

Unit 27: Undertake Large Scale Working for Blacksmithing and Metalworking

Unit reference number: H/602/0724

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 for large 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

This unit is one of two designed to give learners an understanding of the scope of large scale 3D design and manufacture for blacksmithing and metalworking.

The professional production of large scale work especially to commission is a core part of the blacksmith's craft and there are many opportunities for developing this type of work in areas such as restoration, reproduction and contemporary design.

In learning outcome 1, learners will explore the use of ironwork in the historical perspective in areas of study such as architecture, architectural ironwork, public artworks and large scale domestic ironwork. Learners will gain an awareness of future career possibilities.

In learning outcome 2, learners will develop skills in large scale design for blacksmithing and metalworking production, by exploring the range of work possible and experimenting with appropriate materials, techniques and processes. The modern blacksmith is required to design and produce high quality innovative products across a range of decorative functional and artistic forgework artefacts.

Learning outcome 3 explores the possibilities for improving efficiency and cost reduction in the production process, for example by the use of specialist tool production, pre-cut profiles, efficient record keeping etc.

In learning outcome 4, learners will produce a large scale decorative forged artefact. This could include design and making of, for example, gates, railings, sculpture, garden/public space ironwork, exterior/interior furniture etc.

● Learning outcomes

On completion of this unit a learner should:

- 1 Know the history of ironwork
- 2 Be able to explore and develop large scale creative ideas
- 3 Be able to record information, analyse and present the results
- 4 Be able to produce a large scale decorative forged artefact.

Unit content

1 Know the history of ironwork

Research: ironwork employment eg architecture, public artwork, large scale domestic ironwork; primary and secondary sources of visual information eg books, pictures, internet, actual objects; ethnic influences eg European, Asian, worldwide; styles/movements eg Gothic, Renaissance, art nouveau, arts and crafts; makers eg historical, contemporary; career opportunities

2 Be able to explore and develop large-scale creative ideas

Design analysis: function; form; quality; aesthetics

Design ideas: development of design initiatives; production of working specifications eg working drawings, estimations, computer aided design; drawing skills eg perspective, line, tone, scaling; learning about construction and decoration techniques; ergonomics; range eg architectural, external, domestic, public art

3 Be able to record information, analyse and present the results

Recording information: using drawing eg freehand studies, conventional orthographic drawings; time sheets; production routes; materials eg cutting list, forging estimations

Planning: how the design will be realised eg construction, installation; information technology eg computer aided design, spreadsheets, word processing

Evaluation: review and analysis of recorded information

4 Be able to produce a large scale decorative forged artefact

Making processes: artefacts eg gates, railings, sculpture, garden/public space ironwork, exterior/interior furniture; forgework eg forging, forming, cutting, constructing, finishing; working to drawing/specification; health and safety; personal protective equipment (PPE); risk assessment

Efficient production: specialist tooling; 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 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:
P1 describe a given type or period of large scale forged ironwork [IE]	M1 produce a large scale decorative forged artefact with agreed finish and working specifications and discuss the opportunities for efficient production	D1 evaluate the process used to produce the finished complex large scale decorative forged artefact making recommendations for improvement.
P2 carry out visual research to generate creative ideas for large scale objectives		
P3 carry out analysis to generate creative ideas for large scale objectives		
P4 develop selected creative ideas to produce designs for large scale objectives [CT, RL]		
P5 record information, analyse and present the results of selected investigations and experimental work	M2 demonstrate individuality and an innovative approach in the exploration of large scale design, creating a portfolio of well-organised design ideas.	
P6 produce accurate workshop specifications for a large scale decorative forged artefact		
P7 use forging to produce a large scale decorative forged artefact to given specifications		
P8 use joining techniques to produce a large scale decorative forged artefact to given specifications		
P9 use finishing techniques on a large scale decorative forged artefact to given specifications. [TW, SM, 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

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, site 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 create large scale designs, 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, professional blacksmiths 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 approved methods.

Health and safety issues relating to forgework 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.

Learning outcome 1 looks at the history of ironwork. This is likely to be delivered through formal lectures, discussion, site visits and supervised practical sessions and independent learner research.

In learning outcome 2, learners will develop large scale creative ideas. This is likely to be delivered through formal lectures, discussion, site visits and supervised practical sessions and independent learner research.

In learning outcome 3, learners will need to be taught how to record, analyse, modify, adapt and refine ideas for 3D outcomes. 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. 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, and function, form, quality and aesthetics.

Learners will need to use the results of their investigations to help develop ideas for large 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.

