

Unit 103: Exploring Specialist Glass Techniques

Unit code:	M/502/5446
QCF Level 3:	BTEC National
Credit value:	10
Guided learning hours:	60

● Aim and purpose

The aim of this unit is for learners to gain a thorough knowledge of the properties and characteristics of glass and associated materials and the specialist working techniques. Learners will do this through exploration and investigation rather than the production of finished artefacts.

● Unit introduction

For any practitioner working within the field of art, design and applied arts, an understanding of the specialist techniques and processes for working with the materials relevant to their chosen field is essential. The ability to skilfully manipulate and explore these materials and techniques to exploit their full potential, within both expected and unexpected contexts, is the backbone of any designer's work. An important aspect of this exploration is the continuous analysis and evaluation of results and use of the knowledge and understanding gained to inform further work.

This unit exposes learners to the properties and characteristics of glass and associated materials and a range of specialist working techniques which may include leading, copper foiling, fusing, slumping, casting, surface decoration, torch work and hot glass depending on the resources and facilities available. Whilst processes form an essential part of this exploration, the key aim is to gain a thorough understanding of how these materials can be treated, prepared and worked to satisfy design intentions. It is important for learners to appreciate the importance of developing a creative yet methodical approach and to be able to investigate and analyse the suitability of specialist glass techniques in terms of aesthetic qualities and fitness for purpose at appropriate stages of the creative process.

This unit is likely to be delivered mainly in the workshop or studio but could be supplemented with outside visits. Together with *Extending Specialist Glass Techniques*, it is designed to familiarise learners with the specialist techniques for glass and associated materials and will also extend the understanding gained in *Materials, Techniques and Processes*. Additionally, it contributes to preparation for progression to higher education or to work as a practitioner.

Inevitably, any use of materials, tools and equipment has health and safety implications and learners will become familiar with the COSHH guidance relevant to specialist glass techniques and materials.

● Learning outcomes

On completion of this unit a learner should:

- 1 Know about the properties and characteristics of glass and associated materials
- 2 Be able to select and prepare glass and associated materials to meet specified requirements
- 3 Be able to experiment with specialist glass techniques
- 4 Be able to present explorations in specialist glass techniques.

Unit content

1 Know about the properties and characteristics of glass and associated materials

Properties: eg strength, flexibility, ductility, malleability, weight and durability, transparency, opacity, compatibility, potential for surface treatment, construction and structural potential

Characteristics: eg aesthetic qualities, ease of working, capacity to accommodate detail, colour, pattern, texture, suitability for specified contexts, performance according to strengths and weaknesses, impact, durability

Materials: a range of glass types, eg sheet, cullet, crystal; associated materials, eg lead calm, copper foil, glass paints, lustres, wire, wax, clay, plaster, flexible and rigid mould-making materials, card, glues, found objects, recycled materials, components and fixings

2 Be able to select and prepare glass and associated materials to meet specified requirements

Selecting suitable materials: properties (technical, aesthetic, characteristics); associated materials, eg lead calm, copper foil, glass paints, lustres, wire, wax, clay, plaster, flexible and rigid mould-making materials, card, glues, found objects and recycled materials, components, fixings

Preparing specialist glass materials: cleaning marking, scoring, cutting, measuring, laying out, planning, storing

Health and safety in workshop practice: the Health and Safety Act 1974, elimination of risk to self and others; thinking and working safely within a studio or workshop environment; following relevant COSHH guidance on materials and workshop practice for specialist glass techniques and associated materials

3 Be able to experiment with specialist glass techniques

Working characteristics and physical properties: specialist glass techniques; eg cutting, crushing, leading, copper foiling, patination, painting, mould-making, fusing, slumping, casting, kiln firing, cold-working, 'hot' glass processes

Investigate: eg materials, techniques, professional glass-makers (historical, contemporary)

Challenge: investigate, eg potential, limitations, associated materials; testing materials, eg finishes, structures, processes; sketchbook work, sample pieces

Record findings: format, eg notes, technical data, reports, drawings, samples, photographs

4 Be able to present explorations in specialist glass techniques

Present ideas: eg visuals, discussion, presentation, portfolio, design board; audience, eg peers, tutors, clients, customers

Explain choices: decision making; problem solving, eg written evaluation, oral presentation, discussion

Evaluate suitability of alternatives: eg aesthetic, structural, fitness for purpose, stages of the creative process; annotate, eg sketchbooks, notebooks

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 describe the properties and characteristics of glass and associated materials [IE]	M1 generate individual work, through purposeful exploration of specialist glass techniques, consistently meeting specified requirements	D1 independently produce an innovative body of work that explores specialist glass techniques comprehensively, showing perceptive evaluation of techniques and processes.
P2 select and prepare glass and associated materials in response to specified requirements [RL, SM]	M2 coherently present exploratory work, showing analysis of techniques and processes.	
P3 experiment safely with specialist glass techniques [IE, CT]		
P4 present exploratory work		
P5 review own work. [RL]		

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

For this unit learners should have access to appropriate tools and equipment in a studio/workshop environment. Depending on the range of specialist techniques to be offered, this may include kilns, mould-making/casting facilities, finishing equipment, hand tools and appropriate machinery. In all cases appropriate personal protective equipment should be available.

