SEMAE3027

Vacuum forming aircraft components

Overview

This standard identifies the competences you need to vacuum form aircraft components, in accordance with approved procedures. It covers both fixed wing and rotary winged aircraft. You will be required to use appropriate manufacturing drawings and specifications, together with other quality documentation, to produce the various types of component from thermoplastic sheet, fibre reinforced sheet and structural foam, using air circulating ovens, vacuum forming machines, trimming equipment and assorted tooling. The components produced will have the following features: 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 moulding activities undertaken and to report any problems with the moulding activities, equipment, materials or consumables 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 vacuum forming procedures. You will understand the vacuum forming procedures used and their application and will know about the vacuum moulding techniques, materials, tooling and consumables used, 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 vacuum forming operations. 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. confirm that the equipment is set up correctly and is ready for use
3. operate 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
8. complete the relevant documentation, in accordance with organisational requirements
9. 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 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, protection of others
4. the hazards associated with vacuum forming activities and with the tools and equipment used and how to minimise them and reduce any risks
5. the procedure for the correct separation and safe disposal of waste materials
6. the layout of the area to give maximum throughput
7. the interpretation of drawings, standards, quality control procedures and specifications used for the vacuum forming activity and how to carry out currency/issue checks on the documents you are working with
8. the methods and techniques to be used during tool preparation
9. the reasons for the use of intensifiers and the robber system
10. equipment checks and the stores and kitting functions
11. the methods of sheet trimming and sheet cleaning, prior to forming
12. the principles of deep drawing, concave/convex moulding, positive pressure moulding and stress relieving
13. the sheet profiling procedures and material trimming methods/procedures
14. the supply and storage of stock material (such as colour, thickness, sheet size, surface texture, material protection)
15. the preparation methods and procedures applied to the moulding surface
16. the merits of male/female moulding, de-moulding techniques and temperature control procedures
17. the methods and techniques for carrying out the de-moulding procedures and first article inspection (such as test samples, non-destructive testing (NDT) requirements)
18. the methods and techniques for lifting, handling and supporting the components/equipment/materials during the vacuum forming activities
19. recognition of vacuum forming defects (such as misalignment, distortion, foreign object damage, contamination and surface defects)

20. the quality control procedures to be followed during the vacuum forming operations
21. the procedures for ensuring that you have the correct tools and equipment
22. the tools and equipment used in the vacuum forming activities and their calibration, care, preparation and control procedures
23. why tool/equipment control is critical and what to do if a tool or piece of equipment is unaccounted for on completion of the activities
24. the problems that can occur with the vacuum forming operations and how these can be overcome
25. 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
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 vacuum forming activities:

1.1 obtain and use the appropriate documentation (such as job instructions, drawings, planning and quality control documentation, material data sheets, aircraft standards and specifications)
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 provide and maintain a safe working environment for the moulding activities
1.4 obtain the correct materials for the vacuum forming operations (batch number, colour, thickness, sheet size, composition, surface texture, correctly protected)
1.5 obtain the correct tools and equipment for the activity, and check that they are in a safe and usable condition (such as part marked, cleared inspection, undamaged)
1.6 follow safe practice/approved moulding techniques and procedures at all times
1.7 return all tools and equipment to the correct location on completion of the moulding activities
1.8 dispose of waste materials in accordance with approved procedures

2.

Use three of the following types of equipment :

2.1 air circulating ovens
2.2 wood tooling
2.3 vacuum forming machines
2.4 trimming equipment
2.5 tufnol tooling
2.6 composite tooling
2.7 metal tooling

3.

Carry out four of the following operations:

3.1 bubble blowing to minimize webbing
3.2 positioning of robbers
3.3 tooling cleaning
3.4 temperature control
3.5 trimming techniques
3.6 drying of sheet
3.7 use of intensifiers
3.8 sheet cleaning

4.

Produce a range of components with three of the following features:

4.1 double curvatures
4.2 female shapes

4.3 male shapes
4.4 stiffened mouldings

5.

Produce a range of components using all the following materials:

5.1 thermoplastic sheet (such as polycarbonate, polysulphone, acrylic, polyvinyl chloride (PVC), ABS)
5.2 fibre reinforced thermoplastic sheet
5.3 structural foams (polyvinyl chloride (PVC), polymethate (Rohacell)

6.

Produce components which comply with one of the following standards:

6.1
Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
6.2
Ministry of Defence (MoD)
6.3 Military Aviation Authority (MAA)
6.4 Aerospace Quality Management Standards (AS)
6.5 customer standards and requirements
6.6 Federal Aviation Authority (FAA)
6.7 company standards and procedures
6.8 BS, ISO or BSEN standards and procedures
6.9 manufacturers standards and procedures

7.

Complete the relevant paperwork, to include one from the following and pass it to the appropriate people:

7.1 build records
7.2 job cards.
7.3 log cards
7.4 aircraft flight log
7.5 other specific recording method

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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