What are Occupational Standards (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 standards that individuals must achieve when carrying out functions in the workplace, together with specifications of the underpinning knowledge and understanding

Contents

Introduction

Qualifications Pack - Bearing Maintenance

SECTOR: Iron & Steel

SUB-SECTOR: Steel, Sponge iron, Ferro Alloys, Re-Rollers, Refractory

REFERENCE ID: ISC/Q0906

ALIGNED TO: NCO-2004/NIL

Title of Job: The job is to inspect, identify the problems in the equipment, rectify the root causes for e.g. leakages, replaces the bearings, lubricates the bearings, ensures fitness of all types of bearings in the plant and carry out routine maintenance.

Personal Attributes: This job requires the individual to work independently as well as in teams. He should be physically fit, not having colour blindness , having analytical skills, problem solving attitude, high concentration levels and willingness to work in a factory environment.

Job Details

Qualifications Pack Code	ISC/Q0906		
Job Role	Bearing Maintenance		
Credits(NSQF)	TBD	Version number	1.0
Industry	Iron & Steel	Drafted on	08/09/2014
Sub-sector	Steel, Sponge iron, Ferro Alloys, Re-Rollers, Refractory	Last reviewed on	30/12/2014
Occupation	Mechanical Maintenance	Next review date	30/12/2015
NSQC Clearance on	18/06/2015		

Job Role	Bearing Maintenance
Role Description	The job holder inspects, identifies the problems in the equipment, rectifies the root causes for e.g. leakages, replaces the bearings, lubricates the bearings, ensures fitness of all types of bearings in the plant and carry out routine maintenance.
NSQF level	3
Minimum Educational Qualifications	10th Pass
Maximum Educational Qualifications	ITI pass
Training (Suggested but not mandatory)	• 2 weeks hands on training (mandatory) • Machining, welding, gas cutting, assembling • Working knowledge of tools & fixtures • 5S and safety practices • Working at heights, confined spaces & high temperatures
Minimum Job Entry Age	18 years
Experience	• 0-2 years' experience in similar function • In lieu of minimum qualification the incumbent should have minimum 6 to 7 years relevant experience in the similar field/function as utility hand/helper
Occupational Standards (OS)	Compulsory: ISC/N0929: Understand the assigned job of bearing maintenance ISC/N0930: Prepare for bearing maintenance operation ISC/N0931: Carry out the assigned bearing maintenance operation ISC/N0008: Use basic health and safety practices at the work place ISC/N0009: Works effectively with others Optional: N/A
Performance Criteria	As described in the relevant NOS units

Definitions

Keywords /Terms	Description
Core Skills/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 NOS, these include communication related skills that are applicable to most job roles.
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 NOS.
Job role	Job role defines a unique set of functions that together form a unique employment opportunity in an organization.
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.
National Occupational Standards (NOS)	NOS are Occupational Standards which apply uniquely in the Indian context
Occupation	Occupation is a set of job roles, which perform similar/related set of functions in an industry.
Organisational Context	Organisational 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.
Performance Criteria	Performance Criteria are statements that together specify the standard of performance required when carrying out a task.
Qualifications Pack(QP)	Qualifications Pack comprises the set of NOS, together with the educational, training and other criteria required to perform a job role. A Qualifications Pack is assigned a unique qualification pack code.
Qualifications Pack Code	Qualifications Pack Code is a unique reference code that identifies a qualifications pack.
Scope	Scope is the set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on the quality of performance required.
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.
Sub-functions	Sub-functions are sub-activities essential to fulfil the achieving the objectives of the function.
Technical Knowledge	Technical Knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
Unit Code	Unit Code is a unique identifier for a NOS unit, which can be denoted with an 'N'
Unit Title	Unit Title gives a clear overall statement about what the incumbent should be able to do.
Vertical	Vertical may exist within a sub-sector representing different domain areas or the client industries served by the industry.

Acronyms

Keywords /Terms	Description
NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
OEM	Original Equipment Manufacturer
OS	Occupational Standard(s)
QP	Qualifications Pack
5 S	Technique of maintaining orderliness –Japanese terminology
CP	Control Plan
WI	Work Instructions

ISC/N0929: Understand the assigned job of bearing maintenance

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National Occupational Standards

Overview

This NOS is about understanding the assigned job of bearing maintenance in accordance with the checklist and get any clarifications on the same

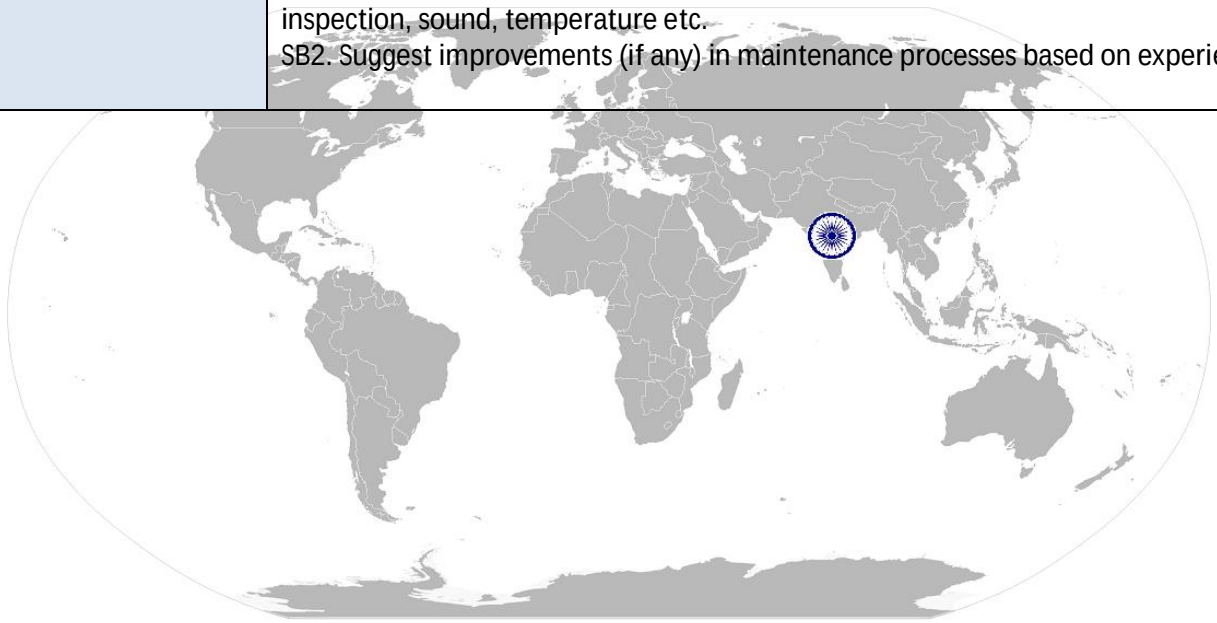
National Occupational Standard

Unit Code	ISC/N0929
Unit Title (Task)	Understand the assigned job of bearing maintenance
Description	This unit is about understanding the assigned job of bearing maintenance in accordance with the checklist, obtain any clarifications on the same and identify the tools and tackles that would be needed to carry out the job.
Scope	This unit/task covers the following: • Understand the assigned job of bearing maintenance in accordance with the instructions / checklist • Understand the engineering drawings of the equipment for bearing maintenance • Seek clarifications with respect to the equipment, drawings, if any • Identify the tools, tackles and bearings that are required to carry out the assigned job of bearing maintenance