Learning outcome 4 covers the production of a large scale decorative forged artefact. Learners will need to use their experimental results, own views and feedback from others to inform their work. Supporting knowledge should be delivered in the workshop and classroom environment via set and learner project work. Differing sections and sizes of metals should be used to produce the samples in order for learners to have as broad as possible an experience of the elements.

This unit is closely related to *Unit 26: Undertake Large Scale Design for Blacksmithing and Metalworking* and it may be taught either within a double unit integrated programme, where design development gradually

supersedes introductory sessions and exploration, or in sequence, with the whole introductory unit taught first.

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.
Assignment 1: History of Ironwork (P1)
Tutor introduces the assignment brief.
Research into the history of ironwork.
Learner research into historical influences and styles.
Learner assessment/feedback.
Assignment 2: Practical Large Scale Working (P2, P3, P4, P5, P6, P7, P8, P9, M1, M2, D1)
Tutor introduces the assignment brief.
Production methods for forged artefacts.
Learners review and evaluate large scale artefact process and make recommendations for improvement.
Student assessment/feedback.
Guest speaker, workshop/site visits.
Unit review.

Assessment

For P1, learners must describe a given type or period of large scale forged ironwork. Where possible, to ensure fairness of assessment, the size and complexity of the task 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 P2, P3 and P4, learners must explore and develop selected large scale creative ideas. Tutors should identify the large scale creative ideas or agree them through discussion with learners. These could be learner ideas developed from the work undertaken for P1. 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 P5 and P6, learners must record information, analyse and present results. This could be linked to the large scale creative ideas developed for P2. Evidence could be in a similar format to that suggested for P2.

For P7, P8 and P9, learners must produce a large 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 a large scale decorative forged artefact with agreed finish and working specifications, and discuss the opportunities for efficient production. Tutors should identify the finish and working specifications or agree them through discussion with learners. 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 large scale design, creating a portfolio of well-organised design ideas. This is likely to be based on the work completed for P2, P3 and P4. 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 P2.

For D1, learners must evaluate the process used to produce the finished complex large scale decorative forged artefact, making 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	History of Ironwork	You are working as a self-employed designer and have been asked to submit an article on the history of ironwork to a design periodical. You have to produce a brief history of ironwork in the UK.	Assignment. Project.
P4, P5, P6, P7, P8, P9, M1, M2, D1	Practical Large Scale Working	You need to plan, undertake production of, and review a large scale artefact.	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	Unit 26: Undertake Large 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

This unit requires vocationally specific craft knowledge and demands appropriately qualified tutors to deliver it. Workshops and classrooms appropriate to learners' specialist pathways will be needed, including a finishing area and storage space for work in progress. They should contain 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 considerations require that sufficient facilities be provided to allow for one forging station per learner.

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

Learners should have access to sufficient library and information technology facilities to enable research into techniques, materials, equipment and existing work examples.

Learners will need access to a range of visual and technical resources, including photographic facilities.

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, 1995) 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

Gardner J – *English Ironwork* (Dover Publications, 2003) ISBN 9780486412436

Harris J – *English Decorative Ironwork from Contemporary Source Books 1610—1836* (Tiranti, 1960)
ISBN 9780854586080

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

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

Lindsay J – *An Anatomy of English Wrought Iron, 1000-1800* (Tiranti, 1964)
ISBN 9780854589890

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

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

Parkinson P – *Forged Architectural Metalwork* (The Crowood Press, 2006)
ISBN 9781861268174

Parkinson P – *The Artist Blacksmith: Design and Techniques* (The Crowood Press, 2002)
ISBN 9781861264282

Powell D – *Presentation Techniques* (Orbis, 1985) ISBN 9780856136009

Journals

Artist Blacksmith

The Artists Newsletter

Crafts

Creative Review

Design

Design Week

Eco Design

Fine Scale Modeller

Forge

Modelmaker

Websites

www.abana.org

www.baba.org.uk

www.blacksmithscompany.org.uk

www.nafbae.org

The Artist Blacksmiths Association of North America

British Artist Blacksmiths Association

The Worshipful Company of Blacksmiths

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 ...
Independent enquirers	describing a given type or period of large scale forged ironwork
Creative thinkers	developing selected creative ideas to produce designs for large scale objectives
Reflective learners	
Team workers	using forging to produce a large scale decorative forged artefact to given specifications
Self-managers	using joining techniques to produce a large scale decorative forged artefact to given specifications
Effective participators	using finishing techniques on a large scale decorative forged artefact to given specifications.