Core Mechanical carousel CME32 Using a CAD system to produce Engineering drawings

Scope

- This short carousel consolidate prior learning from Phase 1 BTEC Unit 16 *(Engineering Drawing For Technicians)* The carousel covers a broad range of CAD skills that will prepare the trainee into the engineering or manufacturing sectors, creating a progression between education and employment, or will provide a basis for the development of additional skills which will be used in further mechanical carousels. The course entails the trainees learning to efficiently use a CAD system and the uses and applications of CAD in a modern Engineering environment. The trainees will undertake 3 assessments to develop their CAD and Drawing skills. The assessments are:

1. Produce an A4 & A3 template drawing.
2. Produce a standard orthographic component drawing.
3. Produce a series of component drawings & an assembly drawing.

The assessments are realistically achievable in the time scale of the carousel.

Aim

- To successfully use a CAD system to produce Engineering drawings

Objectives

- Configure the PC to use the AutoCAD software
- Configure the AutoCAD software user interface
- Use basic menus, commands & layers
- Produce component Cad drawings
- Save, manage & print drawing files

Underpinning Knowledge Lectures – Refreshers /Consolidation

- Apply safe working practices
- Introduction to AutoCAD
- Practical demonstrations

Hand-outs

- DSE Hand-out
- AutoCAD 2D Tutorial – Introduction to Commands
- AutoCAD 2D Tutorial – Draw Commands
- Assessment 1 Brief
- Assessment 2 Brief
- Assessment 3 Brief

Write-ups

- End Test
- ROA

Experiential Learning - Learning through practical experience and learning by reflecting on experience.

Learning through practical experience

- Learning in a work-based environment – TTE IT Suite
- Carrying out case study work – Research cost effective design materials
- Planning and carrying out practical tasks and write-ups

Learning through reflecting at all stages of the experience

- Preparing and planning for the tasks
- Reviewing and adapting as necessary
- Reflecting after the task has been completed
- Evaluating, self-assessing and identifying learning points.

Core & Functional Skills Employed

Of the five Core Skills four are covered:

- **Communication** – *Understanding & Interpreting Engineering Drawings*
- **Numeracy** – *Using Imperial & Si Units to make calculations (non calculator) using known equations to solve triangles.*
- **Problem Solving** – *Dealing with problems that arise using the AutoCAD software*
- **Working with Others** – *Collaborating to work Effectively & Efficiently by seeking advice from the TO whilst working with their peers as part of a team*
- **Information Technology** – Using IT equipment, Using AutoCAD software, File management, Using peripherals

Generic Skills & Attitudes Gained:

- Understanding of the workplace and the employee's responsibilities, for example H&S, time-keeping, appearance,
- Self-evaluation skills
- Positive attitude to learning
- Flexible approaches to solving problems
- Adaptability and positive attitude to change

Learning Outcomes

- Be fully conversant with the Health & Safety requirements
- Be able to competently use IT equipment
- Use a CAD system to produce component drawings
- Be able interpret and understand Engineering drawings
- Be able to plan a project
- Understand the progression between education and employment,
- Working with others as part of a team
- Self-Actualization, self-reliance, confidence - through achievement

Personal Development Outcomes

- successful learners
- confident individuals
- responsible citizens
- effective contributors

Differentiation

- **By Extension** – Additional practical tasks for students who are achieving their objectives –
    1. Produce more detailed drawings by the use of additional tolerance both linear and geometrical
    2. Produce a detailed BOM *(Bill of Materials)*
    3. Peer support for example students with a natural aptitude to specific area can support the other members of the group.
- **By Group Work** –Small groups can produce piece part drawings that on completion can be integrated into an assembly thus promoting good teamwork and reinforcing the importance of an individuals role within a team – real world examples are large CAD projects e.g. an Aircraft where many people contribute piece part drawings culminating into a final product assembly.
- **By Activities** – Example available are file management and batch printing.
- **By Content –** There may be a requirement for the trainees to be given an input / presentation on Engineering materials. This can be delivered at any point within the carousel if deemed appropriate by the training officer

Strategies for E&D challenging stereotypes

Typically some groups may have a small female contingent and it is often the case where the males in the group have the view engineering as a male dominated profession thus stereotyping the female members of the group and in some cases resent them being there. This can be further exacerbated when the females out perform the males. Alternately the females may feel intimidated and underperform.

In addition to females there are often ethnic minorities within the group- I will use the term "Ethnic Minorities" in its broadest characteristics. This may involve Black & Asian also religious beliefs for example "Jehovah's Witnesses" along with geographical minority members e.g. Wales, Liverpool, Manchester.

Methods for challenging behaviours associated with the above:

- Emphasis on how diverse engineering is in today's world and the values of having a diverse workforce
- Demonstrate and explain how CAD/Engineering drawing is the International language of Engineers thus overcoming language barriers.
- Encourage collaboration
- Negotiate and agree behavioural expectations
- Define examples of unacceptable language /behaviour
- Challenge inappropriate language /behaviour
- Monitor group dynamics for existing or potential "Cliques"
- Re-enforce teamwork