Dirt detector could slash airplane emissions

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Airlines could significantly reduce their fuel bills and carbon footprint thanks to a new device being developed with the University of the West of England (UWE Bristol).

The unique hand-held instrument can measure precisely how much dirt has accumulated on an aeroplane's surface and determine whether the build-up increases drag.

Plane operators can use data collected by the scanner to optimise aircraft cleaning routines and ensure their fleet is as aerodynamic as possible.

It is estimated airlines using the ECOTEC system – developed by academics from UWE Bristol in association with concept designer Intercede Ventures Limited – could cut their fuel bills by as much as one per cent.

One of the world's largest charter airlines is trialling the patented system in six of its aircraft ahead of the product being launched into the market this year.

Intercede worked with researchers from UWE's Institute of Bio-Sensing Technology to develop the system, using the UWE team's considerable expertise in sensor system design, fabrication and evaluation, together with the university's wind tunnels for early testing and calculations.

The company's managing director Graham Mimms said the technology – which uses lasers, light beams and mirrors – also had applications in the automotive, marine, rail and wind turbine industries because all use aero-dynamic surfaces.

Graham said: "A clean aircraft is a more efficient aircraft but that's not always been too easy to prove. We thought 'If we can prove it, airlines would keep them clean and efficient' and as a result more environmentally friendly.

"Engineers will soon be able to walk around the aircraft with our patented and industry approved instrument to analyse which surface sections need cleaning to keep it in its most efficient state. If you clean it by applying an industry approved cleaning compound you will have an aircraft aerodynamically more efficient.

"We detect when it becomes beneficial to re-clean specific areas of the aircraft as degradation (increased drag) is not even across the aircraft surface. By doing this, we can keep the aircraft within an efficiency envelope. By following our protocols, airlines will be able to maintain the surfaces in a more efficient state. An aircraft can look clean to the eye but not be aero-dynamically at its best – our instrument can detect this."

Graham said airlines' approach to cleaning their planes varied, hampered by the high water usage (sometimes more than 20,000 litres per wet wash) which is not eco-friendly. But he said the ECOTEC system would generally recommend the dry washing of aircraft with environmentally-friendly cleaning products supplied by project collaborative partner Chemetall, a global supplier of aircraft-approved cleaning and maintenance compounds and products.

He said: "What we are recommending is more labour intensive (dry washing) but the resulting efficiency can be greater. If carbon emissions can be reduced by reduced drag efficiencies, airlines may also be able to benefit from reduced taxes."

Graham, who along with his two fellow founding directors have more than 100 years of experience in the airline industry at senior managerial and director level, said his company decided to work with UWE because of its facilities, expertise and close ties with the aviation industry.

He said: "A big deciding factor was the fact UWE has considerable expertise in sensor technology development coupled with appropriate facilities, for example three wind tunnels. There is duel speed sub-sonic one and an ultra-sonic one. Using these was the basis of the initial research to prove that drag can be measured and could be related to the efficiency of the aeroplane.

"We also looked at the history of the university and the way it is supported by the big names in the aviation industry including aircraft manufacturers and aero engine suppliers. For us it had the right credentials for the technological aspects of what we are doing."

The development of the surface analyser has been supported with £100,000 in grants from UWE's Business Technology Centre, iNets South West and Innovation 4 Growth. Investment firm Angels4Angels has also recently backed the venture with a six-figure sum.

Graham said: "We are delighted to welcome the support and financial expertise that Angels4Angels brings to our project, enabling us to focus our efforts on further product development and marketing our carbon footprint reduction systems to international aviation and other markets.

"Through our collaborative working relationship with the international aircraft cleaning manufacturer Chemetall – Intercede Ventures will commence marketing its airline carbon footprint reduction aircraft surface management service in 2016 through Chemetall's global aviation distribution network alongside its own marketing activities."

Provided by University of the West of England