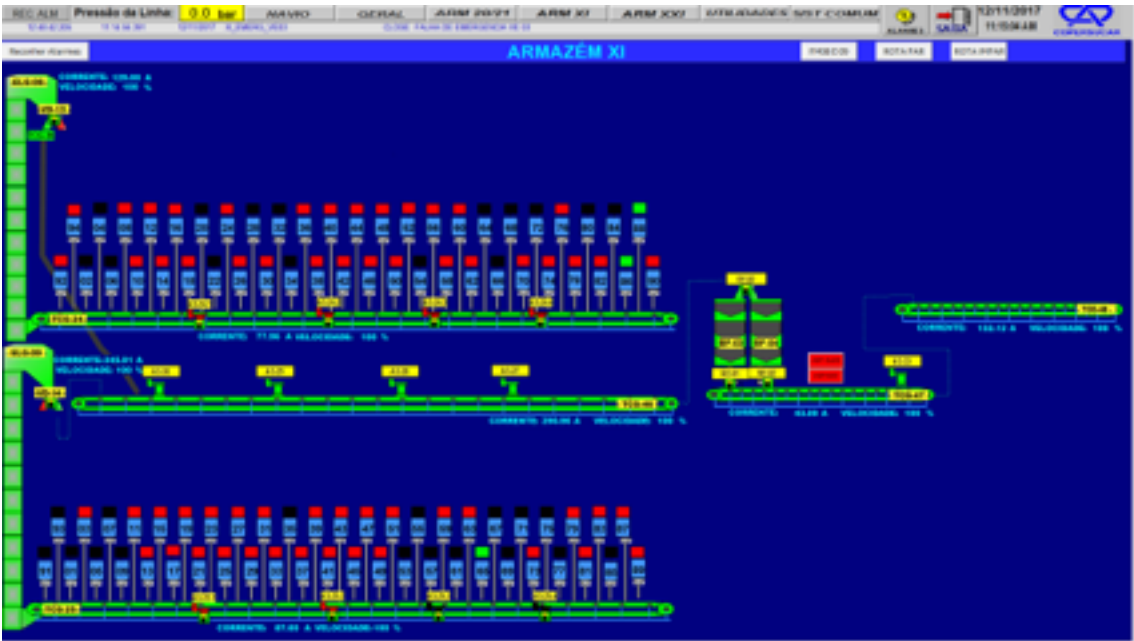Figure 4: General Shipping Screen - All Optimized Routes

Figure 3: Warehouse XI - Shipping Line - Optimization of Routes

Figure 5: Electrical Quantities - Optimized on a Single Screen

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.
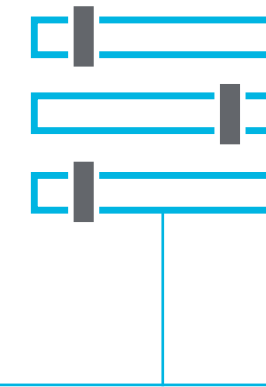
" *My practical view of Industry 4.0 is to reduce costs and search for operational efficiency through IIoT and the use of advanced technologies. I also see the autonomous systems, tracing routes and performing autocorrections."*

" *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

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.
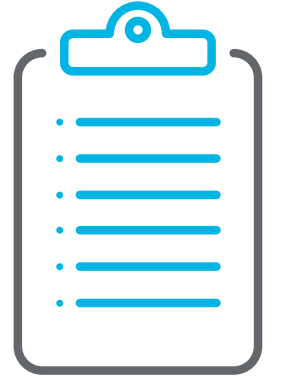
We began with a long list of requirements

