Unit 77: Design Materials and Processes

Unit code: H/600/0179

QCF Level 3: BTEC National

Credit value: 10

Guided learning hours: 60

Aim and purpose

In this unit learners will research into and experiment with materials and processes used to make artefacts in the performing arts industry. Learners will also design, construct and evaluate a functional artefact.

Unit introduction

Designing sets, costumes and props is an important and creative element in the performing arts sector. In this unit learners will have the opportunity to carry out research into and experiment with a variety of materials and processes that are used in the performing arts industry.

This unit enables learners to explore, experiment with and construct a finished artefact using a variety of materials. Learners will be able to develop and utilise their skills in any performing arts discipline including set design/construction, costume design/construction, mask design/construction and makeup. The advantage is that with experience in this unit learners will be able to gain an insight into how materials can be used in a creative context. Learners will be able to use this experience when applying for careers within the performing arts.

Modern manufacturing processes allow learners to work with a variety of materials in a stimulating, exciting unit.

Learning outcomes

On completion of this unit a learner should:

1 Know how to research materials and techniques used to construct artefacts

2 Be able to produce artefact designs

3 Be able to realise an artefact

4 Understand the suitability of the finished artefact.

Unit content

1 Know how to research materials and techniques used to construct artefacts

Materials: working characteristics and physical properties of natural and synthetic fabrics, card, paper, glass, Perspex, aluminium foils, wire, metal sheeting, modelling mesh, wood, clay, plasticine, plaster, expanded polystyrene, Styrofoam, fibreglass, mod roc, plastic, latex

Techniques: eg dyeing, printing, collage, montage, carving, sculpting, modelling, gluing, riveting, tying, soldering, welding, carpentry, scrimming

2 Be able to produce artefact designs

Concepts: eg analysis of texts, artistic requirements, aesthetic considerations, practical considerations, budget, skills audit, initial drawings and final designs, renderings, notes, sketches, storyboards, fabric swatches, paint finishes, patterns, illustrations, collage, photography, print and digital media

Construction details: eg plans, layouts, ground plans, side elevations, construction drawings, perspective drawings, diagrams, instructional drawings, scale models, paint samples, fabric samples, budget

3 Be able to realise an artefact

Selecting specialist materials, techniques and processes: eg tools, equipment, experimental materials testing, sketchbook work, design developments, drawings, models, using specialist materials, techniques and processes to produce finished pieces

2D processes: eg printing, tapestry, weaving, embroidery, painting, dyeing, stencilling, batik, knitting, screen printing, photography

3D processes: eg sculpting, carving, modelling, mould making, casting, armature construction, scale model making, plastering, pattern drafting, machine stitching, hand stitching, tailoring, breaking down, millinery, wig making, prosthetics

4 Understand the suitability of the finished artefact

Suitability of design: eg durability, ease of use, construction timescale, materials, finish, cost, repeatability

Accuracy of finished artefact to original design: eg dimensions, cost, materials, colour, finish, detail

Suitability of finished artefact to production requirements: eg reaction from production team, cast, usage issues, safety issues, aesthetic qualities, fitness for purpose, requirement for alternative materials or finishes, relevance to the artistic concept

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 identify materials and techniques used to construct artefacts in the performing arts industry [IE]	**M1** analyse materials and techniques used to construct artefacts in the performing arts industry	**D1** evaluate materials and techniques used to construct artefacts in the performing arts industry
P2 investigate and experiment with materials and techniques used to produce artefacts for the performing arts industry [IE]	**M2** carry out detailed investigation and experimentation into a variety of materials and techniques used to produce artefacts for the performing arts industry	**D2** carry out in depth investigation and experimentation into a wide variety of materials and techniques used to produce artefacts for the performing arts industry
P3 produce a simple design for an artefact that can be used in the performing arts industry together with construction details [CT]	**M3** produce a suitable design for an artefact that can be used in the performing arts industry together with appropriate construction details	**D3** produce a sophisticated design for an artefact that can be used in the performing arts industry together with fully detailed construction details
P4 produce a simple, functional artefact for the performing arts industry, for the most part following the construction details [SM, EP]	**M4** produce a functional artefact for the performing arts industry carefully following the construction details and modifying as necessary	**D4** produce a sophisticated functional artefact for the performing arts industry, meticulously following the construction details and modifying as necessary
P5 discuss the finished artefact with reference to its suitability for use in the performing arts industry. [RL]	**M5** assess the finished artefact and explain its suitability for use in the performing arts industry.	**D5** thoroughly evaluate the finished artefact and comment on its suitability for use in the performing arts industry.