Performance Criteria (PC) w.r.t. the Scope	
Element	Performance Criteria
Understand the assigned job of bearing maintenance in accordance with the instructions / checklist	To be competent, the user/individual on the job must be able to: PC1. Interpret the checklist and understand the bearing maintenance job requirements PC2. Identify classifications of bearings e.g. single row radial ball bearing, roller bearing, angular contact ball bearing, self-aligning bearing, special bearing races, cylindrical roller bearing, single/double row tapered roller bearing, thrust bearing etc. PC3. Understand the cleaning procedure of bearing and related parts PC4. Understand the dimensions and related parts of bearing PC5. Plan, as appropriate to carry out the bearing maintenance job
Understand the engineering drawings of the equipment for bearing maintenance	To be competent, the user/individual on the job must be able to: PC6. Understand sections, views, scale of measurement used in the engineering drawing of the equipment PC7. Understand the symbols used in the engineering drawings PC8. Understand other specifications and identify the sequence of activities required for bearing maintenance/changing PC9. Read and interpret engineering drawings to ensure correct limits, tolerance and fits of bearings
Seek clarifications with respect to the equipment, drawings, if any	To be competent, the user/individual on the job must be able to: PC10. Identify any clarifications that he wants to seek with respect to the given equipment drawing PC11. Identify and seek clarifications with respect to bearings with all related parts PC12. Recognize whom to contact for clarifications on the engineering design PC13. Escalate the concern to the supervisor or shift-in-charge, if needed

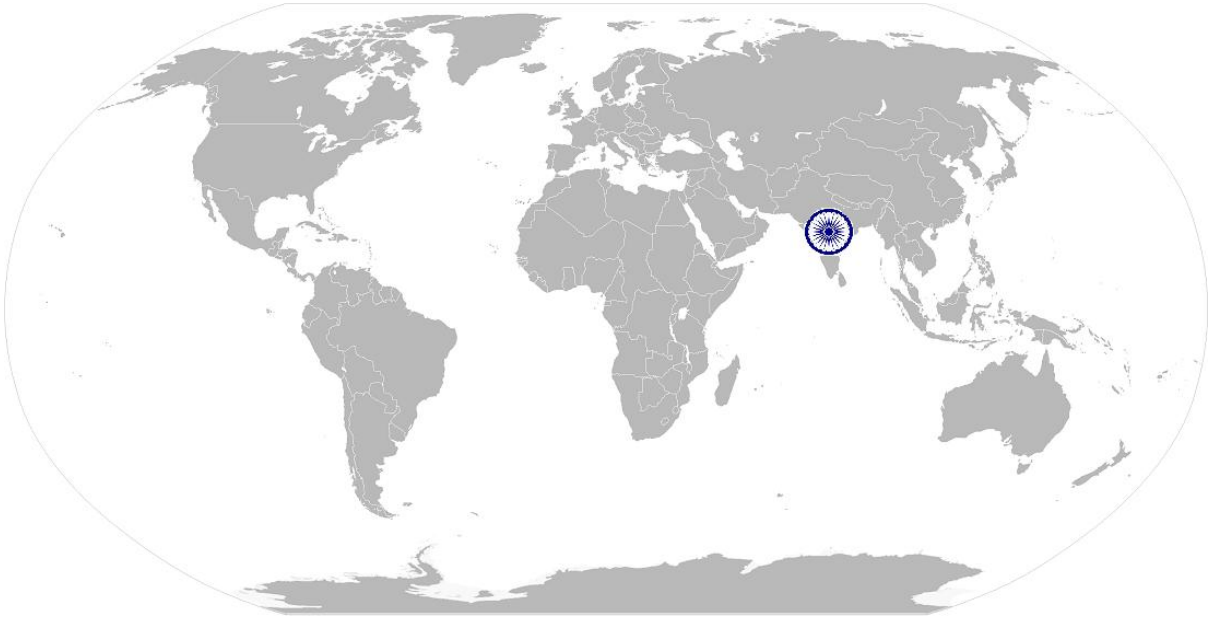
Identify the tools, tackles and bearing that are required to carry out the assigned job of bearing maintenance	To be competent, the user/individual on the job must be able to: PC14. Identify tools, tackles & equipment (lifting equipment, various sizes of spanner, dial gauge, Vernier calliper, filler gauge, torque range, bearing heating furnace etc.) required to perform the bearing maintenance operation PC15. Identifying the different types of bearings for maintenance and changing PC16. Ask helper to carry tools required to the desired work site PC17. Report to stores / supervisor in case of non-availability of tools & tackles or stock-out of spares
Element	**Knowledge and Understanding**
A. Organisational Context (Knowledge of the Company/ Organisation and its processes)	The user/individual on the job needs to know and understand: KA1. Quality and damage checks to be done and importance of the same KA2. Risk and impact of not following defined procedures/work instructions KA3. Escalation matrix for reporting identified issues
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. Engineering drawings of the equipments KB2. Knowledge of tools, tackles and equipment (lifting equipment, various sizes of spanner, dial gauge, Vernier calliper, filler gauge, torque range, bearing heating furnace etc.) to be used for the bearing maintenance job KB3. Knowledge of types of lubricants and their respective usage KB4. Knowledge of various types of bearing maintenance and changing procedure KB5. Understanding of normal running characteristics of relevant equipment KB6. Implications of not adhering to sequence of activities and operations for bearing maintenance KB7. Units of measurement KB8. Response to emergencies e.g. Power failures ,fire and system failures
Skills (S) w.r.t. the scope	
Element	**Skills**
A. Core Skills/ Generic Skills	Writing Skills
	The user/ individual on the job needs to know and understand how to: SA1. Construct simple sentences and express ideas clearly through written communication SA2. Fill up appropriate technical forms, process charts, activity logs in required format of the company
	Reading and Understanding Skills
	The user/individual on the job needs to know and understand how to:

	SA3. Read and interpret engineering and machine drawings SA4. Read and understand manuals, health and safety instructions, memos, reports, job cards, etc.
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA5. Express statements, opinions or information clearly so that others can hear and understand SA6. Respond appropriately to queries SA7. Communicate with team members and supervisor
B. Professional Skills	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB1. Diagnose common problems in the bearing functioning based on visual inspection, sound, temperature etc. SB2. Suggest improvements (if any) in maintenance processes based on experience



NOS Version Control

NOS Code	ISC/N0929		
Credits(NSQF)	TBD	Version number	1.0
Industry	Iron and steel	Drafted on	08/09/2014
Industry Sub-sector	Steel, Sponge iron, Ferro Alloys, Re-Rollers, Refractory	Last reviewed on	30/12/2014
Occupation	Mechanical Maintenance	Next review date	30/12/2015



National Occupational Standards

Overview

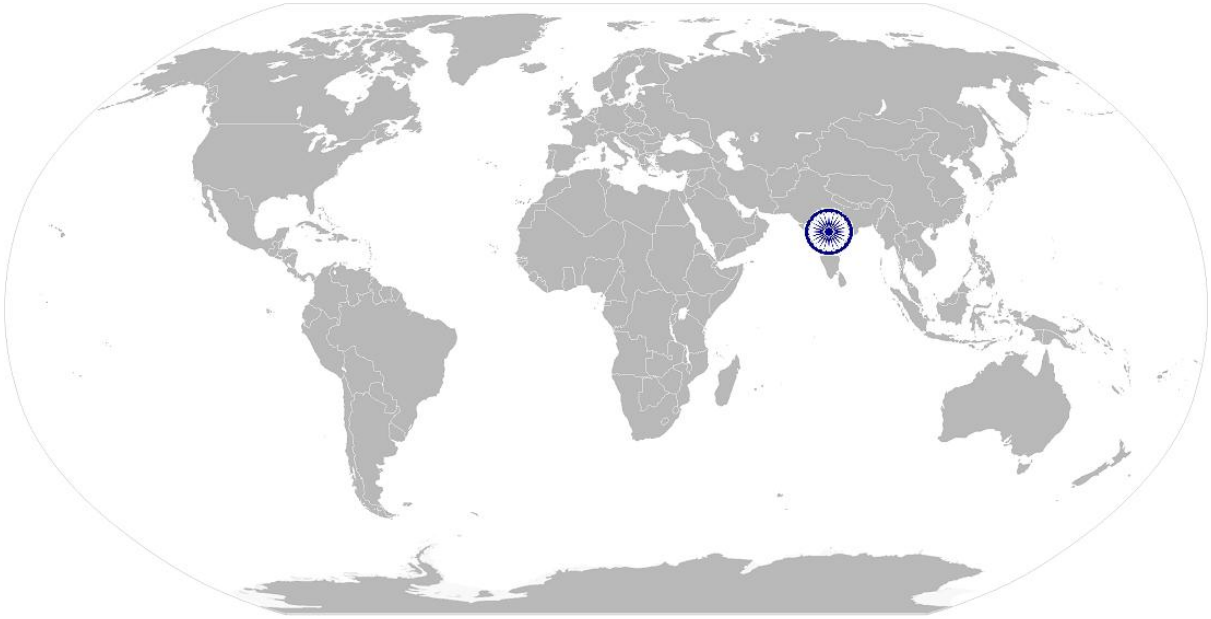
This NOS is about inspecting the equipment for scheduled maintenance or defects and prepares for operation for bearing maintenance

