



Australian Government

**UEECD0032 Produce detailed
electrotechnology/utilities drawings using
CAD equipment and software**

Release: 1

UEECD0032 Produce detailed electrotechnology/utilities drawings using CAD equipment and software

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to produce detailed electrotechnology/utilities drawings using computer-aided design (CAD) equipment and software.

It includes planning, producing and completing detailed electrotechnology/utilities drawings. It also includes modification and maintenance of detailed electrotechnology/utilities drawings and diagrams using CAD equipment and software from specifications, layouts, sketches or verbal instructions

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECS0033 Use engineering applications software on personal computers

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECD0031 Prepare engineering drawings using manual drafting and CAD for electrotechnology applications

UEECD0030 Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and software

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS

PERFORMANCE CRITERIA

Elements describe the essential outcomes.

Performance criteria describe the performance needed to demonstrate achievement of the element.

1 Plan detailed electrotechnology/utilities drawing

1.1 Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures are identified and applied

1.2 Hazards are identified, risks are assessed and control measures are implemented

1.3 Extent of work is determined from job specifications and discussions with relevant person/s

1.4 Relevant person/s is consulted to coordinate work

1.5 CAD software, tools and equipment for work are obtained in accordance with workplace procedures

2 Produce detailed electrotechnology/utilities drawing

2.1 WHS/OHS risk control measures and procedures for carrying out the work are followed

2.2 Design, detailed drawings and layouts required are determined from job specifications

2.3 Technical data of system components is interpreted to determine parameters included in detailed drawings

2.4 Relevant CAD software tools are used to produce detailed drawings based on standard protocols

2.5 Detailed drawings are checked for accuracy and compliance with job specifications

2.6 Unplanned situations are responded to in accordance with workplace procedures and approval with authorised person/s

3 Complete detailed electrotechnology/utilities drawing

3.1 Completed detailed drawings are submitted to relevant person/s and checked for accuracy and compliance with job specifications

- 3.2 Modifications are followed and detailed drawings re-submitted for final approval
- 3.3 Completed detailed drawings are filed in accordance with workplace procedures

Foundation Skills

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

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Producing detailed electrotechnology/utilities drawings using CAD equipment and software must include:

- detailed circuit and wiring diagrams/schedules, block diagrams, schematics, printed circuit board (PCB) layouts, assembly and installation drawings, modification drawings, and conversion between drawing types
- electrotechnology/utilities specifications, layouts, sketches or verbal instructions in conformance with Australian Standards, enterprise standards and/or design brief
- master sketches methods, techniques, procedures and devices including freehand sketching
- type, form and size of materials from information, abbreviations and symbols supplied on electrotechnology/ utilities engineering drawings, briefs and/or specifications
- specifications may be obtained from design information, customer requirements, sketches, preliminary layouts and/or field investigations
- materials and equipment used in electrotechnology/ utilities engineering applications by selecting the correct type, form and size of materials and equipment from information, abbreviations and

- symbols supplied on detailed electrotechnology/ utilities engineering drawings, briefs and/or specifications
- advanced CAD equipment commands and drawing techniques and processes
 - CAD application programs and advanced tools
 - utility programs disk and file management
 - filing systems management including entering/retrieving technical information from computer-related database programs for the production, modification and/or maintenance of detailed electrotechnology/ utilities drawings
 - safety precautions when working with CAD equipment
 - detailed working drawings
 - drafting/modelling electrotechnology/ utilities
 - detailed electrotechnology/utilities drawings including a representative array of relevant 2-D and 3-D CAD drawings
 - single and multi-part components and detailed electrotechnology utilities assemblies for fabrication, assembly, installation and/or modification of products including dimensions including dimensions; fabrication, assembly, installation and/or modification notes, circuit/wiring layouts/schedules and parts lists from specified dimensions, associated tolerances and design specifications.
 - architectural drawings for electrotechnology/utilities applications
 - organisational procedures for preparation and production of drawings, drawing sets, specifications, drafting documentation and operating and maintenance instructions/manuals for products and systems
 - organisational procedures for processing, filing and saving all graphics, specifications, instructions and related documentation in correct format and location in accordance with work site procedures
 - organisational procedures for collaborating

with the client, key stakeholders and other staff in the selection of the preferred option

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE192A Produce detailed electrotechnology/utilities drawings using computer aided design equipment and software

Links

Companion Volume implementation guides are found in VETNet - -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6>

Assessment Requirements for UEECD0032 Produce detailed electrotechnology/utilities drawings using CAD equipment and software

Modification History

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Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least two separate occasions and include:

- applying modifications to original drawings and re-submitting for approval
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements including implementing risk control measures
- checking drawings for accuracy and compliance with job specifications
- determining job specifications from designs, drawings and layouts
- filing completed drawings
- preparing, producing and completing detailed electrotechnology/utilities drawings
- producing detailed electrotechnology/utilities drawings using computer-aided design (CAD) equipment and software
- responding to unplanned situations
- submitting completed drawings
- working with relevant person/s.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- detailed working drawings, including:
 - definition of detailed working drawings
 - usage and types of detailed working drawings
 - composition and layout of detailed working drawings
 - preparation of detailed working drawings
- advanced (master) sketching techniques, including:
 - lines and letters
 - shapes
 - solids

