Unit 93: Small-scale Working

Unit code: Y/502/5263
QCF Level 3: BTEC National
Credit value: 10
Guided learning hours: 60

Aim and purpose

The aim of this unit is to enable learners to develop skills in small-scale working methods and production. This unit offers learners the opportunity to work in small-scale materials and employ a variety of techniques and processes.

Unit introduction

Small-scale working is an essential part of the development and realisation of ideas and outcomes for 3D design. Whether working on domestic or commercial products, architecture, interiors, stage and film sets, accessories, jewellery or display design, the ability to produce test pieces, samples, prototypes and scale models is crucial to the development and communication of ideas. In this unit learners will be taught skills in small-scale working methods and production. This unit offers learners the opportunity to work in a range of materials and employ a variety of techniques and processes.

Learners will develop an understanding of the importance of using appropriate methods to achieve their creative intentions. They will develop skills and understanding within specific disciplines through realistic briefs. Briefs should be written and presented in a vocational context in order to encourage learners to work on credible scenarios and outcomes.

Learners will develop their understanding of how to record, analyse, evaluate and communicate ideas and intentions professionally through visual, verbal and written communication. Learners will undergo market research, visiting appropriate sites, workshops and exhibitions as well as researching the work of professional practitioners in order to develop their understanding of the properties and characteristics of materials for small-scale working and production. Learners will be taught how to use small-scale working methods to both represent and generate different ideas, either as prototype or a customised piece.

Learners will be made aware of any relevant health and safety issues associated with specific materials, equipment, techniques and practices.

Learning outcomes

On completion of this unit a learner should:

1 Understand the properties and characteristics of materials for small-scale working and production

2 Be able to use small-scale working and production technology, equipment and processes safely

3 Be able to research and develop ideas for small-scale working and production

4 Be able to record and present the results of investigations and experimental work.

Unit content

1 Understand the properties and characteristics of materials for small-scale working and production

The properties and characteristics of a variety of materials: eg paper, card, wood, metal, plastics, fabrics, glass, clay, plaster, model-making, design, production

Physical properties: eg strength, compression, tension, durability, stability, weight, density, malleability

Aesthetic qualities: eg surface texture, reflective, absorbent, patina, opaque

Reactive properties: heat; flame, eg fire proof, fire retardant, flame resistant, melting point; weather proof eg waterproof, water resistant, oxidation, corrosion

Working characteristics: eg cutting, shaping, joining, bending, folding, rolling

2 Be able to use small-scale working and production technology, equipment and processes safely

Design and production: design, eg samples, test pieces, demonstration pieces, record keeping, technical notes; production, eg hand tools, machine tools, maintenance, potential, technology, processes

Equipment: eg knives, hand saws, scroll saw, band saw, jigsaw, files, hammers, chisels, planes, hand drills, pillar drill, pendant drill, router, vacuum former, CAD/CAM

Processes: eg filing, planning, sanding, chiselling, fixing, screwing, riveting, gluing, soldering, braising, welding, stapling, bolting, CAD/CAM; techniques, eg cutting, sawing, splitting, tearing, drilling, vacuum forming, stapling

3 Be able to research and develop ideas for small-scale working and production

Research: identify, eg sources, information, market research, professional practitioners, historical, contemporary; traditional, non-traditional, application, practice, techniques, processes, production techniques, developments, materials, tools, technology

Develop: eg experiment, select, modify, explore, respond, work with materials, presentations, technical, working drawings, models, maquettes, prototypes, series, annotation, notes, presentations, reviews, evaluations

4 Be able to record and present the results of investigations and experimental work

Record: eg written notes, lists, technical records, visual notes, storyboards, research sheets, design sheets, annotated sketches, technical drawings, collages, photographs, video recordings

Analyse: eg effectiveness, individual elements, design development, outcome(s), expectations, strengths, weaknesses, usefulness, potential, choice of materials, functionality, form, aesthetics

Present: audiences; clients, eg peer groups, professionals, commercial clients, for different purposes; displays, eg maquettes, models; presentations, eg verbal, annotated visuals, on-screen, online, print-outs

