

# Unit 1: Undertake Workshop Practice for Blacksmithing and Metalworking

**Unit reference number:** D/601/9782

**QCF Level 3:** BTEC National

**Credit value:** 10

**Guided learning hours:** 60

## ● Aim and purpose

This unit aims to introduce learners to the skills and knowledge associated with workshop practice for blacksmithing and metalworking and how these can be applied in practice. The unit is designed for learners in centre-based settings looking to progress into the sector or on to further or higher education.

## ● Unit introduction

Blacksmiths produce forged items which are often joined together to create a fabrication of forged work. The process may appear to be simple and elementary but it actually involves a range of diverse activities. As an introduction to blacksmithing and metalworking, this unit will cover the knowledge, skills and understanding that underpin the fundamental practice in the forge workshop.

Learners will be introduced to a wide range of tools and materials associated with fitting workshops and the variables in identification, selection, setting up and use. These will be demonstrated and practised in the forge workshop, giving learners confidence and skills in this diverse range of activities.

Learning outcome 1 looks at health and safety. It covers personal protective equipment (PPE) and clothing and the implications of legislation such as Control of Substance Hazardous to Health (COSHH) Regulations 2002 and Provision and Use of Work Equipment Regulations (PUWER) 1998.

Learning outcomes 2 and 3 address a wide range of tools and materials commonly found in a blacksmith's workshop, enabling learners to make rational selections and to use them correctly.

Learning outcome 4 looks at maintenance and storage requirements of tools and materials.

## ● Learning outcomes

**On completion of this unit a learner should:**

- 1 Understand health and safety related to the forge workshop
- 2 Understand the range and use of tools and materials commonly found in the forge workshop
- 3 Be able to use tools and materials commonly found in the forge workshop
- 4 Be able to maintain physical resources in a forge workshop.

# Unit content

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## 1 Understand health and safety related to the forge workshop

*Health and safety:* types of hazards, risks, accidents and injuries associated with the forge workshop; consequences of workplace accidents to the individual, business and national economy; risk assessment; safe working practices and policies; first aid facilities; relevant, current legislation eg Health and Safety at Work Act 1974, Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) 1995, Control of Substances Hazardous to Health Regulations (COSHH) 2002, Provision and Use of Work Equipment Regulations (PUWER) 1998; use of PPE

## 2 Understand the range and use of tools and materials commonly found in the forge workshop

*Tools and materials:* hand tools (hammers, hand hacksaws, spanners, wrenches, measuring devices, screwdrivers, scribes, drills, grinders, polishers, cutters); cutting tools (oxy-acetylene, guillotine, cropper, power hacksaws, band saws, nibblers); fasteners (adhesives, nuts, bolts, washers, rivets, screws, studs, circlip); finishes (paints, coatings, heat treatment); non-metallic materials (nylon, plastic, rubber, glass fibre, wood); metals (ferrous, brass, copper, aluminium, bronze, lead); factors affecting selection; costs

## 3 Be able to use tools and materials commonly found in the forge workshop

*Tools, equipment and materials:* factors affecting selection; costs; availability; replacement; training requirements; suitability and limitations for task or job requirements; ease of use; safe working practices; health and safety; risk assessment; application of tools, equipment and materials to satisfy specification/produce desired outcome; application of fasteners and finishes

## 4 Be able to maintain physical resources in a forge workshop

*Common maintenance or repair:* manufacturers' recommendations; routine care of tools eg cleaning, sharpening; identification and replacement of worn or damaged parts; costs of maintenance/repair

*Storage and disposal:* record keeping systems; storing tools, equipment and materials including gases; relevant, current legislation; environmental issues; costs

## Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
<b>P1</b> identify the hazards and relevant legislation for a common workshop [IE]		
<b>P2</b> produce a risk assessment, identifying hazards and controls for a selected workshop process or machinery		
<b>P3</b> demonstrate awareness of roles and responsibilities relating to safe working [TW]		
<b>P4</b> identify and suggest a typical use for selected tools and materials commonly found in the forge workshop	<b>M1</b> discuss relevant current legislation in relating to the storage and use of tools and materials in the workshop environment	<b>D1</b> evaluate the process and materials used to produce the finished component/artefact and make recommendations for improvement to meet craft standard, using craft samples to demonstrate understanding.
<b>P5</b> select tools to fulfil set task	<b>M2</b> select a process and produce a complex component or artefact that is fit for purpose with appropriate construction and finish.	
<b>P6</b> produce set component/artefact to specification		
<b>P7</b> use joining techniques to produce a component/artefact		
<b>P8</b> apply appropriate finish to specification		

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
<p><b>P9</b> identify the maintenance and/or repair requirements for selected tools commonly used within the forge workshop</p>		
<p><b>P10</b> carry out the maintenance and/or repair requirements for selected tools commonly used within the forge workshop. [SM]</p>		

**PLTS:** This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills applicable in the pass criteria. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

<b>Key</b>	IE – independent enquirers	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

# Essential guidance for tutors

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## Delivery

Delivery of this unit will involve practical and written assessment and visits to suitable collections it will link to work experience placements. Delivery should stimulate, motivate, educate and enthuse learners.

Tutors delivering this unit have opportunities to use a wide a range of techniques. Lectures, discussions, seminar presentations, site visits, supervised fitting workshops, research using the internet and/or library resources and the use of personal and/or industrial experience are all suitable.

Work placements should be monitored regularly in order to ensure the quality of the learning experience. It would be beneficial if learners and supervisors were made aware of the requirements of this unit before any work-related activities take place so that naturally occurring evidence can be collected at the time. For example, learners may have the opportunity to repair forge workshop tools, and they should be encouraged to ask for observation records and/or witness statements to be provided as evidence. Guidance on the use of observation records and witness statements is provided on our website ([www.edexcel.com](http://www.edexcel.com)).

Whichever delivery methods are used, it is essential that tutors stress the importance of health and safety regulations and operator welfare, and the need to manage the resource using legal methods.

Health and safety issues relating to working with forging tools and equipment must be stressed and reinforced regularly. Risk assessments must be undertaken before any practical activities take place. Following the production of suitable risk assessments adequate personal protective equipment (PPE) must be provided and used.

Tutors should consider integrating the delivery, private study and assessment for this unit with other relevant units and the assessment instruments that learners are taking as part of their programme of study.

Learning outcome 1 covers health and safety. It is likely to be delivered through formal lectures, discussion, site visits, supervised forge workshop practicals and independent research. Visiting expert speakers could add to the relevance of the subject, for example, health and safety officers or forge workshop managers could talk about their work, the situations they face and the methods they use.

Learning outcomes 2 and 3 cover the identification and use of tools and materials commonly found in the forge workshop environment. Learners must be exposed to a wide range of tools, equipment and materials. They must have sufficient time and guidance to develop practical skills and the ability to compare and select the equipment and processes to be used. During the comparison and selection processes learners will be encouraged to discuss and plan their work. Visiting expert speakers could add to the relevance of the subject for learners. For example, blacksmiths could talk about their work, the situations they face and the methods they use.

Learning outcome 4 covers the maintenance and storage of physical resources in a forge workshop environment. This is likely to be delivered within the workshop but there could be directed and personal opportunities for research by using information and learning technologies, supported by some formal classroom activity. Visiting expert speakers could add to the relevance of the subject for learners. For example, blacksmiths could talk about their work, the situations they face and the methods they use.

## Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan gives **an indication of the volume of learning it would take the average learner** to achieve the learning outcomes. It is **indicative and is one way of achieving the credit value**.

Learning time should address all learning (including assessment) relevant to the learning outcomes, regardless of where, when and how the learning has taken place.

