Main thematic area: Economics/Science/*Technology*
Cost: £/ff/fff

Influence of implementation of composite materials in civil aircraft industry on reduction of environmental pollution and greenhouse effect

Background

With air traffic expected to double by 2020, it is important to reduce aircraft emissions as far as possible. Whilst there are many features of operation that affect an aircraft's environmental impact, the amount of carbon dioxide emitted is proportional to the aircraft structure weight. For several decades, non metallic materials have been steadily introduced into aircraft in order to reduce structure weight. However, most recently, advanced composite materials have begun to replace metal in the primary load bearing structures, such as the wing and fuselage, with the promise of substantial weight reduction.

Whilst this move towards the all composite aircraft will undoubtedly produce environmental benefit, the degree of improvement is not yet understood.

Study aims

This study provides the quantified impact of each aircraft composite component on emissions reduction. It will provide the information to enable efficiency gains from new designs and configurations to be modelled.

Academic component level assessment of potential gains from composites will provide an independent assessment of the efficiency gains achieved through fleet turnover.

Aircraft and composites

Airbus uses hybrid aluminium/fibre glass composites in the upper fuselage of the A380 and standard composites throughout its structure: keel beam, pressure bulkhead, centre wing box, J nose, outer landing strips, upper floor beams and vertical stabiliser are only some of the examples. Boeing has introduced a new all composite aircraft with over 90% carbon fibre composites in its structures.

Photo credit: Boeing photo

Benefits

This study draws in knowledge from industry to add practical experience alongside the theoretical and experimental knowledge within academia. It is intended that the quantified data will be used to manage and plan how composite aircraft will be used in the future.

The study will influence and facilitate the take up of technology options to improve fuel efficiency with its consequent environmental benefit.

Assessing and quantifying the scale of environmental gains through the use of composite materials in aircraft will aid planning for their use and ultimately result in emissions savings.

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