



Australian Government

Department of Education, Employment and Workplace Relations

MSL955001A Supervise a robotic sample preparation system

Revision Number: 1

MSL955001A Supervise a robotic sample preparation system

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	This unit of competency covers the ability to ensure that an enterprise's robotic sample preparation system operates safely and continuously to provide clients with samples that meet their specifications. This includes prioritising and planning job sequences, solving common system problems as they arise and working closely with system operators to ensure safety and achievement of production targets and quality standards. Personnel are not expected to undertake system repairs, servicing or non routine cleaning and maintenance.
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Application of the Unit

Application of the unit	This unit of competency is applicable to laboratory supervisors in charge of robotic sample preparation systems in the mining industry sector. Robotic sample preparation systems are used where there are high volumes of material and/or there is a need to minimise the operator's contact with potentially hazardous materials. Therefore, this unit of competency may also be relevant for some laboratories in the construction materials testing and manufacturing sectors. Industry representatives have provided case studies to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. These can be found at the end of this unit of competency under the section 'This competency in practice'.
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units		
	MSL953002A	<i>Operate a robotic sample preparation system</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. Plan work for shift	1.1. Review job requests to determine nature of samples, required parameters and any specific client instructions or preparation methods for each 1.2. Assess hazards associated with samples and identify the need for specific safe work procedures and use of safety/personal protective equipment 1.3. Determine job sequence after consideration of the dryness of samples, need for further drying or pre-treatment and client/production priorities 1.4. Record job sequence and confirm details with operators
2. Oversee system setup	2.1. Check that data entry for samples is complete, accurate and matches accompanying documentation 2.2. Check that sample preparation parameters assigned to each sample are appropriate and adjust as necessary 2.3. Conduct pre-use system checks, make necessary system adjustments and authorise startup
3. Monitor system performance and recover from errors and breakdowns	3.1. Conduct regular system checks to determine whether system outputs are consistent with normal operation 3.2. Conduct regular visual checks to identify signs of malfunction, equipment wear or impending system failure 3.3. Interpret error codes and analyse system/equipment outputs to investigate the nature of problems 3.4. Shut down and/or isolate faulty system components to enable safe investigation and continuation of unaffected work tasks 3.5. Troubleshoot causes of problems and take appropriate corrective actions within scope of responsibility and technical competence 3.6. Seek advice when problems are beyond scope of responsibility or knowledge 3.7. Arrange for servicing and/or repairs in response to mechanical breakdowns 3.8. Prior to restart, conduct pre-use checks, adjust job sequence and sample preparation parameters and re-synchronise system components as necessary
4. Maintain system safety	4.1. Ensure operators know about sample and system hazards, required safe work procedures and use of

ELEMENT	PERFORMANCE CRITERIA
	safety/personal protective equipment 4.2. Ensure that safety equipment and required personal protective clothing and equipment is available and fit for purpose 4.3. Conduct regular checks to ensure that operators work safely when handling hazardous samples, operating the system and performing authorised cleaning/maintenance of system components
5. Maintain system records	5.1. Ensure that the data, results and comments entered by operators into system are complete and accurate for each shift 5.2. Maintain the security, integrity and traceability of samples and system documentation 5.3. Record and report system/equipment use, errors, breakdowns, maintenance and repairs in accordance with enterprise procedures
6. Contribute to system improvements	6.1. Identify and report opportunities to improve system safety to appropriate personnel 6.2. Examine system logs and outputs to identify instances or emerging trends of sub-standard performance 6.3. Recommend appropriate preventative/corrective actions for improving performance to relevant personnel 6.4. Implement authorised system improvements 6.5. Train operators to improve performance and minimise recurrence of preventable problems

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

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

Required skills

Required skills include:

- planning and prioritising jobs for a shift
- recognising, assessing and controlling hazards associated with samples and system
- working safely at all times
- interpreting, applying and improving enterprise procedures for operating robotic system
- explaining system operation and safe work procedures to operators
- recognising and rectifying problems caused by prior sample handling and preparation
- interpreting system error codes and taking appropriate corrective actions
- troubleshooting and solving common system problems within scope of responsibility
- communicating clearly with clients, operators, maintenance/IT technicians and production managers
- maintaining system records

