

## New installation

# Dust collector captures fugitive silica dust

A paving stone manufacturer installs a dust collector to help eradicate fugitive dust.

When Unilock Ltd., headquartered in Ontario, Canada, was making plans to build a new facility in Pickering, Ont., one of its priorities was to find a dust collector that could manage fugitive particle emissions, especially from crystalline silica. Silica, always a concern, is a basic component of sand, granite, and other minerals. Because

crystalline silica is a regulated substance, eliminating exposure through engineered filtration controls and providing a safe work environment was of the utmost importance to Unilock.

Unilock manufactures interlocking paving stones and retaining walls used in landscaping projects to create



*Unilock's dust collector was installed outside the paving-stone manufacturing facility to conserve valuable floor space.*

patterned pathways, patios, and structural or decorative walls. When manufacturing concrete products, the manufacturer blends aggregates of varying size, texture, and color into a homogenous blend. As the aggregates are loaded and consumed, fine particles can become airborne. Quartz aggregate, in particular, is a common culprit emitting fugitive silica particles, a known health hazard.

During the batching process, the manufacturer uses a conveyor-fed skip hoist to charge several 40-ton top-loaded storage silos with various aggregates. When the skip hoist opens its discharge gate, it deposits approximately 3 tons of material into one of the 13 silos. This process creates air displacement resulting in a large amount of fine airborne aggregate particles.

### Selecting a dust collector

By July 2011, the manufacturer's expansion plans were underway with the goal of making the new batching facility operational by March 2012. Aaron Bailey, plant manager, began searching for the facility's equipment and was interested in finding a local contractor that could install a reliable dust collector. After being introduced by a mutual colleague, Bailey met with John Jurk, vice president of Ker-

nic Systems, Burlington, Ont., to discuss Unilock's dust collector needs.

Bailey already had a dust collector quote from a supplier who provided dust collectors to another Unilock location, but he had been told about some intriguing dust collection equipment that Kernic represented. At first blush, this supplier seemed an unusual choice for the aggregate manufacturer because its specialty is providing dust collectors for the paper manufacturing sector, including corrugated box and envelope plants and paper mills. But in addition to equipment, the supplier offered engineering, design, and blueprint creation services not offered by the other dust collector suppliers. These services were beneficial to Unilock, which was in the midst of acquiring city construction permits and approvals.

Based on the successful first meeting, Jurk went to Unilock's Georgetown, Ont., facility to see the manufacturer's operation and the dust collector used there. What he found was a horizontally configured dust collector with a safety-monitoring filter and a fan installed alongside, all housed inside the facility. With the new plant's space limitations, Jurk knew this configuration wouldn't work in Pickering and made his dust collector recommendation.

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*A full bucket opens its discharge gate and drops nearly 3 tons of material into one of the 13 silos.*

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***This 6-inch duct pickup under the silos pulls the fugitive silica dust out of the atmosphere and into the dust collector.***

## Integrating the dust collector with existing plans

Jurk recommended a Farr Gold Series GS12SQ modular dust collector manufactured by Camfil Air Pollution Control (APC), Jonesboro, Ark. The company is a dust collector manufacturer specializing in dust and fume control for a range of industries. Not only could this model's secondary filtration system — a HEPA filter for the silica dust — and the fan be mounted on top of the dust collector to conserve space, the collector could be housed outside the facility rather than taking up valuable floor space.

The supplier went to work on the collector's design and blueprints, and by February 2012 the plans were completed and integrated with the supplier's CAD machinery drawings. Once the plant's other machinery installation was underway, the supplier successfully faced the ongoing challenge of modifying ducting and other plans to fit around the equipment. When the facility was ready, the supplier installed the collector and ducting and provided start-up assistance and the basic training plant personnel needed for the system.

The facility was designed and segregated into two sections — one for the silo loading, where a negative pressure is created by the dust collector, and one where filtered air is returned to the building and where the aggregate batching takes place. The dust collector was installed just outside the silo loading area.

## The dust collector

In addition to its vertical configuration, which allows it to be 25 percent more compact than standard dust collectors, the collector is designed to handle approximately 9,000 cfm airflow. Its frame is made with 7-gauge carbon steel, and the door, hopper, inlet, and panels are constructed using 10-gauge steel. "The dust collector is built like a tank," says Bailey. "It's a tough piece of equipment."

Three 9-inch duct pickups positioned at the top of the aggregate silos and three 6-inch duct pickups positioned at the bottom of the silos pull the dust from the silo side of the plant into the dust collector. The dust collector has channel baffles installed in the inlet to protect the filters from incoming dust and separates the larger particles directly into the bottom hopper, reducing the load on the filters.

The dust collector uses 12 round Gold Cone HemiPleat cartridge filters with PTS-PolyTech Standard filter media. Each filter has an injection-molded inner cone in its center, which increases the media area and provides uniform dispersion of reverse-pulsed air during cleaning. The filter media is a proprietary blend of cellulose and polyester fibers with a moisture-resistant silicone treatment for optimum dust release.

The filter's open-pleat design increases the media's filtration efficiency, extends the media's service life, and produces a lower pressure drop compared to other standard media. The filter's high-filtration efficiency ensures optimum air quality, allowing the filtered air to be recirculated back into the plant. The filters are installed vertically rather than horizontally, which makes them easy to change out and eliminates dust entrainment problems that can occur when dust settles on horizontal media surfaces.

During operation, air and dust particles are pulled in from the ducts through the dust collector's side toward the cartridge filters, which hang from the unit's top. As the dirty air passes through the filters, the large dust particles fall to the unit's bottom hopper, the small dust particles become entrained in the filter media, and clean air discharges from the unit's top through an exhaust fan and is recycled back into the plant. The cartridge filters remove 99.99 percent of particles down to 0.5 microns, ensuring that Unilock meets government dust emission standards.

To keep the filters clean, the dust collector's reverse-pulse air system directs short air blasts at a filter's back side, knocking off dust particles from its front side and sending them to the unit's bottom hopper. The cartridge filters are installed in multiple-filter rows, and the reverse-pulse air system sequentially pulses one row at a time, repeatedly cycling through the rows. The pulse system's cycling sequence, pulse rate, and pulse duration are programmed based on the application's requirements.

The collector is also equipped with an Integrated Safety Monitoring Filter (iSMF) that's mounted on the dust collector's top along with the fan. The iSMF secondary filter uses HEPA grade filters that prevent collected dust from re-entering the workspace should there be a leak in the primary HemiPleat filters.

## Locating dust now difficult

Since installing the dust collector, Bailey reports that the dust on the manufacturing side of the facility is nearly nonexistent. "Locating the dust collector and filtration system outside the building and partitioning the building into two sections allows us to constantly remove the air from the low-pressure side, run it through the dust collector, and then return the clean air back into the manufacturing side," says Bailey. "And we're happy that the dust collector has required no maintenance — only scheduled filter changes." **PBE**

**Note:** Find more information on this topic in articles listed under "Dust Collection and Dust Control" in *Powder and Bulk Engineering's* article index (in the December 2012 issue and at *PBE's* website, [www.powderbulk.com](http://www.powderbulk.com)). You can also purchase copies of past *PBE* articles at [www.powderbulk.com](http://www.powderbulk.com).

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