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 examine the properties and characteristics of materials for small-scale working and production [IE, CT, RL, TW, SM, EP]	**M1** explore the properties and characteristics of diverse production technology, equipment and processes through experimental approaches effectively and creatively	**D1** individually demonstrate innovative and perceptive approaches to the exploration and production of small-scale designs, supported by a comprehensive range of presentation methods.
P2 use small-scale working and production technology, equipment and processes safely [IE, CT, RL, TW, SM, EP	**M2** purposefully research, develop, analyse and refine ideas for effective presentation to audiences.	
P3 research and develop ideas for small-scale working and production [IE, CT, RL, TW, SM, EP]		
P4 record and present the results of investigations and experimental work. [IE, CT, RL, 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

In this unit learners should be taught skills in small-scale working methods and production. Learners should have the opportunity to work in a range of materials and employ a variety of techniques and processes.

Tutors need to give learners the opportunity to engage in realistic projects, set to reflect current professional practice. Depending on the choice of specialist area, projects should be set for a wide range of media, materials and processes. Tutors should use realistic scenarios to motivate, inspire and stimulate learners.

Delivery would be best through a programme that is predominately practical. Learners should gain enough exposure to professional practice to recognise the significance of a methodical approach to solving the specific problems of small-scale work and develop their practical skills in relevant areas.

Tutors should raise learners' awareness of historical and contemporary model making, prototyping and small-scale work and show how to use the results of their investigations to then develop their own ideas for model making, design and production. Learners should be taught to identify sources of information and to select relevant topics for research.

Learners need to recognise that there is no single method or design process that can be applied to all creative work. There is a difference between the free exploration and origination of ideas, and the means through which they can be developed to meet specified design requirements. Tutors should also ensure that learners record processes as well as outcomes.

Learners need to be guided through current legislation such as health and safety at work and Care of Substances Hazardous to Health (COSHH).

Learning outcomes 1 and 2 offer the opportunity to link theory and practice through experimental testing, workshop practice and technical studies of materials. The outcomes cover the links between materials' properties and how they are worked. Tutors should encourage learners to participate in critical analysis of ideas, working methods and the appropriate use of materials and processes. Learners should be taught where to seek technical data and other documentation relevant to specific materials and practices.

Learning outcome 3 has links with learning outcome 4 and learners should be encouraged to test their ideas through prototypes, proofs, maquettes or other appropriate pre production models and mock ups. Tutors should encourage learners to analyse and evaluate of their own and others' work at all stages. These outcomes also combine theory and practice and learners should be given instruction and opportunities in all relevant 2D and 3D design skills, research techniques and recording methods. The link between learning outcomes 3 and 4 should be used to emphasise the importance of regular review and analysis of ideas and alterations during the development stage. Learners should be taught how to question and test their ideas and to critically assess the success of outcomes.

Presenting their work to different audiences or clients should encourage learners to develop and refine their ideas. Presentations might include the use of worksheets, maquettes and models using ICT and print-outs. Different audience reactions and feedback will encourage learners' critical, analytical and evaluative skills.

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 the brief/explore aims and requirements of the unit. **Assignment 1**: Costume Jewellery 1 Presentation, discussion – whole group; brief focus: costume jewellery from recycled materials. • Primary sources for investigation – such as local theatre companies and groups, charity shops, jewellery shops. • Contextual references – cultural, contemporary, historical.
Selecting potential media: • Identify and review the properties/qualities of a range of appropriate small-scale working materials. • Evaluate potential use and suitability of selected small scale working materials for the project.
Exploration and experimentation: • Explore a range of appropriate traditional small scale working techniques. • Experiment with a range of appropriate non-traditional small-scale working techniques.
Designing and maquette creation: • Generate and develop ideas using a range of appropriate small scale working methods. • Produce a range of small scale working studies, test pieces, models/maquettes.
Learner-initiated study.
Presentation of design ideas and sample pieces/models: • Review and evaluate developmental studies. • Present to peers and tutor and respond appropriately to feedback.
Refining and completing final sculptural piece: • Select and develop final idea using appropriate small scale working methods and techniques. • Produce final small scale working idea.
Learner-initiated study.
Final presentation of completed brief: • Plan, and create a presentation of the work as a whole. • Present appropriately to different audiences.
Learner-initiated study.
Unit review and assessment.

