



Australian Government

RIIARO405 Optimise automated drilling operations

Release: 1

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Modification History

Release 1	This version first released with RII Resources and Infrastructure Industry Training Package Version 9.0. Newly created unit.
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Application

This unit describes the skills and knowledge required to optimise the performance of automated drilling operations to meet performance targets relating to quality, efficiency, and safety. It includes optimising automated drilling system performance and outputs, monitoring automated drilling systems and processes, and responding to abnormal situations.

The unit applies to those who manage multiple automated drilling rigs at locations remote from the control centre.

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

Unit Sector

Coal mining

Metalliferous mining

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes	Performance criteria describe the performance needed to demonstrate achievement of the element
1. Optimise automated drilling system performance	1.1 Undertake drill path planning and sequencing in accordance with machine capability, working conditions, requirements of the drill pattern, and organisational requirements 1.2 Coordinate multiple drills on the same drill pattern in line with requirements for quality, safety, and efficiency 1.3 Control access to drilling areas in accordance with entry and exit procedures to ensure the safety and efficiency of people and equipment undertaking operations in vicinity of automated drill rigs 1.4 Confirm that scheduled timing for replenishment of consumables aligns with system data on usage and take

ELEMENT	PERFORMANCE CRITERIA
	action where necessary
2. Monitor automated drilling systems and processes	2.1 Monitor control system gauges to maintain drill rotation speed and pressure, feed force and penetration rates within required parameters 2.2 Monitor drill rig sensors, camera feeds and positional data to confirm drills are operating according to plan 2.3 Monitor drill operations in higher risk areas to enable timely intervention when needed 2.4 Monitor people and equipment in the drilling area and the boundaries between automated and manned equipment to ensure functional safety 2.5 Monitor completed blast holes against specific quality requirements in the drill plan, and identify and record anomalies
3. Respond to abnormal situations	3.1 Prioritise and resolve alarms, warning devices and systems in accordance with organisational procedures 3.2 Compensate or adjust to potential adverse situations within designated level of own responsibility 3.3 Confirm obstacle detection readings using drill rig cameras and request site personnel to investigate if drill operations are likely to be impacted 3.4 Respond to changed conditions in drilling area in a timely manner and follow escalation protocols according to the situation

Foundation Skills

This section describes those language, literacy, numeracy, and employment skills that are essential to performance but not explicit in the performance criteria.

SKILL	DESCRIPTION
Numeracy	Interprets and uses a range of mathematical information relating to drilling systems and their gauges

Unit Mapping Information

No equivalent unit. Newly created unit.

Links

Companion Volume Implementation Guide is found on VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=88a61002-9a21-4386-aaf8-69c76e675272>

Assessment Requirements for RIIARO405 Optimise automated drilling operations

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Performance Evidence

The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to:

- optimise automated drilling operations, or aspects thereof, on at least 2 occasions.

During the above, the candidate must:

- undertake drill path planning and sequencing
- coordinate multiple drills
- control access to drilling site/s
- monitor system gauges and drilling system data
- interpret, prioritise and resolve alarms, warning devices and systems
- respond to changed conditions in line with organisational protocols.

Knowledge Evidence

The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including knowledge of:

- fundamentals of automated drilling control system, including:
 - drill functions, characteristics, technical capability, and limitations
 - human-machine interface (HMI)
 - electronic barriers/cables/geo fencing and other safety features
 - auto navigation
 - auto drill, where drill automatically determines optimal energy required depending on hardness of softness of drill area
 - closed circuit TV (CCTV), machine sensing, guidance and positioning systems
 - obstacle detection
 - when and how to intervene in the pre-configured drill operations
 - factors that ensure quality and efficiency