This unit has been designed to give learners an opportunity to undertake focused investigation into the properties of glass. It should allow learners to challenge the technical processes associated with glass. Tutors need to provide specific vocational, technical and theoretical support to enable learners to do this.

For learning outcome 1 tutors should introduce the properties and characteristics of glass and associated materials and a range of specialist working techniques. These may include leading, copper foiling, fusing, slumping, casting, surface decoration, torch work and hot glass, depending on the resources and facilities available.

For learning outcome 2, learners need to explore and investigate the properties, characteristics and potential of specialist glass techniques and materials. Tutors need to instruct them in how to carry out an investigative enquiry from planning, research, exploration and evaluation of results. Learners need to demonstrate, mainly through practical work, an understanding of the properties and characteristics of a range of specialist glass techniques.

For learning outcome 3, learners need to engage in more self-directed work exploring, and challenging the potential of specialist techniques and processes, consolidate their learning. Learners should expect to produce a range of work that demonstrates their breadth of understanding when using specialist glass techniques and processes. Investigation and exploration may arise from the needs of a given situation but may also be stimulated by unusual examples of work, extending personal vocabulary or style.

This unit is likely to be delivered mainly in the workshop or studio but may be supplemented with outside visits to exhibitions, museums, glass studios, and glass suppliers. For learning outcome 4, when learners are presenting and reviewing the suitability of specialist glass techniques, tutors should ask them to discuss and comment on the success and/or failure with regard to the 'fitness for purpose' of work produced. Discussion, group work and presentation to peers may form part of the delivery.

Since the emphasis in this unit is on exploration rather than on the production of finished work, learners should be encouraged to use many different means of discovering, challenging and investigating the potential of specialist glass techniques. Work can range from discovering the unexpected outcome as well as confirming established information, to systematic, scientific and sequential investigation of the materials. It is particularly important for learners to make accurate and comprehensive records of their exploration. These should be organised in a sketchbook or notebook. These records, alongside actual work and tutor observation, will provide the evidence required for assessment purposes.

This unit is linked to *Extending Specialist Glass Techniques* and in most cases the two should be taught either in sequence or through an integrated programme. For assessment purposes the units are written in order to separate exploration and preparation from design development and production processes. As this is an artificial separation an integrated approach to delivery is likely to be more suitable. It is essential that there are appropriate means of referencing the unit specifications within integrated projects and programmes.

Tutors need to advise learners of, all aspects of current legislation associated with health and safety practices in the studio or workplace and ensure they adhere to it. Learners should observe appropriate COSHH guidance material and need to be inducted in the safe working practices as they are applied to the working characteristics of specialist glass techniques. Tutors should explain the importance of using personal protective equipment, such as clothing, eye shields and masks, and behaving with regard to the health of themselves and others. Where glass is concerned, it is clearly important to continuously reinforce the principles of safe working practice to avoid minor injuries.

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 the programme – whole class.
Introduction to relevant health and safety in the workshop including COSHH, use of personal protective equipment etc – whole class.
<p>Assignment 1: Investigating the Materials – Research and Enquiry</p> <p>Introduction to assignment and tasks – whole class.</p> <p>Introduction to carrying out an investigative enquiry – whole class.</p> <p>Learners:</p> <ul style="list-style-type: none"> • explore historical and contemporary precedents – group visit to gallery/museum/site – make drawings, notes, photographs etc • investigate the creative potential of types of glass and associated materials and their properties and applications – exhibitions, sketchbook work, internet research, etc • collate findings from all research – annotated sketchbook work.
Learner-initiated study.
<p>Assignment 2: Investigating the Materials – Experiment and Exploration</p> <p>Introduction to assignment and tasks – whole class.</p> <p>Introduction to exploring the properties and characteristics of glass and associated materials – tutor whole class then individually explore and experiment.</p> <p>Learners:</p> <ul style="list-style-type: none"> • carry out a series of experiments with different types of glass – sample/test pieces, practical studio work observed by tutor • keep records of results and analyse findings against expectations – technical notes, annotated sketches • explain choices, resolve problems – discuss in one to one tutorials • carry out a series of experiments combining glass with other materials – sample pieces, practical studio work observed by tutor • analyse results and write up – technical notes • evaluate effectiveness of techniques and processes used – verbally and written • plan presentation • present results to tutor and group – explain choices and present a collection of sample pieces, annotated sketches and technical notes.

