

APPLY MATERIAL SCIENCE PRINCIPLES

UNIT CODE: 0716 541 20A

TVET CDACC CODE: ENG/OS/AGR/CC/04/6/MA

UNIT DESCRIPTION:

This unit specifies the competencies required by an Agricultural Engineering Technologist Level 6 to apply material science principles. It involves analysing physical and mechanical properties of engineering materials, performing engineering materials heat treatment and testing of engineering materials.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
These describe the key outcomes which make up workplace function	These are assessable statements which specify the required level of performance for each of the elements <i>(Bold and italicized terms are elaborated in the Range)</i>
1. Analyse physical and mechanical properties of engineering materials	1.1 Personal protective equipment are worn based on OSHA 1.2 Engineering materials are identified as per their <i>physical</i> and <i>mechanical properties</i> 1.3 Engineering materials properties are tested as per work requirement
2. Perform engineering materials heat treatment	2.1 Personal protective equipment are worn based on OSHA 2.2 <i>Heat treatment methods</i> are described as per heat stages 2.3 Heat treatment on engineering materials carried out as per work requirements
3. Test engineering materials	3.1 Personal protective equipment are worn based on OSHA 3.2 <i>Methods of testing materials</i> are identified as per their properties 3.3 Material testing is carried out as per material testing method 3.4 Material testing results are analysed and interpreted

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

VARIABLE	RANGE
Physical and mechanical properties may include but are not limited to:	• Density • Texture • Melting point • Boiling point • Thermo conductivity • Electrical resistivity • Colour
1. Heat treatment methods may include but are not limited to:	• Annealing • Tempering • Case hardening • Normalizing • Hardening
2. Methods of testing materials may include but are not limited to:	• Dynamic testing • Static testing • Destructive testing • Non destructive material testing

REQUIRED SKILLS AND KNOWLEDGE

This section describes knowledge and skills required for this unit of competency.

Required knowledge

The individual needs to demonstrate knowledge of:

- Laws of conservation of energy
- Heat transfer
- Type of forces
- Power transmission systems

- Units of measurement, conversions and abbreviations

Required Skills

The individual needs to demonstrate the following skills:

- Logical thinking
- Problem solving
- Communication
- Analytical

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the learner 1.1 Worn personal protective equipment based on OSHA 1.2 Identified engineering materials as per their physical and mechanical properties 1.3 Tested and analysed engineering materials properties 1.4 Described heat treatment methods 1.5 Carried out heat treatment on engineering materials 1.6 Identified methods of testing materials depending on their properties 1.7 Carried out material testing as per material testing method 1.8 Analysed and interpreted material testing results
2. Resource Implications	The following resources should be provided: 2.1 Appropriately simulated environment where assessment can take place 2.2 Access to relevant work environment 2.3 Resources relevant to the proposed activity or tasks
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1 Practical 3.2 Project

	3.3 Portfolio of evidence 3.4 Third party report 3.5 Written tests 3.6 Oral assessment
4. Context of Assessment	Competency may be assessed: 4.1 Workplace 4.2 Simulated work environment
5. Guidance information for assessment	Holistic assessment of other units relevant to the industry sector, workplace and job role is recommended.