

REPAIRS TO COMPOSITE STRUCTURES

1. Introduction

It is important that, before the repair to any damage to the composite structure of a LAA aircraft is embarked upon, the LAA Engineering Department agrees with the repair scheme. A recognised repair technique described by the designer or, failing that, techniques described in Burt Rutan's Mouldless Composite Homebuilt Sandwich Aircraft Construction manual or the Glass Fibre Glider Repair Manual by Slingsby Sailplanes, should be used where possible.

2. Weight

Although composite structures are often straightforward to repair, it should be understood that not all damage may be repairable. A repair will inevitably result in the part weighing more than the original. On a control surface, an increase in weight could be critical as to whether or not it would make it susceptible to flutter. The repair of a micro-light could take the aircraft beyond its maximum empty weight.

3. Stiffness

The stiffness of a structure may also be altered following repair. Where the repair is on the airframe will have great importance on how the repair is designed. Any significant change in stiffness must be avoided. Consideration should therefore be given about replacement of a complete moulding rather than trying to repair it.

4. Repair work

Repairing a composite structure is not the same as constructing a composite aircraft from a kit. The part needing repair may have been factory produced in a mould so greater skills will be required to ensure that the repair is fully effective. It is, therefore, important that the person carrying out the repair work is highly skilled in the use of the composite materials and is fully conversant with the techniques necessary. Specialist equipment may be necessary, e.g. for vacuum bagging to consolidate a laminate during cure.

If a repair, carried out without prior LAA approval, is subsequently found to be sub-standard, it will not be accepted.

5. Information required

Typically, the information required by LAA will be:

5.1 Reason for repair.

5.2 Description of damage including its size and position relative to critical components e.g. wing attachments. A careful examination of the entire aircraft should be carried out to search for less obvious damage. It is possible for damage to exist remote from the obvious areas. Fuel leakage as the result of an accident could attack materials, such as the foam core of a sandwich panel that would not normally come in to contact with fuel.

5.3 Details of the original materials of the damaged area including fibre type and weight, fibre orientation and core material if a sandwich panel. This information should be accompanied with where it was obtained, e.g. from the manufacturer.

REPAIRS TO COMPOSITE STRUCTURES

5.4 Proposed method of repair including its source and details of surface preparation, materials to be used (types of cloth, resin system, core material, adhesives and fillers), layer sequence and fibre orientation and overlap dimension onto sound structure. Also the environment where the repair and cure will be carried out should be noted. The temperature and humidity levels must be kept within pre-subscribed limits during layup and cure. Silicone based products must not be present in the repair area to avoid contamination of bond surfaces, layups etc.

5.5 Final finishing method.

6. Repair proposal

The repair proposal should be presented to LAA engineering with an application using form LAA/MOD 8 available from the web site at www.laa.uk.com
Included with the proposal should be the name of the inspector who will oversee the repair and the person who will carry out the work.

Once LAA Engineering agrees with the repair scheme, the repair can be carried out and worksheets written for signature by the inspector who will also raise a PMR.