Monitoring resin levels

A plastics molding company installs a level-measurement system to track its raw material inventory.

Much has changed at Garner Industries, Lincoln, NE, since the company started out as a local tool and die shop in 1953. In 1993, Garner purchased a small, local injection molding operation that’s since grown to include 29 molding presses. With press capacities ranging from 35 to 500 tons and a 75,000-square-foot facility, the company can now complete both large and small projects using plastic resin to create a wide range of products.

Garner recently invested in its operation to accommodate the needs of several of its largest customers. The company had three smooth-walled steel silos constructed to eliminate the need to store large numbers of gaylord boxes full of resin in various on-

A vibrating rod sensor in the cone of the surge bins alerts workers of low resin levels.
and off-site warehouses. The new silos have deep cone hoppers to facilitate the free flow of resin pellets to the silo outlet. The resin is pneumatically conveyed from the silos to large surge bins inside the factory, which feed three new 500-ton molding presses.

Eliminating gaylord boxes allows customers to buy resin in bulk and have it delivered by truck, which reduces costs and packaging waste. Using silos to store resins allows inventory to be monitored automatically instead of using physical counts. The silos also increase efficiency by reducing the amount of resin handling in the plant. To automatically monitor inventory, however, Garner needed a way to accurately measure the amount of material in each silo.

“Real-time management of expensive resins helps ensure a continuous supply of raw materials for our operation that runs 24/7,” says Dan Hurtz, plastics manager for Garner Industries. “Our largest molding customers want visibility of their inventory so they can buy smart and reduce carrying costs of expensive resins.”

Preventing outages and overfilling

To monitor its resin supply, Garner turned to its own subsidiary. BinMaster, Lincoln, NE, a level measurement and inventory management equipment supplier. The supplier equipped each silo with a VR-21 vibrating rod sensor for low level control, mounted roughly halfway up the 11.5-foot hopper section of the silo. The sensor sends an automated alert when the resin level gets low and inventory needs to be replenished.

To prevent overfilling, each silo has a VR-41 extended vibrating rod sensor mounted in a 1.5-inch coupling in the silo roof. The rigid extension reaches 4 feet down into the silo to compensate for the material’s angle of repose and the capacity of the silo as it’s emptied and filled. The vibrating rod sensors are connected to a multi-input annunciator panel for high- and low-level indication. The point level system also includes an external horn to alert a truck driver if a high level is detected during the filling process.

Each surge bin is also equipped with a VR-21 vibrating rod sensor to alert when the surge bin is nearly empty. The point level indicator alerts workers when they need to convey additional resin from the silos to the surge bins to ensure continuous production. This helps maximize cycle times and ensure that the presses can run continuously with no downtime.

“Installing silos allows the company to keep more material on hand without adding the physical labor of handling gaylord boxes.”
Automated inventory management

For inventory management, the supplier mounted a 3D Level Scanner continuous level sensor at the top of each silo. The 3D Level Scanner is a noncontact, acoustics-based sensor that measures and maps multiple points on the resin surface in the silo, detecting whether the material is piled cone up or cone down and other surface variations. The scanner processes the data to determine inventory volume, while taking into account surface variations, and then reports a “percentage full” number based on a weighted average of the measurements. Each silo’s resin level readings are sent to a cloud-based database of inventory reporting, where local and remote users can then log in and view current inventory levels and generate reports on resin usage.

Since resin inventory information is proprietary to each of Garner’s customers, security parameters are entered into the system to display information for only the silos and resins belonging to a particular customer. Customers also have the option of allowing their resin vendor to monitor the silos using a feature called Vendor Managed Inventory. With the new system, Garner can monitor all silos and work closely with each customer to ensure that inventory is optimized based on upcoming demand.

“We wanted to always be in sync with our customers on resin inventory levels,” Hurtz says. “Our operation runs 24/7, so the silos are always active, and inventory levels are constantly changing.”

The monitoring system also allows the company to set usage alarms to notify users of silo activity or high or low alerts via email or text message. As inventory data can be accessed anywhere, Garner and its customers can ensure a continuous supply of resins to meet production needs. The 3D Level Scanners on the silos are also compatible with software that creates a representative image of the material’s surface topography. The software can be configured to calculate the number of pounds of resin contained in each silo by the resin’s bulk density and allowing for compaction of the material closer to the cone. For inventory monitoring, the software reports high, low, and average level and calculates inventory volume based on the silo and material parameters entered into the program.

Eliminating manual measurement

One silo is also outfitted with a traditional weight-and-cable-based level sensor that works like an automated tape measure but eliminates climbing the silo to take the measurement. This sensor is networked to a computer inside the main facility, where workers can view inventory levels, generate reports, and monitor usage alarms. The monitoring system provides more flexibility for connectivity to various sensors and devices and allows the system to be scalable as the company adds more silos and sensors.

“We automating inventory using level controls in our silos is certainly more efficient than bringing in gaylords of product,” Hurtz says. “It’s been a welcome change to our operations and purchasing personnel.”

Note: Find more information on this topic in articles listed under “Level detection” and “Storage” in Powder and Bulk Engineering’s article index in the December 2016 issue or the Article Archive on PBE’s website, www.powderbulk.com. (All articles listed in the archive are available for free download to registered users.)