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

This unit will broaden learners' knowledge and understanding of the materials, techniques and processes normally associated with the specialist field of producing artefacts for the performing arts industry. Exploration of a variety of specialist materials, techniques and processes will enable learners to consolidate their learning.

Learners will need to be advised of and adhere to all health and safety practices in the studio or workplace. Safety issues do not attract grades and should be integrated into all aspects of the delivery of this unit. Learners should observe and adopt appropriate control of substances hazardous to health (COSHH), Provision and Use of Work Equipment Regulations (PUWER) and Lifting Operations and Lifting Equipment Regulations (LOLER) guidelines.

Tutors should encourage learners to develop a versatile approach when evaluating the suitability of different materials, techniques and processes; learners should be invited to discuss and comment upon success and/or failure with regard to 'fitness for purpose' and quality of work produced.

Tutors should utilise all performing arts design options including set, lighting, sound, costume, props, puppets and make-up, encouraging learners to appreciate the potential variety of experience that this unit can generate. Learners should also be given the opportunity to follow a project through from conception to final performance.

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 demonstrates one way in planning the delivery and assessment of this unit.

Topic and suggested assignments/activities and/assessment
Introduction to unit and structure of programme.
Lectures – materials and processes used in the performing arts industry.
Lectures/discussions – designing artefacts.
Lectures/discussions – preparing construction details.
Assignment 1: Researching Materials and Processes – P1, M1, D1 • Learner carries out research into materials and techniques used in the performing arts industry. • Learner prepares presentation of findings.
Practical workshops – materials and techniques.
Practical demonstrations – materials and techniques.
Assignment 2: Investigation and Experimentation – P2, M2, D2 • Learner carries out experimentation with materials and techniques used in the performing arts industry.
Assignment 3: Designing, Constructing and Evaluating an Artefact for the Performing Arts Industry – P3, M3, D3, P4, M4, D4, P5, M5, D5 Part 1: Designing an artefact • learner designs artefact • learner outlines construction details. Part 2: Constructing an artefact • learner constructs artefact following the construction details. Part 3: Evaluating the artefact • learner evaluates the suitability in performance.
Visits to theatre and film/television workshops.
Review unit and assignments.
Individual and group feedback.

Assessment

The principal purpose of this unit is the acquisition, exploration and application of knowledge within learners' chosen specialism(s). Work generated in this context will be influenced by the technical opportunities and constraints of the specialism(s), for example artistic or production concepts. Investigation and exploration may arise from the needs of a given situation but may also be stimulated by curiosity, extending personal vocabulary or style.

Learners should expect to produce a range of work, related to the performing arts disciplines, that demonstrates their breadth of understanding when using different contextual related materials, techniques and processes.

Assessment opportunities centre on the production of designs and finished artefacts. Learners could build artefacts following their own designs or those of other learners. Group work may be appropriate for large designed items. Assessors need to consider how to attribute credit correctly in the form of grades to individual learners when they have been involved in group activities.

Due to the short-term nature of some of the finished artefacts, centres need to develop reliable and secure methods of recording evidence that can be used for later verification. Photographic and video evidence may be suitable but assessors need to ensure the evidence actually shows the processes used by learners. As an example, learners could produce a finished flat or other item of scenery. Grade levels would depend on the finish and construction used so evidence would need to show constructional details, rather than an aesthetic image that would not show how well it was actually constructed or designed.

Learning outcome 1, which relates to criteria 1 and 2, requires learners to identify materials and techniques used to construct artefacts for the performing arts industry and to investigate and experiment with materials and techniques used to construct them. Differentiation between pass, merit and distinction will be apparent by the level of understanding and inquiry shown.

