

CONNECTING THE MOLDING COMMUNITY

INJECTION MOLDING

Toro's rejects dry up

An anything-but-ordinary, standard-model, closed-loop dryer helped The Toro Co. to reduce its scrap rate and setup time in a manufacturing cell producing precision molded, laser-etched products. —Carl

Kirkland

Use of an H Series four-bed dryer from Dri-Air Industries Inc. (East Windsor, CT) helped the Irrigation Products Div. of The Toro Co. (El Paso, TX) reduce its scrap rate on the laser-etched parts that it precision molds in Dow's Pellethane TPU from about 20-25% down to .0003%. What's more, the dryer helped to cut setup times for the cell in half.

You might think that a \$1.8 billion company that molds parts for irrigation products wouldn't have much use for materials that hate water. But the folks at Toro's El Paso facility (Toro El Paso) say they need the long-term durability, chemical resistance, and all of the other performance properties that engineering



Below The Toro Co., a worldwide provider of outdoor maintenance equipment and precision irrigation systems, has launched an expansion and modification of its 250,000-ft² molding facility in El Paso, TX. **Above** Left to right are Michael Keane, Dri-Air Industries; Dennis Campbell, Toro; John E. Knipp, KPI Products; Brian Allan, Toro; Gilbert Muniz, Toro.

resins provide to extend the service life of their products.

Laser light reacts with a \$17-\$18/lb concentrate mixed in with the Pellethane run in this cell to produce white etchings on finished parts. Toro found that the press-side Dri-Air unit was capable of metering just the right amount of dry air to dry this special concentrate, which is

mixed with the dried Pellethane that is conveyed by dry air to its 150-ton Toyo TM150-G2 hydraulic press.

Under the leadership of a 25-year injection molding veteran, Dennis Campbell, operations manager, along with an equally experienced management and technical team, Toro El Paso is undergoing a lean transformation along with a



Toro El Paso fast facts

- 80,000-ft² molding area
- 71 molding machines, 25-1450 tons
- Molds anywhere from 7 million to 15 million parts per week—about 340 million pieces per year
- 360 salaried and hourly workers, working four shifts, 24/7
- Plans for at least eight more RJG Master Molder 1 and four more Master Molder 2 graduates this year
- Standardizing on Toshiba all-electrics; current capacity includes six new Toshibas—five 390-ton electric and one 1450-ton hydraulic. Also evaluating Maruka/Toyo presses. Yushin robots are standard.
- More than 800 active molds, plus another 500-plus at its 42-press



A closed-loop, Dri-Air H Series four-bed dryer precisely and repeatedly dries TPU filled with a special concentrate that allows Toro to laser-etch precision molded sprinkler components. Toro was so pleased with the dryer's performance it bought 30-plus more.

comprehensive workforce training initiative, one using Master Molder certification course programs from RJG Inc. (Traverse City, MI). It's also in the midst of a capital equipment transformation. After seeing what its Dri-Air dryer could do, Toro bought more than 30 others.

Extraordinary drying

Toro El Paso's 250,000-ft² facility was occupied by at least five different companies before Toro bought it in 1995. The Irrigation Products Div. moved in about five years ago, and two years ago Toro El Paso's management team began to lead its transformation into a high-precision molding operation, one capable of molding complex products to ± 0.001 -inch tolerances. Less complex molding and all assembly work is done at Toro's operations south of the Rio Grande in Ciudad Juárez, Mexico.

In addition to TPU, Toro El Paso runs a variety of other filled and unfilled engineering thermoplastics, including acetal, nylon, and ABS. It also molds in rigid PVC. The El Paso facility molds more than 900 different parts that it ships

to its sister plants in Juárez. This accounts for about \$9.5 million worth of resins that accommodate 266 resin part numbers, which consist of about 60 different resins and a variety of colorants.

Several of its runs are small-volume, which is why it has no centralized material drying and conveying system, according to Brian Allan, senior manufacturing engineer of plastics and a 23-year Toro veteran.

"The dryer systems' performance surpassed our expectations," Allan says. Dri-Air customized each of Toro's dryer systems for each application. Customization allows for quicker material changeovers—a critical factor in a plant processing so many materials. Allan also says the Dri-Air's precise metering capabilities allow Toro simply to dial in the desired regrind percentage.

"One more thing," he adds. "These Dri-Air units are nice looking—the aesthetics of our manufacturing operation are important to us. Our new dryers have a small footprint, and they're also easy to move around—a great ergonomic design."

Extraordinary service

Another plus for Toro was the comprehensive training program provided by Dri-Air and John E. Knipp, owner of KPI Products (El Paso, TX), Dri-Air's area sales rep.

"The training provided us with valuable troubleshooting information to ensure proper operation and the highest productivity," says Gilbert Muniz, Toro El Paso's lead materials handler. Muniz supervises the plant's team of materials handlers, who work in four shifts, 24/7.

"These systems cut our drying time in half, and the moisture reading on the hoppers provides the exact dewpoint settings, so we don't have to fumble around at its control panel to find the information."

He adds that they're also easy to clean. "We don't have to take anything apart. The latches make it simple to access the hoppers and there are no screws to lose. The doors are laser cut and there are no seals to worry about, so we don't lose drying efficiency from losing seals, which seems to be inevitable with other models."