National Occupational Standard

Unit Code	ISC/N0930
Unit Title (Task)	Prepare for bearing maintenance operation
Description	This unit is about inspecting the equipment for scheduled maintenance or defects and prepares for operation for bearing maintenance.
Scope	This unit/task covers the following: • Reach the site and inspect the equipment for scheduled bearing maintenance and/or defects and identify cause of problem • Prepare tools, tackles, spares, material required for bearing maintenance
Performance Criteria (PC) w.r.t. the Scope	
Element	**Performance Criteria**
Reach the site and inspect the equipment for scheduled bearing maintenance and/or defects and identify cause of problem	To be competent, the user/individual on the job must be able to: PC1. Reach the site with desired tools, tackles and equipment PC2. Plan for job duration and understand the process as per SOP PC3. Arrange necessary instruments to carry out maintenance (dial gauge, spirit level, vibration measuring instrument and tools for dismantling and assembling e.g. spanners, torque wrench, power tools etc.) PC4. Identify the root cause of the problem, if any (radial run out of assemble bearing, face run out with race way, face run out with bore, race way parallel with face, outside face inclination and thickness variance) PC5. Identify and collect bearings as per drawing PC6. Plan for storage of new bearing and old bearing at job site PC7. Ensure not to store multiple bearings on top of each other PC8. Ensure not to store large bearings in the upright position PC9. Understand the hazardous area of work and necessary precautions to be taken to execute the job as well as safe handling of equipments
Prepare tools, tackles, spares, material required for bearing operation	To be competent, the user/individual on the job must be able to: PC10. Prepare tools, tackles, the list of spares (lifting equipment, various sizes of spanner, dial gauge, Vernier calliper, filler gauge, torque range, bearing heating furnace etc.) required for completion of bearing maintenance/change job and ensure availability at work site PC11. Ensure that tools and tackles match the standard specifications PC12. Ensure tools, tackles and equipment required for assembly are free from physical damage and ready for bearing maintenance/changing operation PC13. Report damaged / defective components of equipment and bearings as per the escalation matrix
Element	**Knowledge and Understanding**
A. Organisational	The user/individual on the job needs to know and understand:

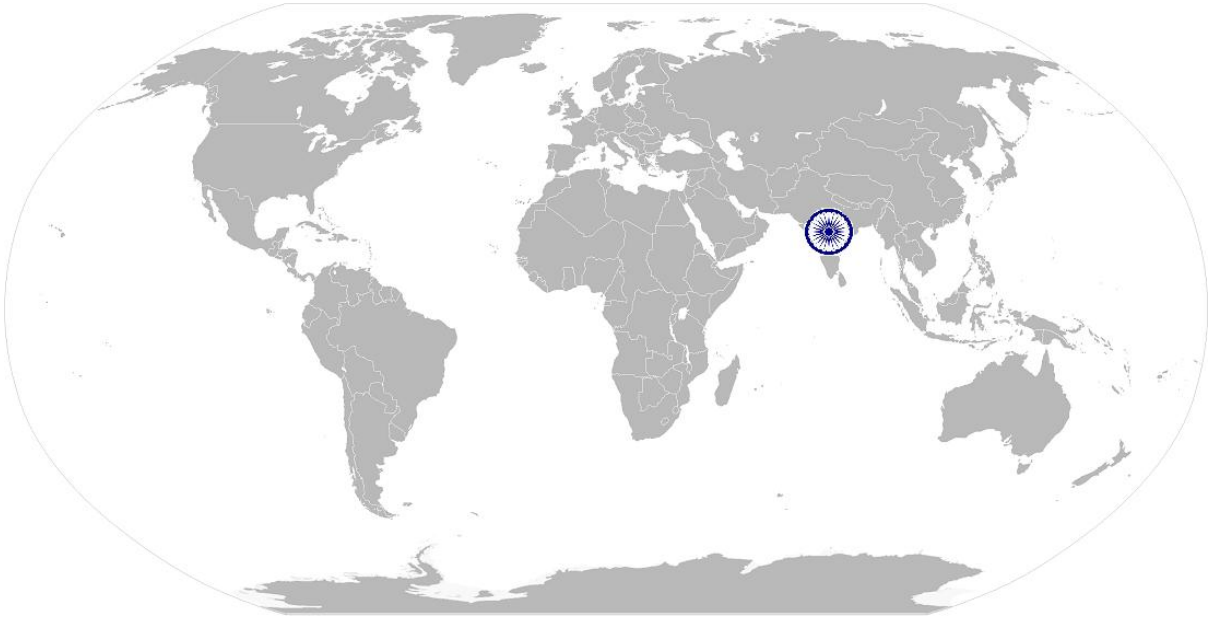
Context (Knowledge of the Company/ Organisation and its processes)	KA1. Quality and damage checks to be done and importance of the same KA2. Risk and impact of not following defined procedures/work instructions KA3. Escalation matrix for reporting identified issues
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. Engineering drawings of the equipments KB2. Understanding of normal running characteristics of relevant equipment KB3. Possible causes of common problems during assembly & their remedies KB4. Knowledge of tools, tackles and measuring instruments (lifting equipment, various sizes of spanner, dial gauge, Vernier calliper, filler gauge, torque range, bearing heating furnace etc.) required for the operation of bearing maintenance KB5. Standard specifications of spare parts KB6. Knowledge of types of lubricants and their respective usage KB7. Knowledge of various types of bearing maintenance and changing procedure KB8. Implications of not adhering to sequence of activities and operations for bearing maintenance KB9. Units of measurement KB10. Response to emergencies e.g. Power failures ,fire and system failures
Skills (S) w.r.t. the scope	
Element	Skills
A. Core Skills/ Generic Skills	Writing Skills
	The user/ individual on the job needs to know and understand how to: SA1. Construct simple sentences and express ideas clearly through written communication SA2. Fill up appropriate technical forms, activity logs in required format of the company
	Reading and Understanding Skills
	The user/individual on the job needs to know and understand how to: SA3. Read and understand manuals, health and safety instructions, memos, reports, job cards, specifications of spare parts etc.
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA4. Express statements, opinions or information clearly so that others can hear and understand SA5. Respond appropriately to queries SA6. Communicate with supervisor, team members, other departments e.g. – stores, operations, etc.

