SEMFEW311 - SQA Unit Code HIWE 04
Preparing resistance spot, seam and projection welding machines for production

Overview

This unit identifies the competencies you need to prepare a resistance spot, seam or projection welding installation for production in accordance with approved procedures. You will be required to set up and check both the welding equipment and all associated mechanical and electrical apparatus forming part of the mechanised or automated installation. This will include setting up of handling and loading equipment, workholding arrangements, traversing mechanisms, transfer mechanisms and safety equipment as is applicable to the machine type. In setting up the welding conditions you will be expected to set the welding current, welding and squeeze times, electrode pressure cycle, and welding speed for seam or spot pitch. You must produce trial welds and prove the machine is working satisfactorily before declaring the equipment ready for production. Making adjustments to settings to achieve specification and solving machine related problems during production will also form part of your role.

Your responsibilities will require you to comply with organisational policy and procedures for setting up the welding installation and to report any problems with the welding equipment or the welding activities that you cannot resolve, or are outside your permitted authority, to the relevant people. You will be expected to work with minimum supervision, taking personal responsibility for your own actions and the quality and accuracy of the work that you carry out.

Your underpinning knowledge will provide a good understanding of your work, and provide an informed approach to applying resistance-welding procedures. You will understand the welding process carried out, and its application, and will know about the equipment, relevant materials and consumables in adequate depth to provide a sound basis for setting up the equipment, correcting faults and ensuring the work output is produced to the required specification. You will understand the safety precautions required when working with the machine and its 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:

P1 work safely at all times, complying with health and safety and other relevant regulations and guidelines

P2 follow the relevant joining procedure specification and job instructions for the work to be produced

P3 check that the equipment is as specified and in usable condition

P4 obtain the required components and check that the joint preparation complies with the specification

P5 set up the handling, work-holding and associated equipment to achieve correct joint positioning

P6 select and prepare the appropriate consumables in line with the joining procedure specification

P7 set and adjust the machine operating conditions to achieve joints of the required quality and within specified dimensional accuracy

P8 check that all safety mechanisms are in place and that the equipment is operating satisfactorily

P9 deal promptly and effectively with problems within your control and report those that cannot be solved

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Knowledge and understanding

You need to know and understand:

K1 the specific safety precautions to be taken when setting and operating resistance welding installations (working with machinery; the use of appropriate personal protective equipment; machine guards; operation of machine safety devices; stopping the machine in an emergency; closing down the machine on completion of the welding activities; statutory requirements, risk assessment procedures and relevant requirements of HASAWA, COSHH and Work Equipment Regulations; safe disposal of waste materials)

K2 the hazards associated with resistance welding machines and how they can be minimised (dangers from live internal electrical components, fumes, hot metal, expulsion of hot particles, moving parts of machines)

K3 the basic principles of resistance welding (heat and pressure to join metals; heating effect of welding current; principle features of the welded joint; heat input; welding and pressure cycles; how variations in the parameters influences the weld features; terminology used in welding)

K4 the key components and features of the resistance welding equipment used (power source; welding head; power range; electrical parameters such as voltage, current, electrode pressure and welding time; systems for parameter control)

K5 mechanised and automated resistance welding basics (types of installation; machine functions; control systems; safety features; loading, handling, clamping and transfer of components)

K6 extracting information from drawing and welding procedure specifications

K7 types of electrodes used in resistance welding, contact profiles and maintenance requirements of the electrodes

K8 types of joints applicable to resistance welding and the surface preparation required

K9 methods of setting up the joints to achieve correct location of components (work holding arrangements; component location and contact)

K10 setting up the welding equipment to the welding procedure specification (setting welding conditions, time and pressure cycles; welding speed)

K11 checking that the equipment functions to the required specification (running pre-production trials to prove that the installation is working satisfactorily)

K12 problems that can occur with the welding activities and how these can be overcome (welding characteristics of relevant materials and sources of weld defects; methods of prevention)

K13 organisational quality systems (standards to be achieved; production records to be kept)

K14 personal approval tests and their applicability to your work

K15 the extent of your own responsibility and whom you should report to if you have problems that you cannot resolve

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Additional Information

Scope/range related to performance criteria

You must be able to:

1. ensure the resistance welding equipment is suitable for production by carrying out **all** of the following checks:
   - 1.1 the equipment is correctly maintained and in a safe and usable condition
   - 1.2 the equipment is correctly calibrated
   - 1.3 all electrical and mechanical systems function smoothly
   - 1.4 equipment shut down systems function correctly
2. set up, check, adjust and use **one** of the following types of resistance welding installations:
   - 2.1 spot welding
   - 2.2 seam welding
   - 2.3 projection welding
3. set up the welding installation and parameters in accordance with the welding procedure specification to include setting up **all** of the following as is applicable to the type of installation:
   - 3.1 welding current
   - 3.2 welding speed (seam)
   - 3.3 welding and squeeze times
   - 3.4 weld pitch (spot)
   - 3.5 electrode pressure cycle
4. set up the work piece to achieve correct joint fit-up and alignment to include setting and checking **all** of the following as is applicable to the type of installation:
   - 4.1 handling and loading equipment
   - 4.2 preparation of materials and joint faces is to specification
   - 4.3 traversing mechanisms
   - 4.4 work holding arrangements
   - 4.5 safety mechanisms
   - 4.6 transfer mechanisms
5. set up the equipment to produce welded components in the specified materials and forms that cover **both** of the following:
   - 5.1 two different material thicknesses
   - 5.2 two different joint configurations
6. prove the installation is operating correctly and is ready for production by producing specified trial welds and checking **all** of the following as is applicable to the application:
   - 6.1 visual appearance of weld area
   - 6.2 weld quality
   - 6.3 dimensional accuracy
   - 6.4 machine settings are as specified
7. solve problems in production relating to **all** of the following as is applicable:
   - 7.1 machine performance

7.2 joint set-up
7.3 condition of electrode
7.4 condition of materials being joined

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