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Section 5 AIRFRAME COMPOSITE

THIS MODULE CONTAINS A BASIC KNOWLEDGE SELF STUDY GUIDE AND SUGGESTED MAINTENANCE TASKS

Module 5L – AIRFRAME COMPOSITE BASIC THEORETICAL KNOWLEDGE (self study guide)

See Section 1 - Instructions for use

Module 5L.1 Airframe Fibre-Reinforced Plastic (FRP) (Level 2)	Completed,
Basic principles of FRP construction Resins (epoxy, polyester, phenolic resins, vinyl ester resins) Reinforcement materials glass, aramide and carbon fibres, features; weave types plain, unidirectional and bi-directional, rovings Fillers Supporting cores (balsa honeycombs, foamed plastic) Constructions, load transfers (solid FRP shell, sandwiches) Identification of damage during overstressing of components Colour requirements for composite aircraft Procedure for FRP projects (according to maintenance organisation manual) including storage conditions of material	

Module 5L.2 Materials (level 2)	Completed,
Thermosetting plastics, thermoplastic polymers, catalysts Understanding properties, machining techniques, detaching, bonding, welding Resins for FRP; epoxy resins, polyester resins, vinyl resins, phenolic resins Importance of cleanliness and accurate measuring and mixing of resins Reinforcement materials From elementary fibre to filaments (release agent, finish, weaving patterns) Properties of individual reinforcement materials (e-glass fibre, aramide fibre) Problem with multiple material systems, matrix Adhesion/cohesion, various behaviours of fibre materials Filling materials and pigments Technical requirements for filling materials Property change of the resin composition through the use of e-glass, micro balloons, aerosols, cotton, minerals, metal powder, organic substances Understanding the cure and post cure procedures and differing requirements for sailplanes and powered sailplanes Paint assembly and repair technologies Support materials Honeycombs (paper, FRP, metal, balsa wood, Divinycell (Contizell) development trends	

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Health and safety. Use of correct Personal Protective Equipment (PPE) and understanding limitations of each

General

First aid requirements particularly in respect of working with composites

Workplace conditions, dust and fume extraction, heating and humidity control of working and storage areas and effect of less than ideal conditions

Fire safety and extinguishing media for composites

Module 5L.3 Assembly of Fibre-Reinforced Composite Structure Airframes (Level 2)

Completed,

Solid shell

Sandwiches

Assembly of aerofoils, fuselages, control surfaces

Module 5L.4 Identifying Damage (Level 3)

Completed,

Behaviour of FRP components in the event of overstressing

Identifying delamination, loose bonds

Bending vibration frequency in aerofoils

Load transfer

Frictional connection and positive locking

Fatigue strength and corrosion of metal parts

Metal bonding, surface finishing of steel and aluminium components during bonding with FRP

Module 5L.5 Mould making (Level 2)

Completed,

Plaster moulds, mould ceramics

GFK moulds, Gel-coat, reinforcement materials, rigidity problems

Metal moulds

GRP moulds

Male and female moulds

Release agents and methods

Module 5L.6 Performance of practical activities (Level 2)

Completed,

Cables

Thimble splice

Nicropress and Talurit repairs

Repair of coverings

Repair of solid FRP shells

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Mould fabrication/moulding of a component (e.g. fuselage nose, landing gear fairing, wing tip and winglet)

Repair of sandwich shell where interior and exterior layer are damaged

Repair of sandwich shell by pressing with vacuum bag

Transparency repair (PMMA) with one and two component adhesives

Bonding of transparency with the canopy frame

Tempering of transparencies and other components

Performance of a repair on a sandwich shell (minor repair less than 20 cm)

General

Aircraft rigging. Calculation of control surface mass balance and range of movement of the control surfaces, measurement of the operating forces

Locking of pin, screws, castellated nuts turnbuckles

Performance of a 50hr/100 hr/annual inspection on an FRP airframe

Module 5L – AIRFRAME COMPOSITE SUGGESTED MAINTENANCE TASKS

Registration & date	Maintenance task performed	Confirmed by Licence No.
General activities		
	Carry out delamination inspection as part of routine inspection or after an incident	
	Carry out a composite condition inspection and assess deterioration for continued airworthiness	
Composite repairs		
	Laminate repair assess repair process and establish layup with the aid of drawings or specific repair manual	
	Involvement with structural repair using rovings	
	Use peel ply during laminate repair	
	Carry out repair by making a mould from another aircraft. Use of various release agents	
	Determine glass cloth weight and orientation using the burn out method	
	Sandwich structure repair using foam core	
	Sandwich repair using honeycomb core	
	Sandwich repair that requires both inside and outer skin repair without access from inside	

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	Use different types of filler	
	Set up and use vacuum bag system	
	Cut access hole and effect repair (e.g. for elevator rod chance)	
	Replace hinge or metal fitting in control surface or aerofoil	
	Carry out post repair heat cure/tempering, demonstrate recording methods to confirm satisfactory process	
	Construct post repair heat cure box/tent and use of heat lamps and indirect heat plus monitoring and recording system	
	Repair of fairings (e.g. repair undercarriage door)	
	Carry out a control surface weight and mass balance check following repair. Determine limits and not how to correct out of limit items	
Gel coat and finishing		
	Partial gel coat repair noting different types of gel coat and colour matching. Note correct surface preparation for gel repair	
	Complete gel coating or gel replacement with paint. Practice gel coat removal and note precautions. Use of manual and powered sanding tools.	
	Sanding of applied gel to achieve satisfactory finish. Use of a reveal coat. Polishing and waxing	
	Application of vinyl registration letters and markings/decals	
Module 5L AIRFRAME COMPOSITE ADDITIONAL MAINTENANCE TASKS		

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Add additional pages as necessary