

QUALIFICATIONS PACK - OCCUPATIONAL STANDARD FOR MINING INDUSTRY

What are Occupational Standard (OS)?

- OS describe what individuals need to do, know and understand in order to carry out a particular job role or function
- OS are performance standard that individuals must achieve when carrying out functions in the workplace, together with specifications of the underpinning knowledge and understanding

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Introduction

Qualifications Pack- Mechatronics In charge

SECTOR: MINING

SUB-SECTOR: Open Cast and Underground Mines

OCCUPATION: Instrumentation Maintenance

REFERENCE ID: MIN/ Q 0438

ALIGNED TO: NCO-2004/NIL

A Mechatronics In Charge looks after high tech equipment and machines' operations, right from installation till maintenance.

Brief Job Description: This role is responsible for design activities and instruction in operation, set-up, maintenance, troubleshooting, and repair of machines and systems where high tech equipment is used.

Personal Attributes: Technical knowledge of mechatronics, ability to plan and prioritize, quality consciousness, sensitivity to problem solving, quick decision making, safety orientation, reading, writing and communication skills, Dexterity and high precision, ability to use internal ERP systems

Job Details	Qualification Pack Code	MIN/ Q 0438		
	Job Role	Mechatronics In charge		
	Credits(NSQF)	TBD	Version number	1.0
	Industry	Mining	Drafted on	15/12/2014
	Sub-sector	Open Cast and Underground Mines	Last reviewed on	24/03/2015
	Occupation	Instrumentation Maintenance	Next review date	24/03/2017

Job Role	Mechatronics In charge
Role Description	This role is responsible for design activities and instruction in operation, set-up, maintenance, troubleshooting, and repair of machines and systems where high tech equipment is used
NSQF level Minimum Educational Qualification Maximum Educational Qualification	4 Class XII NA
Training (Suggested but not mandatory)	<ol style="list-style-type: none"> 1. Different mechatronics techniques used in organizations 2. 5S and Safety aspects 3. Problem Solving Techniques 4. Quality Management Systems
Experience	2-3 years in mechatronics
Applicable National Occupational Standards	<p>Compulsory: Click on the hyperlink to read/download the required NOS</p> <ol style="list-style-type: none"> 1. MIN/ N 0505 (Conduct mechatronics operations) 2. MIN/ N 0506 (Repair and maintain the equipment) 3. MIN/ N 0901 (Health and Safety) <p>Optional: Not Applicable</p>
Performance Criteria	As described in the relevant OS units

Definitions	
Sector	Sector is a conglomeration of different business operations having similar businesses and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.
Sub-sector	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
Occupation	Occupation is a set of job roles, which perform similar/related set of functions in an industry.
Function	Function is an activity necessary for achieving the key purpose of the sector, occupation, or area of work, which can be carried out by a person or a group of persons. Functions are identified through functional analysis and form the basis of OS.
Job Role	Job role defines a unique set of functions that together form a unique employment opportunity in an organization.
OS	OS specify the standard of performance an individual must achieve when carrying out a function in the workplace, together with the knowledge and understanding they need to meet that standard consistently. Occupational Standard are applicable both in the Indian and global contexts.
Performance Criteria	Performance Criteria are statements that together specify the standard of performance required when carrying out a task.
NOS	NOS are Occupational Standard which apply uniquely in the Indian context.
Qualification Pack Code	Qualification Pack Code is a unique reference code that identifies a qualification pack.
Qualification Pack	Qualification Pack comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A Qualification Pack is assigned a unique qualification pack code.
Unit Code	Unit Code is a unique identifier for an Occupational Standard , which is denoted by an 'N'
Unit Title	Unit Title gives a clear overall statement about what the incumbent should be able to do.
Description	Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for.
Knowledge and Understanding	Knowledge and Understanding are statements which together specify the technical, generic, professional and organizational specific knowledge that an individual needs in order to perform to the required standard.
Organizational Context	Organizational Context includes the way the organization is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
Technical Knowledge	Technical Knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
Core Skills or Generic Skills	Core Skills or Generic Skills are a group of skills that are key to learning and working in today's world. These skills are typically needed in any work environment. In the context of the OS, these include communication related skills that are applicable to most job roles.

