

# Aircraft Fabric Spoken Here

*Fabric covered aeroplanes are old, modern, beautiful and durable. But where does one turn for repair or restoration support? KiwiFlyer recently spoke with Paul Waterhouse of Central Aero Engineering to help readers demystify the subject.*

**WORKING WITH** fabric covering systems does not involve witchcraft although not all maintenance organisations are equipped to handle major repairs. Most engineers have simply never dealt with it. As more LSA replicas come on line, the already large roll of fabric aircraft on the register is steadily increasing. A market niche is opening for the repair and maintenance of these aircraft and this is a niche that Hamilton based Central Aero Engineering is keen to support.

Central Aero Engineering Director, Paul Waterhouse has his focus on fabric covered aircraft operating within the central North Island and has identified a wide range within the Central Aero client base. The scope of aircraft stretches from classics, such as the Tiger Moth, through to regularly used Piper Cubs, the workhorse glider tug Pawnees and a plethora of recently arrived lightweight replica classics which come under the microlight category.

Certified aircraft must be re-covered under the oversight of a LAME. Non certified aircraft and a number of those in the sport aircraft category can be owner-builder covered and repaired, although subsequent owners are permitted only to make simple repairs.

Paul notes that Central Aero Engineering are seeing a greater number of aircraft come through their doors with fabric components and a variety of finishing systems are being encountered. "We are keen and passionate about classic aircraft and enjoy working on them. Our own knowledge is strengthened by having Colin Sutherland of Rotorua available to carry out major fabric requirements."

Colin acquired his fabric skills on working agricultural aircraft such as the Piper Pawnee and has subsequently re-covered a number of Tiger Moths, Austers and Cubs along with control surface recovers for various Harvards. Recently his expertise has been focused on sport aircraft types in the form of Pitts Specials.

## Material changes

Traditionally fabric systems only dealt with Irish Linen and Grade A Cotton finished with either nitro-cellulose or

butyrate dope systems. The ubiquitous aluminium silver dope finish was the norm. Today, nitro-cellulose dope is a non starter although traditional silver and coloured dope finishes remain popular. Traditional linen and cotton fabrics are expensive and generally relegated to the purist market.

The 1950's saw the advancement of polyester heat-shrinkable fabrics which reduced the time required for installation because the fabric could be glued rather than sewn to the aircraft. Commonly known by the names Dacron, Ceconite or Stits, polyester fabrics have advantages in



Colin Sutherland reinforces the wing tip area prior to applying further fill and finish coats of butyrate dope.

that they are stronger than the natural fibres and are easier to work and less susceptible to fungal rot, although sunlight will deteriorate unprotected fibre. The finishing system is therefore all important. Increasingly, modern vinyl and polyester based finishing systems are replacing the traditional dope finishes and while no system will last forever a properly executed job should be good for 30 years or more.

## Fabric Assessment

If the fabric on the aircraft is not factory original then the airframe logbook is the first place to look, although the entry may be lacking in detail. After determining that the fabric is a modern polyester, take a look at the coatings. Sunlight is the worst enemy of fabric and exposure to UV rays must be avoided. With dope based systems the coatings form a light-proof barrier against sunlight penetration. Look inside the fuselage which should be as dark as a cave. If you can see light then so can the fabric and that is a potential spot for

fabric deterioration. Polyurethane finishing systems put UV barriers in the coatings and let some light in but not UV rays through.

Newer covering systems should be almost in perfect shape while a few repairs on older airframes are common. The upper surfaces of wings get the most exposure to sun, rain and other abuses and the finishing tapes can be prone to lifting. Cracks will be evident in the paint and may well have chipped off a sharp radius such as around door edges. These should be repaired

with dope applied by brush. If you want a higher level of finish then sand it smooth and spray the dope on. A ding or tear may require a bit of glue, a fabric patch and some paint. Wingtips attract 'hangar rash' and are often an area of constant repair.

An all-dope finish is easy to repair. The main disadvantage with dope is the constant shrinking (even with non taughtening dope) that with time can cause cracking of the paint finish and even the bending of structural members. Polyurethane top coats on dope bring their own set of problems as the shrinking properties of the dope are at odds with the polyurethane's less flexible finish and cracks are inevitable.

## Finishing Systems

The subject of the various finishing systems is a whole article in itself. Colin Sutherland likes dope finishes as they are easy to repair. He feels comfortable with the technology but freely admits that it is time to give serious consideration to the likes of the Poly-Fibre and Stewart's systems.

Central Aero Maintenance see a future in offering fabric finishing system support and believe it is timely for newer aircraft engineers to embrace the technology available. "Someone has to be interested in these aircraft and we are," says Paul.

"Our facility has the potential to dedicate specific space to fabric repair and maintenance. Modern systems benefit from having a controlled environment for application and that is a path we are quite determined to pursue. Call us today to discuss your requirements."

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