



Australian Government

Department of Education, Employment and Workplace Relations

MSATCS502A Detail structural steel members

Revision Number: 1

MSATCS502A Detail structural steel members

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	This unit covers the skills and knowledge required to detail structural steel members in steel framed constructions. These members can include beams, girders, columns, trusses, rafters, rakers, tie beams and temporary and permanent braces.
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Application of the Unit

Application of the unit	<p>This unit applies to a structural steel detailer who has to detail structural steel members used in steel constructions. These members can include beams, girders, columns, trusses and braces. Only the most common structural members are considered in this unit. However, the detailing principles and skills covered in this unit can usually be applied to any non standard members specified by designers.</p> <p>In this unit the term beam is interchangeable with the term girder and only 'beam' or 'beams' are used.</p> <p>The unit may apply to structural steel detailing carried out for residential, commercial, industrial or mining fabrication and construction projects. The detailing may be done manually or by using CAD and/or proprietary steel detailing software.</p> <p>The unit assumes that knowledge of basic technical drawing conventions and procedures such as view, dimensioning, drawing layout, etc. is already held.</p> <p>Work is conducted according to defined procedures.</p> <p>Work may be conducted in small to large scale enterprises and may involve individual and team activities.</p> <p>This unit requires the application of skills associated with planning and organising to complete structural steel detail drawings. Communication and numeracy skills are used to refer to patterns and specifications and complete and label sketches. Self management skills are used to ensure conformance of own work to quality standards.</p>
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units	<i>MEM09002B</i>	<i>Interpret technical drawing</i>
	<i>MSATCS301A</i>	<i>Interpret architectural and engineering design specifications for structural steel detailing</i>

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Detail beams	1.1. Location and number of beams are identified from design information 1.2. Beam direction marks are inserted according to industry practice or specific project needs 1.3. Beam dimensions are obtained from design information and inserted into shop drawings 1.4. Beam section designation and cut length are inserted into elevation detail and material list along with any general notes 1.5. Beam levels and beam erection marks and erection clearances are inserted 1.6. Any surface treatment notes are inserted as per design information
2. Detail columns	2.1. Timing and process for detailing of columns is discussed with fabricator to ensure suitability for fabrication schedules 2.2. Column design information is analysed to identify all column connections 2.3. Vertical or horizontal detailing position and viewing direction is elected to suit client requirements and drawing office practice 2.4. Dimensions for columns are inserted from design information 2.5. Sectional views for splices are drawn as per design information 2.6. Plan views for intermediate sections are drawn to illustrate required connections 2.7. Direction and level marks as well as shim and lifting hitches are inserted as required according to design information
3. Detail beam and column splices	3.1. Welded and bolted splices are identified from design information 3.2. Splices to be field welded are identified and checked with fabricator 3.3. Access for welder and electrode is considered for field welded splices 3.4. Column or beam splice is detailed according to design information
4. Detail trusses	4.1. Working points and bevels are established from design information

ELEMENT	PERFORMANCE CRITERIA
	<p>4.2. Layouts for joints are drawn using appropriate scale</p> <p>4.3. Opportunities for symmetry and rotation are noted and used in layouts with approval of fabricator</p> <p>4.4. Trusses are dimensioned including placement of working dimensions, intermediate panel points, other reference points and camber allowances for cambered trusses</p> <p>4.5. Bolted gussets for node points are set out using design information and fabricator preferences</p> <p>4.6. Node points for welded trusses are detailed including set back of member ends and landing for welds using design information and fabricator preferences</p>
5. Detail bracing	<p>5.1. Layout and size of bracing are determined from design information</p> <p>5.2. Setting out points and distances between setting out points are determined</p> <p>5.3. Braces are detailed including bracing connections, allowances for clearances and draw if any</p>
6. Detail purlins, girts and eaves struts	<p>6.1. Layout and type of purlins, girts and eave struts to be used is determined from design information, manufacturers' catalogues and fabricator preferences</p> <p>6.2. Bridging for purlins and girts is determined from design information</p> <p>6.3. Purlins, girts and eaves are detailed consistent with design information</p>

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- assess design information for adequacy of information needed for structural steel detailing
- liaise with architects and engineers
- assess scope of structural steel detailing tasks and priorities
- interpret design drawings, sketches and schedules
- work according to OHS practices of the enterprise and workplace which may include requirements prescribed by legislation, awards, agreements and conditions of employment, standard operating procedures, or oral, written or visual instructions
- communicate at all levels about technical issues related to patterns and specifications
- reading and numeracy is required to the level of interpreting workplace documents and technical information

Required knowledge

- architectural and engineering design drawings including standard symbols, terms, abbreviations and sketches
- connections used in structural steel construction
- the difference between design and detail drawing processes
- drawing office procedures
- fabrication processes and procedures
- the Australian steel structures limit state design code's (AS4100) requirements in so far as they impact on steel detailing

