

Plastics News

Industry 4.0

'MORE OF A JOURNEY THAN A DESTINATION'

By Don Loepp
Plastics News Editor

While the return on investment may still be hard to quantify, a growing number of North American plastics processors are reporting benefits from using Industry 4.0.

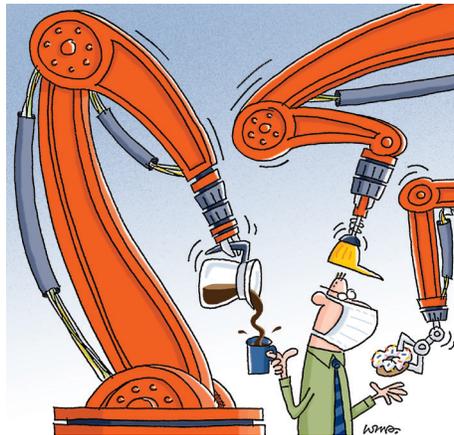
Company owners say it's helped them to win new business, improve quality and deal with shortages of skilled labor.

Scott Rogers, technical director at Noble Plastics Inc. in Grand Coteau, La., is among the injection molders who feel it was the right move to be an early adopter of Industry 4.0 technology.

"I think there's ways to approach it where you can get a return on your investment within a year, or certainly two years," Rogers said.

"There's a lot of sources out there who say if you fully embrace this, you'll get a 20 or 30 percent improvement in efficiency. I don't know if I really believe that. But I think we could all hope to get at least 5 percent," Rogers said.

Plastics News wrote about Noble Plastics' use of Industry 4.0 in 2018. At the time, it had two highly automated plants with Engel and Arburg presses, hooked up to a digital network through its six-axis Fanuc robots. The company was developing



Plastics News editorial by Rich Williams

applications using Oracle Corp.'s Internet of Things cloud service, and monitoring and control systems using IQMS's enterprise resource planning system.

At the time, Rogers dreamed of a time when artificial intelligence would shut down machines that weren't performing correctly, or even automatically correct molding parameters on the fly.

"So we started going down that path. And, you know, it actually worked pretty well. But in the end, you're looking at all this data, and you're excited about things like artificial intelligence. But at the end of the day, it's the people who are closest to the machines who have the biggest effect on your business," Rogers said.

"So we started looking at it from this standpoint: How do we get information to those people as quick

as possible? So if it's a maintenance problem, how quickly can I get that information to the maintenance guy so he can help if there's something weird going on with the process, or maybe the operator, or the shift leader, to quickly alert them when there's an issue."

Noble Plastics created a shop floor application that works as a conduit, both to and from the molding floor. It takes the IoT data and connects it with the ERP system.

"It alerts the appropriate people if something is awry, and then it tracks how quickly things happen. People can make requests through the ERP system, and that all becomes data," Rogers said.

Noble Plastics developed a hardware device that sends information to the IoT platform. It plugs directly into the Euromap interface that connects injection presses to robots.

As a pioneer in using Industry 4.0, Rogers has had the opportunity to attend and present at technology conferences where Noble Plastics is much smaller than its peers, many of which generate sales of at least \$2 billion a year.

"It's a different scale. You know, the Industry 4.0 journey for somebody like us is the not the same as it is for Ford or Black & Decker," he said.

Its newfound experience helped Noble Plastics differentiate itself from

other molders. But Rogers joked about that: “I try to remind everybody that our customers don’t care if we’ve got robots. They don’t care if we’re into Industry 4.0, in most cases. Our customers care if they get their parts and if they’re right and if they’re on time.

“Of course, when we talk to people, we talk about our technology. And hopefully that gives them some added confidence that we can get them the parts that they want on time,” Rogers said.

Rogers considers the implementation a success, and now he plans to create a new business to help other molders tackle Industry 4.0.

“You know, it’s more of a journey than a destination, because there’s always going to be something a little newer coming out. There’s always improvements that can be made, like any process. But yeah, I consider what we’ve done successful,” Rogers said.

Noble Plastics has 14 presses ranging from 50-730 tons of clamping force, 50 employees and about \$9 million in annual sales. In addition to molding, it also builds automation systems for other companies, mostly in plastics, using Fanuc robots.

By the end of the year, Rogers plans to have multiple beta sites for its Industry 4.0 implementation business.

Reducing variation

Industry 4.0 means different things at different companies, but in general it refers to the fourth industrial revolution, using smart factories, automation, integration and the Internet of Things to improve manufacturing. Benefits being touted include cost savings and improved quality.

For Medbio LLC, a Grand Rapids, Mich.-based injection molder that specializes in medical and biotech, Industry 4.0 is all about reducing variation.

“In medical, one of the worst words

you can hear is recall, and they are getting more and more expensive nowadays,” President Sean Callaghan said.

Medbio is a 15-year-old company that has seen steady growth. It had about nine machines 11 years ago; now it has 47. The company has been investing heavily in automation, too. When Ethan Bruyn came on board as process engineer six years ago, it had three robots. Now it has about 20.

Callaghan said automation has been a game-changer for Medbio. He points out that, historically speaking, many injection molders don’t take advantage of the latest technology.

“I’ve been in this business a long time, and I know that when you go to trade shows and read the articles and you look at the latest technology, the vast majority of people are not actually using it like it’s intended to be used,” Callaghan said. “For example, a handful of people will have cavity pressure, but they monitor with it, they don’t control and go closed loop, and that’s been out there a long time.”

Bruyn looks at YouTube videos created by other molders to help Medbio stay on the cutting edge, and the team likes to visit leading firms, too. They’re proud of the progress that Medbio has made.