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.
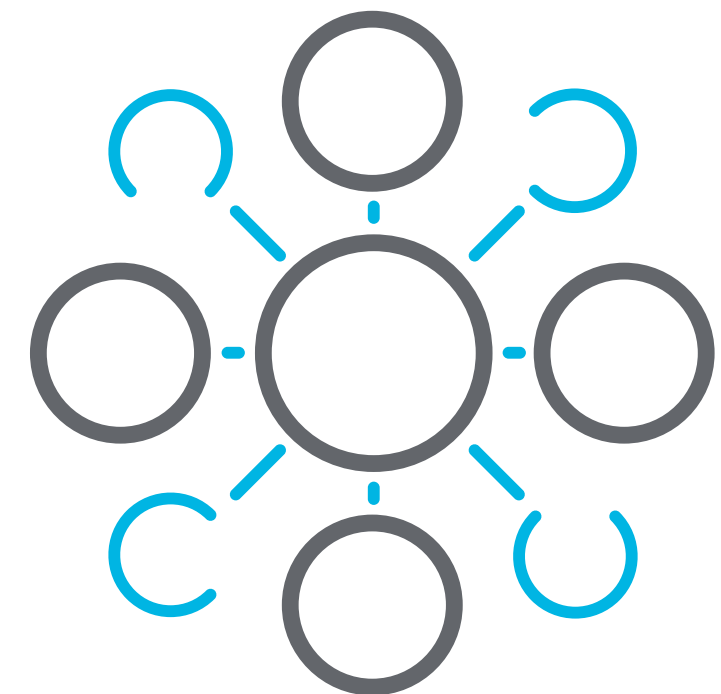
Facts

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

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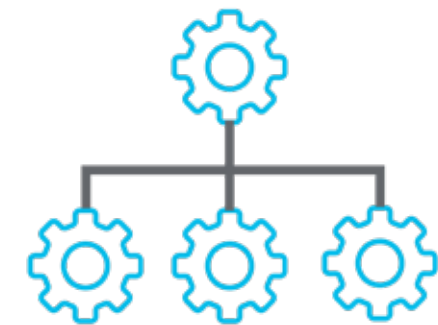
McNeil in Sweden chooses Proficy to increase OEE of its packaging lines

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."*
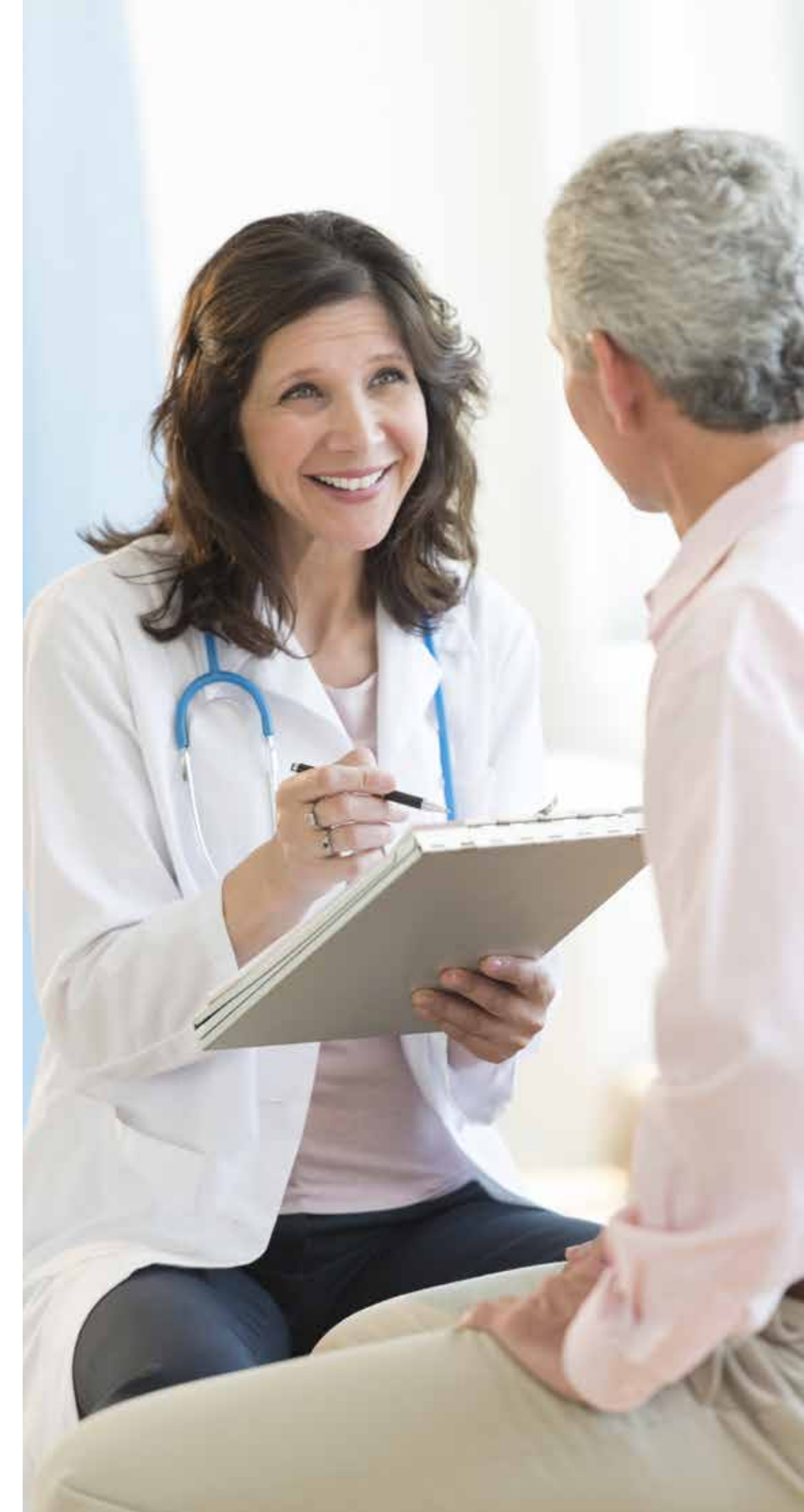
Real-time data on the intranet

