

# Unit 26: Undertake Large Scale Design for Blacksmithing and Metalworking

**Unit reference number: D/602/0723**

**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 design 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

Much of the work undertaken by the blacksmith involves large scale one off commission work requiring interaction with the client to arrive at a finished piece. Undertaking large scale blacksmithing or metalwork requires a hybrid of technical knowledge, engineering skills, creative ingenuity and flair.

Having the confidence and technical knowledge to present and express concepts and design ideas to meet aesthetic and technical engineering challenges is demanding of any designer.

In learning outcome 1, learners will analyse a brief for a large scale design project through client interaction and purposeful research. Developing a clear understanding of the technical problems associated with large scale construction in metalwork, and the blacksmithing skills needed to meet this challenge, are all fundamental within this unit. The presentation of detailed working drawings, material lists and working schedules are all key to the successful large scale design.

Learning outcomes 2 and 3 introduce 2D and 3D large scale design methods, problem-solving and one-off production techniques to manufacture scaled models or prototypes. The construction of scaled and working prototypes and models is an important tool with which the designer can problem solve and communicate ideas.

In learning outcome 4, learners will analyse, review and evaluate working methods to realise an effective final outcome.

## ● Learning outcomes

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

- 1 Understand a large scale design project brief
- 2 Be able to develop and communicate large scale design ideas
- 3 Be able to make large scale models and prototypes
- 4 Be able to assess working methods to realise an effective design outcome.

# Unit content

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## 1 Understand a large scale design project brief

*Interpretation and analytical techniques to assess and establish an understanding of the aesthetic and functional requirements of a brief for a large scale artefact;* brief variations according to the scale and nature of the design eg site specific, client needs, preparation for exhibition; brief clarification (aesthetic requirements eg appearance, style, fashion and relationship to wider environment); functional requirements eg type, size, volume, performance, durability and serviceability; the needs of the audience/consumer eg end user, client, market and competition; any constraints eg costs, time, materials and technology

## 2 Be able to develop and communicate large scale design ideas

*Investigation, researching and recording of findings to meet a large scale design brief:* effective planning and working specifications for a large scale design project eg time management, material selection, making processes and sequences, site visits, modifications and the involvement of clients and/or users

*Design process:* identification of information sources eg ecological, environmental, planning regulations, public health and safety factors; site survey (site analysis); investigation of clients and/or users' needs eg in terms of aesthetic and functional factors, materials, techniques and processes; producing initial ideas and models eg drawings, photographs or audio-visual presentation; consulting clients and/or users; development of designs and preparation of working drawings and orthographic representations and/or illustrations; presentation of proposed solution, rationale, alternatives eg through computer aided design (CAD), accompanying drawings, models and samples

## 3 Be able to make large scale models and prototypes

*Development of skills and understanding in how to produce models and/or prototypes of an appropriate scale and precision for large scale spaces:* materials and methods selection; construction of models or prototypes to scale and of an appropriate standard for presentation; testing eg in terms of requirements of the brief, accuracy, fitness for purpose, aesthetic appeal; demonstrating the potential of design ideas; demonstrating production methods for the final commission; health and safety; personal protective equipment (PPE); risk assessment

## 4 Be able to assess working methods to realise an effective design outcome

*Ongoing review, analysis and evaluation of the progress of blacksmith and metal design work in large scale to meet set briefs:* planning and time management of construction; costs of constructing final project to required specifications; development of analytical skills and understanding; communication and presentation of design work; evaluation criteria that are appropriate to the brief eg fitness for purpose, suitability of materials, effectiveness of making process, relationship of final piece to original brief, overall quality; judgements about the aesthetic and functional qualities of the final outcome

## 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:
<p><b>P1</b> produce relevant aesthetic research for a selected large scale design project to meet given objectives</p>	<p><b>M1</b> use a range of research sources and media to develop and communicate selected design ideas effectively</p>	<p><b>D1</b> review and evaluate a selected large scale design project making appropriate recommendations for design development.</p>
<p><b>P2</b> produce relevant research for a selected large scale design project to meet the functional requirements</p>		
<p><b>P3</b> produce a brief for a selected large scale design project to meet given objectives [CT, RL]</p>		

