

# Unit 25: Undertake Small Scale Working for Blacksmithing and Metalworking

<b>Unit reference number:</b>	<b>Y/602/0722</b>
<b>QCF Level 3:</b>	<b>BTEC National</b>
<b>Credit value:</b>	<b>10</b>
<b>Guided learning hours:</b>	<b>60</b>

## ● Aim and purpose

This unit aims to introduce learners to the skills and knowledge for small scale working for blacksmithing and metalworking, and how these can be applied in practice. It is designed for learners in centre-based settings looking to progress into the sector or on to further/higher education.

## ● Unit introduction

The modern blacksmith is required to design and produce high quality innovative products across a range of decorative functional and artistic forgework artefacts. The professional production of small scale work is gaining in importance within the blacksmith's craft and there are many opportunities for direct or indirect marketing of these items through, for example, shops, galleries and craft fairs.

The possibilities for small batch production will be explored with, for example, specialist tool production, use of pre-cut profiles etc to facilitate efficiency and cost reduction in the production process.

In learning outcome 1, learners will develop creative ideas. The learning outcome gives learners an understanding of the scope of small scale 3D design and manufacture for blacksmithing and metalworking.

In learning outcome 2, learners will produce decorative forged samples. The range of small scale working covered could include design of domestic ware and utensils, architectural detailing, fixtures and fittings and small decorative artefacts.

Learning outcome 3 looks at recording, analysing and presenting the results of investigations and experimental work.

In learning outcome 4, learners will produce a small scale decorative forged artefact. Learners will develop skills in small scale design for blacksmithing and metalworking production by exploring the range of work possible and experimenting with appropriate materials, techniques and processes.

## ● Learning outcomes

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

- 1 Be able to develop creative ideas
- 2 Be able to produce decorative forged samples
- 3 Be able to record, analyse and present the results of investigations and experimental work
- 4 Be able to produce a small scale decorative forged artefact.

# Unit content

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## 1 Be able to develop creative ideas

*Research:* sources of visual information eg primary and secondary sources, (books, pictures, internet, actual objects) sketch book; ergonomics; breadth; range; drawing skills eg perspective, line, tone, scaling

*Design analysis:* function; form; quality; aesthetics

*Design ideas:* development of design initiatives

## 2 Be able to produce decorative forged samples

*Exploring and experimenting:* materials eg combinations of materials, metals (ferrous, non-ferrous); forging methods eg joints, surface textures; coatings eg applications and treatments; health and safety; personal protective equipment (PPE); risk assessment

## 3 Be able to record, analyse and present the results of investigations and experimental work

*Investigations and experimental work:* professional practice eg record, analyse, present results; recording methods eg drawing, annotations, word processing, photography, samples

*Working processes:* selection and use of eg media, techniques

## 4 Be able to produce a small scale decorative forged artefact

*Making processes:* forgework eg forging, forming, cutting, constructing, finishing; working to drawing; health and safety; PPE

*Small batch production:* processes eg potential of, limitations; suitability to eg replicate, scale up or down

## 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 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> carry out visual research to generate creative ideas	<b>M1</b> produce appropriate working specifications and a small scale decorative forged artefact to meet stated design objectives	<b>D1</b> evaluate the process used to produce the finished complex small scale decorative forged artefact making recommendations for improvement.
<b>P2</b> carry out analysis to generate creative ideas		
<b>P3</b> develop selected creative ideas to produce designs [CT, RL]		
<b>P4</b> produce selected forged samples exploring materials	<b>M2</b> demonstrate individuality and an innovative approach in the exploration of small-scale design.	
<b>P5</b> produce selected forged samples exploring surface texture		
<b>P6</b> produce selected samples exploring finishes [TW]		
<b>P7</b> record, analyse and present the results of selected investigations and experimental work [SM]		
<b>P8</b> use forging to produce a small scale decorative forged artefact to given specifications		
<b>P9</b> use joining techniques to produce a small scale decorative forged artefact to given specifications. [EP]		

**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.

Key	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 assessments, written assessment, visits to suitable collections and will have links to industrial experience placements.

Tutors delivering this unit have opportunities to use as wide a range of techniques as possible. Lectures, discussions, seminar presentations, heritage garden visits, internet and/or library based research and the use of personal and/or industrial experience would all be suitable. Delivery should stimulate, motivate, educate and enthuse learners.