"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.
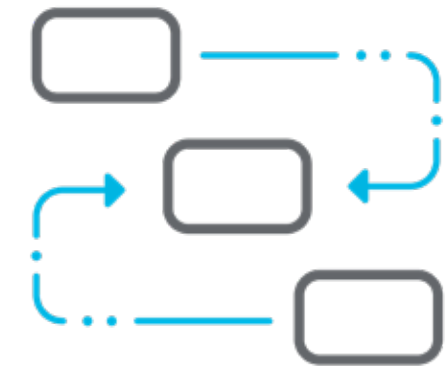
"By choosing GE's software we have the reassurance of long term product support. We have been able to develop a customised solution, paying only for the elements we need. But it offers much more. Looking to the longer term, the package we are using is just one element in the complete Proficy intelligent 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

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 conveyer 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

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"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.

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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%."*

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**
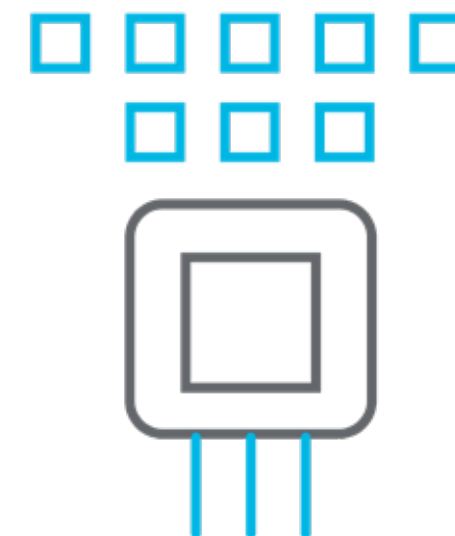
Learning

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

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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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.
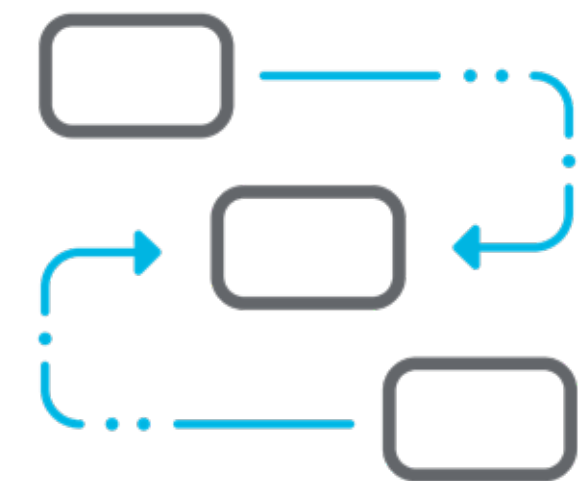
Procter & Gamble

