

Overview

This standard identifies the competences you need to repair composite mouldings (such as cured panels, moulds, components and jigs), in accordance with approved procedures. You will be required to use appropriate drawings, specifications and documentation to repair composites materials, using the correct techniques.

You will be expected to identify the method of repair to be used and select suitable repair materials. You will repair a range of composite mouldings with various defects using a range of methods. Mouldings repaired will include a range of resin and fibre materials.

Your responsibilities will require you to comply with organisational policy and procedures for the repair activities undertaken, and to report any problems with the repair activities, equipment or materials that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You will be expected to work with a minimum of supervision, taking personal responsibility for your own actions and for the quality and accuracy of the work that you produce.

Your underpinning knowledge will provide a good understanding of your work, and will provide an informed approach to applying composite moulding repair procedures. You will understand the repair techniques used, and their application, 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 repair activities and when using the associated tools and equipment. You will be required to demonstrate safe working practices throughout, and will understand the responsibility you owe to yourself and others in the workplace.

Performance criteria

You must be able to:

1. work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
2. follow the relevant specifications for the moulding to be repaired
3. prepare the moulding for repair
4. carry out the repairs within agreed timescale using approved materials and components and methods and procedures
5. ensure that the repaired moulding meets the specified operating conditions
6. produce accurate and complete records of all repair work carried out
7. leave the work area in a safe and appropriate condition on completion of the activities

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Knowledge and understanding

You need to know and understand:

1. the health and safety precautions to be taken and procedures used when working with composite materials, consumables, tools and equipment in the specific work area
2. the hazards associated with carrying out composite repair activities, and with the composite materials, consumables, tools and equipment used, and how to minimise these and reduce any risks
3. the protective equipment (PPE) that is needed for personal protection and, where required, the protection of others
4. the application of COSHH regulations in relation to the storage, use and disposal of composite materials and consumables
5. the specific environmental conditions that must be observed when producing composite mouldings (such as temperature, humidity, fume/dust extraction systems and equipment)
6. safe working practices that are required when working in confined spaces (such as ventilation, use of flammable materials) and emergency procedures that may need to be followed
7. how to extract and use information from engineering drawings and related specifications, to include symbols and conventions to appropriate BS, ISO or BSEN standards in relation to work undertaken
8. how to interpret drawings, lay up manuals, imperial and metric systems of measurement, workpiece reference points and system of tolerancing
9. the quality procedures used in the workplace to ensure production control (in relation to currency, issue, meeting specification) and the completion of such documents
10. the conventions and terminology used when repairing composite mouldings (such as dis-bonds, de-lamination, resin injection, resin voids, core potting, repair patches)
11. the methods used to cure bonded repairs and their applications
12. failure modes for various composite mouldings, and what can contribute to these
13. different types of composite resin systems, fibres, reinforcements, and their applications
14. different methods of production for composite mouldings, and their applications

15. different methods of trimming composite mouldings, and their applications
16. different methods of producing composite assemblies, and their applications
17. different bonding agents, methods used, and their applications
18. the importance of carrying out dimensional/tolerance checks on completion of the repair activity
19. why repairs may affect the structural integrity of the composite moulding
20. correct methods of storage and handling of composite materials
21. the tools and equipment used for various activities associated with repairing composite mouldings
22. 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 repair activities:
 1. obtain and use the appropriate documentation (such as job instructions, drawings, material data sheets, specifications, planning and quality control documentation)
 2. adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
 3. provide and maintain a safe working environment for the composite repair activities
 4. obtain and check that all tools and equipment to be used are correct for the operation to be carried out and are in a safe and usable condition
 5. follow safe practice/approved composite repair techniques and procedures at all times
 6. return all tools and equipment to the correct location on completion of the composite repair activities
 7. segregate and dispose of waste materials using the correct procedure

2. Carry out all of the following activities when preparing for the repair activity:
 1. confirm what has to be prepared
 2. assess the extent of the damage to be repaired
 3. identify the method of repair to be used
 4. check availability of ancillary materials required
 5. select the correct equipment for the activity
 6. check that the equipment is suitable for use
 7. identify and protect the moulding and repair materials in the work area

