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## MUVAX FOR HIGHER EFFICIENCY IN AIRPLANE PART MANUFACTURING

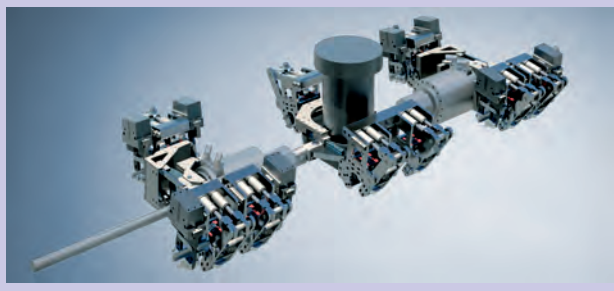
Thanks to its advantages in comparison with riveting technology, friction stir welding is regarded as an alternative technique for the assembly of airplane fuselage shells. The challenge is to develop hardware systems and processes allowing huge part sizes and the welding process forces. The Fraunhofer IWS Dresden has developed the system "Multi Use Vacuum Assisted Exoskeleton" (MUVAX) for this purpose.

Metallic fuselage shells have been so far joined by means of the proven riveting technology, which requires many expensive process steps and results in long manufacturing times. It also demands a lap joint that results in higher material consumption in the joining zone. The current high request for new passenger planes requires more efficient production methods. Friction stir welding has the potential to substantially increase manufacturing efficiency and reduce airplane structure weight at the same time.

### Welding in combination with milling

This technique does not require a lap joint, and fewer process steps are necessary. However, we need customized equipment for reliable welding of the up to 12 meters long large parts. To meet these requirements, the researchers at the Fraunhofer IWS have developed the MUVAX system: MUVAX consists of a combined welding and milling robot, and a vacuum-based clamping system. Based on an initial laboratory demonstrator, the new MUVAX system makes it possible to friction stir weld demonstrator parts on the scale of real airplane structural parts. The manufacturing concept provides secure part fixing and milling of edges in the weld line area to the nominal size defined for the welding process. In this setup, the part is subsequently friction stir welded. A single welding and milling robot executes all process steps. The development of the MUVAX system represents an important step towards the introduction of friction stir welding into aircraft construction.

### Unique welding and milling robot



1 The MUVAX system enables friction stir welding of demonstrator parts.

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### CONTACT

Dr. Sebastian Schulze

Special Joining Technologies

+49 351 83391-3565

sebastian.schulze@iws.fraunhofer.de