Assessment

For P1, learners must examine the properties of materials and the resulting characteristics and their relationship with small-scale working practice.

P2 requires learners to use relevant tools and safety equipment. They should select the correct tools and equipment to achieve desired outcomes from specific materials. Assessment evidence for P1 and P2 could come from annotated sketchbooks, written records such as a technical file, physical evidence such as samples, text pieces, photographs or video records of practical sessions as well as witness statements.

P3 requires learners to carry out research into both the outcomes and methods of historical and contemporary practitioners and to use that research to aid and develop their own ideas and working methods. Again, assessment evidence could come from a variety of sources as specified for criteria P1 and P2. It is important, however, that the methods used are such that they can demonstrate links between research and practice.

For P4, learners must record, evaluate and present their experimental and exploratory work. Evidence for P4 could come from written records such as a technical folder, journal project diary and annotated visual records such as photographs or sketches; or from video recording or witness statements of verbal presentations. Evidence for presentations might also include annotated worksheets, bullet points, notes, print-outs, maquettes, models and ICT.

To achieve M1, learners must demonstrate their ability to employ their knowledge and understanding of material properties creatively to achieve effective outcomes. This should be supported by the vocabulary used in written notes as well as their choices of materials, tools and techniques to achieve outcomes. To achieve merit criteria learners should demonstrate purposeful engagement and independence as well as effective skills in using tools and equipment.

M2 requires learners to produce coherent and accurate documentation and to demonstrate clear links between their research and analysis and their working practice. Assessment evidence should demonstrate effective skills and sophistication in learners' subject knowledge and understanding of processes and outcomes. Evidence for presentations might include different audience reactions and learner analysis of questionnaires.

For D1, learners are required to demonstrate independence and individuality in all areas and produce sophisticated and creative work. They should also evidence informed awareness of others' ideas and working methods while making perceptive judgements in response to reviewing their own research and development. They should exploit material qualities and techniques through independent endeavour to produce innovative and exciting small-scale work.

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, P2, P3, P4 M1, M2 D1	**Assignment 1**: Costume Jewellery	A designer producing a thematic range for a retail outlet in an arts centre, using recycled materials.	Portfolio of evidence consisting of: • research • development of ideas such as, experiments with materials, techniques relevant to proposal • final piece including presentation sheets • evaluation such as development and analysis of design ideas and final piece; strengths and weaknesses of design ideas and final piece • reports of progress from work experience placements • learner's own ongoing review of progress and self-evaluation evidenced through statements, notes and annotated sketchbooks/worksheets • evidence of visual studies from portfolio of ongoing and final 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 Art and Design sector suite. This unit has particular links with the following unit titles in the BTEC Art and Design suite:

Level 1	Level 2	Level 3
Introduction to 3D Design Crafts	2D Visual Communication	Human-scale Design
Explore 3D Design Crafts	3D Visual Communication	Human-scale Working
An Accessory Project	Working with 3D Design Briefs	Small-scale Design
A Personal Project	Working with 3D Design Crafts Briefs	3D Design Media, Techniques and Technology

National Occupational Standards

This unit also provides development opportunities for some of the underpinning skills, knowledge and understanding of the following National Occupational Standards:

CCSkills Sector Skills Council

Design (revisions in draft form June 2009)

- DES5 Follow a design process
- DES24 Create 3D Models using a Computer Aided Design System
- DES38 Manage design realisation.

Essential resources

For design and production learners must have access to 3D design workshops for hand and machine tools. Provision of malleable and non-malleable materials is essential for learners' design experimentation, development and small-scale working outcomes.

Equipment for use of cutting, shaping, modelling, carving, forming, constructing and moulding and the use of digital working practice is essential.

As well as access to a well-equipped three-dimensional workshop, learners also require photographic or video equipment for recording purposes, which will include gathering primary source material and keeping a record of models, maquettes and work in progress.

Access to design studios for group teaching and evaluation sessions including design ideas origination and development, is essential. Facilities with both specialist and general learning support materials, including books, journals and periodicals, are vital for research purposes. Computers with appropriately updated design software are required to support learners' digital ideas, technical development and expertise. Access to the internet is required for historical, cultural and contemporary contextual research.