At pass level, learners will give a basic description of materials and techniques used to construct products for the performing arts industry. Although unsophisticated the answer will be correct. Learners will carry out limited investigation and experimentation into materials and techniques used to produce artefacts for the performing arts industry and little attempt will be shown to assess the research findings. Learners will articulate their findings using simple terminology.

At merit level, learners will carry out thoughtful and competent research into materials and techniques used to construct artefacts for the performing arts industry and will assess their findings. Learners will carry out detailed investigation and experimentation into materials and techniques used to produce artefacts for the performing arts industry and make some attempt to analyse their results using technical terminology.

At distinction level, learners will produce thoughtful and sophisticated research into materials and techniques used to construct artefacts for the performing arts industry and critically appraise their findings. Learners will carry out in depth investigation into materials and processes used to produce artefacts for the performing arts industry. Learners will evaluate their results, articulating their conclusions fluently using appropriate technical terminology.

Learning outcome 2, which relates to grading criterion 3, requires learners to produce a design for an artefact, complete with construction details. Differentiation between pass, merit and distinction will be shown in the level of skill and creativity shown in the finished designed and the level of accuracy and appropriateness shown in the construction details.

At pass level, learners will draw on their research into materials and techniques and produce a simple design for a functional product. Although basic, the design will be clearly drawn and show the artistic intentions of learners. The construction details will give straightforward information in simple language and diagrammatic form on how to make the product. A limited amount of technical terminology will be used. Learners will expect to receive help from their tutor to achieve this criterion.

At merit level, learners will draw on their research into materials and techniques and produce a competent design for a functional product. The design will show a thoughtful development of the research material and will be produced with care. The work will very clearly show the artistic intentions of learners. The construction instructions will give detailed information using appropriate technical language and accurate diagrams on how to make the product. Learners will expect to receive some help from their tutor to achieve this criterion.

At distinction level, learners will draw on their research into materials and techniques and produce a design for a functional product that moves beyond the purely conventional. The design will show a creative and thoughtful development of the research material and will be produced with great care. The work will show in detail all the artistic intentions of the learners. The construction information will show precisely how every detail of the artefact will be made. Learners will use technical language fluently and produce sophisticated diagrams. Learners will work independently to achieve this criterion.

Learning outcome 3, which relates to grading criterion 4, requires learners to produce an artefact that is suitable for use in the performing arts industry, following the construction details provided in criterion 3. Differentiation between pass, merit and distinction will be apparent through the level of skill shown in the construction of the artefact and learners' ability to follow the construction details.

At pass level, learners will produce a basic, functional artefact that incorporates straightforward materials and undemanding construction techniques. Learners will mainly follow the construction techniques but may deviate from the proposed plan if the methods prove too difficult to follow through. The finished artefact will, for the most part, be accurate and reflect learners' design, but there may be some slight flaws in the construction process. Learners will need support using tools and equipment throughout the construction process and assistance in selecting appropriate materials and construction techniques.

At merit level, learners will produce a fairly sophisticated functional artefact that incorporates an imaginative use of materials and displays competent construction techniques. Some demanding construction techniques will be carried out during the production of the artefact. Learners will accurately follow the construction details and the artefact will reflect the design. Learners will expect to receive some support from their tutor when constructing the artefact.

At distinction level, learners will produce a sophisticated functional artefact that incorporates a highly imaginative and skilful use of materials and displays highly proficient construction techniques. Several demanding construction techniques will be incorporated into the production of the artefact. Learners will follow the construction details exactly and the artefact will wholly reflect the design. Learners will work independently seeking and finding solutions to construction issues.

Learning outcome 4, which relates to grading criterion 5, requires learners to discuss the finished artefact and its suitability for use in the performing arts industry. Differentiation between pass, merit and distinction will be apparent through the level of understanding shown by learners whilst discussing the artefact and their ability to justify the appropriateness of the artefact for use in the performing arts industry.

At pass level, the response will be basic. Learners will describe the artefact but little attempt to justify their use of materials and construction techniques will be made; learners will give a descriptive rather than an analytical response. Learners will briefly outline the suitability of the artefact for use in the performing arts industry; little attempt to assess the 'whys' and 'hows' of its appropriateness will be shown.

