Freedom Tower – end results

Graco

SHATTERING PRODUCTIVITY PACE: IMPROVING BONDING AND SEALING SPEED, QUALITY AND PRECISION

The Graco® ExactaBlend™ AGP Advanced Glazing Proportioner, a new technology specifically developed to improve real-time ratio assurance, reduce material usage and enhance tracking of key information, was chosen by Viracon in its search for a system to speed up production and enhance quality by better mixing.

Insulated glass manufacturer Viracon uses a two-part structural glazing sealant for insulating glass (IG) production on large and high-profile building projects around the world. When the material is cured, it forms a durable, flexible, watertight bond. To seal properly, silicone and catalyst material must be properly mixed and dispensed in exactly the manufacturer-specified ratio. Viracon had been using an older mechanical technology that could go off-ratio with mechanical failure and had no feature to alert operators of an off-ratio situation. In addition, the company

was looking to improve productivity by increasing the speed of their process. After installing the Graco® ExactaBlend™ AGP Advanced Glazing Proportioner, Viracon has increased production by 20 per cent and achieved quality, health and safety and environmental benefits.

NEW PROPORTIONING EQUIPMENT SYSTEM TO MEET ON TIME DELIVERY NEEDS

Viracon, based in Owatonna, Minnesota, produces insulating, laminated, and monolithic glass products for large building projects. Their glass appears in at least five of the world's ten tallest buildings. The Freedom Tower at the new World Trade Center, the Minnesota Vikings' Stadium and many of the major Las Vegas casinos are just a few of the well-known buildings in which their glass is found. To succeed at this level, on-time delivery and superior quality are critical.

"We don't have the luxury of delaying projects," says Steve DeNeui, Viracon's senior IG manufacturing engineer. "We work on high-profile jobs and they must be delivered complete and on time. We do not want other contractors waiting on us. We carefully monitor our on-time deliveries and if they fall below 95 per cent, we hold a series of meetings to get back on track."

FREEDOM TOWER AND THE VIKINGS' US BANK STADIUM

DeNeui explains that the Freedom Tower pushed Viracon to its limits due to the sheer size of the units required – 165 inches tall by 60 inches wide. In fact, the bottom stories of the building had specifications beyond their capabilities, and they were disappointed when a foreign competitor got the bid. "As it turned out, they were unable to deliver on their commitment, so the substrate used on the bottom floors is not glass. Therefore, we are honoured to be able to say we have all the glass on the Freedom Tower."

He adds, "As far as the glass for the Vikings' new home, while it is not our biggest project, we want all the projects in our own back yard and we are proud to be supporting the home team."

Producing insulating glass for these large jobs calls for the use of insulating glazing and sealing adhesive made up of two-component material that must be accurately mixed and dispensed in accordance with a specific ratio. Deviations from material manufacturers' mixing specifications can lead to compromised product performance and structural failure.

A variety of traditional mixing and proportioning technologies exist, including pneumatic, positive displacement piston, mechanically linked proportioner and passive metering proportioners.

ROBOTIC EQUIPMENT

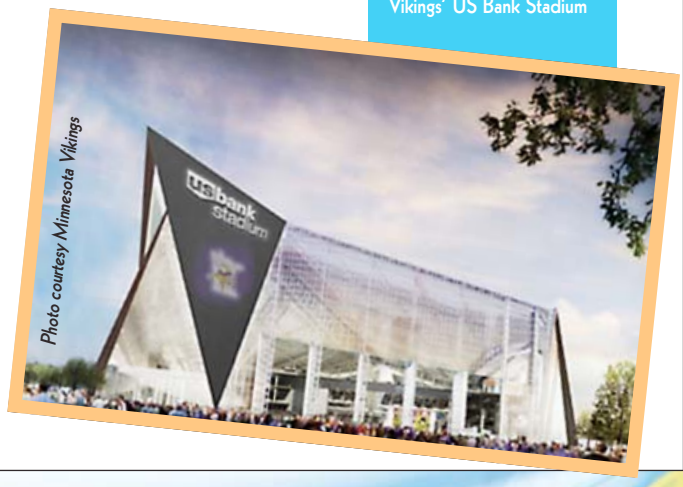
Viracon uses robotic equipment for dispensing silicone on four production lines, but there are certain applications that must be done by hand. For example, four-sided offsets, where all four edges are bigger on one side, must be sent to the hand-fill line. With a four-sided offset unit, the width and height of one sheet of glass is larger than the sheet of glass it is glued to, with the smaller glass facing the interior of the building. In this way, the glass covers the metal extrusions placed on the outside of the building, so only glass will be seen from the exterior of the building. A great deal of craftsmanship goes into these units and the glass sealant is critical to the unit's final quality.

