Solving flow problems

by Prowell Technologies Ltd, Israel

Nesher Cement is Israel's main supplier of cement. Its modern integrated Ramle plant has a production capacity of 5Mta (850tph). Like many other plants Nesher faced problems with some of its bulk materials storage and flow processes, in particular with gypsum feeder bins.

The Nesher Cement plant in Ramle, Israel

Despite the modern design, the installed air cannons (several per bin) and 24h emergency team, the gypsum bins would clog on average 2-5 times per shift. Any gypsum flow stoppage of more than a couple of minutes led to disruption of the cement production process.

Yair Yitzhak, the plant's cement grinding manager, is an expert on the Nesher plant and a big believer in technological innovation. Yair is behind many of the plant's technical advances and new technology implementations. He was frustrated with their continuous gypsum flow problems and unpredictability of the cement production process. When he heard of a new technology that assured the continuous and stable material flow he went to visit a chemical plant where it was installed. After seeing it at work but still being cautious, he agreed with the supplier on a 30-day test trial at the Nesher plant.

The Silo-Flow™ technology

The Silo-Flow™ patented technology was developed and is marketed by ProWell Technologies Ltd. It was designed to solve the toughest bulk material storage and process flow problems. The Silo-Flow system may be installed at all types of feeders, hoppers, bins, silos, as well as high-temperature facilities such as kiln preheaters and coolers.

Figure 1: the Silo-Flow™ device installed at the gypsum feeder bin in Nesher Cement (note the special shock absorbing couplers)

The Silo-Flow device (SFD) is made of high grade stainless steel and designed for very high pressure (see Figure 1). Unlike standard air cannons that use up to 100psi (7 bar) provided by the plant air pressure line, Silo-Flow uses compressed air at up to 3000psi (200 bar), supplied by a dedicated high-pressure compressor through a couple of buffer air cylinders. The device creates a powerful shock wave followed by high velocity air stream. The shock wave and air stream are generated inside the vessel and dislodge any build-ups inside. The sheer force of the device combined with its quick repeat action leaves no material stuck to the vessel walls. Therefore, the Silo-Flow system maintains continuous material flow, even with the most problematic materials or structure designs.

The device can be activated from a control room computer or by a stand alone controller. The SFD is then programmed to 'fire' at pre-determined intervals depending on the application. Typical air cannons fire once every few minutes depending on their tank's filling time. Silo-

