



PIABC Level 2 NVQ Diploma in Furniture and Wood Processing – CNC Machining

Qualification Number: 601/4043/4

Qualification Specification

Updated: 15 January 2020

CONTENTS

	Page
Executive Summary	3
Aim	4
Outcomes/ who is this qualification for?	4
Target Group	4
Entry Requirements	5
Progression.....	5
Qualification Structure.....	5
Rules of Combination.....	6
Qualification Level.....	7
Programme Organisation	8
Guidance on Learning and Teaching	8
Qualification Description	9
Unit Content: Learning Outcomes and Assessment Criteria.....	10
Assessment	50
Glossary.....	50
Further Information	50

EXECUTIVE SUMMARY

The PIABC Level 2 NVQ Diploma in Furniture and Wood Processing – CNC Machining is a nationally recognised qualification which is designed to enable individuals to demonstrate trade specific competence and knowledge appropriate for the day to day activities in a manufacturing environment using CNC wood machinery and wood-based materials to create products and components

To achieve the qualification, learners need to successfully gain 87 credits made up from mandatory and optional units.

Programmes leading to the qualification can be organised and delivered by providers who have gained centre and qualification approval from PIABC. To achieve this they need to complete the PIABC centre and qualification approval procedures available from **www.piabc.org.uk**. In completing the documentation and the approval visit, centres need to demonstrate their ability to deliver high quality education leading to the qualification. Centres are expected to employ robust quality assurance processes. PIABC will appoint its own moderators to ensure the effective operation of these processes and the maintenance of standards of quality.

There is no necessity for any formal entry requirement to this course beyond the basic literacy and numeracy expected from anyone entering the business world.

This qualification was developed under the Qualifications Credit Framework (QCF) and comprises of units from a number of Sector Skills Councils and therefore Assessors should use the associated relevant Assessment Strategies.

AIM

The primary purpose of the qualification is to enable individuals to demonstrate trade specific competence and knowledge appropriate for the day to day activities in a manufacturing environment using wood and wood-based materials to create products and components. Specific products may include, for example: furniture for domestic, commercial and industrial use and other items for the engineered wood and construction sectors

The PIABC Level 2 NVQ Diploma in Furniture and Wood Processing - CNC Machining is a national qualification consisting of mandatory and optional units. The mandatory units cover health and safety, effectiveness, Setting and operating CNC woodworking machines, mechatronics, sustainability, preparation of tools, problem solving and the principles of mechanical engineering. Individuals choose units that match their job role which may be about marking out, tooling or using machinery, maintenance or continuous improvement. These job-specific units confirm both skills competence and the necessary related job knowledge.

By the end of the qualification, the learner should be competent in the job role and have a good understanding of the related job knowledge associated with the role - including terminology, materials, machinery, equipment and processes.

The qualification can be taken as a standalone qualification or as part of the national apprenticeship framework programme

OUTCOMES/ TARGET GROUP/ WHO IS THIS QUALIFICATION FOR?

In setting out a clearly-defined level of achievement, this qualification will:

1. Acknowledge skills and competence in the job role
2. Enhance the knowledge and job satisfaction of learners- providing them with a means of progression to higher level job roles and qualifications.
3. Provide employers with an open and transparent basis for judging the suitability of learners for employment and promotion.
4. Facilitate job movement throughout the timber sector and other related areas of the timber industry.

Specific outcomes for the qualification are listed under the individual unit description.

This Level 2 qualification is appropriate for those working in the wood and furniture and related industries, wanting to gain recognition for the competencies and understanding

Job role	Type of company
CNC Wood Machinist -	Wood products manufacturing

ENTRY REQUIREMENTS

There are no entry qualifications or age limits required for this qualification.

Assessment for this qualification is open to any learner who has the potential to reach the standards laid down for this qualification. An initial assessment of past experience and current skills, knowledge and understanding should be carried out prior to commencement, to determine suitability for this qualification.

Aids or appliances, which are designed to alleviate disability, may be used during assessment, providing they do not compromise the standard required.

PROGRESSION

Success in this qualification prepares learners for progression in the timber industry. Learners may have the opportunity to progress into supervisory and management roles taking suitable qualifications. Learners are encouraged to consider belonging to a professional institute or similar. Centres are encouraged to make learners aware of relevant associations and related professional bodies.

QUALIFICATION STRUCTURE

The qualification was developed under the Qualifications Credit Framework (QCF) and comprises of units from a number of Sector Skills Councils and therefore Assessors should use the associated appropriate Assessment Strategies.

The qualification is made up of mandatory and optional units. The mandatory units cover those areas which have a common approach, such as safety and the principle learning outcomes for the job role. The optional units offer a choice that can be combined to meet the needs of an individual's specific job role together with the organisations and learners preferences.

Guided Learning Hours (GLH) is the number of hours of teacher supervised or directed study time required to teach an individual unit or qualification. GLH have been calculated unit by unit - in isolation of each other - such that the unit is a standalone unit, therefore centres may find that where learners are completing a number of units to achieve the complete qualification actual overall GLH will reduce (i.e. the actual GLH for the entire qualification is unlikely to be a sum total of the individual units taken).

Learning time will clearly be reduced if learners hold QCF credits from prior learning. Learners will also be expected to carry out additional reading, practice and other work to complete each unit and prepare for assessment.

Credit values are determined by the total learning hours (teaching + demonstrations + practice + reflection + assessment - including developing competence in the work environment etc) divided by 10. For example 7 credits reflect a total learning time of 70 hours. Learning time is usually much greater than GLH. Credit values have been calculated unit by unit - in isolation of each other - such that the unit is a stand alone unit; therefore centres may find that where learners are completing a number of units to achieve the complete qualification, actual learning time will reduce (i.e. the actual learning time for the entire qualification is unlikely to be a sum total of the credits of the individual units taken).

Rules of Combination are used to define the structure of QCF qualifications and specify the minimum credits which must be achieved through a particular combination of units to gain a full qualification.