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 prior to any work-related activities so that naturally occurring evidence can be collected at the time. For example, learners may have the opportunity to produce forged samples, and they should be encouraged to ask for observation records and/or witness statements to be provided as evidence of this. Guidance on the use of observation records and witness statements is provided on the Edexcel website.

Visiting expert speakers could add to the relevance of the subject for learners. For example, forge workers could talk about their work, the situations they face and the methods they use.

Whichever delivery methods are used, it is essential that tutors stress the importance of sound environment management and the need to manage the resource using legal methods.

Health and safety issues relating to working in the forge environment must be stressed and regularly reinforced, and risk assessments must be undertaken prior to practical activities. Adequate PPE must be provided and used following the production of suitable risk assessments.

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

For learning outcome 1, learners will develop creative ideas. Learners will need to use a variety of recording methods (eg drawing, annotations, word processing, photography and/or video) suitable for the scale of their work. Delivery is likely to be in the form of lectures, practical workshop sessions, site visits and independent learner research.

In learning outcome 2, learners will produce decorative forged samples. Differing sections and sizes of metals should be used to produce the samples for learners to gain a broad experience of the elements. Delivery is likely to be in the form of lectures, demonstration, supervised workshop sessions and independent learner research.

Learning outcome 3 looks at recording, analysing and presenting the results of investigations and experimental work. Learners will need to use the results of their investigations to help develop ideas for small scale outcomes. This will involve identifying sources of information and selecting relevant topics for research, originating ideas from a range of information and stimuli and developing them to meet specified intentions. Learners will need to be taught how to record, analyse, modify, adapt and refine ideas for 3D outcomes. When reviewing, learners will need to analyse their work in terms of the successes and/or failures of: working processes; selection and use of media, techniques; function, form, quality and aesthetics. Delivery is likely to be in the form of lectures, practical workshop sessions, site visits and independent learner research.

In learning outcome 4, learners will produce a small scale decorative forged artefact. Learners will undertake a number of practical exercises in the forge and studio environment. When making modifications learners will need to refine and clarify their intentions and working practices. Learners will need to use their experimental results, own views and feedback from others to inform their work. They will need to investigate the potential

and limitations of technology and making processes for small-batch production of small scale outcomes. Delivery is likely to be in the form of lectures, demonstration, supervised workshop sessions and independent learner research.

## 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: Small Scale Working</b> (P1, P2, P3, M1, D1)
Tutor introduces the assignment brief.
Research to assess the requirements of a design for small scale working.
Learner research of design considerations.
Learner assessment/feedback.
<b>Assignment 2: Practical Small Scale Working</b> (P4, P5, P6, P7, P8, P9, M2)
Tutor introduces the assignment brief.
Production methods for forged samples/artefacts.
Learners review and evaluate small scale artefact process and make recommendations for improvement.
Learner assessment/feedback.
Guest speaker, workshop/site visits.
Unit review.

## Assessment

For P1, P2 and P3, learners must develop creative ideas from their investigations. They should identify the creative ideas and agree them through discussion with the tutor. Where possible, to ensure fairness of assessment, the size and complexity of the tasks should be the same for all learners. Evidence could take the form of a pictorial presentation with notes (possibly using appropriate software or an overhead projector), an annotated poster or a project.

For P4, P5 and P6, learners must produce decorative forged samples. Tutors should identify the samples or agree them through discussion with learners. These criteria could be assessed through the presentation of a number of pieces and presentations that show competence in the range of techniques. Learners could be assessed on a continuous basis by producing project work, using direct observation and questioning the design process. Results of experiments and records of exploration should be carefully collated and could be presented within a portfolio learners have arranged to show the range of work covered and the skills acquired.

For P7, learners must record, analyse and present the results of selected investigations and experimental work. Tutors should identify the investigations and experimental work or agree them through discussion with learners. These are likely to be based on the work completed for P3, P4, P5 and P6. Where possible,

to ensure fairness of assessment, the size and complexity of the tasks should be the same for all learners. Evidence could be in a similar format as that suggested for P1.

For P8 and P9, learners must use techniques to produce a small scale decorative forged artefact. This 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 worklogs 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 M1, learners must produce selected decorative forged samples to meet given design objectives. Tutors should identify the decorative forged samples and objectives or agree them through discussion with learners. Objectives could be based on normal factors that can be found in industry, eg design criteria, measurements, materials, finish tolerances and any relevant standards. Evidence could be in a similar format as that suggested for P2.

