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Enhances Corrugator's Productivity Gains:

Acme's Experiment: Predictive Maintenance

by Jim Curley

If we are going to spend this much money on a piece of new machinery, we should protect the productivity edge it should afford and the uptime it will provide." That's the rationale Jeremy Cohen, Manufacturing Engineer at Acme Corrugated Box, used to install 24/7 condition monitoring sensors on the motors and other critical mechanical areas of his company's new 98-inch Fosber corrugator, installed last fall.

The installation of the new monitors is no knock on the new Fosber corrugator, which has performed well since its installation last fall, Acme President Bob Cohen insists. "It doesn't matter what corrugator you have. The problem we wanted to address was not the corrugator, but the motors. It's entirely possible that if this experiment with predictive maintenance is successful, we'll use the system on converting machines in our plant."

Painful Past

He adds that his concerns stem in large part from past experience. The Fosber replaces two smaller corrugators that Acme had purchased used when it began making sheets nearly a decade ago. "We had so much trouble with the old equipment," Bob recalls.

"He remembers one time when a main breaker failed, causing a power surge that destroyed "six or seven motors" on one of his narrow-web corrugators. "At \$3,800 apiece of replacements, that was quite an expensive experience," he notes.

Acme Corrugated operates in a make-to-order environment, he explains, so it doesn't rely on warehouse inventory to save the day when a motor fails and downtime strikes. "We do real-time manufacturing, so there are no excuses," Bob says.

The newly-installed Fosber equipment includes a SMART 400 singlefacer, three LINK M2 400 splicers; three Auto M2 400 roll stands; a track and trolley system for the roll stand; an E&L bridge web guide sys-



Bob and Jeremy Cohen, inset, were looking to ensure the high productivity gains promised by Acme's purchase of a new 98-inch Fosber corrugator.

tem; a ThermoStack 400 "Triplestack"; a CREST 400 double level glue unit; an EXPRESS 400 15-plate doublefacer; a Constant System rotary shear, a Twin 400 slitter/scorer; a refurbished Series IV cut-off knife and a SYNCRO corrugator control system. Acme presently runs E-, B- and C- flute singlewall and about 15 percent doublewall on the new Fosber singlefacer with the remaining Agnati singlefacer.

The purchase also included training, a full maintenance program, and an interface with both an existing

Agnati singlefacer station and an existing MWU double downstacker.

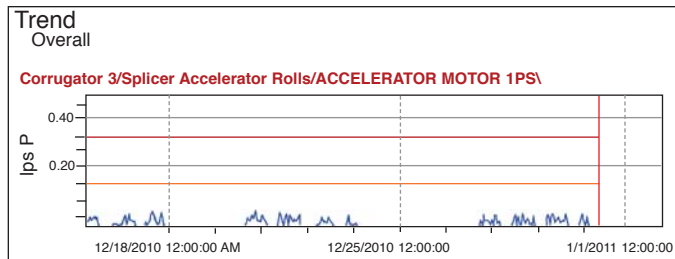
“We initially had problems with the interface between the dry end of the corrugator and the stacker, but that was my fault,” Bob admits. “I didn’t want to overwhelm our already large budget.” Fosber worked with Chicago Electric to upgrade the motors and controls of the stackers.

“Fosber was great,” Jeremy says. “They said, ‘We’re not leaving until this problem is settled.’ I’ve never dealt with any supplier that said that.”

Fosber was also “intimately involved” in working with SKF in installing and testing the predictive maintenance equipment, said Fosber America President Jeff Pallini. “We were happy to support the Cohens’ strategy any way we could.”

Early Warnings

Together with the supplier’s software, the newly-installed hardware from Sweden based SKF Reliability Systems, is said to provide a complete system for early



In this report, the SKR monitors show that the vibration of this motor is operating well below the warning (orange line) and alarm (red line) levels.

fault detection and prevention, automatic advice for correcting existing or impending conditions and advanced condition-based maintenance to improve reliability, availability and performance.

“I had talked to SKF for several years about their predictive maintenance tools, which had been used successfully so when we purchased the new Fosber, we developed a strategy,” Jeremy recalls.