RULES OF COMBINATION

PIABC Level 2 NVQ Diploma in Furniture and Wood Processing - CNC Machining (601/4043/4)

87 Credits are required: 67 credits from the mandatory group plus a minimum 20 credits from the optional group.

Mandatory Units all units to be taken				
Ref	Title	Level	Credit	GLH
Ref	Title	Level	Credit	GLH
<u>F/503/8136</u>	Make sure your own actions reduce the risks to health and safety	2	6	27
<u>F/503/5995</u>	Contribute to the effectiveness of work in a commercial setting	2	5	30
<u>H/506/6219</u>	Set and operate CNC woodworking machines	2	12	60
<u>T/503/0339</u>	Principle of mechanical manufacturing engineering	3	9	80
<u>Y/506/6220</u>	Mechatronics systems principles and fault finding	3	9	80
<u>M/506/6188</u>	Operate computer numerically controlled (CNC) machinery and equipment	2	10	50
<u>M/506/6028</u>	Contribute to sustainable business practice	3	3	10
<u>D/506/6221</u>	Prepare tools and equipment	2	5	20
<u>D/506/6235</u>	Problem solving and fault diagnosis in furniture processing operations	2	8	34
Optional Units - 20 credits units to be taken				
<u>D/506/6218</u>	Applying total productive maintenance (TPM)	3	15	54
<u>A/506/6243</u>	Contributing to the application of continuous improvement techniques_Kaizen	2	14	55
<u>J/506/6195</u>	Produce and maintain woodmachining tooling for furniture and related products	2	11	42
<u>L/506/6196</u>	Apply edge treatment finishes to wood and wood based furniture and related products	2	10	17
<u>J/506/6200</u>	Mark out from setting out details for routine wood products	2	12	42
<u>R/506/6202</u>	Manufacture routine wood products	2	11	42
<u>Y/506/6203</u>	Wood machinery and equipment maintenance	2	16	44
<u>T/506/6208</u>	Provide advice and guidance on the selection and application of wood and wood based materials	2	10	32
<u>R/600/0260</u>	Properties and Applications of Engineering Materials	3	10	60

QUALIFICATION LEVEL

PIABC Level 2 NVQ Diploma in Furniture and Wood Processing - CNC Machining is a Level 2 qualification.

Level 2 Descriptor

Summary

Achievement at Level 2 reflects the ability to select and use relevant knowledge, ideas, skills and procedures to complete well-defined tasks and address straightforward problems. It includes taking responsibility for completing tasks and procedures and exercising autonomy and judgement subject to overall direction or guidance.

Knowledge and Understanding

- Use understanding of facts, procedures and ideas to complete well-defined tasks and address straightforward problems.
- Interpret relevant information and ideas.
- Be aware of the types of information that are relevant to the area of study or work

Application and action

- Complete well-defined, generally routine tasks and address straightforward problems
- Select and use relevant skills and procedures
- Identify, gather and use relevant information to inform actions
- Identify how effective actions have been

Autonomy and accountability

- Take responsibility for completing tasks and procedures
- Exercise autonomy and judgement subject to overall direction or guidance

Source: Regulatory arrangements for the Qualifications and Credit Framework OFQUAL 2008

PROGRAMME ORGANISATION

Programmes leading to the PIABC Level 2 NVQ Diploma in Furniture and Wood Processing - CNC Machining can be organised and delivered by providers who have gained centre and qualification approval from PIABC. To achieve this they need to complete the PIABC centre and qualification approval procedures available from www.piabc.org.uk. In completing the documentation and the approval visit, centres need to demonstrate their ability to deliver high quality education leading to the qualification. Centres are expected to employ robust quality assurance processes. PIABC will appoint its own moderators to ensure the effective operation of these processes and the maintenance of standards of quality.

The organisation of the qualification is at the discretion of the centre and will take into account the aims, aspirations and experience of the learners.

Centres are encouraged to choose the most suitable curriculum model for their learners. Whilst the sequential delivery of parts of the unit is a possibility and may provide the most straightforward way of determining completion, it may be that some degree of integration of elements will occur, or that other methods of delivery are more appropriate to meet the needs of learners. It should be noted however that the whole unit and all the learning outcomes will be assessed.

Centres must ensure that adequate arrangements are in place for supporting learners. This could be either through separate tutorial sessions or through the use of time within structured study sessions. Centres using on-line or other forms of open learning must ensure that appropriate tutorial support is provided for learners.

The employer's engagement in learning and assessment opportunities will be paramount in securing timely achievement and a participative role should be encouraged.

In relevant circumstances, centres are recommended to provide career related information and guidance to their learners.

GUIDANCE ON LEARNING AND TEACHING

Learners employed in the timber and related industries will come to the qualification with varying levels of existing knowledge and/or practical experience of some parts of the Learning Outcomes. Training needs should be identified and gaps in knowledge and competency should be filled with a planned delivery of an individual learning plan. This should be utilised in preparing for teaching and assessment. The sharing of knowledge which has the potential to lead to a high level of understanding should be encouraged by the use of staff with direct experience with CNC machining in the related industries. This must, of course, be balanced against a sound understanding of the theoretical understanding.

The relationship between theory and practice is a theme that should be reflected in the assessments for the programme. Therefore in structured learning and individual work, learners should be aware of the requirement to develop a theoretical understanding to their practical work and a practical application to their theoretical understanding.

Those developing learning programmes should expect to achieve all the learning outcomes. It may be useful to have workbooks for use either at home or in the workplace.

QUALIFICATION DESCRIPTION

The PIABC Level 2 NVQ Diploma in Furniture and Wood Processing - CNC Machining follows the QCF principles for designing units and qualifications and contains the features listed as follows:

- Unit QCF reference number, title, level, guided learning hours and credit value.
- Each unit consist of:
 - Learning Outcomes that show what the Learners will be able to understand, know or demonstrate.
 - Assessment Criteria that show what the Learners can do or produce in order to show that they have met the learning outcome.
 - Some Units also indicate the intended scope of the performance criteria
- To successfully complete a unit, learners must meet all the learning outcomes by showing that they have achieved all the assessment criteria with consideration to the intended scope.

UNIT CONTENT: LEARNING OUTCOMES AND ASSESSMENT CRITERIA

The PIABC Level 2 NVQ Furniture and Wood Processing CNC Machinery is a nationally recognised qualification which requires the candidate to possess or acquire all of the competencies and knowledge in each unit

MAKE SURE YOUR ACTIONS REDUCE RISKS TO HEALTH AND SAFETY WITHIN YOUR WORKPLACE

Unit Accreditation No: F/503/8136
Unit Level: 2

Guided Learning Hours: 27
Unit Credits: 6

Assessment Guidance

This unit is for everyone at work (whether paid, unpaid, full or part-time). It is about having an appreciation of significant risks in your workplace, knowing how to identify and deal with them.

This unit is about the health and safety responsibilities for everyone in your workplace. It describes the competences required to make sure that:

- your own actions do not create any health and safety hazards
- you do not ignore significant risks in your workplace, and
- you take sensible action to put things right, including: reporting situations which pose a danger to people in the workplace and seeking advice

Fundamental to this unit is an understanding of the terms "hazard", "risk" and "control".

