SPECIAL ISSUE
CUSTOMER EXPERIENCE

The Proto Labs
Journal

2008 ISSUE 3

A TOOL FOR THE MOST DEMANDING CYCLIST

The iBike® power meter delivers precision and innovation at a fraction of the cost of the competition.

IN THIS ISSUE:

WALKING in the customer's shoes

I love technology, and I love being in a technology business. But I am periodically reminded that one of the challenges is not getting so wrapped up in technology that we forget our customers ...

Here at Proto Labs we certainly aren't immune to the charms of technology, and we've been fortunate in getting our most pointed reminders of the importance of the customer experience from day-to-day life occurrences. These reminders help keep us on our toes.

About a year ago, Proto Labs Founder Larry Lukis and I were in Japan. During a long wait in an airport, Larry got to wondering whether, since we can mill an injection mold in one day, could we also adapt the process to produce CNC-machined plastic prototypes from a 3D CAD model in a day? Never one to let a good idea sit, he called back to headquarters and asked that someone search the web for "fast-turnaround" CNC machining and place some test orders.

It took an entire week, in response to 3D CAD models we had sent out, for the first quotes from machine shops to begin trickling in. We placed some orders and by the time the first machined parts arrived, Larry had ordered and installed CNC machining equipment, had tweaked our mold-milling software to do the direct machining of parts, and had produced our first batch of finished parts in-house.

Additionally, we noticed a scarcity of information in the responses we were getting from vendors. Some of the quotes consisted of nothing but a faxed price based on a specified material, quantity, and time frame. They certainly weren't giving us the opportunity to experiment with material choices or turnaround times. Nor were they giving us feedback on our submitted models. The entire process left us — the customer — frustrated and disappointed.

As we pondered our own customer experience, it was clear that we had value to offer in the "fast-turnaround" machining market on the basis of speed and price and could offer a vastly improved customer experience.

Admittedly, we'd set high standards with the ProtoQuote® we were offering customers for Protomold's rapid injection molding. It appeared that by offering interactive quotes on CNC machining, design analyses, and real-time access to trained representatives, we would be filling a rather large void in the marketplace. In October, 2006 we introduced First Cut Prototype and started doing just that.

We've been very pleased with the market response and firmly believe that price and speed alone wouldn't have been enough. There's no question in our minds that the customer experience we offer has been a big part of First Cut's success, just as it has been for Protomold. We're dedicating this issue of *The Proto Labs Journal* to the customer experience and hope you'll find it useful.

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At Proto Labs, our goal is to bypass the middleman, deliver the benefits of direct sales, with speed and flexibility to create an extraordinary customer experience.

Customers upload 3D CAD models and get interactive quotes and design analyses within hours.

Automated toolpath generation and massive production capabilities lets Proto Labs produce parts from customer models in as little as a day.

If questions arise or changes are required, **customers have direct access to account managers, customer service reps and engineering staff.**

Online customer websites provide direct, secure, 24 hour access to detailed information regarding past and current quotes, orders, and other account information.

Proto Labs provides these services at **competitive prices** and without the added overhead of broker fees.

To see for yourself just how easy it is to get good parts fast, go to **WWW.PROTOMOLD.COM** or **WWW.FIRSTCUT.COM.**

Disintermediation
and the customer experience

Over the past 20 years, the term "disintermediation" has become more commonplace as companies continue to seek ways to drive down the cost of doing business. Simply put, disintermediation is the removal of intermediaries in the supply chain. Removal of the intermediary or "middleman," who adds no value, decreases cost, and places the customer one step closer to the merchant supplying the good or service.

Certain industries have been impacted by disintermediation to a greater extent than others. Millions of people now bypass a computer retailer to buy their computers from Dell® online, largely because of an easy-to-use and informative website. Likewise, many people choose to do their banking and manage their investments through online bankers and brokers such as E*TRADE®. Full-service gas stations, travel agencies, and traditional bookstores are becoming more and more scarce.

How has disintermediation affected the customer experience? All consumers of goods and services have likely experienced both good and bad examples of disintermediation. It's a pretty good bet that most people would admit that they don't mind pumping their own gas — until they need to fill-up during a pouring rain!