B. Professional Skills	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB1. Diagnose common problems in the bearing functioning based on visual inspection, sound, temperature etc. SB2. Suggest improvements(if any) in assembly process based on experience



NOS Version Control

NOS Code	ISC/N0930		
Credits(NSQF)	TBD	Version number	1.0
Industry	Iron and steel	Drafted on	08/09/2014
Industry Sub-sector	Steel, Sponge iron, Ferro Alloys, Re-Rollers, Refractory	Last reviewed on	30/12/2014
Occupation	Mechanical Maintenance	Next review date	30/12/2015



ISC/N0931: Carry out the assigned bearing maintenance operation

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National Occupational Standards

Overview

This NOS is about carrying out the operations in terms of rectifying the identified problem and carrying out operation for bearing maintenance

National Occupational Standard

Unit Code	ISC/N0931
Unit Title (Task)	Carry out the assigned bearing maintenance operation
Description	This NOS is about rectifying the identified problem and carrying out operation for bearing maintenance
Scope	This unit/task covers the following: • Conduct routine maintenance or rectify the problem, as appropriate • Ensure lubrication of bearings and monitor vibration, temperature using appropriate equipment • Conduct tests to ensure fitness • Communicate to supervisor about completion of work

Performance Criteria (PC) w.r.t. the Scope	
Element	Performance Criteria
Conduct routine maintenance or rectify the problem, as appropriate	To be competent, the user/individual on the job must be able to: PC1. Interpret the SOP and plan for handling the parent equipment, dismantling, assembling of bearing PC2. Understand the checklist and ensure all assembly check points are measured and correctly recorded PC3. Dismantle the equipment, as needed for bearing maintenance and changing activities PC4. Correct the defects in the bearing or replace the defective bearing PC5. Assemble the bearing related parts according to the drawings PC6. Fasten mechanical components/ subassemblies together using screws, bolts, and collars using hand/ power tools for bearing replacement PC7. Set and adjust linkages, tensions and clearances of assembled components to specifications using fixed gauges and hand tools PC8. Re assemble the bearing related parts post correcting the defect PC9. Understand and ensure all necessary steps are completed before start-up of the machine
Ensure lubrication of bearings and monitor vibration, temperature using appropriate equipment	To be competent, the user/individual on the job must be able to: PC10. Identify and use appropriate vibration and temperature measuring instruments PC11. Understand different types of bearings (anti friction, frictional bearing and their classification) the procedure of lubrication PC12. Assemble, dismantle and measure gaps of different anti friction bearings e.g. ball bearing, roller bearing, taper roller bearing etc. PC13. Assemble, dismantle and measure gaps of Babbitt bearing PC14. Understand and conduct hand scraping of Babbitt bearing PC15. Ensure lubrication of bearings prior to starting use of equipment

	PC16. Record and monitor that temperature and vibration are at desirable levels PC17. Identify any deviations from desirable levels and take necessary actions to correct them
Conduct tests to ensure fitness	To be competent, the user/individual on the job must be able to: PC18. Ensure alignment of bearing related parts and with the engineering drawings PC19. Check bearing vibrations to ensure they are within desired limits PC20. Test the machine to ensure it is fit to use before handover PC21. Record the test results in the prescribed format of the organization
Communicate to supervisor about completion of work	To be competent, the user/individual on the job must be able to: PC22. Ensure all activities are complete according to checklist PC23. Communicate to supervisor on completion of given job and/or in case of any deviations from checklist
Element	**Knowledge and Understanding**
A. Organisational Context (Knowledge of the Company/ Organisation and its processes)	The user/individual on the job needs to know and understand: KA1. Quality and damage checks to be done and importance of the same KA2. Contact person across departments for spare parts, information etc. KA3. Escalation matrix for reporting identified issues KA4. Risk and impact of not following defined procedures/work instructions
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. Different lubricants and their applications KB2. Knowledge of different bearings and their applications, instruments used to measure temperature and vibration KB3. Different instruments for measurement of temperature and vibration KB4. Assembling techniques such as aligning, bending, fixing, mechanical jointing, threaded jointing, sealing, light fitting KB5. Steps required to assemble/ dismantle an equipment with a given design KB6. Checks that need to be made to ensure that equipment is safe and ready to use KB7. Limits, fits and tolerances of the bearings and equipments of bearings KB8. Possible causes of common problems during assembly & their remedies KB9. Units of measurement KB10. Response to emergencies e.g. Power failures ,fire and system failures KB11. Use of measuring instruments e.g.- Vernier, Micro meter, dial gauge, filler gauge, torque wrench etc. KB12. Compilation of test results in prescribed format
Skills (S) w.r.t. the scope	
Element	**Skills**
A. Core Skills/	Writing Skills
	The user/ individual on the job needs to know and understand how to:

Generic Skills	SA1. Construct simple sentences and express ideas clearly through written communication SA2. Fill up appropriate technical forms, process charts, activity logs in required format of the company
	Reading and Understanding Skills
	The user/individual on the job needs to know and understand how to: SA3. Read and interpret engineering and machine drawings SA4. Read and understand manuals, memos, reports, job cards, etc.
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA5. Express statements, opinions or information clearly so that others can hear and understand SA6. Respond appropriately to queries SA7. Communicate with supervisor, team members, other departments e.g. – operations, stores etc.
B. Professional Skills	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB1. Diagnose common problems in the bearing functioning based on visual inspection, sound, temperature etc. SB2. Suggest improvements(if any) in process based on experience

NOS Version Control

NOS Code	ISC/N0931		
Credits(NSQF)	TBD	Version number	1.0
Industry	Iron and steel	Drafted on	08/09/2014
Industry Sub-sector	Steel, Sponge iron, Ferro Alloys, Re-Rollers, Refractory	Last reviewed on	30/12/2014
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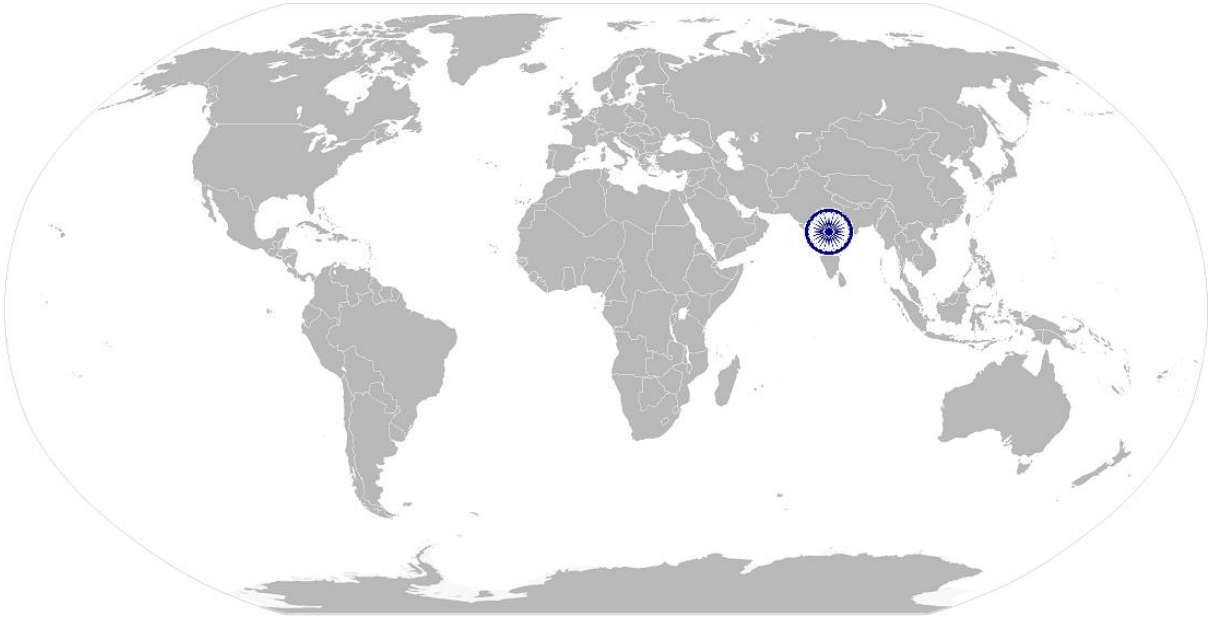
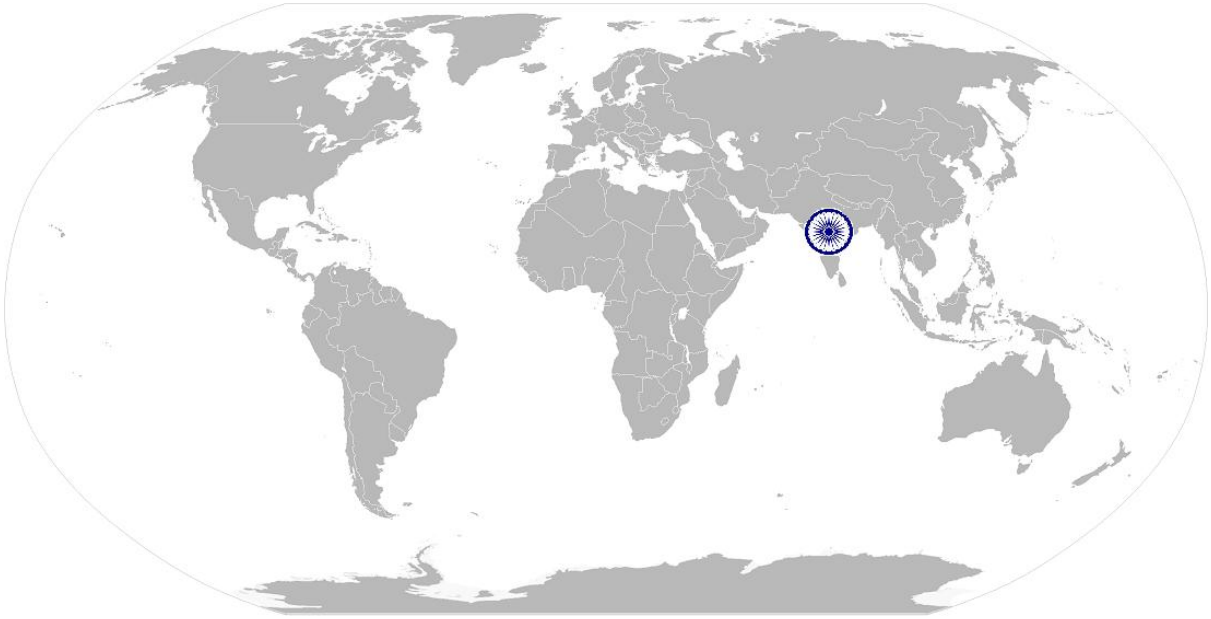


