SEMME3061

Bending and straightening material using the heat-line method

Overview

This standard identifies the competences you need for bending and straightening plate and section materials used in marine fabrication, in accordance with approved procedures. You will be required to interpret drawings and to form the materials to the required shape by using the appropriate equipment and techniques, such as hand held and portable track oxy-fuel heat-line equipment and induction heat-line methods. The operations carried out will include such items as the removal of distortion in plates, girders, sections and frames, the bending and forming of plates/shell plates, sections and frames and the levelling of distortion to deck panels, bulkheads, partitions and walls.

Your responsibilities will require you to comply with organisational policy and procedures for the activities undertaken and to report any problems with the equipment, materials, tooling or heat-line bending and forming activities that you cannot personally resolve, or are outside you personal 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 be sufficient to provide a good understanding of your work and will provide an informed approach to applying the heat-line bending and forming procedures required. You will have an understanding of the heat-line bending processes and will know about the equipment used and its application, in adequate depth to provide a sound basis for carrying out the activities, correcting faults and ensuring that the completed work is to the required specification.

You will understand the safety precautions required when working with heat-line bending and forming equipment and the safeguards necessary for undertaking the activities safely and correctly. You will be required to demonstrate safe working practices and procedures throughout and will understand the responsibilities 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. 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 precautions to be taken when working with heat-line equipment (such as hand and track operated oxy-fuel gas equipment and/or induction heating equipment, in a marine fabrication environment, both on land and on board vessels (to include general workshop and site safety, appropriate personal protective equipment, accident procedure; statutory requirements, risk assessment procedures and relevant requirements of HASAWA, COSHH and Work Equipment Regulations; safe disposal of waste materials)
2. the correct personal protective equipment (PPE) and handling precautions to be taken, when working with heavy platework and heat-line equipment (such as leather aprons and gloves, eye/ear protection, safety helmets)
3. the correct methods of moving or lifting sheet or plate materials
4. the hazards associated with carrying out heat-line forming and bending activities (such as handling heavy sheet materials and components; operating gas or induction heating equipment; fumes and gases, explosive gas mixtures; hot metal; using faulty or badly maintained tools and equipment) and how they can be minimised
5. safe working practices and procedures for using oxy-fuel gas heat-line equipment, in line with British Compressed Gas Association (BCGA) codes of practice (to include setting-up procedures, permit-to-work procedures and emergency shutdown procedures)
6. how to obtain the necessary drawings and bending specifications
7. how to extract information from engineering drawings and related specifications (to include symbols and conventions to appropriate BS or ISO standards) in relation to work undertaken
8. how to carry out currency/issue checks of the specifications you are working with
9. the basic principles of bending and forming using the heat-line method
10. the various types of heat-line equipment that is used and their typical applications
11. the methods and techniques that are used to obtain the required shape and size
12. ways of removing distortion in plates, sections, fabricated structures and frames

13. how to prepare and set up the induction heat-line equipment
14. the gases used in the heat-line process (including gas identification and colour codes used)
15. how to set up the oxy-fuel heat-line equipment (including connection of hoses, regulators and flashback arrestors, selection of heat-line torch and nozzle size in relationship to material thickness and operations performed)
16. the correct procedure for lighting and extinguishing the flame and the importance of following the procedure
17. preparations prior to carrying out the forming operations (such as checking connections for leaks, setting gas pressures, setting up the material/workpiece, checking the cleanliness of materials used)
18. the preparations to be carried out on the materials, prior to forming them
19. the basic characteristics of the materials with regard to the forming operations undertaken
20. the problems that can occur with the heat-line forming activities and how they can be avoided
21. the organisational quality control procedures that are used and how to recognise defects in the finished work
22. how to make dimensional and forming inspection checks and the tools and equipment that can be used for this
23. accuracy and limitations of the heat-line bending process
24. 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.

Confirm that the equipment is safe to use and fit for purpose, by carrying out **all** of the following checks, as applicable to the machine type:

1.1 the equipment is appropriate for the operations being performed
1.2 regulators, hoses and valves are securely connected and free from leaks and damage
1.3 the correct gas nozzle is fitted to the heat-line torch
1.4 a flashback arrestor is fitted to the gas equipment
1.5 appropriate gas pressures are set
1.6 hoses are safely routed and protected at all times
1.7 the correct procedure is used for lighting, adjusting and extinguishing the heat-line flame
1.8 gas cylinders are handled and stored safely and correctly
1.9 the machine guards and safety devices are in position and function correctly
1.10 the machine is in a serviceable condition
1.11 machine settings are suitable for the material thickness

2.

Use **two** of the following heat-line methods:

2.1 hand held oxy-fuel heat-line equipment
2.2 portable track oxy-fuel heat-line equipment
2.3 induction heat-line method

3.

Perform heat-line activities, to produce **four** of the following:

3.1 removal of distortion in plates
3.2 removal of distortion in girders/sections
3.3 removal of distortion in frames
3.4 bending and forming of plates/shell plates
3.5 removal of distortion rails/stanchions
3.6 removal of distortion in pipework
3.7 bending and forming of pipework
3.8 bending and forming of rails/stanchions
3.9 bending and forming of sections/frames
3.10 levelling of distortion in deck panels
3.11 levelling of distortion in bulkheads
3.12 levelling of distortion in partitions and walls

4.

Use heat-line methods on **two** of the following:

4.1 plate
4.2 rolled sections
4.3 pipe/tube

4.4 fabricated structures

5.

Produce heat-line shapes using **one** of the following types of material:

5.1 mild steel
5.2 high tensile steel
5.3 other specific metal

6.

Produce components which conform to **all** of the following standards:

6.1 dimensional accuracy is within the specification tolerances, or within +/- 1.5mm
6.2 shapes and curvatures are within specification requirements
6.3 the material/component conforms to best practice and/or specification, without deformation

Behaviours

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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