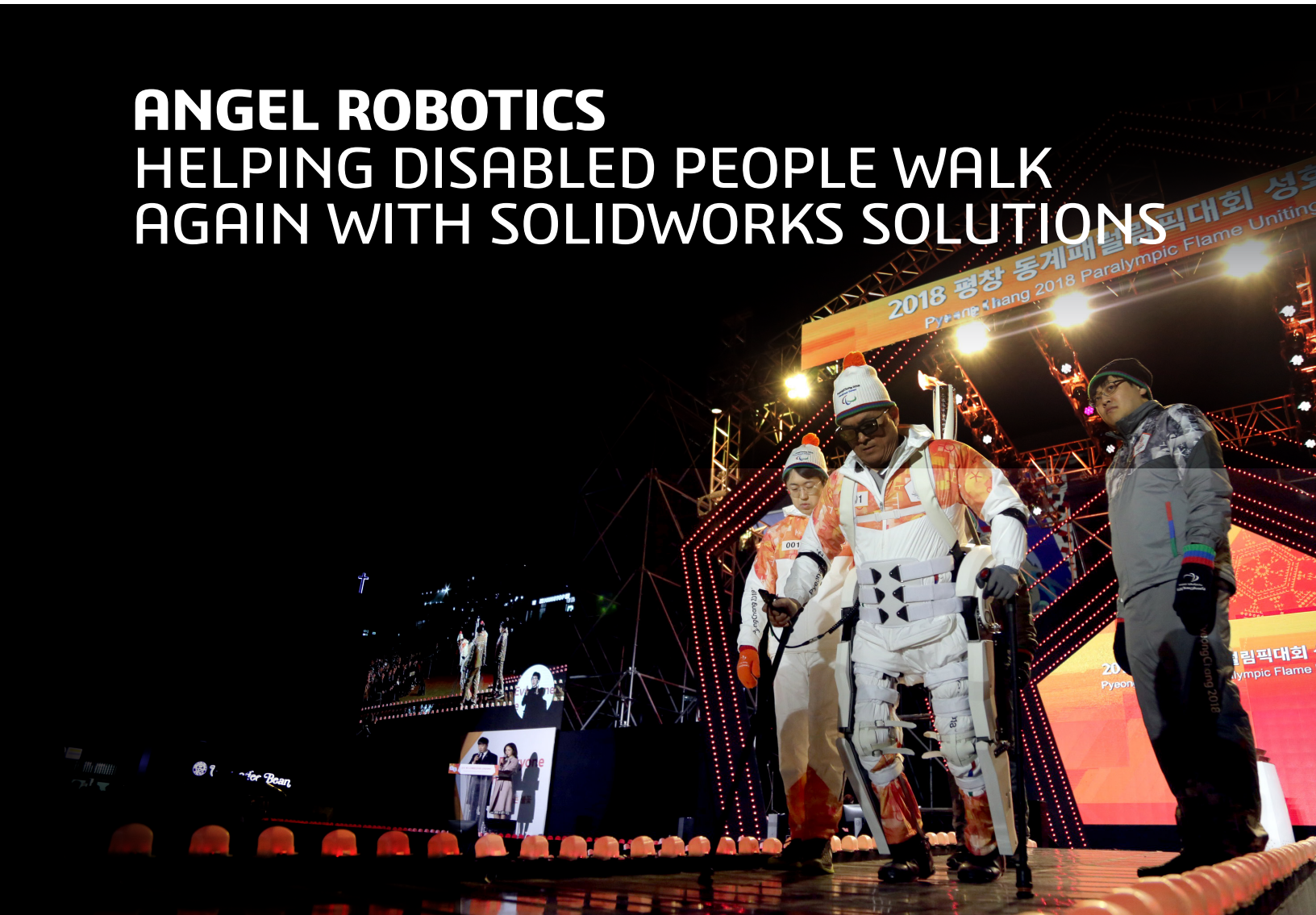


ANGEL ROBOTICS HELPING DISABLED PEOPLE WALK AGAIN WITH SOLIDWORKS SOLUTIONS



Angel Robotics has relied on SOLIDWORKS mechanical design, electrical design, simulation, and product data management solutions to quickly develop its wearable robotic exoskeletons, which help people with impaired mobility live independently by allowing them to walk.

Challenge:

Quickly design, manufacture, and introduce custom-fitting, wearable robotic products by streamlining development processes.

Solution:

Implement SOLIDWORKS Professional design, SOLIDWORKS Simulation analysis, SOLIDWORKS Electrical design, and SOLIDWORKS PDM product data management solutions.

Results:

- Developed wearable robotic products quickly
- Improved ability to make design changes to custom-fit products
- Increased use of additive manufacturing techniques
- Reduced prototyping time and cost using simulation

Spun off from the Sogang University Robot System Control Laboratory in Seoul, Angel Robotics is a startup company developing wearable robotic exoskeletons for people with impaired mobility, such as the elderly and those suffering from paraplegia. By developing wearable, custom-fit products, Angel Robotics is working to help people with mobility impairments live independently by allowing them to walk. The company demonstrated the strength of its technology in 2016 when Kim Byeong-wook won a bronze medal at the first Cybathlon, an international competition organized by the Swiss Federal Institute of Technology in Zurich for disabled competitors using bionic assistive technology.

