



Gallo Glass Company Improves Quality, Safety, and Efficiency with iFIX from GE Digital

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John Gallo, Vice President, Gallo Glass Company

Benefits

- Saved \$5 million annually through improved quality
- Increased production by 5%
- Reduced defects by 25%
- Reduced plant downtime by 25%
- Protected the environment by significantly lowering energy needs and reducing furnace emissions by 80%
- Decreased training time and helped to facilitate job changes and job sharing

A glass act

When it comes to making all of the bottles for one of the largest winemaking operations in the world, production processes need to be as clear as the glass itself. At Gallo Glass Company in Modesto, California, just-in-time delivery means the bottles are available when needed to help keep the wine flowing through the bottling and labeling operations, out to distribution, and into millions of homes each year.

Additionally, the glass plant has to contribute more than fast, reliable bottle production—the team at the plant also needs to support E. & J. Gallo Winery parent company's deep commitments to quality, consumer safety, and environmental protection. With one billion bottles being produced annually, a state-of-the-art production system, including monitoring and control software from GE Digital, helps Gallo Glass shine. And shining is exactly what Gallo is doing—after being named #1 in the prestigious InformationWeek Top 500.



A toast to high technology

The Gallo Glass plant manufactures to more than 100 different combinations of bottle shapes, sizes, and colors. As one of the world's largest glass container manufacturing sites, the plant provides bottles for:

- E. & J. Gallo Winery wines, including those that are Gallo branded as well as Turning Leaf, Ecco Domani, Carlo Rossi, and Frei Brothers Reserve
- Sparkling wines such Tott's, Indigo Hills, André, and Ballatore Spumante
- The winery's Bartles & Jaymes coolers
- Distilled spirits, including America's bestselling brandy—E. & J. VS Brandy, Cognac, and the E&J Cask & Cream liqueurs
- External customers, including other wineries, apple juice companies, and makers of specialty beverages, such as espresso syrups

In addition to being unique for its size—E. & J. Gallo Winery is one of the largest wineries in California—it is also unique for having its own glass plant. Ernest and Julio Gallo built the plant in 1958 on the company's main campus in Modesto. By owning a glass plant, the company reduces freight costs for heavy glass but, most importantly, eliminates the possibility of production delays caused by outside bottle suppliers. And, that means a commitment to reliable production that Gallo Glass upholds every day.

"The primary goal of the glass plant is to maintain a steady,

reliable, and high quality supply of bottles for the E. & J. Gallo Winery," explains George White, Information Systems Manager at Gallo Glass Company. "What we make at the glass plant today gets used tomorrow in bottling and labeling."

Automation plays a key role at the plant and blends together the art of glassmaking with the high technology needed to meet production, quality, consumer safety, and environmental protection goals. At the heart of the plant's automated Shop Floor Information System (SFIS) is iFIX from GE Digital. This integrated information system collects and presents data from all steps in bottle making—batch, furnace, forehearth, mold shop, forming, Lehr, inspection, and packing. The system serves multiple users at Gallo Glass—from operators on the lines to maintenance managers to senior managers who need quick, graphical reports via the web. With the SFIS in place, the Gallo Glass plant has:

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With these kinds of results, John Gallo, Vice President of the

glass plant, has built upon his grandfather and great uncle's idea for a smoother supply chain. "The vision is one of an information-centric management culture," Gallo explains. "Where every employee can combine trade craft and science in every bottle we make. Our process is complex with many interacting variables. This new technology has simplified the learning curve for new employees, making them more effective and proactive in their jobs. Ultimately we foresee use of the new technology fundamental in our journey toward Lean Six Sigma manufacturing."



Eliminating production bottlenecks

The glass plant operates 24/7, utilizing 14 production lines. Each line starts with hot molten glass and ends with inspection, followed by packing. iFIX presents data collected from all devices on the lines, and the beginning and end of each line has an iFIX node. With an open architecture, the software connects to the plant's installed base of equipment, such as sensing and inspection devices, programmable logic controllers (PLCs), scales and timing systems, communicating over Ethernet TCP/IP. The plant uses a client-server database architecture for fast communication and lower costs, and operates on a server-based computing model, the iClientTS terminal server version of iFIX running on a CITRIX server farm, and dedicated Windows terminal devices as clients.

“Our automation started with sensing and inspection devices, and from there, we needed to have a way to collect production data to allow us to make more informed decisions,” White says. “We reviewed many software packages before selecting iFIX as the single HMI/SCADA system for the whole plant. It was critical to implement one interface package and have everyone in the plant operating from the same page and sharing information.”

Bruce Williams, Senior Production Manager at Gallo Glass, says, “SFIS has brought all of my production managers together onto the playing field.”

Troy Wells, Director of Maintenance and Engineering at Gallo Glass, notes, “The Gallo SFIS system has transformed us from a make and inspect mentality to a make, measure, and improve mentality. This change continually drives us back to the manufacturing process for root cause analysis and correction. SFIS drives us to make it right the first time, and this system never ceases to amaze me with its ability to constantly receive and update information that is vital to the production process.”

