3D Systems and Ekso Bionics Help Man and Machine to Walk as One

3D printing, with its amazing versatility, has the ability to create the perfect junction, to create harmony. 3D Systems explores ways to apply these connections for the betterment of society and the greater well-being of its citizens. Such is the motivation behind 3D Systems' recent exploratory partnership with Ekso Bionics, as the two come together to fully integrate paraplegics with an amazing machine that helps them stand tall.

"This project represents the triumph of human creativity and technology. I am deeply grateful and thrilled."

Upon first glance, the Ekso™ bionic suit may appear as the stuff of science fiction: a rigid exoskeleton shaded with human form and the metallic sheen of a robot. Yet this remarkable creation, the work of Ekso Bionics, is quite real, and it's changing the lives of individuals with any degree of lower extremity weakness. Ekso allows those who cannot walk alone to walk again.

So many of us take standing and walking for granted, yet for those who cannot rise out of a wheel chair, those abilities mean everything. "The first time that I donned Ekso, I strapped the device on and I stood up. That was a defining moment," says Amanda Boxtel in a video by Ekso Bionics.

Over 20 years ago Amanda suffered a devastating spinal cord injury on a snowy Colorado ski slope. Since then she's been in a wheel chair until Ekso Bionics made her a test pilot for its exoskeletal suit.

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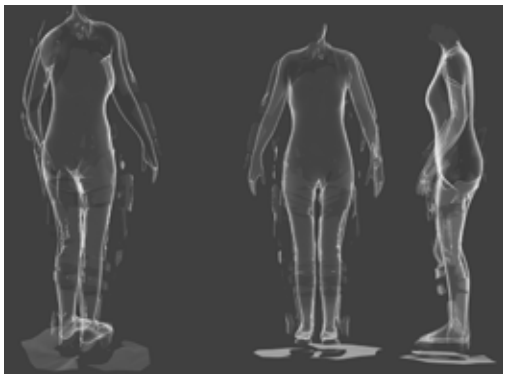

After meeting Amanda, 3D Systems CEO Avi Reichental offered to have her Ekso refitted with 3D printed components that would fit her better and incorporate her unique form into the exoskeleton design. At that point, 3D Systems began working with Ekso Bionics, using 3D printing to bring man and machine closer together.

The process began with a full 3D scan of Amanda's body, transforming it into a 3D underlay that would serve as the basis for the 3D printed parts. 3D Systems designers Scott Summit and Gustavo Fricke digitized her body and then created CAD models of new components for specific points on the suit: the shins, thighs and spine. Fricke designed these components to integrate seamlessly with the complex mechanical parts on the Ekso while providing a simple, comfortable and stable interface with Amanda's body.

While function was the main consideration, the design team also wanted to visually connect Amanda's body with the Ekso suit via an aesthetically pleasing design. The parts incorporate beautiful complex patterns, like muscle strands, with fluid contours. The striated pattern creates greater flexibility and ventilation channels as well.

After creating these 3D models, they 3D printed prototypes overnight to test for fit and function. Following each successive fitting, the design team made necessary adjustments to the design. Once this iterative design process was finished, the final parts were 3D printed using a 3D Systems Selective Laser Sintering (SLS) machine. SLS was chosen specifically for its ability to create lightweight, highly durable parts.

This project, to visually and mechanically smooth the space between Amanda and her Ekso, culminated when Amanda debuted the conceptual, hybrid robot on November 15, 2013. On a stage in Budapest she stood from her wheel chair and walked.

"This project represents the triumph of human creativity and technology," she said. "I am deeply grateful and thrilled."