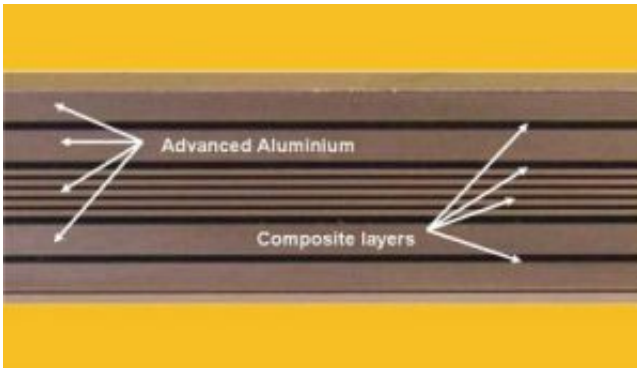


# New material concept for aircraft wings could save billions

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Detail of CentrAl sandwich. Credit: TU Delft / GTM

Building aircraft wings with a special aluminium fibre combination makes them nearly immune to metal fatigue. The application of this technology, partly developed at Delft University of Technology, will lead to substantial savings.

The unusual qualities of this special material (called CentrAl, an abbreviation of Central Reinforced Aluminium) can make a significant contribution to the development of truly energy-efficient, ‘green’ aircraft. Lower fuel consumption and reduction of maintenance costs could lead to worldwide savings as high as \$100 billion.

Fatigue is a phenomenon that affects materials after long-term exposure to cyclic loading. As a result of varying loads, fractures eventually occur.

The new, high-quality CentrAl aluminium constructions are stronger than the carbon fibre reinforced plastic (CFRP) constructions that have recently been used in aircraft wings such as the Boeing 787.

By using CentrAl wing constructions, the weight can be reduced by another 20 per cent compared to CFRP constructions. Furthermore, using CentrAl results in considerably lower manufacturing and maintenance costs.

The CentrAl concept comprises a central layer of fibre metal laminate (FML), sandwiched between one or more thick layers of high-quality aluminium. This creates a robust construction material which is not only exceptionally strong, but also insensitive to fatigue. The CentrAl technique allows for simple repairs to be carried out immediately, as is the case in aluminium constructions, – but not the case when using CFRP constructions.

This patented new concept is one of the results of an intensive collaboration between the company GTM Advanced Structures, founded in The Hague in 2004 and specialising in new aircraft materials and constructions, the American aluminium company Alcoa, and the Faculty of Aerospace Engineering of Delft University of Technology. During a conference in Delft (Conference on Damage Tolerance of Aircraft Structures: 25-28 September 2007), GTM and Alcoa have presented the new concept to international experts in the field of metal fatigue and damage sensitivity of aircraft constructions.

The US Air Force, Alcoa and GTM will also shed new light on the fact that the new CentrAl materials create possibilities for so-called ‘Carefree structures’. These are aircraft constructions that are less sensitive to damage caused, for example, by fatigue, hail storms, other weather phenomena, trucks that collide with the aircraft and corrosion. Carefree aircraft constructions will be characterised by significantly reduced

maintenance costs.

Source: Delft University of Technology

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