An example of good disintermediation is when a company removes obvious barriers and layers from the supply chain that no longer add real value. This in turn benefits the customer in the form of lower prices. Customers can also benefit by being in greater control of the buying transaction as a result of disintermediation. With no middle-man sitting in between the merchant and customer, the information flow between customer and merchant is improved, helping the buyer make a more informed buying decision, resulting in a more satisfying transaction.

For buyers of plastic parts, today's middleman is often a broker or sales agent who will shop a project out to a cadre of potential suppliers in search of the lowest price and fastest turnaround. While this approach certainly saves the customer the time of locating a supplier, the potential risk of poor quality parts is a valid concern. Furthermore, like all middlemen, the broker distances the customer from his supplier and adds additional overhead to the purchase price of the product.

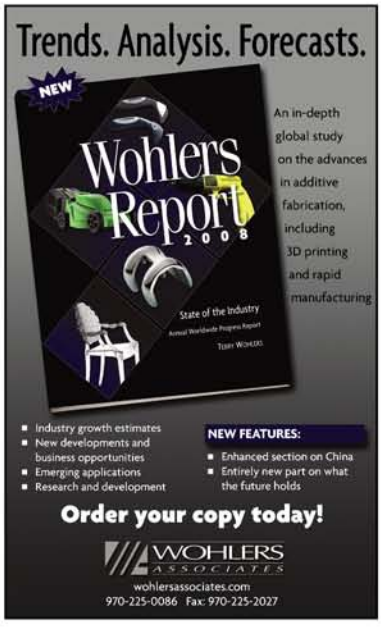
At Proto Labs, our goal is to bypass the middleman, deliver the benefits of direct sales — low overhead, fast turnaround, and direct customer-to-manufacturer communication — with speed and flexibility to create an extraordinary customer experience. We do that with a combination of cutting-edge production capabilities, educational tips and advice, live help when needed, and an easy-to-use informative website.

SELF-SERVICE
as a customer benefit

If you asked for a cup of coffee at the neighborhood cafe, "Get it yourself" might not seem like a friendly response. On the other hand, "Make it yourself at home" probably would, especially if the invitation included "anytime, day or night." That's the message we're sending with our new Proto Labs customer portal.

Proto Labs first introduced customer self-service in 1999 with online, next-day ProtoQuotes® and, a few years later, with online FirstQuotes®. "We saw the benefits of customer self-service with fast interactive quoting and design analysis leading up to a job, and we wanted to extend those benefits to the ongoing customer relationship," says Director of Business Development Bill Dietrick. "That's why we developed the customer portal."

Available 24 hours a day, the portal allows customers to set up password-protected account pages, where they can view their entire histories with the company, and a shopping cart where they can update their accounts and place reorders. Customer Chris Crowley of Table Mountain Innovation was asked to help test the new portal. "I liked the idea of being able to get information myself whenever I need it," says Crowley. "I just wanted to be sure that the process wouldn't be too complicated since I have plenty to keep me busy already."



"I like the fact that the portal is available 24 hours a day," he continues. "All the molds I have at Protomold, back to 2006, are on the system, so I can see when they were milled and how much they cost, and even view pictures of the resulting parts. I can get detailed parts history including the number of parts made in the mold, resins used, production and shipping dates, where each batch of parts was shipped, and how they were paid for. I can also manage current business through the same portal. I can order new molds or select existing molds and order parts from them with a simple shopping cart interface. I can choose the material, the quantity, and the lead-time, and place the order with a click."

PROTOMOLD CUSTOMER PORTAL

"To protect my private information, log-in is required for the customer portal, but it's no more complicated than necessary to provide security. My information is clearly laid out and navigation is simple. It's a very straightforward system that does exactly what it's supposed to do in an easy, understandable way. The new portal makes my job easier by providing lots of important data in a simple and useful way. That means I can spend less time doing administrative work and chasing down information, and more time designing products for my clients."

To sign on to the new Protomold and First Cut Prototype customer portals, go to https://portal.protomold.com or https://portal.firstcut.com.

A tool for the most **DEMANDING CYCLIST**

Delivering precision and innovation at a fraction of the cost

Among the training tools used by cyclists are small computers that allow the rider to manage his output in real time. These have typically cost between $1600 and $5000, but the Velocomp iBike® power meter sells for between $400 and $700 and does things no other cycling computer has ever done, according to company CEO John Hamann. These include measuring incline, wind speed, aerodynamic drag, and friction in the bike's drive train.

