



Australian Government

Department of Education, Employment and Workplace Relations

MSL953002A Operate a robotic sample preparation system

Revision Number: 1

MSL953002A Operate a robotic sample preparation system

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	This unit of competency covers the ability to operate a robotic sample preparation system to ensure efficient throughput of samples without sacrificing quality or safety. Personnel are expected to seek advice from their shift supervisor when non-routine problems arise.
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Application of the Unit

Application of the unit	This unit of competency is applicable to instrument operators in the mining, construction materials testing and manufacturing industry sectors. 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. 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		

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. Prepare robotic system for operation	1.1. Perform routine system checks at start of shift 1.2. Confirm shift priorities with supervisor 1.3. Review job requests to identify the samples, required parameters and special instructions/preparation methods for each 1.4. Identify hazards and safety equipment/procedures associated with samples, preparation methods and robotic system 1.5. Check that samples are dry and free of obvious contamination 1.6. Check that the particle size of any sample does not exceed system input size limits 1.7. Check samples against accompanying documentation and record/report any discrepancies
2. Load samples into system	2.1. Scan sample barcodes into system 2.2. Load samples in the correct sequence when the system is ready 2.3. Use system monitor to ensure that correct worksheet is assigned to each sample
3. Monitor system and report errors	3.1. Monitor screen displays and conduct visual checks as necessary to ensure that system operates correctly throughout cycle 3.2. Recognise common error codes and promptly inform supervisor 3.3. Seek advice to deal with any situation beyond scope of responsibility or knowledge
4. Unload samples	4.1. Unload samples sequentially in accordance with enterprise procedures 4.2. Obtain analytical portions of each sample using enterprise procedures 4.3. Label and store analytical portions and excess sample material in accordance with enterprise procedures 4.4. Seek advice when problems are beyond scope of responsibility or knowledge
5. Maintain a safe work environment	5.1. Use safe work practices and protective equipment to ensure personal safety and that of others 5.2. Minimise the generation of waste and environmental impacts

ELEMENT	PERFORMANCE CRITERIA
	5.3. Segregate and dispose of wastes in accordance with enterprise requirements 5.4. Clean robotic system components, care for and store equipment as required

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

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

Required skills

Required skills include:

- recognising hazards and working safely at all times
- interpreting and applying enterprise procedures for operating robotic system
- recognising potential problems caused by prior sample handling and preparation
- recognising and interpreting system error codes
- communicating problems clearly and promptly to supervisor
- accurately recording sample details in system

Required knowledge

Required knowledge includes:

- procedures for sorting and receiving samples
- sample preparation processes for common mineral ore samples
- purpose of routine downstream analytical tests
- procedures for preventing contamination
- procedures for ensuring traceability of samples
- function of key components and operating procedures for robotic sample preparation system
- hazards, control measures and operation of safety equipment 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	
<p>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.</p>	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>Assessors should ensure that candidates can:</p> <ul style="list-style-type: none"> operate a robotic sample preparation system reliably, efficiently and safely for a range of different samples with different preparation requirements and subsequent analysis maintain sequential control of samples through all preparation stages recognise and report common system error codes minimise rework, waste and environmental impacts.
Context of and specific resources for assessment	<p>This unit of competency is to be assessed in the workplace or simulated workplace environment.</p> <p>This unit of competency may be assessed with:</p> <ul style="list-style-type: none"> <i>MSL953001A Receive and prepare samples for testing</i> <i>MSL943002A Participate in laboratory/field workplace safety.</i> <p>Resources may include:</p> <ul style="list-style-type: none"> access to a robotic sample preparation system a variety of mineral ore samples sample preparation methods, equipment and reagents safety equipment.
Method of assessment	<p>The following assessment methods are suggested:</p> <ul style="list-style-type: none"> review of entries made by the candidate in operator and robotic system logs review of quality control performance and analytical results traceable to samples prepared by the candidate feedback from peers, clients and supervisors written/oral questioning about robotic sample preparation procedures, common problems and their specified corrective actions. <p>In all cases, practical assessment should be supported by questions to assess underpinning knowledge and those aspects of competency which are difficult to assess</p>

EVIDENCE GUIDE	
	<p>directly.</p> <p>Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate ethnicity, age, gender, demographics and disability.</p> <p>Access must be provided to appropriate learning and/or assessment support when required.</p> <p>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.</p>
This competency in practice	<p>Industry representatives have provided the case studies below to illustrate the practical application of this unit of competency and show its relevance in a workplace setting.</p> <p>Mineral processing</p> <p>A robot operator checks the nearby whiteboard to identify what jobs are set down for the next shift and reviews the shift handover notes. He/she locates the first rack of samples, checks that the paperwork is complete for each sample and reviews the sample preparation parameters for each. He/she checks that the samples have been dried correctly and that the listed grind times are consistent with typical values. After scanning each barcode, he loads the batch of samples from the oven racks into the input magazine and starts the robot control program. He/she checks for the sample loss indicated on the screen as each sample is prepared to ensure that any loss doesn't exceed ~2%. After 20 minutes operation, the screen displays an error code that indicates that the system has detected an air pressure problem in the pneumatic control lines. He/she promptly notifies the shift supervisor for assistance. While the supervisor is attending to the problem, the operator unloads the output magazine and removes the sample containers that have been correctly prepared according to the set parameters. He/she extracts analytical portions from each one using a standard procedure for obtaining representative samples and then boxes them up using labels generated by the system. He/she arranges for the excess sample material to be stored.</p>

Range Statement

RANGE STATEMENT	
<p>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.</p>	
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	<p>Standards, codes, procedures and/or enterprise requirements may include:</p> <ul style="list-style-type: none"> • Australian and international standards, such as: <ul style="list-style-type: none"> • 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	
	<ul style="list-style-type: none"> 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	<p>Client requests/documentation may include:</p> <ul style="list-style-type: none"> client profile, sample identification, sample receipt, storage and analyses required preparation method and service charges
Sample preparation methods	<p>Sample preparation methods may include:</p> <ul style="list-style-type: none"> 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	<p>Sample preparation equipment may include:</p> <ul style="list-style-type: none"> 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	<p>Hazards may include:</p> <ul style="list-style-type: none"> dust, silica and fibrous materials asbestiform minerals naturally occurring radioactive materials (NORM) samples containing nickel and lead-based compounds noise and vibration

RANGE STATEMENT	
	<ul style="list-style-type: none"> • crushing, entanglement and cuts associated 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	<p>Safety equipment and procedures may include:</p> <ul style="list-style-type: none"> • ensuring access to service shut-off points • recognising and observing hazard warnings and safety signs • labelling of samples and hazardous materials • extraction of dust • 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 using enterprise procedures • reporting of abnormal emissions and airborne contaminants to appropriate personnel
Occupational health and safety (OHS) and environmental management requirements	<p>OHS and environmental management requirements:</p> <ul style="list-style-type: none"> • 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		