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Limb loss drives innovative prosthetics



[Dan England](#)



Joe Johnson's company, Quorum Prosthetics of Windsor, developed a better way to fit prosthetic devices. Courtesy Quorum Prosthetics

WINDSOR — Joe Johnson went to the Olympics to compete for the U.S. Ski Team. He's married with three grown children. He's had a career that many would envy, and he didn't ever need to think about what he wanted to do for a living.

And yet, there are still times he wishes he could have his leg back.

"The only problem with it," Johnson said, "is I take my work home with me."

Johnson has owned Quorum Prosthetics of Windsor for 23 years, and so you might assume that's a good setup for a joke. Johnson lost his leg when he was 12 in a motocross crash. But Johnson doesn't smile when he says it.

"When someone's leg doesn't fit right," he said, "it really bothers me."

Johnson, 50, knows, after all, what it feels like when it doesn't. He knows the pain from the rubbing, or the limits even a slight wobble can have on his patient's freedom, or even the humiliation that comes from a limb not working correctly. He knows even more than most amputees: He lost his leg one inch below the knee, which gives him an especially difficult fit.

He acknowledges the rewards that come from a tinkering, hard-working brain. He has a second office in Cheyenne, and he's about to open a third in Denver. He has two patents on his Quatro product, and he believes in it so much that he may seek out investors to take it nationwide. But holy moly, it would be nice to relax. He even KNOWS that he won't ever replace the limbs his patients lost, but he also wants to keep trying.

"I'm a pain in the ass to my employees," he said. "I always want to try new things. The fit is everything. You could have the most high-tech equipment and the patient won't use it. They aren't living their best life with a bad fit. They aren't at their full potential."

Johnson probably has lived about as good a life as he could have dreamed after such a horrific end to his adolescence. Johnson never despaired about losing the leg — he's too optimistic, he said — but he credits Children's Hospital for rescuing him nonetheless.

Children's had a program for amputees to learn how to ski. Johnson, who before he lost his leg bought his first motorcycle with the money he won bull riding, found that the skiing satisfied his need for speed, daredevilish risk-taking and to be treated like a person, not a handicap who lost a limb. He

had some bad luck in the paralympics. He was supposed to go to Albertville, France, in 1992 but broke his leg a week before, and then, before Lillehammer in 1994, he tore his ACL two weeks before but competed anyway and finished fourth, just off the medal stand, three times.

Still, the sport gave him a career, too: One of his sponsors was a prosthetics company, and after an internship with it, he became a technician at 19.

He still uses his technician's skill and sees all his own patients and designs their prosthetics, but he's also embraced technology so much that he's not afraid to lean on an engineering staff he hired straight out of college. The engineers help design and perfect his models on a computer and run a 3D printer to bring them to life. He doesn't really understand what they do on the computer: It's not his area of expertise. Both his engineers have degrees in mechanical engineering and biomedics from Colorado State University. Johnson doesn't have a college degree. His career path, he said, wouldn't be available to someone today.

"I can barely open an email," Johnson said.

Johnson, however, is hardly an idiot. He invented the complicated Quatro using a pulley system through the prosthetic that allows adjustments in four different areas of the limb with equal pressure. The idea, said one of his engineers, Jack Fleischmann, is that it leaves the fit up to the amputee instead of the prosthetic. That's a simple and not entirely accurate description, but it does allow the amputee, Johnson said, to get as close a fit as possible, even under varying conditions: Imagine how your shoes feel tighter during a hot, humid day of walking or running.

The computers, and the 3D printers, allow him the kind of exact fit that Johnson so desperately wants for his patients and, truth be told, himself. The methods he learned when he was a technician involved manually tweaking a molded prosthetic. Johnson's patented design, combined with the technology, sets them apart, Fleischmann said, even when other prosthetics companies probably use similar technology.

Johnson comes up with the designs and the ideas, and the technology and the people running it perfect them. It's a good system, and Johnson trusts it so much that he trusts his engineering staff to tell him when his ideas won't work.

"Some of my ideas are just stupid," Johnson said and laughed.

But he's always got another one for him to take home.

Editor's note: Quorum Prosthetics was among the winners of the 2021 BizWest IQ (innovation quotient) Awards.

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