

## National Unit Specification: general information

<b>UNIT</b>	Bench Skills – Metal (Intermediate 2)
<b>NUMBER</b>	D178 11
<b>COURSE</b>	Engineering Craft Skills (Intermediate 2)

### SUMMARY

This unit aims at developing the candidates' abilities in reading working drawings and producing products using metalworking tools.

### OUTCOMES

- 1 Use marking-out tools and equipment to mark out components.
- 2 Demonstrate knowledge of common bench tools and equipment.
- 3 Use a range of metal-working hand tools and equipment.
- 4 Manufacture artefacts from working drawings.

### RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates would normally be expected to have attained some previous experience of Craft Skills. This may be evidenced by:

- Standard Grade Craft and Design
- Engineering Craft Skills at Intermediate 1 level

### CREDIT VALUE

1 credit at Intermediate 2.

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### Administrative Information

<b>Superclass:</b>	XF
<b>Publication date:</b>	December 1999
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<b>Version:</b>	03

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## **National Unit Specification: general information (cont)**

**UNIT**      Bench Skills – Metal (Intermediate 2)

### **CORE SKILLS**

This unit gives automatic certification of the following:

<b>Complete core skills for the unit</b>	None
<b>Core skills components for the unit</b>	Planning and Organising      Int 1

Additional information about core skills is published in *Automatic Certification of Core Skills in National Qualifications* (SQA, 1999).

## **National Unit Specification: statement of standards**

### **UNIT        Bench Skills – Metal (Intermediate 2)**

Acceptable performance in this unit will be the satisfactory achievement of the standards set out in this part of the unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to the Scottish Qualifications Authority.

#### **OUTCOME 1**

Use marking-out tools and equipment to mark out components.

##### **Performance criteria**

- (a) Datums are located correctly.
- (b) Workpiece is marked out correctly.
- (c) Functional dimensions are marked out correctly within prescribed limits of accuracy.

##### **Note on range for the outcome**

Equipment: scribe, rule, combination set, square, dividers, oddleg callipers, centre punch.

##### **Evidence requirements**

Performance and observed evidence that the candidate can use tools and equipment to mark out workpieces to meet the performance criteria. Evidence should show a minimum of five functional sizes, with tolerances of  $\pm 0.5$  mm on three linear sizes.

#### **OUTCOME 2**

Demonstrate knowledge of common bench tools and equipment.

##### **Performance criterion**

- (a) Identification of common bench tools and equipment is correct.

##### **Evidence requirements**

Written and/or oral evidence to demonstrate that the candidate can correctly identify at least 17 items from a selection of bench tools and equipment.

#### **OUTCOME 3**

Use a range of metal-working hand tools and equipment.

##### **Performance criteria**

- (a) Common bench tools and equipment are selected correctly.
- (b) Hand tools and equipment are used correctly.

##### **Evidence requirements**

Performance evidence that the candidate can select and use six fitting tools, three sheet-metal tools and three measuring tools.

## **National Unit Specification: statement of standards (cont)**

### **UNIT**      Bench Skills – Metal (Intermediate 2)

#### **OUTCOME 4**

Manufacture artefacts from working drawings.

##### **Performance criteria**

- (a) Artefacts are produced in accordance with given working drawings.
- (b) Functional dimensions are within prescribed limits.
- (c) The quality of the finish complies with stated standards.
- (d) All safety practices and procedures are observed correctly in the use of tools and in the manufacture of the artefacts.

##### **Note on range for the outcome**

Artefacts: one artefact from sheet-metal, one artefact using fitting skills.

##### **Evidence requirements**

Performance evidence that the candidate can manufacture an artefact to meet the PCs (a), (b) and (c).  
Observed adherence to safe working practices for PC (d).

The artefact should show evidence of three functional sizes within tolerances of  $\pm 0.5$  mm for two linear dimensions in fitting work, and  $\pm 1$  mm for sheet-metal work and  $\pm 2$  mm for bending.

## **National Unit Specification: support notes**

### **UNIT        Bench Skills – Metal (Intermediate 2)**

This part of the unit specification is offered as guidance. The support notes are not mandatory.

While the time allocated to this unit is at the discretion of the centre, the notional design length is 40 hours.

This unit develops knowledge and skills in reading and interpreting working drawings, hand-fitting skills and some basic sheet-metalworking.

Candidates attempting this unit will mainly be in post-16 education, although it may also be undertaken by some adult returners and perhaps some candidates in the 14 to 16 curriculum.

Candidates require little prior experience but will be expected to produce good practical work. The artefacts produced should have a personal appeal to the client group, but must provide challenge and stimulation.

Apart from developing basic engineering hand skills, this unit should emphasise the need for safe working practices and a disciplined approach to achieving quality work. As part of a course in the post-16 curriculum, the candidates should be required to act and perform as adults and, accordingly, the tasks set should be challenging to the candidates at the level at which they are working. As the course develops, the candidates will be required to operate machinery and equipment to a code of practice, with a degree of independence, and it is essential that ground rules for acceptable standards are set and applied throughout this unit.

