

Pearson BTEC Level \_ Higher Nationals in Engineering (RQF)

## Unit 32: CAD for Maintenance Engineers

# Unit Workbook 1

in a series of 1 for this unit

Learning Outcomes 1, 2, 3 & 4

## 2D CAD Drawings, Blocks, Schematics & Data Extraction

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SAMPLE

## INTRODUCTION

### Create and modify CAD drawings.

- *Introduction to the User Interface:*
  - Command line, Status Bar, panel titles and tabs.
  - Recognise and apply absolute relative and polar coordinates.
- *Drafting Aids:*
  - Grid, snap, object snap, ortho and polar tracking.
- *Draw Commands:*
  - Line types, circle, text, hatching, dimensioning.
- *Modifying Commands:*
  - Copy, rotate, move, erase, scale, chamfer, fillet.
  - Creating and defining text and dimension styles.
- *Creating Layers:*
  - Layers/levels, colour.
- *Viewing Commands:*
  - Zoom, pan, viewports and layouts.

### Construct, insert and export blocks with textual attributes.

- *Creating and editing blocks and write blocks.*
- *Defining, editing and managing attributes.*
- *Inserting blocks from external sources.*
- *Attribute extraction.*
- *Dynamic and nested blocks.*
- *Using the design centre and tool palettes.*

### Produce complex schematic drawings.

- *Create block library and table legend, including symbols and description.*
- *Create electrical, electronic, hydraulic and pneumatic schematic drawings.*

### Transfer information to external sources.

- *Electronic transfer of information:*
  - Data extraction and data extraction (DXE) files.
  - Extracting data to tables and spreadsheets.
  - Organise and refine the extracted data.
  - Table styles and formatting data extraction tables.

## GUIDANCE

This document is prepared to break the unit material down into bite size chunks. You will see the learning outcomes above treated in their own sections. Therein you will encounter the following structures;

### Purpose

Explains *why* you need to study the current section of material. Quite often learners are put off by material which does not initially seem to be relevant to a topic or profession. Once you understand the importance of new learning or theory you will embrace the concepts more readily.

### Theory

Conveys new material to you in a straightforward fashion. To support the treatments in this section you are strongly advised to follow the given hyperlinks, which may be useful documents or applications on the web.

### Example

The examples/worked examples are presented in a knowledge-building order. Make sure you follow them all through. If you are feeling confident then you might like to treat an example as a question, in which case cover it up and have a go yourself. Many of the examples given resemble assignment questions which will come your way, so follow them through diligently.

### Question

Questions should not be avoided if you are determined to learn. Please do take the time to tackle each of the given questions, in the order in which they are presented. The order is important, as further knowledge and confidence is built upon previous knowledge and confidence. As an Online Learner it is important that the answers to questions are immediately available to you. Contact your Unit Tutor if you need help.

### Challenge

You can really cement your new knowledge by undertaking the challenges. A challenge could be to download software and perform an exercise. An alternative challenge might involve a practical activity or other form of research.

### Video

Videos on the web can be very useful supplements to your distance learning efforts. Wherever an online video(s) will help you then it will be hyperlinked at the appropriate point.

## 1.2 Blocks

Blocks are specific groups of objects that act as a single 2D object, they are used to create repeated content such as components which are commonly used and standard details or notes. They are a very useful tool in 2D CAD design because they save the designer from re-drawing exactly the same object every time that they wish to use it. It is possible to create brand new custom blocks which may be specific to a certain application, or to use a block from a library which is built into the CAD software, or even from an online catalogue of blocks.

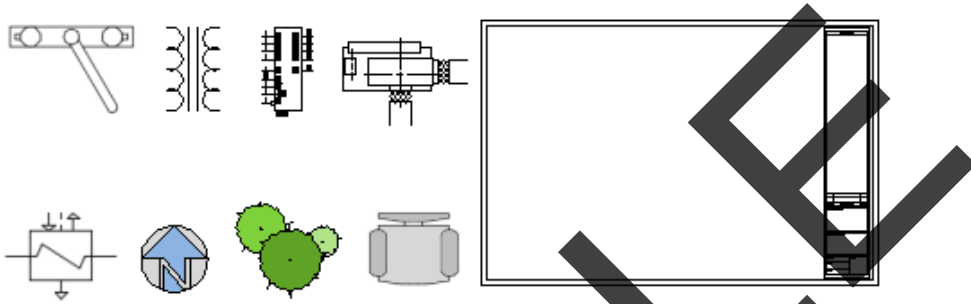


Figure 1.2: Various Block Examples

Dynamic blocks have flexibility and some degree of intelligence so that they can accommodate variable attributes, such as colour, layer, linetype, linewidth, material, name, orientation, scale and rotation. Any kind of block can be added to your own library, this library is known as a design centre or tool palette generally. There are many tutorial videos available which can help in explaining these versions of block libraries, such as the following:

Video

<https://www.youtube.com/watch?v=k0nJBS7RWH8>

<https://www.youtube.com/watch?v=TT0zrZYQyFo>

<https://www.youtube.com/watch?v=pf34RMSfP2Y>

Review the AutoCAD tutorials on blocks and attributes to become familiar and more competent in their use.

<https://knowledge.autodesk.com/support/autocad/getting-started/caas/CloudHelp/cloudhelp/2015/ENU/AutoCAD-Core/files/GUID-2DA2ADA1-C8CC-4E61-9598-06580FFD3544-htm.html>

<https://knowledge.autodesk.com/support/autocad/learn-explore/caas/screencast/Main/Details/f5684b6a-5141-4bfe-880a-09ab3354dfa9.html>

## 1.3 Schematics

One of the main uses of 2D CAD software is in the production of complex schematics, these are often in the form of electrical or hydraulic systems. There are certain addons to the standard AutoCAD software which provide specific additional capacity and features that are tailored to things like plumbing, building systems, electrical etc. The AutoCAD MEP toolset is one such of these addons and can be accessed via:

<https://www.autodesk.com/products/autocad/included-toolsets/autocad-mep>

The following video provides a useful tutorial for beginners as well as some schematic examples:

**Video**

<https://www.youtube.com/watch?v=Ye6plsPSiBU>

<https://www.youtube.com/watch?v=ciNMQCdXypY>

**Challenge**

Create a 2D schematic of, either a hydraulic or electrical system that you are familiar with. It could be something related to your working life or a system that you have encountered outside of work, try to include a block library in this schematic.

SAMPLE