At merit level, the response will be thoughtful and competent. Learners will analyse the artefact and show some attempt to justify their use of materials and construction techniques. They will give examples to back up their comments. Learners will assess the suitability of the artefact in some detail and they will explain 'why' and 'how' the product is appropriate for use in the performing arts industry. The response will articulated thoughtfully using technical terminology appropriately.

At distinction level, the response will show a high level of understanding. Learners will appraise the artefact discussing the negative and positive aspects of the materials used to construct it and articulating their conclusions. They will give detailed examples to back up their findings. Learners will evaluate the suitability of the artefact for use in the performing arts industry giving reasoned judgements for their results. Learners will give a sophisticated response using technical terminology fluently.

Programme of suggested assignments

The table below shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the assessment and 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, M1, D1	Assignment 1: Materials and Techniques 1 – Research	Brief from a performing arts magazine requiring information relating to materials and techniques used to make artefacts in the performing arts industry. The information will be used to produce an article on materials and processes used in the performing arts industry, which will be published in a forthcoming issue of their magazine.	A well-annotated sketchbook/notebook or file, which shows both pictorial and written evidence of researching materials and techniques used in the performing arts industry.
P2, M2, D2	Assignment 2: Materials and Techniques 2 – Experimentation	Brief from a performing arts magazine requiring learners to produce evidence of investigation and experimentation into materials and techniques used to make artefacts in the performing arts industry, which the editors can draw on to produce an article on experimenting and investigating construction materials and techniques in a forthcoming issue of their magazine.	A well-annotated sketchbook/notebook or file, which shows evidence of investigating and experimenting with materials and techniques. Observation of learner experimentation.

Criteria covered	Assignment title	Scenario	Assessment method
P3, M3, D3, P4, M4, D4, P5, M5, D5	Assignment 3: Designing, Constructing and Evaluating an Artefact for the Performing Arts Industry Part 1: Designing an artefact complete with construction details Part 2: Constructing the artefact Part 3: Learners' evaluation of the artefact.	Brief from a company that specialises in educational books for the performing arts industry requiring learners to design, construct and evaluate a artefact that can be used in the performing arts industry. The company wants to see a design, construction details, photographs of the finished artefact and an evaluation of suitability for use in the performing arts industry. Learners' work will be produced in the new edition of 'Making Artefacts for the Performing Arts Industry – A Beginner's Guide'.	A portfolio of evidence consisting of: • artefact design • construction details • evaluation written or verbal (taped) • observation of learner work.

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

This unit forms part of the BTEC Performing and Production Arts sector suite. This unit has particular links with the following unit titles in the BTEC Performing and Production Arts suite:

Level 1	Level 2	Level 3
Exploring Design Skills for the Performing Arts	Set Construction	Design Method
	Costume Construction	Stage Design for Performance
	Mask Making	Stage Model Making
		Stage Costume Making
		Period Costume for the Stage
		Mask Making
		Puppet Construction and Operation
		Prop Making

This unit also has links with the following National Occupational Standards:

Technical Theatre

- CPD1 – Improving your skills
- CPD2b – Ensure that you and your team keep up to date with the technical and production areas of the live arts
- TP4a – Provide design information to enable drawings to be produced.

Essential resources

Learners will need access to a learning resource centre, library, internet, specialist video, film, visits to appropriate exhibitions, galleries and museums for research. For documentation of research results, access to an IT suite is required.

The unit will require a clean design space/working area and a workshop equipped with appropriate equipment for constructing props, scenery, puppets or masks. Learners will also need a costume construction space/workshop that is equipped with cutting and measuring tools, sewing machines, models, cutting tables and provision for dyeing and painting.

The unit will also require a space for storage of artefacts. It is important that the workshop space meets with current health and safety directives. Health and safety induction when working within 3D workshops and using glue and cutting equipment is necessary.

Employer engagement and vocational contexts

Learners should develop links with theatre, film and television studios that have design/construction departments. Most of the large producing theatre companies such as The Royal Shakespeare Theatre and The National Theatre offer work placements to learners – www.rsc.org.uk and www.nationaltheatre.org.uk. Designers and makers are usually willing to talk to learners about the processes involved in designing and constructing artefacts for the performing arts industry.

