
Overview

This standard identifies the competences you need to produce composite mouldings (such as moulds, components, splashes, jigs) using wet 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 correct wet lay-up laminating production techniques.

You will be expected to prepare a range of tooling, apply release agents and prepare composite materials. You will produce a range of composite mouldings, incorporating a range 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 production activities undertaken, and to report any problems with the production 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 carry out.

Your underpinning knowledge will provide a good understanding of your work, and will provide an informed approach to applying wet 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, correcting faults, and ensuring the work output is produced 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 done and how this will be achieved
4. obtain and prepare the appropriate tools, equipment and materials
5. carry out the moulding or laying-up activities using the correct methods and techniques
6. produce composite mouldings to the required specification using appropriate methods and techniques
7. check that all the required operations have been completed to specification
8. complete and store all relevant documentation in accordance with organisational procedures
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 in accordance with approved procedures

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 wet lay-up moulding techniques, 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 specific environmental conditions that must be observed when producing composite mouldings (such as temperature, humidity, styrene levels to threshold limits, fume/dust extraction systems and equipment)
5. how to extract and use information from engineering drawings and related specifications (to include symbols and conventions to appropriate standards) in relation to work undertaken
6. how to interpret first and third angle drawings/lay-up manuals, imperial and metric systems of measurement, workpiece reference/datum points and system of tolerancing
7. the quality procedures used in the workplace to ensure production control (in relation to currency, issue, meeting specification) and the completion of such documents
8. the conventions and terminology used for wet lay-up techniques (such as resin and fibre weights/volumes, material orientation, material identification, material tailoring, mixing ratios, gel times, exotherm, bleed plies)
9. the different types of resins, fibre, reinforcement, catalysts, accelerators and additives used, and their applications
10. the visual identification of both raw and finished composite materials
11. different types of production tooling used for producing composite mouldings, and their applications
12. the identification and rectification of defects in production tooling
13. methods of preparation for patterns, moulds and tooling including the correct use of surface sealers and release agents
14. methods for handling and preparing the reinforcing fibres
15. how to estimate/calculate resin volume/weight required to wet-out the reinforcing fibres
16. mixing ratios for gel coats, resins, accelerators and catalysts, and the associated working times
17. the methods used in the application of the resin/fibre during the lay-up activity
18. the tools and equipment used in the lay-up activities and their care,

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- preparation and control procedures
19. the problems that can occur during the lay-up process (including defects such as contamination, resin/fibre rich areas, and distortion)
 20. how defects can be overcome during the lay-up activity
 21. procedures and methods used for removing mouldings from production tooling
 22. the identification of defects in the composite moulding (such as delamination, voids, contaminants)
 23. the care and safe handling of production tooling and composite mouldings throughout the production cycle
 24. the production controls used in the work area, and actions to be taken for unaccounted items
 25. how the composite moulding relates to its own quality documents and the production tooling used
 26. 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 moulding 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, 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 moulding activities
 4. obtain and check that all tools and equipment to be used are correct for the activity to be carried out and are in a safe and usable condition
 5. follow safe practice/approved moulding techniques at all times
 6. return all tools and equipment to the correct location on completion of the moulding activities
 7. dispose of waste materials in accordance with approved procedures
 8. leave the work area in a safe and appropriate condition on completion of the activities
2. Carry out all of the following activities when preparing production tooling:
 1. check that tooling is correct and complete
 2. clean tooling and remove resin build-ups
 3. check for surface defects
 4. correctly apply sealers/release agents
 5. clean and store tooling suitably after use
3. Carry out all of the following activities to prepare materials for production:
 1. obtain correct materials for the activity
 2. check that materials are fit for purpose and in life
 3. cut materials to correct size and shape
 4. check correct quantity of resin is available
 5. identify and protect materials in the work area
 6. check correct measure and mix of resin/catalyst
4. Produce a range of mouldings using four of the following types of production tool:
 1. metallic

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2. tooling block
 3. wet lay-up
 4. glass pre-preg
 5. carbon pre-preg
 6. female tooling
 7. male tooling
 8. multi-part tools
 9. matched tooling
 10. closed tooling
 11. other specific type
5. Produce a range of mouldings using three of the following application techniques:
1. application of a gel coat
 2. spray application of fibre/resin
 3. brush application of fibre/resin
 4. roller application of fibre/resin
 5. removal of voids and air pockets
 6. use of vacuum bagging
 7. use of bleed plies
 8. other specific technique
6. Produce a range of mouldings incorporating two of the following in the lay-up:
1. butt joins
 2. overlap joins
 3. feathered joins
 4. orientated plies
 5. inserts
 6. fixtures
 7. other specific method
7. Produce a range of mouldings incorporating three of the following shape features:
1. internal corner
 2. external corner
 3. vertical surface
 4. double curvature
 5. concave surface
 6. convex surface
 7. other specific feature
8. Produce a range of mouldings using one type of resin from:
1. polyester
 2. vinyl ester

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3. epoxy
 4. phenolic
 5. other specific type
 9. Produce a range of mouldings using techniques for one type of fibre from:
 1. polyethylene
 2. glass
 3. aramid
 4. carbon
 5. other specific type
 10. Carry out the lay-up activities in accordance with two from:
 1. fibre orientation
 2. core orientation
 3. stacking sequence
 4. warp face
 5. fill face
 6. symmetric
 7. asymmetric
 8. callout tables
 9. other specific type
 11. Produce a range of mouldings using techniques for two types of reinforcement from:
 1. roving
 2. chopped strand
 3. continuous filament
 4. woven
 5. braids
 6. tapes
 7. other specific type
 12. Produce a range of mouldings using techniques for one type of core material from:
 1. wood
 2. expanding core
 3. syntactic core
 4. foam
 5. nomex honeycomb
 6. aluminium honeycomb
 7. other specific type
 13. Use four of the following methods/processes when using core materials:

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1. core templates
 2. pre-shaping core
 3. core chamfers
 4. core splicing
 5. peel plies
 6. bonding paste
 7. edge filling
 8. adhesive/resin films
 9. single stage curing
 10. multi stage curing
14. Produce a range of mouldings which comply with all of the following quality and accuracy standards:
1. company standards and procedures
 2. dimensionally accurate within specification tolerances
 3. has an appropriate surface finish and is free from defects or surface blemishes

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