3. Carry out five of the following types of repair:
 1. temporary
 2. cosmetic
 3. non structural
 4. minor structural
 5. major structural
 6. temporary mould
 7. graft/pre-cured patch
 8. laminate only

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9. partial thickness laminate
 10. through laminate
 11. type A sandwich panel
 12. type B sandwich panel
 13. type C sandwich panel
 14. single sided access
 15. double sided access
4. Repair defects in six of the following types of composite moulding:
1. internal corners
 2. external corners
 3. horizontal surface
 4. vertical surface
 5. double curvature
 6. concave surface
 7. convex surfaces
 8. flat surfaces
 9. return surfaces
 10. joggle details
 11. nett edges
 12. webs/ribs
 13. inserts
 14. fixtures
 15. other (to be specified)
5. Repair defects in composite mouldings using four of the following methods:
1. localised curing
 2. fettling
 3. surface filling
 4. laminating
 5. relieving distortion
 6. bonding
 7. osmosis
 8. resin injection
 9. wet-lay patching
 10. pre-preg patching
 11. polishing
 12. core patching
 13. insert/core potting

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14. repair patches/kits
 15. colour matching
6. Repair defects using techniques/materials applicable to two of the following resin types:
 1. bio resin
 2. thermoplastic
 3. polyester
 4. vinyl ester
 5. epoxy
 6. phenolic
 7. bismaleimide
 8. cyanate ester
 9. other (to be specified)
 7. Repair defects using techniques/materials applicable to two of the following fibre types:
 1. natural fibre
 2. thermo plastic
 3. glass
 4. aramid
 5. carbon
 6. hybrid
 7. other (to be specified)
 8. Repair defects in two of the following core materials (where applicable to the Sector or process):
 1. solid timber
 2. end grain balsa
 3. rigid foam
 4. expanding foam
 5. coremat
 6. honeycomb
 7. fibrous honeycomb
 8. aluminium honeycomb
 9. syntactic core
 10. expanding core
 11. thermoplastic
 12. other (to be specified)

9. Repair ten of the following types of defect in composite mouldings:

1. dimensional
2. tolerances
3. surface finish
4. colour separation
5. distortion
6. blisters
7. dents or 'dings'
8. surface cracks
9. incorrect material
10. contamination
11. bridging
12. broken fibres
13. stray fibres
14. ply orientation
15. wrong join type
16. gaps at joins
17. incorrect overlap
18. wrinkles
19. splintering
20. voids
21. resin rich areas
22. fibre deviation
23. damaged cores
24. dis-bonds
25. excessive adhesive
26. wrong inserts
27. insert positions
28. porosity
29. local exotherm
30. fayed/burned area
31. incomplete curing
32. de-lamination
33. impact damage
34. puncture
35. gouges
36. holes
37. abrasion/erosion
38. fluid ingress

39. fractures
 40. other (to be specified)
10. Cure bonded repairs using two of the following methods:
 1. room temperature
 2. oven
 3. autoclave
 4. heated tools/moulds
 5. heat mats
 6. curing lamps
 7. infrared heating
 8. UV curing
 9. electro-magnetic inductance
 10. micro-wave
 11. hot bonder
 12. other (to be specified)
 11. Repair a range of mouldings in compliance with one of the following standards:
 1. BS, ISO or BSEN standards and procedures
 2. customer standards and requirements
 3. company standards and procedures
 4. recognised compliance agency/body standards
 12. Complete the relevant documentation, to include one of the following:
 1. production documentation
 2. quality control documentation
 3. job cards

Behaviours

You will be able to apply the appropriate behaviours required in the workplace to meet the job profile and overall company objectives, such as:

- strong work ethic
- positive attitude
- team player
- dependability
- responsibility
- honesty
- integrity
- motivation
- commitment

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Developed by	Semta
Version Number	2
Date Approved	February 2018
Indicative Review Date	February 2021
Validity	Current
Status	Original
Originating Organisation	Semta
Original URN	COMP3020
Relevant Occupations	Engineering; Engineering and manufacturing technologies; Engineering Professionals; Science and Engineering Technicians
Suite	Composite Engineering Suite 3
Keywords	Engineering; repair; composite; mouldings; components; laminating; resin; fibre; assemblies; mark out; drawings