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>P4</b> produce a range of initial concept proposals to meet a selected large scale design brief</p>	<p><b>M2</b> carry out purposeful and innovative design development to produce models and/or samples which effectively demonstrate and communicate selected functional and aesthetic criteria.</p>	
<p><b>P5</b> develop selected concept proposal(s) to final specification stage to meet a selected large scale design brief</p>		
<p><b>P6</b> produce appropriate working specifications and drawings to meet a selected large scale design brief</p>		
<p><b>P7</b> explain design ideas to meet a selected large scale design brief [TW]</p>		
<p><b>P8</b> make a model and/or samples which satisfy given functional and aesthetic criteria [SM]</p>		
<p><b>P9</b> review working methods and final design for a selected project. [EP]</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 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, supervised workshop practicals, 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 scaled models, 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 Pearson website.

Visiting expert speakers could add to the relevance of the subject for learners. For example, designers, engineers, artists and model makers 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 copyright law and the importance of independent work using approved methods, for example, sourcing material on the internet.

Health and safety issues relating to working in the workshop, welding and fabrication must be stressed and regularly reinforced, and risk assessments must be undertaken prior to practical activities and before learners visit any proposed site. 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 outcomes 1 and 2 are directly linked. These are likely to be delivered through formal lectures, discussion, client consultation, site visits, studio work and independent learner research. Learners will be aware of the methods and associated activities commonly used to complete a site analysis and client brief.

Learning outcome 3 covers the use and construction of models and prototypes to communicate ideas and potential of a proposed metal work artefact or sculpture which satisfies a client brief. Delivery techniques for learning outcome 3 should be varied and could be linked to the delivery of learning outcomes 1 and 2. It is expected that formal lectures, discussions, supervised fabrication practicals and formal presentations should form part of the delivery of this learning outcome.

Learning outcome 4 looks at evaluation and analysis methods which should be used throughout the project to produce a final outcome that exploits the potential and limitations of large scaled 3D design for further improvement. The evaluation must be linked and integral throughout learning outcomes 1, 2 and 3. Model and/or sample making is likely to play a significant part in this process but there should be some opportunity to review and evaluate scaled prototypes.

## 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 learners** 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: Large Scale Design</b> (P1, P2, P3, M1, D1)
Tutor introduces the assignment brief.
Interpretation and analytical techniques to assess the requirements of a brief for large scale designs.
Learner research of design considerations.
Learner assessment/feedback.
<b>Assignment 2: Practical Large Scale Design</b> (P4, P5, P6, P7, P8, P9, M2)
Tutor introduces the assignment brief.
Production method for models, mock-ups and samples of an appropriate scale and precision for large scale design.
Learners review and evaluate large scale design project and make recommendations for improvement.
Learner assessment/feedback.
Guest speaker, workshop/site visits.
Unit review.

## Assessment

For P1, P2 and P3, learners must provide evidence of research and a brief for a selected large scale design project to meet given objectives. Tutors should identify the design project and objectives or agree them through discussion with learners. Objectives could be based on research needed, client/tutor interaction etc. Where possible, to ensure fairness of assessment, the size and complexity of the tasks should be the same for all learners. Learners should communicate with a client or interest group (actual or simulation) and record clearly the design requirements for a large scale design in metalwork. Evidence could take the form of the production of a detailed brief with site analysis and supporting.

P4, P5, P6 and P7 require learners to develop and communicate design ideas to meet a selected large scale design brief. Tutors should identify the large scale design brief or agree it through discussion with learners. This is likely to be the brief created for P1 and/or M1. Where possible, to ensure fairness of assessment, the size and complexity of the tasks should be the same for all learners. Learners should use a range of communication media and established design processes to produce a possible solution to the large scale brief. This could take the form of concept notes of design solutions using photos, sketches, plans and illustrations. A final detailed plan would evolve from this draft work, giving technical details as required from the brief.

