

**SKILLS FRAMEWORK FOR PRECISION ENGINEERING
SKILLS STANDARDS FOR
ASSOCIATE ENGINEER/ASSISTANT ENGINEER**

Occupation: Associate Engineer/Assistant Engineer

Occupation Description:

The Associate Engineer/Assistant Engineer adapts and applies engineering techniques to support the design, development and manufacture of machinery and components and/or machine repair and maintenance.

He/She works closely with the Engineers and/or Principal or Senior Engineers to generate mechanical and system design, equipment prototyping and conduct tests and inspections, while complying with Workplace Safety and Health and other regulatory requirements.

Important Points to Note about this Document

This document is intended purely to provide general information to enable individuals, employers and training providers to be informed about the skills for career, training and education purposes. SkillsFuture Singapore Agency provides no warranty whatsoever about the contents of this document, and does not warrant that the courses of action mentioned in this document will secure employment, promotion, or monetary benefits. WDA will not be liable for any loss, damage or expense that individuals may incur as a result of reliance on the contents of this document.

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The skills expected of the Associate Engineer/Assistant Engineer are summarised as below:

Skill Category	Skill Sub-Category	Skills	
Technical and Engineering Fundamentals	Numerical and Analysis Methods	PRE-TEF-4018-1	Apply Geometric Dimensioning and Tolerancing
	Computer Technology	PRE-TEF-4019-1	Perform Engineering Simulation for Design Verification
	Materials and Metallurgy	PRE-TEF-4020-1	Apply Materials Characterisation
PRE-TEF-4021-1		Apply Vibration Design and Control for Precision Engineering	
PRE-TEF-4022-1		Determine Heat Transfer Loads for Processing Equipment	
Technical and Engineering Design	Components and Modules	PRE-TED-4005-1	Apply Materials Technology
		PRE-TED-4006-1	Apply Advanced Materials Technology
	Machinery and Systems	PRE-TED-4007-1	Apply Automation Control for Machines
		PRE-TED-4008-1	Design and Build Industrial Machine Electrical System
PRE-TED-4009-1		Design for Manufacture and Assembly	
PRE-TED-4010-1	Design Mechanism Unit of Machine		
Precision Manufacturing Processes	Machining Processes	PRE-PMP-4028-1	Apply Mechanical Fixtures Design
		PRE-PMP-4029-1	Apply Mould Design
		PRE-PMP-4030-1	Apply Precision Machining
	Forming Processes	PRE-PMP-4031-1	Apply Polymer Materials Technology
		PRE-PMP-4032-1	Perform Advanced Polymer and Polymer Composites Processing
Finishing Processes	PRE-PMP-4033-1	Apply Cleaning Technologies	
	PRE-PMP-4034-1	Perform Protective Coating Inspection	
Sub-Assembly and Final	PRE-PMP-4035-1	Apply Assembly of Mechanical Machines	

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Skill Category	Skill Sub-Category	Skills	
	Assembly Processes	PRE-PMP-4036-1	Apply Sensors and Actuators in Automation
	Production Shop Floor Optimisation	PRE-PMP-4037-1	Implement Engineering Activities and Processes
Quality		PRE-QUA-4011-1	Apply Measurement Metrology in Quality Assurance
Additive Manufacturing		PRE-AMA-4001-1	Apply Additive Manufacturing Technology
Laser and Optics		PRE-LOP-4001-1	Apply Laser Machine Technology
Robotics and Automation		PRE-RAU-4001-1	Apply Robotics Fundamentals
Workplace Safety and Health		PRE-WSH-2003-1	Apply Workplace Safety and Health Policies
		PRE-WSH-4004-1	Implement Workplace Safety and Health Systems
		PRE-WSH-4005-1	Supervise Manufacturing Work for Workplace Safety and Health
		PRE-WSH-4006-1	Manage Workplace Safety and Health Systems
Manufacturing Productivity and Innovation		PRE-QUA-3006-1	Apply Root Cause Analysis
		PRE-MPI-3006-1	Implement Continuous Improvement Processes
		PRE-MPI-4008-1	Manage Continuous Improvement
Business Analytics		PRE-BAN-4001-1	Solve Problems using Operations Research Techniques
Business Negotiation		BM-BN-401E-1	Participate in Negotiations

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Skill Category	Skill Sub-Category	Skills	
Communication		BM-COM-303E-1	Present Information
		BM-COM-304E-1	Write Reports
Info-Communication Technologies		PRE-ICT-4001-1	Perform Advanced Spreadsheet Functions
Project Management		BM-PM-402E-1	Manage Project Scope
		BM-PM-403E-1	Manage Project Team
		BM-PM-405E-1	Manage Project Resources
		BM-PM-406E-1	Manage Project Procurement
		BM-PM-407E-1	Manage Project Costs
		BM-PM-408E-1	Manage Project Timeline
		BM-PM-409E-1	Manage Project Quality
		BM-PM-410E-1	Manage Project Risk
Sales and Marketing		PRE-SMA-4001-1	Understand Sales and Marketing in a Manufacturing Organisation
Strategy Planning and Implementation		PRE-SPI-4002-1	Understand Business Management
Personal Management and Development		ES-PMD-403G-1	Apply Emotional Competence to Manage Self and Others in a Business Context
		ES-PMD-404G-1	Contribute towards a Learning Organisation
		ES-PMD-405G-1	Manage Workplace Challenges with Resilience
Analytical, Conceptual and		ES-ACE-401G-1	Support the Establishment of a Framework for Initiative and Enterprise

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Skill Category	Skill Sub-Category	Skills	
Evaluative		ES-ACE-402G-1	Solve Problems and Make Decisions at Managerial Level
Interpersonal		ES-IP-401G-1	Lead Workplace Communication and Engagement
		ES-IP-402G-1	Develop a Work Team
		ES-IP-403G-1	Lead a Virtual Team

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Skill Code	PRE-TEF-4018-1	Skill Category	Technical and Engineering Fundamentals
		Skill Sub-Category	Numerical and Analysis Methods
Skill Title	Apply Geometric Dimensioning and Tolerancing		
Skill Description	This skill describes the ability to apply knowledge and skill required in geometrical tolerancing and inspection for the manufacture of components including geometrical dimensioning, tolerancing and visual inspection.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Health, Safety and Environmental requirements • Identification of organisational procedures on carrying out dimensional and geometrical measurements • Specifications and acceptance criteria • Adjusting deviation in tolerance • Tolerance stack up in assemblies • Reading and recording of results of measurements • Use of inspection fixtures and dial indicators • Importance of calibration for dimensional measuring gauges and fixtures • Use of binocular • Types of visual defects • Record of inspection results in accordance to organisational procedures 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Apply safety requirements in accordance to the WSH Act • Perform pre-operational checks • Perform loading of components to inspection fixtures • Perform component dimensional measurement • Perform unloading of component from inspection fixtures • Perform documentation as per organisational procedures 		
Innovation and Value Creation <i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Review existing processes to meet industrial requirements to assess areas of potential value add 		

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<i>aligned to organisational goals.</i>	
Social Intelligence and Ethics <i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Communicate with colleagues and team to assist in establishing timelines and requirements
Learning to Learn <i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Engage in self-reflection to explore alternative techniques to best meet requirements
Range of Application (where applicable) <i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i>	<p>Tools and equipment:</p> <ul style="list-style-type: none"> • Types of measuring instrument • Binoculars • Types of dimensional measuring gauges and applications <p>Procedures and supporting documents:</p> <ul style="list-style-type: none"> • Technical Instructions • Organisational policy and procedures <p>Rules and regulations:</p> <ul style="list-style-type: none"> • Workplace Safety and Health standards • National qualifications framework • Industry codes of practice • International quality standards Workplace Safety and Health standards • National qualifications framework • Industry codes of practice • International Quality Standards

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Skill Code	PRE-TEF-4019-1	Skill Category	Technical and Engineering Fundamentals
		Skill Sub-Category <i>(where applicable)</i>	Computer Technology
Skill Title	Perform Engineering Simulation for Design Verification		
Skill Description	This skill describes the ability to perform engineering analyses related to the industrial equipment and machineries using simulation and analysis tools and methods to assist in making engineering decisions.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Concepts and fundamentals of rigid and flexible dynamic analysis • Steps for performing rigid body dynamic analysis • Steps for performing rigid body dynamic post-processing • Steps for performing flexible dynamic analysis • Concepts and fundamentals of heat transfer analysis • Steps for performing nonlinear thermal and transient analyses • Steps for performing radiation heat transfer and phase change analyses • Concepts and fundamentals of structural contact and fatigue analysis • Steps for performing pre-processing for mechanical stress simulation • Steps for performing basic and advanced structural contact • Steps for performing basic post-processing for mechanical stress simulation • Steps for performing the assignment of material properties, including S-N curves • Steps for performing the stress-life high-cycle fatigue analysis • Steps for performing the strain-life low-cycle fatigue analysis • Steps for performing post-processing for results with the fatigue tool for stress and strain life • Steps for operating the graphical user interface • Steps for performing geometry creation and meshing • Steps for performing a board level simulation analysis • Steps for performing basic meshing and non-conformal meshing • Steps for performing solution setting, optimisation setup and parameters setting operations • Steps for performing transient analysis and radiation analysis on PCB • Steps for performing post-processing • Steps for performing a zoom-in modelling analysis and MCAD/ECAD import • Concepts of the fundamentals of rotating machinery simulation 		

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	<ul style="list-style-type: none"> • Steps for performing computational fluid dynamics (CFD) analysis with single reference frame (SRF) • Steps for performing CFD analysis with multiple reference frame (MRF) • Steps for performing CFD analysis with sliding mesh (SMM) • Steps for performing post-processing for rotating machinery analysis
<p>Application and Adaptation</p> <p><i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Perform pre-processing for mechanical stress simulation • Perform basic and advanced structural contact • Perform basic post-processing for mechanical stress simulation • Perform assignment of material properties, including S-N curves • Perform post-processing for results with the fatigue tool for stress and strain life • Operate the graphical user interface • Perform geometry creation and meshing • Perform a board level simulation analysis • Perform basic meshing and non-conformal meshing • Complete solution setting, optimisation setup and parameters setting operations • Evaluate and conduct post-processing •
<p>Innovation and Value Creation</p> <p><i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Identify and conduct rigid body dynamic analysis • Perform rigid body dynamic post-processing • Perform flexible dynamic analysis • Perform nonlinear thermal and transient analyses • Perform radiation heat transfer and phase change analyses • Perform stress-life high-cycle fatigue analysis • Perform strain-life low-cycle fatigue analysis • Perform transient analysis and radiation analysis on PCB • Perform a zoom-in modelling analysis and MCAD and ECAD import • Perform CFD analysis with SRF • Perform CFD analysis with MRF • Perform CFD analysis with SMM • Complete post-processing for rotating machinery analysis • Control, or preclude, error sources in developing and using CFD software
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Communicate with colleagues and team to assist in establishing

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<p><i>to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>timelines and requirements</p>
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	<p>The ability to:</p> <p>Reflect on the following questions throughout simulation exercise interpret results</p> <ul style="list-style-type: none"> • What is known about the flow problem to be dealt with? • What physical phenomena need to be taken into account? • What is the geometry of the domain and operating conditions? • Are there any internal obstacles or free surfaces and interfaces? • What is the type of flow (laminar and turbulent, steady/unsteady)? • What is the objective of the CFD analysis to be performed? <ul style="list-style-type: none"> ○ Computation of integral quantities (lift, drag, yield) ○ Snapshots of field data for velocities, concentrations etc. ○ Shape optimisation aimed at an improved performance • What is the easiest/cheapest/fastest way to achieve the goal?
<p>Range of Application</p> <p>(where applicable)</p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	<p>Computer-aided engineering (CAE) must include:</p> <ul style="list-style-type: none"> • Geometry creation • Geometry modification • Import and export of geometry • Mesh generation • Finite Element Analysis • Computational Fluid Dynamics (CFD) analysis • Post-processing • Design Optimisation

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Skill Code	PRE-TEF-4020-1	Skill Category	Technical and Engineering Fundamentals
		Skill Sub-Category <i>(where applicable)</i>	Conceptual Knowledge
Skill Title	Apply Materials Characterisation		
Skill Description	This skill describes the ability to apply instrumental methods useful for materials characterisation and testing for applications in the manufacturing industry and apply in quality control, product development, failure analysis and process development and trouble shooting.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Types of Properties of materials such as: <ul style="list-style-type: none"> ○ Optical properties of materials. ○ Thermal properties of materials. ○ Mechanical properties of materials. ○ Chemical properties of materials. ○ Microstructures of materials • Principles of the methods and instruments used in measuring and characterising the properties of materials 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Apply appropriate methods and select correct instruments in measuring and characterising optical properties of materials. • Apply the principles of the methods and instruments in measuring and characterising the following: <ul style="list-style-type: none"> ○ Thermal properties of materials. ○ Mechanical properties of materials. ○ Chemical properties of materials. ○ Microstructures of materials. 		
Innovation and Value Creation <i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Review existing processes to meet industrial requirements to assess areas of potential value add 		

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<i>organisational goals.</i>	
Social Intelligence and Ethics <i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Communicate with colleagues and team to assist in establishing timelines and requirements
Learning to Learn <i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Engage in self-reflection to explore alternative techniques to best meet requirements
Range of Application (where applicable) <i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i>	<ul style="list-style-type: none"> • Failure analysis of components • Trouble shooting of process to optimise the manufacturing process • Quality control of finished products • Quality assurance of finished products • Identification of materials • Internal structure characterisation • Defects detection • Materials research • Manufacturing process research and development

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Skill Code	PRE-TEF-4021-1	Skill Category	Technical and Engineering Fundamentals
		Skill Sub-Category <i>(where applicable)</i>	Conceptual Knowledge
Skill Title	Apply Vibration Design and Control for Precision Engineering		
Skill Description	This skill describes the ability to apply theory, computational aspects, and applications of vibrations. It also includes emphasis on design and control for vibration, explanations of the fundamentals, focusing on physical significance and interpretation.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Know the basic definitions and principles of engineering mechanics. • characteristics of simple vibration of one DoF undamped oscillator and effect of damping • effect of mass and stiffness • Able to model mechanical systems and write equations of motions • Able to understand the solutions of second order differential equations • Understand complex numbers and complex exponentials 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Understand the physical aspects of the mathematical concepts necessary to describe the vibration phenomena • Develop realistic design by taking into consideration of vibration analysis • Visualise practical phenomena of vibration and solve related problems • Apply vibration design and control measures in achieving the quality requirements in precision industry 		
Innovation and Value Creation <i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Review existing processes to meet industrial requirements to assess areas of potential value add 		

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<i>organisational goals.</i>	
Social Intelligence and Ethics <i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Communicate with colleagues and team to assist in establishing timelines and requirements
Learning to Learn <i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Engage in self-reflection to explore alternative techniques to best meet requirements
Range of Application (where applicable) <i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i>	<p>Rules and Regulations:</p> <ul style="list-style-type: none"> • WSH requirements pertaining to laboratories