Required knowledge

Required knowledge includes:

- procedures for sorting, receiving and analysing samples
- geological and chemical characteristics of mineral ores
- sample preparation processes for a wide range of mineral ore samples
- purpose and key steps in routine downstream analytical tests
- procedures for preventing contamination
- procedures for ensuring security, integrity and traceability of samples
- procedures for ensuring confidentiality of results
- function of key components and operating procedures for robotic sample preparation system
- function of key components of laboratory information management system (LIMS), system software and layout of screens
- error codes for system errors, recommended preventative/corrective actions and breakdown procedures
- system hazards, control measures and operation of system safety equipment
- troubleshooting and problem solving skills relevant to job role
- importance of good customer relations, throughput, costs and minimising rework
- health, safety and environment requirements relevant to job role

Evidence Guide

EVIDENCE GUIDE

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.

Overview of assessment

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Assessors should ensure that candidates can:

- plan, monitor and adjust work flow to manage competing client/production priorities
- ensure that the robotic sample preparation system operates efficiently and safely to produce outputs that meet the enterprise/client quality requirements
- promptly identify/rectify common system problems
- work closely with operators to improve safety, efficiency and quality.

Context of and specific resources for assessment

This unit of competency is to be assessed in the workplace or simulated workplace environment.

This unit of competency may be assessed with:

- *MSL944001A Maintain laboratory/field workplace safety*
- *MSL977002A Troubleshoot equipment and/or production processes.*

Resources may include:

- access to a robotic sample preparation system
- a variety of mineral ore samples, sample preparation methods, equipment and reagents
- safety equipment
- relevant enterprise procedures.

Method of assessment

The following assessment methods are suggested:

- review of production logs, quality control, performance and analytical results traceable to samples prepared on shifts supervised by the candidate
- review of system records prepared by the candidate
- feedback from operators, service/maintenance technicians, clients and laboratory/production managers
- written/oral questioning about robotic sample preparation procedures, common problems and their

EVIDENCE GUIDE

	specified corrective actions. In all cases, practical assessment should be supported by questions to assess underpinning knowledge and those aspects of competency which are difficult to assess directly. Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate ethnicity, age, gender, demographics and disability. Access must be provided to appropriate learning and/or assessment support when required. The language, literacy and numeracy demands of assessment should not be greater than those required to undertake the unit of competency in a work like environment.
This competency in practice	Industry representatives have provided the case study below to illustrate the practical application of this unit of competency and show its relevance in a workplace setting. Mineral processing An operator observes that the robotic sample preparation system is displaying an 'incorrect weight' error code and informs the shift supervisor. The supervisor notes that although the input weight for the sample being processed was 800g, the indicated output weight is zero. He/she immediately suspects that the sample is stuck in the bowl. He/she switches off the mill and tags it out so that the operator can continue unloading the completed samples. The supervisor checks the mill for a faulty hose but they are all functioning correctly. He/she decides that the problem could be in the grinding vessel and tries to manually discharge the sample with a pendant without success. After opening up the grinding vessel, he/she finds that a 'plastic' sample is stuck in the bowl. He/she replaces the grinding vessel with a new one. As he/she extracts the sample from the bowl, he/she notices a very strong smell of diesel. He/she subsequently finds that the client's other samples are also contaminated and removes them from the input magazine. He/she deletes the client's worksheets from the robot control program, checks and synchronises the system and then restarts the robot. He/she reports the problem to the laboratory manager and asks him/her to notify the client of the diesel

EVIDENCE GUIDE

contamination and the laboratory's inability to prepare their batch of samples.

Range Statement

RANGE STATEMENT

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.

