

Automotive and transportation

Cavalier Tool and Manufacturing

Award-winning mold manufacturer relies on NX

Product
NX

Business challenges

Shorter delivery times
Helping customers make the right decisions
Improving efficiency through automation
Tackling the toughest tool-making challenges

Keys to success

Leveraging state-of-the-art technology
Automation at every level
Commitment to quality and continuous improvement
Investment in people, process and equipment

Results

30 percent year-over-year increases in revenue
Building complex molds 20 to 40 percent faster than competitors
Reliable on-time delivery
Recognition as 2015 Leadtime Leader Award winner from MoldMaking Technology

Leading-edge technology helps Cavalier succeed in challenging mold projects

World-class mold builder

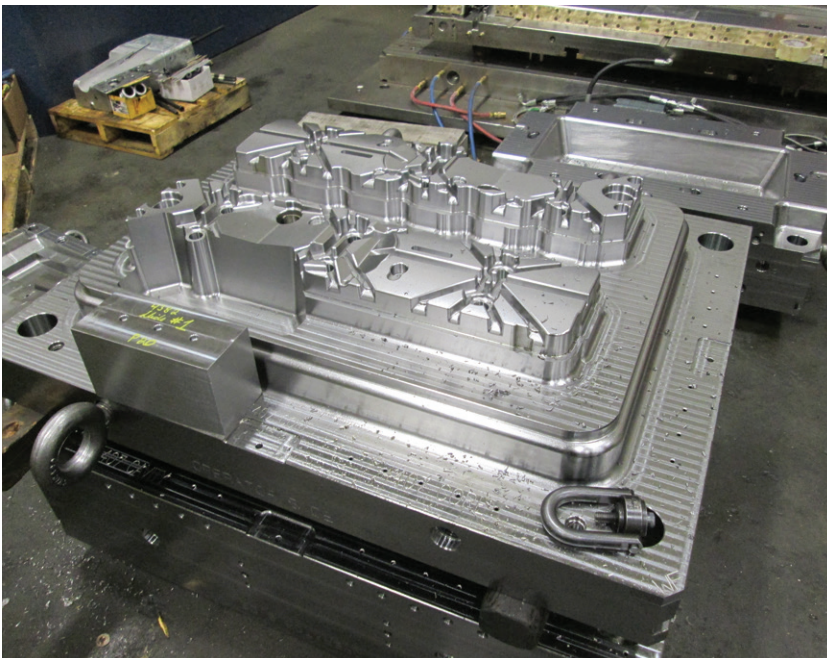
For more than 40 years, Cavalier Tool and Manufacturing (Cavalier) has been successfully serving customers worldwide in the tooling industry. Cavalier builds molds for widely diverse applications, including products for the automotive, commercial, recreational and domestic industries. The company provides solutions for injection, structural foam, gas assist, multi-shot, thermoset, prototype and compression molds.

Founded in 1975, Cavalier employs more than 115 people. With a 54,000 square foot facility containing state-of-the-art design and manufacturing capabilities, the company builds tools for 250- to 4,000-ton presses, and manufactures more than 200 molds per year.

Meeting tough challenges

"Anybody can build the small tools, the simple tools," explains Jim Korenev, system administrator at Cavalier. "We're going with the complicated things, the stuff that nobody wants to touch. There's a huge learning curve that we've already gone through, and we're making our customers happy."





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Jim Korenev
System Administrator
Cavalier Tool and
Manufacturing

Cavalier tackles the tough challenges in tool design with a commitment to quality and continuous improvement throughout the organization. "We have grown the business without adding bricks and mortar, but rather by developing our people, processes and equipment," says Brian Bendig, president of Cavalier.

To find the right formula for success, the company continuously investigates software, machine tools, equipment and processes that are state-of-the-art

worldwide. At the tip of the leading edge, Cavalier has discovered that newer, more efficient high-tech equipment and processes give the company a competitive advantage, even in challenging economies and against lower-cost global competition. Over the past five years, annual sales have increased from \$8 million to \$24 million and continue to climb.

"We tend to build tools much quicker – as much as 20, 30, or 40 percent quicker than our competition on very complex tools," says Bendig. "We're one of the best and we're very proud of that. We're the go-to shop, the guys who can get it done." Cavalier's commitment is reflected in the company's mission statement: Know what needs to be done. Do it right the first time. Do it better tomorrow.