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Skill Code	PRE-TEF-4022-1	Skill Category	Technical and Engineering Fundamentals
		Skill Sub-Category <i>(where applicable)</i>	Conceptual Knowledge
Skill Title	Determine Heat Transfer Loads for Processing Equipment		
Skill Description	<p>This skill describes the ability to apply knowledge and application skills in performing heat transfer and energy balance calculations used in the optimal design and energy-efficient operation of process equipment and apply them in the workplace. It also includes identifying applicable modes of heat transfer (conduction, convection and radiation), estimating heating and cooling requirements for production machinery and systems involved, implementing energy conservation measures and fuel saving technologies, balancing heat and cool with mechanical work and addressing the skills demanded in plastics, rubber and cable making industry.</p>		
<p>Knowledge and Analysis</p> <p><i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i></p>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • The three modes of heat transfer • The basic heat transfer equation • Applying parallel, counter flow and crossflow heat exchangers • Thermal physical properties of air, water, oil and steam cycles and plant efficiencies • Thermophysical properties of polymer compounds, elastomers and plastics including thermal conductivity, heat capacity, thermal expansion and contraction, heat resistance, heat deflection point, melting point, flammability, thermal stresses of moulding components • Addressing the effects of heat on mechanical strength, yield stress, strain and microstructural deformation of polymeric materials • Cooling curves, superheat and thermal arrest • The process of cooling rates for crystallisation and polymerisation • Maintaining repetitive heating and cooling cycles of elastomers • The various sources of heating and cooling • Developing heating systems including ovens, dryers, panel, radiant and strip heaters, heat lamps, glass, quartz and ceramic heaters • Developing cooling systems including chillers, dehumidifiers, heat pumps, heat pipes and fans • Geometry of heating and cooling lines and passages • Overall heat transfer coefficients for separate and composite mechanisms of heat transmission • Monitoring and controlling temperature • and heat transfer rates, 		

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	<ul style="list-style-type: none"> • Potentials for electrical and gaseous fuels savings, energy recovery, recycling and waste reduction • Thermoplastics and thermosetting • Polymer processing and moulding techniques including compression, transfer, injection (blow and rotary), extrusion (screw and barrel types) as well as casting
<p>Application and Adaptation</p> <p><i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Conductive heat transmissions to or from items are calculated. • Natural and forced convective heat transmissions to or from items are calculated • Radiative heat transmission to or from items can be calculated. • Combined conductive, convective and radiative heat transmissions to or from items • Equivalent electrical analogies are calculated • Saturated steam properties are calculated • Temperature change due to heating of polymer compounds in typical processing equipment is calculated • Temperature change due to cooling of polymer compounds in typical processing equipment is calculated • Variation in heat content caused by shear on a polymer compound is calculated • Temperature increase as a result of shear on a polymer compound is calculated • Sources of heating and cooling such as steam and oil heating and air and water cooling are examined • Fuel types for generating heat and cool such as electricity, gas, solar and renewables are evaluated • Heat transfer coefficients and rates for heating and cooling methods are compared • Appropriate methods of varying and controlling heat transfer rates are determined • Rates of heat transfer under a range of conditions are evaluated • Plastic materials (thermoplastics, thermosetting and elastomers) are classified • Polymer processing and moulding techniques included compression, transfer, injection (blow and rotary), extrusion (screw and barrel types) as well as casting and fabrication of fibres and films (spinning and drawing methods) are recognised • Factors relevant to required heating and cooling rates such as scorch, and flow rates required for process mould filling are identified • Appropriate heat transfer mechanism(s) to achieve desired conditions are selected. • Thermal load and the process requirements are checked to match

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	<p>perfectly with a view to improved productivity and manufacturing</p> <ul style="list-style-type: none"> • Total heating load applied to process components are evaluated • Total cooling load applied to process components are evaluated • Heat generated from mechanical work is evaluated • Adequacy of the heating system used in the process plant is checked, if it copes with the heating or cooling load • Adequacy of the cooling system used in the process plant are checked, if it copes with the heating or cooling load • Conformity of all performed operations with industry and government standards and codes of practice, workplace procedures and policies are checked
<p>Innovation and Value Creation</p> <p><i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Parallel, counter-flow and cross-flow heat exchangers are analysed • Effects of heat on thermo physical characteristics and mechanical properties of polymeric materials being processed are analysed • Effects of cooling on thermo physical characteristics and mechanical properties of polymeric materials are analysed • Feasible possibilities applicable in implementing energy-efficiency, energy conversion and conservation measures are investigated • Available technologies and systems, evaluate heating requirements are considered to obtain correct viscosity for polymer processing
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Communicate with colleagues and team to assist in establishing timelines and requirements
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Ability to perform conduction through a flat plate, composite flat plates, thin and thick wall pipes, composite pipes • Ability to perform convection at a surface or tube • Ability to perform radiation from a black or grey flat surface or tube • Ability to perform combined conduction and convection through single or multiple flat plates or thin wall tubes • Ability to perform combined convection and radiation • Ability to perform combined conduction, convection and radiation • Ability to practise minimisation of energy conversion losses associated with mechanical work such as in screw, mixer, blender or

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	<p>mill machines</p> <ul style="list-style-type: none"> • Ability to implement energy conservation technologies • Ability to address viscosity, flow and thermal stability • Ability to address fabrication of polymeric materials, fibres and films (spinning and drawing methods) • Ability to perform injection moulding systems including single and double stage plunger units, two-stage screw plunger and in line reciprocating screw units • Ability to identify injection tooling including hot and cold runners • Ability to check sufficiency of supply flow rates and the overall thermal loads with the plant systems • Ability to balance heat and cool with mechanical work
<p>Range of Application (where applicable) <i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	<p>Rules and Regulations:</p> <ul style="list-style-type: none"> • WSH requirements pertaining to laboratories, radiation and heat protection regulation

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Skill Code	PRE-TED-4005-1	Skill Category	Technical and Engineering Design
		Skill Sub-Category <i>(where applicable)</i>	Components and Modules
Skill Title	Apply Materials Technology		
Skill Description	This skill describes the ability to identify different engineering materials, understand and evaluate their properties and select appropriate materials for engineering applications.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Types and properties of materials • Tests for tensile strength, hardness and impact strength • Procedure to prepare metallographic samples • Heat treatment of steels 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Identify different engineering materials • Define the properties of materials • Determine the tensile properties from a tensile test • Demonstrate the procedure to conduct tensile test, hardness and impacts test of metals • Identify the common types of steels and their applications • Apply the Fe-Fe₃C phase diagram • Report the objectives of heat treatment • Report the changes that occur during the various heat treatment processes • Correlate the effect of heat treatment process to the mechanical properties • Report properties and applications of aluminium alloys • Review the properties and applications of titanium alloys • Report properties and applications of superalloys • Demonstrate the procedure to prepare metallographic samples 		
Innovation and Value Creation	<p>The ability to:</p> <ul style="list-style-type: none"> • Review existing processes to meet industrial requirements to assess 		

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<i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</i>	areas of potential value add		
Social Intelligence and Ethics <i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Communicate with colleagues and team to assist in establishing timelines and requirements 		
Learning to Learn <i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Engage in reflective practice to evaluate the feasibility of identified materials and methods to evaluate their properties • Interpret the principle and limitations of the various hardness tests 		
Range of Application (where applicable) <i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i>	<p>Types of materials must include:</p> <ul style="list-style-type: none"> • Engineering materials • Ferrous materials <p>Tools and equipment must include:</p> <ul style="list-style-type: none"> • Operation manual • Technical manual and instructions • Laboratory sheets • Work-pieces <p>Rules and regulations must include:</p> <ul style="list-style-type: none"> • Workplace Safety and Health Act • Organisational processes and procedures 		
Skill Code	PRE-TED-4006-1	Skill Category	Technical and Engineering Design
		Skill Sub-Category	Components and Modules

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	<i>(where applicable)</i>
Skill Title	Apply Advanced Materials Technology
Skill Description	This skill describes the ability to apply knowledge of physical and mechanical properties of engineering materials, using mechanical testing, metallography and heat treatment and selecting appropriate materials for engineering applications.
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	The ability to understand: <ul style="list-style-type: none"> • Types of engineering materials • Properties of materials • Tests for Tensile strength, hardness and impact strength • Types and properties of steels • Objectives of heat treatment of steels • Hardening of steels • Annealing and Normalising of steels • Properties and applications of aluminium alloys • Properties and applications of titanium alloys • Properties and applications of Super alloys • Procedure to prepare metallographic samples
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	The ability to: <ul style="list-style-type: none"> • Identify different engineering materials • Define the properties of materials • Determine the tensile properties from a tensile test • Explain the principle and limitations of the various hardness tests • Demonstrate the procedure to conduct tensile test, hardness and impacts test of metals • Identify the common types of steels and their applications • Apply the Fe-Fe₃C phase diagram • Correlate the effect of heat treatment process to the mechanical properties • Demonstrate the procedure to prepare metallographic samples
Innovation and Value Creation <i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are</i>	The ability to: <ul style="list-style-type: none"> • Review the properties and applications of titanium alloys to make improvements

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<i>aligned to organisational goals.</i>	
Social Intelligence and Ethics <i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Report the objectives of heat treatment for alignment • Report the changes that occur during the various heat treatment processes • Report the properties and applications of aluminium alloys • Report the properties and applications of superalloys and seek consensus
Learning to Learn <i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Engage in self-reflection to explore alternative techniques to best meet requirements
Range of Application (where applicable) <i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i>	<ul style="list-style-type: none"> • Identification of engineering materials, its types and properties • Tests to determine basic mechanical properties of metallic materials • Basis for material selection and application fundamentals <p>Tools and equipment must include:</p> <ul style="list-style-type: none"> • Operation manual • Technical manual and instructions • Laboratory sheets • Work-pieces

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Skill Code	PRE-TED-4007-1	Skill Category	Technical and Engineering Design
		Skill Sub-Category	Machinery and Systems
Skill Title	Apply Automation Control for Machines		
Skill Description	This skill describes the ability to design, interpret and apply actuators, sensors, pneumatics and electro-pneumatics components with programmable logic control programming in equipment building and automation		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Elements of an automatic control system • Standard electro-pneumatics components • Electro-pneumatics symbol / diagram and circuit diagram • GRAFCET development tool • GRAFCET and generation of ladder logic diagram • Enhancement of ladder logic diagram with timer and counter instructions • IEC 61131-3 Programming Standard • IEC 61131-3 with development of Function Block Diagram • Assembly techniques in assemble of Modular Production System (MPS) • Mini Project on MPS with system integration and troubleshooting 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Identify Automatic Control System • Apply electro pneumatics components and its application • Perform Automated Controller and I/O Interfacing with PLC • Identity GRAFCET elements and rules • Apply GRAFCET and generate process application with Ladder logic diagram • Develop ladder logic solution using timer, counter instructions • Identify PLC Program Development Technique as per IEC 61131-3 Standard • Apply IEC 61131-3 Programming Standard for automation processes • Assemble Modular Production System as per drawing • Complete system integration and troubleshooting 		

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<p>Innovation and Value Creation</p> <p><i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Review existing processes to meet industrial requirements to assess areas of potential value add
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Communicate with colleagues and team to assist in establishing timelines and requirements
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Engage in self-reflection to explore alternative techniques to best meet requirements
<p>Range of Application (where applicable)</p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	<ul style="list-style-type: none"> • Automatic control systems • Programming skills for PLC that is essential for automatic control machines • Fundamentals of assembly, system Integration and troubleshooting in engineering environment <p>Tools and equipment:</p> <ul style="list-style-type: none"> • operational manual • technical manual and instructions • Repair and maintenance tools • PLC and software <p>Procedures and supporting documents:</p> <ul style="list-style-type: none"> • Organisational processes and procedures • Technical manual and instructions

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	<p>Rules and Regulations:</p> <ul style="list-style-type: none">• Workplace Safety and Health Act
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Skill Code	PRE-TED-4008-1	Skill Category	Technical and Engineering Design
		Skill Sub-Category <i>(where applicable)</i>	Machinery and Systems
Skill Title	Design and Build Industrial Machine Electrical System		
Skill Description	This skill describes the ability to operate electric drives and electromechanical systems in a range of industrial applications within the workplace. It also includes preparing for work activities, carrying out design of electric drive and electromechanical systems, testing electric drive and electromechanical systems.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Types and usage of electric drives • Types and usage of electromechanical system devices • Types of hardware and software for design drawing • Types and usage of electrical circuit diagram • Interpretation of control requirements • ISO circuit diagram symbols • Assessment of electric drives • Electromechanical systems configurations and process line up blueprint drawings • Industry standards in electric drives and electromechanical systems operation • Interpreting of ISO circuit diagram symbols • Preparing of parts list of component • Design principles of electrical circuit operation of electric drives and electromechanical system components • Procedure of checking, verifying and amending completed electrical control circuit types and usage of electric drives and electromechanical system equipment • Industrial health and safety risks and dangers involved in designing electric drives and electromechanical and systems • Using appropriate personal protective equipment • Principles of electric drives and electromechanical and systems • Interpreting of circuit diagrams • Types and usage of electric drives, electromechanical system and equipment • Industrial health and safety risks and dangers involved in testing electric drives and electromechanical and systems • Recording of observations, defects and other findings 		

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	<ul style="list-style-type: none"> • Procedure of shutting down electric drives and electromechanical systems • Disconnecting components and returning them to storage area • Organisational procedures for submission of completed circuit diagrams, parts list and control requirements • Organisational procedure for reporting faulty electric drives and electromechanical system device • Recording and compiling of work documentation • Organisational procedure for reporting incomplete work • Procedure of cleaning and returning tools, equipment and unused materials • Proper disposal of waste materials housekeeping procedure
<p>Application and Adaptation</p> <p><i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Identify control sequence for designing electric drives and electromechanical and systems based on control requirements and electrical diagram • Identify and select required electric drive components based on given control requirements • Identify and select required electromechanical system devices based on given control requirements • Prepare and carry out quality and process checks of IT hardware and software, if any, required for electric drives and electromechanical system design in accordance to approved written work instructions • Draft electric drives and electromechanical system design to fulfil control requirements in accordance with ISO symbols • Design electric drives and electromechanical systems in accordance with control requirements and established organizational procedures • Check completed circuit diagram to ensure that it meets control requirements • Make amendments, if any, to completed circuit to meet control requirements • Prepare parts list of all components used in electric drives and electromechanical and systems upon successful completion of circuit • Put on appropriate personal protective equipment in accordance to organisational procedures • Select required electric drives, electromechanical system and test equipment identified in accordance to completed circuit diagram • Connect electric drives, electromechanical system and test equipment in accordance to specification of completed circuit diagram and approved written work instructions • Activate and test electric drives and electromechanical and systems in accordance with established organizational procedures including ensuring that design sequence meet control requirement

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	<ul style="list-style-type: none"> • Carry out required modifications to electric drives and electromechanical and systems, when necessary, to ensure that • control requirements are met • Carry out all connections and testing in accordance with industrial health and safety procedures • Record testing results of electric drives and electromechanical and • systems in appropriate document • Shutdown electric drives and electromechanical systems properly in accordance with established organizational procedures • Disconnect electric drives, electromechanical system devices and test equipment and return to allocated storage area • Maintain tools and equipment after use and return them for storage, in accordance with organisational procedures • Submit completed circuit diagram, parts list and control requirements to supervisor • Label, isolate and report clearly any faulty component or device identified during work activity to supervisor in accordance with established organizational procedures • Dispose waste material in accordance to environmental, health and safety requirements • Maintain workstation in accordance to organisational housekeeping procedure
<p>Innovation and Value Creation</p> <p><i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Review existing processes to meet industrial requirements to assess areas of potential value add
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Obtain details of given control requirements for designing electric drives and electromechanical and systems from supervisor, including checking types and details of control requirements • Clarify with supervisor the details of control sequence based on given control requirements • Seek guidance or supervision from supervisor, when preparation of work activities cannot be fully completed, in accordance to approved written work instructions • Submit design of completed circuit diagram to supervisor for verification • Seek guidance or supervision from supervisor, when completed circuit

