
Overview

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This standard identifies the competences you need to prepare and set up automatic cold wire extension spring making machines for production, in accordance with approved procedures. This will involve setting up for the production of a range of extension springs, such as right and left-handed helix, garter springs and other specific extension springs.

You will need to select the appropriate material, feed and guide mechanisms, bending, forming and cut off tools, and to check that they are in a safe and usable condition. You will then set the machine operating parameters to produce the extension springs to the required specification. This will involve mounting and setting up all the required tooling, wire feed mechanisms, operating cams and cam timing, and setting mechanical or pneumatic actuators, electromechanical controls, stops, feed and speed mechanisms, as appropriate to the machine type. You must produce trial runs and prove that the machine is working satisfactorily before allowing it to run in automatic production mode. Making adjustments to settings to achieve the spring 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 the automatic cold wire extension spring machine-setting activities undertaken, and to report any problems with the machine, tooling, equipment or setting-up activities 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 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 the setting-up procedures used on automatic cold wire extension spring making machines. You will understand the automatic cold wire extension spring making machine used, and its application, and will know about the material feed mechanisms, tooling, relevant materials, consumables and setting-up procedures, in adequate depth to provide a sound basis for setting up the equipment, correcting faults and ensuring that springs are produced to the required specification.

You will understand the safety precautions required when working with the automatic cold wire extension spring making machine, and with its associated tools and equipment. You will be required to demonstrate safe working practices throughout, and will understand your responsibility for taking the necessary safeguards to protect

yourself and others in the workplace.

This standard does not cover CNC spring making activities, for which other standards apply.

Performance criteria

You must be able to:

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1. work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
2. follow the correct component drawing and any other related specifications for the component to be produced
3. determine what has to be done and how the machine will be set to achieve this
4. mount and set the correct forming tools and devices for the component being produced
5. set the machine operating parameters to achieve the required pressure shaping requirements and component specification
6. check that all safety mechanisms are in place and that the equipment is set correctly for the required operations
7. deal promptly and effectively with problems within your control and report those that cannot be solved

Knowledge and understanding

You need to know and understand:

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1. how to work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
2. the hazards associated with working on automatic cold wire extension spring making machines and how to minimise them and reduce any risks
3. the safety mechanisms on the machine, and the procedure for checking that they function correctly
4. how to start and stop the machine in normal and emergency situations
5. the importance of ensuring that the machine is isolated from the power supply before setting up the various cams and operating systems
6. the importance of wearing the appropriate protective clothing (PPE) and equipment, and of keeping the work area clean and tidy
7. the basic principles of operation of the automatic cold wire extension spring making machine used and its accessories, and typical operations that it can perform
8. how to handle and store spring forming tools and equipment, safely and correctly
9. 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
10. how to interpret first and third angle drawings, imperial and metric systems of measurement, workpiece reference points and system of tolerancing
11. terminology used in relationship to the automatic cold wire extension spring making machine used, the activities undertaken and types of springs produced
12. how to check that the tools and equipment used are in a safe and serviceable condition, and their care and maintenance procedures
13. the range of forming tools and devices that are used on the machine
14. the selection of cams, and how they are set up and timed in order to produce the components to the required specification
15. factors which determine the coiling/forming speed and material feed to be used, and how they are set
16. how the spring wire materials are to be prepared for the coiling operations, and why some materials may require a heating process

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- prior to forming
17. the characteristics of the various materials used with regard to the coiling and forming process
 18. the variations in manufacturing methods and spring characteristics that will occur with different ferrous and non-ferrous metals
 19. how the various types of material will affect the feeds and speeds that can be used
 20. how to set up the automatic cold wire extension spring making machine and its accessories for the particular operations being performed
 21. the need to conduct trial runs, and to check that the machine is set up and producing the components correctly
 22. organisational quality control procedures, and the recognition of coil forming defects
 23. the various checks to be carried out on the extension springs (such as dimensional checks, coil forming checks and extension/load checks), and the tools and equipment to be used
 24. the importance of completing all relevant documentation on conclusion of the spring making activities
 25. problems that can occur with setting up the tooling and machine operating parameters, and what to do if they occur
 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

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1. Carry out all of the following during the setting up of the automatic cold wire extension spring making machines:
 1. obtain and interpret correctly the documentation for the type of extension spring being made
 2. adhere to procedures or systems in place for risk assessment, personal protective equipment and other relevant safety regulations
 3. check that the machine and spring forming equipment to be used is in a safe and usable condition
 4. carry out the setting-up activities, following good practice/approved procedures
 5. ensure that first-off springs are correctly heat treated for inspection/verification
 6. ensure that correctly adjusted machine guards are in place
 7. leave the machine and work area in a safe and clean condition on completion of the setting-up activities
2. Produce wire extension springs from two different types of material from the following:
 1. carbon steel
 2. alloy steel
 3. nickel based alloys
 4. stainless steel
 5. copper based alloy
 6. titanium and other special material
 7. other specific material
3. Set up automatic cold wire extension spring forming machines for the production of three of the following:
 1. right-hand helix
 2. left-hand helix
 3. garter springs
 4. other specific extension springs
4. Set the machine to finish extension spring ends, to include producing three of the following:
 1. full round hook/full round eye
 2. square end
 3. machine loop
 4. long round end hook on centre
 5. English loop
 6. crossover

7. coned end to hold long swivel eye
 8. continental (German) loop
 9. double loop
 10. eye and hook at right angles
 11. enlarged loop
 12. 45 degree loop
 13. extended eye on centre or side
 14. side loop
 15. extended leg
 16. small eye on centre
 17. plain ends
5. Select and set up four of the following types of spring making tooling:
 1. bending tools
 2. looping tools
 3. cut-off/cropping tools
 4. forming tools
 5. straightening tools
 6. other special-purpose tooling
 6. Set up the operating control systems for an automatic cold wire extension spring making machine, to include four of the following devices:
 1. material guide/wire feed mechanisms (such as feed rollers, pneumatic, magazine)
 2. cams and mechanical actuators
 3. straighteners
 4. pitch spacers
 5. pneumatic/hydraulic actuators
 6. electro-mechanical actuators
 7. feed fingers
 8. de-reeler
 7. Set up the machine in accordance with instructions and specifications, to include all of the following, as appropriate:
 1. wire feed/speed rollers
 2. spring arm/leg length
 3. wire stop mechanisms
 4. finished spring length
 5. selecting and setting appropriate cams/gears
 6. trip dogs and limit switches
 7. correct helix
 8. position and operation of forming tools
 9. correct pitch
 10. position and operation of cropping tool
 11. number of coils required
 12. guards/safety mechanisms
 8. Use four of the following whilst checking the quality of the springs produced:
 1. vernier callipers

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2. vernier protractors
 3. gauges
 4. micrometers
 5. squares
 6. jigs
 7. spring testing machines
 8. electronic measuring equipment
 9. Carry out checks of the wire springs, to include all of the following:
 1. size of wire and material specification
 2. dimensional accuracy of the free/overall length
 3. dimensional accuracy of the outside diameter
 4. dimensional accuracy of the inside diameter
 5. the number of coils is as specified
 6. the spring is wound with the correct hand helix
 7. spring ends/legs are of the correct length, angle and shape (where appropriate)
 8. spring load/extension meets specification requirements
 9. completed springs are free from tooling marks and deformation
 10. Set up automatic cold wire extension spring making machines to produce springs to one of the following:
 1. BS, ISO or EN standards and procedures
 2. customer standards and job requirements
 3. company standards and procedures

SEMMME3127

Setting automatic cold wire extension spring making machines for production



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