Learning Outcome – *The learner will:*

Assessment Criterion – *The learner can:*

- | | | |
|---|-----|--|
| 1. Be able to identify the hazards and evaluate the risks in your workplace: | 1.1 | Identify which workplace instructions are relevant to your job role |
| | 1.2 | Identify those working practices in your job role which could harm you or others |
| | 1.3 | Identify those aspects of your workplace which could harm you or others |
| | 1.4 | Check which of the potentially harmful working practices and aspects of your workplace present the highest risks to you or to others |
| | 1.5 | Deal with hazards in accordance with workplace instructions and legal requirements |
| | 1.6 | Correctly name and locate the people responsible for health and safety in your workplace |
| | 1.7 | Report to the people responsible for health and safety in your workplace those hazards which present the highest risks |
| 2. Know how to identify the hazards and evaluate the risks in your workplace: | 2.1 | Define what "hazards" and "risks" are |
| | 2.2 | State your responsibilities for health and safety as required by the law covering your job role |
| | 2.3 | Describe the hazards which exist in your workplace and the safe working practices which you must follow. |
| | 2.4 | Describe the particular health and safety hazards which may be present in your own job role and the precautions you must take |

**Learning Outcome –
The learner will:**

**Assessment Criterion –
The learner can:**

- | | | |
|---|------|---|
| | 2.5 | Explain the importance of remaining alert to the presence of hazards in the whole workplace |
| | 2.6 | Explain the importance of dealing with, or promptly reporting, risks |
| | 2.7 | Define the responsibilities for health and safety in your job role/description |
| | 2.8 | Describe the safe working practices for your own job role |
| | 2.9 | Identify the responsible people you should report health and safety matters to. |
| | 2.10 | State where and when to get additional health and safety assistance |
| 3. Be able to reduce the risks to health and safety in your workplace: | 3.1 | Carry out your work in accordance with your level of competence, workplace instructions, suppliers or manufacturer's instructions and legal requirements |
| | 3.2 | Control those health and safety risks within your capability and job responsibilities |
| | 3.3 | Pass on suggestions for reducing risks to health and safety to the responsible people |
| | 3.4 | Make sure your behaviour does not endanger the health and safety of you or others in your workplace |
| | 3.5 | Follow the workplace instructions and suppliers' or manufacturers' instructions for the safe use of equipment, materials and products |
| | 3.6 | Report any differences between workplace instructions and suppliers' or manufacturers' instructions |
| | 3.7 | Make sure that your personal presentation and behaviour at work: <ul style="list-style-type: none">• protects the health and safety of you and others,• meets any legal responsibilities, and• is in accordance with workplace instructions |
| | 3.8 | Make sure you follow environmentally-friendly working practices |
| 4. Know how to reduce the risks to health and safety in your workplace: | 4.1 | Define and describe your scope and responsibility for controlling risks |
| | 4.2 | State the workplace instructions for managing risks which you are unable to deal with |
| | 4.3 | Identify the suppliers' and manufacturers' instructions for the safe use of equipment, materials and products which you must follow |
| | 4.4 | Explain the importance of personal presentation in maintaining health and safety in your workplace |
| | 4.5 | Explain the importance of personal behaviour in |

Learning Outcome –
The learner will:

Assessment Criterion –

The learner can:

maintaining the health and safety of you and others

- 4.6 Describe the risks to the environment which may be present in your workplace and/or in your own job role

CONTRIBUTE TO THE EFFECTIVENESS OF WORK IN A COMMERCIAL SETTING

PIABC Unit No: PI002
Unit Accreditation No: F/503/5995
Unit Level: 2

Guided Learning Hours: 30
Unit Credits: 5

Learning Outcome –

The learner will:

1. Plan and organise own work

Assessment Criterion –

The learner can:

1.1 Ensure you have the required authority to complete the required activity

1.2 Comply with current legislation including working safely

1.3 Check that you understand the particular work activity and your role within it

1.4 Check that the area is clean, tidy and free from hazards before starting work

1.5 Check that required resources and equipment are ready before starting work

1.6 Check the job documentation prior to starting work

1.7 Complete the activity as planned without any undue delay

1.8 Complete all documentation accurately and legibly and pass it on to the next stage

2. Know how to plan and organize their work

2.1 Describe your job roles, responsibilities and levels of authority

2.2 List the current legislation and describe how it applies to your role

2.3 Describe the work activity and your role in that activity

2.4 Explain how you would check that the area is clean, tidy and free from hazards including listing the hazards and possible consequences

2.5 List the resources required for the activity

2.6 Describe how to check that the equipment is ready for use

2.7 Identify the documentation and show how it is used

2.8 Describe the workplace procedures for monitoring the progress of the activity and keeping others informed

2.9 Show how the documentation is completed and describe the next stage

3. Work effectively with other team members

3.1 Treat others with respect at all times

3.2 Communicate with others using the appropriate method

3.3 Give constructive support and feedback to appropriate personnel

Learning Outcome –*The learner will:***Assessment Criterion –***The learner can:*

- | | | |
|--|-----|--|
| | 3.4 | Receive support and feedback from personnel |
| 4. Know how to work effectively with others | 4.1 | Explain how treating others with respect contributes to workplace efficiency |
| | 4.2 | State what methods of communication to use and when to use them |
| | 4.3 | Describe how to identify when assistance may be needed and the how this may be given |
| | 4.4 | Explain why it is important to receive feedback and support |
| | 4.5 | Describe how to give constructive feedback and support |
| | 4.6 | Explain why it is important to give constructive feedback and support |
| 5. Contribute to problem solving and improvements | 5.1 | Respond to any problems that occur during the work activity |
| | 5.2 | Report any problems that occur and the actions taken |
| | 5.3 | Identify and share opportunities for improving workplace practices and procedures using the appropriate method |
| 6. Know how to contribute to problem solving and improvement | 6.1 | Describe the most common problems that may occur and how these are solved |
| | 6.2 | Describe the reporting procedure for problems |
| | 6.3 | Describe how to identify opportunities for improvement |
| | 6.4 | Describe how suggestions for improvements should be made and to whom |
| | 6.5 | Explain how the identification of improvements can benefit you and the organisation |

SET AND OPERATE CNC WOODWORKING MACHINES

Unit Accreditation No: H/5066219
Level 2

Guided Learning Hours: 60
Unit Credits: 12

Learning Outcome –

The learner will:

1. Be able to set CNC/NC woodworking machines

2. Know how to set and prepare tooling for CNC/NC woodworking machines

Assessment Criterion –

The learner can:

- 1.1 Comply with health and safety requirements and procedures at all times
- 1.2 Interpret drawings, specifications, schedules, cutting lists, risk assessments and manufacturers' information related to the work to be carried out
- 1.3 Select and handle resources associated with own work following company procedures
- 1.4 Obtain and use the appropriate documentation (such as job instructions, drawings, quality control documentation)
- 1.5 Follow safe practice/approved setting up procedures at all times
- 1.6 Confirm that the correct operating program has been loaded
- 1.7 Check that the tooling is in a usable condition
- 1.8 Ensure that the workpiece is correctly positioned and secured without distortion
- 1.9 Update the program tool data, as applicable
- 1.10 Ensure that correctly adjusted machine guards are in place
- 1.11 Leave the work area and machine in a safe and appropriate condition on completion of the activities
- 1.12 Determine what has to be done and how the machine will be set to achieve this
- 2.1 Explain how to start and stop the machine in normal and emergency situations
- 2.2 Describe the importance of ensuring that the machine is isolated from the power supply before mounting cutting tools and holding devices
- 2.3 Explain how to handle and store cutting tools safely and correctly
- 2.4 Explain why it is important to set the workholding device in relationship to the machine datum's and reference points
- 2.5 Describe the methods of setting the workholding

- devices, and the tools and equipment that can be used
- 2.6 Explain how to check that the cutting tools are in a safe and serviceable condition
 - 2.7 Give reasons for the importance of wearing the appropriate protective clothing and equipment, and of keeping the work area clean and tidy
 - 2.8 Explain the use of different tips, and the factors which will determine their selection and use
 - 2.9 Explain the tool holding devices that are used, and the methods of correctly mounting and securing the cutting tools to the tool holders
 - 2.10 Explain the use of tool posts, magazines and carousels, and how to position and identify the tools in relationship to the operating program
 - 2.11 Describe how to conduct trial runs using single block run, dry run and feed and speed override controls
 - 2.12 List the things that need to be checked before allowing the machine to operate in full program run mode
3. Be able to prepare tooling for CNC/NC woodworking machines
- 3.1 Prepare the tooling for operation, by carrying out all the following activities, as applicable to the machine type:
 - position tools in the correct position in the tool posts, turrets, magazine or carousel
 - check tools have a specific tool number in relation to the operating program
 - enter all relevant tool data to the operating program (tool lengths, tool offsets, radius compensation)
 - pre-set tooling using setting jigs/fixtures
 - set tool datum
 - save changes to the program
 - 3.2 Mount and set the required work holding devices, work piece and cutting tools following company procedures and manufacturers instructions
 - 3.3 Select and mount the appropriate tool holding device and tooling
4. Know how to operate CNC-NC woodworking machines
- 4.1 Explain the relevant health and safety responsibilities and obligations
 - 4.2 Explain what relevant health and safety procedures need to be followed

- 4.3 Explain how to interpret drawings, specifications, schedules, cutting lists, risk assessments and manufacturers' information related to the work to be carried out
 - 4.4 Describe how to handle resources associated with own work following company procedures
 - 4.5 Describe how to operate machinery, monitor the machinery and quality of the finished product following company procedures and manufacturers instructions
 - 4.6 Explain how the various types of materials used will affect the feeds and speeds that can be used
 - 4.7 Describe difficulties that can occur with the process and how to correct them
 - 4.8 List who to report difficulties outside your control
 - 4.9 List what information systems should be used
 - 4.10 Explain why it is important to use the information systems
5. Be able to operate CNC-NC woodworking machines
- 5.1 Follow the specifications for the component to be produced
 - 5.2 Set up the machine to produce components following company procedures and manufacturers instructions
 - 5.3 Check that all safety mechanisms are in place and that the equipment is set correctly for the required operations
 - 5.4 Maintain machinery following company procedures and manufacturers instructions within the limits of your responsibility
 - 5.5 Recognise any difficulties with the process to the required quantity and quality and correct them, report difficulties outside your control to the correct person
 - 5.6 Carry out your work to the required quality and output to meet production schedules and targets
 - 5.7 Record information on the process in the appropriate information systems

PRINCIPLES OF MECHANICAL MANUFACTURING ENGINEERING

Unit Accreditation No: T/503/0339
Level 3

Guided Learning Hours: 80
Unit Credits: 9

Learning Outcome –

The learner will:

1. Understand how to determine the alignment of machine tools

2. Know how to differentiate between methods of power transmission in machine tools

3. Understand how to evaluate the application of CNC to machine tools

4. Understand the maintenance requirements of machine tool systems

Assessment Criterion –

The learner can:

1.1 Describe the range of machine tools available in terms of size, capacity, accuracy and production capability

1.2 Explain the structural requirements of a range of common machine tools

1.3 Explain the common methods of mounting machine tools

1.4 Explain the importance of alignment in machine tools and methods to achieve it

2.1 Explain the methods used to achieve rotational movement

2.2 Explain the methods used to achieve linear movement

2.3 Explain the methods used to change speeds

2.4 Explain the methods used to control feed speeds

2.5 Explain the methods used to control feeds and speeds of hydraulic components on machine tools

2.6 Explain the application of pneumatic systems to the operation and control of machine tools

3.1 Explain the operating principles of computer numerically controlled machine tools

3.2 Describe how to produce a part-programme to demonstrate the relative work/tool movement of a CNC machine tool

3.3 Describe how to prove the part-programme using simulation software

3.4 Critically compare CNC machine tools against non-CNC machine tools

3.5 Describe how to evaluate cutting tools materials for given applications (CNC and non-CNC)

4.1 Describe the differences between types of maintenance carried out on machine tools

4.2 Describe a maintenance programme for a typical machine tool

- 4.3 Describe what would be included in a lubrication chart for a typical machine tool workshop
- 4.4 Classify coolants and lubricants applicable to machine tool systems
- 4.5 Classify the methods of application for common surface coatings
- 4.6 Explain the commissioning/maintenance procedures carried out on machine tools

OPERATE COMPUTER NUMERICALLY CONTROLLED (CNC) MACHINERY AND EQUIPMENT

Unit Accreditation No:M5066188
Unit level 2

Guided Learning Hours: 50
Unit Credits: 10

Learning outcomes

The learner will:

- 1 Be able to prepare to operate CNC machinery and equipment
- 2 Know how to prepare to operate CNC machinery and equipment
- 3 Be able to operate CNC machinery and equipment

Assessment criteria

The learner can:

- 1.1. Comply with health and safety requirements and procedures at all times
- 1.2. Interpret drawings, specifications, schedules, cutting lists, risk assessments and manufacturers' information related to the work to be carried out
- 1.3. Select and handle resources associated with own work following company procedures
- 1.4. Check timber for suitability for use
- 1.5. Prepare timber for use including measuring, marking out, adjusting, fitting, finishing and securing
- 1.6. Prepare and set up the CNC machine following manufacturers instructions and company procedures
- 2.1. State the relevant health and safety responsibilities and obligations
- 2.2. Describe what relevant health and safety procedures need to be followed
- 2.3. Describe how to interpret drawings, specifications, schedules, cutting lists, risk assessments and manufacturers' information related to the work to be carried out
- 2.4. Describe how to handle resources associated with own work following company procedures
- 2.5. State the procedures for checking timber for suitability for use
- 2.6. Describe how to prepare timber for use including measuring, marking out, adjusting, fitting, finishing and securing
- 2.7. Describe how to prepare and set up the machine following manufacturers instructions and company procedures
- 3.1. Operate machinery and monitor the machinery and quality of the finished product following company procedures and manufacturers instructions
- 3.2. Set up and change appropriate tooling to meet requirements following manufacturers instructions and company procedures
- 3.3. Use and maintain hand ancillary equipment
- 3.4. Maintain machinery following company procedures and manufacturers instructions within the limits of your responsibility

