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Parts for a Lighter Flight

Airbus uses additive manufacturing to eliminate unnecessary weight from aircraft.

STORY BY JEAN THILMANY • ILLUSTRATION BY ZINA SAUNDERS

Board a flight in 2050 and the plane may be made from plastic-encased carbon nanotubes produced on a 3-D printer. Bastian Schäfer, an Airbus engineer, believes the ability to 3-D print airplane parts—including the plane's very skeleton structure—will revolutionize air travel. Such lightweight, additively produced parts will make for planes that burn less fuel and reduce greenhouse gases emissions, while still being bigger and roomier than today's aircraft, Schäfer said.

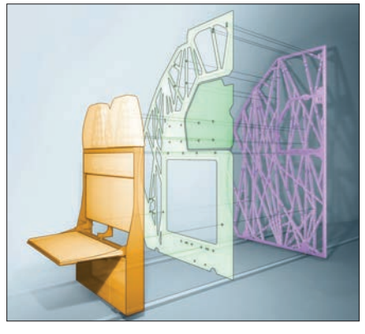
For him, the move to a 3-D-printed airliner begins with a printed partition his group unveiled two years ago and continues to perfect.

Schäfer is project manager on what his group calls the Bionic Partition Project. The project itself is under the purview of the Airbus Emerging Technologies and Concepts Group, led by Peter Sander.

Working under Schäfer, the group has created a 3-D printed partition to separate the seating area on the A320 from the galley. The 7-foot-tall partition weighs 45 percent less than the ones previously used on airliners of that model, while also being substantially stronger. The team replaced the component's solid aluminum alloy parts with a number of slender, 3-D-printed metal pieces that connect to form a lattice of the same shape and size as the existing partition. The lattice is then covered in a thin material.

The piece recently passed the recertification process, meaning airlines are cleared to replace the partition on their A320s with the 3-D printed version, Schäfer said.

While it may sound strange to 3-D print an innocuous cabin divider, partitions of this nature are large, weighty, and can be somewhat of a design challenge. It needs to include a cutout wide and tall enough for a hospital stretcher to pass through



and to be strong enough to support the two fold-down seats on which flight attendants sit. It must be able to withstand impacts of up to 16 G. Oh, and it also must be less than 1-inch thick and attach to the plane in only four places to keep down the weight of connecting hardware.

With all that in mind, the team turned to nature. The partition's internal, 3-D-printed structure mimics that of human bones, which have a high strength-to-weight ratio and extra material at their stress points. Schäfer's team designed a lattice structure comprised of metal pieces that are printed individually and then fit together to form the partition. Schäfer would rather print the larger pieces of the structure at once, but printer size now limits this capability.

The partition isn't in production, but that will probably change within five years as Airbus furthers its move toward lighter planes, Schäfer said.

Airbus already includes a number of 3-D printed small parts on its planes. It recently announced that printed space panels on overhead storage components—the first 3-D printed parts that flyers can see, according to Airbus—will be installed on new FinnAir aircraft.

The move from smaller 3-D printed parts to larger ones such as the partition will continue as Airbus strives for ever-lighter aircraft. Even as Schäfer's team continues to perfect its 3-D printed partition, its members work to make the Airbus vision a reality: An entire plane, including the body itself, created from lightweight but strong 3-D printed pieces. ME

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A Partition Printed in Three Dimensions

INNOVATOR: Airbus Emerging Technologies and Concepts Group. Bastian Schäfer, project manager. Peter Sander leads the group.

INNOVATION: A 3-D printed partition to separate the galley from the seating area on an Airbus A320.

IMPACT: The lighter part will make for a lighter plane that burns less fossil fuel. Airbus plans to fly many more 3-D printed parts as part of its airliners.

BASTIAN SCHÄFER