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SYSTEMS & CONTROLS, INC.
Automation ~ Batching ~ Process ~ Systems

CASE STUDY

The Challenge

- Reduce or eliminate the amount of bad, out of specification batches
- Increase weighment accuracy and production capacity
- Minimize and control dust from ingredients during automatic batching and bin filling

The Solution

- Automatic state-of-the-art minor Ingredient weighing and batching System
- New controls and automation to maximize production output by minimizing batch cycle time

The Results

- Using three (3) scale conveyors achieved 55 seconds calculated batch cycle time
- Batch integrity increased through automatic operation, high accuracy, batch identification and lot tracking

System Valuation

An 18 bin automatic minor ingredient batching system with controls and automation, along with features similar to that described here in this case study will typically range in price from \$200 - \$400 thousand per system. Pricing is subject to change due to specific project requirements and selected options. Call for current pricing.

MINOR INGREDIENT BATCHING SYSTEM FOR THE RUBBER INDUSTRY



OVERVIEW:

The manufacture of various products of rubber requires compounding or batching/blending multiple powder ingredients. When a manufacturer of hoses that use rubber in their products had problems with their manual batching and weighing of the powder ingredients they came to Sterling Systems & Controls and asked how we might be able to improve their production process. The manufacturer wanted a customized solution, which is the specialty of Sterling Systems, e.g. the custom engineering and manufacturing of weighing systems and automation.

THE CHALLENGE:

The manual batching process was costly. It produced a lot of scrap and significant dust hazards. The manual batching feeds a mixer. In order to optimize and improve the production process, the ingredient batching must be done quickly. An increase in production capacity is desired. The production formulas include more than eighteen (18) ingredients, but only that number were to be included in the automatic system. Other ingredients would also be added, less frequently, to the batch. The overall system would need to control the automatic and semi-automatic addition of ingredients to ensure batch accuracy and validation. Dust associated with refilling ingredient bins and discharging from ingredient feeders to the batch totes would need to be contained and collected to eliminate or minimize possible hazards.

THE SOLUTION:

After a thorough review of the existing process, goals and objectives with customer personnel, Sterling Systems proposed and implemented a system that would provide accurate weighments for each of the ingredients as well as maximize production by minimizing batch cycle time. The proposed system includes the automation of material feeding and weighing, as well as the semi-automatic weighing function of the "hand add" or manually fed materials. The system stores formulation and ingredient data to ensure batch quality and integrity. Automatic and semi-automatic weigh processes can be configured

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to function simultaneously, or independent of each other, depending upon how the formula is designed. The system allows for excellent data tracking, storage of raw material data, batch data, production data, batch validation and quality control.

The system simultaneously weighs onto the three (3) scale conveyors – one ingredient per scale at a time. This provides increased throughput. When batch containers have completed collecting ingredients at each scale conveyor, the containers are conveyed to the check-weigh scale conveyor. The system prompts the operator for any semi-automatic “hand add” ingredients that are required for that specific batch container. Once the check-weigh is verified, the operator takes the batch container and places it in an RFID tagged container for movement to the mixer upon the completion of all batches. The scale design is repeatable. The scale and support frames are independent of the supply bin frames, thereby improving system accuracy. Vibration is eliminated from the system when filling ingredient supply bins and improves the overall weighing process. The Load Cell design is a solid design using the latest technology load cells and mounting assemblies.

We have dust containment included in the minor ingredient weighing and batching system as follows:

- Dust produced while filling the supply bins has been significantly reduced by locating a dust collection hood at and above each of the three (3) bin clusters covering all of the eighteen (18) ingredient bins for the automatic system, for a total of six (6) bin dust hoods.
- Dust that may be produced from the discharge of each ingredient into the batching containers is controlled and contained by the inclusion of three (3) hoods for dust collection at the three scale hopper discharge points.



Each of the eighteen (18) ingredient supply bin feeders uses industrial bearings at both ends of the feeder assembly, seal plates to prevent the material from entering the bearings and air gaps between the bearing and seal plates, to extend feeder life and accurate operation. The air gap creates a buffer zone to insure product doesn't enter the bearings and bearing lubricant doesn't enter the product. The augers are multiple pitch design to ensure that the weightments are accurate and repeatable batch after batch. The augers are kept in suspension using shaft clamps to insure that the auger thrust load is not transferred to the drive assembly. We use shock absorbing couplings to help reduce the start and stop shock on the motor and drive. The entire system is controlled using Rockwell Factory Talk Machine Edition (ME) software and Allen Bradley PLC based hardware. The Sterling Systems batching control system makes creating new formulas and scheduling batches easy. Using a touch screen and icons, the customer supervisor can complete complex tasks with ease. The control system ensures that batch throughput is maximized and all batches meet their specifications. Real time batch reports are produced with every batch, and typically show the ingredient desired and actual amounts along with batch start and end times. The customer can access the batching control system database from their remote office locations using the WebCentral supervisor software provided with the system, allowing access and system control using a simple web browser.

SYSTEM FEATURES:

- Eighteen (18) Mild Steel Supply Bins with External Steel-It Epoxy Finish
- Eighteen (18) Mild Steel Supply Bin Feeders
- Six (6) Stainless Steel Dust Hoods over Ingredient Bins
- Four (4) Scale Conveyors
- Three (3) Dust Hoods Under Feeders, Over Conveyor Scale Fill Points
- Three (3) Mild Steel Bin/Feeder Support Frame Assembly
- One (1) Bag Lift Unit
- Two (2) Pallet Lifts
- One (1) Automatic Batching System Operator Station
- One (1) Semi-Automatic Batching System Operator Station
- One (1) Automatic Batching System PLC/Motor Starter Panel
- One (1) Weight Indicator Panel



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