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Case Study: Batch Process Control Solution Increases Productivity and Manufacturing Flexibility



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Batch Process Control Solution Increases Productivity and Manufacturing Flexibility

Case Study for Ventura Foods

Executive summary

Consider for a moment what it takes to produce a product in a traditional manufacturing facility that has multiple lines producing different products at various times. First, there are the logistics of scheduling and raw material handling. Then, add the human labor factor affecting both quality and efficiency. Meanwhile consider the continuous labor of cleaning and prepping for the next cycle to begin. Now imagine this reoccurring multiple times every day at 12 plants across the country. For ESE customer Ventura Foods of California, one of the largest foodservice producers in the country, this was the reality they faced before implementing a batch process control system.

Ventura Foods is known for its commitment to their customers - and their customers' growth and profit goals. In foodservice, the profitability of any company depends on efficient operations and marketing, especially considering oil, one of the chief ingredients in their products, is a commodity product. Because of this, Ventura sought additional ways to add value to their products and services while increasing profitability. Two successful answers were found – consolidation of three plants into one and implementation of a batch process control automaton solution from ESE, Inc. Today, production variances are kept to a minimum, inventories are under control, and profitability is on the rise.

Company profile

You may not recognize the name Ventura Foods, but you likely know the California-based company's brands –Chef's Pride, Classic Gourmet, Dress-All, Gold-n-Sweet, Sunburst, SunGlow, Marie's Dressings, and Hidden Valley, to name a few. It also carries the trans-fat-free margarine brand Smart Balance®. Formed in 1995, and built on a tradition of hard work, quality products and listening to their customers, Ventura Foods specializes in a select group of related products including edible oils, shortenings, dressings, margarine, sauces, and more. The company also makes soup and flavor bases and concession items such as popcorn and popping oil under the

LouAna® brand name. With production facilities strategically located throughout the United States, Ventura Foods processes a broad range of branded and private label foodservice products.



Business situation

For Ventura Foods, the process of producing their well known brands is quite complex - considering what it takes to produce a product in a traditional manufacturing facility that has multiple lines producing different products at various times, not to mention across nearly a dozen strategic plant locations. First, scheduling needs to be manually configured to most efficiently produce product, eliminating as much down time for the lines as possible. Next, raw materials need to be brought to the lines in a precise and timely manner – this can be the most inefficient step in the process as multiple lines often share the same raw materials. Not only are the logistics important in this step but also the amount and configuration, both of which help ensure product consistency and eliminate variability and waste. And, when raw material inventories are low, production can come to a screeching halt. Then, human labor constantly monitors the systems throughout the production cycle. Whether continuous runs or batches, the human component is the most critical and can have the greatest impact on the final product produced. Finally, cleaning the production lines and prepping for the next product to be produced ends the cycle as the next begins.

Controlling production lines in a manufacturing plant historically has meant complex processes involving regulating, by hand, which lines received raw materials at any given time and how much

material was used by each line, and down time waiting for lines to receive materials, be cleaned; or worse – the production team needing to reconfirm what that specific line was supposed to be doing next. Plus, batching, if it was done at all, was often inefficient and inconsistent, resulting in unreliable end products.

With a mission to add enhanced food values to customers, Ventura Foods identified improvements in process control and plant consolidation as ways to further improve efficiencies and add value to their customers. Ventura realized that the potential to consolidate three operations into one would create opportunities to reduce costs and accelerate growth. According to Ralph Freda, regional engineering manager with Ventura, “Our three facilities lacked the capacity to handle our projected business growth. We recognized the inefficiencies that were going to be realized if we tried to grow in these three constrained plants.”

By consolidating facilities and at the same time introducing process control automation, Ventura could prioritize and minimize conflict in inventories and in the flow of raw materials, produce products in controlled batches, increase consistency of the end product, and better manage Ventura recipes and formulas among all products. In addition, Ventura’s utility usage, labor, and raw materials shipping costs could also be reduced and operational management would be simplified by a consolidation.