Both Skillset, the Sector Skills Council for the audio-visual industries and the BBC have substantial sections of their websites dedicated to careers, including job descriptions – www.skillset.org/careers and www.bbc.co.uk/design/careers.

Indicative reading for learners

Textbooks

Aldrich W – *Metric Pattern Cutting for Menswear* (Blackwell, 1996) ISBN 9781405131414

Arnold J – *Patterns of Fashion, the Cut and Construction of Clothes* (Drama Book, 2008) ISBN 9780896760837

Green D J – *Arteffects* (Watson Guptill, 1993) ISBN 9780823025299

Hill M H – *The Evolution of Fashion* (Drama Book, 1989) ISBN 9780896760998

Holman G – *Pattern Cutting Made Easy* (BT Batsford, 1997) ISBN 978071348093 1

Hunnisett J – *Period Costume for Stage and Screen* (Players Press, 1991) ISBN 9780887346101

McCann M – *Artist Beware* (Lyons, 2001) ISBN 97815857421 10

Neat D – *Model – Making: Materials and Methods* (Crowood, 2008) ISBN 9781847970176

Penny N – *The Materials of Sculpture* (Yale University Press, 1995) ISBN 9780300065817

Thorne G – *Stage Design: A Practical Guide* (Crowood Press, 1999) ISBN 9781861262578

Tilke M – *Costume Patterns and Designs* (Rizzoli, 1990) ISBN 9780302002667

Trimble E – *Designing with Texture* (Leisure Arts, 2005) ISBN 9780971491380

Waugh N – *Corsets and Crinolines* (BT Batsford, 1987) ISBN 9780713456998

Waugh N – *The Cut of Men's Clothes 1600-1900* (Faber Ltd, 1994) ISBN 9780571057146

Waugh N – *The Cut of Women's Clothes 1600-1930* (Faber Ltd, 1994) ISBN 9780571085941

Website

www.theatredesign.org.uk British Society of Theatre Designers

Delivery of personal, learning and thinking skills

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 ...
Independent enquirers	carrying out research into materials and techniques used to construct artefacts in the performing arts industry investigating and experimenting with materials and techniques used to construct artefacts in the performing arts industry
Creative thinkers	producing a design for an artefact that can be used in the performing arts industry
Reflective learners	evaluating an artefact that has been designed and made
Self-managers	organising time and resources when constructing an artefact
Effective participators	proposing practical ways forward when constructing an artefact and breaking the processes down into manageable stages.

Although PLTS 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 ...
Independent enquirers	discussing issues of concern when making an artefact with tutor or theatre professionals and seeking resolution if necessary
Creative thinkers	finding alternative techniques and new solutions when constructing an artefact adapting design ideas if necessary
Reflective learners	inviting feedback on design and construction work and dealing positively with praise, feedback and criticism reviewing progress when constructing an artefact and acting on any outcomes
Self-managers	anticipating, taking and managing risks when constructing an artefact.

Functional Skills – Level 2

Skill	When learners are ...
ICT – Use ICT systems	
Select, interact with and use ICT systems independently for a complex task to meet a variety of needs	researching materials and processes researching construction methods
ICT – Develop, present and communicate information	
Enter, develop and format information independently to suit its meaning and purpose including: • text and tables • images • numbers • records	using tables to make measurement charts producing a research portfolio producing a database of suppliers producing work schedules producing a budget
Mathematics	
Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations	taking actors' measurements drafting pattern using formulae using calculation to work out the amount of material required to construct an artefact using calculation to work out the cost of the artefact using calculation to produce plans and construction drawings of artefacts using calculation to produce outline budget
Identify the situation or problem and the mathematical methods needed to tackle it	
Select and apply a range of skills to find solutions	
Use appropriate checking procedures and evaluate their effectiveness at each stage	
Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations	
Draw conclusions and provide mathematical justifications	
English	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	presenting and evaluating artefact design presenting and evaluating finished artefact
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	reading information on materials and techniques reading information on construction methods
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	writing reports on research into materials and techniques writing reports on research into construction methods writing construction information for making artefact.