



# Large, Complex and Gold-Medal- Worthy

## 3D Printing with a Unique New Material Gets an Athlete Back in the Game

Following an accident, professional motorcyclist and extreme snowmobiler Mike Schultz lost a leg. But thanks to his own dedication, a committed design team, and a flexible 3D printing material, he didn't miss a step. In order to compete again, this time on a snowboard, Schultz needed a unique prosthetic cover that could handle the pressure of intense athletic activity. He brought his fundamental design idea to the Center for Advanced Design (CAD) to help him make the prosthetic cover a reality. "Mike's design was intriguing, but it required significant machining," notes Marc McCauley, CEO and Design Engineer for CAD. "We cut the machining back significantly through a design path that led to 3D printing."

“

If you can test and prove your design with a functional prototype, all while saving time and money, that's a win in my book. And that's what we get with Stratasys 3D printing.”

Jesse Hahne

**President, Industrial Designer, CAD**



# From the Drawing Board to the Snowboard

Shultz's leg had been amputated above the knee, so the prosthetic needed to have two different joints built in. "It's a complex piece," said McCauley, "but all of us wanted to make sure Mike could get back to competing, which he loves."

The CAD team began by conceptualizing the design with the Wacom Pro 3D pen and then taking it into their CAD software of choice, SOLIDWORKS. "This project became a reality because Stratasys®, Wacom and SOLIDWORKS joined us by bringing together their leading technology," said Jesse Hahne, CAD President and Industrial Designer. "Wacom's pen technology is ideal for sketching industrial design. We can create and explore right on the screen. Designing is faster, and that in turn gets us to 3D printing of prototypes faster. The combination of Wacom tools, SOLIDWORKS and Stratasys 3D printing saves a lot of time in the design process."

"3D printing allows us to iterate quicker rather than spend more time staring at a design on a screen," adds McCauley. "For Mike, the piece we were developing needed to meet a lot of requirements. Obviously, the prosthetic needed to fit — and fit comfortably. It also needed to withstand the stress and strain it would be under in competition. And, of course, it needed to hold up under extreme weather conditions as well. That's where the TPU material comes in."

CAD utilized FDM® TPU 92A material from Stratasys. "Other materials could work for certain elements, but the TPU 92A met every challenge," said Hahne. "It's amazingly tough, virtually indestructible, so it can handle the pressure. It's flexible with outstanding memory, so it goes right back into place after bending. And the soluble support capability literally saved us weeks. We had half the waste than usual because of the soluble support, and we didn't have to send the piece out for machining. Really, I don't think the prosthetic cover could have been prototyped without TPU 92A."

## A Matter of Time: The Soluble Support Difference

While the prosthetic cover was made possible through the efforts of Mike Schultz, Wacom, the Center for Advanced Design, and Stratasys, the soluble support of the TPU 92A material made the final production a reality. With winter coming and Mike's Olympic dreams looming, time to part was critical. The piece has incredibly complex geometry, and without TPU 92A's soluble support, production would have required costly and time-consuming post-processing. With TPU 92A, the support structure is simply washed away, leaving the needed piece intact and ready to use.

