Vinyl Applications – A Hidden Threat

Talking aircraft maintenance? A vinyl decal on the fuselage or tailfin may not strike you as a 'maintenance event'. But it is, and at least one LAME has seen several cases of vinyl decals incorrectly attached to aircraft.

In 1996, all 70 people aboard Aeroperú flight 603 died when it plunged into the Pacific Ocean on its way from Lima, Peru to Santiago, Chile. The reason? An inexperienced employee had left duct tape over vital static ports on the underside of the fuselage, causing a complete failure of multiple flight instruments.

While this is certainly at the extreme end of what can happen, it doesn't affect only big airliners.

In 2002, a NZ Aerospace FU24-950 (Fletcher) crashed south east of Masterton after its tailfin had separated. Microscopic examination found that the cracking on the tailfin was due to metal fatigue which had originated from an apparent cut or score mark in the outer surface of the skin.

That corresponded to the edge of a rubber protective strip applied to the tailfin's leading edge, and then trimmed. The tool used to trim the strip had cut into the metal skin and the cut had then acted as a stress riser from which the fatigue crack originated.

What do these two very different accidents have in common? Well, they're both simple maintenance errors, although in the case of the Fletcher, the maintenance may not have been carried out by a licensed aircraft maintenance engineer (LAME).

Manawatu-based maintenance controller, Adrian Williams, says his company, Aero Support Engineering, has come across instances where decals have covered static ports – which can be as small as 2 mm wide – and vortex generators.

That's dangerous as the static ports feed the instruments details of ambient air pressure, which if incorrect can cause the instruments to be way off, as was the case with the Aeroperú flight.

"A commercial vinyl applicator can do the graphics, but they're not aircraft engineers," says Adrian. "And they don't necessarily understand the potentially fatal consequences that covering a small static port or a vortex generator can have."

Vortex generators are sometimes installed on aircraft wings and tail surfaces. They control airflow over the upper surface of the wing by creating vortices that energise the boundary layer to improve the lift to drag ratio. The vortex generators are small aluminium vanes around 25 – 35 mm long which create more lift.

"While they're very small, they can have a huge effect on aerodynamics," says Adrian. "That's why it's concerning when we see decals over them."

The same principle applies to painting.

"When painting part of an aircraft, its 'static balance' needs to fall within the manufacturer's specified limits," says Adrian.

Static balancing refers to the alignment of centre of gravity with the axis upon which the surface revolves.

"Often balance limits for painted and unpainted surfaces can be substantially different."

John Keyzer, one of the CAA's Aviation Safety Advisers, echoes Adrian's thoughts. "Applying a decal is a maintenance activity and should be carried out or supervised by a LAME or a person who can certify that maintenance." ■

Vinyl decal applied over a vortex generator.