National Occupational Standards



Overview

This unit covers health, safety and security at the workplace. This includes procedures and practices that candidates need to follow to help maintain a healthy, safe and secure work environment.

National Occupational Standard

Unit Code	ISC/N0008
Unit Title (Task)	Use basic health and safety practices at the workplace
Description	This OS unit is about knowledge and practices relating to health, safety and security that candidates need to use in the workplace. It covers responsibilities towards self, others, assets and the environment. It includes understanding of risks and hazards in the workplace, along with common techniques to minimize risk, deal with accidents, emergencies, etc.
Scope	This unit/task covers the following: • Health and safety procedures • Fire safety procedures • Emergencies, rescue and first aid procedures

Performance Criteria (PC) w.r.t. the Scope	
Element	Performance Criteria
Health and safety procedures	The user/individual on the job should be able to: PC1. Use protective clothing/equipment for specific tasks and work conditions Protective clothing includes: • Leather or asbestos gloves • Flame proof aprons • Flame proof overalls buttoned to neck • Cuff less (without folds) trousers • Reinforced footwear • Helmets/hard hats • Cap and shoulder covers • Ear defenders/plugs • Safety boots • Knee pads • Particle masks • Glasses/gloves/visors Equipment includes: • Hand shields • Machine guards • Residual current devices • Shields • Dust sheets • Respirator PC2. State the name and location of people responsible for health and safety in the

	workplace Various areas are listed below: • On chemical containers • Equipment • Packages • Inside buildings • Open areas, public places etc. PC3. State the names and location of documents that refer to health and safety in the workplace PC4. Identify job-site hazardous work and state possible causes of risk or accident in the workplace Hazards include: • Working with electrical and thermal tools and equipment • Sharp edged and heavy tools • Heated metals • Oxyfuel and gas cylinders • Welding radiation • Surfaces: sharp, slippery, uneven, chipped, broken, etc. • Substances: chemicals, gas, oxy-fuel, fumes, dust, etc. • Physical: working at heights, large and heavy objects and machines, sharp and piercing objects, tolls and machines, intense light, load noise, obstructions in corridors, by doors, blind turns, noise, over stacked shelves and packages, etc. • Electrical: power supply and points, loose and naked cables and wires, electrical machines and appliances, etc. PC5. Carry out safe working practices while dealing with hazards to ensure the safety of self and others state methods of accident prevention in the work environment of the job role Safe working practices include: • Using protective clothing and equipment • Putting up and reading safety signs • Handle tools in the correct manner and store and maintain them properly • Keep work area clear of clutter, spillage and unsafe object lying casually • While working with electricity take all electrical precautions like insulated clothing, adequate equipment insulation, use of control equipment, dry work area, switch off the power supply when not required, etc. • Safe lifting and carrying practices • Use equipment that is working properly and is well maintained • Take due measures for safety while working in confined places, trenches or at heights, etc. Including safety harness, fall arrestors etc. Methods are: • Training in health and safety procedures • Using health and safety procedures • Use of equipment and working practices (such as safe carrying procedures) • Safety notices, advice

	• Instruction from colleagues and supervisors PC6. State location of general health and safety equipment in the workplace PC7. Inspect for faults, set up and safely use steps and ladders in general use Faults : • Corrosion of metal components • Deterioration • Splits and cracks timber components • Imbalance • Loose rungs • Nuts or bolts, etc. Set up: • Firm/level base • Clip/lash down • Leaning at the correct angle, etc. PC8. Work safely in and around trenches, elevated places and confined areas PC9. Lift heavy objects safely using correct procedures PC10. Apply good housekeeping practices at all times. Good housekeeping practices: • Clean/tidy work areas • Removal/disposal of waste products • Protect surfaces PC11. Identify common hazard signs displayed in various areas PC12. Retrieve and/or point out documents that refer to health and safety in the workplace
Fire safety procedures	The user/individual on the job should be able to: PC13. Use the various appropriate fire extinguishers on different types of fires correctly. Fire extinguishers: • Sand • Water • Foam • Co2 • Dry powder Fires: • Class A: Ordinary solid combustibles, e.g. wood, paper, cloth, plastic, charcoal etc. • Class B: Flammable liquids and gases, e.g. gasoline, propane, diesel fuel, tar, cooking oil and similar substances • Class C: Electrical equipment e.g. appliances, wiring, breaker panels etc. (these categories of fires become Class A, B, and D fires when the electrical equipment that initiated the fire is no longer receiving electricity) • Class D: Combustible metals such as magnesium, titanium, and sodium (these fires burn at extremely high temperatures and require special suppression agents) Causes of fires:

	• Heating of metal • Spontaneous ignition • Sparking, • Electrical heating • Loose fires (e.g. Smoking, welding, etc.) • Chemical fires, etc. PC14. Demonstrate rescue techniques applied during fire hazard PC15. Demonstrate good housekeeping in order to prevent fire hazards PC16. Demonstrate the correct use of a fire extinguisher
Emergencies, rescue and first-aid procedures	The user/individual on the job should be able to: PC17. Demonstrate how to free a person from electrocution PC18. Administer appropriate first aid to victims as required e.g. in case of bleeding, burns, choking, electric shock, poisoning etc. PC19. Demonstrate basic techniques of bandaging PC20. Respond promptly and appropriately to an accident situation or medical emergency in real or simulated environments. few General health and safety equipment are mentioned below : • Fire extinguishers • First aid equipment • Safety instruments and clothing • Safety installations, e.g. Fire exits, exhaust fans etc. PC21. Perform and organize loss minimization or rescue activity during an accident in real or simulated environments PC22. Administer first aid to victims in case of a heart attack or cardiac arrest due to electric shock, before the arrival of emergency services in real or simulated cases PC23. Demonstrate the artificial respiration and the CPR Process PC24. Participate in emergency procedures. Emergency procedures are: • Raising alarm • Safe/efficient evacuation • Correct means of escape • Correct assembly point • Roll call • Correct return to work PC25. Complete a written accident/incident report or dictate a report to another person, and send report to person responsible Incident Report should capture: • Name • Date/time of incident • Date/time of report, • Location • Environment conditions • Persons involved • Sequence of events • Injuries sustained • Damage sustained • Actions taken

