DCSMAT608: Use Materials in Engineering

UNIT CODE		**DCSMAT608**	
UNIT TITLE		**Use materials in engineering**	
APPLICATION		This unit describes the performance outcomes, skills and knowledge required to determine the mechanical properties of a variety of materials used in civil engineering. The unit of competency is applied by technicians in a civil and structural engineering environment to determine appropriate use of materials. No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.	
ELEMENTS		**PERFORMANCE CRITERIA**	
Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.	
1	Determine properties of engineering materials established from a tension test.	1.1	Create a tension test to industry standards to establish a load extension graph.
		1.2	Explain the outcome of the tensile test as well as any other phenomena observed during a tension test.
		1.3	Convert the load extension graph into a stress strain graph and determine relevant strength and stiffness parameters.
2	Determine properties of engineering materials established from shear, hardness or impact tests.	2.1	Create a shear test to industry standards to establish ultimate shear strength of a material.
		2.2	Explain the outcome of the shear test as well as any other phenomena observed during the test.
		2.3	Create a hardness test to industry standards on a range of materials to rank them in order of hardness.
		2.4	Explain the outcome of the hardness tests as well as any other phenomena observed during the tests
		2.5	Create an impact test to industry standards on a range of materials to rank them in order of ductility.
		2.6	Explain the outcome of the impact tests as well as any other phenomena observed during the tests.
3	Determine the properties of concrete in the plastic and solid states.	3.1	Create a slump test to industry standards on a sample of concrete in the plastic state in order to determine its workability.
		3.2	Explain the outcome of the slump test as well as any other phenomena observed during the test.

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		3.3	Create a compression test to industry standards on a sample of hardened concrete in order to determine its characteristic compressive strength.
		3.4	Explain the outcome of the compression test as well as any other phenomena observed during the test.
4	Determine the properties required to grade a piece of timber.	4.1	Create a flexural test on samples of timber to stress grade the samples.
		4.2	Explain the outcome of the flexural tests as well as any other phenomena observed during the test.
5	Determine the properties of bitumen relevant for facilitating placement.	5.1	Describe common tests used in industry to determine the suitability of a bitumen for use in pavements.
6	Outline NDT techniques used in materials.	6.1	Identify and describe typical processes of common non- destructive tests (NDT) used to locate flaws in materials.
		6.2	Outline the advantages and disadvantages of NDT techniques

FOUNDATION SKILLS
Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

UNIT MAPPING INFORMATION
No equivalent units.

TITLE	**Assessment requirements for DCSMAT608 Use materials in engineering**
PERFORMANCE EVIDENCE	To achieve competency in this unit, a person must satisfy the requirements of the elements and performance criteria, foundation skills and range of conditions included in the unit. The person must also, for each type of test listed in the performance criteria (tension, shear, hardness impact, slump), produce a test report that: • refers to and complies with Australian standards • clearly identifies any deviation to standard procedures and provides explanations of reasons for the deviation. • is formatted to industry standards • explains the appropriate mechanical properties of the materials tested Note: If a specific volume or frequency is not stated, then evidence must be provided at least once for each criterion.
KNOWLEDGE EVIDENCE	To achieve competency in this unit, a person must demonstrate knowledge of:

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	• engineering materials • material properties • the characteristics and applications of the results of the materials tests included in the performance criteria • material testing methods
ASSESSMENT CONDITIONS	**Assessment Conditions:** All assessment must be completed in accordance with work health and safety standards. When assessments are conducted remotely, invigilation software must be used to ensure authenticity of work completed. Model answers or marking guides must be provided for all assessments to ensure reliability of assessment judgements when marking is undertaken by different assessors. Assessors must gather a range of evidence that is valid, sufficient, authentic, and current. Questioning techniques must not require language, literacy and numeracy skills beyond those required in this module. The candidate must have access to all tools, equipment, materials and documentation required. **Assessor Requirements:** Assessment must be conducted only by persons who: • hold vocational competencies at least to the level being delivered and assessed • maintain current industry skills directly relevant to the training and assessment being provided • hold a tertiary qualification in engineering or a related field • meet the assessor requirements specified in the current Standards for Registered Training Organisations (RTOs) • undertake ongoing professional development in vocational training, learning, and assessment, including competency-based training and assessment, as required by their RTO. The RTO must also ensure that trainers and assessors keep their industry knowledge up to date through ongoing professional development. The RTO must take appropriate steps, as an ongoing procedure, to verify information about trainer and assessor's qualifications.