“Any new press we have coming in the door has some form of auto rejection for startup,” Bruyn said. “We’re incorporating temperature control units into the controller, monitoring temperature as well as set point. We have integrated hot runner controllers. We’re actually, with Arburg, the first ones in the United States right now that have the option of tying in an integrated hot runner controller. So tying stuff into one central controller is huge for the technician — instead of remembering to turn on seven things, they just turn on one.”

Director of Engineering Shane Piers said using advanced technology helps Medbio improve quality and reduce

risk, but the overarching philosophy is to reduce variation.

“Some of our customers actually require that the first 10 shots be thrown away, and you have to prove that you threw them away,” Callaghan said. “So we’ve adapted that across the board, which is where the ERP system ties in and records it.

“I think our customer expectations and requirements have increased significantly in the last three to four years,” he said.

Asked how Medbio started on the path to Industry 4.0, Callaghan said the first step was to implement more automation.

“In general this, we hired Ethan [Bruyn] to help do this and that’s why he’s leading the charge and is building a staff to help maintain our progress,” Callaghan said. “Because, you know, Ethan can create it and make this stuff do wonders, but he can’t be here 24/7.

“So the next challenge is how do you train and educate a staff that can handle those technologies, because it’s definitely a level above just a what we call us a plastic technician,” Callaghan said.

Piers said Medbio’s next step will be on the metrology side, to significantly increase the number of parts that it can measure.

“We’re keeping an eye on vision, laser scanning and CT [computed tomography] scanning, for when those hit a cost-competitive point where we can bring those into the mix,” Piers said. “We can produce a lot more parts than our metrology department can measure per our customer standard. So how do we pull the labor out and reduce variation there?”

Collecting

At Precision Custom Products Inc. in DeGraff, Ohio, the goal of using advanced technology was to help track of all the data that its injection molding machines were generating.

“When we started in the electric machine realm, we would have alarm logs and last change logs and things like that, but that would only hold so much information,” Brett Paulins, vice president of operations, said.

“So the longer time goes on and the more cycles a machine makes, you start to lose that data off the back end. So if you ever wanted to investigate when something that was either going wrong with the machine or something wrong with the parts, you really had nothing to look at, besides paper. For the most part, it was a guessing game of what might have been a potential issue,” he said.

PCPI was founded in 1995 and has 29 employees in a 35,000-square-foot plant. It uses Enterprise IQ ERP software from IQMS, and it monitors operational and production data with Fanuc’s LINKi software.

“The Fanuc software really tracks so much more information,” Paulins said. “Rather than just having cycle and production information, it’s tracking actual machine settings and parameters every cycle that’s made on the production floor.”

Is that too much information? For someone with an injection molding background, having a history of all the data points helps him to troubleshoot problems.

“My goal was to have a way to look back at that information and be able to make sense of it, and have some direction to go and rather than just guessing based off of whatever my experience was with a certain part or a certain tool,” Paulins said.

He said customers did not require PCPI to implement Industry 4.0, but they benefit from it.

“We get people who come in and tour our facility, and they say that we’re well beyond the technologi-

cal advancement compared to some much larger businesses,” he said.

“I would say over the last 10 years, we’ve made sure that our equipment is up to date so we can be ready for whatever the next advancement or opportunity that comes through our building.”

Dawn Beelman, senior vice president and chief financial officer, said that as a close-tolerance molder of engineering resins, PCPI has the kind of customers that appreciate its level of technology. She added that the investment has paid off for the company, and not just in terms of dollars and cents, but also from a culture standpoint.

“If I went back and looked at labor hours, that’s probably going to be the biggest savings for us,” she said. “Just the simple act of taking a process that once took nine people, and now it takes three or four, is important. And speaking for myself, the days of me having to dig through files to get copies of invoices for the auditor are long, long gone. I mean, it’s just a couple of clicks of a mouse and it’s right there in front of you.”

The same advantages apply for documenting information for ISO and customer requirements, she said.

Going lights out

Louis Columbus, a principal at Paso Robles, Calif.-based Delmiaworks, formerly IQMS, isn’t surprised that plastics processors cite different reasons for pursuing Industry 4.0.

“Every one of them is attempting to use the selected group of technologies that comprise Industry 4.0 to complement their own business model,” he said. “Some of them want to achieve shop floor efficiencies; sometimes they talk about growth.

“But in the very near term, it’s,

‘How do I get more done in less time? How do I drop my per-unit cost? How do I drive better evidence and increase operational efficiency?’

“Typically what brings people to us is quality,” he said. That makes sense because a processor that’s reporting, say, a typical 20 percent operating margin, may see improving efficiency as a way to boost that to 40 percent, or more.

“They equate the quality they deliver with the customer experience they’re delivering,” Columbus said.

Columbus said the goal for some North American plastics processors is to achieve lights-out manufacturing.

“That comes down to the labor shortage. I don’t think anybody goes into it with the primary objective of reducing headcount. Plastics companies want to take the people that they have and put them into more challenging positions,” he said.

“They want to use lights out to get better yield rates, and they’ll take their people and put them on a completely different track of solving problems and becoming quality engineers,” Columbus said. “People are incredibly valuable, and people with experience in the company are priceless.”

What’s the future for Industry 4.0? In the short term, Columbus said traceability and employee training and enrichment will become more important.

Longer term, he sees the factory of the future being able to quickly take advantage of opportunities and pivot into new markets.

“And you can do that aggressively because you have a lot of confidence. You can say, ‘I know how this machine works. I can move into medical products instead of automotive, because I have the assurance of that data, and every decision I’m making is data-driven,’” Columbus said.