Acronyms	Keywords /Terms	Description
	SCMS	Skill council for Mining Sector
	NOS	National Occupational Standard
	NSQF	National Skill Qualification Framework
	NVEQF	National Vocational Educational Qualification Framework
	NVQF	National Vocational Qualification Framework
	OS	Occupational Standard
	PC	Performance Criteria
	QP	Qualification Pack
	SSC	Sector Skill Council

National Occupational Standard



Overview

This unit is about identifying the mechatronics equipment to be installed and conduct its operations

Unit Code	MIN/ N0505
Unit Title (Task)	Conduct the mechatronics operations
Description	This OS unit is about identifying the mechatronics equipment to be installed and conduct its operations
Scope	This unit/task covers the following: <ul style="list-style-type: none"> Conduct the mechatronics operations

Performance Criteria (PC) w.r.t. the Scope

Element	Performance Criteria
Conduct the mechatronics operations	<p>PC1. understand the work output requirements and finalize various specifications of the mechatronics machinery</p> <p>PC2. understand the software coding , programming logic , electrical connections logic, hardware requirements, robotic parameters and its operation sequence etc. as per the applicability of the system</p> <p>PC3. translate mechanical & electronic technical drawing</p> <p>PC4. operate the automation panel/control mechanism for the equipment and apply advanced electronic control systems, which are usually computer-driven</p> <p>PC5. read the mechatronics equipment readings continuously while in operation and gather statistical data</p> <p>PC6. understand the quality control procedure and ensure compliance of the operations to the same</p> <p>PC7. understand the fabrication requirements of the mechanical parts and conduct the same</p> <p>PC8. continuously monitor the system functioning and resolve the issues observed</p>

Knowledge and Understanding (K) w.r.t. the scope

Element	Knowledge and Understanding
A. Regulatory context (knowledge of safety guidelines specified by Director General of Mine Safety (DGMS))	<p>The user/individual on the job needs to know and understand:</p> <p>KA1. Different types of mines and detail of the mine he is working in</p> <p>KA2. Mine Organisation, time keeping, need for discipline and punctuality</p> <p>KA3. Benching in quarries, Dressing of overhangs, Undercuts, Fencing, First aid and Hygiene</p> <p>KA4. Standing orders in force at the mine. Safety in the vicinity of machinery</p> <p>KA5. Shot firing and Safety regulations. How and where to take shelter</p> <p>KA6. Duties of workmen</p> <p>KA7. Provision of wages, working hours and accident compensation as per Mines act</p> <p>KA8. Knowledge of mining safety procedures</p> <p>KA9. Impact of violation of safely procedures</p>

MIN/ N0505 Conduct the mechatronics operations

<p>B. Organizational Context (Knowledge of organization)</p>	<p>The user/individual on the job needs to know and understand:</p> <p>KB1. Job specific documents e.g. daily maintenance checklist and importance of the same</p> <p>KB2. Risk and impact of not following defined procedures/work instructions</p> <p>KB3. Escalation matrix for reporting identified problems</p>
<p>C. Technical Knowledge</p>	<p>The user/individual on the job needs to know and understand:</p> <p>KC1. different types of controlling operations of equipment or systems</p> <p>KC2. different kinds of Watching gauges, dials, or other indicators to understand machine working</p> <p>KC3. complete knowledge of the process in consideration</p> <p>KC4. process control and automation systems installed for the processes</p> <p>KC5. electrical -wiring drawings of existing layout/ equipment/systems</p> <p>KC6. operation of electrical equipment etc . being used for the process</p> <p>KC7. robotic instruments used for process</p> <p>KC8. PLC , SCADA , & electrical elements operation ,testing etc</p> <p>KC9. hazards and safety aspects and usage of relevant PPEs</p> <p>KC10. knowledge of electronics and mechanical</p>

