SEMAUT3085

Repairing motorsport composite mouldings

Overview

This standard identifies the competences you need to repair motorsport composite mouldings (such as moulds, wings, body panels, ductwork, fairings, jigs), in accordance with approved procedures. You will be required to use appropriate drawings, specifications and repair documentation, and to extract the relevant information in order to carry out the necessary repairs to the composite components or assemblies, using the correct techniques.

You will be expected to identify the method of repair to be used, and to select suitable repair materials. You will repair range of motorsport 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 that 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 carry out.

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 component to be repaired
3. prepare the component for repair
4. carry out the repairs within agreed timescale using approved materials and components and methods and procedures
5. check that the repaired component meets the specified operating conditions
6. deal promptly and effectively with problems within your control and report those that cannot be solved
7. ensure that work records are completed, stored securely and available to others, as per organisational requirements
8. leave the work area in a safe condition on completion of the activities, as per organisational and legal requirements

Knowledge and understanding

You need to know and understand:

1. the specific safety precautions to be taken whilst carrying out the activities (including any specific legislation, regulations or codes of practice relating to the activities, equipment or materials)
2. the health and safety requirements of the work area and the activities, and the responsibility these requirements place on you
3. the hazards associated with the activities, and how to minimise them and reduce risks
4. how to extract and use information from engineering drawings and related specifications (to include symbols and conventions to current industry standards and codes of practice)
5. how to interpret first and third angle drawings, imperial and metric systems of measurement, workpiece reference points and system of tolerancing
6. quality procedures used in the workplace to ensure production control (in relation to currency, issue, meeting specification), conventions and terminology used when repairing composite mouldings (dis-bonds, de-lamination, resin injection, resin voids, core potting, repair patches)
7. failure modes for various composite mouldings, and what can contribute to these
8. the different forms of damage or defect that can occur in the mouldings, and how this affects the type of repair selected
9. how to assess the damage or defect in the mouldings, and how to determine the most suitable type of repair
10. the importance of ensuring that the repair conforms to the repair specification
11. different types of composite resin systems, fibres and reinforcements, and the types of defect that might be present
12. different methods of production for composite mouldings, and the types of defect that may be present
13. different methods of trimming composite mouldings, their merits, and the types of damage that may be present
14. different methods of producing composite assemblies, their merits, and the defects that can be present
15. different bonding agents, methods used, and the sorts of defect that might be present in the bond

16. the various methods that can be used to help identify whether defects are present in the mouldings (visual inspection, touch, sound, measurement, mechanical and non-destructive tests)
17. correct methods of storage and handling of composite materials
18. tools and equipment used for various activities associated with repairing composite mouldings
19. the problems that can occur with the repair activities and how these can be overcome
20. the extent of your own responsibility and to whom you should report if you have problems that you cannot resolve
21. how to access, use and maintain information to comply with organisational requirements and legislation

Scope/range related to performance criteria

1.

Carry out all of the following during the motorsport composite moulding repair activities:

1.1 obtain and use the appropriate documentation (such as job instructions, drawings, planning and quality control documentation, material data sheets, specifications)
1.2 adhere to procedures or systems in place for risk assessment, hazardous substances, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
1.3 provide and maintain a safe working environment for the composite mould repair activities
1.4 obtain the correct tools and equipment for the activity, and check that they are in a safe, tested and usable condition
1.5 follow safe practice/approved mould repair techniques and procedures at all times
1.6 return all tools and equipment to the correct location on completion of the mould repair activities
1.7 dispose of waste materials in accordance with approved procedures

2.

Carry out all of the following when preparing for the repair activity:

2.1 check that mouldings are correct and complete
2.2 select correct equipment for the activity
2.3 assess the extent of the damage to be repaired
2.4 check that equipment is suitable for use
2.5 identify the method of repair to be used
2.6 check availability of ancillary materials required
2.7 identify and protect the moulding and repair materials in the work area

3.

Repair damage/defects in the following types of motorsport composite mouldings:

Either three of the following:

3.1 tub/monocoque
3.2 wings
3.3 nose cones
3.4 crash structures
3.5 floor/diffuser
OR six of the following:
3.6 splitters
3.7 pedal boxes
3.8 bumpers
3.9 dash panels
3.10 body panels

3.11 floor trays
3.12 brake ducts
3.13 fairings/shrouds
3.14 side pods
3.15 fuel tank housings
3.16 air intakes
3.17 moulds/jigs
3.18 engine covers
3.19 wing endplates
3.20 radiator ducts
3.21 seats

4.

Repair defects in composite mouldings, using six of the following methods:

4.1 localised curing
4.2 relieving distortion
4.3 resin injection
4.4 core patching
4.5 fettling
4.6 separation of bonds
4.7 wet-lay patching
4.8 insert/core potting
4.9 surface filling
4.10 bonding
4.11 pre-preg patching
4.12 repair patches/kits
4.13 colour matching
4.14 polishing
4.15 laminating

5.

Repair defects using techniques/materials applicable to two of the following resins types:

5.1 polyester
5.2 bismaleimide
5.3 phenolic
5.4 epoxy
5.5 cyanate ester
5.6 vinyl ester

6.

Repair defects using techniques/materials applicable to two of the following fibre types:

6.1 polyethylene
6.2 aramid
6.3 hybrid
6.4 glass
6.5 carbon

7.

Repair eight of the following types of defect in motorsport composite mouldings:

- 7.1 incomplete curing
- 7.2 blisters
- 7.3 voids
- 7.4 damaged cores
- 7.5 dimensional
- 7.6 bridging
- 7.7 dis-bonds
- 7.8 wrong inserts
- 7.9 tolerances
- 7.10 de-lamination
- 7.11 dents or 'dings'
- 7.12 insert positions
- 7.13 surface finish
- 7.14 broken fibres
- 7.15 excessive adhesive
- 7.16 impact damage
- 7.17 distortion
- 7.18 holes
- 7.19 fractures
- 7.20 gouges/abrasion

8.

Check repaired motorsport composite mouldings comply with one of the following:

- 8.1 industry standards, codes of practice and procedures and legislation
- 8.2 customer standards and requirements
- 8.3 company standards and procedures
- 8.4 recognised compliance agency/body's standards

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