



Australian Government

Assessment Requirements for UEEEL0043 Develop engineering solutions for induction machine and control problems

Release: 1

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Modification History

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

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 one occasion and include:

- understanding the extent of the machine problem
- forming effective strategies for solution development and implementation
- obtaining machine parameters, specifications and performance requirements appropriate to each problem
- testing and solutions to machine problems
- documenting instruction for implementation of solutions that incorporate risk control measure to be followed
- documenting justification of solutions implemented in accordance with professional standards
- dealing with unplanned events
- analysing approaches to solutions
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- determining the scope of induction machine problems
- monitoring quality of work
- planning activities to meet timelines.

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:

- induction machines diagnostics and engineering solutions for induction motor problems, including:
 - operating principles of polyphase induction motors encompassing:
 - rotating magnetic field torque slip
 - MMF relationships
 - leakage fluxes

- construction of polyphase induction motors encompassing:
 - squirrel cage motors
 - slip-ring motors
 - construction considerations in minimisation of tooth locking
- speed-torque relationships in induction motors encompassing:
 - maximum torque
 - torque – slip relationships
 - squirrel cage rotor types
 - power flow in the motors
 - power distribution
 - torque units
 - slip ring rotors
- induction motor performance testing encompassing:
 - no-load tests
 - locked rotor tests
 - development of motor equivalent circuit from test results
 - analysis of motor performance using circle diagrams
- induction motor starters encompassing:
 - starting requirements
 - type of starters
 - starting torque
 - starting dynamics
 - static friction
 - mechanical loads
 - starting duration
- reduced voltage starting encompassing:
 - starting dynamics
 - change over conditions
 - starting duration
 - acceleration curves
- speed control of induction motors encompassing:
 - constant torque, constant power concepts
 - torque-flux-voltage relationships
 - rotor resistance control
 - stator impedance control
 - variable frequency control (e.g. PAM, PWM and flux vector control)
- braking of induction motors encompassing:
 - electrical braking systems (plugging, direct current (d.c.) dynamic, regenerative and capacitor-magnetic)
 - mechanical braking systems (mechanical drum, demag and eddy current)

- motor protection encompassing:
 - overload
 - earth fault
 - phase failure
- motor selection criteria and RMS rating
- induction motor maintenance/repair encompassing:
 - routine maintenance schedules
 - type of repairs (mechanical and electrical)
- single phase induction motors encompassing:
 - operating principles (especially RMF)
 - construction types
 - speed-torque relationships
 - testing
- relevant induction machine construction, operation, characteristics and applications, including driven load and duty cycle
- relevant machine parameters, specifications and performance requirements
- relevant manufacturer specifications and operating instructions/manuals
- relevant job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace quality, instructions, 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 suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable 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 simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to developing engineering solutions for induction machine problems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - -

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