
Overview

This standard identifies the competencies you need to produce metal components to form pattern, corebox or model equipment using hand-fitting techniques, in accordance with approved procedures. You will be required to select the appropriate equipment to use, based on the operations to be carried out and the accuracy required. In producing the components, you will be expected to use a range of hand tools, portable power tools, shaping and fitting techniques that are appropriate to the type of material and operations being performed. These activities will include activities such as hand sawing, band sawing, filing, drilling, chiselling, threading, scraping, lapping and off-hand grinding. The components produced will have features from the following: flat, square, parallel and angular faces, radii and curved profiles, drilled holes, internal and external threads, and sliding or mating parts.

Materials to be used will include ferrous and non-ferrous, which may be in sheet form, bar sections (such as square/rectangular, round, hexagonal) or part-machined components.

Your responsibilities will require you to comply with organisational policy and procedures for the cutting and shaping activities undertaken, and to report any problems with the equipment, materials or activities that you cannot personally 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 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 hand-fitting procedures to produce metal parts for plated patterns and associated equipment or models. You will understand the hand-fitting techniques used, and their application, and will know about the tools, materials and equipment used, in adequate depth to provide a sound basis for carrying out the activities, correcting faults and producing the components to the required specification.

You will understand the safety precautions required when using hand and power tools. 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 relevant specifications for the component to be produced
3. obtain the appropriate tools and equipment for the shaping operations and check they are in a safe and usable condition
4. cut and shape the materials using appropriate methods and techniques
5. check that all the required shaping operations have been completed to the required specification
6. complete relevant data and documentation
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. the health and safety requirements and safe working practices and procedures required for the hand fitting activities undertaken
2. the importance of wearing appropriate protective clothing and equipment (PPE), and of keeping the work area safe and tidy
3. the hazards associated with carrying out hand fitting techniques (such as use of power tools, trailing leads or hoses, damaged or badly maintained tools and equipment, using files with damaged or poor fitting handles), and how they can be minimised
4. the procedure for obtaining the required drawings, job instructions and other related specifications
5. how to use and extract information from engineering drawings and related specifications (to include symbols and conventions to appropriate BS or ISO standards in relation to work undertaken)
6. how to interpret first and third angle drawings, imperial and metric systems of measurement, workpiece reference points and system of tolerancing
7. the cutting and shaping methods to be used, and the sequence in which the operations will need to be carried out
8. how the properties of ferrous and non-ferrous metals affect the cutting, forming and shaping processes and the use of various tools (such as cutting speeds, angles)
9. how to file flat, square and curved surfaces, and how to achieve a smooth surface finish
10. how to cut external threads using hand dies, and the method of fixing and adjusting the dies to give the correct thread fit
11. how to determine the drill size for tapped holes, and the importance of using taps in the correct sequence
12. how to produce a sliding or mating fit using filing, scraping and lapping techniques
13. how to select saw blades for different materials, and how to set the saw blades for different operations (such as cutting externally, internally)
14. the types of files that are available, and the cut of files for different applications
15. how to prepare the components for the filing operations (such as cleaning, de-

burring, marking out)

16. the use of vice-jaw plates to protect the workpiece from damage
17. the types and application of portable power tools that can be used for the hand-fitting operations
18. the importance of ensuring that file handles are secure and free from embedded foreign bodies or splits
19. how to check that portable power tools and extension cables are free from damage and are in a safe, tested and usable condition
20. how to set and adjust tools, such as squares, protractors and verniers
21. the importance of using tools only for the purpose intended; the care that is required when using the equipment and tools; the proper way of storing tools and equipment between operations
22. the need for clear and dimensionally-accurate marking out to specification and drawing requirements
23. the company procedures for controlling documents and information
24. the problems that can occur with the cutting and shaping operations, and how can these be overcome
25. the extent of your own responsibility and whom you should report to if you have problems that you cannot resolve

Scope/range related to performance criteria

1. Carry out all of the following during the hand fitting activities:

- 1.1. obtain and use appropriate drawings, instructions, specifications and quality documentation
- 1.2. check all cables, extension leads or air supply hoses are in a tested and serviceable condition
- 1.3. check all tools and equipment are in a safe and usable condition
- 1.4. return all tools and equipment to the correct location on completion of the fitting activities
- 1.5. leave the work area in a safe and tidy condition

2. Use a range of hand-fitting methods, to include seven from the following:

- 2.1. filing
- 2.2. external threads
- 2.3. drilling
- 2.4. internal threads
- 2.5. off-hand grinding
- 2.6. lapping
- 2.7. power sawing
- 2.8. hand sawing
- 2.9. scraping
- 2.10. polishing
- 2.11. chiselling
- 2.12. other specific method

3. Produce components which combine several features and cover eight from the following:

- 3.1. flat datum faces
- 3.2. drilled holes (to a depth)
- 3.3. faces which are square to each other
- 3.4. drilled holes (through)
- 3.5. faces which are parallel to each other
- 3.6. counterbores, countersinks, or spotface
- 3.7. faces at an angle to each other
- 3.8. internal threads
- 3.9. curved profiles
- 3.10. external threads
- 3.11. chamfers and radii
- 3.12. sliding or mating parts
- 3.13. reamed holes

4. Cut and shape two different types of material from the following:

- 4.1 low carbon steel
- 4.2 aluminium
- 4.3 high carbon steel
- 4.4 brass/bronze
- 4.5 stainless steel
- 4.6 plastic/synthetic

4.7 cast iron

5. Produce components to one of the following quality standards:

5.1 company

5.2 customer (contractual)

5.3 international

6. Complete the relevant data/documentation from one of the following, and pass it to the appropriate person:

6.1 job cards

6.2 production records

6.3 company specific documentation/computerised system

Behaviours

You will be able to apply the appropriate behaviours required in the workplace to meet the job profile and overall company objectives, such as:

- strong work ethic
- positive attitude
- team player
- dependability
- responsibility
- honesty
- integrity
- motivation
- commitment

SEMPAT315

Producing pattern, corebox or model components using hand fitting techniques



Developed by Enginuity

Version Number 2

Date Approved 28 Feb 2018

Indicative Review Date 29 Apr 2021

Validity Current

Status Original

Originating Organisation Senta

Original URN SEMPAT15

Relevant Occupations Engineering, Engineering and Manufacturing Technologies, Functional Managers, Managers and Senior Officials

Suite Engineering Woodworking, Pattern and Model Making Suite 3

Keywords engineering, woodworking, pattern making, model making, manufacture, patterns, corebox, model, components, hand fitting, techniques