Employer engagement and vocational contexts

Centres should develop links with practising artists, craftspeople and designers, to deliver assignments to learners or to provide work experience.

Links with employers are essential to the delivery of the programme for work experience and future employment.

Vocational learning support resources:

- Learning and Skills Network – www.vocationallearning.org.uk

Business and finance advice:

- local and regional Business Link – www.businesslink.gov.uk

Assignments should be vocationally relevant; centres should consider the delivery of 'live projects' for example, to support the vocational content of the unit and programme.

Creative and Cultural Skills (www.ccskills.org.uk), the Sector Skills Council for Arts, Crafts and Design has launched the web portal Creative Choices (www.creative-choices.co.uk). This portal has a range of information about careers in the arts, crafts and design sector, including job descriptions.

Indicative reading for learners

Textbooks

'Dynamite' Payson H – *Boat Modeling With Dynamite Payson: A Step-by-Step Guide to Building Models of Small Craft* (International Marine Publishing, 1989) ISBN 978-0071573719

Fuad-Luke A – *The Eco-Design Handbook: A Complete Sourcebook for the Home and Office* (Thames & Hudson, 2009) ISBN 978-0500288399

Hanaor Z and Woodcock V – *Making Stuff: An Alternative Craft Book* (Black Dog Publishing, 2006) ISBN 978-1904772613

Hembree M – *How to Build Scale Models: Basic Techniques and Advanced Results* (Kalmbach Publishing, 1994) ISBN 978-0890241387

Kater G – *Design First for 3D Artists* (Jones & Bartlett, 2005) ISBN 978-1556220852

Kenny M, Bairstow J and Baber R – *Design Modelling: Visualising Ideas in 2D and 3D* (Hodder & Stoughton, 2000) ISBN 978-0340663394

Lefteri C – *Materials for Inspirational Design* (RotoVision, 2007) ISBN 978-2940361502

Lesko J – *Industrial Design: Materials and Manufacturing Guide* (Wiley, 2007) ISBN 978-0470055380

Neat D – *Model Making: Materials and Methods* (The Crowood Press, 2008) ISBN 978-1847970176

Pheasant S – *Bodyspace: Anthropometry, Ergonomics and the Design of Work* (Taylor & Francis, 2007) (Kindle Edition) ASIN B000FBFBCQ

Powell D – *Presentation Techniques* (Little, Brown, 1990) ISBN 978-0316912433

Slack L – *What is Product Design?* (Essential Design Handbooks) (RotoVision, 2006) ISBN 978-2940361243

Sutherland M – *Modelmaking: A Basic Guide* (WW Norton and Co, 1999) ISBN 978-0393730425

Tilley A and Henry Dreyfus Associates – *The Measure of Man and Woman: Human Factors in Design* (John Wiley & Sons, 2001) ISBN 978-0471099550

Weizhi C – *Big Book of Creative Product Design* (Links International, 2008) ISBN 978-8496969254

Journals

AN Magazine

Blueprint

Crafts

Crafts

Creative Review

Design Magazine

Design Week

Eco Designer

Eco Designs

Fine Scale Modeller

Make

Modelmaker

Schmuck

Websites

www.burrows.com/found.html	Founders of the Arts and Craft movement 1870-1900
www.coshh-essentials.org.uk	COSHH guidelines
www.craftscouncil.org.uk	Crafts Council
www.designcouncil.org.uk	Design Council
www.designobserver.com/archives/category.html	Writings on design and culture
www.desktoppublishing.com/design.html	Graphic design
www.eyemagazine.com	Eye magazine
www.intute.ac.uk/artsandhumanities/visual	Visual arts resources
www.vam.ac.uk/?view=compliant	V & A museum and exhibitions
www.vts.intute.ac.uk/acl/tutorial/artscrafts	Using the web for arts and crafts

