



Australian Government

MEM24015 Perform digital and computed radiography

Release: 1

MEM24015 Perform digital and computed radiography

Modification History

Release 1. New unit.

Application

This unit of competency defines the skills and knowledge required by non-destructive testing (NDT) technicians to perform computer and digital radiographic testing to the level described in relevant Australian and international standards and codes. The unit applies to computer digital radiographic testing undertaken in a range of industrial applications, including metallic and non-metallic fabrications, structures and components. Digital radiography testing may be performed by NDT technicians in a wide range of industries and sectors, including mechanical or mechatronics engineering, maintenance, manufacturing, construction, mining, oil/gas, and associated industry sectors.

The unit covers calibration, set-up and use of computer and digital radiography equipment, including X-ray generators and sealed radioactive sources. Techniques covered include real-time digital radiography (DR), digital detector arrays (DDA) and computed radiography (CR). The unit requires attention to personal and work health and safety (WHS) and ionizing radiation equipment materials and chemicals codes and regulations.

Where interpretation of technical drawings is required, unit MEM09002 Interpret technical drawing should also be selected.

Where the selection and use of engineering measurement is required, unit MEM12023 Perform engineering measurements should also be selected.

Where the selection and use of power tools are required, unit MEM18002 Use power tools/hand held operations should also be selected.

No licensing or legislative requirements apply to this unit at the time of publication. Certification against Australian standards may be achieved where assessment in this unit of competency is carried out in conjunction with an examining authority as described in ISO 9712 Non-destructive testing — Qualification and certification of personnel.

Band: B

Unit Weight: 6

Pre-requisite Unit

MEM11011 Undertake manual handling

MEM13013 Work safely with ionising radiation

MEM13015 Work safely and effectively in manufacturing and engineering

MEM16006 Organise and communicate information

MEM18001 Use hand tools

MEM24010 Perform radiographic testing

MEM24020 Apply materials technology principles to non-destructive testing

MEM30007 Select common engineering materials

Competency Field

Non-destructive testing

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. Determine job requirements	1.1 Follow standard operating procedures (SOPs) 1.2 Comply with work health and safety (WHS) requirements at all times 1.3 Use appropriate personal protective equipment (PPE) in accordance with SOPs 1.4 Identify job requirements from specifications, job sheets or work instructions
2. Prepare testing site(s)	2.1 Assess suitability of site for digital radiography 2.2 Liaise with client to explain testing/safety requirements and schedule tests to minimise disruption, 2.3 Assemble all specified testing equipment, materials and containers and safety equipment 2.4 Determine test site boundary for test operations and arrange safe access to testing site(s),
3. Prepare test material and equipment	3.1 Identify test material inspection area 3.2 Clean and prepare inspection areas for testing using appropriate test procedures and materials in accordance with WHS and regulatory requirements 3.3 Assess inspection areas visually and identify obvious discontinuities 3.4 Select the most appropriate digital radiographic test technique for the material or application 3.5 Select appropriate testing and processing equipment and conduct pre-use checks in accordance with relevant standards and/or procedures 3.6 Calibrate computer and digital radiography equipment using radiography phantoms and reference images records
4. Perform computed	4.1 Optimise computed radiography equipment set-up for various

Elements	Performance Criteria
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
radiographic testing	geometries in accordance with standards and/or procedures 4.2 Conduct computed radiographic tests in accordance with relevant standards, codes and specifications 4.3 Use radiation control measures to minimise personal radiation exposure 4.4 Process image plate and assess radiograph for quality 4.5 Modify computed images to optimise defect detection
5. Perform digital radiographic testing	5.1 Optimise digital radiography equipment set-up for various geometries in accordance with standards and/or procedures 5.2 Conduct radiographic tests in accordance with relevant standards, codes and specifications 5.3 Use radiation control measures to minimise personal radiation exposure 5.4 Process digital radiograph and assess for quality 5.5 Modify digital images to optimise defect detection
6. Interpret and report radiographic test results	6.1 Assess computed or digital radiograph indications and determine the type of discontinuity for each relevant indication 6.2 Classify defects in accordance with relevant national and international codes and standards 6.3 Interpret results according to applicable standards, codes, specifications or procedures 6.4 Prepare report according to standards and specifications 6.5 Maintain statutory records of the use of radiation sources and/or instruments that emit ionising radiation.

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance.