With those challenges in mind, ESE business development manager Tony Suda teamed with ESE application engineer Kevin Nowack to define the strategies that would make the Ventura project a success. According to Hue Than, vice president of engineering for Ventura Foods, his early concerns about how well engineering would understand his needs were put to rest after working with the team of Suda and Nowack. “They did a great job of helping to convey my very specific wants and needs to their engineering team and they delivered on every demand,” cited Than.

Solution details

Ventura Foods had a less than pleasant experience working with another automation vendor on a past project; this caused them to take even greater care in choosing a vendor for their next project. After a review of several process control system integrators, Ventura Foods offered ESE the opportunity to convince them that the reputation they had heard of for being professional, reliable and innovative integrator was true. ESE successfully implemented a small batching solution at Ventura’s margarine plant in Albert Lee, Minnesota, giving them the confidence to move forward with a larger and far more complex project. Thus, Ventura sought ESE’s expertise in exploring options when looking to consolidate their California operations. Ventura needed a

partner that could handle technology well beyond out-of-the-box basics because of the complexity involved in consolidating existing lines, adding new lines, and implementing process control automation across the entire system.

Ventura gave ESE the goal of providing a batching control system that would maximize equipment availability, maximize efficiency, maximize quality (and repeatability), minimize operator error (since batches are “scripted” according to their preconfigured recipes), and incorporate an intuitive user interface for operators and production management to minimize the learning curve associated with operating a completely new system.

ESE engineers worked with Ventura’s engineering group to determine which elements and features from the existing system needed to be incorporated into the new system, and which items needed to be completely revamped or eliminated. The groups worked closely throughout the entire scope and design phase; ongoing communication during this phase would be critical to the project outcome. It was in the design phase that it became clear that multiple users would need to be able to use the configuration system concurrently without impacting the integrity of the data. Ingredient availability variances among the systems were also uncovered – these two items drove selection of the configuration system choices and the hardware available for use.

Recipe creation was another area of discussion the two teams worked out early in the project. Originally, Ventura was not comfortable with the idea of recipe creation; ESE knew that recipe creation, one of its showcase capabilities, helps customers minimize inconsistencies among product production. Through careful evaluation and discussion, Ventura and ESE were able to design a system that would apply the very latest technologies and develop the most relevant solution across the board. The new system became a hybrid in that it allows an operator to choose the product he or she is going to make while allowing the operator to make and automatically control the addition of materials to ensure consistency with the product formula.

Technical details

Ventura Foods chose to implant the Batch Optimizer® from ESE. ESE offers its recipe-based batch process engineering system with storage capability at the processor, HMI terminal or SQL database. Batch system configurations may vary from a fixed sequencer-based solution to a user configurable system. In this case, Ventura chose storage directly at the PC and a user configurable system. This offered Ventura full flexibility based on equipment profiles so program modifications are not required to facilitate a parameter change. If desired, profiles can also be changed for phases, heating, cooling, agitation, ingredient additions, etc., based on the mechanical installation. ESE is also able to create unique batch reporting to document the recipe

batch parameters in conjunction with the actual batch parameters. This feature can be built upon to meet the FDA's 21 CFR Part 11 requirements relating to the safety and traceability of electronic data.

The Batch Optimizer approach is based on a Microsoft Access interface in conjunction with a Microsoft SQL Server database providing recipe control for an Allen-Bradley ControlLogix-based control system. By splitting the recipe configuration and controls portions of the system, recipes were allowed to be created and updated using a Windows (MS Access) application while system response and control is performed by a PLC (processor) in the production area. This allows for the configuration of recipes and reports from a very user-intuitive, Windows-based interface from a remote location. Recipe management does not need to be performed on the operator terminal as was the case with the previous Albert Lee, MN project. Multiple Batch Optimizer instances may also be in use concurrently from multiple locations. For example, the production office can be creating or editing a recipe while the operations manager is reviewing trending or batch information from another terminal without affecting production.

To further support their initiatives, ESE encouraged Ventura Foods to use two major processors to control each area of the facility and provide a hot back-up so they'd never lose production time. If a processor was to go down and they didn't have the hot back-up, Ventura could conceivably lose 50% of their production capacity.

