County Dublin VEC

Programme Module for

Engineering Workshop Processes

leading to

Level 5 FETAC

Engineering Workshop Processes 5N1608

Introduction
This programme module may be delivered as a standalone module leading to certification in a FETAC minor award. It may also be delivered as part of an overall validated programme leading to a Level 5 FETAC Certificate.

The teacher/tutor should familiarise themselves with the information contained in the County Dublin VEC's programme descriptor for the relevant validated programme prior to delivering this programme module.

The programme module is structured as follows:

1. Title of Programme Module
2. FETAC Component Title and Code
3. Duration in hours
4. Credit Value of FETAC Component
5. Status
6. Special Requirements
7. Aim of the Programme Module
8. Objectives of the Programme Module
9. Learning Outcomes
10. Indicative Content
11. Assessment a. Assessment Technique(s) b. Mapping of Learning Outcomes to Assessment Technique(s) c. Guidelines for Assessment Activities
12. Grading
13. Learner Marking Sheet(s), including Assessment Criteria

Integrated Delivery and Assessment
The teacher/tutor is encouraged to integrate the delivery of content where an overlap between content of this programme module and one or more other programme modules is identified. This programme module will facilitate the learner to develop the academic and vocational language, literacy and numeracy skills relevant to the themes and content of the module.

Likewise the teacher/tutor is encouraged to integrate assessment where there is an opportunity to facilitate a learner to produce one piece of assessment evidence which demonstrates the learning outcomes from more than one programme module. The integration of the delivery and assessment of level 5 Communications and level 5 Mathematics modules with that of other level 5 modules is specifically encouraged, as appropriate.

Indicative Content

The indicative content in Section 10 does not cover all teaching possibilities. The teacher/tutor is encouraged to be creative in devising and implementing other approaches, as appropriate. The use of examples is there to provide suggestions. The teacher/tutor is free to use other examples, as appropriate. The indicative content ensures all learning outcomes are addressed but it may not follow the same sequence as that in which the learning outcomes are listed in Section 9. It is the teacher's/tutor's responsibility to ensure that all learning outcomes are included in the delivery of this programme module.

1. Title of Programme Module
Engineering Workshop Processes

2. Component Name and Code
Engineering Workshop Processes 5N1608

3. Duration in Hours
150 Hours

4. Credit Value
15 Credits

5. Status
This programme module may be compulsory or optional within the context of the validated programme. Please refer to the relevant programme descriptor, Section 9 Programme Structure

6. Special Requirements
The provider will have to have access to an engineering workshop.

7. Aim of the Programme Module
This programme module aims to equip the learner with the knowledge and skill to carry out a range of engineering processes competently and safely.

8. Objectives of the Programme Module

- To enable the learner to explore and progress in a chosen engineering area.
- To facilitate the learner to develop skills relating to engineering workshop machining, joining and bench work processes.
- To assist the learner to gain an understanding of key terminology, symbols and units of measure in the engineering environment.
- To create an awareness of good work practices and appreciate the need for health and safety requirements in the workplace.
- To assist the learner to develop the academic and vocational language, literacy and numeracy skills related to Engineering Workshop Processes through the medium of the indicative content.
- To enable the learner to take responsibility for his/her own learning.

9. Learning Outcomes of Level 5 Engineering Workshop Processes 5N1608

Learners will be able to:

1. Analyse key principles and techniques relating to engineering workshop tooling and processes.

2. Interpret key terminology, symbols and units of measure in relation components, tools and techniques utilised in an engineering workshop environment.

3. Select appropriate hand tools and safely employ techniques to cut, file and shape a range of components and materials utilised in an engineering workshop.

4. Produce components using a range of workshop machinery to include safe use of drilling machines, lathes, milling machines and computer numerical control.

5. Employ appropriate techniques and tooling to shape and bend materials including use of formers, folding bars and heaters.

6. Utilise a range of metallurgical joining techniques to include welding, solder and brazing.

7. Utilize a range of technologies and techniques to join various materials to include use of mechanical and chemical fixings.

8. Utilise appropriate techniques to apply a range of finishes to include polishing, lacquering, painting and dip-coating.

9. Demonstrate an ability to select material and tools appropriate to the requirements of specific engineering workshop tasks.

10. Demonstrate an ability to contribute to, and improve on, health and safety procedures in a workshop environment.

11. Analyse health and safety legislation and identify the key legal responsibilities in relation to employers and employees in a workshop environment.

