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Getting a better grip

The battery operated Michelangelo hand gives amputees better control

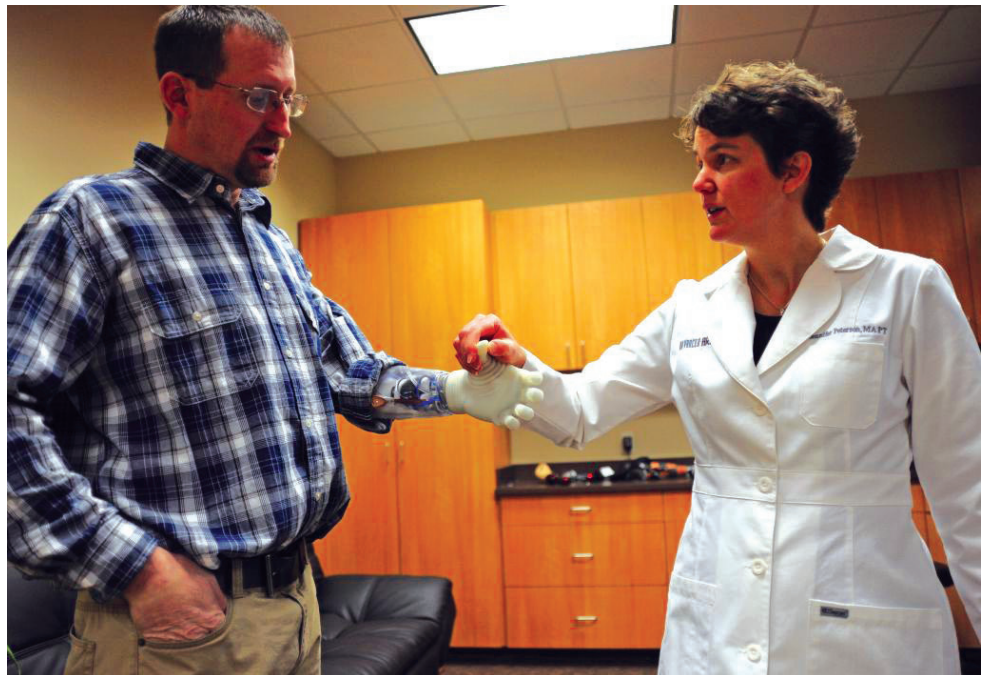
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Star Tribune

When Matt Razink, 36, lost his hand in a work accident six years ago, everyday life became much more difficult.

His artificial hand, set in one curved position, lacked the appropriate grip to open a large soda bottle. He couldn't make left turns in his car without his entire body moving alongside the wheel.

No longer.

Last week, the Wisconsin resident came to Maple Grove to test out the Michelangelo Hand, a battery-powered artificial hand with an opposable thumb. The invention lets patients change the thumb and finger positions on the hand by flexing their limb muscles. Electronic sensors pick up the movement, and trigger gears in the hand to move the fingers into place. The change in grip patterns lets patients pick up CDs, ride a bike or use a knife to chop foods, just like the natural hand.



Matt Razink, who received his prosthetic hand from Advanced Arm Dynamics in Maple Grove, worked with rehab coordinator Jennifer Peterson.

"It's awesome," Razink said. "There is nothing like this out there."

Analysts said the Michelangelo Hand, created by German manufacturer Otto Bock Healthcare, is a significant innovation in a space manufacturers often overlook. In 2009, there were about 541,000 people in the U.S. living with upper-limb amputations and roughly twice that number of people living with lower-limb loss, according to data from the Healthcare Cost and Utilization Project.

"Innovation has a tendency to focus on lower-limb loss because that's where companies can make the most money because there's a bigger market," said Sue Stout, the Amputee Coalition's public policy director. "We applaud them for taking this on."

Otto Bock, which has its U.S. headquarters in Minneapolis, started developing the Michelangelo Hand about a decade ago and expects to sell it later this year, said Pete Nohre, the company's director of marketing. It took years to develop the right product that could integrate the strength, size and weight of the natural hand.

"The human hand is so complex. There are 27 bones, 39 muscles and 36 joints in the natural hand," Nohre said. "To try to replicate that is a significant challenge."

Otto Bock came up with the Axon-Bus system, which combines parts used in the aviation and automotive industries. The company compared the hand-arm relationship to that of a steering wheel and tires: the interaction must be just right.

"If it's a very light grip force, individuals are limited in what they can do," Nohre said. "If you can't lift up a briefcase and carry it, what's the point? By far, our hand has much stronger gripping capabilities than other products that are out there."

Another challenge was trying to figure out a way to make the hand light enough for patients to use. The result was fitting one motor that operates the four fingers in the palm and a second motor in the thumb, which helps prepare the thumb for seven different hand positions, he added. Electronic sensors are attached to the patient's limb and as he or she flexes certain muscles, the sensors move the fingers and thumb.



Matt Razink has begun the orientation and training for his new battery-powered artificial hand with an opposable thumb.

Once Otto Bock was satisfied with its progress, it tested the devices on patients in the U.S. and Europe. The company also worked to develop a glove that goes around the prosthetic hand so that it appears more natural. Details were added, such as hair on male versions of the hand.

Otto Bock said the Michelangelo Hand will go on the market in March at about \$80,000 and is expected to be covered by insurance. Redondo Beach, Calif.-based Advanced Arm Dynamics and other providers will sell the Michelangelo Hand.

Pat Prigge, the north central clinical director for Advanced Arm, praised the hand's novel design.

"The hands that are out there, they are more of a tool than they are a device designed to mimic the hand," Prigge said.

There are similar prosthetic hands on the market, but Otto Bock says it believes it has a superior product. For example, a version of United Kingdom-based RSLSteeper's Bebionic Hand requires patients to manually adjust the thumb's position to achieve its 14 grip patterns.

Razink tested the hand last week through Advanced Arm, which has a center in Maple Grove. The company is working with his insurance to work out payment for the hand. He heard about Advanced Arm after his wife, Katie, read about it on the Internet. Their experience working with the firm changed their lives, Katie Razink said.

"It's like the rainbow came out," she said. "Finally, a different experience."

Wendy Lee