Unit 7: Graphical Detailing

Delivery guidance

In this unit, learners will develop the knowledge and skills to enable them to produce graphical information using manual and computer-aided design (CAD) methods.

Learners will be able to assess the appropriate media and materials for the intended visual outcome. They will also learn the importance of clear visual, written and verbal communication to convey the information and detailed instructions required for successful construction projects.

Learners will need access to computers with suitable CAD software installed, along with an area suitably equipped to produce graphical information using manual methods. It is advisable to plan more time in the CAD room/drawing office than in the classroom, as this unit requires learners to develop practical skills to produce graphical information.

High-quality drawings following conventions of BS1192:2007 – for example, of a typical two-storey building – will be a valuable learning resource and may be available from local architecture or construction firms. You should also plan visits to an architectural practice and invite guest speakers from architectural or structural engineering backgrounds. This will help your learners appreciate the importance of learning in this unit and will contribute towards their motivation.

This is an optional unit for learners taking the Subsidiary Diploma, Foundation Diploma, Diploma and the Extended Diploma. Throughout the delivery, you should relate the content and skills focus to a number of other units on these qualifications – such as the mandatory *Unit 2: Construction Design* and *Unit 1: Construction Technology* – as this will help to motivate learners. There will be further links applicable for learners taking optional units, such as *Unit 13: Site Engineering in Construction*.

Approaching the unit

This unit focuses on developing practical skills to produce graphical information, covering various types of drawings and freehand sketches. Before you start developing these skills, you should introduce learners to the materials and equipment they need for this unit. Providing learners with an industry standard set of drawings will help them to understand the layouts and conventions used.

You will need to provide constructive and developmental feedback on learner work on an ongoing basis. You should expect that the learners' progress on the attainment of skills will vary. You may, therefore, need to arrange additional support or drop-in sessions for some learners.

To further support learners in developing their CAD skills, you could store all resources on a shared drive or server where learners can access them at any time. This would also help learners who require more time in developing their skills.

Delivering the learning aims

Learning aim A

In learning aim A, learners will develop their understanding of the resources required to produce construction drawings using both manual and CAD methods.

You could introduce the materials and equipment required to produce drawings manually. Give your learners a set of drawings to appreciate the requirements. You will need to do some practical demonstrations of how equipment can be used.

When introducing learners to the CAD environment, you should again approach with practical demonstrations followed by individual support as required. Demonstrations could be supported with web-based video resources. You could provide links to such resources through the shared folder. These resource links are liable to change over time, so you will need to ensure that you keep the list updated and relevant.

Learning aim B

In learning aim B, learners will be tasked with developing construction drawings for a given brief. Offer your learners enough opportunities to practice drawing to standard conventions, for example in accordance with BS1192:2007, but also ensure that learners are able to work independently when working on their assessment tasks. Ask learners to reflect on, and evaluate, their experience of producing graphical information using manual and CAD methods.

Make a continuous reference to the assessment criteria when learners are working on the class-based exercises. This should be particularly be done when relating the quality of output to meet recognised national and international standards. This is so that learners appreciate the importance of following standard conventions, always keep the focus on the exact requirements of the assessment and put effort where it is needed, instead of into something of little value in terms of assessment of the unit.

Learning aim C

Learning aim C is about production of two-dimensional (2D) and three-dimensional (3D) freehand construction sketches. Use suitable video resources to develop freehand sketching skills. You could do a practical demonstration of, for example, how the interior of a room could be drawn from a square or a rectangle. Give learners examples of suitably annotated freehand sketches. Allow enough time for learners to practice before starting an assessment activity. You should also refer to the assessment criteria as appropriate, especially to the importance of annotations and the use of a suitable sketching technique.

Assessment model

Learning aim	Key content areas	Recommended assessment approach
A Understand the resources required to produce construction drawings	**A1** Manual methods **A2** Computer-aided design (CAD) **A3** Comparison of manual and CAD methods of drawing	An evaluative report or presentation supported with illustrations, images and sketches of the equipment and media that learners used in producing their construction drawings. Learners' construction drawings produced using manual and CAD methods, following standard conventions and practices in response to a given brief.
B Develop construction drawings for a given construction brief	**B1** Construction drawings	
C Undertake production of two-dimensional and three-dimensional freehand construction sketches	**C1** Principles, techniques and conventions. **C2** Freehand sketches **C3** Skills, knowledge and behaviours	A portfolio of 2D and 3D freehand sketches. The portfolio should demonstrate the skills to use two- and three-point perspectives.

Assessment guidance

A maximum number of two summative assignments is recommended for this unit, with assignment 1 covering both learning aims A and B.