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
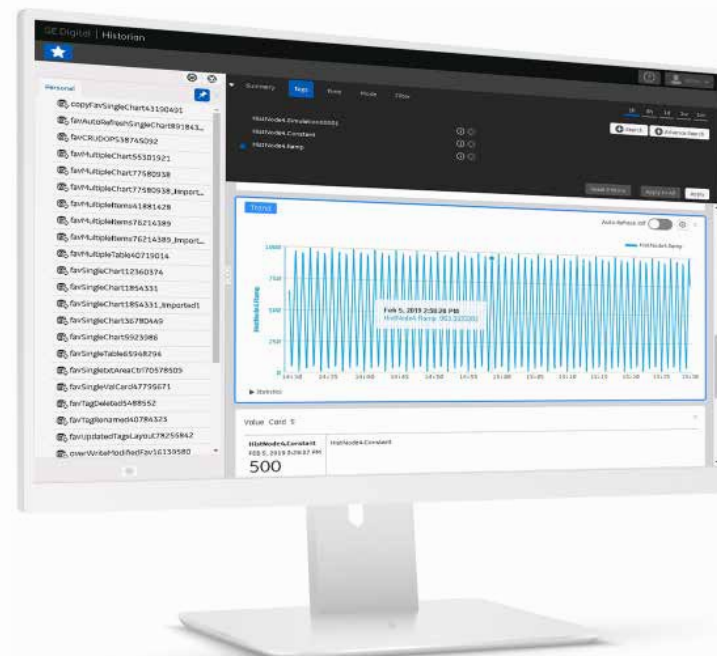- Improved operational safety

Watch Video

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

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

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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.

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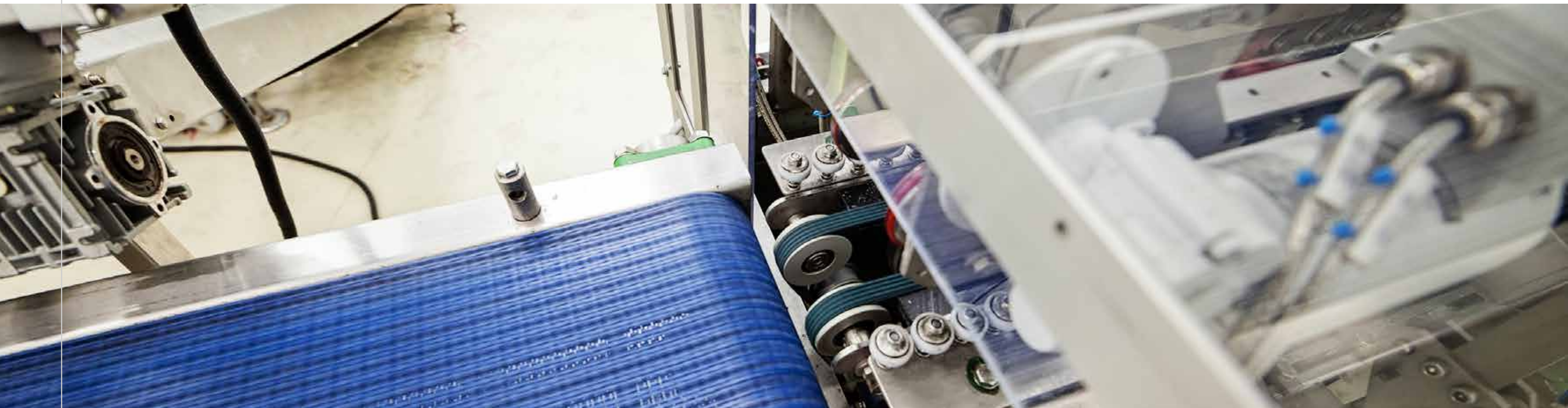
Background

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.

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.

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

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 MES suite. As an on-premises solution, Plan 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**

Results:

- Reduced lead time for product traceability
- Savings in film recovery
- Increased film productivity
- Improved line efficiency
- Increased uptime
- Decreased film defective rate

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's Predix, 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 MES 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

About GE

GE (NYSE: GE) is the world's Digital Industrial Company, transforming industry with software-defined machines and solutions that are connected, responsive and predictive. GE is organized around a global exchange of knowledge, the "GE Store," through which each business shares and accesses the same technology, markets, structure and intellect. Each invention further fuels innovation and application across our industrial sectors. With people, services, technology and scale, GE delivers better outcomes for customers by speaking the language of industry.

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