Wells continues, “Bottom line is that—what gets measured and improved. Gallo SFIS is the catalyst to make this happen. From a maintenance and engineering perspective, SFIS is the first thing I look at each morning; I monitor it throughout the day, and it is the last thing I check at day's end.”

Conceptualized by Gallo, designed and implemented by integrator Saber Engineering with a team that included Brian Thomas, Dennis Hopkins, and Bob Sullivan, the iFIX system includes over 20 Human Machine Interface (HMI) screens and generates 30 reports for the glass plant production team. This easy-to-use web-based monitoring and control software works in conjunction with an Oracle database to consolidate the data from the plant's devices, then transform that real-time data into dynamic text, alarm, and graphic displays. Information is presented on the terminals located on the lines for a quick, easy-to-view snapshot of production. Operators and managers can view key performance indicators (KPIs) such as percent pack, which displays the number of bottles successfully produced for every 100 attempts, defects, losses, production quantities, and more. Essential to success, the system provides timely notification of defects so that operators can correct production and boost quality.

“The SFIS not only monitors and controls production, but also acts as a real-time factory floor dashboard,” White says. “We are collecting so much data now that it would be impossible to manually analyze it. But, using the latest technology, we can manipulate the data and look at it from a bigger picture to make a real difference in our processes.”



As an example, by analyzing the data from the plant floor processes, the team was able to redesign the glass molds to engineer out defects and decrease cracking. This change has reduced scrap and improved yield. Additionally, the team has perfected wall thickness and distribution—a long-term improvement that affects the amount of liquid that goes into the bottles—using wall thickness run charts.

“Using the system as an engineering and planning tool, we have been able to make major improvements that have saved the company money and helped increase the quality of our product to consumers,” White notes.

Additionally, the team has made adjustments in batching and furnace operations through root cause analysis. A more efficient furnace design has helped the plant use less energy—decreasing costs and improving environmental friendliness. At the furnace level, Gallo Glass uses a special GAS-OXY firing process to burn pure oxygen and significantly reduce nitrous oxide output. The company is the first major user of the process and makes its own oxygen within its on-site cryogenic oxygen plant. At the electrostatic precipitator or scrubber level, iFIX runs on a desktop computer for further operational analysis. This Gallo commitment to the environment has helped the glass plant improve air quality and reduce emissions by 80%.

After the bottles are formed, automated bottle inspection has helped the plant become more agile if there is an error on a line. White estimates a 25% decrease in defects through timely net inspection. On the lines, video cameras take pictures of the moving bottles, and the system analyzes for variances in shape or pattern, and light and dark spots. A defect could be a piece of unmelted sand, or could take the form of a bubble or blister, seen as a dark spot.

Another machine inserts a plastic dowel into each bottle to check for free, open, and unobstructed bottle necks—known as choked necks. Inspection also includes checks for cracks or chips at the top of threaded bottles, known as checks. Another inspection is to ensure a clean sealing surface, which can result in leakage in the case of filled product.

Defects can make a bottle weak, which can lead to breaks, chips, or cracks. Gallo Glass follows the automated inspection of 100% of the bottles with automated random sampling inspection methods as well as manual inspection to achieve the highest quality—which ensures the safest possible bottles for consumers. When defects are found, the operator can use the system to adjust machines properly, check calibrations, or perform additional tests.

Between the production and inspection, Gallo Glass collects more than 2.5 million packets of data per day in the glass plant. The system provides an Internet portal dashboard with global visibility into the information. The Thin Client system works on dial up for remote connections, and users can also access via Virtual Private Network (VPN) and the Internet.

In addition to production improvements, the data helps the plant maintain its ISO certification and archive information as part of a HACCP plan under the FDA’s Good Manufacturing Practices. Operators can document any issues by simply filling out an iFIX screen for a Hazard Analysis and Critical Control Point (HACCP). Susan Anders, Quality Manager in charge of HACCP, says, “We have automated the entire HACCP documentation process and can analyze cumulative trends and compliance easily and quickly.”



Head of the glass

Recently, White presented the details of the system to the Independent Glass Producers Research Association and hopes that the company's commitment to innovation will help other manufacturers, customers, and communities.

"Gallo has helped set the standard for efficient, environmentally friendly glass production, and we are sharing this technology and knowledge," White explains. "This system is not just software—it is a powerful toolset closely coupled with a successful management methodology. The combination has helped us achieve major results and is attracting industry attention." GE Digital is interested in working with Gallo Glass to distribute this system to other manufacturers.

And, while the industry looks into Gallo Glass, the team at the glass plant continues to serve up the benefits using the Shop Floor Information System and iFIX software.

Integrated information system

Real-time components

- Forming operations—equipment management and downtime
- Automated inspection—rejects
- Automated sampling—measurement and trends
- Manual observations—defects
- Hot end-cold end communication

Historical archive components

- Forming operations—defects by sect or position
- Automated inspection
- Automated sampling
- Manual observation

Decision support system

- Team leader supervision tool
- Production meeting reports
- Quality management reports/ISO: 9000/specifications
- Plant communication system
- Upper management reports and performance metrics
- Problem solving, root cause analysis tool
- Job on and job off metrics
- Planning tool





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