

# SAA Training – Aircraft Fabric Course at Hawera

By Bruce Cooke, SP1980

On the Tuesday and Wednesday before the Hawera SportAvex Fly-In, SAA held a technical training course on the art of aircraft fabric covering. Although a very old technique, homebuilt aircraft are still being constructed with fabric covering, and this course was intended to demystify the process and give builders confidence and skills to use on their own projects.

The class of five participants was slightly smaller than the previous course held in 2016, but this worked well as it allowed plenty of personal oversight from course tutor Bruce Cooke, and assistant Paul Parsons. Brad Pearpoint and Alex Kaandorp are rebuilding a Tiger Moth in Palmerston North; Howard Smith is progressing, well building a Jodel at Fielding; Tim Ward is planning on building a Kitfox at Rangiora; and the final participant, Guy Standen from Levin, didn't actually have a project in mind, but was really keen to learn a traditional skill just out of interest.

The course was primarily practical instruction, with some background theory and discussions to provide a "big picture" understanding of why things are done a particular way. Each participant was provided an instructional frame, representing typical aircraft structure, with some tricky bits such as curved tips, to illustrate how to deal with those on real aircraft components. Over the course of the two days, the frame was covered in fabric, which was shrunk and sealed, the ribs were laced and tapes, inspection rings and drain-hole grommets applied. Due to practicalities of the venue and time limitations, spraying of the final sealing, UV protection and top coats was not possible, but a good discussion ensued covering the techniques required.

The course used the Stits Polyfiber fabric system as it is a common, well proven system, but the techniques are equally applicable to all other modern fabric covering systems. The differences between fabric systems were discussed to provide an understanding of each and the considerations when choosing which system to use. Commonly used products such as traditional cotton and dope, Ceconite, Superflight, Stewart Systems and Oratex were all covered in detail. Aviation best practice, which SAA encourages, is to use a single reputable system in its entirety rather than mixing and matching different glues and fillers (or inventing your own) as some systems are



Participants with their panels at the completion of the course: Left to right: Howard Smith, Guy Standen, Tim Ward, Bruce Cooke (Tutor) Alex Kaandorp, Brad Pearpoint. Below: Various photos during the course. (All photos by Paul Parsons)

definitely not compatible with others.

Some interesting historical precedents were also examined, such as the Walsh brothers 1910 Farman biplane, which had fabric tensioned with boiled sago – to its detriment as the aircraft was eaten by cows! Another example was the Hindenburg airship, which had huge fabric panels treated with Nitrocellulose (Nitrate) dope. Not only is nitrocellulose extremely flammable (it is essentially guncotton, an early explosive) but the Hindenburg's silver pigment was not the normal aluminium powder, but magnesium. Add a Hydrogen environment and things are not going to be good in a fire – footage of the disaster at Lakehurst shows the fabric almost instantly vaporising as fire spreads through the structure.

Instruction also covered exactly what the fabric covering is supposed to do, and why certain processes should be (literally) adhered to. Many people fail to realise that the thin, lightweight fabric covering is actually considered to be part of the airframe's primary structure. It is of course the load path that transfers Mr Bernoulli and

Mr Newton's magical lifting effects to the aircraft structure, so it needs to be properly attached. Because mechanical connection of fabric to structure is critical, great effort was spent learning the "modified seine knot" used to lace fabric to wing ribs. This is a fiddly business with waxed thread, long, bent needles and "The palm tree comes out of the Island, and the rabbit goes under, over and around the tree"! It does eventually make sense and there is a great sense of achievement when a nice row of tight, even rib lacing is completed. An additional aspect covered was a demonstration of repairing damaged fabric – a useful factor to consider for anyone operating a fabric-covered aircraft.

Feedback received from the participants showed it was a very worthwhile and rewarding course, which will be repeated again in the future.