“Jeremy contacted us several years ago about a machine maintenance strategy and was eager to find out whether our monitors would enable Acme to do more with the corrugators they had,” SKF’s Andy Hoy remembers. “Then his father decided to invest in a new corrugator. Acme then decided to invest in the SKF system and put the monitors on the Fosber.”

“We monitor 28 individual points on the corrugator. The sensors that we put on motors, bearings and other equipment send information to a server, which is hooked up to our plant network,” Jeremy explains. “The data looks at three spectrums of vibration, and based upon the information that Fosber gave SKF on particulars such as the bearing type or the number of teeth on a gear, SKF was able to construct a normal

operating range. From that, they set up trend lines. When the data shows that the trend line is starting to vary, you know that a future problem is starting to happen.

“The system doesn’t avoid the expense of replacing a motor or a bearing, but it does eliminate the expense associated with the downtime,” he adds. “We’re hoping that it takes some of the surprise out of machine failure.”

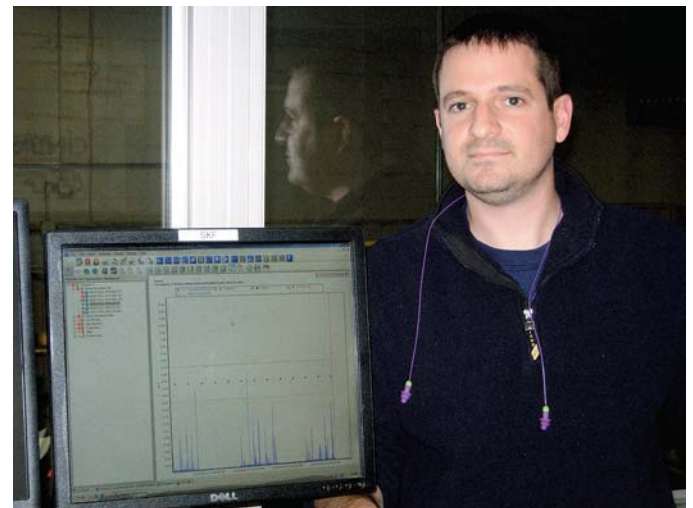
“And downtime is expensive in so many ways,” explains Bob. “It can cost up to \$2,000 to \$3,000 per machine hour alone, and the hours before you get a replacement motor can really add up.”

Smooth Transition

With help from Hazleton, Pennsylvania based Freedom Corrugated, which provided Acme with sheets until the new Fosber was up and running, Acme



Information is gathered from each of the 28 points on the corrugator and sent to the control room, notes Jeremy Cohen.



was able to achieve almost seamless service and delivery to its box customers during the transition to the new Fosber. All the while a corrugator was taken out and a new one was being installed.

Size Pros And Cons

“In some ways, I liked having a 68-inch machine,” Bob says. “We were on a lot of dance cards. There was always someone looking for trim.”

“But even considering the trim discount that we

received, we lost quite a bit of productivity at the shorter width," he adds. "The web was 1/3 less than the web we presently have on our 98-inch machine."

So, almost 10 years after Acme moved from nearby Bensalem to Hatboro and became a corrugator plant (a move he described as a "painful learning experience"), Bob sealed the deal with Fosber and purchased a new corrugator.

"I'm a great believer in new technology," he says. In the last several years, Acme has also invested in a Martin flexo folder gluer from Bobst and an Apstar rotary die cutter from Haire Machine.

The new corrugator "will provide a better sustainability solution for our customers," Bob Cohen says. "We weren't convinced we could do things like getting a better bond on the board and still reduce starch consumption if we stayed with older machinery. The Fosber will allow us to do more with less fiber and pass this savings on to our customers."

"The Fosber corrugator will allow us to run at top speed with no degradation of the board," he explains. "If you can run board through the corrugator and converting machinery with minimal crush, you can make a stronger box with less fiber. That will be very attractive to manufacturers seeking to do well on sustainability scoreboards posted by major retailers."

"I'm surprised that the big consumers of boxes in North America haven't demanded packaging with less fiber," Bob says. "These buyers are missing an opportunity to network with independents to get less fiber in their boxes and better service at the same time."

(Editor's Note: For a intriguing look at that process, view the time-lapse video of the removal of the old corrugator and the installation of the new Fosber at www.acmebox.com/corrugator.btm.)