Skills (S) [Optional]	
Element	Skills
Element A. Core Skills/ Generic Skills	Writing Skills
	The user/ individual on the job needs to know and understand how to: SA1. note down observations (if any) SA2. write information documents or enter the information in online ERP systems under guidance of the supervisor
	Reading Skills
	The user/individual on the job needs to know and understand how to: SA3. read and interpret symbols and measurements SA4. read information documents SA5. understand and analyse the available data about the site
B. Professional Skills	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA6. discuss task lists, schedules and activities SA7. effectively communicate SA8. attentively listen with full attention and comprehend the information given by various sources about the site
	Plan and Organize
	The user/individual on the job needs to know and understand how to: SB1. plan and organize the work order and jobs SB2. organize all process manuals so that sorting/ accessing information is easy
	Judgment and Critical Thinking
	The user/individual on the job needs to know and understand how to: SB3. use common sense and make judgments during day to day basis SB4. use reasoning skills to identify and resolve basic problems SB5. use intuition to detect any potential problems which could arise
	Desire to learn and take initiatives
The user/individual on the job needs to know and understand how to: SB6. follow instructions and work on areas of improvement identified SB7. complete the assigned tasks with minimum supervision SB8. complete the job within timelines and quality norms	
	Problem Solving and Decision making
	The user/individual on the job needs to know and understand how to: SB9. detect problems in day to day tasks SB10. discuss possible solution with the supervisor for problem solving SB11. make decisions in emergency conditions

NOS Version Control

NOS Code	MIN/ N0505		
Credits(NSQF)	TBD	Version number	1.0
Industry	Mining	Drafted on	15/12/2014
Industry Sub-sector	Open Cast and Underground Mines	Last reviewed on	24/03/2015
Occupation	Instrumentation Maintenance	Next review date	24/03/2017

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National Occupational Standard



Overview

This unit is about repairing and maintaining the mechatronics equipment

Unit Code	MIN/ N0506
Unit Title (Task)	Repair and maintain the equipment
Description	This OS unit is about repairing and maintaining the mechatronics equipment
Scope	This unit/task covers the following: <ul style="list-style-type: none"> Repair and maintenance of the equipment
Performance Criteria (PC) w.r.t. the Scope	
Element	Performance Criteria
Repair and maintain the equipment	<p>PC1. prepare a performance management schedule for the mechatronics system/s</p> <p>PC2. basis the schedule , inspect the systems and identify the replacements required</p> <p>PC3. check / confirm internal conditions of wiring , motherboards, software/ hardware malfunctioning, circuit failures etc. to verify working status to expected conditions.</p> <p>PC4. discuss with the user/ operator to learn about problems /unusual phenomenon noticed in the systems</p> <p>PC5. execute sequence of activities for changing , correcting the situation after opening, verifying contact/ insulation conditions, failure of internal wires etc</p> <p>PC6. ensure that all the systems are integrated through a computer interface</p> <p>PC7. ensure the replacements of identified systems</p> <p>PC8. ensure that the software used for system interfacing are upgraded as per the process requirement</p> <p>PC9. maintain a record of all the vendor and system 2D/3D- as built drawings , equipment operation related diagrams , program codes etc. in a legible and safe condition</p>
Knowledge and Understanding (K) w.r.t. the scope	
Element	Knowledge and Understanding
A. Regulatory context (knowledge of safety guidelines specified by Director General of Mine Safety (DGMS))	<p>The user/individual on the job needs to know and understand:</p> <p>KA1. Different types of mines and detail of the mine he is working in</p> <p>KA2. Mine Organisation, time keeping, need for discipline and punctuality</p> <p>KA3. Benching in quarries, Dressing of overhangs, Undercuts, Fencing, First aid and Hygiene</p> <p>KA4. Code of practice in specific areas of mine. Significance of fences</p> <p>KA5. Standing orders in force at the mine. Safety in the vicinity of machinery</p> <p>KA6. Shot firing and Safety regulations. How and where to take shelter</p> <p>KA7. Duties of workmen</p> <p>KA8. Provision of wages and working hours as per Mines act</p> <p>KA9. Knowledge of mining safety procedures</p>

	KA10. Impact of violation of safely procedures
B. Organizational Context (Knowledge of the Organization / organization and its processes)	<p>The user/individual on the job needs to know and understand:</p> <p>KB1. Types of documentation in organization e.g. daily maintenance checklist and importance of the same</p> <p>KB2. Risk and impact of not following defined procedures/work instructions</p> <p>KB3. Rules and regulations of mine as per standard operating procedure</p> <p>KB4. Risk and impact of not following Organization's SOP</p> <p>KB5. Escalation matrix for reporting identified problems</p>
C. Technical Knowledge	<p>The user/individual on the job needs to know and understand:</p> <p>KC1. different types of controlling operations of equipment or systems</p> <p>KC2. different kinds of Watching gauges, dials, or other indicators to understand machine working</p> <p>KC3. complete knowledge of the process in consideration</p> <p>KC4. process control and automation systems installed for the processes</p> <p>KC5. electrical -wiring drawings of existing layout/ equipment/systems</p> <p>KC6. operation of electrical equipment etc . being used for the process</p> <p>KC7. robotic instruments used for process</p> <p>KC8. PLC , SCADA , & electrical elements operation ,testing ,</p> <p>KC9. hazards and safety aspects and usage of relevant PPEs</p> <p>KC10. knowledge of electronics and mechanical</p>