Topic and suggested assignments/activities and/assessment

Learner-initiated study.

Assignment 3: Investigating the Materials – Surfaces and Structures

Introduction to a range of specialist working techniques – tutor demonstration, Q&A then individual experimentation with surface decoration and structural potential of glass and associated materials.

Learners:

- carry out a series of experiments using a range of surface decoration techniques and materials – sample pieces, practical work in studio
- assess results and collate – annotated sketchbook work, technical notes
- carry out a series of experiments using a range of construction and joining techniques – test pieces, practical work in studio
- evaluate effectiveness of techniques and processes used – verbally and written
- plan presentation
- present results of explorations as a series of maquettes, drawings, sample pieces, annotations, technical notes.

Learner-initiated study.

Review of unit and assessment.

Assessment

For the pass criteria, learners must investigate the relevant specialist glass techniques safely and be able to describe properties and characteristics in simple terms. It is anticipated that learners may need tutor support to achieve the pass criteria.

Evidence for P1, P2 and P3 will overlap to a certain extent and should include recordings of research and investigations for a range of specialist glass techniques and processes. These should be organised in a sketchbook or notebook. These records, alongside actual work and tutor observation, will provide the evidence required for assessment purposes.

Evidence for P3 should include a range of work, likely to be in the form of sample pieces with well-organised records. Work generated in this context will be influenced by the technical opportunities and constraints of the specialism and the available resources.

For P4, learners need to present their experiments and findings in a suitable way. This should include actual samples, photographs and notations of processes and techniques and is intended to be of use to learners in future work using specialist glass techniques. Evidence for P4 should be strongly linked to P5.

For P5, learners need to review their work using appropriate terminology. This may be part of the exploratory work, as notation or other recording of the processes and techniques followed. It may be presented as an oral presentation or discussion, or may take the form of a written evaluation or questionnaire. Evidence for oral presentation/discussion could be recorded or in the form of tutor written observations.

For M1, learners should show clear understanding of the characteristics and uses of a range of specialist glass techniques and processes. They should demonstrate the ability to use glass techniques and processes in different contexts and to apply results of experiments to their own continued creative work. The tasks are likely to be the same as those set for the pass criteria but learners should carry out investigations with increased independence and greater understanding.

For M2, learners need to demonstrate a greater awareness of skills and knowledge gained in any discussion of their work. Again, assessment evidence should take a similar format to that for P4.

For D1, learners must work independently to produce an innovative body of work that recognises the potential and limitations of specialist glass techniques and processes and shows a high level of practical skill and intellectual rigour. Additionally, learners should reflect on the effectiveness of their decision making and use knowledge and skills gained to advance the creative work. Assessment evidence should take a similar format to M1 and M2.

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, P3 M1 D1	Assignment 1: Investigating the Materials – Research and Enquiry	Glassmaker carries out an investigative enquiry into historical and contemporary use of glass and presents results.	Annotated sketchbook. Photographs, images. Collated research.
P1, P2, P3, P4, P5 M1, M2 D1	Assignment 2: Investigating the Materials – Experiment and Exploration	Interior designer explores the properties and characteristics of glass and associated materials through a series of experiments, analysis and problem solving.	Samples/test pieces. Technical notes. Annotated sketches. Verbal and written evaluation.
P1, P2, P3, P4, P5 M1, M2 D1	Assignment 3: Investigating the Materials – Surfaces and Structures	Sculptor explores a range of specialist working techniques for glass to include surface decoration, construction and joining.	Annotated sketchbook work. Technical notes. Sample pieces. Maquettes/models. Verbal and written evaluation of effectiveness of techniques and processes used.

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
Creative Use of Materials, Techniques and Processes	Working in 3D Design Crafts	Extending Specialist Glass Techniques
Explore Surface Decoration	Explore Surface Decoration	Exploring Resistant Materials
	Materials, Techniques and Processes	Extending Resistant Materials

Essential resources

Learners need access to workshop facilities equipped to the appropriate standards for this level of specialised work. They also require workbenches, glass working tools and machinery with extraction mechanisms where necessary, storage facilities and a suitable space for experimental work. Suitable space for 'hot' work such as soldering and a safe area for handling hazardous materials such as sheet glass, lead, glass paints, plaster and alginate are required according to the techniques offered. Where kiln-formed glasswork is to be offered, learners need access to appropriate kilns and if casting is to be offered a range of mould-making and cold working equipment. There should be adequate storage space for materials, work in progress and finished work. A separate plaster area with appropriate extraction is essential if mould-making is to be offered. Learners also need a clean area for drawing and recording work. For research learners need access to technical resources, a library, the internet, journals and IT facilities.

