
Overview

This standard identifies the competences you need to produce aircraft composite mouldings by using pre-preg laminating techniques, in accordance with approved procedures. You will be required to follow the appropriate instructions, drawings, specifications and documentation to produce the composite mouldings, using the correct pre-preg laminating production techniques.

You will produce a range of composite mouldings, incorporating a variety of features and using a range of techniques and processes. Mouldings produced will include laminates and sandwich structures, using a range of resin, fibre and core materials.

Your responsibilities will require you to comply with organisational policy and procedures for the pre-preg laminating activities undertaken, and to report any problems with the moulding activities, equipment or materials that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You will need to ensure that all tools, equipment and materials used in the moulding process are correctly accounted for on completion of the activities, and you must complete all necessary job/task documentation accurately and legibly.

You will be expected to work either with a high level of supervision or as a member of a team, and you will take personal responsibility for your own actions and for the quality and accuracy of the work that you carry out. Where team working is involved, you must demonstrate a significant personal contribution during the team activities in order to satisfy the requirements of this standard, and you must demonstrate competence in all the areas required by the standard.

Your underpinning knowledge will be sufficient to provide a sound basis for your work, and will provide an informed approach to applying the appropriate pre-preg laminating techniques and procedures. You will understand the production procedures and techniques used, and will know about the tools and techniques, in adequate depth to provide a sound basis for carrying out the activities to the required specification.

You will understand the safety precautions required when carrying out the pre-preg laminating activities, and when using the associated tools and equipment. You will be required to demonstrate safe working practices throughout. You will also understand your responsibilities for safety, and the importance of taking the necessary safeguards to protect yourself and others in the workplace.

Performance criteria

You must be able to:

- P1 work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
- P2 follow the correct component drawing or any other related specifications for the component to be produced
- P3 determine what has to be done and how this will be achieved
- P4 obtain and prepare the appropriate tools, equipment and materials
- P5 carry out the moulding or laying-up activities using the correct methods and techniques
- P6 produce components to the required specification
- P7 check that all the required operations have been completed to specification
- P8 complete and store all relevant documentation in accordance with organisational requirements
- P9 deal with problems within your control and report those that cannot be solved

Knowledge and understanding

You need to know and understand:

- K1 how to work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
- K2 the importance of wearing the appropriate personal protective equipment (PPE), and of keeping the work area clean and tidy
- K3 the application of COSHH regulations in relation to the storage, use and disposal of composite materials and consumables
- K4 the specific workshop environmental conditions that must be observed when producing aircraft composite mouldings
- K5 how to use and extract information from engineering drawings and related specifications in relation to work undertaken
- K6 how to interpret imperial and metric systems of measurement
- K7 quality procedures used in the workplace to ensure production control (in relation to currency, issue, meeting specification), and how to complete such documents
- K8 conventions and terminology used for pre-preg laminating techniques (to include material orientation, material identification, material templates, ply lay-up, pressure plates, vacuum bagging, cure cycles, exotherm)
- K9 the different types of resin systems, fibres, reinforcements, and their applications
- K10 how to build up laminates (including orientation and balance of plies to minimise spring and distortion in composite mouldings)
- K11 the different core, insert and filler materials used, and their applications
- K12 the visual identification of both raw and finished composite materials, and the identification of materials by product codes
- K13 methods of preparation for patterns, moulds and tooling (including the correct selection and use of surface sealers and release agents)

- K14 the correct methods of storage, thawing and handling of pre-preg materials (including monitoring temperature, storage life and 'out-life')
- K15 methods used in the application of pre-preg materials to tooling surfaces (including methods of tailoring and cutting)
- K16 mixing ratios for resins and catalysts, and the associated working times for two-part resin systems
- K17 the correct methods of storage and handling of ancillary and consumable materials
- K18 tools and equipment used in the pre-preg laminating activities, and their care, preparation and control procedures
- K19 how to recognise faults that can occur during the moulding process
- K20 cure cycles (including temperature and pressure ramps and dwell times for pre-catalysed resin films), and the importance of adhering to the cure cycle
- K21 the need for monitoring the cure cycle, using thermocouples, probes, chart recorders, thermometers and data logs
- K22 procedures and methods used for removing mouldings from production tooling
- K23 the care and safe handling of production tooling and composite mouldings throughout the production cycle
- K24 the procedure for the safe disposal of waste materials
- K25 the recording documentation to be completed for the pre-preg laminating activities undertaken and, where appropriate, the importance of marking and identifying specific pieces of work in relation to the documentation
- K26 the extent of your own responsibility and to whom you should report if you have problems that you cannot resolve

