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Hydroforming Design Light AB seizes

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Anyone who's stepped into the ocean has felt the fearsome power of water. A wave pushing you back to shore or

an undertow dragging you out to sea hints at the principles behind hydroforming, a metal-shaping technique that yields stronger, lighter and potentially more intricate products.

Hydroforming uses pressurized water to expand aluminum or steel into molds. The consistent, even force minimizes the weaknesses that can plague stamped and deep drawn parts. Hydroforming has long been popular in automotive and aviation, industries with deep pockets and high-quantity production runs; however, a Swedish company, Hydroforming Design Light AB, has found a way to make the process more affordable and suited to lower production runs. It uses less pressure but compensates with hydraulics and mechanical locks.

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"For the first time, a company can obtain high-quality hydroformed parts in quantities as low as 500 per year," explains Peter Alm, design manager and co-owner of the firm, whose customers include Volvo, Electrolux and Metso. The full-service company designs solutions for its clients then uses hydroforming to fabricate them, resulting in everything from exhaust pipes to bicycle frames to designer furniture.

Challenge: proving value to customers

Although Hydroforming Light AB is driving down the cost of hydroforming, the fabrication equipment is still expensive. Consequently, the company must demonstrate to clients that the value of hydroforming their products is worth the extra cost.



Alm spends much of his time analyzing these relative benefits by running computer simulations of the hydroforming process and performing design analysis on hydroformed parts. His AutoForm software displays strengths and weaknesses in finished parts, information that helps his engineers improve their designs.

During the first four years of the business, Hydroforming Design Light AB would communicate this same analysis information to customers through PowerPoint presentations, a medium that seemed to require customers to make a conceptual leap because of the limits of two dimensions.



Solution: 3D printing

To improve its effectiveness in communicating with customers, the company in February 2007 purchased a 3D printer from Z Corporation. A 3D printer is an output device for 3D data in the same way that a 2D printer is an output device for the words and pictures on a computer screen. The primary difference is that a 3D

printer produces three-dimensional models and prototypes in composite material. Z Corporation is maker of the world's fastest 3D printers and the only ones able to print objects in multiple colors.

Color was critical for Hydroforming Design Light AB since its finite element analysis results, in accordance with standard industry practice, were expressed in the colors of the rainbow. A bright red splotch on a part design indicates high stress or potential weakness. A blue patch indicates low stress or part strength. The decision to purchase the Spectrum ZTM510 3D printer from Z Corporation was easy for Hydroforming Design Light AB since no other company makes 3D printers that produce multicolored physical models.

Results: 40 percent shorter design cycles

Since February, Hydroform Design Light AB has used the Spectrum Z510 to create 3D physical models of part designs in full color to express to customers exactly how their models are superior to stamped or drawn parts. "You cannot underestimate the power of holding a full-scale physical model in your hands, turning it, grabbing it, examining it," says Alms. "It really makes a PowerPoint picture of the analysis results obsolete. Customers are impressed and absorb the information better. 3D printing with Z Corp. has made a big difference in our ability to demonstrate the added value of hydroformed parts, and as a result to secure business."



Creating 3D physical models has also enabled Hydroforming Design Light AB to save time and money by ensuring parts fit correctly in tooling and parts assemblies. "We don't assume – we know – that a part fits before we invest in tooling," he says. "In fact, we often print section models of assemblies – say, an engine – with a part embedded inside."

The company's design cycles range from a week to three months depending on the product, and they're getting shorter, according to Alm: "Because of our improved ability to communicate our value to customers and eliminate errors in design and manufacturing, we've been able to shorten our design and production cycle by approximately 40 percent."

Just as important, customers are impressed by 3D printing. "Rapid prototyping is not yet prevalent in Sweden," says Alm. "3D printing helps us position ourselves as technology leaders, which is an accurate message because we are technology leaders."

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