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	<p>does not meet control requirements or problems identified which cannot be resolved, in accordance to approved written work instructions</p> <ul style="list-style-type: none"> • Seek guidance or supervision from supervisor, when testing of electric drives and electromechanical and systems cannot be fully completed, in accordance to approved written work instructions • Seek guidance or supervision from supervisor, when reinstatement of work area, shutting down electric drives and electromechanical and systems cannot be fully completed, in accordance to approved written work instructions
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve own self within and outside of own area of work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Engage in self-reflection to explore alternative techniques to best meet requirements
<p>Range of Application</p> <p>(where applicable)</p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	<p>Rules and regulations must include:</p> <ul style="list-style-type: none"> • Relevant process control system standards • Quality procedures and applicable procedures • Environmental legislations and regulations • Workplace Safety and Health Act

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Skill Code	PRE-TED-4009-1	Skill Category	Technical and Engineering Design
		Skill Sub-Category <i>(where applicable)</i>	Machinery and Systems
Skill Title	Design for Manufacture and Assembly		
Skill Description	This skill describes the ability to apply principles and techniques to design for ease of assembly in manufacturing.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Product and process design or easy assembly • Manual assembly design • Assembly systems design • Principles of design for assembly • Role and importance of rules for ease of assembly 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Design product and process for easy assembly • Design for manual assembly • Design for assembly systems • Assessing a given product for ease of assembly 		
Innovation and Value Creation <i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Review existing processes to meet industrial requirements to assess areas of potential value add 		
Social Intelligence and Ethics <i>It refers to the ability to use affective</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Communicate with colleagues and team to assist in establishing timelines and requirements 		

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<i>factors in leadership, relationship and diversity management guided by professional codes of ethics.</i>	
Learning to Learn <i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i>	The ability to: <ul style="list-style-type: none"> • Engage in self-reflection to explore alternative techniques to best meet requirements
Range of Application (where applicable) <i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i>	<ul style="list-style-type: none"> • Underlying principles and rules for manufacturing a high quality, cost-effective product

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Skill Code	PRE-TED-4010-1	Skill Category	Technical and Engineering Design
		Skill Sub-Category <i>(where applicable)</i>	Machinery and Systems
Skill Title	Design Mechanism Unit of Machine		
Skill Description	This skill describes the ability to apply fundamental knowledge of engineering drawing and design. It also includes the approach of project initialisation, designing and selecting of machine parts and elements using CAD (Computer-Aided Design) and engineering design techniques, to accomplish a design task and desired function and build parametric models of parts and assemblies for a range of industrial applications within the precision engineering arena and will be able to apply them to the workplace.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Essential stage of the design process • Functional requirement of the design • Fundamentals of machine mechanisms • Association between the assembly drawing, detail drawing and BOM (Bill of material) • Surface roughness obtainable from manufacturing processes • Limits and Fits • Hole Basis and Shaft Basis of tolerance • Application of GD and T (Geometric Dimensioning and Tolerancing) to engineering drawings • Tolerance stacking analysis • Machine elements selection in machine design • Principle of installation of the selected machine elements • Basic part modelling • Basic assembly modelling • Engineering drawings detailing 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Produce the statement of functions and design requirements for a device in accordance with machine specifications • Identify the machine mechanisms according to the design specifications • Identify geometric features of engineering drawings. • Interpret the types of dimensioning applied on components • Identify the datum references applied on components • Interpret the dimension limits applied on components 		

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	<ul style="list-style-type: none"> • Interpret the surface sign and finish applied on components • Interpret the basis and class of fit applied on components • Size out appropriate machine elements to accomplish a desired design • Produce the parametric models of parts in accordance with the assignment specifications • Produce the parametric models of assemblies in accordance with the assignment specifications • Produce the engineering drawings from the models of parts and assemblies with appropriate presentations in accordance with the assignment specifications
<p>Innovation and Value Creation</p> <p><i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Interpretation of technical drawing sheets and apply them • Interpretation of data sheets from commercial catalogues • Apply the relevant technical information from the technical manuals of the machine element into the engineering design • Apply the principle of installation of the selected machine elements into the engineering design
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Communicate with colleagues and team to assist in establishing timelines and requirements
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Identify sources of standard machine components
<p>Range of Application</p> <p>(where applicable)</p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	<p>Tools and equipment must include:</p> <ul style="list-style-type: none"> • Tools, equipment and material • Machine design specifications • Fundamentals of machine's mechanisms • Use of standards for limits and fits • Geometric features of engineering drawings • Orthogonal representations of drawings

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	<ul style="list-style-type: none">• Dimensioning applied on components• Datum references applied on components• Classification of tolerance• Surface and finish applied for machining of material• Basis of fit• Class of fit <p>Rules and regulations must include:</p> <ul style="list-style-type: none">• Workplace Safety and Health Act
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Skill Code	PRE-PMP-4028-1	Skill Category	Precision Manufacturing Processes
		Skill Sub-Category <i>(where applicable)</i>	Machining Processes
Skill Title	Apply Mechanical Fixtures Design		
Skill Description	This skill describes the ability to design or draw a Mechanical Design Fixture Assembly for manufacturing including designing locators, clamps, jig and fixtures.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Fundamentals of jigs and fixtures design • Design of locators including supporting and locating principles • Design of clamps including clamping and work holding principles • Jig design, rules and considerations and function of jig bushes. • Design of fixture , rules and considerations and fixture design process • Modular construction of jigs and fixtures and application of modular fixture design • Types and elements of modular fixtures • Principles of clamping • Positioning of clamps • Consultation process in laboratory assignments • Manufacturing design assembly for a simple component drawing 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Identify datum or reference surfaces to be used as location features for jigs and fixtures design • Distinguish between a jig and fixture as a work holding device • Design locators by drawing the 6 or 12 degree of movements of a free body • Generate 3-2-1 or 4-2-1 principle of locations to constraint a free body movements • Sketch the application of locating pins and buttons through examples including selecting <ul style="list-style-type: none"> ○ appropriate type of clamping method for work holding applying the basic rules for successful work holding ○ jig bushes available to design a jig applying important considerations for jig design ○ modular fixture and the typical design process for the design of a fixture, including their advantage and disadvantages 		

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	<ul style="list-style-type: none"> • Write the requirements for locking elements • Recognise the position of clamps • Produce mechanical fixture design assembly drawings
<p>Innovation and Value Creation</p> <p><i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Review existing processes to meet industrial requirements to assess areas of potential value add
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Communicate with colleagues and team to assist in establishing timelines and requirements
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Learn the principles and methodologies in evaluating design • Understand, evaluate and compute the engineering drawings
<p>Range of Application</p> <p>(where applicable)</p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	<ul style="list-style-type: none"> • Tooling engineering - mechanical fixtures and jig design for work holding • Engineering drawing • Design for assembly and manufacturing • Computer-aided Design (CAD) - 3D solid part and assembly modelling <p>Rules and regulations must include:</p> <ul style="list-style-type: none"> • Workplace Safety and Health Act

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Skill Code	PRE-PMP-4029-1	Skill Category	Precision Manufacturing Processes
		Skill Sub-Category <i>(where applicable)</i>	Machining Processes
Skill Title	Apply Mould Design		
Skill Description	This skill describes the ability to apply principles and techniques to select and design plastic injection moulds. It also includes required knowledge in mould parting lines, gates, ejection, temperature control and calculations, advanced mould temperature control methods, selection of mould materials, standard components and moulding machines.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Different types of mould parting lines, gates and ejection • Mould shrinkage factor and calculations • Number of cavities calculation and different types of mould layouts • Drafting mould assembly views and their objectives • Classification and quantifying of mould components • Methods of constructing tandem moulds • Salient features of micro mould • Salient features of liquid silicone rubber mould 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Define parting line, gate and ejection for part model • Apply mould shrinkage to part model • Select number of cavities and cavity layout for mould • Design mould parting using CAD application • Select and construct mould base • Design mould temperature control method • Select standard components for mould • Select mould plate and insert materials • Generate general assembly drawing • Complete bill of materials for mould assembly • Apply hot runner mould design concept • Apply unscrewing mould design concept • Apply tandem mould design concept • Assess and apply micro mould design concept • Apply liquid silicone rubber mould design concept 		

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<p>Innovation and Value Creation</p> <p><i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> Describe the strengths and weaknesses of the mould design
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> Verify selection made with Supervisor or Manager to ensure it is within organisational procedure Verify sources for mould standard components and cost considerations for optimal usage
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> Different types of mould parting methods Different types of mould bases and their function Different types of mould temperature control methods and their effectiveness Different types of mould materials and their processing Different types of hot runner components Different methods used for unscrewing in moulds
<p>Range of Application</p> <p>(where applicable)</p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	<p>Tools and equipment must include:</p> <ul style="list-style-type: none"> Operational manual Technical manual and instructions Relevant CAD software <p>Procedures and supporting documents must include:</p> <ul style="list-style-type: none"> Organisational processes and procedures <p>Rules and regulations must include:</p> <ul style="list-style-type: none"> Workplace Safety and Health standards

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Skill Code	PRE-PMP-4030-1	Skill Category	Precision Manufacturing Processes
		Skill Sub-Category <i>(where applicable)</i>	Machining Processes
Skill Title	Apply Precision Machining		
Skill Description	This skill describes the ability to use CAD modelling with CNC processes to machine components. It also includes knowing multiple and various machining processes.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • 2D drafting with CAD • 3D modelling with CAD • Metal machining • Dimensional tolerances and surface finishes • Machinability of common materials • Programming of machining operations with CAM • CNC turning processes • CNC machining centre processes • Electrical discharge machining process • Wire cutting electrical discharge machining process • High speed machining technology • Multi-axis machining processes • Process planning 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Generate CNC turning processes to machine a component • Generate CNC milling processes to machine components • Identify appropriate machines and processes to manufacture components • Execute part programs on CNC machines to produce components 		
Innovation and Value Creation <i>It refers to the ability to generate purposive ideas to improve work performance and/or</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Review existing processes to meet industrial requirements to assess areas of potential value add 		

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<i>enhance business values that are aligned to organisational goals.</i>	
Social Intelligence and Ethics <i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i>	The ability to: <ul style="list-style-type: none"> • Collaborate with colleagues to seek opinions on workplace performance improvement after implementation
Learning to Learn <i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i>	The ability to: <ul style="list-style-type: none"> • Engage in reflective practice to evaluate the feasibility of identified methods
Range of Application (where applicable) <i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i>	<p>Precision Machining – machine and tool set-up must include:</p> <ul style="list-style-type: none"> • CNC machining centre • CNC turning centre • Electrical discharge machine • Wire-cut electrical discharge machine • High speed milling machine • 5-axis machine <p>Tools and equipment must include:</p> <ul style="list-style-type: none"> • CAD/CAM system • CNC turning machine • CNC machining centre • Precision measuring instruments • CAD/CAM applications • CNC machine controllers <p>Procedures and supporting documents must include:</p> <ul style="list-style-type: none"> • Work instructions CAD/CAM manuals • Machine Manuals <p>Rules and Regulations must include:</p>

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	<ul style="list-style-type: none">• Workplace Safety And health Act
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Skill Code	PRE-PMP-4031-1	Skill Category	Precision Manufacturing Processes
		Skill Sub-Category <i>(where applicable)</i>	Forming Processes
Skill Title	Apply Polymer Materials Technology		
Skill Description	This skill describes the ability to identify different types of polymer materials, make appropriate selection and applications of commodity and engineering polymers. It also includes determining the tensile property, melt flow index, heat deflection and thermal properties of polymer materials.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Polymerisation process • Effect of molecular weight on material properties • Polymer structure • Morphology of thermoplastic materials • Viscosity of polymer material • Effect of temperature and strain rate on the tensile and impact properties of polymer materials • Differences between commodity and engineering polymers • Types of additives used in the plastics industry • Applications of fillers and fibers to thermoplastic materials • Procedure to conduct tensile, melt flow index, heat deflection and thermal • properties of polymer materials 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Identify and explain the two main polymerisation methods to create polymer chains • Report the effect of molecular weight on material properties • Explain how the polymer structure can affect the material's properties • Explain the two basic morphology of thermoplastic materials • Explain the important factors that affect the viscosity of material • Explain the effect of temperature and strain rate on the tensile and impact • Properties of polymer materials • Explain the differences between a commodity and engineering polymers • Check and list the main types of additives used in the plastics industry 		

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	<ul style="list-style-type: none"> • Explain the changes in properties associated with adding fillers and fibres to thermoplastic materials • Review and demonstrate the procedure to conduct tensile, melt flow index, heat deflection and thermal properties of polymer materials
<p>Innovation and Value Creation</p> <p><i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Review existing processes to meet industrial requirements to assess areas of potential value add
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Communicate with colleagues and team to assist in establishing timelines and requirements
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Engage in self-reflection to explore alternative techniques to best meet requirements
<p>Range of Application</p> <p>(where applicable)</p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	<ul style="list-style-type: none"> • Types of polymerisation processes • Effect of polymer structure, molecular weight and morphology on the properties of polymer materials • Effect of temperature and strain rate on the mechanical properties of polymer materials • Applications of additives, fillers and fibres • Material testing such as tensile, melt flow index, heat deflection temperature and thermal properties of polymer materials <p>Tools and equipment must include:</p> <ul style="list-style-type: none"> • Operational manuals • Technical manual and instructions

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	<ul style="list-style-type: none">• Repair and maintenance tools• Relevant plastics material testing equipment and supporting software <p>Rules and regulations must include:</p> <ul style="list-style-type: none">• Workplace Safety and Health Act
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Skill Code	PRE-PMP-4032-1	Skill Category	Precision Manufacturing Processes
		Skill Sub-Category <i>(where applicable)</i>	Forming Processes
Skill Title	Perform Advanced Polymer and Polymer Composites Processing		
Skill Description	This skill describes the ability to prepare and setup for advanced thermoplastic polymer and polymer composite processing techniques, thermoset polymer processing techniques and CAE simulation of injection moulding process and evaluating results.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Techniques of polymer and polymer composite processing • Principles of precision injection moulding processes • Principles of twin screw extrusion process • Processing factors affecting good mould replication for micro feature component • Processing factors affecting good mould replication for biomedical micro component • Processing factors affecting compounding of short-fibre reinforced thermoplastic composite • Techniques of basic thermoset composite processing • Principles of thermoset processing • Methods for defect minimisation during thermoset processing • Application of specialty materials for thermoset composite processing • Principles of fabrication for thermoset fibre reinforced composite laminates from fibre-only preforms • Principles of finite element method for polymer flow analysis • Application of finite element in mould flow analysis and associated software 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Prepare polymers and composites for processing • Setup process for compounding and moulding • Apply specialty materials and processing principles for processing of thermoset composite laminates from fibre only preforms 		