Toro's Campbell also gives high marks to Knipp's aftersales service initia-



The precise metering capabilities of its dryers allow Toro to simply dial in the concentrate percentage required for its laser-etched components.

tives. “John’s coming in practically every week, making operational suggestions and running tests,” he says.

Toro has standardized on Dri-Air systems, but Campbell says he’s not an easy sell. “We have to ensure that we’re get-

ting the best value. We’re consistently looking at at least three vendors for different pieces of equipment, examining the pricing, the service capabilities, and the delivery times each provides. We don’t want to look back and say we didn’t get the state of the art.” ■

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Employee empowerment at Toro

According to Dennis Campbell, operations manager at Toro’s El Paso facility, “Toro takes great pride in the investment it makes in its people. We focus on technical training of all personnel as a fundamental component of our investment in new equipment and technology. Our employee involvement and empowerment is critical to our success and we have received a tremendous amount of recognition from the community.” Toro was recognized last year in Forbes magazine as being one of the “Best Big Companies in America.” It was the sixth consecutive year Toro received such recognition.

Campbell says that though Toro El Paso has been successful in building a solid foundation in training its folks on the floor, the company continues to invest in developing the skills of its people and in new technologies to move the company into high-precision molding.

In addition to intensified training in lean manufacturing and a continuing commitment to conformance with ISO standards, Campbell is a staunch proponent of the training programs and process control systems being offered by

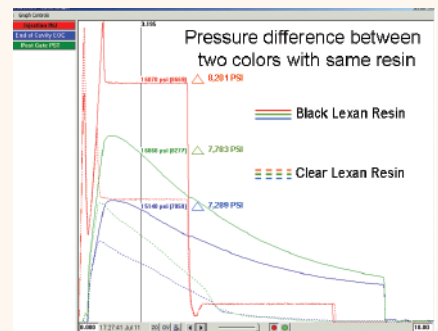
RJG Inc. (Traverse City, MI).

Each Toro El Paso process technician will receive 85 hours of training in RJG’s Master Molder Certification Series this year. He plans to have eight new fully trained Master Molders on board by year’s end.

“RJG puts all the pieces together—a scientific understanding of the process, plus a systematic approach to problem solving,” Campbell says. Interactive training courses from Paulson Training Programs (Chester, CT) also are used in-house, he says, for “baseline” training.

“In the last couple of years, we’ve had a 33% increase in output, with the same workforce. Our reject rate was 4.5% of our total sales one year, and we brought that down to 3% the next year. We expect we’ll see that we’ve gotten it down into the 2% range when we analyze the 2006 figures, and I believe our training programs and our use of RJG’s process control technologies are directly responsible for our successes.”

Of the 34 new tools that had come in when we visited Toro, 16 were equipped with RJG sensors. The accompanying



An RJG sensor accurately monitors the effects of color changes on melt pressure.

RJG graph shows the cavity pressure differences between color changes of the same material in a single-cavity RJG sensor-equipped tool.

“The pressure differences between the two colors are significant,” Campbell says. “I did not realize that a color change would have such a significant viscosity change—thus the difference in cavity pressure. The data tells the truth.”

“RJG makes it clear, ‘This material has to be this dry,’ he continues. “You have to have all the pieces to solve the puzzle.”

A bigger, better Toro

In the midst of a large expansion project, Toro's El Paso facility added five 390-ton all-electric Toshiba presses in 2005 and a sizable, 1450-ton, twin-platen Toshiba in 2006 to its existing 62-press capacity. Yushin servo robots are a company standard. Plans call for even more expansion within the next three to five years.

Its significant capital investment in both infrastructure and equipment reportedly is aimed at improving its high-precision molding capabilities, safety, and factory ergonomics and appearance.

All cardboard boxes will be replaced with plastic returnables, for instance. And, regarding safety, Toro El Paso's accident rate reportedly is lower than the plastics industry average. "We've bought five all-electrics, more than 30 new dryers, a new closed-loop Thermal Care water tower, which will allow us to add eight more molding machines, and we've replaced every inch of water-line," says Toro El Paso's Brian Allan.

The facility's 80,000-ft² molding area has 28-ft ceilings and plans call for epoxy-coating the entire room's floor. The big 1450-tonner, the largest machine in the shop, will be housed in a new room of its own on the floor.

The new big machine is in an area once used for parts assembly, which is now a storage room for finished parts warehousing. Assembly operations have been moved to Toro's facility across the Rio Grande.

Materials are qualified and part quality is verified in a quality room, equipped with advanced equipment, such as an Optical Gaging Products Smart Scope video inspection system, a laser inspection system from ShapeGrabber, and a Mitutoyo CMM.



A brand-new 1450-ton, twin-platen Toshiba is a recent addition to Toro El Paso's press capacity.

Mold repairs and engineering changes are performed in its equally well-equipped toolroom.

Although it's still a work in progress, Toro's plant is brightly lit, fully air-conditioned, full of lean 5S signage, and equipped with several electronic bulletin boards posting everything from quality performance records and shipping costs to Juárez to employee birthdays.

More photos of Toro's new purchases can be found at immnet.com.