Evidence Guide

EVIDENCE GUIDE	
<p>The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.</p>	
Overview of assessment	
Critical aspects of assessment and evidence required to demonstrate competency in this unit	<p>Demonstrates skills and knowledge to:</p> <ul style="list-style-type: none"> • identify and interpret architect and engineer design specifications for structural steel members and their connections • relate design information to detailing of structural steel members • establish efficient administrative arrangements for liaison with designers • establish drawing and document control procedures • identify standard components and connections from industry publications, manufacturers' catalogues and Australian or other relevant standards
Context of and specific resources for assessment	<p>Assessment may occur on the job or in an appropriately simulated environment</p> <p>Resource implications for this unit include:</p> <ul style="list-style-type: none"> • access to real or appropriately simulated detailing of structural steel members including provision of suitable design information • computer with suitable CAD software or manual drafting equipment and material including work areas, materials and equipment • access to steel and component manufacturers' catalogues or websites • access to relevant standards through either hard copy or internet access. <p>Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate ethnicity, age, gender, demographics and disability.</p> <p>Access must be provided to appropriate learning and/or assessment support when required. Where applicable, physical resources should include equipment modified for people with disabilities.</p>

EVIDENCE GUIDE	
Method of assessment	<ul style="list-style-type: none"> • Assessment must satisfy the endorsed assessment guidelines of the Manufacturing Training Package • Assessment methods must confirm consistency and accuracy of performance (over time and in a range of workplace relevant contexts) together with application of underpinning knowledge • Assessment methods must be by direct observation of tasks and include questioning on underpinning knowledge to ensure its correct interpretation and application • Assessment may be applied under project related conditions (real or simulated) and require evidence of process • Assessment must confirm a reasonable inference that competency is able not only to be satisfied under the particular circumstance, but is able to be transferred to other circumstances • Assessment may be in conjunction with assessment of other units of competency where structural steel detailing is involved
Guidance information for assessment	Assessment processes and techniques must be culturally appropriate and appropriate to the oracy, language and literacy capacity of the assessee and the work being performed.

Range Statement

RANGE STATEMENT	
<p>The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.</p>	
Legislative/regulatory requirements	All work must comply with relevant Federal and State or Territory legislative or regulatory requirements
Design information	Design information is the information provided to the detailer and fabricator by the architects and consulting engineers for a project. For some projects the design information may only be provided by an engineer. The design information will usually be in the form of design drawings or sketches but may also be via material lists, written instructions or computer files
Direction marks	Direction marks are indicated on the shop drawings and on the beam or girder by the words 'North' or 'West' as applicable. Industry standard practice is to determine the placement of these marks by viewing and numbering the beams and girders from the bottom or right hand edge of the floor plan. Variations from this practice may occur on specific projects and should be noted on the erection plan
Beam dimensions	<p>Beam dimensions are obtained from design information in conjunction with Design Capacity Tables (see below) and manufacturers' catalogues. Beam dimensions to be inserted into shop drawings should include:</p> <ul style="list-style-type: none"> • longitudinal dimensions <ul style="list-style-type: none"> • centre to centre distance between supports • overall length of the beam • overall cut length of the beam • dimensions of holing and other details occurring along the length of the beam. The method of showing hole dimensions may be centre to centre, consecutively

RANGE STATEMENT	
	<p>from end to end of beam or as running dimensions according to the needs of the fabricator</p> <ul style="list-style-type: none"> • longitudinal dimensions to groups of holes in the web or flange • vertical dimensions to top most holes for end connection elements <p>Additional dimensions and symbols may be required for non-proprietary welded plate girders. These dimensions and symbols would be specified by the designer and would normally include web and flange dimensions, web stiffener locations and welding symbols</p>
Working points	Working points for trusses may also be referred to as setting out points or intersection points
Design Capacity Tables	Design Capacity Tables refers to the publication ' <i>Design Capacity Tables for Structural Steel, Volume 1: Open Sections</i> ' published by the Australian Steel Institute
Connections	All connections are steel to steel unless specifically noted
Standard connections	Standard connections are those specified in the Australian Steel Institute's publication ' <i>Standardised Structural Connections</i> '
Connection type	<ul style="list-style-type: none"> • Connections may be standard flexible or rigid connections • Flexible connections may include: <ul style="list-style-type: none"> • angle seats • bearing pads • flexible end plates • angle cleats • web side plates • Rigid connections may include: <ul style="list-style-type: none"> • fully welded end plates • bolted moment end plates
Standard detailing parameters	Standard detailing parameters are connections suitable to be detailed using the standard bolting and welding specifications contained in the

RANGE STATEMENT	
	<p>Australian Steel Institute's publication '<i>Standardised Structural Connections</i>'. These details include:</p> <ul style="list-style-type: none"> • size of fillet welds • electrode and MIG welding wire specification • bolt type and size • arrangement of holes for bolts • back gauge dimensions and minimum edge distances • distance from beam top to the first row of bolts • detailing parameters for components such as cleat plates, gussets, end plates, base plates and angle plates
Components	Components may include cleat plates, gussets, end plates, base plates and angle plates
Standard welding symbols	Standard welding symbols as described in AS 1101 Part 3
Non-steel connections	<p>Non-steel connections are those between steel members and concrete, timber, glass or plastic or other building or fabricated component required to be shown on a structural steel detail drawing. The connection may be for structural or decorative purposes. An example would be steel supports for a timber deck</p>
Fixings	Fixings may include standard bolts, dynabolts, chemsets, female internal thread tube bolts, and other specialist steel to non-steel fixings
Work environment	<p>Detailing may be undertaken in a variety of work environments including commercial, home office or fabrication or construction enterprise.</p> <p>Work may be performed individually on a contracting/project basis or as part of a project team and in response to combinations of paper based and electronic instructions.</p>

Unit Sector(s)

Unit sector	Structural steel detailing
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Competency field

Competency field	
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Co-requisite units

Co-requisite units		