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Students at University of Applied Sciences Ravensburg-Weingarten 'Design for Additive' with First-of-Its-Kind 3D Printed Self-Balancing Scooter

- *Tasked with optimizing a digital product life cycle for customized production, students learn how to 'think additively' by designing self-balancing scooter development process around additive technology*
- *Production of first self-balancing scooter prototype reduced from four weeks to four days with Stratasys additive technologies, equating to time-savings of 85%*
- *Self-balancing scooter to be displayed at formnext in Frankfurt, November 14-17 in Hall 3.1, Stand F40*

MINNEAPOLIS & REHOVOT, Israel--(BUSINESS WIRE)-- Stratasys Ltd. (Nasdaq:SSYS), a global leader in applied additive technology solutions, today announced that the University of Applied Sciences Ravensburg-Weingarten in Germany is developing a first-of-its kind 3D printed self-balancing scooter with Stratasys additive technologies. Tasked with "thinking additively" to achieve true customization, the students built the entire product development process for the scooter around additive manufacturing. As a result, the team produced the first fully-functional prototype 85% faster compared to traditional manufacturing methods.

This press release features multimedia. View the full release here: http://www.businesswire.com/news/home/20171108005786/en/

The University of Applied Sciences Ravensburg-Weingarten is participating in a collaborative state university project supported by industry leaders, including Porsche and Siemens. The goal of the research project "Digital Product Life Cycle[1]" is to establish a fully integrated and automated digital development process for the production of customized products – in this case the development of a one-off self-balancing scooter. The students have been challenged to explore different technologies and processes to overcome the limitations of traditional manufacturing when producing with quantity of one. From idea generation and product design to the creation of complex prototypes for functional testing, designing each stage of the development process for additive manufacturing has been crucial to the success of the project.

"Producing the core prototype parts for the self-balancing scooter was a real stumbling block until we discovered 3D printing," says Dr.-Ing. Markus Till, Head of Department Mechanical Engineering at University of Ravensburg-Weingarten. "We realized that 3D printing offers the best possible manufacturing solution for an ideal executable product development method for a customized product. We designed the entire product development process around

The first fully-functional 3D printed prototype of the self-balancing scooter featuring Stratasys 3D printed frame and platform, produced in tough Nylon6 material (Photo: Business Wire)

Stratasys' additive technologies, enabling us to quickly design and produce a fully-functional prototype of a geometry that was previously too complex to be created through any other traditional method – offering the first viable alternative for quick and cost-effective customized production."

The frame and platform parts of the self-balancing scooter were 3D printed in tough Nylon6 material on the large-scale Stratasys Fortus 900mc Production 3D Printer, enabling the larger parts to be 3D printed in one piece. The self-balancing scooter platform was then fitted with a 3D printed rubber-like cover for better grip, produced in Agilus30 material on the Stratasys Connex3 Color Multi-material 3D Printer. According to Till, 3D printing the frame and platform of the self-balancing scooter has changed the team's entire mindset when it came to product development.

"Using traditional manufacturing processes such as milling or molding, the most notable challenge is developing the scooter's body frame, which houses several parts from motor to electrics," he explains. "Firstly, the structure of the part is too complex for subtractive methods, while the turnaround times are too time-intensive to meet the production schedule. As a result, we've seen students start to 'think additively', leveraging the capabilities of the 3D printing to design with more freedom and with customization in mind."

According to Till, this is resulting in significant time-savings throughout the product development cycle: "When creating a customized product, the bottleneck is usually manufacturing as tools, molds and specific fixtures need to be made – this takes a long time. With traditional methods, the manufacturing process would have taken us three weeks. With Stratasys 3D printing this phase was reduced to four days, which is a huge time-saving."

Following the successful role of 3D printing for customized production in the self-balancing scooter project, the university has now extended the use of 3D printing to a wider range of engineering projects to verify designs and validate concepts.

Prof. Dr. Till comments: "Not only is 3D printing playing a more prominent role in our curriculum, we are also encouraging more students to bring their projects to life on our 3D printers to visualize and improve their design skills. We've also seen a change in student behavior, as they become more engaged with 3D printing and have the chance to be closer to the project. Global companies we work with have also approached us and asked that we

further integrate 3D printing into our courses, demonstrating the growing demand for graduates who have knowledge and expertise in this technology."

Andy Middleton, President EMEA, Stratasys, concludes: "The University of Applied Sciences Ravensburg-Weingarten is a prime example of how designers, engineers and manufacturers today are involving additive manufacturing from the outset of product design to be able to exploit its benefits throughout the entire development cycle. As such, we believe it's crucial that the next generation of engineers are given the right education to prepare them for the requirements of engineering within industry. As we see more educational institutions continue to adopt additive technologies, we expect to see more students learn the relevant skills and tools to be competitive for top engineering and manufacturing jobs."

About Stratasys

Stratasys (NASDAQ: SSYS) is a global leader in applied additive technology solutions for industries including Aerospace, Automotive, Healthcare, Consumer Products and Education. For nearly 30 years, a deep and ongoing focus on customers' business requirements has fueled purposeful innovations—1,200 granted and pending additive technology patents to date—that create new value across product lifecycle processes, from design prototypes to manufacturing tools and final production parts. The Stratasys 3D printing ecosystem of solutions and expertise—advanced materials; software with voxel level control; precise, repeatable and reliable FDM and PolyJet 3D printers; application-based expert services; on-demand parts and industry-defining partnerships—works to ensure seamless integration into each customer's evolving workflow. Fulfilling the real-world potential of additive, Stratasys delivers breakthrough industry-specific applications that accelerate business processes, optimize value chains and drive business performance improvements for thousands of future-ready leaders around the world.

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[1] The project „digital product life-cycle (ZaFH)" (information under: https://dip.hs-weingarten.de) is supported by a grant from the European Regional Development Fund and the Ministry of Science, Research and the Arts of Baden-Württemberg, Germany (information under: www.rwb-efre.baden-wuerttemberg.de).

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