Codes of practice

Where reference is made to industry codes of practice, and/or Australian/international standards, it is expected the latest version will be used

Standards, codes, procedures and/or enterprise requirements

Standards, codes, procedures and/or enterprise requirements may include:

- Australian and international standards, such as:
 - AS 2939 Industrial robot systems - Safe design and usage
 - AS 3988-1991 Copper, lead, zinc, gold and silver ores - Guide to sample preparation for the determination of gold
 - AS 4433.2-1997 Guide to the sampling of particulate materials - Preparation of samples
 - AS ISO 1000-1998 The international system of units (SI) and its application
- Australian code of good manufacturing practice for medicinal products (GMP)
- enterprise recording and reporting procedures
- equipment startup, operation and shutdown procedures
- material safety data sheets (MSDS)
- national measurement regulations and guidelines
- principles of good laboratory practice (GLP)
- production and laboratory schedules
- quality manuals, equipment and procedures manuals
- standard operating procedures (SOPs) and published preparation methods

Samples

Samples may include:

RANGE STATEMENT	
	- solids, such as rocks, minerals, soils, sands and stream sediments - pulverised core and other drill samples (e.g. rotary air blast (RAB), reverse circulation (RC) and aircore) - powder concentrates - dump samples and grab samples
Client requests/documentation	Client requests/documentation may include: - client profile, sample identification, sample receipt, storage and analyses - required preparation method, service charges
Sample preparation methods	Sample preparation methods may include: - sorting, boxing and drying - sieving - milling - primary crushing (e.g. 10 mm, 2 mm) - fine pulverising (e.g. 100 micron, 75 micron) - robotic system parameters such as grind time, crushing time and cleaning cycles to prevent cross-contamination
Sample preparation equipment	Sample preparation equipment may include: - splitters (e.g. riffles and rotary dividers) - mills (e.g. ball, ring and rod) - bowls (e.g. chrome-steel, tungsten-carbide and zirconia) and tumblers - crushers (e.g. cone, jaw and roll), grinders and disc pulverisers - sieves - ovens - sample containers and labels
Hazards	Hazards may include: - dust, silica and fibrous materials - asbestiform minerals - naturally occurring radioactive materials (NORM) - samples containing nickel and lead-based compounds - noise and vibration - crushing, entanglement and cuts associated

RANGE STATEMENT	
	with moving machinery • impact injuries from contact with robot arms • failure of pneumatic hoses • manual handling of heavy loads, such as sample bags/containers, racks and trolleys • heat exhaustion/stress and fatigue
Safety equipment and procedures	Safety equipment and procedures may include: • ensuring access to service shut off-points • recognising and observing hazard warnings and safety signs • labelling of samples and hazardous materials • extraction of dust • cages and guards for moving machinery parts • noise insulation • using personal protective equipment, such as masks, heat resistant mittens, boots, goggles, coats, ear muffs, safety boots and heat reflective clothing • following established manual handling procedures • regular cleaning of equipment and work areas in accordance with enterprise procedures • reporting of abnormal emissions and airborne contaminants to appropriate personnel
Common system errors and corrective actions	Common system errors and corrective actions may include: • sample losses: • inspect mill for mechanical problems and worn hoses • inspect balance/load cell, clean and check calibration • check sample for dryness and contamination • collision of sample buckets, transport belt problem: • clear obstruction, cross-check sample, worksheet, job sequence and synchronise belt • loss of air pressure: • check pneumatic lines, compressor and

RANGE STATEMENT	
	solenoid values - LIMS network connections: - check all parameters are saved in system, if not, unload and reload data and cross-check samples with worksheets
Occupational health and safety (OHS) and environmental management requirements	OHS and environmental management requirements: - all operations must comply with enterprise OHS and environmental management requirements, which may be imposed through state/territory or federal legislation - these requirements must not be compromised at any time - all operations assume the potentially hazardous nature of samples and require standard precautions to be applied - where relevant, users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council (NHMRC) and State and Territory Departments of Health

Unit Sector(s)

Unit sector	Sampling
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Competency field

Competency field	
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Co-requisite units

Co-requisite units		

Co-requisite units		