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<p>Innovation and Value Creation</p> <p><i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Evaluate simulation techniques in moulding • Review gating, runner system and cooling design 		
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Report the function and correct application of specialty tooling and materials used in the processing of thermoset composite laminates from pre-impregnates 		
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Interpretation and analysis of simulation result • FEA modelling, mesh manipulation and result interpretation 		
<p>Range of Application (where applicable)</p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	<ul style="list-style-type: none"> • Preparing polymers and composites for processing • Setting up process for compounding and moulding • Function and correct application of specialty tooling and materials used in the processing of thermoset composites laminates from pre-impregnates • Applying specialty materials and applying processing principles for processing of thermoset composite laminates • Evaluating simulation techniques in moulding • Gating, runner system and cooling design review • Polymer moulding processes • Melt viscosity related issues • Twin screw compounding <p>Rules and regulations must include:</p> <ul style="list-style-type: none"> • Workplace Safety and Health Act 		
Skill Code	PRE-PMP-4033-1	Skill Category	Precision Manufacturing

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			Processes
		Skill Sub-Category <i>(where applicable)</i>	Finishing Processes
Skill Title	Apply Cleaning Technologies		
Skill Description	This skill describes the ability to apply the fundamentals of cleaning processes, cleaning technologies, key considerations, testing and validation methods.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Identify types, sources and impact of contaminants • Different processes for cleaning • Types of technologies and process methods • Factors affecting process efficiency • Types of validation methods • Develop a technical specification 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Identify different types of contaminants • Identify suitable cleaning technologies and processes for own application • Develop a specification to define cleanliness requirement and communicate effectively with vendors/ specialist • Identify relevant testing methods for cleanliness 		
Innovation and Value Creation <i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Contribute ideas to evaluate potential risks at the workplace • Review the adequacy of cleaning processes in proposed solutions by suppliers 		
Social Intelligence and Ethics <i>It refers to the ability to use affective factors in leadership,</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Convey required specification for cleaning to suppliers • Review the adequacy of cleaning processes in proposed solutions by 		

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<i>relationship and diversity management guided by professional codes of ethics.</i>	suppliers
Learning to Learn <i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i>	The ability to: <ul style="list-style-type: none"> • Recognise maintenance providers (internal and external) • Make proper modification to the work schedule plan based on experience and completed documentation
Range of Application (where applicable) <i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i>	<p>Tools and equipment must include:</p> <ul style="list-style-type: none"> • Manufacturers for metal, plastics components • Assembly of products in cleanroom or controlled environment <p>Procedures and supporting documents must include:</p> <ul style="list-style-type: none"> • Appropriate work documents • Work instructions • Organisation work procedures and specifications <p>Rules and regulations must include:</p> <ul style="list-style-type: none"> • Workplace Safety and Health Act • State or country legislative requirements and relevant regulations

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Skill Code	PRE-PMP-4034-1	Skill Category	Precision Manufacturing Processes
		Skill Sub-Category <i>(where applicable)</i>	Finishing Processes
Skill Title	Perform Protective Coating Inspection		
Skill Description	This skill describes the ability to inspect industrial and marine coatings to a level that is recognized and accepted by all national and international oil, gas and civil engineering companies. It also includes carrying out inspection procedures for protective coatings, assess quality of finished protective coatings, keep records in accordance with client requirements and demonstrate sound theoretical background knowledge of protective coating inspection at the indicated level.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Personnel protective equipment in different types of working environments • Materials Safety Data Sheets (MSDS) of materials used in protective coatings • Fundamentals of electro-chemical corrosion • Methods of corrosion control using organic coatings, metallic coatings, cathodic protection, corrosion inhibitors and metal cladding • Methods of preparation of substrate surface • Types of abrasives • Surface profiles on substrates • Inspection of prepared surfaces including instrument designs, operating principles, capabilities and safety requirements • Surface contaminants and the tests for their detection • Levels of cleanliness from substrate surface contamination by different surface preparation processes • Effects of weather and environmental conditions on coating application and finished quality • Weather conditions • Basic paint constituents and their characteristics • Manufacture of paints • Mixing of paints • Forms of paints • Characteristics of organic paint systems • Drying and curing of paint films • Metallic coatings • Types of coating inspection instruments and their operating principles • Requirements of project specifications, codes and practices 		

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	<ul style="list-style-type: none"> • Significance of coating manufacturers' product specifications and recommendations • Principles of quality assurance and quality control • WSH requirements in coating inspection • Surface profile measurement and assessment of profile of substrate surface • Rust grading in accordance with SS 05-59-00 and BS 7079 • Grading of abrasives for blast cleaning, wire brushing and flame cleaning in accordance with SS 05-59-00 and BS 7079 • Surface preparation methods • Colour grading according to BS 4800 • Conditions of application of paints • Methods of application of paints • Correct use and calibration of coating inspection instruments • Measurement of wet and dry paint coating thicknesses • Relationships between volume solid, wet film thickness and dry film thickness • Estimation of quantity of materials and man-hours for preparation and coating application • Paint and paint film testing in accordance with BS 3900 • Requirements of protective coating systems for different substrate surfaces and environmental conditions • Operational process steps in the application of protective coatings for different substrates • Visual and investigative inspection on completed coatings projects • Inspection procedures for new painting (on original substrate) • Inspection procedures for maintenance painting • Criteria of finished quality of paints • Types of common coating faults as listed in BS 2015 and their causes • Identification of contractor malpractices • Essential data of a protective coating inspection report • Inspection anomalies and repeated deviations from specifications and standards • Compilation of surface preparation, painting operations and inspection records • Work documentation and record maintenance • Traceability of records • Maintenance of tools, equipment and workstation
<p>Application and Adaptation</p> <p><i>It refers to the ability to perform the work tasks and activities required of the</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Prepare for inspection of protective coatings • Carry out inspection of protective coatings • Report inspection results • Carry out post-inspection activities

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<i>occupation, and the ability to react to and manage the changes at work.</i>	
Innovation and Value Creation <i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Review existing processes to meet industrial requirements to assess areas of potential value add
Social Intelligence and Ethics <i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Compliance with coating manufacturers' recommendations and requirements of project • specifications, codes and practices • Coordination of quality assurance, quality control and inspection procedures, Site meeting attendance • Frequency and type of inspection reports (daily, weekly and progress summary)
Learning to Learn <i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Engage in self-reflection to explore alternative techniques to best meet requirements
Range of Application (where applicable) <i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i>	<p>Procedures and supporting documents must include:</p> <ul style="list-style-type: none"> • Relevant reference coating inspection standards, codes and documents used in industry methodologies <p>Rules and regulations must include:</p> <ul style="list-style-type: none"> • Regulatory or legislative frameworks

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Skill Code	PRE-PMP-4035-1	Skill Category	Precision Manufacturing Processes
		Skill Sub-Category <i>(where applicable)</i>	Sub-Assembly and Final Assembly Processes
Skill Title	Apply Assembly of Mechanical Machines		
Skill Description	This skill describes the ability to apply knowledge and application skills needed in performing assembly skills by using the appropriate hand tools, measuring instruments and optical instruments. It also includes carrying out housekeeping of the work area.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Importance of work instructions • Types of assembly tasks • Types of assembly methods • Types of tools, instruments and materials • Use of tools, instruments and materials • Handling of materials • Handling of faulty or unsafe tools and instruments procedures • Cleaning methods • Cleaning agents • Importance of cleaning tools and instruments • Importance of returning tools, instruments and materials • Handling of worn out tools and instrument procedures • Importance of clearing the waste 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Prepare tools, instruments and materials in accordance with types of tasks to be performed • Check tools, instruments and materials for working conditions before commencement of tasks • Setup the work area with appropriate tools, instruments and materials in accordance with types of tasks to be performed • Handle faulty or unsafe tools and instruments in accordance with organisational procedures • Select the appropriate tools, instruments and materials according to the defined task • Use appropriate tools and instruments to assemble the required materials for the task • Use tools and instruments without causing damage to the materials 		

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	<p>during assembly</p> <ul style="list-style-type: none"> • Use tools and instruments to complete the required task in accordance with work Instructions • Use tools and instruments safely in accordance with workplace safety and health requirements • Clean tools and instruments using appropriate cleaning agent and method • Inspect tools and instruments for worn out or damaged after use • Return tools, instruments and materials to its designated location • Clear waste upon completion of work activities in accordance with organisational procedures
<p>Innovation and Value Creation</p> <p><i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Review existing processes to meet industrial requirements to assess areas of potential value add
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Check the tasks to be performed against work instructions • Handle worn out tools and instruments in accordance with organisational procedures and seeking clearance with appropriate personnel
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Engage in self-reflection to explore alternative techniques to best meet requirements
<p>Range of Application</p> <p>(where applicable)</p> <p><i>It refers to the critical circumstances and contexts that the skill may be</i></p>	<ul style="list-style-type: none"> • Preparatory work • Product assembly tasks • Housekeeping activities • Materials, tools and instruments

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<i>demonstrated.</i>	<p>Rules and regulations must include:</p> <ul style="list-style-type: none">• Workplace Safety and Health Act• International standards• Quality procedures• Risk management procedures and legislation• Relevant design standards• Environmental legislation and regulations
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Skill Code	PRE-PMP-4036-1	Skill Category	Precision Manufacturing Processes
		Skill Sub-Category <i>(where applicable)</i>	Sub-Assembly and Final Assembly Processes
Skill Title	Apply Sensors and Actuators in Automation		
Skill Description	This skill describes the ability to identify, model, select, operate, and integrate a wide variety of sensors and actuators. It also includes practical considerations, design issues, and industrial techniques from introductory material to more advanced theory and concepts.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • The underlying concepts pertaining to performance specification and analysis, • Implementation of the commonly adopted component interconnection and signal conditioning concepts, • Application of analog sensors and transducers: • Application of the digital transducers • Development of actuator networks 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Execute performance specification and analysis of sensors and actuators for real life applications. • Utilise the commonly adopted component interconnection and signal conditioning principles in automation industry. • Apply analog sensors and transducers to solve real world control problems. • Apply digital transducers to solve real world control problems. • Develop actuators networks with stepper and continuous drive actuators 		
Innovation and Value Creation <i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Review existing processes to meet industrial requirements to assess areas of potential value add 		

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<i>organisational goals.</i>	
Social Intelligence and Ethics <i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Communicate with colleagues and team to assist in establishing timelines and requirements
Learning to Learn <i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Engage in self-reflection to explore alternative techniques to best meet requirements
Range of Application (where applicable) <i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i>	<ul style="list-style-type: none"> • Performance specification and analysis • Component interconnection and signal conditioning • Analogue sensors and transducers • Digital transducers • Steeper motors • Continuous drive actuators

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Skill Code	PRE-PMP-4037-1	Skill Category	Precision Manufacturing Processes
		Skill Sub-Category <i>(where applicable)</i>	Production Shop Floor Optimisation
Skill Title	Implement Engineering Activities and Processes		
Skill Description	This skill describes the ability to implement and facilitate an organisation's engineering activities and processes. It also includes handling and implementing process improvement, promoting team support and coaching team members towards implementation process improvement.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Organisational engineering goals • Ability to achieve organisational goals and targets • Apply organisation's engineering systems, tools, techniques, systems and processes • Ability to gather information for implementation of engineering activities and processes, identify candidates, assess operator feedback and suggestions for improvement opportunities • Ability to determine the benefits and challenges of implementation • Ability to apply organisation's engineering systems, tools, techniques, systems and processes • Conducting change management tools and practices • Ability to identify organisation's engineering target, plan the goals for the target, and document the change required • Know how to communicate the processes up and down and apply the implementation process to the target, assess effectiveness statistics • Conducting comparison techniques 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Interpret objectives of engineering activities and processes • Discuss and direct implementation activities • Manage systems and processes to facilitate implementation • Monitor and evaluate implementation and improvement processes. 		
Innovation and Value Creation	<p>The ability to:</p> <ul style="list-style-type: none"> • Use technology tools to monitor and disseminate implementation goals 		

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<p><i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</i></p>	<p>and review organisation's planning and operations against those goals.</p>
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Establish and facilitate systems for active participation of Teams and individuals in implementation of processes are design • Design and communicate organisation's engineering activities and processes to relevant teams/individuals • Communicate implementation goals to senior management for review • Use organisation's systems for recording and reporting on implementation processes and activities • Ability to seek and obtain approval for the implementation plan
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Engage in self-reflection to explore alternative techniques to best meet requirements
<p>Range of Application</p> <p>(where applicable)</p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	<p>Procedures and supporting documents must include:</p> <ul style="list-style-type: none"> • Organisational structure, functions, resources, policies, procedures and culture • Internal and external benchmarking and best practice principles and practices • Quality assurance and control approaches <p>Rules and regulations must include:</p> <ul style="list-style-type: none"> • Workplace safety and health act • Legislation applicable to production processes

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Skill Code	PRE-QUA-4011-1	Skill Category	Quality
		Skill Sub-Category <i>(where applicable)</i>	N/A
Skill Title	Apply Measurement Metrology in Quality Assurance		
Skill Description	This skill describes the ability to use precision metrology equipment and measuring techniques. It also includes interpreting and measuring geometric dimensioning and tolerancing (GD&T), symbols indicated on a manufacturing drawing, statistical process control and its applications.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	The ability to understand: <ul style="list-style-type: none"> • Metrology standards and terminologies • Types of measuring errors • Interpretation of geometric dimensioning and tolerancing (GD&T) • Methods of inspection using coordinate measuring machine (CMM) • Measurement of roundness • Measurement of surface texture • Basic statistical methods • Process capability index 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	The ability to: <ul style="list-style-type: none"> • Define metrology standards for length measurement • Interpret measurement terminologies for the field of calibration and measurement • Identify and analyse types of measuring errors for evaluation of calibration and measurement capabilities • Interpret and measure geometric, dimensioning and tolerancing symbols on a drawing for the measurement of a product for conformity • Perform layout inspection using a coordinate measuring machine for product conformity • Measure and analyse a cylindrical part using a roundness measuring machine for verification of product quality • Measure surface finish of a part for verification of the surface conformity and its applications • Document a process using basic statistical methods for measurement report and record of QA department • Document process capability index for record and present to customer and QA department 		

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<p>Innovation and Value Creation</p> <p><i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> Review existing processes to meet industrial requirements to assess areas of potential value add
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> Communicate with colleagues and team to assist in establishing timelines and requirements
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> Grasp the basic principles and methodologies of Metrology
<p>Range of Application</p> <p>(where applicable)</p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	<ul style="list-style-type: none"> Metrology standards and terminologies Types of measuring errors Geometric dimensioning and tolerancing (GD&T) Coordinate Measuring Machine (CMM) Measurement of roundness Surface texture measurements Basic statistical methods Process capability index errors in precision measurement <p>Rules and regulations must include:</p> <ul style="list-style-type: none"> Workplace Safety and Health Act

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Skill Code	PRE-AMA-4001-1	Skill Category	Additive Manufacturing
		Skill Sub-Category <i>(where applicable)</i>	N/A
Skill Title	Apply Additive Manufacturing Technology		
Skill Description	This skill describes the ability to apply additive manufacturing (AM) and 3D printing including the concept and applications of various additive manufacturing processes and techniques. It also includes overview of commercially available AM processes for the fabrication of metal and plastic components in the prototype and production environments.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Basics of additive manufacturing technologies • Classifications of additive manufacturing • Additive manufacturing operations • Techniques of additive manufacturing • Build requirements in rapid prototyping technologies • Techniques of rapid tooling 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Identify basic additive manufacturing techniques for various industrial applications • Classify additive manufacturing processes for product specifications and functions • Relate additive manufacturing operations for various RP machines • Identify additive manufacturing techniques for product specifications and functions • Evaluate build requirements for additive manufacturing processes during part design and geometries • Review rapid tooling techniques 		
Innovation and Value Creation <i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Review existing processes to meet industrial requirements to assess areas of potential value add 		