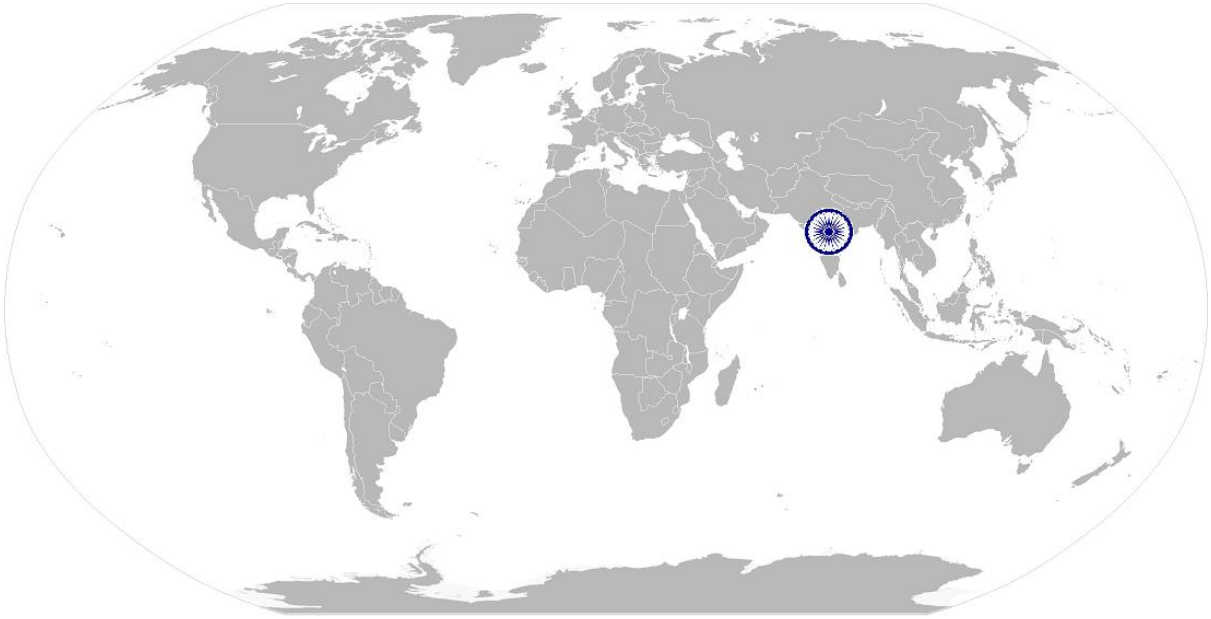
	• Witnesses • Supervisor/manager notified Documents: • Fire notices • Accident reports • Safety instructions for equipment and procedures • Company notices and documents • Legal documents (e.g. Government notices) Job titles: • Health and safety officer • First aid officer • Fire officer PC26. Demonstrate correct method to move injured people and others during an emergency
Element	**Knowledge and Understanding**
A. Organisational Context (Knowledge of the Company/ Organisation and its processes)	The user/individual on the job needs to know and understand: KA1. State the names (and job titles if applicable), and describe where to find, all the people responsible for health and safety in a workplace KA2. State the names and location of documents that refer to health and safety in the workplace
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB3. Meaning of "hazards" and "risks" KB4. Health and safety hazards commonly present in the work environment and related precautions KB5. Possible causes of risk, hazard or accident in the workplace and why risk and/or accidents are possible KB6. Activities and causes of risk and accident KB7. Methods of accident prevention KB8. Safe working practices when working with tools and machines KB9. Safe working practices while working at various hazardous sites KB10. Where to find all the general health and safety equipment in the workplace KB11. Various dangers associated with the use of electrical equipment KB12. Preventative and remedial actions to be taken in the case of exposure to toxic materials. • Exposure: ingested, contact with skin, inhaled • Preventative action: ventilation, masks, protective clothing/equipment • Remedial action: immediate first aid, report to supervisor • Materials: solvents, flux, lead KB13. Importance of using protective clothing/equipment while working KB14. Precautionary activities to prevent the fire accident Activities and causes: • Physical actions • Reading

	• Listening to and giving instructions • Inattention • Sickness and incapacity (e.g. Drunkenness) • Health hazards (e.g. Untreated injuries and contagious illness) KB15. Various causes of fire KB16. Techniques of using the different fire extinguishers KB17. Different methods of extinguishing fire KB18. Rescue techniques applied during a fire hazard KB19. Various types of safety signs and what they mean KB20. Appropriate basic first aid treatment relevant to the condition e.g. Shock, electrical shock, bleeding, breaks to bones, minor burns, resuscitation, poisoning, eye injuries KB21. Content of written accident report KB22. Potential injuries and ill health associated with incorrect manual handing KB23. Safe lifting and carrying practices KB24. Personal safety, health and dignity issues relating to the movement of a person by others KB25. Potential impact to a person who is moved incorrectly
Skills (S) w.r.t. the scope	
Element	Skills
A. Core Skills/ Generic Skills	Reading and Writing Skills
	The user/individual on the job needs to know and understand how to: SA1. Read and comprehend basic content to read labels, charts, signage's SA2. Read and comprehend basic English to read manuals of operations SA3. Read and write an accident/incident report in local language or English
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA4. Question co-workers appropriately in order to clarify instructions and other issues SA5. Give clear instructions to co-workers, subordinates others
	Decision Making
	The user/individual on the job needs to know and understand how to: SA6. Make appropriate decisions pertaining to the concerned area of work with respect to intended work objective, span of authority, responsibility, laid down procedure and guidelines
B. Professional Skills	Plan and Organize
	The user/individual on the job needs to know and understand: SB1. Plan and organize their own work schedule, work area, tools, equipment and materials to maintain decorum and for improved productivity

	Working with others
	The user/individual on the job needs to know and understand how to: SB2. Remain congenial while discussing and debating issues with co-workers SB3. Follow appropriate protocols for communication based on situation, hierarchy, organizational culture and practice SB4. Ask for, provide and receive required assistance where possible to ensure achievement of work related objectives SB5. Thank co-workers for any assistance received SB6. Offer appropriate respect based on mutuality and respect for fellow workmanship and authority
	Problem Solving
	The user/individual on the job needs to know and understand how to: SB7. Think through the problem, evaluate the possible solution(s) and suggest an optimum /best possible solution(s) SB8. Identify immediate or temporary solutions to resolve delays SB9. Identify sources of support that can be availed of for problem solving for various kind of problems SB10. Seek appropriate assistance from other sources to resolve problems SB11. Report problems that you cannot resolve to appropriate authority
	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB12. Identify cause and effect relations in their area of work SB13. Use cause and effect relations to anticipate potential problems and their solution

NOS Version Control

NOS Code	ISC/N0008		
Credits(NSQF)	TBD	Version number	1.0
Industry	Iron and steel	Drafted on	23/07/2014
Industry Sub-sector	All departments	Last reviewed on	30/12/2014
Occupation	Mechanical Maintenance	Next review date	30/12/2015



National Occupational Standards

Overview

This unit covers basic practices that improve effectiveness of working with others in an organisational set-up.

