

Unit 10: Art And Design: Explore 3D Design

Unit code: L/502/3896

QCF Level: BTEC Level 1

Credit value: 4

Guided learning hours: 30

Unit aim

Learners will investigate how to research and develop ideas through to the 3 dimensional (3D) prototype stage of product design; developing practical skills whilst investigating the visual language, materials and methods of the design industry.

Unit introduction

The unit will involve model and prototype construction as this is widely used in the commercial design process to visualise ideas, for testing and for client approval. The use of 3D computer software is also encouraged as this is an alternative way of visualising ideas and has become an accepted part of the design process in the 21st century.

This unit will give learners the opportunity to develop skills relevant to creative activities in the design industry. Learners may focus on practicing skills in one or more materials, developing their ideas through to a prototype outcome. The unit will concentrate on design areas that already feature within learners' personal experience, such as interior design, architectural detailing and goods and domestic ware.

Learners will apply self- and time-management whilst developing ideas, making objects and learning about tools and equipment. The communication of ideas and intentions, and problem solving, will be integrated into the creative activities as learners develop relevant visual language skills. Health and safety requirements will be addressed as relevant safe working practice is essential in all areas of the design industry.

Primary and secondary resource material will be used to inspire ideas and build research skills. References will be made as to how the formal elements of 3D design can be used to communicate style and function, in both historical and contemporary contexts.

The unit can be delivered in a classroom or studio setting. If set in an art department, strong links with the Design and Technology department are encouraged. The unit may be enhanced by educational visits related to learners' work. These could be to galleries, museums, designer studios/workshops, manufacturers, commercial establishments or workshops.

On completion of the unit, the body of work produced may contribute to each learner's portfolio, which will give evidence of their work-related and practical skills – highlighting the use of appropriate materials, techniques and tools to realise an aim. The unit will help to demonstrate learners' ability to reflect upon their own work with regard to function and form.

Essential resources

The tutor should provide guidance on how learners can research a theme, and how to store their findings accessibly.

Primary research is essential as ideas are often at their most original and innovative when developed from observational studies.

The unit requires diverse secondary resources plus historical and contemporary contextual references. Magazines, books, the internet, visits to art galleries, museums and artist or designer studios and commercial premises are all resources that should contribute to this unit.

Some ICT equipment should be available.

A suitable working area should be provided.

Learning outcomes, assessment criteria and unit amplification

To pass this unit, the learner needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

Learning outcomes		Assessment criteria		Unit amplification
1	Be able to develop ideas for a 3D design brief	1.1	Demonstrate knowledge of Formal Elements	<ul style="list-style-type: none"> □ <i>Formal elements:</i> different formal elements eg line, tone, colour, shape, weight, pattern, texture
		1.2	Plan ideas from primary and secondary sources	<ul style="list-style-type: none"> □ <i>Primary and secondary sources:</i> planning eg brainstorming, development exercises, materials, techniques, size of work(s); primary sources eg visits to galleries, exhibitions or museums, recording eg sketches, photos; secondary sources eg libraries, websites, books, magazines, leaflets, TV and other prints, collected items, clippings, books, magazines, leaflets, TV and other formats; limitations eg time, materials, availability of space
	1.3	Present aims for a 3D design brief	<ul style="list-style-type: none"> □ <i>Present aims:</i> methods eg verbally, written, storyboard 	
	1.4	Prepare for and contribute to discussions of ideas and opinions	<ul style="list-style-type: none"> □ <i>Discussions:</i> follow main points; make relevant and positive contributions; respect others' rights to speak; aids eg presentation, thumbnail sketches, ideas worksheets, computer-aided visuals 	

Learning outcomes	Assessment criteria	Unit amplification
<p>2 Be able to produce work in 3D design to a brief</p>	<p>2.1 Produce 3D design work using appropriate materials, methods and equipment</p>	<ul style="list-style-type: none"> □ <i>Materials:</i> different materials eg thick card, Fome-Cor® Board, metals, plastic sheet, styrene and polystyrene, wood and wood-based products, glass, paper, thin card, wire, clay, wet plaster, molten wax, textiles, foam, latex □ <i>Methods:</i> different methods eg construct, cut, carve, form, shape or model, layer, mould or cast, join, assemble: paint, use finishing techniques □ <i>Tools and equipment:</i> ICT eg computers, 3D design software, printers, scanners, video or stills photography; general eg hand and machinery tools, craft knives, scalpels, saws, chisels, drills, embossing tools, vacuum former; textiles eg sewing needles, scissors, shears and sewing machines □ <i>Working methods:</i> materials; methods; processes; correct technical terms
	<p>2.2 Demonstrate self-management skills</p>	<ul style="list-style-type: none"> □ <i>Self-management skills:</i> attendance; punctuality; complete tasks within agreed deadlines; flexibility; take responsibility eg gathering materials, setting up, tidying up; self-motivation; assertiveness; readiness to improve own performance based on feedback
	<p>2.3 Describe measures taken to reduce risks in the work area</p>	<ul style="list-style-type: none"> □ Follow guidelines on safety: risks and hazards; measures taken to minimise risk; appropriate dress; personal protective equipment; materials; tools; work area
<p>3 Be able to comment on own work.</p>	<p>3.1 Present information and points of view about their ideas, using appropriate language</p>	<ul style="list-style-type: none"> □ Discussions: own view point eg strengths, weaknesses, improvements; responses; methods eg sketchbook annotations, written notes, verbal feedback, recordings, illustrated verbal presentations, informal discussion, tutorials, group discussions; make relevant and positive contributions; respect others' rights to speak
	<p>3.2 Prepare for and contribute to formal discussions of ideas and opinions.</p>	