For P8, learners must make a model and/or prototypes which meet the criteria of a selected design brief. Tutors should identify the design brief or agree it through discussion with learners. This is likely to be the brief developed for P2 and/or M2. Where possible, to ensure fairness of assessment, the size and

complexity of the tasks should be the same for all learners. Learners could construct a model or working prototype of suitable scale which communicate the design idea(s) developed within P2 to a satisfactory standard. The assessment of the finished model or prototype could play an important part of P3 but could also 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.

P9 requires learners to review working methods and the final design for a selected project. Tutors should identify the project or agree it through discussion with learners. This is likely to be the project used for P4, P5 and P6 and/or M2. Learners should analyse and evaluate their own work throughout the design process and make improvements and recommendations for improvement. Evaluation of the final work would also be expected. Evidence for P9 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 M1, learners must use a range of research sources and media effectively to develop and communicate selected design ideas. Where possible, to ensure fairness of assessment, the size and complexity of the tasks should be the same for all learners. Evidence may be in the same format as for P1 but show original work and collating information from a range of sources which may have an impact on the final design.

For M2, learners must carry out purposeful and innovative design development and realise a final outcome that meets a selected design brief. Tutors should identify the design brief or agree it through discussion with learners. This is likely to be the brief developed for P1 and/or M1. Where possible, to ensure fairness of assessment, the size and complexity of the tasks should be the same for all learners. Learners should communicate through a range of media, including sketches, plans, illustrations and photographs, to develop a design solution. The work should be well organised and presented to a competent standard. Evidence may be in the same format as for P2.

D1 requires learners to review and evaluate a selected project to produce a final outcome and make recommendations for further improvement. The project is likely to be that developed for P4 and/or M2. Learners should critically evaluate their work, making detailed recommendations for design development, which would impact on a range of design elements such as cost, aesthetics, durability, use and appropriateness to brief requirements. Recommendations for improvement must be appropriate and viable, these could be identified during the making process. Where appropriate, improvements to making quality should be demonstrated within the samples/components/artefacts produced. The artefact and specification may be the same as those used to provide evidence for other grading criteria.

### 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 Pearson assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3, M1, D1	Large Scale Design	You are working as a self-employed designer and have been contracted to produce a large scale design for a client. You must research interpretative and analytical techniques for large scale design.	Assignment. Project.

Criteria covered	Assignment title	Scenario	Assessment method
P4, P5, P6, P7, P8, P9, M2	Practical Large Scale Design	You need to plan, undertake and review the large scale design project.	Practical design. Observation evidence. Work logs or other relevant learner notes and drawings.

## Links to other BTEC units

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

Level 2	Level 3
	Understanding Principles and Methods of Design for Blacksmithing and Metalworking
	Undertake Large Scale Working for Blacksmithing and Metalworking

## Essential resources

Learners will need access to a range of visual and technical resources. The workshop should be equipped to a good standard for working with a wide range of materials and include a separate area for model-making, a welding and forging area with appropriate extraction facilities, a clean area for drawing and preparation, a finishing area and storage space for work in progress. Appropriate facilities for the preparation and presentation of finished work should be available.

Resources for research should include a permanent collection of reference material for ongoing work, display facilities, PC (preferably with internet connection), as well as access to a good library containing a wide reference to design.

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

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit:

Skill	When learners are ...
<b>Creative thinkers</b>	producing relevant aesthetic research for a selected large scale design project to meet given objectives
<b>Reflective learners</b>	
<b>Team workers</b>	producing appropriate working specifications and drawings to meet a selected large scale design brief
<b>Self-managers</b>	making a model and/or samples which satisfy given functional and aesthetic criteria
<b>Effective participators</b>	reviewing working methods and final design for a selected project.

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>	using a range of research sources and media to develop and communicate selected design ideas effectively.