National Occupational Standard

Unit Code	ISC/N0009
Unit Title (Task)	Works effectively with others
Description	This unit covers basic etiquette and competencies that a candidate is required to possess and demonstrate in their behaviour and interactions with others at the workplace.
Scope	This unit/task covers the following: • Ensure appropriate communication with superiors, peers and others as applicable at work place • Demonstrate appropriate behaviour and etiquette at work place

Performance Criteria (PC) w.r.t. the Scope	
Element	**Performance Criteria**
Ensure appropriate communication with superiors, peers and others as applicable at work place	The user/individual on the job should be able to: PC1. Accurately receive information and instructions from the supervisor and fellow workers, getting clarification where required PC2. Accurately pass on information to authorized persons who require it and within agreed timescale and confirm its receipt PC3. Provide information to others clearly, at a pace and in a manner that helps them to understand
Demonstrate appropriate behaviour and etiquette at work place	The user/individual on the job should be able to: PC4. Display helpful behaviour by assisting others in performing tasks in a positive manner, where required and possible PC5. Consult with and assist others to maximize effectiveness and efficiency in carrying out tasks PC6. Display appropriate communication etiquette while working PC7. Display active listening skills while interacting with others at work PC8. Use appropriate tone, pitch and language to convey politeness, assertiveness, care and professionalism PC9. Demonstrate responsible and disciplined behaviours at the workplace PC10. Escalate grievances and problems to

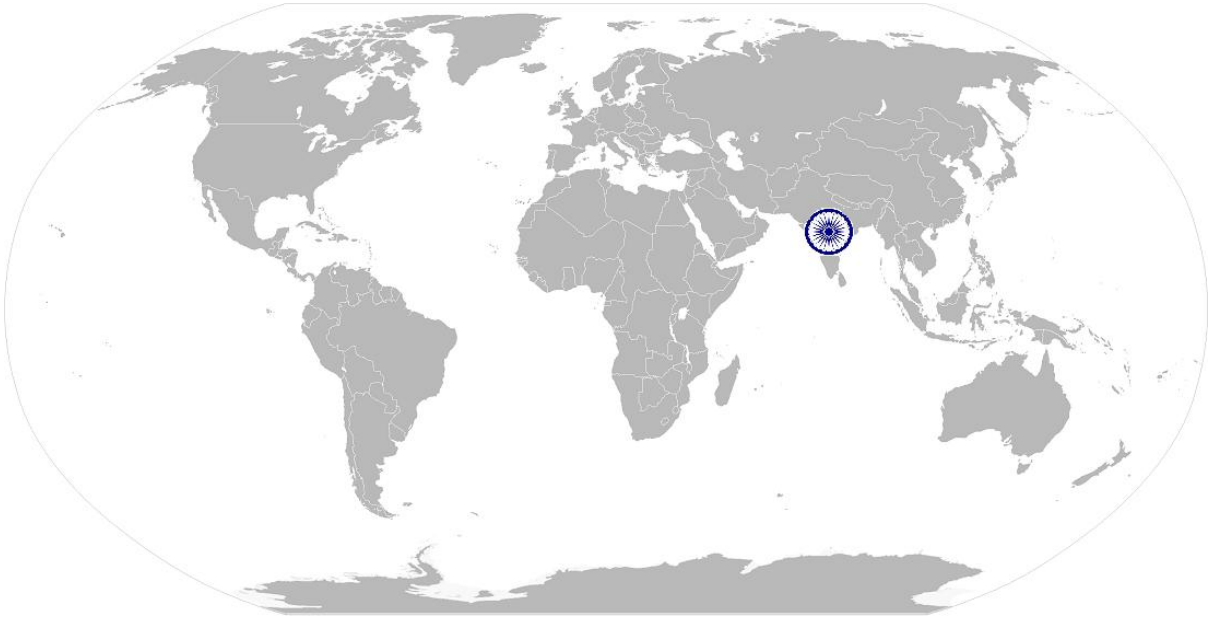
Element	**Knowledge and Understanding**
A. Organisational Context (Knowledge of the Company/ Organisation and	The user/individual on the job needs to know and understand: KA1. Legislation, standards, policies, and procedures followed in the company relevant to own employment and performance conditions KA2. Reporting structure, inter-dependent functions, lines and procedures in the work area KA3. Relevant people and their responsibilities within the work area

its processes)	KA4. Escalation matrix and procedures for reporting work and employment related issues
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. Various categories of people that one is required to communicate and co-ordinate with in the organization KB2. Importance of effective communication in the workplace KB3. Importance of teamwork in organizational and individual success KB4. Various components of effective communication KB5. Key elements of active listening KB6. Value and importance of active listening and assertive communication KB7. Barriers to effective communication KB8. Importance of tone and pitch in effective communication KB9. Importance of avoiding casual expletives and unpleasant terms while communicating professional circles KB10. How poor communication practices can disturb people, environment and cause problems for the employee, the employer and the customer KB11. Importance of ethics for professional success KB12. Importance of discipline for professional success KB13. What constitutes disciplined behaviour for a working professional KB14. Common reasons for interpersonal conflict KB15. Importance of developing effective working relationships for professional success KB16. Expressing and addressing grievances appropriately and effectively KB17. Importance and ways of managing interpersonal conflict effectively
Skills (S) w.r.t. the scope	
Element	Skills
A. Core Skills/ Generic Skills	Reading and Writing Skills
	The user/individual on the job needs to know and understand how to: SA1. Read and comprehend basic content to read labels, charts, signage's SA2. Read and comprehend basic English to read manuals of operations SA3. Read and write an accident/incident report in local language or English
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA4. Question co-workers appropriately in order to clarify instructions and other issues SA5. Provide clear instructions to co-workers, subordinates others
	Decision Making
	The user/individual on the job needs to know and understand how to:

	SA6. Make appropriate decisions pertaining to the concerned area of work with respect to intended work objective, span of authority, responsibility, laid down procedure and guidelines
B. Professional Skills	Plan and Organize
	The user/individual on the job needs to know and understand: SB1. Plan and organize their own work schedule, work area, tools, equipment and materials to maintain decorum and for improved productivity
	Working with others
	The user/individual on the job needs to know and understand how to: SB2. Remain congenial while discussing and debating issues with co-workers SB3. Follow appropriate protocols for communication based on situation, hierarchy, organizational culture and practice SB4. Ask for, provide and receive required assistance where possible to ensure achievement of work related objectives SB5. Thank co-workers for any assistance received SB6. Offer appropriate respect based on mutuality and respect for fellow workmanship and authority
	Problem Solving
	The user/individual on the job needs to know and understand how to: SB7. Think through the problem, evaluate the possible solution(s) and suggest an optimum /best possible solution(s) SB8. Identify immediate or temporary solutions to resolve delays SB9. Identify sources of support that can be availed of for problem solving for various kind of problems SB10. Seek appropriate assistance from other sources to resolve problems SB11. Report problems that you cannot resolve to appropriate authority
	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB12. Identify cause and effect relations in their area of work SB13. Use cause and effect relations to anticipate potential problems and their solution

NOS Version Control

NOS Code	ISC/N0009		
Credits(NSQF)	TBD	Version number	1.0
Industry	Iron and steel	Drafted on	23/07/2014
Industry Sub-sector	All departments	Last reviewed on	30/12/2014
Occupation	Mechanical Maintenance	Next review date	30/12/2015



CRITERIA FOR ASSESSMENT OF TRAINEES

Job Role: Bearing Maintenance
Qualification Pack: ISC/Q0906
Sector Skill Council: Indian Iron & Steel Sector Skill Council

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 center (as per assessment criteria below).
4. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criteria.
5. To pass the Qualification Pack , every trainee should score a minimum of 60% 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 Allocated	
NOSs	PCs	Total Marks 1000	Out Of	Theory	Practical
ISC/N0929: Understand the assigned job of bearing maintenance	PC1. Interpret the checklist and understand the bearing maintenance job requirements	250	15	5	10
	PC2. Identify classifications of bearings e.g. single row radial ball bearing, roller bearing, angular contact ball bearing, self-aligning bearing, special bearing races, cylindrical roller bearing, single/double row tapered roller bearing, thrust bearing etc.		20	5	15
	PC3. Understand the cleaning procedure of bearing and related parts		15	5	10
	PC4. Understand the dimensions and related parts of bearing		10	0	10
	PC5. Plan, as appropriate to carry out the bearing maintenance job		15	5	10

