

Machine Builder Oliver Manufacturing Relies on Rockwell Automation to Deliver the First Fully Automated Gravity Separator

Advanced Automation controls from Rockwell Automation help improve machine performance for end user.

Solutions

Control and Visualization

- Allen-Bradley MicroLogix 1400 programmable logic controllers control the entire gravity-separation process
- Allen-Bradley PanelView Component C600 touch-screen human machine interfaces allow operators to program product recipes and automatically return to previously defined machine settings

Intelligent Motor Control

- Allen-Bradley PowerFlex 40 variable frequency drives precisely control fan speeds and reduce the machine's energy consumption

Machine Builder Support

- Global OEM Technical Consultants (GOTCs) from Rockwell Automation trained machine operators to help ensure a seamless installation and start-up and troubleshoot as needed

Results

Increased Time Savings

- Decreased machine startup time from 30 minutes to four minutes
- Eliminated 100 minutes of recurring manual adjustments in a 10-hour operating shift
- Decreased employee training time from months to days by incorporating programmable recipes that can be quickly recalled by any operator

Improved Performance

- Increased available production capacity by 27 percent
- Decreased maintenance-related downtime from 20 hours to three hours per week



Oliver Manufacturing delivers gravity separator machines to help improve the quality of raw materials and finished food products by sorting and removing contaminants.

Background

Harnessing the power of gravity is the nature of Oliver Manufacturing's business. For more than 80 years, the Colorado-based company has been building machines that separate dry materials by weight – a critical capability in industries from agriculture, to recycling, to mining. Oliver helps its customers improve the quality of raw materials and finished food products by sorting and removing contaminants from dry slurry. Sunflower growers, for instance, rely on gravity separators to cull cracked, damaged and lightweight seeds from heavier, high-quality kernels.

Nearly 70 to 80 percent of Oliver's business is generated by designing and building new gravity separators, with the rest coming from manufacturing destoners and fluidized bed dryers, and retrofitting legacy equipment for use in new applications. With so much revenue riding on gravity separators, Oliver's competitiveness hinges on its ability to continually refine the capabilities of these machines.

Gravity separators use a combination of air to weigh raw material, and vibration to suspend and transport the finely divided particles in a stream of air. The material is conveyed over a table that is tilted or sloped to separate like-size particles with, in Oliver's case, as little as 0.5 percent difference in density.

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The Voyager is the first fully automated, programmable gravity separator.

Oliver recently developed the first fully automated, programmable and power-adjustable gravity separators. To test their effectiveness and ease of use, Oliver turned to its customer of 32 years, Red River Commodities, to execute a pilot project.

Challenge

Red River is a seed source for growers of specialty crops – such as flax, safflower and millet – and also processes these niche crops into products for the marketplace. Although it's a major processor of sunflower seeds, Red River's existing equipment was limiting production and not meeting the quality expectations the company demanded for its customers.

Operating the equipment required many manual adjustments, including adjusting the rate of raw material coming into the gravity table and the flow of air moving across the separating deck. Operators needed to raise the end and tilt the sides of the decks every hour, on the hour, to control the seed levels on the deck where the seeds vibrate and separate. These constant manual adjustments increased machine start-up time and required extra time to train employees.

Manual adjustments also meant the quality of the output varied with the skills of the operator. Red River needed the equipment to more accurately and predictably separate seeds according to size and weight. Troubleshooting the machines was another problem because it was nearly impossible to know which variable(s) – such as feed rate or end raise – was causing a problem.

The existing operation also lacked full integration with Red River's plantwide control system. As a result, operators needed to manually start up and adjust the gravity tables to bring the processing line online to connect with gravity separators, which significantly decreased throughput. Red River needed to upgrade to a control platform that could seamlessly connect with the plant's existing system.

Red River also needed preset control parameters to reduce training time and costs. And machine operators needed to spend less time and effort switching from one sunflower seed recipe to another.