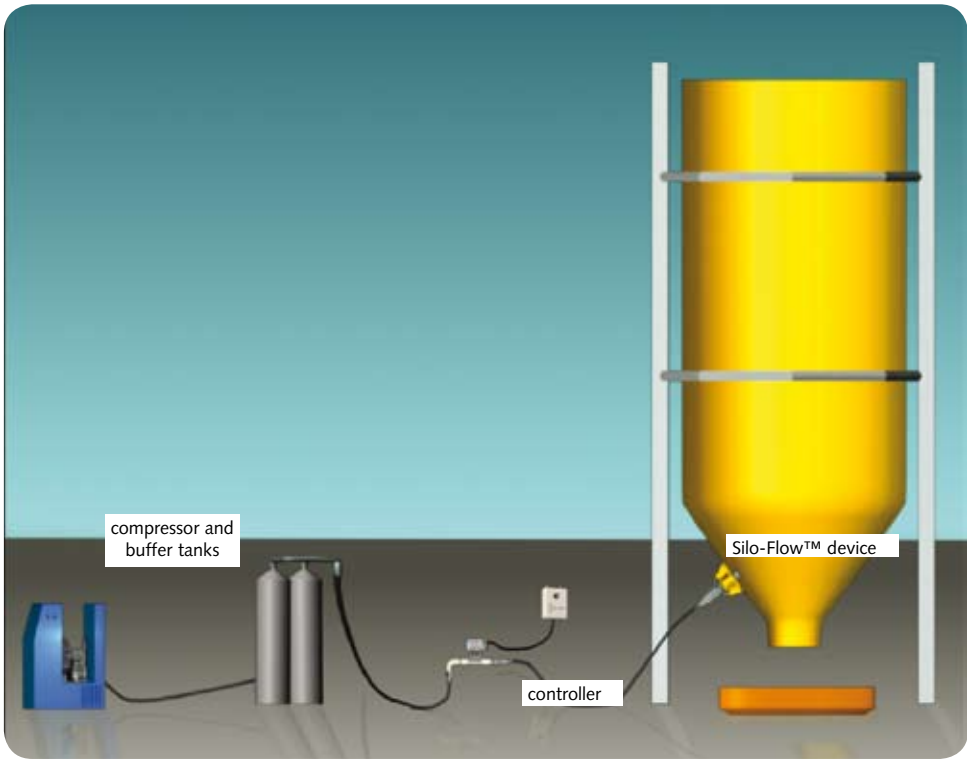

Figure 2 (left): the Silo-Flow™ system components including the SFD, controller, compressor and buffer air tanks

this unit and order several more for other feeder bins. Now we are planning installations at the coolers and preheaters. We have about 200 air cannons at our two preheaters, which is a maintenance nightmare, not to mention that we still have material flow problems there.

We believe that Silo-Flow can help solve those problems at a fraction of the cost and with no headache. I am always on alert in case the cement production stops. Silo-Flow actually helps me sleep better at night."

Flow can fire every few seconds to ensure that even the toughest material does not settle.

In fact, until Silo-Flow, Nesher was using a mixture of synthetic and more expensive natural gypsum to reduce the aggressive stickiness properties of synthetic gypsum. Nesher has the device fire for 15 seconds (5 'shots') every 20 minutes at about half its maximum power. After seeing that the mixture gypsum did not clog any more, they gradually moved to 100 per cent synthetic gypsum. Silo-Flow maintained continuous material flow even at 100 per cent synthetic gypsum at all times. "My main objective was to increase the production process predictability" says Eng Yitzhak, "we got this all right, but as a big bonus we got huge savings with the move to 100 per cent synthetic gypsum. We paid back the investment in no time."

SFD requires minimum maintenance including an annual check and a seal replacement, a piston replacement every 3-5 years and an occasional attendance to the compressor (adding oil, cleaning the filter, etc). The results of the application in Nesher can be seen in the following illustrations showing the gypsum flow before and after the technology implementation (see Figures 3 and 4).

"We got more than we bargained for," says Yitzhak, "we realised the system's advantages right away. After a week we stopped the trial and decided to purchase

Figure 3: Nesher control panel showing a typical shift before the Silo-Flow™ installation. Green line showing gypsum feed and red line showing cement production. Note 5 gypsum stoppages with the 5th leading to cement production stoppage

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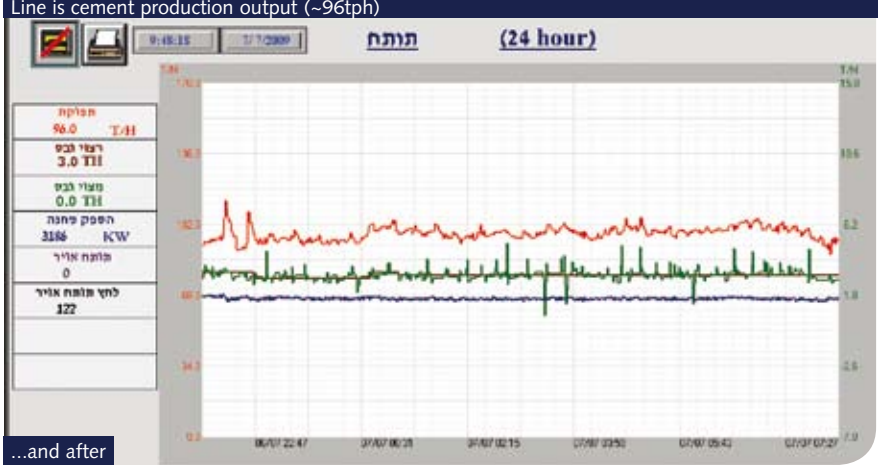
Figure 4 : Nesher control panel showing a typical shift after Silo-Flow™ installation. Green line showing continuous gypsum feed closely following the required quantity (brown line) of 3tph. Red Line is cement production output (~96tph)



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