- 3.5. Recognise any difficulties with the process to the required quantity and quality and correct them, report difficulties outside your control to the correct person
 - 3.6. Carry out your work to the required quality and output to meet production schedules and targets
 - 3.7. Record information on the process in the appropriate information systems
- 4 Know how to operate CNC machinery and equipment
- 4.1. Describe how to operate machinery and monitor the machinery and quality of the finished product following company procedures and manufacturers instructions
 - 4.2. Describe how to set up and change appropriate tooling to meet requirements following manufacturers instructions and company procedures
 - 4.3. Describe how to maintain machinery and hand ancillary equipment following company procedures and manufacturers instructions and the limits of your responsibility
 - 4.4. Describe the difficulties that can occur with the process and how to correct them,
 - 4.5. State who to report difficulties outside your control
 - 4.6. State what information systems should be used
 - 4.7. Describe why it is important to use the information systems

MECHATRONICS SYSTEMS PRINCIPLES AND FAULT FINDING

Unit Accreditation NoY5066219

Guided Learning Hours: 80

Unit level 3

Unit Credits: 9

Learning outcomes

The learner will:

1 Understand the principles of the 'Total Engineering Approach' to production systems

2 Be able to apply the principles of typical sensors

3 Be able to apply the principles of pneumatic, hydraulic, mechanical and electrical actuation systems

4 Be able to apply the principles

Assessment criteria

The learner can:

- 1.1 Classify the basic building blocks of industrial systems
- 1.2 Explain the architecture of various types of industrial systems
- 1.3 Describe the differences between the features of conventional and mechatronic systems

- 2.1 Interface contact and non-contact sensors into a control system
- 2.2 Explain the operation and application of sensors
- 2.3 Explain typical connections and tuning arrangements for sensors
- 2.4 Explain the action and importance of signal conditioning systems
- 2.5 Explain the importance of terms applied to sensors used in an industrial system

- 3.1 Design and implement control and actuation systems
- 3.2 Explain the operation and application of each part of a pneumatic power system
- 3.3 Explain the operation and application of valves employed in pneumatic systems
- 3.4 Explain the operation and application of actuators employed in pneumatic systems
- 3.5 Classify symbols used in pneumatic, hydraulic, mechanical and electrical actuation systems
- 3.6 Explain the operation and application of each part of a mechanical system
- 3.7 Explain the operation and application of each part of an electrical system
- 3.8 explain the application of components in a fieldbus network

- 4.1 Write simple expressions to describe logic

of embedded control

instructions

- 4.2 Explain the function of the main components in Programmable Logic Controller (PLC) architecture
- 4.3 Explain Ladder Logic programming as used in PLC programming
- 4.4 Explain the content of simple programs written using Ladder Logic programming
- 4.5 Explain the function of the main components in Programmable Interface Controller (PIC) architecture
- 4.6 Apply the content of programs written for simple programme languages PIC programming
- 4.7 Explain the operation of embedded control systems
- 4.8 Explain the logical function of logic gates

5 Be able to carry out fault finding on pneumatic, hydraulic, mechanical and electrical actuation systems

- 5.1 Diagnose simple faults on control and actuation systems
- 5.2 Explain methods of fault location
- 5.3 Explain the operation and applications of test instruments
- 5.4 Explain safe isolation procedures for systems
- 5.5 Evaluate the effects of faulty or inefficient pneumatic systems and hydraulic systems.

CONTRIBUTE TO SUSTAINABLE BUSINESS PRACTICE

Unit Accreditation No M5066028

Unit level 3

Guided Learning Hours: 10

Unit Credits: 3

Learning Outcome -

The learner will:

1 Be able to contribute to sustainable business practice

2 Know how to contribute to sustainable business practice

Assessment Criterion -

The learner can:

- 1.1 Work effectively according to organisational procedures and production specifications
- 1.2 Assess own performance to identify opportunities for improving resource efficiency improvements
- 1.3 Report any opportunities to improve the efficiency of resource usage
- 1.4 Report any suspected inefficiency within organisational procedures or production specifications
- 1.5 Support the implementation of actions to improve the efficiency of resource usage within limits of own authority
- 1.6 Work to actively avoid and minimise waste

- 2.1 Explain what is meant by sustainable business practice
- 2.2 Outline organisational sustainability targets and their importance
- 2.3 Describe how organisational procedures and production specifications support sustainable business practice
- 2.4 Explain why resource usage efficiency is important to sustainability in relation to environmental, economic and social factors
- 2.5 Outline how to assess own performance to identify opportunities for improving resource usage efficiency
- 2.6 Explain the importance of reporting any suspected inefficiency within organisational procedures or production specifications
- 2.7 Explain how not working to organisational procedures and production specifications can impact on resource usage and sustainability
- 2.8 Suggest how to identify opportunities for improving resource usage efficiency
- 2.9 Suggest how to potential sources of waste within area of responsibility
- 2.10 Describe how waste is avoided and minimised through recycling and reuse

2.11 Explain how waste minimisation supports sustainability

2.12 Explain how the efficient use of resources supports the economic sustainability of the organisation

2.13 Outline the social benefits associated with sustainable business practice

PREPARE TOOLS AND EQUIPMENT FOR WOOD PROCESSING

Unit Accreditation No D5066221

Guided Learning Hours: 20

Unit level 2

Unit Credits: 5

Learning outcomes

The learner will:

- 1 Be able to prepare tools and equipment

Assessment criteria

The learner can:

- 1.7. Comply with health and safety requirements and procedures at all times
 - 1.8. Identify and confirm the specification for the work being undertaken
 - 1.9. Select the equipment that is suitable and confirm that it is available and safe for use
 - 1.10. Prepare the equipment
 - 1.11. Remove immediately any items liable to damage the tools and equipment
 - 1.12. Clear the tools and equipment of debris, dirt, and other materials that affect its ability to operate
 - 1.13. Calibrate measuring equipment
 - 1.14. Ensure tools are kept sharp
 - 1.15. Identify any problems relating to the tools and equipment and deal with them according to standard operating procedures
 - 1.16. Record information on the operation of the equipment in the appropriate information systems
-
- 2 Know how to prepare tools and equipment
- 2.8. State the relevant health and safety responsibilities and obligations
 - 2.9. State the relevant health and safety procedures that need to be followed
 - 2.10. Describe how to confirm the correct specifications for the work being undertaken
 - 2.11. Describe what level of detail is required in a specification
 - 2.12. State what equipment, materials, and work procedures should be used for different jobs
 - 2.13. Describe where to obtain information on the safe use of tools and equipment
 - 2.14. State what tools and equipment to use for different work activities
 - 2.15. Explain how to avoid damaging equipment through incorrect use
 - 2.16. Describe how different types of tools and equipment can be prepared for different requirements
 - 2.17. Describe how to use different types of tools and equipment
 - 2.18. Describe how to calibrate measuring equipment
 - 2.19. Describe how to keep tools sharp
 - 2.20. The maintenance requirements of different types of tools and equipment
 - 2.21. Describe the type of items that could damage the tools

and equipment

- 2.22. Describe the type of problems that can occur with the tools and equipment, and the standard operating procedures for dealing with them
- 2.23. State what information systems should be used
- 2.24. Describe why it is important to use the information systems

PROBLEM SOLVING AND FAULT DIAGNOSIS IN FURNITURE PROCESSING OPERATIONS

Unit Accreditation No D5066235
Unit level 2

Guided Learning Hours: 34
Unit Credits: 8

Learning outcomes

The learner will:

1 be able to diagnose and evaluate problems and faults

2 know how to diagnose and evaluate problems and faults

5 Be able to carry out problem solving activities

Assessment criteria

The learner can:

1.17. comply with health and safety requirements and procedures at all times

1.18. take prompt action to diagnose and rectify the operational problems and keep all relevant people informed of progress

1.19. obtain all relevant information relating to the problems

1.20. use information obtained to help evaluate the problem

1.21. identify correctly the nature and extent of the problems

1.22. identify the root cause of the problem using a standard technique

2.25. describe the relevant health and safety responsibilities and obligations

2.26. list the relevant health and safety procedures that need to be followed

2.27. explain how to access information on health and safety regulations and guidelines relating to the engineering activities or work area in which the problem exists

2.28. describe the implications of not taking account of legislation, regulations, standards and guidelines when determining solutions to processing problems

2.29. outline how to access and use the appropriate information and documentation systems

2.30. state the methods and techniques for evaluating information

3.1. discuss/consult with the relevant people about the extent of the problem and its impact on the engineering activity

3.2. gather all appropriate information to help identify or clarify the problem

3.3. evaluate possible solutions, considering temporary, short term and long term solutions

3.4. consider cost implications for each solution

3.5. select the most appropriate solution to rectify the problem

3.6. communicate the proposed solution to the relevant people, obtaining feedback where appropriate

3.7. prepare a plan of action for implementation of the agreed solution

3.8. ensure that the agreed solution is implemented correctly and promptly

3.9. monitor outcomes of the rectification activity, and make any necessary revisions to the plan of action

- 3.10. ensure that the problem is rectified to the agreed level of acceptability
- 6 Know how to carry out problem solving activities
- 4.8. Describe how to obtain and interpret drawings, charts, specifications, manufacturers' manuals, history/maintenance reports and other documents needed in the problem solving process
- 4.9. Describe the business need for problem identification and removal
- 4.10. Describe the effects of problems on associated activities
- 4.11. State the communication techniques used to obtain information
- 4.12. Describe how to involve the user/customer in the problem solving process
- 4.13. Describe the importance of collecting as much relevant information as possible, and of collating such information in a way which facilitates decision making, and the methods to achieve this
- 4.14. Explain the importance of analysing problems from a variety of perspectives
- 4.15. Describe how to define and verify root cause of a problem
- 4.16. Describe the importance of involving a range of relevant people in generating possible solutions
- 4.17. Describe the importance of developing a range of possible options in solving problems
- 4.18. State the factors to be taken into account when resolving problems and determining suitable solutions
- 7 Be able to identify solutions and solve problems and faults
- 5.1. Ensure that all information is documented to provide an audit trail
- 5.2. Implement preventive measures, where applicable, to ensure that there is no recurrence of the problem
- 5.3. Evaluate all realistic solutions to rectify the problems
- 5.4. Identify the most effective solution for rectifying the problems
- 5.5. Ensure that solutions are implemented correctly and promptly
- 5.6. Determine and implement the solution for the following:
- temporary (interim solution)
 - short term (will require further action)
 - long term (permanent solution)
- 5.7. Ensure that the rectification complies with all relevant regulations and guidelines from all of the following, as appropriate:

- organisational guidelines and codes of practice
 - equipment manufacturer's operation specification/range
 - recognised compliance agency/body's standards
 - customer standards and requirements
 - health, safety and environmental requirements
- 5.8. Recognise any difficulties with the process and correct them, report difficulties outside your control to the correct person
- 5.9. Carry out your work to the required quality and output to meet production schedules and targets
- 5.10. Record information on the process in the appropriate information systems
- 8 know how to identify solutions and solve problems and faults
- 6.1. Describe how to present possible solutions in a way which helps relevant people to reach an informed and realistic judgement
- 6.2. Explain the process used in the organisation to validate the solution to the problem
- 6.3. Describe how to prevent recurrence of the problems
- 6.4. Describe the importance of maintaining records of the problem solving activities; what needs to be recorded, and where records are kept
- 6.5. Explain the difficulties that can occur with the process and how to correct them,
- 6.6. State who to report difficulties outside your control
- 6.7. State what information systems should be used
- 6.8. Describe why it is important to use the information systems

APPLYING TOTAL PRODUCTIVE MAINTENANCE

Unit Accreditation No D50662185
Unit level 3

Guided Learning Hours: 54
Unit Credits: 15

Learning Outcome -

The learner will:

1 Apply total productive maintenance (TPM)

Assessment Criterion

- The learner can:

1.1 Work safely at all times, complying with health and safety and other relevant regulations and guidelines

1.2 Select the appropriate asset on which to carry out the total productive maintenance activity

1.3 Carry out the total productive maintenance process on at least two assets from the following:

- plant and equipment
- machines
- office equipment
- service equipment
- utilities

1.4 Obtain the necessary information to carry out the activity

1.5 Carry out the total productive maintenance activity by applying the appropriate techniques

1.6 Carry out the total productive maintenance process, and show how one of the following is undertaken:

- assess criticality of equipment/process condition and identify refurbishment needs
- identify an integrated asset care plan for both operator and maintenance staff

1.7 Calculate and use the overall equipment effectiveness (OEE) measure and information to determine which elements of the OEE and their associated losses need improvement