> "... We were impressed with what Protomold promised, but when we actually got the parts we were astonished."

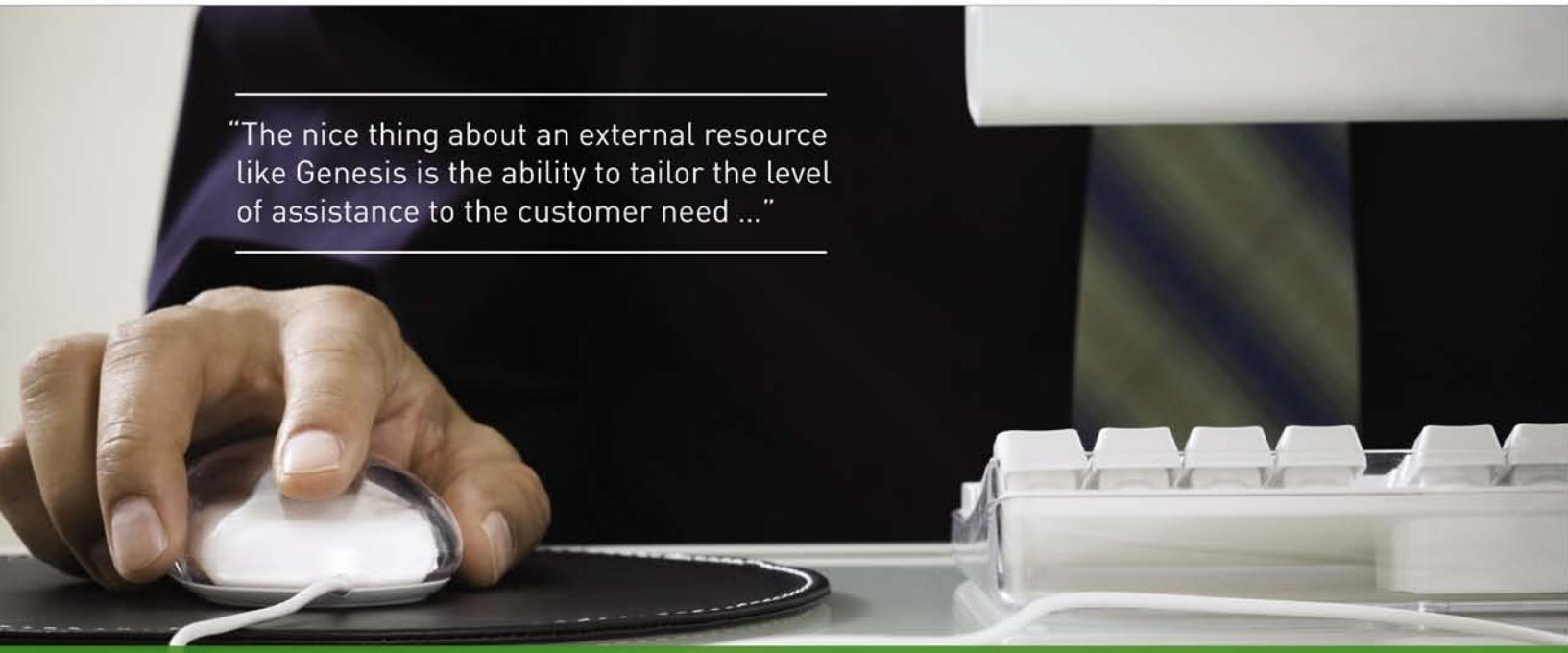
The iBike was born when Hamann teamed up with an engineer who shared his interest in bikes and computers. "Other power meters worked by measuring the forces applied on the bike pedal," says Hamann. "They were expensive, inflexible, and heavy. The breakthrough idea was to use two inexpensive, solid-state sensors: an accelerometer and a wind speed sensor."

"Newton's Third Law states that opposing and applied forces are always equal, and by measuring opposing forces the iBike would get the same power numbers as the other guys, but at a lower cost," he continues. "We could also do cool things like measure drag coefficient. Cycling pros spend thousands of dollars testing aerodynamic drag in wind tunnels. The iBike does it by telling the rider to stop peddling and measuring the loss of speed at each instant. Because the iBike measures incline and wind speed, it can easily separate out impact of drag coefficient on the bike's deceleration."