Skills (S) [Optional]	
Element	Skills
Element A. Core Skills/ Generic Skills	Writing Skills
	The user/ individual on the job needs to know and understand how to: SA1. note down observations (if any) SA2. write information documents or enter the information in online ERP systems under guidance of the supervisor
	Reading Skills
	The user/individual on the job needs to know and understand how to: SA3. read and interpret symbols and measurements SA4. read information documents SA5. understand and analyse the available data about the site
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA6. discuss task lists, schedules and activities SA7. effectively communicate SA8. attentively listen with full attention and comprehend the information given by various sources about the site
B. Professional Skills	Plan and Organize
	The user/individual on the job needs to know and understand how to: SB1. plan and organize the work order and jobs SB2. organize all process manuals so that sorting/ accessing information is easy
	Judgment and Critical Thinking
	The user/individual on the job needs to know and understand how to: SB3. use common sense and make judgments during day to day basis SB4. use reasoning skills to identify and resolve basic problems SB5. use intuition to detect any potential problems which could arise
	Desire to learn and take initiatives
	The user/individual on the job needs to know and understand how to: SB6. follow instructions and work on areas of improvement identified SB7. complete the assigned tasks with minimum supervision SB8. complete the job within timelines and quality norms
	Problem Solving and Decision making
	The user/individual on the job needs to know and understand how to: SB9. detect problems in day to day tasks SB10. discuss possible solution with the supervisor for problem solving SB11. make decisions in emergency conditions

NOS Version Control

NOS Code	MIN/ 0506		
Credits(NSQF)	TBD	Version number	1.0
Industry	Mining	Drafted on	15/12/2014
Industry Sub-sector	Open Cast and Underground Mines	Last reviewed on	24/03/2015
Occupation	Instrumentation Maintenance	Next review date	24/03/2017



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National Occupational Standard

A large, light gray world map is centered behind the title. A small blue circular marker is placed on the map, specifically over the Indian subcontinent region.

Overview

This unit is about health and safety measures critical in mines

National Occupational Standard

Unit Code	MIN/N 0901
Unit Title (Task)	Health and Safety
Description	This unit is about health and safety measures critical in mines
Scope	This OS unit/task covers the following: <ul style="list-style-type: none"> Health and safety measures critical for personnel in open-cast mines
Element	Performance Criteria
Safety, Security and Administrative	<p>To be competent, the user/individual on the job must be able to:</p> <p>PC1. Comply with occupational health and safety regulations adopted by the employer.</p> <p>PC2. Follow mining operations procedures with respect to materials handling and accidents</p> <p>PC3. Follow the correct safety steps in case of fire, accident, major failure</p> <p>PC4. Work responsibly and carefully so as not to put the health and safety of self or others at risk.</p> <p>PC5. Perform storage and transport of hazardous materials compliant with safety guidelines prescribed by DGMS.</p> <p>PC6. Comply with safety regulations and procedures in case of fire hazard.</p> <p>PC7. Operate various grades of fire extinguishers.</p> <p>PC8. Work responsibly and as safe and careful as possible so as not to put the health and safety of self or others at risk, including members of the public</p> <p>PC9. Demonstrate careful practices in handling explosives and heavy machinery.</p> <p>PC10. Identify characteristics of post-blast fumes and take necessary precautions.</p>

Knowledge and Understanding (K)	
<p>A. Regulatory context (knowledge of safety guidelines specified by Director General of Mine Safety (DGMS))</p>	<p>The user/individual on the job needs to know and understand:</p> <ul style="list-style-type: none"> KA1. Benching in quarries, Dressing of overhangs, undercuts, fencing KA2. First aid and hygiene KA3. Code of practice in specific areas of mine. Significance of fences KA4. Standing orders in force at the mine. Safety in the vicinity of machinery KA5. Shot-firing and Safety regulations. How and where to take shelter KA6. Knowledge of mining safety procedures KA7. Impact of violation of safety procedures KA8. Locally prepared Emergency Preparedness / Disaster Management Plan. KA9. Environmental impact of mining KA10. Sources of dust, noise and vibration and measures to minimise KA11. Hazardous material safety and security rules and regulations as prescribed by DGMS