Information for tutors

Delivery

This unit involves creative and organisational skills as used by contemporary designers as they follow the design process. It is delivered primarily in the classroom or workshop where learners have access to a range of techniques and processes for model and prototype construction. This may be across a variety of materials, or in one specialist material, for example, card or styrene. It is suggested that tutors first define Product Design and show examples most likely to interest learners group. Form (how an object looks) must be defined, function (its purpose) and the role the client and consumer/target audience plays in the design world. Feasible and wide-ranging possibilities for design outcomes can be identified, such as ideas for a chair, salt and pepper pots, CD player or table lamp design, and the formal elements these display such as line, form, structure and balance can be discussed.

A varied approach to delivery is recommended to stimulate and motivate learners to explore the potential of materials and associated methods. Demonstrations of new techniques by the tutor, viewing videos of techniques and processes, taster workshops, group activities and visits are encouraged. For effective time management research from a previous unit may be referenced, as preparation for, and clearing away of, 3D work is especially time consuming. Learners will be encouraged to take personal responsibility for these activities, and to keep an organised, clean and tidy workplace.

The tutor will need to offer direction and support in the research and experimental stages of the work, also guidance in the organisation of the work produced; in folders, sketchbooks, on presentation sheets and by trials and maquettes.

Research is likely to take a 2D form in the early stages, unless working directly in 3D, (for example on an observational study in clay) but the development of ideas must involve both 2D representation of ideas (such as sketches, plans, elevations, perspective drawings) and 3D experimentation (trials and maquettes). Tutors are reminded of the value of a wide variety of computer software available for general 3D, interior and garden design, and of the experience learners might have in designing virtual worlds, for example within computer games.

Both primary and secondary sources must be investigated. Focus may be aided by the introduction of a theme and fictional vocational scenario as this will bring realism to the activities by identifying the client and target audience, and introducing constraints and opportunities for problem solving.

Creative briefs will motivate learners, focus research time and give coherence to the work produced, pulling together the formal elements of visual language such as shape, form, scale, structure and balance and the introduction of technical aspects of card engineering; cutting, folding, bending, scoring and perforating. Learners can be encouraged to make their own choices and to communicate clearly when presenting their aims within the parameters of the brief.

It will be useful for learners to communicate with a professional designer and to investigate the constraints encountered working in the real world. Learners find it an enlightening and motivating experience to hear and see how a professional works, what inspires them, what they make, what materials and techniques they use, what studio space and equipment they have and how the need to make money affects what they make. Open days at further and higher education establishments will be of interest to broaden learners' horizons and to show making and presentation techniques at their best.

Learners will explore different ways of working appropriate to the resources available and will be encouraged to look at how professional designers approach similar activities. This might be the use of basic, general purpose art room materials such as card in various thicknesses through to the use of specialist equipment such as vacuum formers and heat benders, usually found in a design and technology department. Techniques such as using thumbnail sketches to record ideas, a layout pad or computer software to make sequential changes to a design, a scale ruler, styrene block to capture curve and flow in a design and combining and joining materials for best effect are all important aspects of the design process and would be useful to produce each learners final outcome.

The use of technological media such as computers, printers, scanners, video or stills photography are encouraged as they often play an intrinsic part of the development and recording of ideas and to evidence the presentation of final outcomes. The search for images using the internet and library resources is encouraged, as long as learners are informed of copyright issues. An awareness of the possibilities of computer-aided 3D design is strongly encouraged. Practical opportunities to experiment with basic software will enhance the learning experience and aid practical understanding of how computer aided design (CAD) links to the use of real materials.

When researching and developing ideas and producing the final outcome, skills such as self- and time-management, the communication of ideas and intentions, presentation skills and safe practice, will need to be developed, so assistance may need to be offered beforehand. Self-management is essential. Learners will need to collect and record information in an ordered way and review development at each stage of their work. Many practitioners keep a technical notebook to record details for future reference. This will involve recording techniques step-by-step, and the processes that the materials go through (such as vacuum forming). This can be done using storyboard techniques or labelled photographs as an alternative to, or combined with, purely written reports. Centre-devised quizzes, writing frames or interactive handouts may also be of value.