12. Assess and document the condition of workshop machinery and components to include inspection of cutters and guards.

10. Indicative Content

This section provides suggestions for programme content but is not intended to be prescriptive. The programme module can be delivered through classroom based learning activities, skill demonstrations, workshop practice, social media, IT resources, group discussions, one-to-one tutorials, field trips, and other suitable activities, as appropriate.

Section 1: Marking out and use of hand tools.

Facilitate the learner to:

- Identify and apply common engineering symbols and units of measure
- Apply, according to standard conventions, required dimensions such as
  - Linear
  - Angular
  - Diameter
  - Radii
  - Circular arcs
  - Position of holes
  - Location of parts
- Use the following marking out tools
  - Rule
  - Scriber
  - Vernier protractor
  - Dividers
  - Centre Punch
  - Vernier Height Gauge
  - Surface plate
  - Vee Blocks
- Use the following measuring tools
  - Vernier callipers
  - Micrometer screw gauge
- Remove material to a tolerance of ± 0.5mm using the following
  - Files
  - Snips
  - Guillotine
  - Saw
- Bend material into shape using
  - Box and pan
  - Formers
  - Folding Bars
  - Strip heater
- Blow mould or vacuum from thermoplastics

Section 2: Machining

Drilling:

Facilitate the learner to:

- Remove material using fixed and portable drilling machines
- Correctly fit:
    - Parallel shank drill bits
    - Morse taper shank drill bits
    - Machine reamers
- Secure parts while drilling using
    - Machine vice
    - Clamps
- Change spindle speed
- Demonstrate the following
    - Pilot hole
    - Blind hole
    - Countersink hole
    - Counter bore
    - Spot face.

Lathe:

Facilitate the learner to:

- Perform the following operations on the lathe:
    - Facing
    - Diameter reduction
    - Taper turning
    - Drilling
    - Knurling
    - Parting off
- Secure material on the lathe using:
    - Three jaw chuck
    - Four jaw chuck
    - Chuck and tailstock
- Turn material to a tolerance of ±0.2mm
- Apply cutting fluid

Milling:

Facilitate the learner to:

- Machine material on the milling machine using:
    - end mills
    - slot mills
    - form cutter
- Mill material to a tolerance of ±0.2mm
- Apply cutting fluid
- Secure material on the milling machine using:
    - Machine vice clamps
    - Rotary table or dividing head.

CNC:

Facilitate the learner to:

- Set off-sets
- Test a run programme
- Execute a programme
- Carry out the following operations:
    - Facing off
    - Diameter reduction
    - Taper turning
    - Parting off
    - Drilling

Section 3: Fastening and Joining

Facilitate the learner to:

- Cut internal screw threads using taps
- Cut external screw threads using dies
- Assemble components using:
    - Nuts
    - Bolts
    - Screws
    - Rivets
- Join material using the following metallurgical methods:

- Soft solder
- Brazing
- Manual metal arc welding, MAGS welding or TAGS welding
- Oxy-acetylene welding
- Resistance spot welding

- Join materials using the following adhesive types:
  - Cyanacrylate
  - Solvent based
  - Epoxy resin.

Section 4: Protective Coatings and Material Finishes

Facilitate the learner to:

- Apply a range of finishes to include:
  - Polishing
  - Lacquering
  - Painting
  - Dip-Coating.

Section 5: Health and Safety

Facilitate the Learner to:

- Operate tools and equipment safely
- Wear the most appropriate form of PPE during a given task to ensure protection of the:
  - Eyes
  - Ears
  - Hands
  - Feet
  - Skin
  - Respiratory System
- Interpret common hazard symbols and material safety data sheets
- Carry out a hazard identification and risk assessment in the workplace
- Outline the rights and responsibilities of employees and employers as specified in the Safety Health and Welfare at Work Act and associated regulations.

11. Assessment

11a. Assessment Techniques

Skills Demonstration 50%

Project 50%

11b. Mapping of Learning Outcomes to Assessment Techniques

In order to ensure that the learner is facilitated to demonstrate the achievement of all learning outcomes from the component specification; each learning outcome is mapped to an assessment technique(s). This mapping should not restrict an assessor from taking an integrated approach to assessment.