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<i>aligned to organisational goals.</i>	
Social Intelligence and Ethics <i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i>	The ability to: <ul style="list-style-type: none"> • Communicate with colleagues and team to assist in establishing timelines and requirements
Learning to Learn <i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i>	The ability to: <ul style="list-style-type: none"> • Engage in self-reflection to explore alternative techniques to best meet requirements
Range of Application (where applicable) <i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i>	<ul style="list-style-type: none"> • Basic additive manufacturing techniques • Additive manufacturing classification • Additive manufacturing operations • Techniques of additive manufacturing • Build requirement in rapid prototyping technology • Rapid tooling techniques <p>Rules and Regulations:</p> <ul style="list-style-type: none"> • Workplace Safety and Health Act

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Skill Code	PRE-LOP-4001-1	Skill Category	Laser and Optics
		Skill Sub-Category <i>(where applicable)</i>	N/A
Skill Title	Apply Laser Machine Technology		
Skill Description	This skill describes the ability to apply knowledge and application skills to design and measure supply chain in term of greenness by using green supply chain reference model and based on relevant standards. It also includes the fundamentals of laser technology, examining the laser hazards, and the safety measures required in an industrial workplace, understanding of laser beam to material interactions through heat transfer, which can be applied to common laser processes such as cutting, drilling, and marking.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Basic principles and knowledge of laser technologies • Properties of laser beam • Components in a laser system • Function of various optical components • Capabilities of the different types of lasers • Laser hazards and corresponding safety measures in the workplace • Basic heat transfer in laser processes • Mathematical calculations for the laser process • Laser selection criteria for the different processes and materials • Effects of laser parameters • Mechanisms of material removal in a laser process • Understand the cause of potential defects 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Identify common laser hazards as per set procedure • Identify personal protective equipment and implement appropriate safety measures • Select an appropriate laser to perform the necessary function as per set procedure • Use CAD and CAM to design and convert file for laser processing as per set procedure • Setup laser processing head as per set procedure • Select and adjust processing parameters to perform laser processing as per set procedure 		

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<p>Innovation and Value Creation</p> <p><i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Review existing processes to meet industrial requirements to assess areas of potential value add
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Communicate with colleagues and team to assist in establishing timelines and requirements
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Engage in self-reflection to explore alternative techniques to best meet requirements
<p>Range of Application (where applicable)</p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	<ul style="list-style-type: none"> • Manufacturing and production • Product design and development • Research and development • Use of tools and equipment • Use of CAD/CAM software <p>Rules and regulations must include:</p> <ul style="list-style-type: none"> • Workplace Safety and Health Act • Laboratory regulations

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Skill Code	PRE-RAU-4001-1	Skill Category	Robotics and Automation
		Skill Sub-Category <i>(where applicable)</i>	N/A
Skill Title	Apply Robotics Fundamentals		
Skill Description	This skill describes the ability to understand and apply robots and robotics systems. It also includes developments in robotics systems and their applications, robotics mechanisms, kinematics, path and trajectory planning and robotics programming.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • The definition, classification and history of robots, the social and economic issue for robots and the trends for robotics in different applications • Robot components, degree of freedom, joints, coordinates, reference frames and workspace; • Principles for the path and trajectory planning, design point-to-point motion planning; • Programming skills of robots 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Select appropriate robots based on the mechanisms and applications; • Determine the direct kinematics transfer and the work space of robots. • Design appropriate path and trajectory for manufacturing robots. • Program robots for point-to-point movement and path following. 		
Innovation and Value Creation <i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Review existing processes to meet industrial requirements to assess areas of potential value add 		

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<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Communicate with colleagues and team to assist in establishing timelines and requirements
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Engage in self-reflection to explore alternative techniques to best meet requirements
<p>Range of Application</p> <p>(where applicable)</p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	<p>Application of robotics fundamentals in industry must include:</p> <ul style="list-style-type: none"> • Material handling • Material transfer • Machine loading and/or unloading • Spot welding • Continuous arc welding • Spray coating • Assembly • Inspection

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Skill Code	PRE-WSH-2003-1	Skill Category	Workplace Safety and Health
		Skill Sub-Category <i>(where applicable)</i>	N/A
Skill	Apply Workplace Safety and Health Policies		
Skill Description	This skill describes the ability to apply Workplace Safety and Health (WSH) policies to maintain health and safety in the workplace. It also includes the ability to apply basic knowledge and application skills of WSH policies, schedule daily work, identify hazards in accordance to WSH requirements and implement risk controls.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	The ability to understand: <ul style="list-style-type: none"> • Types and interpretation of relevant WSH legislations and relevant industry codes of practice (CP) • Types and usage of Personal Protective Equipment (PPE), safety devices and equipment • Types and interpretation of safety signage • Organisational WSH procedures and Risk Assessment (RA) • Common manufacturing hazards and risk controls • Types of hazards on work area, safety signage, safety devices and equipment • Types of risk control measures • Organisational WSH procedures and WSH legislative requirements 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	The ability to: <ul style="list-style-type: none"> • Establish job and WSH objectives according to work instructions, organisational WSH procedures and policies • Plan work activities to meet WSH requirements • Schedule daily work activities in accordance to organisational WSH procedures • Identify and monitor hazards by conducting WSH checks on work area, safety signage, safety devices and equipment • Carry out risk controls • Follow organisational emergency and evacuation procedures in the event of emergencies or drills • Report any abnormalities and problems encountered in complying with WSH requirements 		

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<p>Innovation and Value Creation</p> <p><i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Contribute ideas to enhance WSH programs • Provide constructive suggestions to apply WSH practices
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Check with designated personnel on risk control measures • Seek appropriate advice for monitoring hazard checks • Cooperate with peers to implement WSH policies
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Undertake appropriate opportunities to learn and develop required work competencies and skills for implementing WSH in workplace • Keep up-to-date on changes to WSH policies
<p>Range of Application</p> <p><i>(where applicable)</i></p> <p><i>It refers to the critical circumstances and</i></p>	<p>Legislative and industrial framework for WSH</p> <p>WSH checks must include:</p> <ul style="list-style-type: none"> • Workplace • Safety tools and equipment

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<i>contexts that the skill may be demonstrated.</i>	<ul style="list-style-type: none">• Safety signage• Personal Protective Equipment (PPE) <p>Type of hazards must include:</p> <ul style="list-style-type: none">• Physical hazards• Chemical hazards• Ergonomics hazards <p>Risk control must include:</p> <ul style="list-style-type: none">• Elimination• Substitution• Engineering controls• Administrative controls• Use of PPE
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Skill Code	PRE-WSH-4004-1	Skill Category	Workplace Safety and Health
		Skill Sub-Category <i>(where applicable)</i>	N/A
Skill	Implement Workplace Safety and Health Systems		
Skill Description	This skill describes the ability to apply Workplace Safety and Health (WSH) procedures and practices to ensure the safety of the production team. It also includes ensuring compliance with standards and supervises the identification of hazards and assessment of risks, application, maintain and review risk control measures.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Common industrial legislation • Environmental legislation • Awareness of The workers responsibility stipulated under the Workplace Safety and Health Act • Role and responsibility of Workplace Safety and Health Committee stipulated under the Workplace Safety and Health (Safety Committee) Regulations • Relevant industry codes of practice (CP) and Singapore Standards (SS) • Workplace Safety and Health Act and its subsidiary legislation • Appropriate PPE • Organisational procedures • Safety Management System (SMS) • Ability to identify and understand Safety Signs and Symbols • Ability to apply the various types of control measures for hazards • Workplace Safety and Health Act and its subsidiary legislation • Ability to understand the workplace procedures for reporting WSH issues to immediate supervisors, Workplace Safety and Health Committee, HR, Workplace Safety and Health Officer • Workplace procedures for contributing and participating in WSH • Analyse typical unsafe working conditions and work practices within industry concerned • Suitable workplace safety and health or environmental control measures in the workplace • Ability to participate in WSH and environmental suggestion scheme in accordance with organisation procedures • Ability to report workplace safety and health or environmental issues to designated personnel according to workplace procedures and relevant 		

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	<p>WSH legislation</p> <ul style="list-style-type: none"> • Ability to review workplace safety and health or environmental issues applicable to own workplace environment
<p>Application and Adaptation</p> <p><i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Supervise the day-to-day performance of workplace safety and health (WSH) activities • Ensure that work is carried out safely in accordance with organisational procedures and legislative requirements • Identify and handle workplace hazards • Ensure compliance to workplace procedures for risk control measures • Monitor and supervise programmes to ensure emergency equipment is correctly used and stored • Oversee incident reporting in accordance with organisational procedures and legislative requirements
<p>Innovation and Value Creation</p> <p><i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Propose improvements to organisational WSH procedures to enhance the organisation's ability to comply with regulatory requirements
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Communicate workplace safety and health (WSH) procedures and risk control measures to the production team
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Identify appropriate training for production team in accordance with organisational and regulatory requirements

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<p><i>improve one's self within and outside of one's area of work.</i></p>	<ul style="list-style-type: none"> • Keep abreast of changes to WSH regulations and other regulatory requirements through legislative forum sharing
<p>Range of Application (where applicable)</p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	<p>Industry Codes of Practice (CP) and Singapore Standards (SS) must include:</p> <ul style="list-style-type: none"> • CP for safety in welding and cutting (and other operations involving the use of heat) • CP for selection, use and maintenance of respiratory protective devices • CP for selection, use, care and maintenance of hearing protectors • SS 217, Specification for industrial safety signs • SS 473, Specification for personal eye-protectors – Part 1: General requirements • SS 473, Specification for personal eye-protectors – Part 2: Selection, use and maintenance • CP 98, Material Safety Data Sheet (Safety Data Sheet) <p>Rules and regulations must include:</p> <ul style="list-style-type: none"> • Occupational Safety and Health Act • Workplace Safety and Health Act • Environmental Management Act • ISO 14000

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Skill Code	PRE-WSH-4005-1	Skill Category	Workplace Safety and Health
		Skill Sub-Category <i>(where applicable)</i>	N/A
Skill Title	Supervise Manufacturing Work for Workplace Safety and Health		
Skill Description	<p>This skill describes the ability to identify common safety and health hazards and take appropriate control measures while working in the metal working or other manufacturing industry. It also includes the ability to identify WSH hazards, evaluate and control risks, carry out WSH inspections, implement WSH training and promotional programmes, conduct accident investigations and prepare reports.</p>		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Importance of Workplace Safety and Health (WSH) • Consequences of unsafe work practices and workplace conditions • Salient WSH legal and other requirements relevant to manufacturing industry • Overview of WSH management system • WSH duties and responsibilities of supervisor in the manufacturing industry • Risk management process • Typical hazards in manufacturing industry • Methods for hazard identification • WSH control measures • 5S housekeeping • Types of organisational WSH inspections • WSH training and promotional programmes • Incident investigation and reporting • Permit-To-Work (PTW) 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Identify WSH hazards, evaluate and control risks in manufacturing industry in accordance with risk management process • Carry out WSH inspections in accordance with organisational inspection procedures • Implement WSH training and promotional programmes in accordance with legal and other organisational requirements • Conduct incident investigation and prepare report in accordance with legal and other organisational requirements 		

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<p>Innovation and Value Creation</p> <p><i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Provide constructive suggestions to evaluate WSH hazards at the workplace • Contribute ideas to improve desired outcomes of process, human and cultural factors and workplace or work-related factors in accordance to legal and organisational requirements
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Identify the unsafe acts or conditions present and recommend corrective actions to management
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Reflect on possible errors in evaluating risks • Keep up-to-date on changes in the Workplace Safety and Health Act
<p>Range of Application</p> <p><i>(where applicable)</i></p> <p><i>It refers to the critical circumstances that the skill may be demonstrated.</i></p>	<p>Tools and equipment must include:</p> <ul style="list-style-type: none"> • Workplace Safety and Health signage • Personal protective equipment <p>Procedures and supporting documents must include:</p> <ul style="list-style-type: none"> • Appropriate work documents • Work instructions • Organisation work procedures and specifications <p>Rules and regulations must include:</p>

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| | <ul style="list-style-type: none">• Workplace Safety and Health Act• Approved codes of practice |
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Skill Code	PRE-WSH-4006-1	Skill Category	Workplace Safety and Health
		Skill Sub-Category <i>(where applicable)</i>	N/A
Skill	Manage Workplace Safety and Health Systems		
Skill Description	This skill describes the ability to apply Workplace Safety and Health (WSH) procedures and practices to ensure the safety of the production teams. It also includes ensuring compliance with standards and managing the identification of hazards and assessment of risks.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Organisational policies and procedures relating to Workplace Safety and Health (WSH) • Personal protective equipment (PPE) • Safety signs and symbols • Industry Codes of Practice (CP) and Singapore Standards (SS) • Rules and regulations • Workplace Safety and Health regulations 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Manage the day-to-day performance of WSH activities • Ensure that work is carried out safely, in accordance with organisational procedures and legislative requirements • Identify and manage workplace hazards • Ensure compliance to workplace procedures for risk control measures • Manage and supervise programmes to ensure emergency equipment is identified, available and maintained • Oversee incident reporting, in accordance with organisational procedures and legislative requirements 		
Innovation and Value Creation <i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Propose improvements to organisational WSH procedures to enhance the organisation's ability to comply with regulatory requirements 		

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<i>aligned to organisational</i>	
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Communicate WSH procedures and risk control measures to the production teams
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Identify appropriate training for production teams, in accordance with organisational and regulatory requirements • Keep abreast of changes to WSH regulations and other regulatory requirements through legislative forum sharing
<p>Range of Application</p> <p>(where applicable)</p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	<p>Industry Codes of Practice (CP) and Singapore Standards (SS) must include:</p> <ul style="list-style-type: none"> • CP for safety in welding and cutting (and other operations involving the use of heat) • CP for selection, use and maintenance of respiratory protective devices • CP for selection, use, care and maintenance of hearing protectors • SS 217, Specification for industrial safety signs • SS 473, Specification for personal eye-protectors – Part 1: General requirements • SS 473, Specification for personal eye-protectors – Part 2: Selection, use and maintenance • CP 98, Material Safety Data Sheet (Safety Data Sheet) <p>Rules and regulations must include:</p> <ul style="list-style-type: none"> • Workplace Safety and Health Act • Environmental Management Act • ISO 14000

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Skill Code	PRE-QUA-3006-1	Skill Category	Quality
		Skill Sub-Category <i>(where applicable)</i>	N/A
Skill	Apply Root Cause Analysis		
Skill Description	This skill describes the ability to systematically identify problems, collect pertinent information to clarify the problems, analyse the root cause(s) and recommend action(s) to resolve the problems. It also includes checking the effectiveness of the action(s) taken and its integration to organisation's overall management system in preventing recurrence of the problems.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Events or symptoms that indicate there is a problem in the workplace • Difference between addressing the symptoms of a problem and tackling its root causes • Root cause analysis method • Definitions of terms used: event, impact, direct causes, contributing causes, root causes, corrective action and preventive action • The principles underlying effective Root Cause Analysis implementation • Method for recognising and clarifying problems in the workplace • Method for analysing causal factors and determining root causes • Difference between Cause and Effect Diagram and Causal Chain Chart • Method for generating corrective actions and preventive actions • Difference between corrective action and preventive action • Criteria for evaluating corrective and preventive actions • Method for evaluating and deciding corrective and preventive actions • Method for reporting root causes and recommending actions to be taken • Method for monitoring the effectiveness of actions taken • Method for sustaining the actions taken • Procedure for implementing root cause analysis in the workplace 		