For M2, learners must demonstrate individuality and an innovative approach in the exploration of small scale design. This is likely to be based on the work completed for P4, P5 and P6. Where possible, to ensure fairness of assessment, the size and complexity of the tasks should be the same for all learners. Evidence could be in a similar format as that suggested for P3.

For D1, learners must evaluate the small scale design process used and make appropriate recommendations for improvement. This must include reference to meeting craft standard and the use of craft samples to demonstrate understanding where appropriate. Evidence could be in a similar format as that suggested for P3.

### 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, M1, D1	Small Scale Working	You are working as a self-employed designer and have been contracted to produce small scale artefacts. You must research and create ideas for small scale artefacts.	Assignment. Project.
P4, P5, P6, P7, P8, P9, M2	Practical Small Scale Working	You need to plan, undertake and review the small scale artefact project.	Practical design. Observation evidence. Work logs or other relevant learner notes and drawings.

### 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
Building an Art and Design Portfolio	Undertake Small Scale Design for Blacksmithing and Metalworking

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

## Essential resources

Learners must have access to a sufficiently diverse range of materials and stock sizes/sections to explore this unit fully, eg mild steel, tool steels. Consideration should also be given to other materials such as alloys, both ferrous and non-ferrous.

Learners will need access to sufficient library and information technology facilities to enable research into techniques, materials, equipment, existing work examples and a range of visual and technical resources, including photographic facilities.

Workshops and classrooms appropriate to learners' specialist pathways will be needed, including a finishing area and storage space for work in progress. They should offer a comprehensive range of blacksmithing and forge tools, including solid fuel forge hearths, gas furnaces, anvils, leg vices, fly presses, mandrels, power hammers supported by a range of tongs, hammers, swages, fullers, setting blocks and other ancillary equipment.

Health and safety regulated require sufficient facilities to be provided to allow for one forging station per learner. Health and safety information and support should be provided.

Tutors delivering this unit should have vocationally specific craft knowledge.

## Indicative reading for learners

### Textbooks

Andrews J – *New Edge of the Anvil: A Resource Book for the Blacksmith* (Skipjack Press, 1994)  
ISBN 9781879535091

Bealer A – *The Art of Blacksmithing* (Castle, 1996) ISBN 9780785803959

Blandford P – *Practical Handbook of Blacksmithing and Metal Work* (Bantam Doubleday Dell Publishing Group, 1998) ISBN 9780318148915

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

Heskett J – *Industrial Design* (Thames & Hudson, 1980) ISBN 9780500201817

Huygen F – *British Design: Image and Identity* (Thames & Hudson, 1989)  
ISBN 9780500275580

McDaniel R – *Blacksmithing Primer: A Course in Basic and Intermediate Blacksmithing* (Dragonfly Enterprises, 2004) ISBN 9780966258912

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

Meilach D – *Architectural Ironwork* (Schiffer Publishing, 2001) ISBN 9780764313240

Meilach D – *The Contemporary Blacksmith* (Schiffer Publishing, 2000)  
ISBN 9780764311062

Parkinson P – *The Artist Blacksmith: Design and Techniques* (The Crowood Press, 2001)  
ISBN 9781861264282

Powell D – *Presentation Techniques* (Little, Brown & Company, 1990)  
ISBN 9780316912433

Rural Development Commission – *The Blacksmith's Craft 2nd Edition* (Countryside Agency, 1990)  
ISBN 9781869964146

Rural Development Commission – *Wrought Ironwork: A Manual of Instruction for Craftsmen* (Rural Industries Bureau, 1957) ASIN B0000EEYT5

### **Journals**

*Artist Blacksmith*

*The Artists newsletter*

*Crafts*

*Creative Review*

*Design*

*Design Week*

*Eco Design*

*Fine Scale Modeller*

*Forge*

*Modelmaker*

### **Websites**

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

The Artist-Blacksmith's Association of North America

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

British Artist Blacksmiths Association

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

The Worshipful Company of Blacksmiths

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

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>Creative thinkers</b>	developing selected creative ideas to produce designs
<b>Reflective learners</b>	carrying out visual research and analysis to generate creative ideas
<b>Team workers</b>	producing selected samples exploring finishes
<b>Self-managers</b>	recording, analysing and presenting the results of selected investigations and experimental work
<b>Effective participators</b>	using joining techniques to produce a small scale decorative forged artefact to given specifications.

Although PLTS opportunities are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are ...
<b>Independent enquirers</b>	evaluating the process used to produce the finished complex small scale decorative forged artefact.