MIN/N0901 Health and Safety

NOS Version Control

NOS Code	MIN/ N0901		
Credits(NSQF)	TBD	Version number	1.0
Industry	Mining	Drafted on	15/12/2014
Industry Sub-sector	Open Cast and Underground Mines	Last reviewed on	24/03/2015
Occupation	Instrumentation Maintenance	Next review date	24/03/2017

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CRITERIA FOR ASSESSMENT OF TRAINEES

Job Role Mechatronics In charge

Qualification Pack MIN/Q 0438

Sector Skill Council Mining

Guidelines for Assessment

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC
2. The assessment for the theory part will be based on knowledge bank of questions created by the SSC
3. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training centre (as per assessment criteria below)
4. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training centre based on this criteria
5. To pass the Qualification Pack, every trainee should score a minimum of 70% in every NOS
6. In case of successfully passing only certain number of NOS's, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification Pack

				Marks Allocation	
		Total Mark (100)	Out Of	Theory	Skills Practical
1. MIN/ N 0505 (Conduct mechatronics operations)	PC1. understand the work output requirements and finalize various specifications of the mechatronics machinery	35	4	2.5	1.5
	PC2. understand the software coding, programming logic, electrical connections logic, hardware requirements, robotic parameters and its operation sequence etc. as per the applicability of the system		4	2.5	1.5
	PC3. translate mechanical & electronic technical drawing		4	2.5	1.5
	PC4. operate the automation panel/control mechanism for the equipment and apply advanced electronic control systems, which are usually computer-driven		5	2.5	2.5
	PC5. read the mechatronics equipment readings continuously while in operation and gather statistical data		5	2.5	2.5
	PC6. understand the quality control procedure and ensure compliance of the operations to the same		5	2.5	2.5

	PC7. understand the fabrication requirements of the mechanical parts and conduct the same		4	2.5	1.5
	PC8. continuously monitor the system functioning and resolve the issues observed		4	2.5	1.5
		Total	35	20	15
2. MIN/ N 0506 (Repair and maintain the equipment)	PC1. prepare a performance management schedule for the mechatronics system/s	35	4	2.5	1.5
	PC2. basis the schedule , inspect the systems and identify the replacements required		4	2.5	1.5
	PC3. check / confirm internal conditions of wiring , motherboards, software/hardware malfunctioning, circuit failures etc. to verify working status to expected conditions.		4	2	2
	PC4. discuss with the user/ operator to learn about problems /unusual phenomenon noticed in the systems		4	2.5	1.5
	PC5. execute sequence of activities for changing , correcting the situation after opening, verifying contact/ insulation conditions, failure of internal wires etc		4	2	2
	PC6. ensure that all the systems are integrated through a computer interface		4	2.5	1.5
	PC7. ensure the replacements of identified systems		3	2	1
	PC8. ensure that the software used for system interfacing are upgraded as per the process requirement		4	2	2
	PC9. maintain a record of all the vendor and system 2D/3D- as built drawings , equipment operation related diagrams , program codes etc. in a legible and safe condition		4	2	2
		Total	35	20	15
3. MIN/ N0901 (Health and Safety)	PC1. Comply with occupational health and safety regulations adopted by the employer.	30	3	2	1
	PC2. Follow mining operations procedures with respect to materials handling and		3	2	1

	accidents.				
	PC3. Follow the correct safety steps in case of fire, accident, and major failure.		3	2	1
	PC4. Work responsibly and carefully so as not to put the health and safety of self or others at risk.		3	2	1
	PC5. Perform storage and transport of hazardous materials compliant with safety guidelines prescribed by DGMS.		3	2	1
	PC6. Comply with safety regulations and procedures in case of fire hazard.		3	2	1
	PC7. Operate various grades of fire extinguishers.		3	2	1
	PC8. Work responsibly and as safe and careful as possible so as not to put the health and safety of self or others at risk, including members of the public.		3	2	1
	PC9. Demonstrate careful practices in handling explosives and heavy machinery.		3	2	1
	PC10. Identify characteristics of post-blast fumes and take necessary precautions.		3	2	1
		Total	30	20	10

