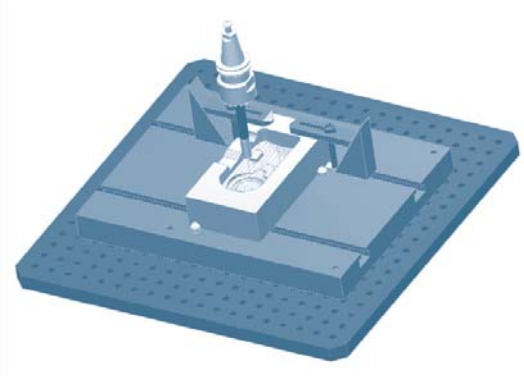
# Manufacturing Engineer Tools in Pro/ENGINEER

## Adapting and Winning in Today's Competitive Market

**Until recently, manufacturing shops remained profitable by machining relatively simple, lower tolerance parts, with high production rates.[1] Today, however, customers are outsourcing basic machining due to lower overseas labor rates and lax regulations, which means manufacturing engineers must adapt if they want to survive–and thrive.[2]**



Toolpath simulation of a high speed roughing sequence in a mold cavity.

To respond to these competitive pressures, manufacturing engineering companies have developed a new strategy to outwit the competition, that is, to take on more complex design work that's difficult–if not impossible–for customers to outsource overseas.

And while that strategy brings new revenue streams, it also forces a shift in core engineering competencies: manufacturing engineers now must be able to manufacture more complex parts, with higher quality, at a faster rate. Plus, to add value and lock out the competition, shops must deliver faster turnaround times, better customer service, and more complete service offerings.[3]

How can you meet these challenges head-on? In one word: technology.

### More Complex Parts–Faster

Machining high quality, complex parts today requires two components: a 5-axis machine and an engineer who knows how to apply it. No doubt the learning curve to master such complicated machinery is a concern; however, today's best CAM solutions are so well engineered, they automate most of the work for you.

"The transition to CNC programming was relatively easy because of the level of automation built into CAD/CAM programs today," says Mike Giboney, owner of Tooling & Assembly Solutions, an eight-person machine shop in Simi Valley, California.

Without any previous experience using a 5-axis machine, Giboney's shop was able to cut in half the amount of time to deliver a multitude of complex parts–from six months to three–shortly after purchasing its 5-axis machine.[4] You can see similar results by using Pro/ENGINEER.

Pro/ENGINEER reduces programming time and increases program efficiency by complementing the skill of the NC programmer. With Pro/ENGINEER, manufacturing shops can leverage their 3D solid model to quickly and simply create an optimized toolpath for machining complex parts. Engineers can capture, automate, and reuse best practices via manufacturing templates, which makes the solution even easier to learn and implement.

With the right machinery however, virtually any firm today can machine complex parts to specification.[5] Today, customers are looking for shops that provide added value, and with Pro/ENGINEER, you have the power to go that extra mile in quality, design and speed.

After you master the tools and develop the skill to machine complex parts, the next challenge is: how can you set yourself apart from the competition?

### More Accurate Quotes–Easier

The first order of business today in securing a job is to provide a competitive quote. The problem: if your quote is too high, you won't win the business, but if it's too low, you can't be profitable. The trick is to make sure you completely understand the part and its manufacturing requirements. Often, the quote is guesswork for two reasons: interpreting the design from a 2D drawing is very difficult, and there's no time to do an in-depth analysis to ensure an accurate quote. The answer: a solution that allows you to quickly gain insight into the design so you can accurately determine how to manufacture it.

Pro/ENGINEER simplifies the quoting process so you can develop an accurate quote fast. With extensive data interoperability tools, Pro/ENGINEER makes it easy to import and convert your customer's 2D data, regardless of its original format. Pro/ENGINEER offers a host of capabilities such as sectioning and transparency to fully interrogate the model. With a complete set of tools to fully evaluate every feature and all geometry, you can fully understand the part and deliver an accurate quote–fast.

1. G. Chris Koepfer," Getting What You Wish For," Modern Machine Shop, (October 2004)
2. Mark Albert," We Can Make It," Modern Machine Shop, (August 2004)
3. Kenneth Harrison,"What Kind of Work Is Resistant to International Outsourcing", Modern Machine Shop, (October 2004)
4. Chris Koepfer,"Five Axis Machining – When You Want It", Modern Machine Shop, (July 2004)
5. Mark Albert," We Can Make It," Modern Machine Shop, (August 2004)

## The Power to Respond Quickly

Turnaround time is also an important ingredient in gaining an edge. Today, engineers are wasting too many hours translating and preparing data to generate toolpaths.[6] Often, the engineer generating the NC toolpaths has a full list of other tasks to manage in parallel, such as setting up the next job and overseeing machining centers. Imagine having a CAM program that not only was easy to use, but also eliminated data translation?

