SEMMPF249

Carrying out thermal spraying operations

Overview

This standard identifies the competences you need to carry out material finishing operations by thermal spraying, in accordance with approved procedures. You will be expected to confirm with the authorised person, such as your immediate supervisor, that the equipment is ready for the thermal spraying operations to be performed and that all the required components/materials and consumables are available.

You will be required to operate the thermal equipment, in line with safe working practices and approved procedures, continuously monitoring the thermal spraying operations and where necessary, making minor adjustments or seeking help from the authorised person to make the required adjustments, in order to ensure that the work output is to the required quality. Meeting production targets will be an important issue and your production records must show consistent and satisfactory performance.

Your responsibilities will require you to comply with organisational policy and procedures for the thermal spraying activities undertaken and to report any problems with these activities that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You will be expected to work to instructions, with a minimum of supervision, taking personal responsibility for your actions and for the quality of the work that you carry out.

Your underpinning knowledge will be sufficient to provide a sound basis for your work and will enable you to adopt an informed approach to applying thermal spraying procedures. You will have an understanding of the thermal spraying process and its application and will know about the equipment, materials and consumables in adequate depth to provide a sound background for carrying out the activities, recognising and reporting thermal spraying defects and ensuring that completed components are to the required specification.

You will understand the safety precautions required when working with thermal spraying equipment and materials. 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.
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. follow work instructions and specifications
3. ensure the material surfaces to be treated are prepared for the finishing operations
4. check that the finishing equipment and treatment solutions are set up and maintained at satisfactory operating conditions and levels
5. carry out the treatment process following operating procedures and to meet the component specification requirements
6. ensure that the treated workpiece achieves the required characteristics and meets the finishing specification
7. deal promptly and effectively with problems within your control and report those that cannot be solved
8. ensure that work records are completed, stored securely and available to others, as per organisational requirements
9. leave the work area in a safe condition on completion of the activities, as per organisational and legal requirements
Knowledge and understanding

You need to know and understand:

1. the specific safety precautions to be taken whilst carrying out the activities (including any specific legislation, regulations or codes of practice relating to the activities, equipment or materials)
2. the health and safety requirements of the work area and the activities, and the responsibility these requirements place on you
3. the hazards associated with the activities, and how to minimise them and reduce risks
4. the personal protective equipment and clothing (PPE) to be worn during the activities
5. the importance of keeping the work area clean and tidy
6. how to obtain and interpret production documentation required during the thermal spraying activity
7. the basic principles of the operation of thermal spraying equipment
8. what surface preparations need to be carried out on the materials prior to spraying them
9. how to check that the spraying plant, equipment and mediums are fit for purpose
10. how to check that equipment safety systems are adjusted and operating correctly
11. how to adjust the spray settings to ensure that the workpiece achieves the correct coverage and depth of coating
12. methods of setting up the component to give the optimal coating and freedom from distortion; the use of jigs/fixtures, manipulators and positioners
13. the types of problem that can occur with thermal spraying and how they can be rectified
14. the type of defects that can occur on the sprayed components, their causes, and method of rectification and prevention
15. the basic visual checks to be carried out on completion of the thermal spraying process
16. the procedure for the safe disposal of waste materials
17. the importance of completing the production documentation throughout the thermal spraying process
18. the extent of your own responsibility and whom you should report to if you have problems that you cannot resolve
19. how to access, use and maintain information to comply with
organisational requirements and legislation
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Scope/range related to performance criteria

1. Spray components, carrying out all of the following activities:
   1. use the correct issue of process documentation (specifications, job cards, quality control documentation)
   2. adhere to health and safety regulations, systems and procedures to realise a safe system of work
   3. confirm with the authorised person that the equipment is ready for carrying out the spraying operations
   4. maintain sufficient quantities of process materials and components during the production cycle
   5. where appropriate, seek any necessary instructions or training on the operation of the spraying equipment
   6. follow the defined operating procedures
   7. ensure that the equipment settings are adjusted (either by yourself or the authorised person) to maintain the correct customer specification
   8. leave the work area in a safe and clean condition

2. Carry out thermal spraying operations, using one of the following types of equipment:
   1. hand held equipment
   2. manually controlled machine
   3. computer controlled equipment

3. Carry out thermal spraying operations, using one of the following methods:
   1. combustion wire (metal spray) process
   2. combustion powder (powder flame spray and low velocity oxygen fuel) process
   3. arc wire thermal spray process
   4. plasma thermal spray process
   5. high velocity oxygen fuel (HVOF) spray process
   6. detonation gun thermal spray process
   7. kinetic metallization (KM) thermal spray process

4. Carry out thermal spraying processes on one of the following materials:
   1. ferrous steel
   2. alloy steel
   3. non-ferrous
   4. plastics and composites
5. Use one of the following types of coating materials during the thermal spraying activities:
   1. inconals
   2. ceramics
   3. tungsten and chrome carbides
   4. pure metal powder or wires (aluminium, zinc, copper, nickel, brass, titanium, stainless and carbon steel)
   5. metal alloy powders or wires (aluminium based, cobalt based, molybdenum and nickel based, iron based)
   6. other specific coatings

6. Carry out thermal spraying operations that cover both of the following:
   1. single stage treatment
   2. multiple stage treatments

7. Carry out three of the following activities during the thermal spraying process:
   1. segregate any defective components (pre and post thermal spraying)
   2. carry out pre-treatments (cleaning and degreasing)
   3. prepare components for thermal spraying (jigging, masking, wiring, suspending, mounting)
   4. monitor equipment settings (mechanical and electrical settings, deposition and feed rates)
   5. safely make adjustments to equipment settings

8. Carry out four of the following checks on thermal spray coated components:
   1. free from damage
   2. free from contamination
   3. surface quality/appearance
   4. completeness of the coating operations
   5. deposit thickness

9. Check thermal spraying activities with one of the following quality and accuracy standards:
   1. military or aviation
   2. current industry standards or codes of practice
   3. international standards company standards and
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requirements
4. customer standards and requirements
# Carrying out thermal spraying operations

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