PROMT23
Producing replacement components for maintenance activities

Overview

This standard identifies the competences you need to produce replacement components resulting from maintenance activities, in accordance with approved procedures. You will produce these components using manual machining techniques, such as milling, turning, grinding, shaping/slotting, drilling/boring, combined with hand fitting techniques. You will be expected to produce components that require you to use a range of different machines, and this will involve setting up the workholding arrangements, workpiece and machine tooling.

You will also be expected to use a range of hand tools, portable power tools, and shaping and fitting techniques, that are appropriate to the type of material and operations being performed. These activities will include such things as hand sawing, band sawing, filing, drilling, chiselling, threading, and off-hand grinding. The components produced will, typically, be such things as shafts, bushes, sleeves, distance pieces/spacers, packings, plates, studs, slides, pulleys, gear blanks, handles, levers or linkages.

Your responsibilities will require you to comply with organisational policy and procedures for the machining activities undertaken, and to report any problems with the machines, tooling, materials or activities that you cannot personally resolve, or that are outside your personal responsibilities, to the relevant people. You will be expected to work with minimal 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 replacement component manufacturing procedures and instructions. You will understand the machining and fitting processes used, and their application, and will know about the machine, tooling, ancillary equipment, materials and consumables, 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 working with the machines and their 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.

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Performance criteria

You must be able to:

P1	Work safely at all times, complying with health and safety and other relevant regulations and guidelines
P2	Follow instructions and any relevant specifications to produce the component
P3	Produce the required components using appropriate manufacturing methods and techniques
P4	Check that the finished component meets the requirements and make any necessary adjustments
P5	Deal promptly and effectively with problems within your control and report those that cannot be solved

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Knowledge and understanding

You need to know and understand:

K1	The safe working practices and procedures to be followed whilst carrying out the machining activities
K2	The safety mechanisms on the machine, and the procedure for checking that they are operating correctly
K3	How to operate all the machine controls, in both hand and power modes, and how to stop the machine in case of an emergency
K4	The importance of wearing appropriate protective clothing and equipment, and of keeping the work area clean and tidy
K5	How to obtain and interpret drawings, specifications, manufacturers' manuals and other documents needed in the manufacturing process
K6	How to take measurements and produce working sketches of parts to be made, where no drawings are available
K7	How to use filing, scraping and lapping to achieve the required surface finish (such as the various types of files/scrapers, checking that file/scraper handles are in good condition, types of lapping mediums)
K8	How to cut external threads using hand dies, and the method of fixing and adjusting the dies to give the correct thread fit
K9	How to determine the drill size for tapped holes and the importance of using the taps in the correct sequence
K10	How to produce a sliding or mating fit
K11	How to select saw blades for different materials and different operations
K12	The use of vice jaw plates to protect the workpiece from damage
K13	How to correctly use hand power tools and specialist equipment (such as electrical, pneumatic, lifting equipment)
K14	How to check that portable power tools, extension cables and air hoses are free from damage and are in a safe, usable condition
K15	The operating requirements of the machine tools and accessories being used (such as guards, workholding devices, taper turning attachments, steadies, dividing heads, specific statutory regulations)
K16	The various shapes and types of tooling that can be used (such as solid high-speed tooling, brazed tip tooling, interchangeable tipped tooling)
K17	How to handle and store tools and equipment safely and correctly
K18	Factors which affect the selection of cutting feeds and speeds, and the depth of cut that can be taken (such as workpiece rigidity, machine condition, type of tooling being used, material type, finish and tolerance required)
K19	The application of cutting fluids with regard to a range of different materials and processes
K20	The techniques and implications of clamping a workpiece in a chuck/work holding device (such as safely secured for the process, not causing distortion in the finished components)

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Knowledge and Understanding	K21	How to recognise machining faults and identify when tools need re-sharpening/dressing
	K22	Types and applications of grinding wheels, methods of mounting, and why some wheels require balancing
	K23	The Abrasive Wheels Regulations and how they apply to your activities
	K24	The methods that can be used to position the workpiece in relation to the cutting tools
	K25	The effects of backlash in the machine slides, and how this can be overcome
	K26	The problems that can occur with the machining and fitting activities, and how these can be overcome
	K27	The extent of your own authority and to whom you should report if you have problems that you cannot resolve

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Scope related to performance criteria

1 Carry out all of the following during the manufacturing activities

1.1 obtain and use the correct drawing, sketch or sample/damaged component to be replaced
1.2 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
1.3 check that machines used are in a safe and usable condition
1.4 check that cutting tools and equipment are in a serviceable condition
1.5 ensure that workpieces are held securely without distortion
1.6 apply safe and appropriate manufacturing techniques at all times
1.7 use correctly adjusted machine guards and safety devices

2 Produce replacement components using a range of hand fitting methods, to include five from the following:

2.1 hand sawing
2.2 drilling
2.3 off-hand grinding
2.4 lapping
2.5 band/power sawing
2.6 chiselling
2.7 scraping
2.8 filing
2.9 threading external
2.10 threading internal

3 Produce replacement components using two of the following machining processes

3.1 turning
3.2 drilling milling
3.3 spark/wire erosion
3.4 grinding
3.5 shaping or slotting

4 Produce replacement components which cover five of the following features

4.1 external diameters
4.2 internal diameters
4.3 flat faces
4.4 parallel faces
4.5 steps/shoulders
4.6 faces that are square to each other
4.7 angular/tapered surfaces

Scope related to performance criteria

4.8	threads
4.9	circular/curved/radial profiles
4.10	slots/recesses
4.11	drilled holes
4.12	bored holes
4.13	reamed holes
4.14	concave or convex form
4.15	special forms
5	**Produce components which comply with all of the following quality and accuracy standards**
5.1	dimensional tolerances are to specification/replacement component requirements
5.2	the surface finish complies to replacement component requirements
5.3	components are free from false tool cuts, burrs and sharp edges
5.4	components are fit for purpose
6	**Produce replacement components from two different types of material from**
6.1	low carbon steel
6.2	high carbon steel
6.3	stainless steel
6.4	cast iron
6.5	aluminium
6.6	brass
6.7	bronze
6.8	plastic/synthetic
6.9	composite
6.10	special steels or alloys

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Developed by	Proskills
Version number	1
Date approved	June 2009
Indicative review date	June 2013
Validity	Current
Status	Imported
Originating organisation	SEMTA
Original URN	EM8
Relevant occupations	Coal Mining Operatives; Managers in Mining; Quarry workers and related operatives
Suite	Mines Technical Operations
Key words	mines; technicians; technical; operations; mining; electrical; engineering; equipment; mechanical; maintenance