



THE EMPEROR'S NEW CLOTHES

What has Hans Christian Andersen's 19th century fairytale about a naïve emperor have in common with the airworthiness of fabric covered aircraft?

By Trevor Robinson.



Fabric covered aircraft, like this Tiger Moth, require regular structural inspection. Beware of extended rebagging periods.

Like Hans Christian Andersen's fairytale about an emperor with no clothes, owners and operators are often ecstatic with the appearance a good fabric covering provides. However, the shine of the fabric often blinds those responsible for continuing airworthiness to the periodic need for inspection of the underlying structure. You would be forgiven for thinking that it is as though the fabric magically makes defects disappear.

Many of Australia's fabric-covered aircraft, specifically those of British origin, originally used Irish linen (made from flax) or cotton fabric. Although these fabrics are suitable, they are adversely affected when exposed to ultraviolet rays (sunlight), moisture (humidity), bacteria and fungi. Unfortunately this decay occurs regardless of storage or maintenance techniques, compelling periodic fabric replacement.

Depending on variables such as aircraft type and operational environment, replacement of natural fabric is usually required every 10 to 15 years (20 years

for exceptionally well-maintained and hangared aircraft). However, the longer between a rebag, the more rectification work is required, increasing maintenance costs. Complete fabric replacement exposes the aircraft's structure, allowing detailed inspection.

Ample evidence exists, both in Australia and overseas, of the dangers of extending rebagging periods.

New materials: Mindful of the finite life of natural fabrics, aircraft manufacturers formulated their maintenance programs accordingly, with the belief that thorough inspections would occur every 10-15 years at fabric replacement. Rigging checks, structural inspection and application of protective coatings would occur during this time.

In the late 1950s, the advent of synthetic

fibre initiated a materials revolution.

Synthetic fibre was adapted for aircraft use in the early 1960s. With high-tensile strength and resistance to both chemicals and micro-organisms, synthetic fibre was an ideal replacement for natural aircraft fabrics. Sold under different trademarks, these new materials are the mainstay of today's fabric aircraft.

Synthetic fibre is stronger and more resilient than natural fabric. Applying these man-made materials, either completely through a rebag or during a field repair, is also easier than working with their natural counterparts, resulting in significant savings of time and money.

But beware. The chemicals used in synthetic fabric application are unique and specific and should never be substituted. Use of materials not detailed or approved not only voids the supplementary type certificate (STC), but impairs the strength and integrity of the fabric, adversely affecting the aircraft's airworthiness.

Although these synthetic fabrics fulfil airworthiness and aesthetic needs, what about the extended period between structural inspections that results from rebagging? Can owners or operators, through their maintainers, guarantee the integrity of the fabric-covered airframe beyond the period expected by the aircraft manufacturers? Are longer inspection intervals safe?

When confronted with this question, many owners or operators typically respond, "there's nothing wrong with the fabric". No argument. But what about the structure beneath? Although the fabric may be very long lasting, the structural skeleton is more difficult to inspect *in toto*. Only comprehensive exposure through rebagging will provide the necessary access needed for maintainers.

Ample evidence exists, both in Australia and overseas, of the dangers of extended rebagging periods. This evidence includes several with fatal accidents.

If your aircraft's fabric is 15-20 years or older, ask yourself: "Do I think the structure is sound, or do I know it is?" If in doubt, rebag it.

The Emperor will not only be happy, but safe.

Trevor Robinson is a CASA airworthiness specialist.