1.8 Collect information relating to all of the following:

- load or demand
- capacity
- Take time or bottleneck analysis

1.9 Develop and use an action plan which will reduce/eliminate the losses, and hence improve the overall equipment effectiveness

1.10 Implement improvements to working practices through the total productive maintenance activities

1.11 Show improvements to working practices through three of the following:

- initial cleaning
- countermeasures for cause and effect of dust and dirt
- cleaning and lubrication standards
- general inspection
- autonomous inspection
- workplace organisation
- full circle implementation of autonomous maintenance

1.12 Carry out all of the following total productive maintenance activities:

- autonomous maintenance (front line asset care)
- condition based maintenance (predictive)
- planned maintenance steps (fixed interval)

2 Know how to apply total productive maintenance (TPM)

2.1 Describe the health and safety requirements of the area in which they are carrying out the total productive maintenance (TPM) activities

2.2 Describe the principles of TPM, and how they can be applied in administration procedures, safety improvement and quality maintenance

2.3 Explain how to select an asset on which to carry out the TPM activity (assets could be plant and equipment, machines, office equipment, service equipment, utilities)

2.4 Explain how to implement a systematic and structured approach to carrying out autonomous, condition based and planned maintenance

2.5 Describe the difference between a chronic and sporadic loss, and the countermeasures to both

2.6 Explain how to calculate overall equipment effectiveness (OEE)

2.7 Explain where to find the information required to calculate the OEE for the chosen asset

2.8 Describe the benefits of having a total productive maintenance system

2.9 Describe the importance of taking ownership of the TPM system, and the issues that can be expected to be resolved

2.10 Describe the six major losses and how loss-reduction actions need to be prioritised

2.11 Describe the use of standard operating procedures, single point lessons and machine/process start-up and shutdown procedures

2.12 Explain how an awareness of the improvement

activities will drive the implementation of the TPM activities (Kaizen and team working)

2.13 Describe the critical processes and early problem detection steps

2.14 Describe the loss areas and opportunities for improvement

2.15 Describe the standards of wear, and the ability to stabilise the component life

2.16 Describe the techniques of visual management used to communicate the information and results obtained by this process (including TPM activity boards and checklists)

2.17 Describe the integration with workplace organisation and improving OEE

2.18 Describe the contaminants and sources of contaminants

2.19 Describe the extent of their own authority, and to whom they should report in the event of problems that they cannot resolve

CONTRIBUTING TO THE APPLICATION OF CONTINUOUS IMPROVEMENT TECHNIQUES – KAIZEN

Unit Accreditation No A5066243
Unit level 2

Guided Learning Hours: 55
Unit Credits: 14

Learning outcomes

The learner will:

1. Contribute to the application of continuous improvement techniques - Kaizen

Assessment criteria

The learner can:

- 1.1 Work safely at all times, complying with health and safety and other relevant regulations and guidelines
- 1.2 Plan the Kaizen process for the agreed work area/activity to include plan, do, check, act
- 1.3 Use the established objectives and targets for the Kaizen activity
- 1.4 Carry out the Kaizen activity within the chosen work area/activity
- 1.5 waste, problems or conditions within the work area or activity where improvements can be made
- 1.6 Identify improvements which cover three of the following:
 - reduction in cost
 - improved health and safety and/or working environment
 - improved quality
 - improved regulatory compliance
 - improvements to working practices
 - reduction in lead time
 - reduction in waste and/or energy usage
 - improved customer service
 - improved resource utilisation
- 1.7 Carry out a structured waste elimination activity, based on the identified wastes, problems or conditions
- 1.8 Make recommendations for the creation or changes to standard operating procedures (SOP's) or other approved documentation that will sustain the improvement made, resulting from the Kaizen activity
- 1.9 Identify and apply improvements, which cover two of the following:
 - cleaning of equipment or work area
 - maintenance of equipment
 - health and safety
 - process procedures
 - manufacturing operations or work area operations
 - quality system

- regulatory compliance systems

- 2 Know how to contribute to the application of continuous improvement techniques (Kaizen)
 - 2.1 Describe the health and safety requirements of the area in which they are carrying out the Kaizen activity
 - 2.2 Explain how a work area/activity is selected for the Kaizen activity
 - 2.3 Describe the principles for the deployment of Kaizen (such as where a culture focuses on sustained continuous improvement, aiming at eliminating waste in all systems and processes in the organisation and supply chain)
 - 2.4 Describe the eight wastes (over-production, inventory, transport, over-processing, waiting time, operator motion, bad quality, failure to exploit human potential) and how to eliminate them
 - 2.5 Describe problem solving and root cause analysis
 - 2.6 Describe the importance of fully understanding the process/activity under review, and how this will affect the quality of the problem solving
 - 2.7 Describe the application of the Deming cycle (plan, do, check, act)
 - 2.8 Explain how to carry out a Kaizen activity and establish measurable improvements
 - 2.9 Explain how to distinguish facts from opinions, in order to identify improvement actions
 - 2.10 Explain how improvements to the process are achieved by engaging the knowledge and experience of the people involved in the process
 - 2.11 Explain how to encourage people to identify potential improvements
 - 2.12 Explain how to evaluate improvement ideas, in order to select those that are to be pursued
 - 2.13 Explain how quantifiable targets and objectives are set
 - 2.14 Explain how to make recommendations for the creation of changes to standard operating procedures (SOPs) or other approved documentation
 - 2.15 Describe the techniques used to visually communicate the work of the Kaizen activity to participants and others
 - 2.16 Describe the application of the business key measures of competitiveness (e.g. DTI's seven measures: delivered right first time, delivery schedule achievement, people productivity, stock turns, overall

equipment effectiveness, value added per person, floor space utilisation)

2.17 Explain how the cycle time of a process can be defined

2.18 Describe the techniques used to distribute work content to balance cycle times to the rate of customer demand, and how to visually represent it (e.g. line balance and process displays)

2.19 Describe the extent of their own authority, and to whom they should report in the event of problems that they cannot resolve

- 2.7. Explain how to produce and maintain tooling
- 2.8. Explain how to mount and set tooling
- 2.9. Explain the scope and limitations of the machine
- 2.10. Explain the reasons when determining the appropriate machine for the work to be carried out
- 2.11. Describe the wheel dressing/removing procedures
- 2.12. State the types of abrasive wheel
- 2.13. Describe the procedure for storing tooling following company procedures
- 2.14. Describe the types and suitability of tooling
- 2.15. Describe the procedure for processing tooling
- 2.16. Outline the principles of cutter development
- 2.17. Explain the factors to be considered using and applying chip limiters
- 2.18. Describe difficulties that can occur with the process and how to correct them,