	PC6. Understand sections, views, scale of measurement used in the engineering drawing of the equipment		15	5	10
	PC7. Understand the symbols used in the engineering drawings		15	0	15
	PC8. Understand other specifications and identify the sequence of activities required for bearing maintenance/changing		15	5	10
	PC9. Read and interpret engineering drawings to ensure correct limits, tolerance and fits of bearings		15	0	15
	PC10. Identify any clarifications that he wants to seek with respect to the given equipment drawing		15	0	15
	PC11. Identify and seek clarifications with respect to bearings with all related parts		15	5	10
	PC12. Recognize whom to contact for clarifications on the engineering design		10	0	10
	PC13. Escalate the concern to the supervisor or shift-in-charge, if needed		15	5	10
	PC14. Identify tools, tackles & equipment (lifting equipment, various sizes of spanner, dial gauge, Vernier calliper, filler gauge, torque range, bearing heating furnace etc.) required to perform the bearing maintenance operation		15	5	10
	PC15. Identifying the different types of bearings for maintenance and changing		15	5	10
	PC16. Ask helper to carry tools required to the desired work site		15	5	10
	PC17. Report to stores / supervisor in case of non-availability of tools & tackles or stock-out of spares		15	5	10
		Total	250	60	190
ISC/N0930: Prepare for bearing maintenance	PC1. Reach the site with desired tools, tackles and equipment	200	15	5	10
	PC2. Plan for job duration and understand the process as per SOP		15	5	10

operation	PC3. Arrange necessary instruments to carry out maintenance (dial gauge, spirit level, vibration measuring instrument and tools for dismantling and assembling e.g. spanners, torque wrench, power tools etc.)		15	5	10
	PC4. Identify the root cause of the problem, if any (radial run out of assemble bearing, face run out with race way, face run out with bore, race way parallel with face, outside face inclination and thickness variance)		15	5	10
	PC5. Identify and collect bearings as per drawing		15	5	10
	PC6. Plan for storage of new bearing and old bearing at job site		15	5	10
	PC7. Ensure not to store multiple bearings on top of each other		15	5	10
	PC8. Ensure not to store large bearings in the upright position		15	5	10
	PC9. Understand the hazardous area of work and necessary precautions to be taken to execute the job as well as safe handling of equipments		15	5	10
	PC10. Prepare tools, tackles, the list of spares (lifting equipment, various sizes of spanner, dial gauge, Vernier calliper, filler gauge, torque range, bearing heating furnace etc.) required for completion of bearing maintenance/change job and ensure availability at work site		20	5	15
	PC11. Ensure that tools and tackles match the standard specifications		15	5	10
	PC12. Ensure tools, tackles and equipment required for assembly are free from physical damage and ready for bearing maintenance/changing operation		15	5	10
	PC13. Report damaged / defective components of equipment and bearings as per the escalation matrix		15	5	10

		Total	200	65	135
ISC/N0931: Carry out the assigned bearing maintenance operation	PC1. Interpret the SOP and plan for handling the parent equipment, dismantling, assembling of bearing	300	15	5	10
	PC2. Understand the checklist and ensure all assembly check points are measured and correctly recorded		15	5	10
	PC3. Dismantle the equipment, as needed for bearing maintenance and changing activities		10	0	10
	PC4. Correct the defects in the bearing or replace the defective bearing		15	5	10
	PC5. Assemble the bearing related parts according to the drawings		10	0	10
	PC6. Fasten mechanical components/ subassemblies together using screws, bolts, and collars using hand/ power tools for bearing replacement		10	0	10
	PC7. Set and adjust linkages, tensions and clearances of assembled components to specifications using fixed gauges and hand tools		10	0	10
	PC8. Re assemble the bearing related parts post correcting the defect		15	5	10
	PC9. Understand and ensure all necessary steps are completed before start-up of the machine		10	0	10
	PC10. Identify and use appropriate vibration and temperature measuring instruments		15	5	10
	PC11. Understand different types of bearings (anti friction, frictional bearing and their classification) the procedure of lubrication		15	5	10
	PC12. Assemble, dismantle and measure gaps of different anti friction bearings e.g. ball bearing, roller bearing, taper roller bearing etc.		15	5	10
	PC13. Assemble, dismantle and measure gaps of Babbitt bearing		15	5	10
	PC14. Understand and conduct hand scraping of Babbitt bearing		10	0	10

	PC15. Ensure lubrication of bearings prior to starting use of equipment		15	5	10
	PC16. Record and monitor that temperature and vibration are at desirable levels		15	5	10
	PC17. Identify any deviations from desirable levels and take necessary actions to correct them		15	5	10
	PC18. Ensure alignment of bearing related parts and with the engineering drawings		15	5	10
	PC19. Check bearing vibrations to ensure they are within desired limits		10	0	10
	PC20. Test the machine to ensure it is fit to use before handover		10	0	10
	PC21. Record the test results in the prescribed format of the organization		15	5	10
	PC22. Ensure all activities are complete according to checklist		15	5	10
	PC23. Communicate to supervisor on completion of given job and/or in case of any deviations from checklist		10	0	10
		Total	300	70	230
ISC/N0008: Use basic health and safety practices at the workplace	PC1. Use protective clothing/equipment for specific tasks and work conditions	150	9	4	5
	PC2. State the name and location of people responsible for health and safety in the workplace		6	1	5
	PC3. State the names and location of documents that refer to health and safety in the workplace		2	1	1
	PC4. Identify job-site hazardous work and state possible causes of risk or accident in the workplace		8	4	4
	PC5. Carry out safe working practices while dealing with hazards to ensure the safety of self and others state methods of accident prevention in the work environment of the job role		6	1	5
	PC6. State location of general health and safety equipment in the workplace		6	1	5

PC7. Inspect for faults, set up and safely use steps and ladders in general use		6	1	5
PC8. Work safely in and around trenches, elevated places and confined areas		6	1	5
PC9. Lift heavy objects safely using correct procedures		6	1	5
PC10. Apply good housekeeping practices at all times		2	1	1
PC11. Identify common hazard signs displayed in various areas		6	5	1
PC12. Retrieve and/or point out documents that refer to health and safety in the workplace		5	1	4
PC13. Use the various appropriate fire extinguishers on different types of fires correctly		9	4	5
PC14. Demonstrate rescue techniques applied during fire hazard		8	4	4
PC15. Demonstrate good housekeeping in order to prevent fire hazards		2	1	1
PC16. Demonstrate the correct use of a fire extinguisher		6	1	5
PC17. Demonstrate how to free a person from electrocution		6	1	5
PC18. Administer appropriate first aid to victims as required e.g. in case of bleeding, burns, choking, electric shock, poisoning etc.		8	3	5
PC19. Demonstrate basic techniques of bandaging		6	1	5
PC20. Respond promptly and appropriately to an accident situation or medical emergency in real or simulated environments		7	2	5
PC21. Perform and organize loss minimization or rescue activity during an accident in real or simulated environments		6	1	5

	PC22. Administer first aid to victims in case of a heart attack or cardiac arrest due to electric shock, before the arrival of emergency services in real or simulated cases		6	1	5
	PC23. Demonstrate the artificial respiration and the CPR Process		6	1	5
	PC24. Participate in emergency procedures		6	1	5
	PC25. Complete a written accident/incident report or dictate a report to another person, and send report to person responsible		4	1	3
	PC26. Demonstrate correct method to move injured people and others during an emergency		2	1	1
		Total	150	45	105
ISC/N0009: Works effectively with others	PC1. Accurately receive information and instructions from the supervisor and fellow workers, getting clarification where required	100	10	5	5
	PC2. Accurately pass on information to authorized persons who require it and within agreed timescale and confirm its receipt		10	5	5
	PC3. Provide information to others clearly, at a pace and in a manner that helps them to understand		10	0	10
	PC4. Display helpful behaviour by assisting others in performing tasks in a positive manner, where required and possible		10	5	5
	PC5. Consult with and assist others to maximize effectiveness and efficiency in carrying out tasks		10	5	5
	PC6. Display appropriate communication etiquette while working		10	0	10
	PC7. Display active listening skills while interacting with others at work		10	0	10
	PC8. Use appropriate tone, pitch and language to convey politeness, assertiveness, care and professionalism		10	5	5

	PC9. Demonstrate responsible and disciplined behaviours at the workplace		15	5	10
	PC10. Escalate grievances and problems to supervisor		5	0	5
		Total	100	30	70