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<p>Application and Adaptation</p> <p><i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Determine the root cause(s) at the workplace in accordance with root cause analysis method • Carry out root cause analysis and generate corrective and preventive actions using the appropriate tools • Evaluate and decide the corrective and/or preventive action(s) in accordance with root cause analysis method • Report root causes and recommend the corrective and/or preventive action(s) in accordance with organisational procedures • Monitor the effectiveness of actions taken in accordance with organisational procedures • Sustain the corrective and/or preventive action(s) implemented in accordance with organisational procedures • Implement root cause analysis in the workplace in accordance with root cause analysis method
<p>Innovation and Value Creation</p> <p><i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Recommend the corrective and/or preventive action(s) based on findings of factors leading to problems and its root causes in accordance with organisational procedures
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Participate in discussion with team members to clarify and verify analyses of causal factors and determining root causes • Obtain advice when dealing with unknowns to achieve the desired outcome • Record and report reviews according to organisational procedures

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<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Recognise problems at the workplace in accordance with root cause analysis method • Collect pertinent information to clarify the problem using the appropriate tools
<p>Range of Application</p> <p>(where applicable)</p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	<p>Organisational Management Systems</p> <p>Organisational problem-solving and quality improvement procedure</p> <p>Tools and equipment</p> <p>Procedures and supporting documents must include:</p> <ul style="list-style-type: none"> • Report and records review (e.g. Internal audit reports, non-conformity report, safety report, etc) • Compilation of operational data (e.g. Product measurement data, process data, etc) • Questionnaire (e.g. Customer satisfaction survey, face to face interview, etc) • Operations review meetings <p>Rules and regulations must include:</p> <ul style="list-style-type: none"> • Workplace Safety and Health procedures

**SKILLS FRAMEWORK FOR PRECISION ENGINEERING
SKILLS STANDARDS FOR
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Skill Code	PRE-MPI-3006-1	Skill Category	Manufacturing Productivity and Innovation
		Skill Sub-Category <i>(where applicable)</i>	N/A
Skill	Implement Continuous Improvement Processes		
Skill Description	This skill describes the ability to implement and facilitate an organisation's systems and processes relating to continuous improvement and apply them to the workplace. It also includes implementing continuous improvement, promoting team support and coaching team members toward continuous improvement, gathering, accessing and recording production information, analysing and interpreting information, applying improvement tools and strategies, monitoring and evaluating improvement processes.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Organisational continuous improvement goals • Organisational goals and targets • Organisation's continuous improvement systems, tools, techniques, systems and processes • Operator feedback and suggestions for improvement opportunities • Relevant legislation and regulations, especially those relating to Workplace Safety and Health • Organisational structure, functions, resources, policies, procedures and culture • Internal and external benchmarking and best practice principles and practices • Quality assurance/control approaches • CI target • CI goals for the target • Documenting the changes required to incorporate the CI • Communication of the CI processes up and down 		

SKILLS FRAMEWORK FOR PRECISION ENGINEERING
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<p>Application and Adaptation</p> <p><i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Execute plan for improvement in consultation with senior management and supervisors of the target areas • Coach teams/individuals to effectively participate in improvement processes • Form teams and facilitate toward a greater understanding of the continuous improvement goals for the organisation • Develop recommendations and plans for improvements and seek approval for deployment with relevant personnel and improvement teams • Implement savings, productivity and service improvements • implement continuous improvement strategy as planned and monitor the result • Deploy the change in processes or procedures as a result of the continuous improvement • Monitor continuous improvement strategy against the identified bench mark and measures • Use organisation’s systems for monitoring continuous improvement processes and activities • Review the performance improvement before and after the implementation to identify further improvement opportunities • Compare productivity to the previous bench mark for improvement gains and comparisons
<p>Innovation and Value Creation</p> <p><i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Use technology tools to monitor and disseminate continuous improvement goals and review organisation’s planning and operations against those goals • Identify and prioritise opportunities for improvements in order to select the best possible targets for application of improvement effort, in accordance with organisational procedures

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<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Establish and facilitate systems for active participation of teams/individuals in continuous improvement processes • Communicate organisation’s continuous improvement processes to relevant teams/individuals • Seek and obtain approval for the CI plan
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one’s self within and outside of one’s area of work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Undertake appropriate opportunities to learn and develop required work competencies and quality skills for continuous improvement
<p>Range of Application</p> <p><i>(where applicable)</i></p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	<p>Procedures and supporting documents must include:</p> <ul style="list-style-type: none"> • Work Improvement activities • Key Performance Indicators (KPIs) • Continuous process improvement techniques • Data collection and analysis techniques • Control mechanisms <p>Rules and regulations must include:</p> <ul style="list-style-type: none"> • Relevant industry codes of practice • Workplace Safety and Health procedures

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Skill Code	PRE-MPI-4008-1	Skill Category	Manufacturing Productivity and Innovation
		Skill Sub-Category <i>(where applicable)</i>	N/A
Skill	Manage Continuous Improvement		
Skill Description	This skill describes the ability to manage, implement and facilitate an organisation's systems and processes relating to continuous improvement. It also includes application of the organisation's systems and processes to the workplace.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Identification of improvement opportunities • Direct continuous improvement activities • Management of systems and processes to facilitate continued improvement • Monitoring and evaluation of improvement processes 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Manage and implement continuous improvement systems • Promote team support, and coach team members, toward continuous improvement • Gather, access and record production information to track improvement • Analyse, synthesise and interpret information • Design and apply improvement tools and strategies • Monitor and evaluate improvement processes • Identify improvement opportunities • Discuss and direct continuous improvement activities • Manage systems and processes to facilitate continued improvement • Monitor and evaluate improvement processes 		
Innovation and Value Creation <i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Evaluate, identify and introduce innovative improvement opportunities to meet organisational goals • Identify improvement activities associated with concepts of process management and improving customer satisfaction 		

**SKILLS FRAMEWORK FOR PRECISION ENGINEERING
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<p><i>aligned to organisational goals.</i></p>	
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Discuss and direct continuous improvement activities with teams to improve customer satisfaction
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Update knowledge and skills in monitoring and evaluating improvement processes to achieve the goals set by the organisation
<p>Range of Application</p> <p><i>(where applicable)</i></p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	<p>Tools and equipment must include:</p> <ul style="list-style-type: none"> • Continuous Improvement tools and techniques • Communication and information technology, e.g. email, Internet, TQM tools Work-related documents and texts; • Precision measuring equipment and tools <p>Regulations must include</p> <ul style="list-style-type: none"> • ISO 14000 (Environmental) • ISO 9000 (Quality) • Workplace Safety and Health requirements • Relevant Singapore Government legislation, regulations, guidelines and procedures • Organisational policies and procedures <p>Procedures and supporting documents must include:</p> <ul style="list-style-type: none"> • Organisational policies and procedures • Liaising and communicating with colleagues, teams, supervisors, managers, QA, continuous improvement personnel, internal and external consultants and experts

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Skill Code	PRE-BAN-4001-1	Skill Category	Business Analytics
		Skill Sub-Category (where applicable)	N/A
Skill	Solve Problems using Operations Research Techniques		
Skill Description	This skill describes the ability to create a mathematical model to represent the business problem and identify solutions. It also includes reviewing of the solution regularly to ensure it remains valid.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Operations research techniques • Operations research tools • Common issues and constraints related to optimisation • Operations research or optimisation procedures and routines 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Identify and formulate the problem with the relevant parties • Construct a mathematical model to represent the problem using operations research techniques • Test the mathematical model to ensure that it is tractable and valid • Identify the solution using operations research tools and decision makers • Implement solutions and new processes to the relevant parties 		
Innovation and Value Creation <i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Review solutions regularly to ensure that the solutions remain valid in the changing environment 		

**SKILLS FRAMEWORK FOR PRECISION ENGINEERING
SKILLS STANDARDS FOR
ASSOCIATE ENGINEER/ASSISTANT ENGINEER**

<i>organisational</i>	
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	N/A
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	N/A
<p>Range of Application (where applicable)</p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	<p>Operations research techniques must include:</p> <ul style="list-style-type: none"> • Decision analysis • Optimisation modelling • Simulation • Statistical and stochastic modelling • Game theory <p>Operations research tools must include tools for:</p> <ul style="list-style-type: none"> • Optimisation • Production planning • Inventory management • Revenue management

**SKILLS FRAMEWORK FOR PRECISION ENGINEERING
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Skill Code	BM-BN-401E-1	Skill Category	Business Negotiation
		Skill Sub-Category <i>(where applicable)</i>	N/A
Skill	Participate in Negotiations		
Skill Description	This skill describes the ability to participate in negotiations. It also includes preparing alternatives and outcomes to support negotiation objectives, applying communication and conflict resolution techniques during negotiation, taking follow-up actions to close negotiation, as well as evaluating negotiation outcomes to identify areas of improvement.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Components of negotiation plans • Negotiation roles and responsibilities • Negotiation processes and techniques • Relevant precedents • Relevant legislation and regulations 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Plan and prepare alternatives and outcomes for both parties in negotiations to support negotiation objectives • Apply communication and conflict resolution techniques to achieve desired negotiation outcomes • Finalise negotiation and take necessary follow-up actions to close negotiation • Monitor and evaluate negotiation outcomes against objectives in accordance with organisational procedures to determine potential areas of improvement for future negotiations 		
Innovation and Value Creation <i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Identify opportunities to strive for negotiation outcomes that adds value to the business and achieves a win-win for both parties 		

**SKILLS FRAMEWORK FOR PRECISION ENGINEERING
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<i>values that are aligned to organisational</i>	
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Manage self to maintain composure and self-confidence when conducting negotiations
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Study past dispute resolutions to identify best practices that may be applied to the current negotiation situation
<p>Range of Application (where applicable)</p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	<p>Relevant legislation and regulations may relate to:</p> <ul style="list-style-type: none"> • Billing policies • Organisational human resources policies • Financial regulations and policies • Employment Act • Industrial Relations Act • Workplace Safety and Health Act • Employment of Foreign Manpower Act • International legislation

**SKILLS FRAMEWORK FOR PRECISION ENGINEERING
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Skill Code	BM-COM-303E-1	Skill Category	Communications
		Skill Sub-Category <i>(where applicable)</i>	N/A
Skill	Present Information		
Skill Description	This skill describes the ability to present information in various formats to achieve presentation objectives. It also includes preparing, conducting and evaluating presentations to determine areas for improvements.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Factors for consideration when selecting presentation formats • Sources of necessary information • Criteria for organising information • Presentation techniques 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Identify presentation objectives and presentation formats in accordance with organisational procedures • Gather and analyse necessary information to support presentation objectives • Develop presentations and presentation collaterals, if necessary, to support presentation structure • Present information in appropriate presentation formats to achieve presentation objectives 		
Innovation and Value Creation <i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Evaluate presentations to determine areas of improvement 		

**SKILLS FRAMEWORK FOR PRECISION ENGINEERING
SKILLS STANDARDS FOR
ASSOCIATE ENGINEER/ASSISTANT ENGINEER**

<i>organisational goals.</i>	
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Assess reactions of target audience towards the presentations to respond appropriately to address their concerns
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Seek guidance and advice from peers and supervisors on past presentations to gain insights to plan the presentation
<p>Range of Application</p> <p><i>(where applicable)</i></p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	<p>Presentation formats may be verbal or written and must include:</p> <ul style="list-style-type: none"> • Reports • Face-to-face presentations • Audio • Videos • Posters • Exhibits • Models • Performances • Demonstrations

**SKILLS FRAMEWORK FOR PRECISION ENGINEERING
SKILLS STANDARDS FOR
ASSOCIATE ENGINEER/ASSISTANT ENGINEER**

Skill Code	BM-COM-304E-1	Skill Category	Communications
		Skill Sub-Category <i>(where applicable)</i>	N/A
Skill	Write Reports		
Skill Description	This skill describes the ability to write reports for submission. It also includes identifying the objectives and structure of the reports, drafting and proofreading, and seeking feedback to improve the reports.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Types of reports • Sections of a report • Report writing techniques • Elements of a well-written report • Methods of displaying data 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Identify objectives of report in accordance with organisational procedures to meet organisational requirements • Consult relevant stakeholders to outline and structure reports • Draft reports to effectively convey information to readers • Proofread reports to minimise errors • Submit reports to relevant stakeholders for their necessary action 		

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<p>Innovation and Value Creation</p> <p><i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Seek feedback from relevant stakeholders to determine areas of improvement
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Adhere to organisational code of conduct, values and ethics when writing reports to ensure quality and integrity
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Engage in self-reflection to identify own areas for improvement in report writing • Improve own report writing techniques by subscribing to learning channels to enhance own report writing skills for workplace application
<p>Range of Application</p> <p><i>(where applicable)</i></p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	<p>N/A</p>

**SKILLS FRAMEWORK FOR PRECISION ENGINEERING
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Skill Code	PRE-ICT-4001-1	Skill Category	Quality
		Skill Sub-Category <i>(where applicable)</i>	N/A
Skill	Perform Advanced Spreadsheet Functions		
Skill Description	This skill describes the ability to use spreadsheet applications to perform advanced spreadsheet functions for developing management reports. It also includes having an in-depth knowledge of spreadsheet applications, including its features.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	The ability to understand: <ul style="list-style-type: none"> • Formatting cells and worksheets • Functions and formulas • Charts • Analysis with tables, sorting and filtering 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	The ability to: <ul style="list-style-type: none"> • Apply advanced formatting options and handle worksheets • Perform functions associated with logical, statistical, financial and mathematical operations • Create charts and apply advanced chart formatting features • Work with tables and lists to analyse, filter and sort data • Use linking, embedding and importing features to integrate data 		
Innovation and Value Creation <i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to</i>	The ability to: <ul style="list-style-type: none"> • Enhance productivity by working with named cell ranges, macros and templates 		

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SKILLS STANDARDS FOR
ASSOCIATE ENGINEER/ASSISTANT ENGINEER**

<i>organisational goals.</i>	
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Validate spreadsheet data • Collaborate on, and review, spreadsheets with key stakeholders
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Engage in self-reflection to explore alternative techniques to best meet requirements
<p>Range of Application</p> <p>(where applicable)</p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	<p>Workplace Safety and Health standards</p>

**SKILLS FRAMEWORK FOR PRECISION ENGINEERING
SKILLS STANDARDS FOR
ASSOCIATE ENGINEER/ASSISTANT ENGINEER**

Skill Code	BM-PM-402E-1	Skill Category	Project Management
		Skill Sub-Category <i>(where applicable)</i>	N/A
Skill Title	Manage Project Scope		
Skill Description	This skill describes the ability determine project deliverables and key work activities as well as monitor and control project scope to meet project objectives. It also includes identifying and resolving issues related to the project scope and recommending ways to enhance project deliverables and key work activities.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Relevant stakeholders • Scope management plan, processes and procedures • Project life cycle • Scope change control procedures • Components of project plans • Project management tools and techniques • Triple constraints and their impact on project management 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Determine project deliverables and key work activities aligned to project objectives and organisational guidelines / policies to define project scope • Identify and resolve potential project scope issues in accordance with organisational procedures to meet project objectives • Monitor and control project scope to meet project objectives 		
Innovation and Value Creation <i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Recommend ways to enhance project deliverables and changes to key work activities to add value to the organisation 		

