DCSSOM638: Use Strength of Materials in Engineering

UNIT CODE		**DCSSOM638**	
UNIT TITLE		**Use strength of materials in engineering**	
APPLICATION		This unit describes the performance outcomes, skills and knowledge required to determine stresses and deformations in selected components using the principles of strength of materials. The unit of competency is applied by technicians in a civil and structural engineering environment operating as part of an engineering design team. No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.	
PREREQUISITE UNIT(S)		▪ DCSSTA634 Use statics in engineering ▪ Group A Mathematics Elective: Either MEM30012 Apply mathematical techniques in a manufacturing, engineering or related environment; **OR** DCSBME631 Use basic mathematics in engineering	
ELEMENTS		**PERFORMANCE CRITERIA**	
Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.	
1	Evaluate a bolted joint.	1.1	Determine shear strength of the bolt group.
		1.2	Determine bearing strength of the bolt group.
		1.3	Determine tensile strength of the components and the joints.
2	Evaluate a welded joint.	2.1	Determine strength of weld per unit length.
		2.2	Determine required length and distribution of weld.
3	Evaluate thin-walled pressure vessels.	3.1	Calculate hoop and longitudinal stresses of a pressure vessel.
		3.2	Apply stress calculations to determine the optimum wall thickness of a pressure vessel.
4	Determine the stress and strain in structural members.	4.1	Calculate the stress in an axially loaded member.
		4.2	Calculate the strain in an axially loaded member.
		4.3	Calculate the extension of an axially loaded member.
		4.4	Calculate the stress in a member loaded in shear.
		4.5	Determine Young's modulus for relevant load extension data.
5	Design beams for flexural strength and deflections.	5.1	Determine flexural strength criteria.
		5.2	Determine required deformation criteria.
6	Determine thermal stresses in restrained members.	6.1	Calculate thermal stresses in a restrained member when subjected to a change in temperature.

DCSSOM638: Use Strength of Materials in Engineering

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 DCSSOM638 Use strength of 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: • solve written problems in strength of materials using the most appropriate computational method • present information in a relevant format Note: If a specific volume or frequency is not stated, then evidence must be provided at least once for each criterion.

DCSSOM638: Use Strength of Materials in Engineering

KNOWLEDGE EVIDENCE	To achieve competency in this unit, a person must demonstrate knowledge of: • Key principles for applying strength of materials to design, including: – differences between a working stress approach and a limit state (ultimate strength) approach to design. – formulas to determine • first moment of area(Q), • position of the centroid, • second moment of area (moment of inertia I), and • elastic modulus(Z) – the parallel axis theorem to determine the second moment of area about a non-centroidal axis. – formula to determine the flexural stress at any point in a beam. – formula to determine hoop and longitudinal stresses in pressure vessels. – formulae to determine the max deflection of either simply supported beams or cantilever beams subjected to either a uniformly distributed load or a concentrated load – (centrally located for a simply supported beam or located at the free end for a cantilever). – theorems 1 and 2 of the area moment method for determining beam deflections. – Simpson's rule for determining areas under a curve and in its modified version to determine the first moment of an area under a curve. – formula to determine the thermal expansion of unrestrained members subject to a temperature change.

DCSSOM638: Use Strength of Materials in Engineering

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.