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.

Creative making skills are identified as a long term need for the creative and cultural sector and this unit aims to equip learners with a broad base of practical design and making skills relating to glass specialist materials and techniques, supported by sound technical knowledge to underpin the processes. With the lack of craft education in schools, the programme which includes this unit contributes to the continuing training of glass craft workers. The contemporary Glass Society website www.cgs.org.uk includes student pages, job vacancies, and so on.

Indicative reading for learners

Textbooks

Beveridge P, Domenech I and Pascual E – *Warm Glass: A Complete Guide to Kiln-Forming Techniques: Fusing, Slumping, Casting* (Lark Books, 2008) ISBN 978-1579906559

Bray C – *A Dictionary of Glass* (A&C Black, 2001) ISBN 978-0713657920

Cummings K – *Techniques of Kiln Formed Glass* (A&C Black, 2002) ISBN 978-0713661200

Gerstein M and Wrigley L – *The Complete Stained Glass Course* (Apple Press, 2000) ISBN 978-1840922745

Hawkins Opie J – *Contemporary International Glass* (V&A Publications, 2004) ISBN 978-1851774265

Hess C and Wight K – *Looking at Glass: A Guide to Terms, Styles and Techniques* (V & A Publications, 2005) ISBN 978-1851774609

Isenberg A and S – *How to Work in Stained Glass* (KP Books, 1998) ISBN 978-0873416283

Lundstrom B – *Glass Casting and Moldmaking: Book 3* (Vitreous Publications, 1989) ISBN 978-0961228224

San Casciani P – *The Technique of Decorative Stained Glass* (Batsford, 1996) ISBN 978-0713479843

Journals

Crafts – magazine published by the Crafts' Council every two months covering full range of crafts including glass

Neues Glass/New Glass – quarterly German publication in English featuring interviews with artists, reviews, information on exhibits and competitions, book reviews and the latest glass art news from around the world

Websites

www.cmog.org	Corning Museum of Glass, New York: good range of images of work by international glass artists
www.craftscouncil.org.uk	Crafts Council: register of contemporary craft workers including glass makers
www.glassindustry.info	Index of glass makers, suppliers etc
www.sunderland.ac.uk	International Institute for Research in Glass: range of research projects in glass
www.nationalglasscentre.com	The National Glass Centre, Sunderland: a cultural and educational resource, website shows artists' work and exhibitions past, present and future
www.vam.ac.uk/collections/glass	Victoria and Albert Museum: glass gallery

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	planning and carrying out an investigative enquiry into the properties and characteristics of specialist materials recording findings of experiments and using to inform further work
Creative thinkers	generating experimental work using specialist techniques for glass and associated materials
Reflective learners	reviewing and evaluating results of their own work and acting on findings
Self-managers	using tools and materials safely.

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	using research to explore appropriate applications for glass and associated materials justifying decisions made with evidence
Creative thinkers	developing and adapting ideas based on results problem solving to address unexpected outcomes of experiments
Reflective learners	keeping a reflective log on their own progress and development considering their own strengths and areas for improvement and suggesting ways forward
Team workers	working in a group to share research and taking responsibility for their own contribution managing discussions to reach agreement and achieve results
Self-managers	managing and prioritising their own workload within specified time frames managing resources communicating to audience of peers and tutors.

● 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 into work of other artists, designers and makers
Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used	planning research and presentations. presenting their own creative work to peer group and tutors
ICT – Find and select information	
Select and use a variety of sources of information independently for a complex task	researching into work of other artists, designers and makers and presenting findings
Access, search for, select and use ICT-based information and evaluate its fitness for purpose	using internet for research selecting appropriate material for presentation
ICT – Develop, present and communicate information	
Enter, develop and format information independently to suit its meaning and purpose including: <ul style="list-style-type: none"> • text and tables • images • numbers • records 	collating research with words and images evaluating work presenting research findings, possibly as a PowerPoint presentation
Bring together information to suit content and purpose	researching and presenting findings planning presentation
Present information in ways that are fit for purpose and audience	presenting findings of research discussing their own, their peers' and others' views on the work of other artists, designers and makers
Mathematics	
Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations	planning project work calculating sizes/weights of materials
Identify the situation or problem and the mathematical methods needed to tackle it	measuring for drawing up and cutting templates for stained glass
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	

Skill	When learners are ...
English	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	<p>discussing their own, their peers' and others' views on their own work and on the work of others</p> <p>presenting their own creative work to peer group and tutors</p>
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	reading for research
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	<p>writing up research</p> <p>writing up technical notes on processes and materials</p> <p>writing an evaluation of their own work.</p>