Hamann and his partner began product development in March 2005. "At Whirlpool and Sunbeam, we'd spend hundreds of thousands of dollars and years in product development," he says. "Working with Protomold, we eliminated a lot of the time, cost, and bureaucracy. At Velocomp, product development was a self-funded, 'no-overhead' process. We used SolidWorks to generate product shapes and drawings. We began with SLA mockups, then turned to Protomold for final prototypes and, eventually, production parts. We were impressed with what Protomold promised, but when we actually got the parts we were astonished. I'd have expected to spend tens or hundreds of thousands of dollars, but we got production quality parts with a finish you'd expect from the best in the world at a fraction of the cost."

Velocomp has been in volume production since September of 2006, and Hamann estimates annual sales growth at about 50 percent. "We have been delighted by the rapid and enthusiastic acceptance of the iBike by cyclists," he says. "With a partner like Protomold, we don't just offer a better product; we can change the way we do business. Instead of waiting 12 weeks for parts from China, we keep a small inventory and get parts as we need them, which lets us be fast to market and cash flow positive at an early stage."

"We got to see how fast Protomold could be this past Christmas. A new product was selling far beyond our expectations, and we were running low on some parts. We called Protomold on a Thursday and got parts by Saturday. Unfortunately, in my haste, I ordered the wrong part, so I corrected my order on Monday and got new parts on Tuesday. You can't get better than that!"



The ins and outs of outsourcing design

Larry Gonier is a designer's designer, literally. His company, Genesis Tek LLC, is an outside resource for companies that are developing new products. "We work on a wide variety of products," says Gonier. "We've helped design medical devices, theatrical props, electronics, a toothbrush, and brackets for Bimini tops for boats. We recently designed a ¾"–scale RC helicopter. "We maintain a small permanent staff and a larger group of subcontracted designers whose specialized skills we can call on to address customers' specific projects. We can be working on 20 or more projects at any time."

"The nice thing about an external resource like Genesis is the ability to tailor the level of assistance to the customer need," Gonier continues. "Some customers need start-to-finish assistance. Others are fully knowledgeable but come to us because they don't have the engineering staff, or don't have the time, or don't have specific skills we can provide. Unless your need is continuous, working with an outside resource is less expensive than hiring specialized talent. It's like renting the cement mixer you're only going to need once in a few years."

"Communication is critical," says Gonier. "We use the phone more than email, and once we get to actual development, we use 'e-drawings' to communicate with customers. They run on either Mac or PC and allow the customer to rotate and explode drawings to see details. We can mark them up and put notes and comments right on the file, and customers who are willing to learn the process can do the same and send their notes back to us. An e-drawing gives our customer a clear idea of what we're doing and lets them provide feedback so we are sure we're staying on track. Internally we use GoToMeeting® software, which lets us share computer screens, and we've discussed the possibility of using that with customers as well."

"Once we're done on paper, we have prototypes made. They're critical for making sure that we and the customer are on the same page. For addressing ergonomic issues like button placement and, if it's an assembly, making sure everything fits, we use FDM in-house to make layered prototypes. If surface finish or function is critical we have prototypes machined by First Cut. It's amazing what they can do. Because they can match the resins that will be used in production, it gives us a chance to test and make any necessary changes before going to the mold. If volume isn't too high, we often use Protomold for production, but even if the volume will be high and we're going to use someone else for molding, we still use Protomold for testable prototypes."

"Over the years, we've learned how to deliver the advantages of an outside resource without losing critical information in translation. For example, years ago, a client sent us a battery holder that had been misdesigned so that the batteries didn't fit. We redesigned it to hold the batteries, but then it didn't fit the rest of the assembly. Now we ask for all the components even if we are just working on some of them. It's one more way we maintain communication with our customer throughout the design process."

Bridging the gap between

MANUFACTURABILITY AND THE CUSTOMER

A hallmark of successful companies is their ability to consistently develop products that delight and amaze their customers. Product designers play a significant role in achieving this goal. Key decisions made during the design phase of a project will determine the overall satisfaction of both the external customer (the buyer) and the internal customer (management and production).

Designing for manufacturability bridges the gap between customer need (delighting the end user) and designing a product that can be manufactured effectively within the context of an existing production system. Good design must address customer need, designing those requirements into the product, and then ensuring that the factory has the capability to effectively produce the product, meeting both cost and time objectives.

