

GETTING SMART IN PRECISE MOLDING DEMANDS

All-electric machines help support one molder's disciplined approach.

PMC, a fourth-generation, family-owned plastic injection molder based in Cincinnati, OH, does not shy away from the toughest jobs in medical devices.

In applications such as orthopedics, spinal, arthroscopic/sports medicine, cardiovascular, tissue biopsy, and more, the company produces components for implantables, handheld surgical instruments, and finished medical electronic devices – both sterile and non-sterile, Class 2 and Class 3. PMC also provides complex assembly and sterile packaging (thermoform and pouch) and manages sterilization for finished devices.

To meet some of these tough manufacturing requirements, PMC must continuously adapt and improve.

This is why company leaders have developed a rigorous system they call SMART (Scientific Manufacturing Assures Reliable Throughput). SMART is a scientific approach that PMC applies to every aspect of product/project development and manufacturing. It focuses on following the value stream from material receipt through delivery to customers, enabling the company to deliver, with consistency, complex, hyper-precision components, and assemblies.

DESIGN, ENGINEERING

The depth of experience PMC has in its technical staff is essential to its SMART approach. The company provides front-end design and engineering support to customers, often working with them in the early concept stage. Services include design for manufacturability to help optimize products for lean, cost-effective manufacturing. It also provides manufacturing engineering services as customers consider scalability and mul-

multiple manufacturing options.

PMC engineers use ProEngineer in house, but also work with models from all of the major software programs.

The company has a dedicated Director of Process Innovation to work on both proprietary processing technologies for new applications, and to help solve the most challenging molding applications for customers. PMC's engineering staff also brings together product design, mechanical, manufacturing, and tooling engineering team members.

FACILITIES, MATERIALS

PMC invests extensively in state-of-the-art facilities to meet the precise demands of medical devices, including a Class 100,000 cleanroom, ISO 13485:2003 certification, and FDA Good Manufacturing Practices compliance at its plant in Shelbyville, IN.

The company also works with a variety of advanced materials, including:

- PEEK – Unfilled and filled polyetheretherketone;
- Bioabsorbables – Lactide, Polylactide, Polyglycolide, and Lactide/Glycolide copolymers;
- TPU – Thermoplastic Polycarbonate Urethane;
- PPSU – Polyphenylsulfone; and
- ABS and PC – Acrylonitrile Butadiene Styrene and Polycarbonate.

ADVANCED EQUIPMENT

The engineering-grade materials PMC uses present processing challenges as well as high material costs, making efficient, exacting processing equipment a must.

“When materials cost thousands of dollars per pound, every fraction of material savings we can achieve



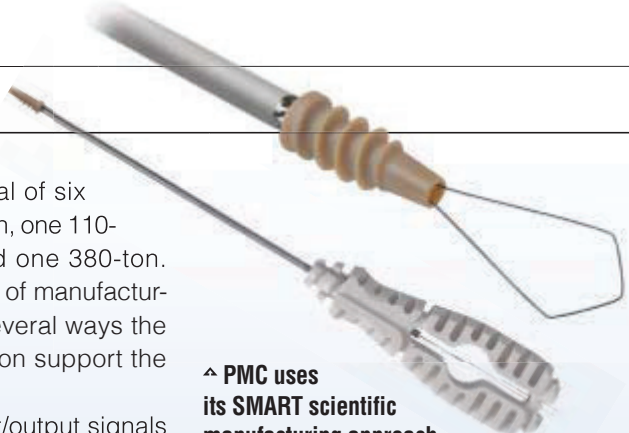
▲ PMC's fleet of Roboshot machines enables ultra-precise molding in the company's Class 100,000 cleanroom.

is important,” says PMC President Lisa Jennings.

Working closely with the PMC team to address the unique needs of their sophisticated operation, Milacron Plastics Machinery has supplied Roboshot all-electric injection molding machines.

PMC deploys a total of six Roboshot’s – two 33-ton, one 110-ton, two 165-ton, and one 380-ton. Lowell Green, director of manufacturing, PMC mentions several ways the machines from Milacron support the ultra-precise molding:

- Customizing input/output signals



▲ PMC uses its SMART scientific manufacturing approach to produce a variety of highly complex medical components.

and controls for new applications;

- Quick troubleshooting with robust controls;
- Shot-to-shot consistency;
- Fast startup – for example, a new eight-cavity, hot runner stripper plate tool running consistently after just five shots; and
- Shot size flexibility.

The greater control of shot size, allows PMC to use injection rather than extrusion for very small implantable parts, and also use much less material, according to Jennings.

Perhaps most importantly, the machines are capable of achieving tolerance levels as low as 15µ to 25µ – one of the many reasons Milacron has become PMC’s provider of choice for new horizontal injection-molding purchases.

“We partner with Milacron because they help us optimize repeatability and precision control of all molding functions,” Green says.

Today, Milacron continues to apply its all-electric expertise technology to configure the machines for PMC’s challenging applications, while ensuring maximum uptime and productivity.

“We are running 24 hours a day, so when we need something serviced, it is critical that it be done immediately,” Jennings says. “The reliability of both our machines and our manufacturing partners is important, and we get that with Milacron.” **tmd**

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