
Overview

This standard identifies the competences you need to carry out bonding activities on aircraft composite mouldings, in accordance with approved procedures. You will be required to follow the appropriate instructions, drawings, specifications and documentation to bond aircraft composite materials, using the correct techniques and procedures.

You will produce a range of bonded composite mouldings, incorporating a variety of features and using a range of techniques and processes. Bonded mouldings produced will include a range of resin, fibre and adhesive materials.

Your responsibilities will require you to comply with organisational policy and procedures for the composite bonding activities undertaken, and to report any problems with the bonding 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 bonding 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 composite bonding techniques and procedures. You will understand the bonding 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 composite bonding 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 relevant bonding procedure specification and job instructions
- P3 check that the materials to be bonded and bonding agents comply with the specification
- P4 prepare the parent materials and bonding agents in line with the bonding specification
- P5 carry out the curing and bonding operations using the specified processes and techniques to position and bond the materials in their correct locations
- P6 ensure that any equipment used to maintain surface contact during the bonding activities is set up
- P7 achieve bonds of the required quality and within the specified dimensional accuracy
- P8 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 bonding/composite materials and consumables
- K4 the specific workshop environmental conditions that must be observed when bonding aircraft composite materials
- K5 how to use and extract information from engineering drawings and related specifications in relation to work undertaken
- K6 how to use imperial and metric systems of measurement, workpiece reference points and system of tolerancing
- K7 the conventions and terminology used for bonding
- K8 methods of preparing components and producing a keying surface (water and solvent cleaning, degreasing, abrading, acid etching, priming)
- K9 the importance of working to organisational and bonding agent manufacturers' instructions whilst carrying out the bonding activities
- K10 the effects of the environment on the bonding process
- K11 the methods and techniques used for bonding the materials
- K12 the procedures for selecting the correct type of adhesive, and the pre-treatment requirements, setting or curing requirements; and time, strength and appearance
- K13 the use and precautions to be taken when using adhesives and solvents, and the correct methods of storage and handling of bonding agents
- K14 bonding agent equipment (holding vessels, brushes, stirrers and spatulas,

scrapers, knives, clamps and weights)

K15 methods of application for different bonding agents

K16 reasons for checking that components are assembled in the correct sequence, are positioned dimensionally accurately and to the correct orientation, in accordance with the specifications, prior to bonding

K17 how to check that completed joints are firm, sound and fit for purpose (types of failure mode, effect of poor pressure application, the effect of inadequate curing)

K18 the procedures for applying bonding pressures to the joints during the curing cycle

K19 procedures for cleaning off surplus adhesive and tidying up the appearance of joints

K20 the procedures when temperature cure is used, and the need for thermocouples on temperature control

K21 common causes of defects associated with the bonding processes, and how to avoid them

K22 the tools and equipment used in bonding activities, and their care, preparation and control procedures

K23 why tool/equipment control is critical and what to do if a tool or piece of equipment is unaccounted for on completion of the activities

K24 the quality control procedures to be followed during the bonding operations

K25 the procedure for the safe disposal and correct separation of waste materials

K26 the recording documentation to be completed for the bonding activities undertaken and, where appropriate, the importance of marking and identifying specific pieces of work in relation to the documentation

K27 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 composite bonding activities:
 - 1.1 ensure that you have the correct documentation for the bonding 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 check that mouldings are of the correct type, complete and free from defects
 - 1.4 correctly prepare the materials for bonding
 - 1.5 check that the surfaces to be bonded mate properly to make a sound joint possible
 - 1.6 ensure that the joint is rigidly secured during the curing period
 - 1.7 remove any surplus material, and clean up at the appropriate time
 - 1.8 identify and protect the moulding and bonding materials in the work area
 - 1.9 dispose of waste items and materials in a safe and environmentally acceptable manner, in line with company procedures
 - 1.10 return all tools and equipment to the correct location on completion of the activities
 - 1.11 leave the work area in a safe condition and free from foreign object debris
2. Prepare the surfaces to be bonded, using three of the following methods:
 - 2.1 peel plies
 - 2.2 abrading
 - 2.3 water cleaning
 - 2.4 dry fitting
 - 2.5 priming
 - 2.6 templates
 - 2.7 bead blasting
 - 2.8 solvent cleaning
 - 2.9 acid etching
 - 2.10 surface masks
 - 2.11 other (to be specified)
3. Bond composite mouldings, using techniques for two of the following:
 - 3.1 one-part pastes
 - 3.2 contact two-part adhesives
 - 3.3 acrylics
 - 3.4 syntactic films
 - 3.5 two-part pastes
 - 3.6 film adhesives
4. Use two of the following methods when bonding the composite mouldings:
 - 4.1 dry fitting
 - 4.2 mixing adhesives
 - 4.3 laying film adhesives
 - 4.4 bonding sequences
 - 4.5 wetting-out by brush

- 4.6 spraying equipment
- 4.7 shimming materials
- 4.8 applicator gun
- 5. Use one of the following to retain the bond during the curing process:
 - 5.1 weighting down
 - 5.2 pinning joints
 - 5.3 clamping
 - 5.4 press
 - 5.5 vacuum bagging
 - 5.6 bonding jigs
 - 5.7 pressure bagging
- 6. Use one of the following to aid the curing process:
 - 6.1 room temperature
 - 6.2 oven
 - 6.3 autoclave
 - 6.4 heated tools/moulds
 - 6.5 heat mats
 - 6.6 heated press
 - 6.7 curing lamps
 - 6.8 infrared heating
 - 6.9 electro-magnetic inductance
 - 6.10 micro-wave
 - 6.11 other (to be specified)
- 7. Bond composite mouldings, using techniques for one of the following:
 - 7.1 sandwich panels
 - 7.2 butt joins
 - 7.3 overlap joins
 - 7.4 joggle joins
 - 7.5 return joins
 - 7.6 tongue and groove
 - 7.7 strap join
- 8. Bond composite mouldings, using techniques for two of the following:
 - 8.1 internal corners
 - 8.2 external corners
 - 8.3 horizontal surface
 - 8.4 vertical surface
 - 8.5 double curvature
 - 8.6 concave surface
 - 8.7 convex surfaces
 - 8.8 joggle details
 - 8.9 return surfaces
 - 8.10 inserts
 - 8.11 fixtures
- 9. Use appropriate techniques for bonding one of the following materials to the composite moulding:
 - 9.1 other composites

- 9.2 metals
- 9.3 ceramics
- 9.4 polymers
- 9.5 natural materials
- 9.6 other (to be specified)
- 10. Bond composite mouldings, using adhesives suitable for both of the following:
 - 10.1 resins (such as polyester, epoxy, phenolic, bismaleimide, cyanate ester, vinyl ester, acrylic)
 - 10.2 fibres (such as polyethylene, glass, aramid, carbon, hybrid, other specific types)
- 11. Bond a range of mouldings, in compliance with one of the following standards:
 - 11.1 Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
 - 11.2 Ministry of Defence (MoD)
 - 11.3 Military Aviation Authority (MAA)
 - 11.4 Federal Aviation Authority (FAA)
 - 11.5 Aerospace Quality Management Standards (AS)
 - 11.6 BS, ISO or BSEN standards and procedures
 - 11.7 customer standards and requirements
 - 11.8 organisational standards and procedures
 - 11.9 manufacturers standards and procedures
- 12. Complete the relevant paperwork, to include one from the following, and pass it to the appropriate people:
 - 12.1 build records
 - 12.2 job cards
 - 12.3 log cards
 - 12.4 aircraft log
 - 12.5 other specific recording method

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Carrying out bonding operations on aircraft composite components



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