Learning Outcome	Assessment Technique
1. Analyse key principles and techniques relating to engineering workshop tooling and processes.	Project
2. Interpret key terminology, symbols and units of measure in relation components, tools and techniques utilised in an engineering workshop environment.	Project
3. Select appropriate hand tools and safely employ techniques to cut, file and shape a range of components and materials utilised in an engineering workshop	Project
4. Produce components using a range of workshop machinery to include safe use of drilling machines, lathes, milling machines and computer numerical control.	Skills Demonstration
5. Employ appropriate techniques and tooling to shape and bend materials including use of formers, folding bars and heaters.	Skills Demonstration
6. Utilise a range of metallurgical jointing techniques to include welding, solder and brazing.	Skills Demonstration
7. Utilize a range of technologies and techniques to join various materials to include use of mechanical and chemical fixings.	Skills Demonstration
8. Utilise appropriate techniques to apply a range of finishes to include polishing, lacquering, painting and dip-coating.	Project
9. Demonstrate an ability to select material and tools appropriate to the requirements of specific engineering workshop tasks.	Project
10. Demonstrate an ability to contribute to, and improve on, health and safety procedures in a workshop environment.	Project/ Skills Demonstration

11. Analyse health and safety legislation and identify the key legal responsibilities in relation to employers and employees in a workshop environment.	Project/ Skills Demonstration
12. Assess and document the condition of workshop machinery and components to include inspection of cutters and guards.	Skills Demonstration

11c. Guidelines for Assessment Activities

The assessor is required to devise assessment briefs and marking schemes for the Skills Demonstration and Project. In devising the assessment briefs care should be taken to ensure that the learner is given the opportunity to show evidence of achievement of ALL the learning outcomes.

Assessment briefs may be designed to allow the learner to make use of a wide range of media in presenting assessment evidence, as appropriate. Quality assured procedures must be in place to ensure the reliability of learner evidence.

Skills Demonstration	**50%**
The learner will complete a minimum of 5 practical tasks based on a range of learning outcomes. Learners will demonstrate adherence to safe working practices throughout the skills demonstration and will submit supporting evidence for each practical task completed. The skills can be assessed at any time throughout the learning process.	
The skills demonstration will be evidenced by: 1. Tutor observation of: • Appropriate planning • Preparation of each task • Execution of each task. • Safe use of tools and techniques • Completion of each task 2. Quality of finish and precision in finished tasks. Evidence for this assessment technique will take the form of finished practical tasks and the tutor devised skills demonstration marking sheet. All instructions for the learner must be clearly outlined in a practical task brief.	

Project	**50%**
The learner will complete a project based on a range of learning outcomes. Learners will demonstrate adherence to safe working practices throughout the project and will submit a written portfolio and a practical assignment. The project will be assessed at an agreed deadline towards completion of the learning process.	
The tutor will devise a project brief that requires learners to demonstrate: • Understanding and application of key principles and techniques relating to engineering workshop processes. • Mastery of tools and techniques, and adherence to safe working practices • A range of skills in engineering workshop processes. • Ability to apply a range of finishes. • Ability to evaluate a project Evidence for this assessment technique may take the form of: • Background information and planning • Plans, working drawings of the project • The finished project • An evaluation of the finished project Any audio, video or digital evidence must be provided in a suitable format. All instructions for the learner must be clearly outlined in an assessment brief and assessment criteria.	

12. Grading

Distinction: 80% - 100%
Merit: 65% - 79%
Pass: 50% - 64%
Unsuccessful: 0% - 49%

At levels 4, 5 and 6 major and minor awards will be graded. The grade achieved for the major award will be determined by the grades achieved in the minor awards.

Engineering Workshop Processes 5N1608	Learner Marking Sheet Skills Demonstration 50%

Learner's Name: _____ Learner's PPSN: _____

Assessment Criteria	Maximum Mark	Learner Mark
• Appropriate preparation and planning of each task	10	
• Effective execution of each task demonstrating mastery and safe use of tools and techniques	25	
• Excellent quality of finish and precision in finished tasks	15	
Total Mark	50	

Assessor's Signature: _____ Date: _____

External Authenticator's Signature: _____ Date: _____

Engineering Workshop Processes 5N1608	Learner Marking Sheet Project 50%

Learner's Name: _____ Learner's PPSN: _____

Assessment Criteria	Maximum Mark	Learner Mark
• Effective use of Engineering workshop processes.	10	
• Mastery of tools and techniques and adherence to safe working practices.	10	
• Background information and planning.	5	
• Comprehensive use of plans and working drawings of the project.	5	
• Excellent technical, visual and aesthetic quality to finished product.	15	
• Critical evaluation of project.	5	
Total Mark	50	

Assessor's Signature: _____ Date: _____

External Authenticator's Signature: _____ Date: _____