Pro/ENGINEER automatically understands the model, so there is no need to translate data to generate toolpaths. With its extensive data exchange tools, you can import any 2D or 3D data, and avoid hours of recreating or repairing data.

Pro/ENGINEER also saves time in model inspection. Today, writing up an inspection routine from a part print takes hours.[7] What if you could use the 3D CAD data directly for inspection? With Pro/ENGINEER, you can automatically create programs to drive Coordinate Measuring Machines, or compare scanned data directly to your 3D CAD model, saving tremendous time during inspection.

Pro/ENGINEER also saves time on design changes. When making a change to a part, your toolpaths update automatically, which ensures they're always up to date.

## Strengthen Customer Relationships

Establishing strong customer relationships is also essential to gaining a competitive advantage. The fact is, if costs are reasonable, a customer will usually choose a vendor who it knows and trusts, rather than one offering the lowest bid.[8]

Good communication is key to building those relationships. Getting involved with the customer early in the design cycle enables you to add value, especially if you can catch potential manufacturing problems early, when it's easy to make changes. The problem up to now is having the time and flexibility to provide the visibility you need into the design. Imagine having a solution that would allow you to easily see the design as it is developing?

Pro/ENGINEER Design Collaboration allows you to securely share and view CAD data online with multiple stakeholders—customers, colleagues and suppliers. You can participate in customer design reviews, and offer your insight and expertise early in the design cycle when changes are inexpensive and easier.

## Expanded Service Offerings

One final competitive advantage is to be more than just a manufacturer, but a complete service provider.[9] For example, some manufacturers combine their ability to conceptualize a part, assembly, or a machine with the ability to build it.[10] By using your 3D CAD tools creatively, you can provide services that the customer cannot find elsewhere. What if your CAM solution offered more than just the ability to generate toolpaths? What if it offered you the flexibility to expand your capabilities, and scaled to allow you to offer additional services going all the way from art-to-part?

Pro/ENGINEER gives you the flexibility to easily grow your capabilities, so that a future investment in new machining technologies won't require a significant investment in new programming tools as well.

Pro/ENGINEER is the only 3D CAD package offering a complete art-to-part solution, enabling you to offer your customers more capabilities, such as NC programming and tool libraries, as well as support for 3-to 5-axis milling, 2-and 4-axis turning, and 2-and 4-axis wire EDM, and verification.

In addition, Pro/ENGINEER offers conceptualization, design, and analytical capabilities. You can even create special touches for your customers such as photorealistic images and process documentation. The possibilities are truly unlimited.

## The Best Competitive Advantage

From art-to-part, Pro/ENGINEER offers the unique solutions you need to stay competitive in today's market and to gain a distinct competitive advantage.

## Pro/ENGINEER Tools for Manufacturing Engineers

**Pro/ENGINEER Prismatic Milling**
Create, post-process, and simulate accurate and efficient NC programs for 2-and 3-axis milling.

**Pro/ENGINEER Production Machining**
Verify and optimize 2 1/2-to 3-axis, 2-to 4-axis turning, and 2-to 4-axis wire EDM.

**Pro/ENGINEER Complete Machining**
Create, verify, and optimize programs for all machine types: 2 1/2- to 5-axis milling, 2-to 4-axis turning, mill/turn machines, and 2-to 4-axis wire EDM.

**Pro/ENGINEER NC Sheetmetal**
Create, verify, and post-process toolpaths for turret punch presses and contouring laser/flame machines.

**Pro/ENGINEER Computer-Aided Verification**
Inspect parts and assemblies by creating CMM programs, based on Pro/ENGINEER design models, tolerances, and G-tols



6. Peter Zelinski,"Humility, Inc.", Modern Machine Shop, (July 2004)
7. Derek Korn,"Prototyping Has Its Place", Modern Machine Shop, (October 2004)
8. Kenneth Harrison,"What Kind of Work Is Resistant to International Outsourcing", Modern Machine Shop, (October 2004)
9. Derek Korn,"Prototyping Has Its Place", Modern Machine Shop, (October 2004)
10. Chris Koepfer,"Five Axis Machining – When You Want It", Modern Machine Shop, (July 2004)

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