DASSAULT SYSTEMES

MECURIS

MECURIS
IMPROVING ORTHOPEDIC CARE VIA ADDITIVE MANUFACTURING WITH SOLIDWORKS
Case Study

Using SOLIDWORKS for Entrepreneurs solutions and 3D printing technology, Mecuris has overturned the paradigm for orthopedic prosthetics and orthotics by expanding patient options in terms of customization (fit, function, and fashion), sizing, and style.

DASSAULT SYSTEMES

Challenge:

Establish and grow a 3D-printing-based orthopedic products business to quickly and cost-effectively create individualized, high-quality, and aesthetically pleasing prosthetic and orthotic products, improving patient satisfaction and outcomes in the process.

Solution:

Take advantage of the SOLIDWORKS for Entrepreneurs program to obtain discounted product development software solutions to accelerate initial research and development prior to standardizing on SOLIDWORKS Premium design software.

Results:

- Customized prosthetic and orthotic designs in seconds compared to hours and days
- Reduced production times to 24 hours compared to weeks and months
- Shortened new product development cycles to three to four months
- Automated configuration of individualized prostheses and orthoses

Until recently, patients requiring orthopedic prosthetics or orthotics had limited options in terms of sizing, style, and customization. They'd have to select the closest size that fit, and then either live with the aesthetic appearance of the artificial limb, brace, or shoe, or pay exorbitant prices for a conventionally produced custom piece tailored to their specific situation. Mecuris, an innovative German company, was founded to overturn this paradigm by providing orthopedists and wearers with greater flexibility and more prosthetic and orthotic options through the power of automated design, digital tailoring, and 3D printing.

With origins in research conducted at the University Hospital of Munich (LMU), Mecuris has developed a solution platform for 3D-printed prostheses and orthoses that empowers orthotists and prosthetists (O&P) to improve patient care. In just three steps, these professionals can order perfectly fitting prostheses from the company while avoiding the time and cost of traditional design and production processes.

By digitizing fitting processes, automating design, and utilizing 3D printing, Mecuris is revolutionizing orthopedic technology, providing modern, customizable, and attractive prostheses and orthoses that are CE- and ISO-certified. Because of design automation and the affordability of 3D printing, the costs associated with these patient-specific prostheses are no higher than those incurred through standard, conventional care. The company's approach has resulted in far greater wearer satisfaction and a multiplication of productivity for O&P professionals.

According to Mecuris' Head of Product Development Jannis Breuninger, who was involved in the research that produced the world's first 3D-printed above-knee prostheses, acquiring a robust 3D development platform that not only could drive 3D printing but could also power design automation of the myriad configuration combinations possible was critically important to the company's success. However, as a fledgling company with no revenue, Mecuris did not have the resources to acquire the SOLIDWORKS® 3D design platform that Breuninger had used during his initial research. Fortunately, the company was able to take advantage of the SOLIDWORKS for Entrepreneurs program, which provides a combination of 10 discounted licenses to help entrepreneurs get their companies off the ground.

"I had used SOLIDWORKS design software while working on my master's thesis [at the University of Design at Schwaebisch Gmuend] on 3D-printed prosthetics and was pleased to be able to use SOLIDWORKS at Mecuris," Breuninger says. "The SOLIDWORKS for Entrepreneurs licenses helped a lot because they enabled us to take the early work that I had done and accelerate R&D. We've since standardized on SOLIDWORKS Premium software to drive design and visualization of our expanding product line."

"Our Software Lead Felix Gundlack leveraged the open SOLIDWORKS API to create the transfer protocol that allows our online application to communicate with SOLIDWORKS. By doing this, customers receive live feedback on how the prosthetic will look. This automation sets us apart from other companies that spend a lot of time individualizing each order."

— Jannis Breuninger, Head of Product Development

CONFIGURATIONS POWER DESIGN, 3D PRINTING DRIVES PRODUCTION

Mercuris' approach relies on the parametric nature of SOLIDWORKS design software and the power of SOLIDWORKS design configurations. By identifying the key parameters that drive prosthetic design, such as foot/limb dimensions, customer weight, and individualized loading conditions, Mecuris has established design tables that encompass all possible combinations of parameters. The tables help automate design - producing custom designs in seconds rather than days - and eliminate the need to separately model every prosthetic design.

"As we add more and more parameters, our prosthetic shapes gain more and more degrees of freedom," notes CEO Manuel Opitz. "We then team with 3D printing service bureaus to cost-effectively produce the custom prosthetic in polyamide 12, a standard thermoplastic that we've determined has very reliable material properties for this purpose, using selective laser sintering. This approach allows us to configure and produce a prosthetic anywhere in the world."

ADDITIONAL AUTOMATION VIA SOLIDWORKS API

Mecuris also leveraged the open SOLIDWORKS Application Programming Interface (API) to connect SOLIDWORKS design configurations to the Mecuris Solution Platform, an intuitive, online, browser-based prosthetic configuring and ordering application that the company created for O&P professionals. "Our software guides a certified prosthetist/orthotist or orthopedist through the configuration process, prompting them to enter dimensional or 3D scan data," Opitz explains. "This way, the professional becomes our co-creator for the prosthetic design, especially in form and functionality."

"Our Software Lead Felix Gundlack leveraged the open SOLIDWORKS API to create the transfer protocol that allows our online application to communicate with SOLIDWORKS," Breuninger adds. "By doing this, customers receive live feedback on how the prosthetic will look. This automation sets us apart from other companies that spend a lot of time individualizing each order."

EXPANDING PRODUCT LINE TO INCLUDE COSMETIC COVERS

Mecuris is also using SOLIDWORKS design and the SOLIDWORKS Visualize rendering solutions to expand its product line into 3D-printed cosmetic covers for prosthetics. If a patient wants a honeycomb pattern or a faux tattoo, they can quickly create the design online and receive a visual representation of the concept. For the first time ever, prosthetic wearers have also become co-creators of the look they want for their own devices.

"SOLIDWORKS Premium is a good visualization tool that makes a good first impression," Breuninger points out. "As we continue to grow, we plan on using SOLIDWORKS Visualize software more to create photorealistic renderings of cosmetic cover concepts for use on our solution platform."

Focus on Mecuris
VAR: SolidLine AG, Ludwigsburg, Germany

Headquarters: Lindwurmstr. 11
Munich 80337
Germany
Phone: +49 89 552623-86

For more information
www.mecuris.com