SEMME2055

Using wet lay-up techniques to produce marine composite components

Overview

This standard identifies the competences you need to produce a range of marine composite mouldings by using wet lay-up techniques, in accordance with approved procedures. You will be required to use appropriate drawings, specifications and documentation to produce various mouldings, using the correct wet lay-up production techniques. The marine composite mouldings produced will include items such as bulk heads, hulls, superstructure, masts, spars, fairings, air intakes, hatches, steering equipment, rudders, skegs, tanks, casings and coverings, radar/navigational domes, davits and internal fitments such as berths, vanity standards, consoles, seating, shower standards.

You will be expected to prepare the tooling, apply release agents and prepare the composite materials. You will produce a range of composite mouldings, incorporating a variety of features and using a range of application methods. 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 composite moulding 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 be expected to work with either a high level of supervision or as a member of a team. 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 the standard, and competence in all the areas required by the standard must be demonstrated.

Your underpinning knowledge will be sufficient to provide a good understanding of your work, and will provide an informed approach to applying wet lay-up moulding techniques and procedures to produce marine composite components. You will have an understanding of the wet lay-up production techniques used, and their application, in adequate depth to provide a sound basis for carrying out the activities, recognising and correcting/reporting faults, and ensuring that the work output is to the required specification.

You will understand the safety precautions required when carrying out the wet lay-up

moulding 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 correct component drawing or any other related specifications for the component to be produced
3. determine what has to be produced and how this will be achieved
4. obtain and prepare the appropriate tools, equipment and materials
5. prepare the moulding using the correct methods and techniques
6. carry out the moulding or laying-up activities using the correct methods and techniques
7. produce components to the required specification
8. complete relevant paperwork, in accordance with organisational requirements
9. deal promptly and effectively with problems within your control and report those that cannot be solved
10. leave the work area in a safe and appropriate condition on completion of the activities

Knowledge and understanding

You need to know and understand:

1. health and safety precautions to be taken, and procedures used in the specific work area, when working with composite materials, consumables, tools and equipment
2. the hazards associated with carrying out wet lay-up laminating and moulding activities, and with the composite materials, consumables, tools and equipment, and how to minimise these in the work area
3. protective equipment that is needed for personal protection (PPE) 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 workshop environmental conditions that must be observed when producing marine mouldings (such as temperature, humidity, styrene levels to threshold limits, fume/dust extraction systems and equipment)
6. how to use and extract information from engineering drawings and related specifications (to include symbols and conventions to appropriate BS or ISO standards) in relation to work undertaken
7. how to interpret and use imperial and metric systems of measurement
8. the quality procedures used in the workplace to ensure production control (in relation to currency, issue, meeting specification) and the procedures for completion of such documents
9. conventions and terminology used for wet lay-up techniques (including resin and fibre weights/volumes, material orientation, material identification, material tailoring, mixing ratios, gel times, exotherm, consolidation)
10. the types of resin, fibres and reinforcement used, and their applications
11. the visual identification of both raw and finished composite materials
12. methods of preparation for patterns, moulds and tooling (including the correct use of surface sealers and release agents)
13. the mixing ratios for gel coats, resins, additives and catalysts, and the associated working times
14. the methods used in the application of the resin/fibre during the lay-up activity
15. tools and equipment used in the lay-up activities, and their care, preparation and control procedures
16. how to recognise faults that can occur during the lay-up process

17. the identification of defects in the composite moulding (such as de-lamination, voids, contaminants)
18. how defects can be overcome during the lay-up activity
19. procedures and methods used for removing mouldings from production tooling
20. the methods and techniques used to trim mouldings prior to release
21. the care and safe handling of production tooling and composite mouldings throughout the production cycle
22. 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
23. how the composite moulding relates to its own quality documents and the production tooling used
24. the extent of your own responsibility and whom you should report to if you have problems that you cannot resolve
25. the documentation to be completed during and/or on completion of the moulding activity

Scope/range related to performance criteria

1.

Carry out all of the following during the moulding activities:

1.1 use the correct issue of production documentation (such as drawings, manuals, specifications, job cards/instructions, material data sheets, planning and quality control documentation)
1.2 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
1.3 maintain a safe working environment for the moulding activities
1.4 use the correct tools and equipment for the activity, and ensure that they are in a safe and usable condition
1.5 use the correct materials, as specified in the production documentation
1.6 follow safe practice/approved moulding techniques at all times
1.7 return all tools and equipment to the correct location on completion of the moulding activities
1.8 segregate and dispose of waste materials using the correct procedure

2.

Prepare moulds and materials for production activities, to include all of the following:

2.1 check that tooling is correct and complete
2.2 clean tooling and remove resin build-ups
2.3 obtain correct materials for the activity
2.4 check tooling for surface defects
2.5 identify and protect materials in the work area
2.6 correctly apply sealers/release agents
2.7 clean and store tooling suitably after use

3.

Produce a range of marine components, using two of the following application techniques:

3.1 spray application of fibre/resin
3.2 roller application of fibre/resin
3.3 application of a gel coat
3.4 removal of voids and air pockets
3.5 brush application of fibre/resin
3.6 brush/roller consolidation
3.7 use of vacuum bagging
3.8 use of bleed plies

4.

Produce marine composite mouldings using wet lay-up techniques, to include:

Either one of the following:

4.1 hull
4.2 superstructure

4.3 mast
4.4 cabins
4.5 bulkheads
4.6 spars
4.7 wheel houses
4.8 other major marine components

OR three of the following types of marine components:

9. rudders
10. casings and covers
11. shower standards
12. air intakes/vents
13. davits
14. seats
15. fairings
16. skegs
17. steering equipment (wheel, tiller)
18. hatches
19. tanks
20. housings
21. consoles
22. berths
23. composite mould tools
24. radar/navigational domes
25. vanity standards
26. other specific marine components

1.

Produce a range of marine components, incorporating one of the following in the lay-up:

1.1 feathered joins
1.2 orientated plies
1.3 fixtures
1.4 overlap joins
1.5 inserts
1.6 butt joins
1.7 other (to be specified)

2.

Produce a range of marine mouldings, incorporating two of the following shape features:

2.1 internal corner

2.2 double curvature
2.3 convex surface
2.4 external corner
2.5 concave surface
2.6 vertical surface
2.7 other specific feature

3.

Produce a range of marine mouldings, using all of the following:

3.1 resin (such as polyester, epoxy, phenolic, vinyl ester)
3.2 fibre (such as glass, carbon, polyethylene, aramid)
3.3 reinforcement (such as braids, roving, tapes, chopped strand, continuous filament, woven)
3.4 core material (such as wood, coremat, structural foam, honeycomb)

4.

Produce a range of marine components, in accordance with one of the following standards:

4.1 BS, ISO or BSEN standards and procedures
4.2 customer standards and requirements
4.3 company standards and procedures
4.4 recognised compliance agency/body's standards

5.

Complete the relevant paperwork, to include one from the following and pass it to the appropriate people:

5.1 build records
5.2 quality/acceptance documentation
5.3 system log
5.4 job cards
5.5 work authorisation documents
5.6 other specific reporting method

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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