Topic and suggested assignments/activities and/assessment
Introduction and overview of the unit.
<b>Assignment 1: Safety in the Forge Workshop</b> (P1, P2, P3, P9, P10, M1) Tutor introduces the assignment. Learners identify, demonstrate awareness and explain risks and hazards found in a selected forge workshop and explain the use and suitable storage requirements for selected tools and materials. Learners identify and demonstrate awareness of the maintenance and/or repair requirements for selected tools commonly used within the forge workshop.
Tutor introduction of current regulations and legislation. Risk assessment. Safe workshop practice. Consequences of unsafe practice. The use and storage requirements for selected tools and materials within the forge workshop environment. Identify and demonstrate awareness of the maintenance and/or repair requirements for selected tools commonly used within the forge.
Learners provides evidence (either practically, orally, written or a presentation) for an identified forge workshop.
Learner research and production of workshop records.
Learner assessment/feedback.
<b>Assignment 2: Tools and Materials in the Forge Workshop</b> (P4) Tutor introduces the assignment. Learners identify and suggest a typical use for selected tools and materials commonly found in the forge workshop.
Tutor introduction of tooling, materials, fasteners and finishes used in a typical forge workshop. Learners are expected to provide evidence for a range of the items listed in the unit content (15 tools, 6 fasteners, 3 finishes, 2 non-metallic materials and 3 metallic materials) either practically, orally, written or a presentation.
Learner research and assignment preparation/writing.
Learner assessment/feedback.
<b>Assignment 3: Producing and Finishing a Component or Artefact</b> (P5, P6, P7, P8, M2, D1) Tutor introduces the assignment. Learners evaluate their work process, use selected tools and materials to meet a given specification to produce a component or artefact including finishing.
Tutor demonstrations of tools and materials to produce components or artefacts.
Learner practice and production of components/artefacts.

## Topic and suggested assignments/activities and/assessment

Learner research and production of workshop records and evaluation.

Learner assessment/feedback.

Visiting lecturer, workshop/site visit or blacksmithing event.

Unit review.

## Assessment

For P1, P2 and P3, learners must identify, demonstrate awareness and explain the risks and hazards found in a selected forge workshop. Tutors should identify the forge workshop or agree it through discussion with learners. The forge workshop may be the same as that used to provide evidence for other grading criteria. Where possible, to ensure assessment is fair, the size and complexity of the task should be the same for all learners.

P3 should be assessed directly by the tutor during practical activities. If this format is used then suitable evidence from guided activities would be observation records completed by learners and the tutor, and accompanied by appropriate work logs or other relevant learner notes. If assessed during a placement, witness statements should be provided by a suitable representative and verified by the tutor.

Evidence for P1, P2 and P3 could take the form of a pictorial presentation with notes (possibly using appropriate software or an overhead projector) or a written assignment.

For P4, learners must identify and suggest a typical use for selected tools and materials commonly found in the forge workshop. Tutors should identify the tools and materials, or agree them through discussion with learners. The tools and materials may be the same as those used to provide evidence for other grading criteria. Where possible, to ensure assessment is fair, the size and complexity of the tasks should be the same for all learners. Learners are expected to provide evidence for a range of the items listed in the unit content (15 tools, 6 fasteners, 3 finishes, 2 non-metallic materials and 3 metallic materials). Evidence could be in the form of a workshop-based verbal presentation, a written assignment or a pictorial presentation with notes.

For P5, P6, P7 and P8, learners are required to use selected tools, equipment and materials to meet a given specification to produce a component or artefact including finishing. Tutors should identify the tools, equipment and materials and the specification or agree them through discussion with learners. The tools, equipment and materials may be the same as those used to provide evidence for other grading criteria. Where possible, to ensure assessment is fair, the size and complexity of the tasks should be the same for all learners.

The specification chosen should include the use of relevant tools, equipment and materials. P5, P6, P7, P8, M2 and D1 could be assessed directly by the tutor during practical activities. If this format is used then suitable evidence from guided activities would be observation records completed by learners and the tutor, and accompanied by appropriate work logs or other relevant learner notes. If assessed during a placement, witness statements should be provided by a suitable representative and verified by the tutor.

