

---

## Overview

| --- ||

This standard identifies the competences you need to prepare and set up automatic hot wire compression spring making machines for production, in accordance with approved procedures. This will involve setting up for the production of a range of compression springs, such as open and closed end and right and left-hand helix 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 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 and wire heating elements, 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 hot wire compression 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 hot wire compression spring making machines. You will understand the automatic hot wire compression spring making machine used, and its application, and will know about the material feed mechanisms, tooling, relevant material heating and quenching requirements, 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 hot wire compression 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:

| --- ||

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:

| --- ||

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 hot wire compression 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 hot wire compression 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 hot wire compression 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 material is heated for the coiling operations
17. how the finished springs are to be quenched/heat treated

- 
18. the characteristics of the various materials used with regard to the coiling and forming process
  19. the variations in manufacturing methods and spring characteristics that will occur with different ferrous and non-ferrous metals
  20. how to set up the automatic 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 compression springs and the tools and equipment to be used for this
  24. the importance of completing all relevant documentation on conclusion of the compression 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

| --- ||

1. Carry out all of the following during the setting up of the automatic hot wire compression spring making machines:
  1. obtain and interpret correctly the documentation for the type of compression spring being made
  2. adhere to procedures or systems in place for risk assessment, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
  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 compression springs from two different types of material from the following:
  1. carbon steel
  2. alloy steel
  3. other specific material
3. Set up automatic hot wire compression spring forming machines for the production of four of the following:
  1. open ended right-hand helix
  2. conical
  3. barrel
  4. open ended left-hand helix
  5. variable pitch
  6. garter springs
  7. closed end right-hand helix
  8. closed end left-hand helix
  9. other wire forms
4. Select and set up two 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
  5. Set up operating control systems for an automatic hot wire compression spring making machine, to include four of the following devices:
    1. material/wire heating equipment
    2. material guide/wire feed mechanisms (such as feed rollers, pneumatic, magazine)
    3. cams and mechanical actuators
    4. pitch spacers
    5. pneumatic/hydraulic actuators
    6. feed fingers
    7. de-reeler
    8. straighteners
    9. electro-mechanical actuators
    10. quenching equipment
  6. 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
  7. Use four of the following whilst checking the quality of the springs produced:
    1. vernier callipers
    2. vernier protractors
    3. gauges
    4. micrometers
    5. squares
    6. jigs
    7. spring testing machines
    8. electronic measuring equipment
  8. Carry out checks of the wire compression spring, 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 are flat and square to spring axis (where

- 
- appropriate)
  - 8. heat treatment meets specification requirements
  - 9. spring load and rate meets specification requirements
  - 10. completed springs are free from tooling marks and deformation
  - 9. Set up automatic hot wire compression 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



SEMMME3130

Setting automatic hot wire compression spring making machines for production



Developed by	Enginuity
Version Number	3
Date Approved	30 Mar 2023
Indicative Review Date	31 Mar 2028
Validity	Current
Status	Original
Originating Organisation	Enginuity
Original URN	SEMMME3130
Relevant Occupations	Engineering, Engineering and Manufacturing Technologies, Engineering Technicians
Suite	Mechanical Manufacturing Engineering Suite 3
Keywords	Mechanical engineering; spring making; setting up; automatic machines; hot wire; compression spring; open ended; closed end; right hand helix; left hand helix; conical; barrel; garter; variable pitch; carbon steel; alloy steel; bending; looping; cut-off