

Angel Trains, ESG Rail and Stratasys Tackle Obsolescence in the Rail Industry with UK's First 3D Printing Manufacturing Solution

MINNEAPOLIS & REHOVOT, Israel--(BUSINESS WIRE)-- Angel Trains, one of Britain's leading train leasing companies, has collaborated with engineering consultancy ESG Rail, and 3D printing technology provider Stratasys, to produce four fully approved interior components using 3D printing, also known as Additive Manufacturing.

This press release features multimedia. View the full release here: <https://www.businesswire.com/news/home/20181210005455/en/>



3D Printed Grab Handle (Photo: Business Wire).

The components approved for service include an arm rest, grab handle and seat back table – all of which will now be trialled on in-service passenger trains in 2019.

The aim of this collaboration is to leverage additive manufacturing to help address the issue of obsolete parts, reduce whole life rolling stock costs and enable vehicles to remain in

passenger service for longer. This innovation also has the added potential to lower costs for train operating companies, as they can produce low run parts as needed, rather than mass manufacturing vast quantities.

All parts have been designed for additive manufacturing and 3D printed using Stratasys' Fused Deposition Modelling (FDM) technology. In addition, the components have been structurally assessed by ESG Rail for manufacturing using Stratasys 3D printed tooling and the company's advanced, rail-certified thermoplastic materials. The components will soon commence in-service passenger trials, which are expected to last until the summer of 2019.

Traditionally, standard thermoplastics have been used, but these have poor mechanical properties and fire performance, and are therefore unsuitable for rolling stock applications. New, high-performance materials, including Stratasys Antero 800 NA, a PEKK-based thermoplastic, have now been tested to demonstrate they are capable of achieving compliance to the Rail Standard EN45545-2.

Commenting on this announcement, Mark Hicks, Angel Trains' Technical Director said: "This exciting industry-first collaboration has the potential to transform manufacturing within the rail industry. We are proud to be driving this innovation with ESG Rail and Stratasys and hope that this solution will help to free the industry from technological constraints, and allow our trains to continue to meet passengers' needs now and in the future."

Martin Stevens, Head of Mechanical Engineering, ESG Rail, commented: "We have learned so much during this project and have addressed many engineering challenges. We believe that this emerging method of manufacturing will reduce costs, production times and issues faced by component obsolescence."

Yann Rageul, Manager, Strategic Account Team EMEA, Stratasys added: "With the highest level of repeatability in the industry and advanced, rail-certified, materials, we believe our FDM additive manufacturing solutions offer huge potential to replace traditional manufacturing for a diverse range of applications within the rail industry. This collaboration will help us to explore how we can support rail companies, such as Angel Trains, to produce parts on-demand – both cost-effectively and efficiently – eradicating the need for obsolete inventory and improving their ability to service customers."

Kevin Dilks, Business Development Manager, ESG Rail, said: "We are absolutely delighted to be working alongside Angel Trains and Stratasys in the development of additive manufacturing components for the rail industry. We are proud to be at the forefront of this emerging technology and we look forward to a long and fruitful collaboration."

For media enquiries contact Heidi Lee, Communications Manager, ESG Rail – 01332 483 849 (mobile - 07870 958043) or email: heidi.lee@deutschebahn.com

About ESG Rail - ESG Rail is the route to market for DB's technology expertise. As part of the DB Group, ESG provides innovative, value-led strategic advice, technical consultancy and technology integration. Based in Derby, home to the largest cluster of railway companies in the world, ESG is a leading rolling stock consultancy and provides services to many of the UK's train operators, manufacturers, owners and maintainers.

For further information visit: www.db-esgrail.com

About Angel Trains

Angel Trains is one of Britain's leading train leasing companies and has been an owner and lessor of rolling stock since 1994. The company leases to 18 franchised operators and two open access operators in the UK. Angel Trains is passionate about financing and delivering high quality, modern assets to its customers and is committed to working with the Government, the Rail Delivery Group ("RDG") and other stakeholders to provide innovative funding solutions to modernise and improve the UK's train fleet. Angel Trains has invested £5.0 billion in new rolling stock and refurbishment programmes since 1994 and is one of the

largest private investors in the industry.

For further information visit: angeltrains.co.uk

For media enquiries please contact angel.trains@grayling.com

About Stratasys

Stratasys is a global leader in additive manufacturing or 3D printing technology and is the manufacturer of FDM[®] and PolyJet[™] 3D Printers. The company's technologies are used to create prototypes, manufacturing tools, and production parts for industries, including aerospace, automotive, healthcare, consumer products and education. For 30 years, Stratasys products have helped manufacturers reduce product-development time, cost, and time-to-market, as well as reduce or eliminate tooling costs and improve product quality. The Stratasys 3D printing ecosystem of solutions and expertise includes: 3D printers, materials, software, expert services, and on-demand parts production. Corporate Headquarters: Minneapolis, Minnesota and Rehovot, Israel. Online at: <http://www.stratasys.com/>, <http://blog.stratasys.com/> and [LinkedIn](#).

Stratasys is a registered trademark and Fortus, ULTEM, and Stratasys signet are trademarks of Stratasys Ltd. and/or its subsidiaries or affiliates. All other trademarks are the property of their respective owners.

Attention Editors, if you publish reader-contact information, please use:

- USA +800-801-6491
- Europe/Middle East/Africa +49-7229-7772-0
- Asia Pacific +852 3944-8888

View source version on businesswire.com:

<https://www.businesswire.com/news/home/20181210005455/en/>

Stratasys Media Contacts

Stratasys Corporate &

North America

Craig.Librett@stratasys.com

+1 612-364-3208

Europe, Middle East, and Africa

Jonathan Wake / Miguel Afonso, Incus Media

stratasys@incus-media.com

+44 1737 215200

Greater China, Southeast Asia, ANZ, and India

Alice Chiu

media.ap@stratasys.com

+86-21-33196051

Japan and Korea

Aya.Yoshizawa@stratasys.com

+81 3 5542 0042

Mexico, Central America, Caribe and South America

Erica.massini@stratasys.com

+55 11 2626-9229

Brazil

Caio.Ramos@GPcom.com.br

Nando@GPcom.com.br

GP Communications

+55 (11) 3129 5158

Source: Stratasys