- levels of automation and related safety functions relevant to operations in own role
- requirements for controlling multiple drill patterns and multiple sites from a single control station
- industry standards and guidelines relating to functional safety in autonomous workplaces, including or equivalent to:
 - IEC 61508 / AS 61508 Functional Safety of electrical/electronic/programmable electronic safety-related systems
 - ISO 17757 Earth moving machinery and mining – Autonomous and semi-autonomous machine system safety
- organisational safety requirements, including those relating to automated machine exclusion zones
- major components and parts of drill rigs, including their functions and typical malfunctions for effective diagnostics of faults and breakdowns
- key characteristics of the topology of the working area
- environmental requirements for drilling operations, including dust suppression
- organisational requirements specific to path planning for given drill patterns
- people and equipment requiring access to drill area, including:
 - drill support vehicles and personnel
 - water trucks
 - refuelling trucks
 - maintenance crews
 - geologists
 - surveyors
 - blast team
- quality requirements for blast holes, including:
 - diameter
 - depth
 - angle
- elements of higher risk areas, including:
 - working near edges
 - highwall
 - contour
 - obstructions
 - manned equipment within work area
- response procedures for potential adverse situations, including:
 - gauge malfunctions
 - ground conditions requiring a row to be cut short and consequent re-adjustment and communication of the path plan
 - changed conditions requiring manual control of machines to perform drilling operations
 - drill bit jamming

- potentially adverse vibrations
- compromised hole integrity.

Assessment Conditions

Mandatory conditions for assessment of this unit are stipulated below. The assessment must:

- include access to:
 - personal protective equipment
 - automated drill rig control system/s
 - communications technology
- be conducted in a safe environment; and,
- be assessed in the context of this sector's work environment; and,
- be assessed in compliance with legislative and regulatory requirements and using policies, procedures and processes directly related to the industry sector for which the unit is being assessed; and,
- confirm consistent performance can be applied in a range of relevant workplace circumstances.

Where personal safety or environmental damage are limiting factors, assessment may occur in a simulated work environment* provided it is realistic and sufficiently rigorous to cover all aspects of this sector's workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills.

Assessor requirements

Assessors must be able to clearly demonstrate current and relevant industry knowledge and experience to satisfy the mandatory regulatory standards as set out in the Standards for Registered Training Organisations 2015/Australian Quality Training Framework mandatory requirements for assessors current at the time of assessment and any relevant licensing and certification requirements.

This includes:

- the minimum years of current** work experience after competency has been obtained as specified below in an industry sector relevant to the outcomes of the unit.

It is also acceptable for the appropriately qualified assessor to work with an industry expert to conduct assessment together and for the industry expert to be involved in the assessment judgement. The industry expert must have current industry skills directly relevant to the training and assessment being provided. This means the industry subject matter expert must demonstrate skills and knowledge from the minimum years of current work experience after competency has been obtained as specified below, including time spent in roles related to the unit being assessed:

Industry sector/Unit sector	AQF indicator level	Required assessor or industry subject matter expert experience
Drilling, Metalliferous Mining, Coal Mining, Extractive (Quarrying) and Civil Infrastructure***	1	1 year
	2	2 years
Drilling, Coal Mining, Extractive (Quarrying), Metalliferous Mining and Civil Infrastructure***	3-6	3 years
Units coded 'RIIARO' (Autonomous and Remote Operations)	Given that this is an emerging industry area, assessors are required to demonstrate vocational competencies at least to the level being assessed, and current industry skills directly relevant to the assessment being provided.	
Other sectors	Where this unit is being assessed outside of the resources and infrastructure sectors assessor and/or industry subject matter expert experience should be in line with industry standards for the sector in which it is being assessed and where no industry standard is specified should comply with any relevant regulation.	

*Guidance on simulated environments has been stipulated in the Companion Volume Implementation Guide located on VETNet.

**Assessors can demonstrate current work experience through employment within industry in a role relevant to the outcomes of the unit; or, for external assessors this can be demonstrated through exposure to industry by conducting a minimum number of site assessments as determined by the relevant industry sector, across various locations.

***Excluding units coded 'RIIARO' (Autonomous and Remote Operations).

Links

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