For almost 25 years, Viracon had used a severe-duty plural-component proportioning and dispensing system for their hand-filling lines. The equipment consists of mechanically linked pumps, a rocker arm pump and a slave pump. The system was robust and reliable, but had begun to show its age. Over time, Viracon began running into problems, especially when comparing the equipment's speed to that of the robotic lines. Line workers couldn't count on the flow to always be continuous.

As DeNeui explains it, "I like to compare it to a hot glue gun or tube of toothpaste. Imagine placing a bead of toothpaste along something for a long distance – whenever you have to relax and re-squeeze, you are starting over again. That is the situation we were facing with the old system. When you can't count on your flow always being there, it is frustrating to the operators and it compromises quality."

In addition to delivering an inconsistent flow, the older system lacked real-

Vikings' US Bank Stadium



time mix information. Ratio assurance is a challenge on traditional mechanical proportioners, especially with delicate manual ratio adjustments on a system's rocker arm. They had weekly issues of having to recheck materials, resulting in downtime while waiting for ratio samples. On one occasion they had to pull back 15 boxes of products due to an air bubble that had gone undetected, resulting in silicone that did not cure properly. Operators had to take the finished products apart and clean them to see if existing parts could be reused or if new ones had to be made. All of this rework takes money, time and material.

SPEEDING UP PRODUCTION AND ENHANCING QUALITY BY BETTER MIXING

Viracon was limited to one speed for all applications, and that speed was slow. They had increased the flow rate of their hand-fill mixing system, but it was still a much slower delivery system than their robotic systems. They decided to seek out newer technology that could help them both speed up production and enhance quality.

They needed equipment that would be extremely reliable and robust. Viracon runs nearly around the clock and needs a real workhorse, since they rarely shut down. "We did not want to compromise with replacing the old tried and proven equipment with cheaper-made, easily broken equipment."

Their tough requirements led Viracon to the Graco® ExactaBlend™ AGP Advanced Glazing Proportioner, a new technology specifically developed to improve real-time ratio assurance, reduce material usage and enhance tracking of key information.

The system allows operators to set up and make ratio changes with a touch of a button. Operators can make ratio changes on the fly, allowing production to continue even when material requirements vary.

With positive ratio assurance, if off-ratio conditions exist, the system automatically shuts down to prevent compromised material from being dispensed onto the curtainwall or insulating glass, which gave them confidence they were producing a high-quality product.

The technology provided Viracon with high-pressure, high-flow mixing and dispensing of plural component silicone materials. The applicators deliver variable ratios between 6:1 and 14:1, and can perform at flow rates up to 4,000 grams per minute.

Material usage, error reporting and other key data can be downloaded via USB, and/or viewed easily on the system's data screen. This information is vital to keeping material costs low, tracking production and ensuring product quality.

To avoid system downtime when adhesive materials run low, the system provides advance notification, prompting operators to replenish the material supply and keep production moving without interruption.

The system uses standard Graco components, including fluid regulators, flow meters, air motors and pumps. Standard wear components are less expensive than custom parts and can usually be shipped immediately.