For P9 and P10, learners must identify and carry out the maintenance and/or repair requirements for selected tools commonly used within the forge workshop. Tutors should identify the tools and equipment, or agree them through discussion with learners. The tools and equipment may be the same as those used to provide evidence for other grading criteria. Where possible, to ensure assessment is fair, the size and complexity of the tasks should be the same for all learners. Learners are expected to provide evidence for at least three hand tools and two types of cutting equipment. Evidence could be in the same form as for P3.

For M1, learners must explain the current legislation for the use and storage requirements for selected tools and materials within the forge workshop environment. Tutors should identify the tools, materials and activities or agree them through discussion with learners. The tools, materials and activities may be the same as those used to provide evidence for other grading criteria. Where possible, to ensure assessment is fair, the size and complexity of the tasks should be the same for all learners. Evidence could be in the same form as for P1, P2 and P3. Evidence should be in a format that is recognised within the industry and by the Health and Safety Executive.

For M2, learners must select suitable tools, equipment and materials to meet given objectives within the forge workshop. Tutors should identify the objectives or agree them through discussion with learners. The objectives may be the same as those used to provide evidence for other grading criteria. Where possible, to ensure assessment is fair, the size and complexity of the tasks should be the same for all learners. The chosen objectives should include the use of relevant tools and materials. Evidence could be in the same form as for P4, P5, P6, P7 and P8.

For D1, learners must evaluate the advantages and disadvantages of processes and materials for various tasks in the forge workshop environment and recommend improvements. Tutors should identify the tools and materials, or agree them through discussion with learners. The process and materials may be the same as those used to provide evidence for other grading criteria. Where possible, to ensure assessment is fair, the size and complexity of the tasks should be the same for all learners. Recommendations for improvement must be appropriate and viable. These could be identified during the making process and, where appropriate, improvements to making quality should be demonstrated within the components/artefacts produced. Evidence could be in the same form as for M1 and M2.

### Programme of suggested assignments

The following table shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Edexcel assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3, P9, P10, M1	Safety in the Forge Workshop	As a responsible person working in a blacksmith's forge you need to be aware of, and conform to, any regulations and legislation that apply to your work practices. This involves working safely and as such you should be able to prepare risk assessments and be aware of safe workshop practice.  This includes the use and storage requirements for tools and materials plus any maintenance issues.	Oral questioning. Written assignment. Presentation. Tooling examples. Visual records. Work logs or other relevant learner notes and drawings. Research.
P4	Tools and Materials in the Forge Workshop	Blacksmiths should not only recognise tools and materials but should also be aware of their properties and uses. As such you are asked to demonstrate your understanding over a range of tooling, materials, fasteners and finishes.	Oral questioning Research. Written assignment. Presentation.



Criteria covered	Assignment title	Scenario	Assessment method
P5, P6, P7, P8, M2, D1	Producing and Finishing a Component or Artefact	<p>As a working blacksmith you will be required to produce components or finished artefacts that correspond to set specifications.</p> <p>Within this craft you will have to select and combine workshop processes to produce components or artefacts that demonstrate these skills to a high standard.</p> <p>You should demonstrate the ability to select, process and evaluate your work practice as you go along, including a review of the finished pieces. Part of this process is either putting in place improvements to your work, or arriving at recommendations for improving future production.</p>	<p>Practical production of samples and components/artefact.</p> <p>Observation records completed by learners and the tutor.</p> <p>Work logs or other relevant learner notes and drawings.</p> <p>Witness statements.</p> <p>Written assignment.</p> <p>Presentation.</p>

## Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC land-based sector suite. This unit has particular links with:

