

Producing aircraft components by vacuum forming

Overview

This standard identifies the competences you need to produce aircraft components by vacuum forming, in accordance with approved procedures. You will be required to follow the appropriate instructions, drawings and specifications to produce the various types of components from thermoplastic sheet, fibre-reinforced thermoplastic sheet and structural foam. This will require you to use a range of air circulating ovens, vacuum forming machines, trimming equipment and various types of tooling. The components produced will have a range of features, including male shapes, female shapes, double curvatures and stiffened mouldings.

Your responsibilities will require you to comply with organisational policy and procedures for the vacuum forming activities undertaken, and to report any problems with the forming activities, equipment or materials that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You will need to ensure that all tools, equipment and materials used in the forming are correctly accounted for on completion of the activities, and you must complete all necessary job/task documentation accurately and legibly.

You will be expected to work either with a high level of supervision or as a member of a team, and 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 this standard, and you must demonstrate competence in all the areas required by the standard.

Your underpinning knowledge will be sufficient to provide a sound basis for your work, and will provide an informed approach to applying the appropriate vacuum forming techniques and procedures. You will understand the production procedures and techniques used, and will know about the tools and techniques, in adequate depth to provide a sound basis for carrying out the activities to the required specification.

You will understand the safety precautions required when carrying out the vacuum forming activities, and when using the associated tools and equipment. You will be required to demonstrate safe working practices throughout. You will also understand your responsibilities for safety, and the importance of taking the necessary safeguards to protect 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 legislation, regulations, directives and other relevant guidelines
2. confirm that the equipment is set up correctly and is ready for use
3. manipulate the machine controls safely and correctly in line with operational procedures
4. produce components to the required specification
5. carry out quality sampling checks at suitable intervals
6. deal promptly and effectively with problems within your control and report those that cannot be solved
7. shut down the equipment to a safe condition on conclusion of the machining activities

Knowledge and understanding

You need to know and understand:

1. the specific safety practices and procedures that you need to observe when working with vacuum forming equipment (including any specific legislation, regulations/codes of practice for the activities, equipment or materials)
2. the health and safety requirements of the work area where you are carrying out the activities, and the responsibility these requirements place on you
3. the protective equipment that you need to use for both personal protection (PPE) and, where appropriate, the protection of others
4. the hazards associated with carrying out vacuum forming activities, and with the tools and equipment used, and how these hazards can be minimised
5. the application of COSHH regulations in relation to the storage, use and disposal of materials and consumables used in the vacuum forming process
6. how to extract information from engineering drawings, and related specifications (to include symbols and conventions to appropriate BS or ISO standards), in relation to the work undertaken
7. how to interpret imperial and metric systems of measurement
8. quality procedures used in the workplace to ensure production control (in relation to currency, issue, meeting specification), and how to complete such documents
9. the supply of material in sheet form (such as colour, thickness, sheet size, surface texture, material protection)
10. the sheet profiling procedures, and material trimming methods/procedures
11. the methods of sheet cleaning, prior to forming
12. the preparation methods and procedures applied to the moulding surface
13. the identification of the correct male/female mould tooling
14. the methods and techniques of loading and aligning materials into the mould tooling
15. the methods and techniques for carrying out the de-moulding procedures
16. how to recognise vacuum forming defects (such as misalignment, distortion, damage, contamination and surface defects)
17. the importance of adhering to the vacuum forming cycle
18. the quality control procedures to be followed during the vacuum forming operations
19. the tools and equipment used in the vacuum forming activities, and their care, preparation and control procedures
20. the problems that can occur with the vacuum forming operations, and how these can be overcome
21. the procedure for the safe disposal of waste materials

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22. the recording documentation to be completed for the vacuum forming activities undertaken and, where appropriate, the importance of marking and identifying specific pieces of work in relation to the documentation
23. the extent of your own authority, and whom you should report to if you have problems that you cannot resolve

Scope/range related to performance criteria

1. Carry out **all** of the following during the vacuum forming activities:

1. ensure that you have the correct documentation for the vacuum forming operations (such as drawings, job instructions, aircraft standards)
2. adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations
3. use the correct tools and equipment for the activity, and ensure that they are safe to use
4. use the correct materials and consumables, as specified in the production documentation (such as colour, size, composition)
5. apply safe and appropriate working practices and procedures at all times
6. dispose of waste items and materials in a safe and environmentally acceptable manner, in line with company procedures
7. return all tools and equipment to the correct location on completion of the activities
8. leave the work area in a safe condition and free from foreign object debris

2. Use **two** of the following types of equipment:

1. air circulating ovens
2. wood tooling
3. vacuum forming machines
4. trimming equipment
5. laminate tooling
6. composite tooling
7. metal tooling

3. Carry out **three** of the following operations:

1. bubble blowing to minimize webbing
2. positioning of robbers
3. cleaning of tooling
4. temperature control wood tooling trimming equipment composite tooling
5. trimming techniques
6. drying of sheet
7. use of intensifiers
8. sheet cleaning

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4. Produce a range of components with **two** of the following features:
 1. double curvatures
 2. male shapes
 3. female shapes
 4. stiffened mouldings
5. Produce a range of components using **one** the following materials:
 1. thermoplastic sheet (such as polycarbonate, polysulphone, acrylic, polyvinyl chloride (PVC), ABS)
 2. fibre-reinforced thermoplastic sheet
 3. structural foams (such as polyvinyl chloride (PVC), polymethate)
6. Produce aircraft components which comply with **one** of the following standards:
 1. Civil Aviation Authority (CAA)
 2. Ministry of Defence (MoD)
 3. customer standards and requirements
 4. Federal Aviation Authority (FAA)
 5. company standards and procedures
7. Complete the relevant paperwork, to include **one** from the following, and pass it to the appropriate people:
 1. production documentation
 2. records of machine settings
 3. quality control documentation
 4. other specific records

Behaviours

Additional Information

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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