### **GUIDANCE ON CONTENT AND CONTEXT FOR THIS UNIT**

Content:

- engineering drawings: orthographic, pictorial, assembly drawings
- drawings should include features such as diameters, machining symbols, linear dimensions, tolerances, fold lines, threads, datums, chamfers and countersinks, sequence diagrams
- graphic representations: tolerances, machining symbols
- common bench tools: fitting tools, sheet-metal tools, measuring tools
- fitting tools to include hammers, chisels, files, saws, taps and dies, and riveting set
- sheet-metal tools to include folding bars, mallets, hammers, tin snips, pop riveter, spot welder
- measuring tools to include rule, square and calipers, vernier calipers (non-digital)

This unit is practical in nature and requires the candidate to develop skills in:

- reading and interpreting workshop drawings
- using marking-out tools to mark out one sheet-metal and one fitting artefact
- using a range of tools to manufacture one sheet-metal artefact and one fitting-type artefact
- adhering to safe working practices at all times

## **National Unit Specification: support notes (cont)**

### **UNIT        Bench Skills – Metal (Intermediate 2)**

#### **GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT**

##### ***Reading and interpreting workshop drawings***

Candidates should have practice at reading and interpreting drawings containing the required range of features. It would assist candidates at this level if orthographic and pictorial views were provided together. Candidates should be aware of the importance of data and references for BS PP7308 should be provided for candidates to use as required. Candidates should be introduced to more sophisticated symbols, such as machining and tolerance symbols, and should be shown how to access information on them for future reference.

##### ***Using marking-out tools***

The marking-out of a model sports-pitch could serve to introduce datums in a familiar context. On metal the datums would first be established by filing two adjacent edges straight and at 90°, and using basic marking-off equipment – rule, square, oddlegs, scriber, centre punch, and dividers – to achieve the required accuracy.

##### ***Using a range of tools to manufacture one sheet-metal artefact and one fitting-type artefact***

Depending on the experience of the candidates some practice work will normally be carried-out. This may take the form of a cardboard mock-up or the manufacture of an introductory artefact. This will help the candidates appreciate the finer points and problems involved in manufacturing in sheet-metal. By doing this, candidates should develop the necessary personal experience to manufacture the unit artefact.

At this stage it will be necessary to amply cover all stages by demonstration and constantly supervise activities. Safety in general, and that specific to the unit, must be stressed and firmly enforced.

Emphasis should be given to the desire for accuracy and quality rather than speed in manufacturing the fitting item.

The type of artefact produced might require the candidates to use equipment and processes from other units in the course, and should be sufficiently complex to stretch the more able candidates in preparation for the final assessment project.

Drilling, although generally a machine process, would most likely be covered at this time. Accuracy would be determined by rule, in conjunction with vernier callipers if necessary, but there is no reason why devices such as micrometers cannot be used at this time. Assembly/joining methods should be covered, as should finishing with no major flaws, although there is scope here for additional support.

##### ***Adhering to safe working practices at all times***

Safe working practices will be demonstrated and highlighted by the teacher/lecturer throughout the course, but the opportunity should be taken here to ensure that the candidates are aware that their approach to this topic is being monitored and will continue to be monitored throughout the course.

Care of tools and recognition of the dangers of tool defects with regard to quality of work and possible hazard will be a recurrent theme in the course, and the topic should be broached in this unit.

## **National Unit Specification: support notes (cont)**

### **UNIT        Bench Skills – Metal (Intermediate 2)**

#### **GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT**

Whenever possible, the dynamic nature of this course should not be hindered by overburdening assessment of the candidate.

The candidate should be aware that certain performances are being monitored constantly and recorded on an observation checklist, and that finished artefacts will be tested against the stated criteria for accuracy and quality. Lengthy written tests are not required for tool, process or equipment recognition and use. Short-answer tests that are mainly of a visual nature will be provided. Another technique would be to display the tools and equipment, and ask the candidates to write or state their names and uses.

#### ***Approaches to generating evidence***

Assessment evidence for this unit should be able to be drawn from the manufacture of two artefacts – one sheet-metal and one fitting artefact. In situations where candidates fail to achieve the required standard of performance in one area, this weakness can be targeted in the next part of the course when the next artefact is manufactured.

In situations where candidates fail to achieve the required standard of performance in more than one area, it may be necessary to provide tasks aimed specifically at the areas to be reassessed.

Some candidates may require additional support and help to ensure success in the manufacturing process, but candidates must also be aware that the overall course assessment takes into account the amount of practical assistance given by the teacher/lecturer, and that ultimately a degree of independence is expected from the candidate.

#### **SPECIAL NEEDS**

This unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering alternative outcomes for units. For information on these, please refer to the SQA document *Guidance on Special Assessment and Certification Arrangements for Candidates with Special Needs/Candidates whose First Language is not English* (SQA, 1998).