Since then, the company has grown rapidly, launching two products: the WalkON Suit for completely paralyzed individuals, and ANGELEGS, a lower-extremity assistive robot for people with partial walking impairment. Angel Robotics was again highlighted at the 2018 PyeongChang Olympic/Paralympic Games as a complete paraplegic carried the torch, walking using a WalkON Suit. Managing the company's growth while quickly developing customizable new products were the two primary requirements that made Angel Robotics' selection of a product development platform critically important, according to Kyoungchul Kong, Angel Robotics CEO and associate professor of mechanical engineering at Sogang University.

"Because the main researchers and developers have been educated in the use of SOLIDWORKS® tools throughout their undergraduate and graduate studies at Sogang University, and most of the early work was done using SOLIDWORKS Research software, it was a natural decision to employ the same design and engineering tools at Angel Robotics," Kong explains. "I first started using SOLIDWORKS back in 2002, designing mechanical parts as an intern for a small venture capital company. I found that SOLIDWORKS was the most time-efficient and convenient design software that I ever tried. This experience and my colleagues' familiarity with SOLIDWORKS made it an easy choice."

Angel Robotics standardized on SOLIDWORKS 3D product development software in early 2017, implementing SOLIDWORKS Professional design, SOLIDWORKS Simulation analysis, SOLIDWORKS Electrical design, and SOLIDWORKS PDM product data management software solutions. The company chose SOLIDWORKS as its development platform because the software is easy to use; provides access to integrated design, engineering, and manufacturing tools; and was already known by key designers.

DESIGNING CUSTOM-FITTING WEARABLE ROBOTS QUICKLY

With SOLIDWORKS design tools, Angel Robotics has been able to quickly develop its robotic products, despite the fact that the products must be custom-sized for each specific user. The Korean startup leverages SOLIDWORKS design configuration capabilities, which automate the creation of design variations from a single base design and 3D scan data of new customers, to custom-fit its products.



"SOLIDWORKS provides an intuitive graphical user interface that allows us to design, check, and verify a design within a few hours. That's why we use SOLIDWORKS: It allows us to design everything very quickly."

— Kyoungchul Kong, CEO

"In the case of our wearable robot products, the brace parts must be customized for every single user," Kong stresses. "Therefore, the ability to make rapid design modifications is mandatory for us. SOLIDWORKS is definitely the fastest and the most convenient design tool, which enables us to quickly modify the braces by adapting the design to the 3D scanned model of users. SOLIDWORKS provides an intuitive graphical user interface that allows us to design, check, and verify a design within a few hours. That's why we use SOLIDWORKS: It allows us to design everything very quickly."

Recently, Angel Robotics began developing wearable robots for children. "The importance of the rapid design and manufacturing of the brace part becomes even more vital in the case of a child's robot, because the brace part must be changed frequently as the child grows up," Kong emphasized.

SIMULATION SHORTENS LENGTH OF PROTOTYPING, USER TRIALS

Instead of creating physical mock-ups of parts for performance testing, Angel Robotics saves time and money by using integrated SOLIDWORKS Simulation finite element analysis (FEA) software to virtually simulate part stiffness and strength, and SOLIDWORKS dynamic motion tools to check for component interferences within assemblies. In addition to saving time and reducing costs during development, virtually and visually prototyping parts helps to minimize trial-and-error iterations during performance and safety testing, which are requirements for gaining the government regulatory approvals needed to market and sell robotic systems in various countries.

"SOLIDWORKS Simulation helped us minimize trial and error in testing the safety of our robots through finite element analysis," notes Senior Designer Byeonghun Na. "Making physical mock-ups is very time-consuming. Therefore, we use SOLIDWORKS to visually prototype parts before we physically assemble them."

FACILITATING MANUFACTURING VIA 3D PRINTING

Custom-fitting wearable robotics demands not only robust design capabilities for rapidly adapting the design for each specific person but also a cost-effective means for manufacturing single-shot parts. Here again, Angel Robotics utilizes SOLIDWORKS design data to quickly create plastic parts, using additive manufacturing, on its Stratasys Fortus 3D printer.

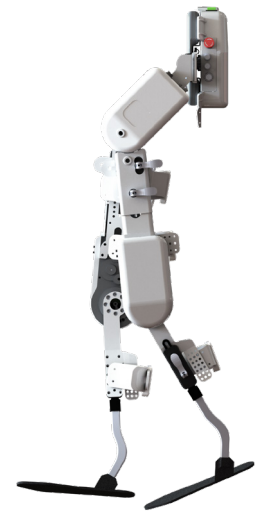
"SOLIDWORKS provides an intuitive and easy interface for utilizing 3D printers, which makes the overall manufacturing process simple and fast," Kong says. "SOLIDWORKS is very powerful in the sense that it allows all the users to utilize such complicated and professional functions without consuming too much time and energy. The easy and intuitive user interface is the most powerful feature of SOLIDWORKS."

Focus on Angel Robotics

Headquarters: 5th Floor, Sogang Bldg. 3
Sogangdae-gil, Mapo-gu,
Seoul 04111
Republic of Korea

Phone: +82 70 7601 0174

For more information
www.angel-robotics.com



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