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	demonstrating understanding of the properties and characteristics of materials for model-making design and production using model-making design and production technology, equipment and processes safely researching and developing ideas for model-making design and production recording, analysing and presenting the results of investigations and experimental work
Creative thinkers	demonstrating understanding of the properties and characteristics of materials for model-making design and production using model-making design and production technology, equipment and processes safely researching and developing ideas for model-making design and production recording, analysing and presenting the results of investigations and experimental work
Reflective learners	demonstrating understanding of the properties and characteristics of materials for model-making design and production using model-making design and production technology, equipment and processes safely researching and developing ideas for model-making design and production recording, analysing and presenting the results of investigations and experimental work

Skill	When learners are ...
Team workers	demonstrating understanding of the properties and characteristics of materials for model-making design and production using model-making design and production technology, equipment and processes safely researching and developing ideas for model-making design and production recording, analysing and presenting the results of investigations and experimental work
Self-managers	demonstrating understanding of the properties and characteristics of materials for model-making design and production using model-making design and production technology, equipment and processes safely researching and developing a range of creative ideas for model-making design and production recording, analysing and presenting the results of investigations and experimental work
Effective participators	demonstrating understanding of the properties and characteristics of materials for model-making design and production using model-making design and production technology, equipment and processes safely researching and developing a range of creative ideas for model-making design and production recording, analysing and presenting the results of investigations and experimental work.

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	researching the brief; selecting contexts and sources for recording; originating and developing small-scale working ideas reviewing and refining ideas towards completed work planning and preparing presentations of final small-scale work
Creative thinkers	recording from sources and contexts in different creative ways using media, materials and processes imaginatively originating and developing creative small-scale working ideas working on final designs presenting work to different audiences creatively and imaginatively
Reflective learners	evaluating the different stages of project development reviewing ideas and listening to feedback at tutorials and crit sessions presenting small-scale working to different audiences
Team workers	working with the group to analyse the brief and develop plans for research and ideas for development carrying out feedback sessions working on final displays or exhibitions and presentations
Self-managers	working independently to further their research studies planning the development of their work to meet the project brief developing ideas and regularly reviewing their progress selecting best ideas and deciding on ways forward evaluating planning and preparing presentations
Effective participators	participating in group discussions and evaluations working on group projects taking part in presentations.

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	scanning and developing sculpture ideas digitally using software to develop small-scale working ideas researching contextual and other information for the development of ideas for small-scale working brief
Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used	planning project briefs and where and how ICT might be used when appropriate evaluating outcomes and the appropriateness of medium
Manage information storage to enable efficient retrieval	researching from internet sources; downloading information; creating folders for storage and retrieval
Follow and understand the need for safety and security practices	undergoing induction period – introduction to the ICT centre and systems and working practices
ICT – Find and select information	
Select and use a variety of sources of information independently for a complex task	researching internet sources, selecting from their research, developing their own response informed by research
Access, search for, select and use ICT-based information and evaluate its fitness for purpose	researching information for different briefs and activities evaluating results of using digital research 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	designing digitally using scanners inputting and formatting information from sources
Bring together information to suit content and purpose	developing small-scale working ideas digitally importing visual and textual information relevant to brief/activity
Present information in ways that are fit for purpose and audience	using digital means to plan, create and give presentations to different audiences
Evaluate the selection and use of ICT tools and facilities used to present information	assessing their progress and commenting on the appropriateness of their selection of ICT tools and facilities, eg use of software
Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists	using email to submit written work downloading information from internet sources storing of information and creating folders for access

Skill	When learners are ...
Mathematics	
Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations	recording visually: scaling, timing, measuring using perspective and other methods of projection
Identify the situation or problem and the mathematical methods needed to tackle it	using measuring and orthographic projection for accuracy, and scaling using software to observe and modify small scale working from different viewpoints
English	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	discussing the project brief describing the physical properties and characteristics of different small-scale working materials contributing to group discussions and the sharing of ideas evaluating their own and others' small-scale working and finished work presenting to target audiences
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	researching, reading, selecting text and images annotating, commenting and comparing using contextual texts and images to relate to own model-making ideas evidencing understanding through discussion, crit sessions, evaluations and presentations
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	evaluating results of small-scale working designs to meet the brief annotating recordings and ideas for judgement of qualities and appropriateness in the use of selected small scale working media, materials and techniques analysing and evaluating selected artists' images for the purpose of developing their own work, using personal judgements and relating research to their own ideas preparing presentations of final work.