

PUMPING ENERGY INTO OFFSHORE DRILLING



FDM Technology Cuts Cost and Time to Market for Subsea

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— Andy Cates,
President and Chief Executive Officer,
The Subsea Company

At the forefront of providing solutions to improve the reliability of offshore oil drilling equipment and components is The Subsea Company, based in Houston, Texas. It produces parts and equipment for the subsea marketplace and early on acquired fused deposition modeling (FDM®) technology to its arsenal of equipment.

"We are constantly creating innovative products that provide solutions to the offshore drilling business," said Andy Cates, president and chief executive officer. "We create new products that prevent critical failures and optimize the performance of offshore operations. We don't machine mold or turn anything in our shop. We investigate, design, engineer, prototype, outsource the making of parts, assemble, test, inspect, document and ship. Design for our company is critical."

In June 2009, Cates added a Dimension® 3D Printer to his solution of 3D modeling software and the analytical tools that go with it. "We chose not to do any traditional AutoCAD drawings because 3D design and printing is so much better," he said. "3D printing brings a lot of design power to us. We can see how it interfaces with other equipment. Previously, we had used our conference room to view 3D images on a screen, but 3D modeling is even better. Once we print a part and have it in our hands, we can spot things we might want to change. 3D printing cuts down on our developmental time and expense."

"A typical mold could cost \$10,000 to \$100,000," said Cates. "We may print a 3D model three or four times before we mold it, and that is after multiple design meetings. This process could be three times more expensive without the Dimension 3D Printer."

Cates remembered when one of the Subsea products, a clamp that connects to marine risers, was being redesigned from 12 inches to 6 inches. On paper, it looked fine, but once it was printed, it looked very different. "Without a 3D printer, we would have moved ahead with the initial concept," he said. "We may have had to mold that part twice at \$15,000 each time. Even worse, each time we molded it would have set us back 14 weeks. That's 14 weeks we would not have gotten back. If that happens two or three times, suddenly we can't meet our commitments. 3D printing cut our time to market down by 28 weeks."

How Does FDM Compare to Typical Molds for Subsea?

Method	Cost	Lead Time
FDM Technology	3-10 times less expensive than typical molding, depending on the number of revisions	Days and weeks
Typical Molding		Several months

"In a former job, I tried to convince my team to use rapid prototyping, but they didn't see the value," Cates said. "This was frustrating because we were spending hundreds of millions of dollars on new equipment, and this would have been an excellent tool. I believe in the product."

"The Subsea Company invested in a Dimension 3D printer even before it had a building," said Kelly Knake, vice president of Impac Systems, the Stratasys reseller that sold Cates the printer. "We housed the machine for him and printed the company's first parts."

Today, Subsea prints dozens of products with its Dimension 3D Printer ranging in size from three inches to 12 inches. "We haven't had to glue any parts yet, but we could if we had to," Cates said. "If the parts we need are large, we simply scale them down. Every week we are printing something. The machine is in use 20 to 40 hours a week."

"Every finished product is unusual," he added. "Everything is a prototype that we develop into products for our international customers." Most parts are printed in ivory ABS. Some are sprayed with contrasting colors to identify intricate parts. "Our customers are impressed that we can come up with a concept and put a prototype in their hands so fast," said Cates. "As a small company, we can move quickly, taking a project from a request to an actual product in a few days. 3D printing eliminates most of the design iterations in the real world and reduces our risk of making a mistake in our design process."

Cates said the Dimension 3D printer works well, and he is pleased with the service provided by Impac Systems.

"We have wanted this equipment from the start of our company," Cates said. Today, the machine sits in the Subsea lobby and is an important part of the building tour. "People think it's a Coke machine," Cates laughed. "When we explain what the printer can do, our customers are captivated. Seeing the printer in operation often helps us close a deal."



FDM technology created a scaled-down plastic model of the Subsea proprietary control head for subsea regulators used in deepwater oil exploration.

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