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

Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Standards and codes include Australian or international standards and codes and include one or more of:	- standards for non-destructive testing of welds - standards for non-destructive testing of materials - standards for materials used in manufacturing and engineering - standards for calibration and operation of test equipment.
Test material include one or more of:	- ferrous and nonferrous metallic items - castings - plate - pipe - welds - tanks - manufactured components - other ferrous and nonferrous metal items - glass - cement and concrete - polymers and elastomers - composites.
Personal radiation control measures include:	- minimising exposure time - maximising distance from radiation source - use of specified shielding.
Computed radiography Includes:	radiography using phosphor-imaging plates for later processing by special software.
Digital radiography includes:	real-time radiography using a single digital scanner or a digital detector array.
Radiographic test techniques include:	- single wall, single image (plate) - double wall, single image (tube) - double wall, double image - double wall, double image, source superimposed.

Unit Mapping Information

No equivalent unit

Links

Companion Volume Implementation Guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2>

Assessment Requirements for MEM24015 Perform digital and computed radiography

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Performance Evidence

There must be evidence the candidate has demonstrated the ability to:

- prepare two sites for digital radiography
- prepare two sites for computed radiography
- using measures to avoid or minimise radiation exposure to self and others for at least one test occasion, selecting a real time radiography reading station location for maximum safety and efficiency
- use radiation dosimeter to monitor personal exposure to radiation
- prepare area for digital radiographic testing on at least three occasions
- select the most appropriate digital radiographic test technique for the material or application
- optimise the quality of digital radiographic test set-up for different geometries and/or specialised applications
- use digital radiography to perform at least three of the following radiographic test techniques on one occasion each:
 - single wall, single image (plate)
 - double wall, single image (tube)
 - double wall, double image
 - double wall, double image, source superimposed
- process acquired digital radiographic images for viewing
- enhance or modify acquired digital image to optimise defect detection
- interpret and evaluate digital radiographs including checking and confirming indicators and identifying defects
- classify defects in accordance with job specifications and national and international codes and standards
- report test results and complete job records in accordance with procedures relevant Australian and international codes and standards
- calibrate digital radiography equipment on at least two occasions including using phantoms and reference images
- minimise environmental impact of digital radiographic tests.

Note: Where a volume and/or frequency is not specified, demonstration must be provided at least once.

Knowledge Evidence

There must be evidence the candidate has knowledge of:

- standards, codes and regulations relevant to handling and storing digital radiographic equipment and radiation sources
- advantages and disadvantages of film and digital radiography
- safety features of radioisotope cameras and X-ray equipment
- principles and stages of digital radiography including:
 - set up and optimisation
 - image capture
 - mapping
 - image reading (CR)
 - image processing
 - image manipulation and magnification
 - image analysis
 - reporting
- applications and differences between digital radiography techniques including direct radiography (DR), digital detector arrays (DDA), and computed radiography (CR)
- procedures for carrying out each type of radiographic test and for specialised radiographic applications
- principal types of X-ray generators and radioisotopes and their effect on radiographic sensitivity
- cleaning and preparation processes for a range of test surfaces
- types of discontinuities and their consequences/effect on the material
- equipment calibration checks including:
 - laser beam jitter and flare
 - beam alignment
 - spatial resolution
 - line pair resolution
 - unsharpness
 - shading correction
 - image plate or cassette positioning
 - linearity
 - contrast sensitivity
- measuring tool calibration
- absorption of ionizing radiation by matter and the biological effects on living tissue
- X-ray equipment
- gamma ray sources
- shielding thickness calculation methods
- exposure calculations and techniques
- reciprocity law.
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Assessment Conditions

- Assessors must:
 - have vocational competency in performing radiographic testing at least to the level being assessed with relevant industry knowledge and experience
 - satisfy the assessor requirements in the *Standards for Registered Training Organisations 2015* or its replacement and comply with the *National Vocational Education and Training Regulator Act 2011*, its replacement or equivalent legislation covering VET regulation in a non-referring state/territory as the case requires.
- Where possible, assessment must occur in operational workplace situations. Where this is not possible or where personal safety or environmental damage are limiting factors, assessment must occur in a sufficiently rigorous simulated environment that reflects realistic operational workplace conditions that cover all aspects of workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills.
- There must be access to all tools, equipment, materials and documentation required, including relevant workplace procedures, product and manufacturing specifications.
- 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.

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