When manufacturability is not adequately considered, a part may not be producible. An example would be a part with internal features that cannot be produced by injection molding. This may cause delays in critical late stages of product introduction, but it gives the design team a chance to correct the problem before costly manufacturing begins in earnest.

In other cases, a component may be manufacturable, but at increased cost. An example would be an injection molded part with avoidable undercuts that necessitate the use of side actions. Obviously, the added complexity in manufacturing will drive up the price of the finished product or cut into profit.

Designing for manufacturability bridges the gap between customer need (delighting the end user) and designing a product that can be manufactured effectively within the context of an existing production system.

A third possibility is that a part may be manufacturable, but at a reduced yield rate. An example would be a molded plastic part with knit lines that weaken the finished part. This could increase inspection costs, increase rejection rates, or, worst of all, put inferior components into the finished product. Any of these situations make life difficult for internal customers — manufacturing, if they have to produce an unexpectedly difficult design; marketing, if the problem carries over into the finished product. They also cause problems for the external customer because poor process capability means parts are made right up to the tolerance limits, and they won't function well in the end product. If the parts are weakened due to knit lines or voids, they can't be as good for the final product as a well made part.

The good news is that all of these problems are preventable. Manufacturing problems can be easily anticipated in the design process by duplicating the manufacturing process in prototyping. Additive "rapid" prototyping processes like stereolithography (SLA) and selective laser sintering (SLS) can easily create prototype parts. However, in the process, these methods may fail to uncover potential production problems such as hidden features or undercuts. And because they are not representative of injection molding, they cannot predict the occurrence of knit lines. They are simply no help in identifying problems that will occur in manufacturing real parts.

Protomold's rapid injection molding process, on the other hand, is an excellent indicator of manufacturability. (For parts that will be manufactured by CNC machining, First Cut Prototype serves a similar function.) By identifying potential manufacturing problems early in the design process, when they can be easily rectified, these prototypes help designers better serve their internal customers in manufacturing and marketing. And, in the process, they serve the entire organization by helping get products to market faster, control costs, and improve manufactured quality. And of course, all those things are what the external customer needs.

To receive monthly design tips, visit **www.protomold.com/designtips.**

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What's New

WHAT'S NEW AT PROTO LABS?

Knock knock. Who's there? Customer. Customer who?

It's Customer you, but you don't have to knock at the Protomold and First Cut Prototype customer portals; these doors are open to you 24 hours a day, 365 days a year. As described elsewhere in *The Proto Labs Journal*, both portals are now complete and available to let you securely check past orders, place new orders, and manage other account related matters at your convenience. Come take a look at https://portal.protomold.com or https://portal.firstcut.com.

Floreat Salopia

In case you haven't kept up your Latin studies, it means "May Shropshire flourish," and it's the motto of the Shropshire [UK] County Council. The county of Shropshire is, of course, the location of Telford, home of Protomold EU. We're pleased to announce that Protomold EU is doing its part to help the county flourish, having won the Shropshire Business Award in the technology category for the second year in a row. This is only the second time ever that a company has won this award twice in a row.

The award is sponsored by *The Shropshire Star* newspaper and the Shropshire Chamber of Commerce. This year's award ceremony had an Olympic theme, and was hosted by former Olympian, now TV presenter and motivational speaker, Roger Black. Our congratulations to everyone at Protomold EU on this recognition of their hard work and dedication.

Speaking of twice in a row ...

After two years on the *Inc.* 500 list of fastest-growing privately held companies, Proto Labs was listed, last year, on the *Inc.* 5000. We've now made that list for a second time. Thanks to all of you for keeping us the world's fastest growing quick turn plastic parts manufacturing company.

In case you haven't heard ...

If perhaps you've been trekking in the Himalayas or marooned on a desert island, you may not have heard that Protomold is now able to produce larger molds and hence, larger parts. Of course we can still offer up to four side actions and all the other capabilities you've come to expect. For details on our expanded capabilities go to www.protomold.com/DesignGuidelines_SizeLimitations.

Come to the show

Both Protomold and First Cut Prototype will be exhibiting at the MD&M (Medical Design & Manufacturing) show in Minneapolis on October 22-23 at the Minneapolis Convention Center. First Cut Prototype will be in Booth #1714, and Protomold will be in Booth #1716. We hope to see you there.