SPEED, QUALITY, AND ENVIRONMENTAL IMPROVEMENTS

Viracon's number one goal in investing in a new system was speeding up their production by improving the hand-fill lines at their facility. This goal has been met and augmented by many other benefits. Viracon is now running material at a rate that is 20 per cent faster than the older equipment. Exact return on investment (ROI) calculations are difficult, since the Minnesota plant does not have a standard size or type of product that lends itself to easy before and after comparisons. In fact, DeNeui calls the company "…the world's largest Ma and Pa shop." He adds, "Everything here is specific to the customer and their unique demands, so one day of product running through the facility rarely, if ever, mirrors the next day."

A big improvement to the bottom line

While this makes it a bit difficult to measure the improvements with the new ExactaBlend AGP, DeNeui is quick to point out that the efficiencies have resulted in a big improvement to the bottom line. In fact, after the initial purchase of two Graco ExactaBlend AGPs, Viracon has since purchased additional units for their Utah plant.

The Graco ExactaBlend system has also resulted in significant ergonomics savings and health improvements. Previously, operators had to slow their motion down and then speed it back up, oscillating movement that can lead to carpal tunnel syndrome, which Viracon was anxious to avoid.

Quality improvements

The use of the system also resulted in quality improvements stemming from continuous monitoring of the product mix. With the old system, Viracon lacked real time verification that its two-part sealant was properly mixed. Verifying the ratio was always more of an art than a science. If an air bubble actually made it all the way down the hose to the static mixer, it could not be seen. This is a pro-

Two additional examples of where the new equipment has been used: the Bellagio and Mandalay Bay casinos

blem, since an air bubble represents a soft spot in the window. Operators had to frequently check the silicone to make sure it would cure properly and that there were no issues with the final product.

Continuous monitoring

Now, the ExactaBlend AGP not only continuously monitors the ratio while the equipment runs, it also records the run history, sends an alarm if the equipment goes off ratio, and provides troubleshooting instructions to get the system back up and running. Having ratio assurance alerts operators to errors, such as forgetting to bleed all the air from the catalyst material. Now, if an air bubble forms in the line, the AGP will sound an alarm as the bubble travels through the system.

The air bubble issue has only happened a few times since Viracon started using the system, but being alerted in advance proved to be a huge advantage. Operators did not have to open up boxes to find the problem and rework projects.

Increasing and decreasing flow rate

Also, the new system allows workers to increase or decrease the flow rate based on channel size, which varies depending on the product they are making. Operators can speed up the flow of the gun so it runs at a constant rate, no matter the channel size.

In addition, the equipment has environmental and energy benefits. While extremely robust, it uses fewer cubic feet per minute (CFM) than the older equipment, reducing energy usage. Also, as anyone who uses a two-part sealant knows, the disposal of unmixed material is costly and takes a toll on the environment. With the advent of continuous material monitoring, Viracon produces less waste than before. And, with the ability to control the flow rates, the company can pinpoint how much material should be used for each product, providing them with another way to monitor usage and reduce waste.

Ease of maintenance, parts availability, training, ease of operation and trouble shooting

Viracon is also benefiting from other key, positive aspects of the new equipment. Tops on the list are ease of maintenance, parts availability, training of maintenance staff and equipment operators, and the ease of operation and trouble shooting.

The Graco ExactaBlend has far fewer moving parts than their old system. For example, the older had three different pumps, while the ExactaBlend has two of the same pump, requiring the stocking of only one set of parts. The ExactaBlend also has a smaller overall footprint, making it easy to incorporate into the hand-filling line. Concludes Deneui, "Any time we can flow sealant faster, with a higher level of confidence, and not have to shut down production to sample, we are increasing productivity. And any time you combine increased productivity with increased quality, everyone is happy. This is the first radical change Viracon has made to our hand-filling equipment in my 24 years here, so this is huge. It has been well received by everyone, from our maintenance group to our equipment operators and up."

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