3 Be able to apply edge treatment finishes to wood and wood based furniture and related products

- 3.1 Operate edgebander (single and/or double sided) to apply any one of the following edge treatment finishes to products
 - solid lippings
 - profiled foil
- 3.2 Monitor the machinery and quality of the finished product following company procedures and manufacturers instructions
- 3.3 Use and maintain hand ancillary equipment
- 3.4 Maintain edgebander following company procedures and manufacturers instructions within the limits of your responsibility
- 3.5 Recognise any difficulties with the process to the required quantity and quality and correct them, report difficulties outside your control to the correct person
- 3.6 Carry out your work to the required quality and output to meet production schedules and targets
- 3.7 Record information on the process in the appropriate information systems

4 Know how to apply edge treatment finishes to wood and wood based furniture and related products

- 4.1 Describe how to operate and monitor the edgebander and quality of the finished product following company procedures and manufacturers instructions
- 4.2 Explain why it is necessary to set up and change appropriate tooling
- 4.3 Describe how to maintain **machinery** and hand ancillary equipment following company procedures and manufacturers instructions and the limits of your responsibility
- 4.4 Describe difficulties that can occur with the process and how to correct them,
- 4.5 State who to report difficulties outside your control
- 4.6 State what information systems should be used
- 4.7 State why it is important to use the information systems

- 2.8 Explain difficulties that can occur with the process and how to correct them
- 2.9 State who to report difficulties outside your control
- 2.10 State what information systems should be used
- 2.11 State why it is important to use the information systems

WOOD MACHINERY AND EQUIPMENT MAINTENANCE

Unit Accreditation No Y5066203
Unit level 2

Guided Learning Hours:44
Unit Credits: 16

Learning outcomes

The learner will:

- 1 Be able to maintain wood machinery and equipment

Assessment criteria

The learner can:

- 1.1 Prepare and maintain wood machinery and equipment in accordance with organisational/manufacturers routine service requirements
 - 1.2 Identify documentation and processing requirements
 - 1.3 Use and maintain maintenance logs following company procedures
 - 1.4 Identify machine principal parts and their functions
 - 1.5 Identify safe working limits of machines
 - 1.6 Identify defects and discrepancies
 - 1.7 Identify requirements of maintenance programmes
 - 1.8 Use and maintain hydraulics and pneumatics correctly
 - 1.9 Identify influencing factors and their implications
 - 1.10 Identify correct lubricants to meet the maintenance requirements
 - 1.11 Identify the techniques of risk assessment
 - 1.12 Recognise any difficulties with the process and correct them, report difficulties outside your control to the correct person
 - 1.13 Carry out your work to the required quality and output to meet production schedules and targets
 - 1.14 Record information on the process in the appropriate information systems
-
- 2 Understand how to maintain wood machinery and equipment
 - 2.1 State what the relevant health and safety responsibilities and obligations are
 - 2.2 State what relevant health and safety procedures need to be followed
 - 2.3 Describe how to set up and change appropriate tooling to meet requirements following manufacturers instructions and company procedures
 - 2.4 Describe how to maintain machinery and hand ancillary equipment following company

procedures and manufacturers instructions and the limits of your responsibility

- 2.5 Explain the machine principal parts and their functions
- 2.6 Explain the safe working limits of machines
- 2.7 Explain the requirements of maintenance programmes
- 2.8 Explain how to use and maintain hydraulics and pneumatics following company procedures and manufacturers instructions
- 2.9 Describe the appropriate lubricants to meet the maintenance requirements
- 2.10 Describe the difficulties, defects and discrepancies that can occur with the process and how to correct them
- 2.11 State who to report difficulties outside your control to
- 2.12 State what information systems should be used
- 2.13 State why it is important to use the information systems

- graded timber and appearance graded timber
- 2.12 Suggest the end use applications of wood based materials
 - 2.13 State the reasons for drying timber
 - 2.14 Give examples of the recommended moisture content for end uses of timber
 - 2.15 State the methods used to improve the durability of timber
 - 2.16 State the main types of timber preservation treatments
 - 2.17 Briefly outline the manufacturing processes and construction of the main types of wood based materials
 - 2.18 Suggest 2 types of adhesives used in the manufacture of wood based products
 - 2.19 Describe the differences between carcassing and joinery timber
 - 2.20 Give examples of strength reducing characteristics in timber
 - 2.21 Describe visual strength grading
 - 2.22 Describe the principles involved in machine strength grading
 - 2.23 Explain the purpose of Chain of Custody and why this is important and who needs Chain of Custody Certificates
 - 2.24 State the purpose of the CE Mark and why this is important
 - 2.25 State the main geographical sources of supply of timber and timber based materials and products

PROPERTIES AND APPLICATIONS OF ENGINEERING MATERIALS

Unit Accreditation No R6000260
Unit level 3

Guided Learning Hours:60
Unit Credits: 10

Learning Outcome

The learner will

1 Know the structure and classification of engineering materials

3 Be able to use information sources to select materials for engineering uses

4 Be able to test engineering materials

Assessment Criterion

The learner can:

1.1 describe the structure (including the atomic structure) of a given metal, polymer, ceramic, composite and smart material

1.2 classify given engineering materials as either metals or non-metals according to their properties

2 Know material properties and the effects of processing on the structure and behaviour of engineering materials

2.1 describe mechanical, physical, thermal and electrical and magnetic properties and state one practical application of each property in an engineering context

2.2 describe the effects on the properties and behaviour of processing metals, polymers, ceramics and composites and of post-production use of smart materials

3.1 use information sources to select a different material for two given applications, describing the criteria considered in the selection process

4.1 describe the principles of the modes of failure known as ductile/brittle fracture, fatigue and creep

4.2 perform and record the results of one destructive and one non-destructive test method using one metal and one non-metallic material

4.3 describe a different process of degradation associated with each of metals, polymers and ceramics.

ASSESSMENT

Assessment principles should follow recognised good practice. The qualification is made up of units from different standard setting bodies and their Assessment Strategies should be used.

All learning outcomes and assessment criteria should be met.

Simulation is not permitted.

The overall achievement threshold for the individual units is not subject to change.

QUALIFICATION CERTIFICATION

All learning outcomes and assessment criteria are to be achieved. Whilst there is no grading to this qualification (pass, credit, etc.), the training delivery and feedback should promote the notion of continued improvement and craftsmanship.

The overall achievement threshold for the qualification is not subject to change.

GLOSSARY

Term	Definition
Learning Outcome	This describes what a learner needs to know, understand or do as a result of the process of learning.
Assessment Criteria	These are the requirements learners are expected to meet to demonstrate that a learning outcome has been achieved.
Centre	The organisation that is approved by PIABC for the purposes of preparing learners for assessment.

FURTHER INFORMATION

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