You should provide adequate details within the brief – such as line plans and concept design – so that learners can produce the drawings to the required standard and carry out suitable evaluation.

Moving on to learning aim C and assignment 2, you could use the same project brief, but add clear instructions about the techniques and annotations required for the freehand sketches.

For each assignment, you could ask learners to submit assessment evidence in the form of an evaluation report or presentation, along with a portfolio of drawings and freehand sketches.

Getting started

This provides you with a starting place for one way of delivering the unit, based around the recommended assessment approach in the specification.

Unit 7: Graphical Detailing

Introduction

Introduce the unit by giving your learners a set of drawings relating to the construction of a two-storey building, produced in accordance with appropriate national or international standards. To emphasise the significance of this unit, you could show your learners how information is extracted from these drawings by the various parties involved – from client, through to planning authorities, the site manager and engineers. By doing this, you can highlight the importance of information being interpreted correctly, e.g. how a setting out engineer will use these plans or how these plans would help a project planner to set up the site and produce a project plan.

Your aim throughout should be to develop learners' appreciation of the materials and equipment required to produce these drawings, with good understanding of the standard conventions used.

Learning aim A – Understand the resources required to produce construction drawings

Learning aim A1

- In a tutor-led practical demonstration, show learners the variety of media and equipment used to produce manual drawings. Use web-based video resources and animations to supplement learning.
- For an initial individual practical activity, you could give learners a sheet of commonly-used symbols and conventions extracted from drawings produced to national or international standards and ask them to redraw these. Support learners in setting up, layout and using equipment.
- You could then give learners a set of drawings for a typical two-storey building, including site plans, building plans and elevations, sections, component details, structural drawings, as well as preliminary sketches. Ask learners to interpret and share their findings in a class discussion, providing tutor support and clarifications where necessary.
- Introduce learners to the use of scale for drawings and ask them to reproduce drawings given in the previous activity to different scales. This activity will develop learners' skills further in understanding symbols and conventions used in drawings.
- Lead a group activity where learners investigate materials and equipment required to produce manual drawings. You could relate this to the previous activity and use the same set of drawings to understand the production requirements: e.g. the requirements to produce a preliminary sketch as compared with component drawings.

Learning aim A2

- In a tutor-led demonstration, show learners the various pieces of hardware that they will use to produce 2D and 3D CAD drawings. Discuss with them the software they will use and its requirements.
- Give a practical tutor demonstration of a range of CAD techniques, starting with basic drawing and editing commands, manipulation of views, importance of file management

and saving files in appropriate formats. As you progress through the functionality, introduce learners to the basic commands as they familiarise themselves with the software and techniques. Support learners in developing templates and create a shared folder where learners can save their work.

- Over several practical sessions, set learners a number of tasks to work through for them to produce different elements of a building, concluding the tasks with a 3D virtual building model, 2D views, camera views and rendered images.

Learning aim A3

- Facilitate a tutor-led discussion on CAD and traditional drafting techniques for learners to consider the need to evaluate resources and design skills learned to date in terms of each of the factors included in the unit content.
- You may wish to then issue the initial assignment for learners to reflect on the use of manual and CAD drawing methods before progressing to the practical, skills development focus of learning aim B.

Learning aim B – Develop construction drawings for a given construction brief

Learning aim B1

- The focus of this learning aim is for learners to refine their practical skills in producing construction drawings to reach the standards and satisfy the conventions of construction drawings. Practice is key, so you will need to support learners by providing sufficient and suitable practice tasks, such as drawing plans and elevations, cross-section drawing, and component drawing for them to work on independently.
- Given the scope of this unit, learners need to focus on the skills applicable to the assessment criteria, and this should be reiterated to them as necessary. It would be appropriate to use drawings that are relevant to specific construction specialisms, such as civil engineering, building services engineering or construction and the built environment.
- Allow adequate time for learners to practice the art of drawing manually or using CAD and monitor their progress by supporting them in their practice tasks. Ensure that the focus of the practice tasks is on developing skills to produce drawings following recognised nationals and international standards and that learners understand the importance of these standards for a quality output.
- Ensure that learners are supported throughout their practice sessions and are given constructive and developmental formative feedback on their work. You will also need to encourage learners to self-assess their own progress in manual and CAD drawings and take responsibility to attend the additional support or drop-in sessions on areas that they struggle with.
- To inspire your learners, invite a guest speaker from an architectural consultancy firm who would be able to emphasise the importance of learning CAD as an essential skill for employability. From the outset, you will need to schedule in sufficient class time and access to resources to accommodate the first assignment.