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ASSOCIATE ENGINEER/ASSISTANT ENGINEER**

<i>values that are aligned to organisational</i>	
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Apply emotional intelligence to guide one’s thinking and actions to communicate changes in project scope and seek acceptance from stakeholders to ensure individual concerns are addressed
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one’s self within and outside of one’s area of work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Engage in self-reflection to identify areas for improvement in managing project scope to enhance performance for managing new projects at the workplace
<p>Range of Application</p> <p>(where applicable)</p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	<p>Triple constraints may include the following constraints:</p> <ul style="list-style-type: none"> • Time • Scope • Cost

SKILLS FRAMEWORK FOR PRECISION ENGINEERING
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Skill Code	BM-PM-403E-1	Skill Category	Project Management
		Skill Sub-Category <i>(where applicable)</i>	N/A
Skill Title	Manage Project Team		
Skill Description	This skill describes the ability to manage and evaluate a team's performance in the execution of a project. This involves an understanding of team dynamics and conflict resolution techniques.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Organisational processes and procedures pertaining to project management • Methods of learning and training • Principles of team dynamics • Methods of conflict resolution • Conflict resolution techniques • Methods of developing team cohesion • Human resources management techniques and tools • Communication techniques 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Monitor and evaluate team performance in accordance with performance measures 		
Innovation and Value Creation <i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are</i>	N/A		

**SKILLS FRAMEWORK FOR PRECISION ENGINEERING
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ASSOCIATE ENGINEER/ASSISTANT ENGINEER**

<i>aligned to organisational</i>	
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Communicate information to team members in accordance with organisational and project requirements • Monitor and manage team dynamics to ensure effective execution of project
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Implement training and development for project team to meet project specifications
<p>Range of Application</p> <p>(where applicable)</p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	N/A

**SKILLS FRAMEWORK FOR PRECISION ENGINEERING
SKILLS STANDARDS FOR
ASSOCIATE ENGINEER/ASSISTANT ENGINEER**

Skill Code	BM-PM-405E-1	Skill Category	Project Management
		Skill Sub-Category <i>(where applicable)</i>	N/A
Skill Title	Manage Project Resources		
Skill Description	This skill describes the ability to allocate, monitor and re-allocate project resources in accordance with project requirements. This involves an understanding of cost management and estimation techniques.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Standard project organisation and structure • Human resources management techniques and tools • Cost management and estimation techniques 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Determine resource needs in accordance with project requirements • Acquire and allocate project resources through various organisational channels • Re-allocate resources where applicable to meet project requirements 		
Innovation and Value Creation <i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Monitor and review resource usage to ensure effective execution of project 		

**SKILLS FRAMEWORK FOR PRECISION ENGINEERING
SKILLS STANDARDS FOR
ASSOCIATE ENGINEER/ASSISTANT ENGINEER**

<i>aligned to organisational</i>	
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	N/A
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	N/A
<p>Range of Application</p> <p>(where applicable)</p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	N/A

**SKILLS FRAMEWORK FOR PRECISION ENGINEERING
SKILLS STANDARDS FOR
ASSOCIATE ENGINEER/ASSISTANT ENGINEER**

Skill Code	BM-PM-406E-1	Skill Category	Project Management
		Skill Sub-Category <i>(where applicable)</i>	N/A
Skill Title	Manage Project Procurement		
Skill Description	This skill describes the ability to develop a procurement plan based on the projects' needs. This includes managing procurement activities and ensuring adherence to legal to organisational requirements.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Relevant stakeholders • Negotiation techniques • Process of developing project procurement specifications 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Develop procurement plan based on project procurement needs • Utilise procurement processes to ensure adherence to legal and organisational requirements • Manage suppliers / vendors to ensure delivery of products / services specified in procurement documentation • Manage procurement activities to minimise risk 		
Innovation and Value Creation <i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Determine processes for monitoring and evaluating procurement related to the project 		

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<i>aligned to organisational</i>	
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Negotiate with suppliers / vendors to clarify expectations and terms and conditions • Communicate procurement arrangements to key stakeholders
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	N/A
<p>Range of Application</p> <p>(where applicable)</p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	N/A

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Skill Code	BM-PM-407E-1	Skill Category	Project Management
		Skill Sub-Category <i>(where applicable)</i>	N/A
Skill Title	Manage Project Costs		
Skill Description	This skill describes the ability to manage and monitor project costs to ensure organisational objectives are achieved. This includes having an understanding of cost management and estimation techniques.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Cost management and estimation techniques • Triple constraints and their impact on project management • Methods to measure costs • Potential cost management issues 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Develop project budget in accordance with project specifications and organisational costing policies • Monitor project costs to ensure project objectives are achieved throughout the project life cycle • Manage project costs to ensure organisational objectives are achieved 		
Innovation and Value Creation <i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are</i>	N/A		

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<i>aligned to organisational</i>	
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Communicate cost management plans
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	N/A
<p>Range of Application</p> <p>(where applicable)</p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	N/A

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Skill Code	BM-PM-408E-1	Skill Category	Project Management
		Skill Sub-Category <i>(where applicable)</i>	N/A
Skill Title	Manage Project Timeline		
Skill Description	This skill describes the ability to manage a project schedule to ensure project objectives are met. This involves understanding project constraints and the use of time management techniques.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	The ability to understand: <ul style="list-style-type: none"> • Time management techniques and issues • Triple constraints and their impact on project management 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	The ability to: <ul style="list-style-type: none"> • Assess project time constraints in order to sequence tasks accordingly • Develop project schedule to guide time management of the project • Implement and manage project schedule to ensure project objectives are met within the stipulated time frame 		
Innovation and Value Creation <i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are</i>	N/A		

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<i>aligned to organisational</i>	
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Liaise with stakeholders on project schedule • Ensure team members and stakeholders are clear on project objectives, deliverables and deadlines
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Incorporate past experience when developing project schedule
<p>Range of Application</p> <p>(where applicable)</p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	N/A

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Skill Code	BM-PM-409E-1	Skill Category	Project Management
		Skill Sub-Category <i>(where applicable)</i>	N/A
Skill Title	Manage Project Quality		
Skill Description	This skill describes the ability to develop a quality management plan using quality management methods, tools and techniques. This includes evaluating and approving project deliverables and identifying opportunities to improve project quality.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Objectives of quality management • Quality management methods, tools and techniques 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Determine project quality assurance needs in accordance with project specifications and organisational quality management policies • Develop quality management plan to define acceptable level of quality for project deliverables • Establish and implement quality assurance processes to meet organisational guidelines and policies • Evaluate and approve project deliverables in accordance with project requirements 		
Innovation and Value Creation <i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Identify opportunities to improve project quality 		

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<i>values that are aligned to organisational</i>	
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Seek stakeholders endorsement on quality criteria and requirements • Communicate quality issues and outcomes to stakeholders
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	N/A
<p>Range of Application</p> <p>(where applicable)</p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	N/A

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Skill Code	BM-PM-410E-1	Skill Category	Project Management
		Skill Sub-Category <i>(where applicable)</i>	N/A
Skill Title	Manage Project Risk		
Skill Description	This skill describes the ability to monitor and control project risks. This involves understanding the risk management framework and internal and external factors that may affect a project plan.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Principles and objectives of risk and risk analysis • Risk management framework • Methods to perform basic risk assessment • Methods to report risk assessment findings to management • Internal and external factors that may affect project plan 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Identify and analyse project risks in accordance with organisational risk policies • Monitor and control project risks to develop scenarios for variances and risk management plan 		
Innovation and Value Creation <i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are</i>	N/A		

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<i>aligned to organisational</i>	
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Recommend follow-up actions to relevant stakeholders
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Monitor risks continually to respond to changes
<p>Range of Application</p> <p>(where applicable)</p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	N/A

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Skill Code	PRE-SMA-4001-1	Skill Category	Sales and Marketing
		Skill Sub-Category <i>(where applicable)</i>	N/A
Skill	Understand Sales and Marketing in a Manufacturing Organisation		
Skill Description	This skill describes the ability to understand the concept of sales and marketing in a manufacturing organisation context. It also includes identification of opportunities for competitive advantage and understanding the marketing mix of the organisation.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Relevant industry and market practices and standards • Four marketing essential elements • Organisations' marketing plans and competitive advantages • Workplace Safety and Health regulations 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Identify the organisation's current and emerging competitors • Determine the marketing mix, in relation to the organisation's targeted competitive advantage 		
Innovation and Value Creation <i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Analyse the organisation's marketing plans to assess suitability in supporting the organisation's competitive advantage 		

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<i>organisational</i>	
Social Intelligence and Ethics <i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i>	N/A
Learning to Learn <i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i>	The ability to: <ul style="list-style-type: none"> • Analyse data and emerging trends through market research to understand the organisation's market potential
Range of Application (where applicable) <i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i>	Four marketing essential elements must include: <ul style="list-style-type: none"> • Product – brand, quality, product range, packaging, delivery and customer service • Place – warehousing, outlet location, type of outlet, wholesalers, retailers and franchisers • Price – product cost, wholesale price, retail price, guarantees, allowances, deals, discounts and delivery terms • Promotion – internal marketing, word of mouth, branding, public reaction, sales promotion, personal selling, direct marketing, sponsorship, exhibitions, merchandising, packaging, corporate image and advertising

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Skill Code	PRE-SPI-4002-1	Skill Category	Strategy Planning and Implementation
		Skill Sub-Category <i>(where applicable)</i>	N/A
Skill	Understand Business Management		
Skill Description	This skill describes the ability to understand an organisation's business and management functions and issues. It also includes knowledge of management principles and organisational structures.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Classical management theories • Management principles • Japanese management principles • Organisational structures • Management functions in an organisation • Management issues in relation to productivity, quality, profitability and human relations 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Relate management principles to the organisation's business • Assess diverse organisational structures' suitability for manufacturing organisations • Correlate organisation functions in a typical manufacturing organisation with modern management practices 		
Innovation and Value Creation <i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Analyse management issues in relation to productivity, quality, profitability and human relations in relation to the organisation's business 		

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<i>organisational</i>	
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	N/A
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	N/A
<p>Range of Application (where applicable)</p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	<p>Classical management theories must include:</p> <ul style="list-style-type: none"> • Fredrick W Taylor • Max Weber • Henri Fayol • Hawthorne Works Experiments <p>Japanese management styles must include:</p> <ul style="list-style-type: none"> • Kaizen • Poka Yoke • Kanban <p>Organisational structures must include:</p> <ul style="list-style-type: none"> • Tall • Flat • Hierarchical • Centralised • De-centralised • Matrix

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Management functions in an organisation must include:

- Planning
- Organising
- Leading
- Resourcing
- Controlling
- Resourcing – personnel, finance, materials, facilities

Management issues in relation to productivity, quality, profitability and human relations must include:

- Leadership
- Motivation
- Team dynamics
- Industrial relations
- Use of technology
- Lean manufacturing
- Agile manufacturing

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Skill Code	ES-PMD-403G-1	Skill Category	Personal Management and Development
		Skill Sub-Category <i>(where applicable)</i>	N/A
Skill	Apply Emotional Competence to Manage Self and Others in a Business Context		
Skill Description	This skill describes the ability to apply principles of Emotional Intelligence to manage oneself and others. It also includes being aware of the environment, expressing empathy, guiding others, upholding integrity and building bonds with others in a business context.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Differences between cognitive intelligence and Emotional Intelligence • Importance of Emotional Intelligence to a manager • Competencies related to Emotional Intelligence • Types of assessment tools and methods to assess own Emotional Intelligence and their features • Methods for development of own Emotional Intelligence and their features • Definition of a business context • Importance of assessing emotional climate in a business context • Ways that different cultures and backgrounds of others affect one's emotions • Benefits of applying Emotional Intelligence in a business context 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Assess own level of Emotional Intelligence in one's dealings and relationships with others in a business context and its effects on achieving organisational goals and objectives • Assess the emotional climate of the environment, recognise the emotional strengths and weaknesses of individuals and exercise flexibility and adaptability in dealing with them • Apply Emotional Intelligence to guide one's thinking and actions and to influence and persuade others to achieve a win-win outcome • Uphold integrity in all business dealings and take responsibility for what have been committed to others that are in alignment with organisational goals 		
Innovation and	The ability to:		

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<p>Value Creation</p> <p><i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational</i></p>	<ul style="list-style-type: none"> • Initiate change and resolve disagreements in business
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Demonstrate empathy by acknowledging the feelings and perspectives of individuals in a business context, taking into consideration their culture, background and needs • Build bonds by nurturing instrumental relationships with others in a business context
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Examine own strengths and weaknesses for development of own Emotional Intelligence to work effectively with others in a business context to achieve organisational goals and objectives • Manage own emotions and maintain composure, self-confidence and resilience when dealing with challenges and setbacks
<p>Range of Application</p> <p>(where applicable)</p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	<p>Cognitive Intelligence must include:</p> <ul style="list-style-type: none"> • Intellectual abilities such as logic, reason, reading, writing, analysing and prioritising <p>Emotional Intelligence must include:</p> <ul style="list-style-type: none"> • Awareness of own emotions and ability to regulate them • Awareness of the emotions of others and the ability to use the knowledge to manage interactions with others <p>Competencies related to Emotional Intelligence must include:</p> <ul style="list-style-type: none"> • Recognising one's emotions and its effects

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	<ul style="list-style-type: none">• Recognising strengths and weaknesses• Confidence about self-worth and abilities• Ability to manage disruptive impulses and emotions• Upholding honesty and integrity• Ownership for personal performance• Adaptable to change• Receptive to new and novel ideas• Exercising empathy• Striving to meet the needs of the stakeholders• Developing others• Leveraging on diversity• Effective communication skills• Inspiring leadership• Building positive relationships• Seeking to collaborate and cooperate
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Skill Code	ES-PMD-404G-1	Skill Category	Personal Management and Development
		Skill Sub-Category <i>(where applicable)</i>	N/A
Skill	Contribute towards a Learning Organisation		
Skill Description	This skill describes the ability to analyse employability issues for self and the organisation in the local and global contexts. It also includes contributing to the development of a learning organisation that can operate effectively in the knowledge-based economy as well as adapt to change and diversity.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Changes to work requirements and expectations in both local and global contexts • Methods to acquire skills and knowledge for the organisation • Types of skills and knowledge required by an organisation and methods to acquire them to stay competitive in the global context • Advantages and disadvantages of the various types of assessment methods to conduct training and development needs analysis • Strategies to enhance employees' receptiveness to training • Types of learning styles, learning theories and learning motivation theories • Motivational factors to learn for self and organisation • Benefits of a learning organisation culture • Types and stages of changes arising from the external environment and their characteristics • Types of strategies that can assist an organisation to adapt to change • Ways in which the types of strategies for managing and synergising diversity can contribute to organisational effectiveness 		

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<p>Application and Adaptation</p> <p><i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Evaluate information gathered from the news media to determine relevant issues and trends that affect the organisation both in the local and global contexts • Evaluate the implications of global competitiveness on one's job and organisation • Establish and evaluate systems for facilitating transfer of knowledge and skills within an organisation • Establish and evaluate learning opportunities, resources and knowledge management infrastructure in an organisation
<p>Innovation and Value Creation</p> <p><i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Analyse and adopt suitable approaches for organisational change • Develop strategies to assist an organisation to adapt to change
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Manage and synergise diversity of the various groups for organisational effectiveness

