

Overview

This standard identifies the competences you need to produce composite mouldings using hot press moulding techniques, in accordance with approved procedures. You will be required to use appropriate drawings, specifications and documentation to produce various mouldings, using the correct hot press moulding production techniques.

You will be expected to prepare a range of tooling, apply release agents and prepare composite materials. You will be expected to setup the hot press moulding equipment to produce a range of mouldings incorporating a variety of features. Mouldings produced will include laminates using a range of resin and fibres in a range of moulding formats (such as sheet, dough, etc).

Your responsibilities will require you to comply with organisational policy and procedures for the setup and production activities undertaken, and to report any problems with the equipment setup, 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 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 hot press moulding techniques and procedures. You will understand the setup and production techniques used, and their application, in adequate depth to provide a sound basis for carrying out the activities, correcting faults, and ensuring that the work output is to the required specification.

You will understand the safety precautions required when carrying out the 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. determine what processing operations are to be performed and how the equipment will be prepared and set up to achieve this
3. set the equipment operating parameters required for the hot press moulding operation and prepare for use
4. prepare the heating equipment and material delivery system for use
5. check that all safety mechanisms are in place and operate correctly
6. follow the correct component drawing or any other related specifications for the component to be produced
7. obtain and prepare the appropriate tools, equipment and materials
8. carry out the moulding activities using the correct methods and techniques
9. check that the equipment operates within the operating parameters set
10. produce mouldings to the required specification
11. check that all the required operations have been completed to specification
12. check the quality of the mouldings by visual inspection
13. complete relevant documentation
14. deal promptly and effectively with problems within your control and report those that cannot be solved
15. 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 hot press 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, fume extraction systems and equipment)
6. 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
7. how to interpret drawings/lay-up manuals, imperial and metric systems of measurement, workpiece reference 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 conventions and terminology used for hot press moulding techniques (such as material identification, lay-up specifications, material maturity, resin viscosity, press pressure, curing temperature, gel time, cure time, exotherm)
10. the safety mechanisms on the machine, and the procedure for checking that they function correctly
11. operation of the machine controls, and how to stop the machine in an emergency
12. the parts and functions of the hot press moulding machines (to include machine controls; hydraulic, pneumatic and electricity supplies; heating controls; material delivery systems; mould ejecting system)
13. the various machine operating parameters that may require

- adjusting prior to hot press moulding activities (such as pressure, clamping rate, moulding temperature, material positioning and weight), and how these are achieved
14. the effects that changes to these settings will have on the quality of the components produced
 15. the different types of resins, reinforcement, catalysts, accelerators and additives used, and their applications
 16. the different types of moulding materials, their combinations and applications
 17. the visual identification of both raw and finished composite materials
 18. different types of production tooling used for producing composite mouldings
 19. the identification of defects in production tooling
 20. methods of preparation for moulds and tooling (including the correct selection and use of release agents)
 21. methods for handling, preparation and application of the reinforcing fibres and fabrics
 22. the tools and equipment used in the hot press moulding activities, and their care, preparation and control procedures
 23. the problems that can occur during the hot press moulding process (including defects such as contamination, flow marks, porosity, resin rich, separation, distortions, incomplete curing)
 24. procedures and methods used for removing mouldings from production tooling
 25. the identification of defects in the composite mouldings (such as dry patches, print through, voids, contaminants)
 26. the care and safe handling of production tooling and composite mouldings throughout the production cycle
 27. the production controls used in the work area, and actions to be taken for unaccounted items
 28. how the composite component relates to its own quality documents and the production tooling used
 29. 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, equipment setting-up documentation ,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 setting and moulding 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. ensure that there are appropriate facilities for storing the completed mouldings (where applicable)
 6. follow safe practice/approved setting and moulding techniques at all times
 7. ensure moulding materials are prepared (weight/cut to size), laid up and positioned according to the part specification
 8. return all tools and equipment to the correct location on completion of the setting and moulding activities
 9. segregate and dispose of waste materials using the correct procedure

2. Prepare the press for use, to include carrying out all of the following:
 1. ensure all press services are connected and operational (such as electrical, hydraulic, pneumatic)
 2. check the correct mould tools are located in the machine and are complete, clean and free from damage
 3. ensure the mould tools are correctly and securely mounted in the press
 4. ensuring that all guards, screens and safety mechanisms are in place and in good working order
 5. ensure injector heads function correctly where used
 6. ensure that moulding ejectors operate correctly where fitted

7. set up the press operating conditions to suit the moulding being produced (such as pressure, speed/time, distance), including alarm conditions
 8. check that all the machine controls are operational and function correctly
3. Prepare the heating equipment for use, to include carrying out all of the following where applicable:
 1. ensure all heating services are connected and operational (such as electrical, fluids, steam)
 2. set up the process heating conditions to suit the moulding being produced (such as temperature, pressure, rates), including alarm conditions
 3. conduct a mould surface temperature survey and adjust heating general and local heating parameters accordingly
 4. check that all the heating controls are operational and function correctly
 4. Prepare the heating equipment for use, to include three of the following:
 1. heated platters
 2. in-mould heating
 3. electric heating
 4. water heating
 5. steam heating
 6. oil heating
 7. electro-magnetic inductance
 8. micro-wave
 9. infrared heating
 10. other (to be specified)
 5. Prepare the material delivery systems, to include carrying out all of the following where applicable:
 1. ensure there are sufficient raw materials available and that they meet the component specification (such as resin, catalyst, fillers, additives, fibres)
 2. set and check that the material mixing and feed systems are operating correctly (such as dispensing heads, mixing heads, injectors)
 3. checking that moulding collection systems are operating

correctly (such as ejectors, conveyors, robotics, collection chutes)

6. Prepare the tooling for production, to include carrying out all of the following:
 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

7. Produce composite mouldings using two of the following mould types:
 1. flash mould
 2. positive pressure mould
 3. semi-positive mould
 4. transfer mould
 5. injection mould
 6. other (to be specified)

8. Produce composite mouldings using five of the following features:
 1. internal corners
 2. external corners
 3. vertical surface
 4. double curvature
 5. concave surface
 6. horizontal surface
 7. convex surfaces
 8. webs/ribs
 9. joggle details
 10. nett edges
 11. inserts
 12. fixtures
 13. other specific feature

9. Produce composite mouldings, using three types of moulding compound/reinforcement from:
 1. sheet moulding compound
 2. dough moulding compound
 3. bulk/thick moulding compound
 4. injection moulding compounds
 5. long fibre thermoplastics
 6. self-reinforced thermoplastics
 7. thermoplastic powder impregnated fabric
 8. co-mingled thermoplastic fabric
 9. thermoplastic preform
 10. fabric preform
 11. other (to be specified)

10. Produce composite mouldings, using two types of resin from:
 1. bio resin
 2. acrylic
 3. polyester
 4. vinyl ester
 5. epoxy
 6. phenolic
 7. other (to be specified)

11. Produce composite mouldings, using two types of fibre from:
 1. natural fibre
 2. thermoplastic
 3. glass
 4. aramid
 5. carbon
 6. hybrid
 7. other (to be specified)

12. Visually inspect a number of sample or trial mouldings, and identify two of the following:
 1. mouldings which meet the required specification
 2. mouldings which have defects

3. mouldings that require further investigation

13. Produce composite mouldings in compliance with one of the following:

1. BS, ISO or BSEN standards and procedures
2. customer standards and requirements
3. company standards and procedures
4. recognised compliance agency/body's standards

14. 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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