Learning aim C – Undertake production of two-dimensional and three-dimensional freehand construction sketches

Learning aim C1

- To introduce this learning aim, give learners some high-quality sketches that have appropriate annotations. To engage learners on the usefulness of various annotations shown, you could question how such information would be used and by whom. For example, an annotation about the condition of a building element will be of use for a building surveyor.
- The practical activities, with demonstration by the tutor, should focus on developing skills to understand proportionality of objects, oblique projections and vanishing points. The learners should then apply these skills to identify horizon lines and vanishing points on the sketches given by the tutor and to produce both two- and three-point perspective sketches.

Learning aims C2 and C3

- Learners will apply these techniques to produce a range of sketches for the interior of a building, covering room and space layout and showing location of various features, doors and windows. Support learners to use correct conventions to communicate information, such as materials and condition. This can be supported by producing sketches of interior spaces and rooms that learners are familiar with.
- Using the same approach, learners will produce sketches for the exterior of a building showing spatial layout, features and marking of correct vanishing points.
- Throughout the practical sessions, you will need to demonstrate to learners the various techniques used for freehand sketching, making use of online tutorials where appropriate.
- Lead a group activity where learners are given sketches with either no annotations or incorrect annotations. Learners could then carry out a group discussion as to how this misinformation could impact on various construction processes. You can facilitate this discussion by drawing on key points and summarising the findings.
- In a class discussion, get learners to consider the professionalism expected when construction sketches are required. As well as the quality and accuracy of drawings and annotations, emphasise the importance of meeting deadlines. Ask learners to consider the consequences for the wider project team if deadlines are missed, or inaccurate drawings are used, and how the construction team members could take incorrect decisions.
- Learners will need access to a number of practice tasks to develop the skills to produce freehand sketches representing, for example, the interior and exterior of a building. Allow adequate time for learners to practice sketching techniques, clearly showing vanishing points, and ensure that learners develop skills to use annotations to communicate details of materials, finishes, condition or any other relevant information in sketches.
- You will provide ongoing support to learners throughout the practice sessions, but you may also need to schedule in additional support or drop-in sessions to help learners master the technical skills.

Details of links to other BTEC units and qualifications and to other relevant units/qualifications

This unit links to:

- Unit 1: Construction Technology
- Unit 2: Construction Design
- Unit 13: Site Engineering in Construction
- Unit 14: Low Temperature Hot Water Systems in Building Services Engineering
- Unit 15: Measurement Techniques in Construction
- Unit 16: Provision of Primary Services in Construction

Resources

In addition to the resources listed below, publishers are likely to produce Pearson-endorsed textbooks that support this unit of the BTEC Internationals in Construction. Check the Pearson website (http://qualifications.pearson.com/endorsed-resources) for more information as titles achieve endorsement.

Textbooks

BSi, *BS1192: 2007+A2:2016*, British Standards Institute, 2008, ISBN 9780580928178
This is the official British Standard Code of Practice dealing with collaborative production of architectural, engineering and construction information covering signs, conventions, naming and so on. You could register using the following link to get a free copy of BS1192:2007 code of practice:

Huth, M., *Understanding Construction Drawings* (7th Edition), Cengage Learning, 2017, ISBN 9781337408639
This book has examples of both domestic and commercial projects and deals with the subject in a hands-on manner.

Kubba, S., *Blueprint Reading: Construction Drawings for the Building Trade*, McGraw-Hill Professional, 2008, ISBN 9780071549868
This book has examples of a range of drawings used in construction and will be useful to understand the information contained within and the conventions used.

Journals

AT Magazine – this journal is published by Chartered Institute of Architectural Technologists (CIAT) and contains updates on regulations and technical issues.

Construction Manager – this journal is published by the Chartered Institute of Building and contains updates on construction projects, methods and materials.

Videos

Go to the 'YouTube' website and search for the following videos:

AutoCAD – Tutorial for Beginners [Complete – 12 mins!]

How to draw like an architect, pt.1 – The Floor Plan

How to draw like an architect, pt.3 – The Wall Section

Websites

Architectural Digest website – a monthly international design magazine. A wide variety of innovative homes and products are available on the website to inspire learners.

Royal Institute of British Architects website – a professional association that offers some educational resource and standards relevant to the drawing, modelling and design phases of construction.

Pearson is not responsible for the content of any external internet sites. It is essential for tutors to preview each website before using it in class so as to ensure that the URL is still accurate, relevant and appropriate. We suggest that tutors bookmark useful websites and consider enabling students to access them through the school/college intranet.