

'NEW SKIN' FOR SELF HEAL PLANES

IMPACT!

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AILING AIRCRAFT could heal themselves during flight thanks to a revolutionary new system.

The technology, that mimics the healing processes found in nature, has been developed by aerospace engineers at University of Bristol, with funding from EPSRC, and Dstl. It could be available for commercial use within four years.

"It's intended to complement rather than replace conventional inspection and maintenance routines, which can readily pick up larger-scale damage, caused by a bird strike, for example."

The technique can be applied wherever fibre-reinforced polymer (FRP) composites are used. These lightweight, high-performance materials are proving increasingly popular not only in aircraft but also in car, wind turbine and even spacecraft manufacture. The new self-repair system could therefore have an impact in all these fields.

The next step

"This project represents just the first step," said Dr Bond. "We're also developing systems where the healing agent isn't contained in individual glass fibres but actually moves around as part of a fully integrated vascular network, just like the circulatory systems found in animals and plants. Such a system could have its healing agent refilled or replaced and could repeatedly heal a structure throughout its lifetime. Furthermore, it offers potential for developing other biological-type functions in man-made structures, such as controlling temperature or distributing energy sources."

The University of Bristol research team, in collaboration with researchers at Imperial College London, have been awarded a further £600,000 from EPSRC and Dstl to continue the development of these techniques.

For more information about EPSRC and the impact it is making visit www.impactworld.org.uk

↗ 2.4m

Number of commercial flights through UK airports in 2008.

↗ 206m

Passengers on scheduled UK flights in 2008.

IMPACT ON AIR TRAVEL

- The technology will improve aircraft safety by allowing planes to self-repair damage during flight.
- The work could also lead to lighter aircraft, cutting both fuel costs and carbon emissions.
- The system could be used in other industries, such as car, wind turbine and even spacecraft manufacturing.

Fixing a hole

If a tiny hole or crack appears in the aircraft – due to fatigue or a stone strike – epoxy resin 'bleeds' from embedded vessels near the crack to quickly seal it and restore integrity. The resin and hardener enable the composite material to recover up to 80-90 per cent of its original strength – comfortably allowing a plane to function at its normal operational load.

Dye in the resin would allow engineers to pinpoint damage repair during subsequent ground inspections.

Dr Ian Bond, the man who led the project, said: "This approach can deal with small-scale damage that's not obvious to the naked eye, but which might lead to serious failures in structural integrity if it escapes attention.

EPSRC

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IMPROVING AIRCRAFT SAFETY