This need for improved quality and eased operation provided an ideal opportunity for Oliver to test its newest gravity separator. It also helped Oliver address the challenge of designing, building and installing the separators in a tight timeframe that other customers would demand.

Solutions

Working in close collaboration with Rockwell Automation, Oliver designed, created and tested its new Voyager series of gravity separators. This new design enabled Red River to fully automate its process and integrate the new machines into the existing control system plantwide.

To meet its customers' requirements, the team utilized a standard control platform that allows easy machine programming and configuration, along with advanced electronic control technology to meet the speed, durability and versatility requirements of various separating operations. Standard programming tools from Rockwell Automation enabled additional advantages over previous machine generations, including added machine diagnostics, recipe functions and automatic device calibration, thereby increasing machine uptime.

The new machines utilize Allen-Bradley® MicroLogix® 1400 programmable logic controllers (PLCs) to control and automate the entire gravity-separation process, including adjusting end-raise and side-tilt of the deck, and controlling air flow. The controllers provide an economical solution for the application due to their compact packaging, integrated I/O and communication, and ease of use.

Allen-Bradley PowerFlex® 40 variable frequency drives precisely control fan speeds and reduce the machine's energy consumption. The PowerFlex drives allow operators to vary the speed of fan motors electrically, rather than mechanically, allowing greater flexibility. The drives also allow tighter control of deck shake and speed, and operators can store and access these movement parameters in the drive to more easily recall parameters when making adjustments.

The machine uses Allen-Bradley PanelView™ Component C600 touch-screen human machine interfaces (HMIs) where operators program many product recipes. By leveraging the functionality of the HMIs, operators can automatically return to previously defined machine settings for feed rate, deck-end raise and side tilt, and fan speeds, saving time when adjusting the machine based on production needs. They also can easily access information about system activity, and quickly identify and troubleshoot problems.

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Allen-Bradley PanelView Component C600 touch-screen human machine interfaces allow operators to program product recipes and automatically return to previously defined machine settings.

With the new control and visualization solution, operators can store and immediately recall numerous recipes, reducing the time to switch from one product to another. It also includes a predefined setting so operators can quickly clean the machine. And with programmable user access rights, operators can minimize or eliminate unplanned adjustments in the production process.

In addition, Red River and other customers can easily integrate the Voyager into their existing electrical and plantwide control system, simplifying installation and machine startup and shutdown.

Results

After a nine-month test period, Red River adopted two Voyager machines for gravity separation of its sunflower seeds, and has continued to realize impressive time and cost savings. The new technology decreased machine startup time from thirty minutes to four – an 86-percent reduction in startup time – because operators can easily integrate the machine with existing control systems and recall stored recipes.

The same size gravity deck can now process 2,060 pounds, or 27 percent more, sunflower seeds per hour because the seeds are automatically fed through the machine rather than waiting for operators to manually adjust the system in the process. The Voyager eliminated 100 minutes of recurring manual adjustments in a 10-hour operating shift at Red River through preprogrammed machine settings.

Red River decreased employee training time from months to days by incorporating programmable recipes that can be quickly recalled by any operator. Maintenance-related downtime declined from 20 hours to three hours per month. And Red River estimates its total sales revenue could increase by a third as a result of implementing the new Voyager machines with the Rockwell Automation control platform and components.

Global OEM technical consultants from Rockwell Automation provided support to Red River to ensure a seamless installation of two Voyagers. The technical consultants trained machine operators on the new system and helped support a quick installation, start-up and troubleshoot as needed.

“Rockwell Automation enabled us to greatly increase our market profile,” said Joe Pentlicki, operations manager at Oliver Manufacturing. “We can provide a new fully automated solution to customers who are operating manual processes. We can also retrofit legacy machines that a customer may have recently replaced by easily integrating the new technology.”

The results mentioned above are specific to Oliver Manufacturing and Red River Commodities’ use of Rockwell Automation products and services in conjunction with other products. Specific results may vary for other customers.

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