Leading-edge technology for mold design

In pursuit of advanced technology, Cavalier long ago chose NX™ software from product lifecycle management (PLM) specialist Siemens PLM Software as its standard computer-aided design (CAD) system. When Korenev was manager of the engineering department in the 1990s, he wanted to implement a solid modeling system and chose Unigraphics software, the precursor of NX. A subsequent release of the software included Mold Wizard, an advanced toolkit developed specifically to accelerate mold design. "We started out with one seat, began using it and realized the power," Korenev says. "As we have steadily gained engineers to design our products, we have grown to eleven seats."

NX is the exclusive mold design system for Cavalier. It includes process automation tools that streamline mold design, from part design to tool design, assembly design and tool validation. With a step-by-step mold design workflow, NX combines advanced automation with moldmaking knowledge and best practices. Mold designs are dynamically associated with part designs, helping Cavalier designers to respond quickly to design changes.

Efficiency in mold design

To begin the typical project, Cavalier prepares a quotation based on a CAD model of the part to be molded. "First we look at moldability – how are you going to mold this part?" Korenev explains. "The first consideration is what size press will be used, so we calculate the volume of the part to determine the required fluid pressures of the plastic. Then we look at draft and undercuts and other aspects of the part that could affect the molding process." With NX, Cavalier can accept CAD models in virtually any format, including native files from all major CAD systems and in neutral exchange formats like STEP, IGES or Parasolid® software format.

NX includes part analysis tools that help Cavalier assess moldability, including wall thickness checking, draft angle analysis, undercut region detection and radius evaluation. Based on this assessment, Cavalier will consult with the customer on feasibility. "Sometimes we point out that in certain areas of the part there are problems," says Korenev. "There may not be enough draft or angle to set the texturing. There may be lines on the part that you have to produce, and we need to know if it's okay to have a slide action on the visible surface of the



part. Ribs may be too thick, causing sinks in the part. There are many questions."

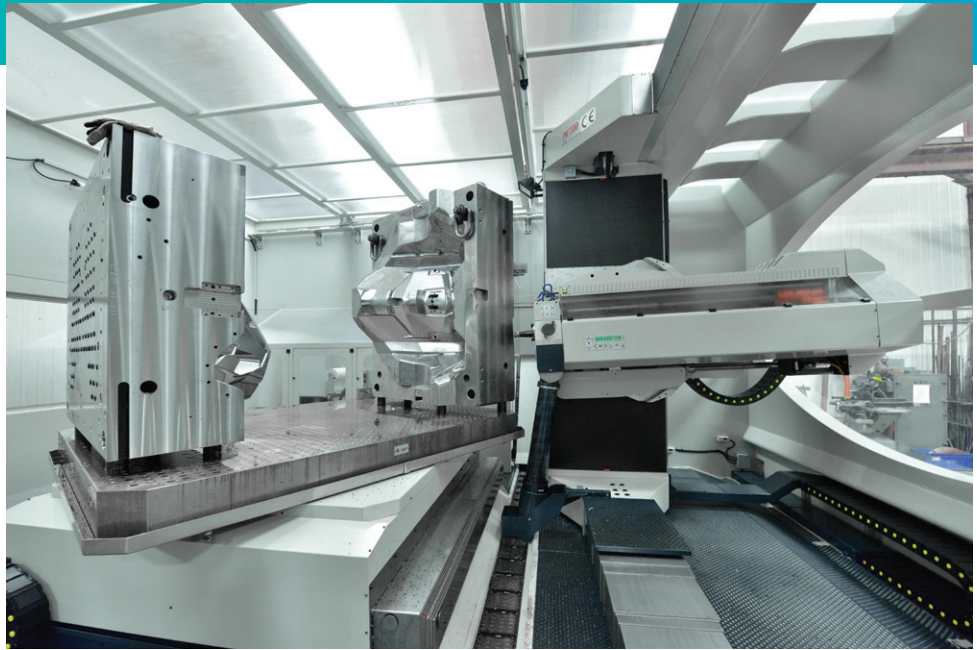
Another frequent problem is the quality of surfaces in the CAD model, which can affect the mold machining and final part quality. "Sometimes we get CAD models with what I call 'broken glass' surfaces made of many patches," says Korenev. "The more patches you have, the more likely that the file will get corrupted or be out of tolerance. It's very important to have clean CAD models."