Working as part of a group may be incorporated in the production of the final piece as long as individual achievement is clearly recorded. However, even if learners are not involved in group projects, the key qualities of support, mutual respect and sharing of facilities and resources are inherent in all activities. The ability to give constructive criticism within the peer group, without negativity or giving offence is a valuable skill.

Tutors should give feedback to learners and make formative assessment of their skills and abilities through informal day-to-day discussion. More formally, interim deadlines within activities will give opportunity for the assessment of creative progress and self-management.

Learners will be encouraged to discuss their approach to solving creative problems, the methods used, choices made, the quality of their work and their progress, evidencing their ability to use a range of technical terms. This discussion may be verbal, informally with the tutor, in group or individual presentations; or in written form in notes and annotation in sketchbooks, or as final comment on their work. Summative feedback will be given so as to offer opportunity for improvement. Tutor observation records or witness statements of activities will have great value, but will not be acceptable as the only evidence for assessment.

A visual or written record of activities should be kept by learners at all stages, in sketchbook annotation, storyboards, logbook and as final comment on the strengths and weaknesses of their work. A self-assessment checklist, peer group assessment sheets, and a health and safety log may all feature at assessment. The

evidence may be supported by the use of audio or video recording of learners presenting their own work.

Working in the studio can be hazardous. Tutors will need to ensure learners are made aware of the health and safety issues relating to the media, materials and equipment they use. Learners should be shown how they reduce risks to themselves and others by thinking and working safely. A common sense approach should be emphasised, rather than merely referring to rules and regulations. Identification of the need for appropriate dress (eg tie long hair back, no hanging jewellery) and protective equipment (eg goggles, face masks, gloves, aprons, sensible footwear; materials) is important. Learners should be made aware of the necessity of following manufacturers' instructions and guidelines for tools, equipment and materials. Knowledge of good practice in the work area should also be emphasised as this kind of approach is transferable to other work spaces (eg avoid hazards in gangways, trailing leads, not obstructing fire exits, keeping work areas clean and tidy). The keeping of a health and safety logbook by learners may be beneficial.

Outline learning plan

The outline-learning plan has been included in this unit as guidance, and is not meant to be prescriptive. The tutor is encouraged to create outline-learning plans that will suit their own teaching style and also suit their learners.

Topic and suggested assignments/activities

Introduction to the unit

Tutor-led discussion on the definition of product design and show examples. Define form (how an object looks) and function (its purpose). Discuss the role of the client and consumer/target audience in the design world.

Introduce theme or choice of themes for practical work. The theme could relate to a design movement, such as Memphis or Bauhaus, or a decade in history such as 1960's. More simply, it could be requested that a motif, shape or effect be incorporated into the design.

Discuss feasible possibilities for design outcomes, eg car design, architecture, salt and pepper pots, furniture, CD player, table lamp etc.

Learners could have a group discussion regarding research opportunities, starting points and outcomes. Researching primary and secondary sources; research from earlier units may be utilised. (Observational studies, books, magazines, internet, visits to galleries, sites. Working with a designer is highly recommended).

The observation and handling of diverse objects (kitchen equipment, hinges, umbrellas, transport mechanisms, and so on) will give first hand information regarding form, function and fitness for purpose.

Throughout the unit health and safety considerations, notes in sketchbooks where appropriate, researching the theme for homework, presenting 'best' visuals on a mood board.

Topic and suggested assignments/activities

Demonstration of available materials and techniques should be given

Learners should watch demonstrations on how to use thumbnail sketches to record ideas, how use a layout pad to make sequential changes to a design, how to read a scale ruler, how to carve styrene block to capture curve and flow in a design, how to combine and join materials for best effect.

Learner can produce some initial ideas. These should be as drawings to start with, or built in a virtual space using a computer, then after careful selection and justification, best ideas can be taken forward to 3D trial or maquette stage for refinement.

Trials need to be presented by the learner neatly presented at pre-arranged time.

Class discussion/

questionnaire by learner on which samples were the most successful and why, and how they could be improved.

Development of final idea to prototype stage.

Tutor-led activity to define prototype. This may be a working or non-working model as appropriate, either to scale or real-size. Learners could be guided to ensure an informed choice of material and technique.

Learners could refine their idea and construct a final outcome using their favourite or most successful technique.

Learners could present and comment on final outcome (in writing or verbally) at pre-arranged time.

Assessment

Assessment will be ongoing throughout the activities via various structured activities. Evidence for learning outcomes may include sketchbooks, design sheets, trials, maquettes and prototypes, supplemented by tutor-devised worksheets, writing frames, interactive handouts, quizzes and questionnaires. Assessment evidence will be cumulative throughout the activities undertaken. It must be viewed holistically as opportunities to cover a particular criterion may well be presented more than once.

