SEMCOMP205

Using spray lay-up laminating techniques to produce composite mouldings

Overview

This standard identifies the competences you need to produce composite mouldings (such as moulds, components, splashes, jigs) using spray lay-up laminating techniques, in accordance with approved procedures. You will be required to use appropriate drawings, specifications and documentation to produce various mouldings using the approved spray lay-up laminating production techniques.

You will be expected to set up the spray laminating equipment to produce a range of composite mouldings, incorporating a range of features. 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 production activities undertaken and to report any problems with the equipment set up, production activities or materials that you cannot personally resolve, or that are outside your permitted authority, to the relevant people. You will be expected to work to instructions under 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 spray lay-up laminating techniques and procedures. You will understand the production techniques used and their application, in adequate depth to provide a sound basis for carrying out the activities and ensuring the work output is produced to the required specification.

You will understand the safety precautions required when carrying out the spray lay-up laminating 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, environmental and other relevant regulations, directives and guidelines
2. confirm the laminating operations to be completed
3. confirm the correct equipment operating settings required for the spray lay-up moulding operation are made ready for use
4. follow the correct component drawing or any other related documentation for the component to be produced
5. carry out any preparation activities on the tools, equipment and materials
6. check that the equipment is connected and operating correctly
7. carry out the moulding activities using the correct methods and techniques
8. confirm the adjustments that are required to settings if moulding is not to specification
9. produce mouldings to the required specification
10. deal promptly and effectively with problems within your control and report those that cannot be solved
11. complete relevant documentation
12. 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. 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 spray lay-up moulding techniques, and with the composite materials, consumables, tools and equipment used, and how to minimise these and reduce any risks in the work area
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, styrene levels to threshold limits, fume extraction systems and equipment)
6. how to identify 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
7. how to interpret drawings/lay-up manuals, systems of measurement, workpiece reference/datum points and system of tolerancing
8. the quality procedures used in the workplace to ensure production control (in relation to currency, issue, meeting specification) and the completion of such documents
9. the basic conventions and terminology used for spray lay-up techniques (such as material identification, lay-up specifications, resin viscosity, spray pressure, resin/catalyst ratios, resin and fibre weights/volumes, gel times, exotherm)
10. the safety mechanisms on the spray and dispensing equipment, and the procedure for checking that they function correctly
11. the operation of the spray and dispensing equipment, and emergency stop procedures
12. the basic parts of the spray and dispensing equipment (to include controls; pneumatic and electricity supplies; material delivery and flushing systems)
13. the various spray and dispensing equipment settings that may require adjusting before or during the process (such as pressure, flow rate, spray pattern, chopper

and chute adjustment, catalyst ratios, fibre ratios), and how these are achieved
14. the effects that changes to theses settings will have on the quality of the components produced
15. the function resins, reinforcement, catalysts, accelerators and additives play in the production of composite mouldings
16. the function fibre materials play in the production of composite mouldings
17. the function core, insert and filler materials have in the production of composite mouldings
18. how to visually identify raw and finished composite materials
19. the type of production tooling used for producing composite mouldings
20. the identification of common defects in production tooling
21.
how to prepare patterns, moulds and tooling (including the correct use of surface sealers and release agents)
22.
the procedure for handling and preparing reinforcing fibres
23. the importance of having the correct mixing ratios for gel coats, resins and catalysts, and the associated gel times
24. the spray lay-up methods used during the moulding activity to ensure consistency of deposition
25. the tools and equipment used in the spray lay-up moulding activities, and their care, preparation and safe handling/operation
26. the common problems that can occur during the spray lay-up process (including defects such as contamination, resin/fibre rich areas, inconsistent deposition)
27. how defects can be prevented during the spray lay-up activity
28. The methods and techniques used to trim mouldings prior to release (green trimming)
29. the procedures and methods used for removing mouldings from production tooling
30. the identification of common defects in the composite moulding (such as dry patches, resin rich areas, voids, contaminants)
31. the care and safe handling of production tooling and composite mouldings throughout the production cycle
32. the extent of your own responsibility and to whom you should report if you have problems that you cannot resolve
33. 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 appropriate documentation (such as job instructions, drawings, material data sheets, specifications, equipment setting-up documentation, 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 setting and moulding activities
1.4 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
1.5 follow safe practice/approved setting and moulding techniques at all times
1.6 clean/flush resin dispensing and spray equipment after use
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 the spray and dispensing equipment for use, to include carrying out all of the following:

2.1 check all machine services are connected and operational (such as electrical, pneumatic, feed pipes)
2.2 confirm there are sufficient raw materials available and that they meet the component specification (such as fibre, resin, catalyst and flushing solvent)
2.3 confirm the machine setting are correct to suit the moulding being produced (such as dispensing pressure/rate, catalyst percentage and alarm conditions)
2.4 check the spray gun and cleaning cycles function correctly
2.5 check the chopper unit functions correctly

3.

Carry out three of the following activities when preparing production tooling:

3.1 confirm that tooling is correct and complete
3.2 clean tooling and remove resin build-ups
3.3 check for surface defects
3.4 correctly apply sealers/release agents
3.5 fit containment flanges/tooling (where required)
3.6 clean and store tooling suitably after use

4.

Carry out three of the following activities to prepare materials for production:

4.1 obtain correct materials for the activity
4.2 confirm that materials are fit for purpose and in life
4.3 confirm the correct quantity of resin is available
4.4 identify and protect materials in the work area
4.5 confirm the correct measure and mix of resin/catalyst

5.

Carry out all of the following activities to prepare the work area for spray laminating:

5.1 mask the work area/over spay areas where required
5.2 check fans/extraction/ventilation equipment is positioned correctly (where required)
5.3 check extraction and ventilation equipment is operating correctly (where required)
5.4 confirm the temperature and humidity in the work area are within spray application specifications

6.

Confirm that the spray/chopper gun has been correctly set up for use, to include carrying out all of the following:

6.1 the correct spray head size to suit the size and complexity of the moulding has been fitted
6.2 the spray pressure to obtain a fully developed spray pattern has been set
6.3 the roving feed rate and cutter has been set to meet the required specification
6.4 the chopper chute has been set to ensure even distribution in the resin stream

7.

Produce a range of mouldings using two of the following types of production tool:

7.1 pattern
7.2 mandrel
7.3 metal
7.4 tooling block
7.5 wet/spray lay-up
7.6 infused mould
7.7 glass pre-preg
7.8 carbon pre-preg
7.9 female tooling
7.10 male tooling
7.11 multi-part tools
7.12 matched tooling
7.13 closed tooling

8.

Produce a range of mouldings using two of the following application techniques:

8.1 spray application of a gel coat
8.2 brush application of a gel coat
8.3 spray application of fibre/resin
8.4 removal of voids and air pockets
8.5 brush/roller consolidation

9.

Produce a range of mouldings incorporating four of the following shape features:

9.1 internal corner
9.2 external corner

9.3 horizontal surface
9.4 vertical surface
9.5 double curvature
9.6 concave surface
9.7 convex surface
9.8 return surfaces
9.9 joggle details
9.10 nett edges
9.11 other specified feature

10.

Produce a range of mouldings using one type of resin from:

10.1 bio resin
10.2 acrylic
10.3 polyester
10.4 vinyl ester
10.5 epoxy
10.6 phenolic
10.7 other (to be specified)

11.

Produce a range of mouldings using techniques for one type of fibre from:

11.1 natural fibre
11.2 thermoplastic
11.3 glass
11.4 aramid
11.5 carbon
11.6 other (to be specified)

12.

Produce a range of mouldings using techniques for one type of core material from:

12.1 solid timber
12.2 end grain balsa
12.3 coremat
12.4 rigid foam
12.5 skinned honeycomb
12.6 other (to be specified)

13.

Use two of the following methods/processes if using core materials:

13.1 core templates
13.2 pre-shaping core
13.3 core chamfers
13.4 core splicing
13.5 peel plies
13.6 bonding paste
13.7 edge filling
13.8 adhesive/resin films
13.9 single stage curing

13.10 multi stage curing

14.

Produce a range of mouldings which comply with one of the following standards:

14.1 BS, ISO or BSEN standards and procedures
14.2 customer standards and requirements
14.3 company standards and procedures
14.4 recognised compliance agency/body standards

15.

Complete the relevant documentation, to include one of the following:

15.1 production documentation
15.2 quality control documentation
15.3 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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