SEMCOMP311

Producing composite mouldings using filament winding techniques

Overview

This standard identifies the competences you need to produce composite mouldings using filament winding moulding techniques, in accordance with approved procedures. You will be required to use appropriate drawings, specifications and documentation to produce various mouldings, using the correct filament winding production techniques. You will be expected to prepare a range of tooling, prepare and apply composite materials. You will be expected to setup the filament winding equipment to produce a range of mouldings incorporating a variety of winding patterns and moulded features. Mouldings produced will include laminates using a range of resin and fibres. Your responsibilities will require you to comply with organisational policy and procedures for the setup and production activities undertaken, and to report any problems with the equipment setup, production activities or materials 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 filament winding techniques and procedures. You will understand the setup and production techniques used, and their application, 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 moulding activities, and when using the 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.

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. follow the correct component drawing or any other related specifications for the component to be produced 3. determine what has to be done and how this will be achieved 4. obtain and prepare the appropriate tools, equipment and materials 5. set the equipment and material delivery system operating parameters required for the filament winding moulding operation and prepare for use 6. check that all safety mechanisms are in place and operate correctly 7. carry out the moulding activities using the correct methods and techniques 8. check that the equipment operates within the operating parameters set 9. produce mouldings to the required specification 10. check that all the required operations have been completed to specification 11. remove completed mouldings using correct methods and techniques 12. check the quality of mouldings by visual inspection 13. complete and store all relevant documentation in accordance with organisational procedures 14. deal promptly and effectively with problems within your control and report those that cannot be solved 15. 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 health and safety precautions to be taken, and procedures used, when working with composite materials, consumables, tools and equipment in the specific work area 2. the hazards associated with carrying filament winding techniques, and with the composite materials, consumables, tools and equipment used, and how to minimise these and reduce any risks in the work area 3. the protective equipment (PPE) that is needed for personal protection and, where required, the protection of others 4. the specific environmental conditions the must be observed when producing composite mouldings (such as temperature, humidity, fume extraction systems and equipment) 5. how to extract and use information from engineering drawings and related specifications (to include symbols and conventions to appropriate standards) in relation to work undertaken 6. how to interpret drawings/lay-up manuals, imperial and metric systems of measurement, workpiece reference points and system of tolerancing 7. the quality procedures used in the workplace to ensure production control (in relation to currency, issue, meeting specification), and the completion of such documents 8. the conventions and terminology used for filament winding techniques (such as material identification, lay-up specifications, resin/catalyst ratios, winding angle, winding tension, curing temperature, gel time, cure time, exotherm) 9. the safety mechanisms on the machine, and the procedure for checking that they function correctly 10. operation of the machine controls, and how to stop the machine in an emergency 11. the parts and functions of the filament winding machines (to include machine controls; hydraulic, pneumatic and electricity supplies; mandrel drive; carriage drive; winding heads; controls; material delivery systems; mandrel extraction systems) 12. the various machine operating parameters that may require adjusting prior to filament winding activities (such as resin/catalyst ratio, accelerators mandrel speed, carriage speed, fibre tension, fibre angle, resin/fibre ratio, moulding temperature, material positioning and weight), and how these are achieved 13. the effects that changes to theses settings will have on the quality of the components produced 14. the different types of resins, reinforcement, catalysts, accelerators and additives used, and their applications 15. the different types of winding combinations and applications 16. the visual identification of both raw and finished composite materials 17. different types of production tooling used for producing composite mouldings 18. the identification of defects in production tooling 19. methods of preparation for moulds and tooling (including the correct selection and use of release films/agents) 20. methods for handling, preparation and application of the reinforcing fibres and fabrics 21. the tools and equipment used in the filament winding activities, and their care, preparation and control procedures 22. the problems that can occur during the filament winding process (including defects such as contamination, exotherm, porosity, resin rich, fibre deviation, broken tows) 23. procedures and methods used for removing mouldings from production mandrels 24. the identification of defects in the composite mouldings (such as porosity, contaminants, fibre deviation, tension variation) 25. the care and safe handling of mandrel tooling and composite mouldings throughout the production cycle 26. the production controls used in the work area, and actions to be taken for unaccounted items 27. how the composite component relates to its own quality documents and the production tooling used 28. 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