Scope/range related to performance criteria

1. Carry out all of the following during the pre-preg laminating activities:
 - 1.1 ensure that you have the correct documentation for the pre-preg laminating operations (such as drawings, job instructions, aircraft standards)
 - 1.2 adhere to procedures or systems in place for risk assessment, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
 - 1.3 use the correct tools and equipment for the activity, and ensure that they are safe to use
 - 1.4 use the correct materials and consumables, as specified in the production documentation
 - 1.5 apply safe and appropriate working practices and procedures at all times
 - 1.6 dispose of waste items and materials in a safe and environmentally acceptable manner, in line with company procedures
 - 1.7 return all tools and equipment to the correct location on completion of the activities
 - 1.8 leave the work area in a safe condition and free from foreign object debris
2. Prepare moulds and materials for the production activities, to include carrying out all of the following:
 - 2.1 checking that the tooling is correct and complete
 - 2.2 cleaning the tooling and removing resin build ups
 - 2.3 checking the tooling for surface defects
 - 2.4 applying sealants/release agents correctly
 - 2.5 obtaining correct materials for the activity, and checking that they are fit for purpose and 'in life'
 - 2.6 identifying and protecting materials in the work area
 - 2.7 cutting materials to the correct shape and orientation (where applicable)
3. Produce a range of mouldings, using techniques for two of the following types of production tool:
 - 3.1 pattern
 - 3.2 mandrels
 - 3.3 metal
 - 3.4 tooling block
 - 3.5 glass pre-preg
 - 3.6 carbon pre-preg
 - 3.7 female tooling
 - 3.8 male tooling
 - 3.9 multi-part tools
 - 3.10 matched tooling
 - 3.11 closed tooling
4. Produce composite mouldings incorporating one of the following in the lay-up:
 - 4.1 butt joins
 - 4.2 overlap joins
 - 4.3 staggered joins
 - 4.4 orientated plies

- 4.5 inverted plies
- 4.6 balancing plies
- 4.7 inserts
- 4.8 fixtures
- 5. Produce composite mouldings incorporating three of the following features:
 - 5.1 internal corners
 - 5.2 external corners
 - 5.3 horizontal surface
 - 5.4 vertical surface
 - 5.5 double curvature
 - 5.6 concave surface
 - 5.7 convex surfaces
 - 5.8 return surfaces
 - 5.9 joggle details
 - 5.10 nett edges
- 6. Use all of the following in the laying-up activities:
 - 6.1 resin (such as polyester, epoxy, phenolic, vinyl ester, bismaleimide, cyanate ester, acrylic)
 - 6.2 fibre (such as glass, polyethylene, aramid, carbon, hybrid)
 - 6.3 reinforcement (such as braids, roving, tapes, chopped strand, continuous filament, woven, uni-directional, knitted, multi-axis)
 - 6.4 core materials (such as solid timber, end grain balsa, expanding core, syntactic core, coremat, structural foam, honeycomb)
- 7. Use one of the following for applying temperature during the cure cycle:
 - 7.1 oven
 - 7.2 autoclave
 - 7.3 heated tools/moulds
 - 7.4 heat mats
 - 7.5 heated press
 - 7.6 curing lamps
 - 7.7 infrared heating
 - 7.8 UV curing
 - 7.9 electro-magnetic inductance
 - 7.10 micro-wave
 - 7.11 other (to be specified)
- 8. Use one of the following for applying pressure during the cure cycle:
 - 8.1 vacuum bags
 - 8.2 hot de-bulk
 - 8.3 pressure de-bulk
 - 8.4 pressure bags
 - 8.5 thermal mould expansion
 - 8.6 fibre tensioning
 - 8.7 press
 - 8.8 autoclave
- 9. Produce a range of mouldings in compliance with one of the following standards:
 - 9.1 Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)

-
- 9.2 Ministry of Defence (MoD)
 - 9.3 Military Aviation Authority (MAA)
 - 9.4 Federal Aviation Authority (FAA)
 - 9.5 Aerospace Quality Management Standards (AS)
 - 9.6 BS, ISO or BSEN standards and procedures
 - 9.7 customer standards and requirements
 - 9.8 organisational standards and procedures
 - 9.9 manufacturers standards and procedures
10. Complete the relevant paperwork, to include one from the following, and pass it to the appropriate people:
- 10.1 build records
 - 10.2 job cards
 - 10.3 log cards
 - 10.4 aircraft log
 - 10.5 other specific recording method

SEMAER220

Producing aircraft components using pre-preg laminating techniques



Developed by	Enginuity
Version Number	3
Date Approved	31 Mar 2026
Indicative Review Date	01 Apr 2029
Validity	Current
Status	Original
Originating Organisation	Enginuity
Original URN	SEMAER2-20
Relevant Occupations	Engineering, Engineering and Manufacturing Technologies, Engineering Professionals, Science and Engineering Technicians
Suite	Aeronautical Engineering Suite 2
Keywords	Aeronautical; Engineering; composite mouldings; pre-preg laminating; resin; fibre and core materials