Level 2	Level 3
Working with Blacksmithing Specifications and Calculations	Undertake Forging Techniques for Blacksmithing and Metalworking
Introduction to Forgework Processes	Undertake Drawing Practice for Blacksmithing and Metalworking
Introduction to Forgework Construction Techniques	Undertake Introductory Welding for Blacksmithing and Metalworking
Application of Welding Processes	Undertake Forge Practice for Blacksmithing and Metalworking
Fabrication Techniques and Sheet Metal Work	Understanding and Using Blacksmithing and Construction Skills
	Understanding and Using Blacksmithing Installation Skills
	Undertake Oxy-acetylene Welding for Blacksmithing and Metalworking
	Undertake Manual Metal Arc Welding for Blacksmithing and Metalworking
	Undertake Metal Arc Gas Shielded Welding for Blacksmithing and Metalworking
	Undertake Fabrication Drawing for Blacksmithing and Metalworking
	Understanding and Using Fabrication Skills for Blacksmithing and Metalworking
	Understanding and Using Fabrication Techniques for Blacksmithing and Metalworking

This unit also has links with Level 3 National Occupational Standards in Fabrication and Welding, and Farriery.

## Essential resources

Learners will need supervised access to a sufficiently resourced forge workshop. This should include a comprehensive range of tools, equipment and materials reflecting commonly found scenarios that learners might meet in a forge workshop environment.

Health and safety considerations and effective learning require that sufficient facilities be provided to allow for one welding station per learner. Health and safety information and support must be provided.

This unit requires vocationally specific craft knowledge and appropriately qualified tutors to deliver it.

## Employer engagement and vocational contexts

This unit focuses on introducing and developing the practical skills and underpinning knowledge associated with general workshop practice. Tutors are encouraged to promote learner/employer links by either inviting visits from supporting industries to the centre or visiting practitioners in the workplace. Examples could include metal finishers, suppliers of fixings and profile cutters.

## Indicative reading for learners

### Textbooks

Bray S – *Metalworking: Tools and Techniques* (The Crowood Press, 2003) ISBN 9781861265739

George M – *Metalworking: A Manual of Techniques 2nd Edition* (The Crowood Press, 1990)  
ISBN 9781852234973

Jeffus L – *Metal Fabrication Technology for Agriculture* (Delmar, 2003) ISBN 9781401815639

Kenyon W – *Basic Welding and Fabrication* (Longman, 1987) ISBN 9780582005365

Marlow F – *Welding Fabrication & Repair Tips: Questions and Answers* (Industrial Press Inc, 2002)  
ISBN 9780831131555

### Journals

*Artist Blacksmith*

*Forge*

*The Worshipful Company of Blacksmiths* newsletter

### Websites

[en.wikipedia.org/wiki/Metalworking](http://en.wikipedia.org/wiki/Metalworking)

[www.blacksmithscompany.org.uk](http://www.blacksmithscompany.org.uk)

[www.defra.gov.uk](http://www.defra.gov.uk)

[www.hse.gov.uk](http://www.hse.gov.uk)

[www.lantra.co.uk](http://www.lantra.co.uk)

[www.nafbae.org](http://www.nafbae.org)

Metalworking

The Worshipful Company of Blacksmiths

Department for Environment, Food and Rural Affairs

Health and Safety Executive

Lantra Sector Skills Council

National Association of Farriers, Blacksmiths and  
Agricultural Engineers

## Delivery of personal, learning and thinking skills (PLTS)

The following table identifies the PLTS opportunities that have been included within the assessment criteria of this unit:

Skill	When learners are ...
<b>Independent enquirers</b>	identifying the hazards and relevant legislation for a workshop
<b>Creative thinkers</b>	selecting processes to produce a complex component or artefact
<b>Reflective learners</b>	evaluating processes and materials used and making recommendations for improvements
<b>Team workers</b>	demonstrating awareness of roles and responsibilities relating to safe working
<b>Self-managers</b>	identifying and carrying out maintenance and/or repair requirements for selected tools commonly used within the forge workshop
<b>Effective participators</b>	discussing relevant current legislation relating to the storage and use of tools and materials in the workshop environment.