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CAD

# Winning Results

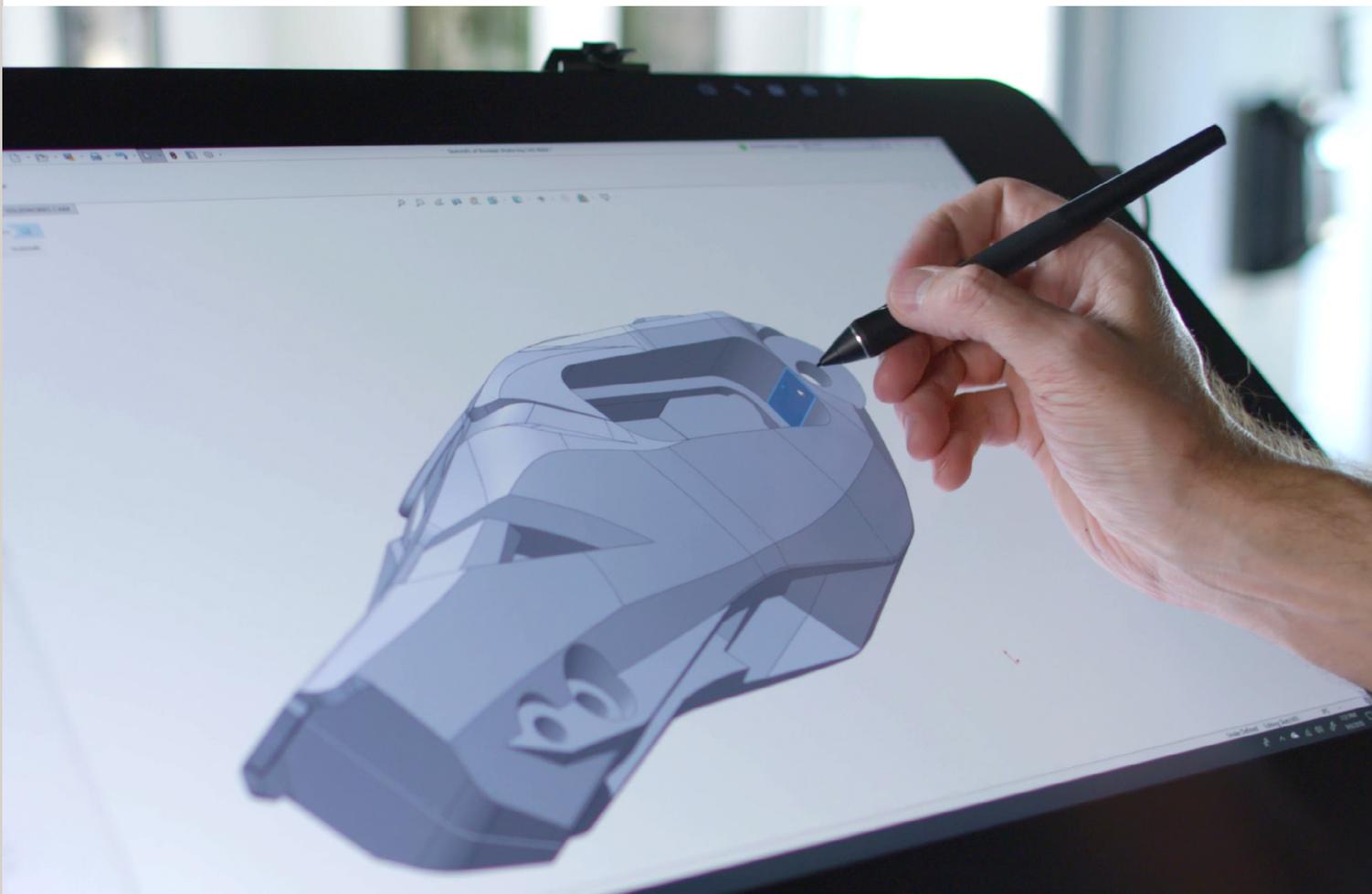
The final design challenge was the size of the prosthetic cover. “It’s more than twelve inches tall,” notes McCauley. “Fortunately, we use the Stratasys F370™ 3D printer, which has a large capacity. That’s the kind of feature you don’t realize you need until you need it, then it’s an absolute must. Rather than figure out work-arounds, we could hit print and relax.”

The results were outstanding in many ways. “Our original goal was to get Mike back to competing,” said Hahne, “and he did a lot more than just compete. He excelled.” Using the prosthetic, Mike Schultz has won both Gold and Silver snowboarding medals in the Paralympic Games.

Schultz also created a business called BioDapt that helps produce customized prosthetics for athletes around the world. Every person

presents a unique geometry, not only for size and fit, but also in regard to the activities that they do. Because 3D printing on the F370 allows for customization at scale, Schultz has been able to outfit more than 700 people to return them to the racing, snowboarding, wakeboarding, horseback riding and other extreme sports and activities they love.

“It’s amazing to think that 3D printing is what makes it all possible,” notes Hahne, “but it does. Without it, the machining costs alone would make these prosthetics unaffordable for most people, and the metal parts would make them too heavy anyway. The TPU 92A material and the capacity of the F370 do a lot more than help us with design challenges. They’re helping these people get back an important part of their lives. It’s a great feeling.”





This prosthetic cover printed in TPU 92A on the F370 3D printer provides the benefits of a durable elastomer while serving as a functional part.

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