

Unit 81: Structural Behaviour and Detailing for Construction

Unit code: J/600/0370

QCF Level: 3

Credit value: 10

Guided learning hours: 60

Unit aim

This unit will enable learners to gain an understanding of the serviceability requirements of structures and gain the skills required to calculate the maximum deflections of loaded beams and design and detail structural elements. The unit also includes the preparation of schedules and cutting lists. The emphasis is firmly on the standard methods of detailing used for a variety of structural elements constructed using a variety of structural materials.

Learning outcomes and assessment criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

Learning outcomes	Assessment criteria
1 Understand the serviceability requirements of structures	1.1 Explain the concept of serviceability limit state design as applied to steel and concrete
2 Be able to perform calculations on the deflection of beams under load	2.1 Explain the factors affecting the deflection of beams
	2.2 Calculate the maximum deflection in beams using Moments of Area and Macauley's method
3 Be able to design structural elements	3.1 Calculate required section sizes for beams
	3.2 Calculate required section sizes for timber floor joists
4 Be able to detail structural elements	4.1 Produce general arrangement details
	4.2 Produce details of individual structural elements

	4.3 Produce connection details for structural members
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Unit content

1 Understand the serviceability requirements of structures

Serviceability requirements: intended use of the structure; location context; relevant British Standards; limit state design; factor of safety; partial safety factors

2 Be able to perform calculations on the deflection of beams under load

Deflection of beams: factors that affect deflection; methods used to determine deflection

Factors: magnitude of loads; load configuration; sectional properties of beams; materials used

Methods: Moment Area Method; Macauley's method

3 Be able to design structural elements

Design of structural elements: information and data requirements; determination of section sizes

Information and data requirements: loading and support conditions; sectional properties of simple beam sections determined from the use of standard formulae or manufacturer's published tables in timber, steel and in-situ reinforced concrete

Section sizes: requirements for simply supported reinforced concrete, timber and steel beams, design of timber floor joists to carry a given load over a simply supported span

4 Be able to detail structural elements

General arrangements: framing plans; elevations; sections

Individual details: fabrication details for steel members; reinforcement details; schedules and cutting lists

Connection details: beam-to-column; beam-to-beam; joist-to-joist; joist-to-support