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Depending on the part model, Cavalier's response to the request for a quotation may be a simple presentation outlining the feasibility issues. In other cases, the Cavalier team creates a quotation with estimated pricing and production timelines.

In some instances, the engineering team uses NX to build a preliminary CAD model of the mold to validate the accuracy of the quotation. For this purpose, Cavalier has created a custom program that uses NX to automatically create a complete mold base. Mold designers can supply a few parameters, such as distances around the part in the X or Y directions, and then the program selects standard plates based on the part dimensions to create the mold base. "In 15 minutes, we can have a detailed 3D model with steel all around the part, all the plates in the mold base," Korenev says. "It uses the NX user interface, but it's our program."

Once the customer approves the quotation, the Cavalier team begins detailed development of the mold. Using NX Mold Design, design engineers split the core and cavity, building the parting line and separating the two. As the mold assembly becomes more complex, engineers use the color-coding capability of NX to visually

distinguish details – for example, the seal-off where the two pieces of steel touch in green, part faces in gray, runner systems in blue, venting systems in pink. The color-coding helps the entire development team to immediately understand the mold structure and function.

The mold design process at Cavalier results in a complete 3D assembly model with every detail of the tool produced with NX. The engineering team uses NX to create an accurate bill of materials (BOM) for the mold and, when necessary, 2D engineering drawings.

All of the design data needed for manufacturing is handled by Cavalier's product and project data management systems, which automatically convert the NX mold component models to files used directly for numerical control (NC) programming and machining operations.

The facility at Cavalier features advanced-technology equipment, including multi-axis, multi-function and high-speed machining centers with high-capacity tool changers. The most recent additions are three sinker electrical discharge machines (EDMs). The shop is a model of efficiency, with automation at every level, and runs 24/7 with minimal manual intervention.

Solutions/Services

NX

www.siemens.com/nx

Customer's primary business

Cavalier Tool and Manufacturing Ltd. is a respected global manufacturer of mid- to large-size molds. Cavalier builds molds for widely diverse applications, including products for the automotive, commercial, recreational and domestic goods industries. Cavalier has solutions for diverse needs including injection, structural foam, gas assist, multi-shot, thermoset, prototype and compression molds. www.cavaliertool.com

Customer location

Windsor, Ontario
Canada

Partner

Longterm Technology Services
Inc.
www.longtermtec.com

Customization with NX programming tools

In his experience with the CAD system, Korenev has written programs to automate as many functions as possible, using the full range of application programming and customization tools available with NX. These include the Graphics Interactive Programming (GRIP) language from earlier versions, the Visual Basic (VB) application programming interface (API), journaling and NX SNAP™ software.

"Programming is important in automating things that you use every day, maybe four or five hours a day," Korenev explains.

"Those things should be as simple as possible, and they should be specialized. Programming can remove extra steps in a process, or reduce pointing and clicking." In addition to automatically creating mold bases, Cavalier uses custom programs to streamline insertion of attributes in mold assemblies, automate engravings and accomplish other functions more efficiently.

Cavalier works closely with Longterm Technology Services Inc., a Siemens PLM

Software channel partner that specializes in automotive tooling and mold design. Besides supporting Cavalier's NX installation, Longterm has programming expertise and assists Cavalier with automation projects, helping to go further on the leading edge. Longterm's collaboration with the NX software development team has resulted in software enhancements requested by Cavalier. "The software development team listens to their customers, and they have done a wonderful job so far with NX," says Korenev. "I can see that some of the things Cavalier has requested have been implemented."

Recognizing success

Cavalier's efficiency, quality and innovation in mold manufacturing were recently recognized by MoldMaking Technology, which honored Cavalier with the 2015 Leadtime Leader Award. The annual award acknowledges the outstanding efforts of North America's top manufacturers. Cavalier's standardized, flexible process, advanced technology and people-centric philosophy were identified as the company's key leadership attributes.

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www.siemens.com/plm

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