- axonometric views
- building sketch
- isometric views
- object sketch
- perspective: building interior perspective sketch
- detail labelled sketch
- complex surfaces with tangent and curvature continuities
- surfaces manipulation using editing tools
- surfaces analysis for quality and desired characteristics
- drafting/modelling electrotechnology/utilities, including:
 - standard documentation practices for block diagrams
 - wiring diagrams
 - circuit schematics
 - control circuits
 - creating one-line diagrams
 - standard printed circuit board (PCB) layouts
 - printing wiring assemblies
 - art masters
- electrotechnology/utilities related drawings, including:
 - charts and graphs, including alternating current (a.c.), frequency, electromagnetisms, signals and transmission
 - measuring devices and gauges
 - power sources, transformers, alternators, motors and related applications
 - earthing
 - conduits, boxes and fittings, harnesses, cable trays and ducts
 - conductor terminations, splices, installations and wiring schedules
 - busways
 - electric services installations
 - protection devices -over current and voltage, circuit breakers and fuses
 - switches, contactors and relays
 - control systems and devices
 - high voltage (HV) devices and apparatus
 - cabinet and panel layouts
 - plot and floor plans
 - electric lighting
 - analogue and digital systems, circuits, electronic components and devices - connections; resistors; capacitors; magnetic devices; piezoelectric devices; crystals and resonators; transducers, sensors and detectors; solid state components and semiconductors; display technologies filament; light-emitting diode (LED); liquid crystal display (LCD), discharge devices; thermionic valves; vacuum tubes; assemblies and modules; prototyping aids and mechanical accessories

- data networks, communication and telecommunications equipment and devices
- pneumatic and hydraulic circuits, including related piping ware and components
- AutoCAD functional for electrotechnology/utilities, including:
 - user coordinates systems
 - right-hand rule
 - 2-D geometry extrusion
 - 2-D views from 3-D models and visa-versa
 - user coordinate systems creation
 - 3-D wireframe geometry creation
 - 3-D faces on wireframe geometry placement
 - 3-D geometry viewing
 - surfaces construction
 - working drawings generation
 - drawing set up using model space and paper space, including printing and plotting
 - plotting
 - rendering
 - 3-D models construction
 - 3-D surface models construction
 - 3-D models display from different vantage points
 - orthographic drawings constructed from 3-D models
 - rendered images creation
 - solid modelling construction using Boolean operations
 - scripts writing and tool button macros application
 - organisation of writing scripts and tool button macros commands
 - advanced drawing, editing, and configuration procedures application
 - basic user-level system customisation
 - design environment
 - basic workflow
- AutoCAD project basics, including:
 - project manager
 - project drawing list
 - projects progression/stages
 - projects copy and activation
- AutoCAD schematic wiring, editing, components and reporting, including:
 - wiring and ladders
 - wire types and wire numbers
 - source and destination signal arrows
 - multiple phase and multi wire circuits
 - circuits

- connectors and point-2-point wiring
- basic editing utilities
- miscellaneous tools
- data tools
- re-sequence and re-tag drawings
- using the auditing tools
- schematic symbol annotation
- inserting schematic symbols
- swapping and updating blocks
- inserting schematic components from lists
- generating schematic reports
- AutoCAD panel layouts, including:
 - creating panel layouts from schematic lists
 - din rail utility usage
 - panel footprints
 - terminal strip editor usage
 - panel layout annotation and reports
- AutoCAD programmable logic controller (PLC) modules, including:
 - PLC input/output (I/O) modules
 - PLC modules builder
 - PLC database file editor, including insert and edit in parametric PLC modules, non-parametric PLC modules and stand-alone PLC I/O points
 - PLC I/O address-based tagging
 - spreadsheet to PLC I/O utility
- AutoCAD detailed settings and configurations advanced commands, including:
 - drawing properties
 - project properties
 - creating wire types
 - reference files usage
 - creating drawing templates
 - installation and search paths
- AutoCAD detailed customised components and customised detailed data, including:
 - schematic symbols
 - icon menu system
 - panel footprints
 - part catalogue databases usage
 - pin list database editor
 - title block update and attributes
 - terminal properties editor
 - reference files usage

- AutoCAD advanced auditing tools, automation tools and integration, including:
 - auditing tools
 - troubleshooting tools
 - updating schematics from spreadsheets
 - generating automatic reports
 - AutoCAD integration
 - din rail editor
 - footprint with wire annotation
 - conduit tools
 - cables management
- AutoCAD database management and productivity tools, including:
 - title block attributes automation tools update
 - schematics update spreadsheets
 - adding wire data to footprints
 - managing cables
 - using the circuit builder
 - working with peer-to-peer
- drawings production using CAD application programs, including:
 - principals, concepts and applications of drawings production using CAD application programs
 - terms, conventions and codes related to drawings production using CAD application programs
 - drawing production types using CAD application programs
 - CAD advanced commands identification and application for drawings
 - CAD advanced commands identification and application for editing drawings
 - CAD advanced commands identification and application for hardcopy drawings
 - techniques and applications in producing detailed architectural drawings of a floor plan, elevation, and exterior wall section for a residential structure related to electrotechnology/utilities applications
- T15 utility programs disk and file management, including:
 - principals, concepts and applications of disk and file management of utility programs
 - terms, conventions and codes related to disk and file management of utility programs
 - disk operating system commands identification and usage
 - utility commands identification and usage
 - commands for word processing identification and usage
- CAD information technology
- detailed electrotechnology/utilities drawings
- relevant manufacturer specifications
- relevant risk mitigation processes include risk control measures
- relevant WHS/OHS legislated requirements
- relevant workplace documentation

- relevant workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

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<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6>