There are no pre-requisite number of trials or maquettes that should be produced for criterion 3.1 but one final outcome (in prototype form) is required to show completion of the design process. This may be a working or non-working model as appropriate, either to scale or full size. At this level it may well be necessary for the tutor to guide learners to ensure an informed choice of material and technique.

To generate assessment evidence learners will be encouraged to discuss the methods used, choices made, the quality of their work and their progress. This may be verbal; in informal discussion with the tutor, in group discussions or individual presentations, and could be an alternative to writing. Observation records by tutors and witness statements by others involved in the delivery (such as visiting artists) are permissible forms of evidence for these. Learners' own written and visual evidence for assessment may be in sketchbooks, on worksheets and presentation sheets and in the final outcome.

To achieve assessment criterion 1.1 learners must be able to demonstrate an understanding of formal elements. These will be identified in learners' own work. Elements such as line and form, the use of scale, colour and texture are likely to be relevant. This knowledge can be assessed from visual, verbal and written evidence.

Learners will show evidence for 1.2 by exploring more than two examples of both primary and secondary sources. For primary research, assessment will be of learners' own observational studies, supplemented by their own drawings or

photographs. All other sources are secondary. For example, learners might first draw and photograph a machine (primary), then look at books on the subject and the work of engineers, artists or designers (secondary). Assessment will be based on how learners collect, then use, rudiments of the material to plan ideas that meet the needs of the given theme.

The aims provided for 1.3 will be practical and skills based, rather than conceptual, leading to the creation of a body of work and a final outcome. Evidence may take the form of a short written statement near the start of a brief, or a short verbal presentation.

Opportunities will occur throughout the unit to gain evidence for criterion 1.4; formally and informally. Initially these ideas for discussion will be a response to the research material learners have gathered, and will continue within the development and modification of the work as it progresses. Evidence can be visual within the work, verbal or written and relate to all aspects of the brief.

Learning outcome 2 may be evidenced through; sketchbooks, studies, worksheets, annotations, action plans, self-assessment checklists, organisation of portfolio, witness testimonies, observation reports, peer group assessment, one-to-one discussions or group discussions, health and safety logbook.

For criterion 2.1 learners will explore at least three materials, techniques and processes, showing some development and understanding from the initial trial stage. Also three test pieces on different surfaces and sizes need to be produced based on and developed from the original research and ideas generated, but can be a trial for part of the proposed final finished piece. An understanding of appropriate tools, material, scale and time given to the work(s) must be evidenced in more than one piece.

Assessment for 2.2 will be on each learner's approach to their practical work and their motivation and desire to succeed. These also relate both to practical activities such as working in a tidy and responsible manner and generic skills such as attendance and punctuality, assertiveness, willingness to respond to feedback and an ability to reflect the set theme. Assessment evidence may be by tutor observation reports, witness testimonies, action plans, self-assessment checklist, organisation of portfolio, peer group assessment, one-to-one discussions or group discussions.

To achieve assessment criterion 2.3 learners need to be able to identify potential risks and hazards within the work area and describe the measures to be taken to reduce the risk. Learners will show that they have followed the health and safety guidelines for the materials, techniques and processes used. Observation of safe practice can be documented by tutors, and from records kept by learners. The keeping of a health and safety logbook by learners may be beneficial; these, and witness statements confirming tutor observation of safe practice in the workshop, are also acceptable evidence.

For assessment criterion 3.1 learners need to demonstrate some understanding of their use of materials, methods, processes and use some correct technical terms. Comments on the strength and weakness of their work need to be made on more than one aspect of their learning and their work. Final comment may be supported by ongoing evaluative comments, sketchbook annotations, reference to learning from verbal feedback, illustrated verbal presentations, written notes from informal discussion, tutorials or group discussions. The use of audio or visual recording of learners presenting their work, or individual or group critiques may also support this evidence.

For assessment criterion 3.2 learners need to be able to make relevant and positive contributions to discussions regarding their work and respect others' rights to speak. Learners must be able to add positive comment on feedback given to them.

Suggested resources

Books

Fiell C and Fiell P (Editors) – *Designing the 21st Century (Hardcover)*
(Taschen GmbH, 2005) ISBN 9783822848029

McDermott C – *Design Museum Book of Twentieth Century Design: Pocket Edition (Designers of the 20th Century)* (Carlton Books Ltd, 1999) ISBN 9781858687100

McDermott C – *Design Museum Little Book of Design Classics*
(Carlton Books Ltd, 2002) ISBN 9781842225370

Journals

Crafts magazine – published bi-monthly by the Crafts Council

Creative Review magazine

Design Week magazine

Website

Design Council www.designcouncil.org.uk