Additional services

Project management was key to a successful implementation for Ventura Foods. Flexibility was a major component of the development of the new facility at both the construction and process control phases. Ventura planned to bring their existing 33 lines under one roof as well as to allow for expansion to 45 lines at full capacity. Since the remaining 12 lines would be future expansion lines, ESE needed to plan and develop the entire system framework around projected specifications of future equipment and logistics. The challenge was to integrate existing, new, ESE and non-ESE lines all within the same process control system and keep them operating at expected levels. This was accomplished with the ESE and Ventura teams working together at implementation. Ventura's internal organization and appointment of engineering personnel specialized to the respective production areas greatly assisted in system design and commissioning.

Perhaps the greatest challenge throughout the entire process was coordinating the movement of existing production lines to minimize downtime. Timing of and logistics of moving the lines were two critical issues analyzed well before the implementation process began so that service levels

to Ventura's customers would be unaffected. Throughout the process, ESE's project manager worked closely with Ventura Foods personnel to ensure a successful implementation.

Operation benefits

ESE configured batching controls to help Ventura Foods minimize production variances, all customized with Ventura's specific needs in mind. With responsibility for more than a dozen brands, minimizing variances is a key to Ventura's product quality and profitability. ESE's process control solution helped make variances and inconsistencies a thing of the past.

- Flexible Recipe/formula creation – with the use of Operational Codes/Phases, programming and editing of recipe modifications is flexible and easy
- Product consistency / control – recipe steps are followed in the proper batch order with the use of Op Codes ensuring consistency with each step
- Recipe organization & storage – simple, secure and confidential archiving of an infinite combination of recipes
- Centralized access - recipe versions can be controlled, monitored, and shared at appropriate levels
- Raw Material Inventory and Flow – effective product metering in bulk tanks assures inventories do not run low mitigating down time

Financial benefits

For Ventura, consolidating three plants into one and at the same time implementing a process control system were so tightly integrated that it is difficult for anyone, even controller Jack Rose, to separate the two. Yet, Rose is quick to confirm that Ventura is enjoying a return on investment and pleased with the results of the project to date. In addition to product quality improvements, and enhanced customer satisfaction, he identifies the greatest financial benefit of this project as gaining a more predictable inventory control system. With process control technology, inventory in Ventura's bulk tanks are constantly metered and accurately measured, meaning there is no down time due to inventory shortages. 70% of Ventura's inventory is vegetable oil – a staple ingredient in the production of all products from dressings to spreads. Running low or out of this key ingredient caused Ventura problems in the past – down time, additional labor, product quality, and yield losses. "We are experiencing positive results on inventory tracking – attributable to the accuracy of the metering our process control solution allows us." comments Rose. Ventura has not experienced an inventory-related production delay since implementing ESE's batch processing solution.

Results

Ventura has seen the control systems allow for cross training of operators 'on the fly' to keep the multi-shift operation up and running during the transition as operators have a better means to measure and control the production parameters even when operators are changed due to sickness, vacation and turnover. The best view of success to-date is shared by Donny Hughes, regional engineering manager of Ventura, "Ventura Foods is more strongly positioned to service its customer base on the west coast and throughout the country as a result of this new facility and the advanced technology used by ESE."

The end result of the project was a completely integrated facility featuring:

- 33 production lines with room for expansion up to 45 lines
- Recipes for all 14 systems controlled from a central PC-based Batch Optimizer® system which provides a recipe on-demand with batch start
- Supervisory Control And Data Acquisition (SCADA) trending and reporting functionality
- Complete process control
- User-friendly, intuitive interface allowing multiple user access at one time
- Complete flexibility
- Raw material planning, sharing and overall increased efficiency

Throughout the design, construction and implementation of the entire project, the scope of the Ontario, California, facility changed to meet changing business needs. However, as the project changed, additional automation was built into the facility from that originally planned and opportunities were revealed that had not been considered in the original design. Ventura's advice is to stay flexible throughout a process control solution implementation; and above all, to approach the project with a dedicated team of representatives who can lead the project to success. For Hue Than, Ventura's vice president of engineering believe the results of the project reflect the team effort on both sides. "Would I work with the ESE team again...yes...you bet I would."