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## 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 approved 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 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).

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 hot press moulding techniques and procedures. You will understand the set up and production techniques used and their application, in adequate depth to provide a sound basis for carrying out the activities 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.

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## 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 what has to be produced and how this will be achieved
3. confirm the equipment and material delivery system have been set up correctly for the hot press moulding operation
4. check that all safety mechanisms are in place and operate correctly
5. follow the correct component drawing or any other related documentation for the component to be produced
6. carry out any preparation activities required on the tooling, equipment and materials
7. check that the equipment is connected and operating correctly
8. carry out the moulding activities using the correct heating source, methods and techniques
9. produce mouldings to the required specification
10. check the quality of the mouldings by visual inspection
11. deal promptly and effectively with problems within your control and report those that cannot be solved
12. complete relevant documentation
13. leave the work area in a safe and appropriate condition on completion of the activities

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## 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 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 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 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. how to operate the machine controls and how to stop the machine in an emergency
12. the function of the main parts of the hot press moulding machines (such as heating controls; material delivery systems; mould ejecting system)
13. the common machine settings that may require adjusting to achieve the required specification
14. the effects that changes to these settings will have on the quality of the components produced
15. the function resins, reinforcement, catalysts, accelerators and additives used play in the production of mouldings
16. the function moulding materials, their combinations play in the production of mouldings

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17. how to visually identify raw and finished composite materials
  18. the type of production tooling used for producing composite mouldings
  19. the identification of common defects in production tooling
  20. how to prepare moulds and tooling (including the correct selection and use of release agents)
  21. the methods for handling, preparing the reinforcing fibres and fabrics
  22. the tools and equipment used in the hot press moulding activities and their care, preparation and safe handling
  23. the common 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. the procedures and methods used for removing mouldings from production tooling
  25. the identification of common 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 actions to be taken for unaccounted items
  28. the extent of your own responsibility and to whom you should report if you have problems that you cannot resolve
  29. the documentation to be completed during and/or on completion of the moulding activity

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## Scope/range related to performance criteria

1. Carry out all of the following during the moulding activities:
  1. 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. maintain a safe working environment for the setting and moulding activities
  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
  5. confirm 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 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
  10. leave the work area in a safe and appropriate condition on completion of the activities
  11. complete relevant production documentation
2. Confirm the press has been set up correctly to include all of the following:
  1. all press services are connected and operational (such as electrical, hydraulic, pneumatic)
  2. the correct mould tools are located in the machine and are complete, clean and free from damage
  3. the mould tools are correctly and securely mounted in the press
  4. all guards, screens and safety mechanisms are in place and in good working order
  5. the injector heads function correctly (where used)
  6. that moulding ejectors operate correctly (where fitted)
  7. the press settings are appropriate for the moulding being produced (such as pressure, speed/time, distance), including

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- alarm conditions)
  - 8. all the machine controls are operational and function correctly
3. Confirm the heating equipment has been set up correctly for use, to include all of the following:
- 1. the heating services are connected and operational (such as electrical, fluids, steam)
  - 2. the heating conditions set meet the moulding being produced (such as temperature, pressure, rates), including alarm conditions
  - 3. check that all the heating controls are operational and function correctly
4. Use one of the following heating sources:
- 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. Confirm the material delivery system has been set correctly to include all of the following as applicable to the system being used:
- 1. there are sufficient raw materials available and that they meet the component specification (such as resin, catalyst, fillers, additives, fibres)
  - 2. the material mixing and feed systems are operating correctly (such as dispensing heads, mixing heads, injectors)
  - 3. the moulding collection systems are operating correctly (such as ejectors, conveyors, robotics, collection chutes)
6. Prepare the tooling for production, to include carrying out three 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 one of the following mould types:
- 1. flash mould

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2. positive pressure mould
  3. semi-positive mould
  4. transfer mould
  5. injection mould
  6. other (to be specified)
8. Produce composite mouldings using three 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 one of the following 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 one type 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 one type of fibre from:

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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



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## 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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