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<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Conduct training and development needs analysis using appropriate assessment methods and set learning goals for self and organisation • Conduct learning style analysis to identify learning styles of self and staff to ensure the effective acquisition and transfer of knowledge and skills within the organisation
<p>Range of Application</p> <p><i>(where applicable)</i></p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	<p>N/A</p>

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Skill Code	ES-PMD-405G-1	Skill Category	Personal Management and Development
		Skill Sub-Category <i>(where applicable)</i>	N/A
Skill	Manage Workplace Challenges with Resilience		
Skill Description	This skill describes the ability to apply resilience techniques to manage challenges. It also includes assessing one's personal as well as the organisation's level of resilience.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Concept of resilience • Importance of resilience to an individual and/or an organisation • Types of assessment tools and methods to assess level of resilience • Characteristics of assessment tools and methods used to assess level of resilience • Methods for development of resilience • Characteristics of the various methods for development of resilience 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Assess the level of resilience at the individual and/or organisational level and its effects on achieving desired outcomes according to methods set • Apply resilience techniques to manage challenging circumstances at the individual and/or organisational level 		
Innovation and Value Creation	The ability to:		

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<p><i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</i></p>	<ul style="list-style-type: none"> • Examine the areas for development in resilience of the individual and/or organisation to achieve desired outcomes
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Seek support from others when dealing with challenging situations
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Reflect on opportunities to learn and renew oneself to bolster resilience
<p>Range of Application</p>	<p>Concept of resilience must include:</p> <ul style="list-style-type: none"> • Definition of resilience from individual and/or organisation perspective • Psychology of resilience includes: <ul style="list-style-type: none"> ○ Cognitive ○ Neurophysiology ○ Psychoneuroimmunology <p>Domains of resilience must include:</p> <ul style="list-style-type: none"> • Individual's perspective includes: <ul style="list-style-type: none"> ○ Being in control to influence whatever happens next ○ Assuming ownership to improve the situation, regardless of one's formal responsibilities ○ Being optimistic ○ Able to surmount stressful situations and emerge stronger thereafter ○ Able to adapt one's thinking to the situation at hand e.g. taking another's point of view, able to see things from a different

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perspective, able to see difficulties as challenges, etc.

- Able to use humour to get through difficult circumstances
- Able to accept that something has happened and moving on to deal with it
- Able to persevere and endure adverse situations
- Able maintain composure and a healthy level of physical and psychological wellness in the face of challenges.
- Able to contain setbacks in one aspect from spilling over to other professional or personal aspects
- Able to acquire resources to move on in challenges and reach one's full potential
- Organizational perspective includes:
 - Systems in place to ensure business continuity
 - Diversification of business activities to mitigate risks
 - Flexible systems and processes
 - Strong leadership
 - Responsiveness to operating environment
 - Systems to generate and protect business resources e.g. supply chains, financial and human resources
 - Systems and tools in place to train, maintain and track resilient individuals and teams

Factors affecting the level of resilience must include:

- An individual's level of resilience must include:
 - Nature of occupation e.g. fast-paced, dynamic vs. stagnant, predictable and routine
 - Personality and traits
 - Life experiences
 - Wellness of one's mind, spirit, body, et cetera
- An organisation's level of resilience includes:
 - Culture
 - Leadership
 - Systems and processes
 - Investment in training and development of staff

Resilience techniques must include:

- Practising and internalizing resilient behaviours must include:
 - Not giving up and persisting in achieving goals despite the difficulties
 - Being decisive and able to make sound decisions despite uncertainties and pressures
 - Staying composed and positive in times of difficulty
 - Thinking clearly and staying focused under pressure
 - Recognising how your feelings affect performance and

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understanding how it affects your relationship with stakeholders, team members, customers, and in turn affects organisational performance

- Distinguishing personal and professional outcomes
- Responding to changes and situations with a positive and open mind
- Creating a supportive culture within an organisation
- Coaching others through difficulties
- Recognising stress symptoms before they become an issue
- Engaging in activities to maintain the well-being of one's mind, spirit and body
- Controlling unwanted thoughts and emotional reactions

Formulating an action plan to develop resilience at the individual and/or organisational level, with components of an action plan to develop resilience at:

- The individual level must include:
 - Measurement/ outcome indicators to track development in resilience
 - Areas for development in resilience
 - Methods/ tools for collecting feedback on level of resilience
 - Schedule of timelines
 - Resources e.g. physical, financial required
 - Possible methods to develop resilience, such as:
 - Using journals to list and challenge limiting beliefs
 - Attending courses
 - Building a strong support network through nurturing strong and positive relationships, getting involved in community and volunteer work, or joining a faith or spiritual community
 - Building long-term stress resilience and reduce situational stress throughout the day
 - Sharing and exchanging stories
 - Setting progressive and incremental goals to build self confidence in specific areas
 - Reflecting on past experiences and using them to positively reframe future experiences
 - Practising relaxation techniques that can include imagery and breathing techniques
 - Applying nutritional strategies for boosting vitality, motivation and productivity,
 - Applying learned optimism techniques
 - Applying problem-solving and decision-making techniques to make sound decisions despite uncertainties and pressures
 - Controlling unwanted thoughts and emotional reactions
- The organisational level must include:
 - Measurement and outcome indicators to track development in

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resilience

- Areas for development in resilience
- Methods/ tools for collecting feedback on level of resilience
- Schedule of timelines
- Resources e.g. manpower, financial, logistics required
- Plan to stakeholders
- Possible methods to develop resilience, such as:
 - Encouraging innovation and experimentation
 - Implementing systems to ensure business continuity
 - Diversifying business activities to mitigate risks
 - Introducing systems and processes to enhance organisation's flexibility and adaptability and to generate and protect business resources e.g. supply chains, financial and human resources
 - Leadership development programmes
 - Implementing scenario analysis and planning to enhance organisation's responsiveness to operating environment
 - Investment in training and development for staff at all levels
 - Introducing culture-building and awareness programmes
 - Implementing communication and engagement sessions with staff at all levels
 - Implementing alternative work practices e.g. flexible working arrangements, empowerment of decision-making, et cetera
 - Implementing staff welfare programmes such as exercise days, staff bonding events, et cetera

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Skill Code	ES-ACE-401G-1	Skill Category	Analytical, Conceptual and Evaluative
		Skill Sub-Category <i>(where applicable)</i>	N/A
Skill	Support the Establishment of a Framework for Initiative and Enterprise		
Skill Description	This skill describes the ability to apply strategies to create, promote and sustain a culture of continuous improvement. It also includes identifying, evaluating and managing risks associated with improvement initiatives.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Managerial roles and responsibilities in developing an enterprising and self-directed workforce • Areas for continuous improvements in an organisation • Steps to implement continuous improvement at the workplace • Common pitfalls in establishing an organisational culture of continuous improvement • Areas for operating guidelines, corporate policies and strategies to support continuous improvement • Resources required to encourage innovation in an organisation • Ways to prepare employees to think and initiate for continuous improvement • Activities and guidelines to promote and sustain innovation and enterprise in an organisation • Steps and strategies for managing risks 		

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<p>Application and Adaptation</p> <p><i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Develop an organisational culture of innovation, enterprise and continuous improvement in consultation with stakeholders • Develop enterprise actions and strategies to improve organisational growth • Establish a framework to track and evaluate improvement efforts at the workplace • Perform risk assessment of a new policy or management decision on organisational performance • Evaluate implications of risks on organisational performance using appropriate tools and techniques • Develop a framework for an enterprise risk management programme in an organisation • Evaluate the effectiveness of the enterprise risk management programme in an organisation
<p>Innovation and Value Creation</p> <p><i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Establish policies and strategies to promote initiative behaviour for continuous improvement at the workplace • Develop comprehensive policies that encourage innovation and enterprise
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Provide organisational leadership to promote and sustain innovation and enterprise by cultivating and empowering employees to release their untapped potential and creativity

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<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Enhance and build skills for teams in the organisation to work together to make decisions, plan work and resolve differences • Engage in continuous self-assessment and review to enhance own skills to promote innovation and enterprise
<p>Range of Application</p> <p><i>(where applicable)</i></p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	<p>N/A</p>

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Skill Code	ES-ACE-402G-1	Skill Category	Analytical, Conceptual and Evaluative
		Skill Sub-Category <i>(where applicable)</i>	N/A
Skill	Solve Problems and Make Decisions at Managerial Level		
Skill Description	This skill describes the ability to examine the causes of performance deficiency and its impact on an organisation. It also includes managing team dynamics to identify and address performance deficiency.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Advantages and disadvantages of the various methods to collect relevant and current information on organisational performance standards and quality control policies • Sources of information to identify performance deficiency • Advantages and disadvantages of the various methods to identify performance deficiency • Types of analytical tools and techniques and their application in the problem- solving and decision-making process • Principles of group dynamics and teamwork and techniques to manage team dynamics • Types of decision-making models for arriving at the preferred solution and their features • Factors affecting the effectiveness of an implementation plan • Tools and techniques to identify performance deficiency or cause of failure in implemented solution and implementation plan and their features • Advantages and disadvantages of various ways to formalise implemented solution as part of current Standard Operating Procedures (SOPs) • Organisational procedures for amending and disseminating SOPs 		
Application and Adaptation	The ability to:		

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<p><i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i></p>	<ul style="list-style-type: none"> • Collect relevant and current information on organisational performance standards and quality control policies • Identify the types of performance deficiency and examine the causes and their impact on organisation-related aspects • Identify the root causes of the problems with team members using appropriate group facilitation techniques • Determine a preferred solution using appropriate methods and draw up an implementation plan to implement the solution at the workplace • Formalise implemented solution as part of the organisation's current standard operating procedures • Evaluate the effectiveness of the implemented solution and implementation plan using appropriate techniques and criteria
<p>Innovation and Value Creation</p> <p><i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Generate creative ideas using appropriate idea generation and group facilitation techniques • Shortlist the most viable ideas based on a set of pertinent criteria using appropriate problem-solving and decision-making techniques and tools • Evaluate the impact of shortlisted ideas using appropriate problem-solving and decision-making techniques and tools • Develop a corrective action plan for any shortfalls identified in the implemented solution and conduct a follow-up review of modifications made
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Manage team dynamics and differing opinions through the use of conflict management techniques
<p>Learning to Learn</p>	<p>The ability to:</p>

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<p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	<ul style="list-style-type: none"> • Reflect on own strengths and weaknesses and its impact in solving problems and making decisions
<p>Range of Application (where applicable) <i>It refers to the critical circumstances and contexts that the skill may be demonstrated</i></p>	<p>N/A</p>

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Skill Code	ES-IP-401G-1	Skill Category	People and Relationship Management
		Skill Sub-Category <i>(where applicable)</i>	N/A
Skill	Lead Workplace Communication and Engagement		
Skill Description	This skill describes the ability to lead workplace communication through the implementation of communication strategies and mechanisms. It also includes using negotiation strategies to achieve organisational goals and win-win outcomes.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Communication strategies, tools and methods associated with the various communication mechanisms to meet organisational goals and objectives and their features • Types and dimensions of organisational culture and their characteristics • Dimensions of conflict or dispute • Desired goals to be achieved as a outcome of negotiation • Motivations, priorities, interests and inclinations of stakeholders involved in a negotiation • Importance of considering cultural factors and various diversity issues that affect the communication in a negotiation process • Factors affecting the prioritising of goals and evaluation of possible trade-offs • Steps to develop relevant details and supporting arguments for negotiation • Negotiation styles and tactics for countering other party's style and their characteristics • Sources of power, conflict and obstacles to a successful negotiation and their implications in a negotiation 		

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<p>Application and Adaptation</p> <p><i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Conduct research on best practices in workplace communication, evaluate their suitability for adoption and establish benchmarks for the organisation • Develop communications plan to implement communication strategies and mechanisms to meet organisational goals and objectives • Evaluate employees' level of acceptance of organisation's vision, mission and core values and take corrective actions where needed • Evaluate effectiveness of communication strategies and mechanisms and implementation plan according to criteria set • Establish the actual causes of conflict or dispute and plan for negotiation taking into account organisational goals and objectives • Assess negotiation situation and develop negotiation strategies taking into consideration diversity issues • Evaluate negotiation process and delegate appropriate follow-up actions in a timely manner based on accurate and objective analytical techniques
<p>Innovation and Value Creation</p> <p><i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Evaluate gaps and barriers in workplace communication based on determined benchmarks and establish communication strategies and mechanisms that meet organisational goals and objectives
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Use communication strategies to influence organisational culture and motivate employees to commit to the organisation's vision, mission and core values • Conduct negotiation to achieve organisational goals and win-win outcomes by applying negotiation strategies and effective communication skills

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<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Reflect on gaps in own communication and negotiation style to make adjustments for future interactions
<p>Range of Application</p> <p>(where applicable)</p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated</i></p>	<p>N/A</p>

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Skill Code	ES-IP-402G-1	Skill Category	People and Relationship Management
		Skill Sub-Category <i>(where applicable)</i>	N/A
Skill	Develop a Work Team		
Skill Description	This skill describes the ability to establish teams and allocate resources in achieving organisational goals. It also includes cultivating open communication for teamwork and evaluating the progress of the team.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Critical factors in building a high performance team • Characteristics and impact of team synergy on team performance • Techniques for team building and development • Coaching process aligned to organisational vision and business goals • Platforms and tools to create opportunities for team members to contribute ideas and skills • Components of systems to recognise contributions of team members • Implications of diversity issues on coaching • Components of systems for development of staff • Motivational theories related to rewards and recognition for staff • Ways to determine trends in team performance 		

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<p>Application and Adaptation</p> <p><i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Analyse the types of teams required and their value in achieving organisational goals • Identify and elect work team members and align roles, responsibilities, objectives and expectations of the work team to organisational goals • Delegate tasks and allocate resources to facilitate work team towards the achievement of goals and objectives, taking into consideration diversity issues • Evaluate impact of task and role delegation among team members on team synergy and make adjustments where necessary in accordance to criteria set • Encourage teamwork and foster commitment and sense of ownership among team members based on team building and development techniques • Assess the barriers to group interaction and communication and establish infrastructure to facilitate knowledge management and work team coaching which is aligned to organisational vision and business goals
<p>Innovation and Value Creation</p> <p><i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to organisational goals.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Monitor and evaluate team progress and performance in achievement of goals and objectives
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Communicate the roles, responsibilities, objectives and expectations to the work team and empower team members to accomplish them • Communicate feedback to team using the most suitable means and data and provide recommendations to improve performance • Recognise and reward team work and performance taking into consideration implications of diversity issues

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<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Seek feedback from peers and supervisors to improve own future performance
<p>Range of Application</p> <p><i>(where applicable)</i></p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	<p>N/A</p>

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Skill Code	ES-IP-403G-1	Skill Category	Interpersonal
		Skill Sub-Category <i>(where applicable)</i>	N/A
Skill	Lead a Virtual Team		
Skill Description	This skill describes the ability to analyse the importance of virtual collaboration and establish a virtual team in achieving organisational goals and objectives. It also includes supporting infrastructure to operationalise virtual collaboration, fostering cohesion and commitment among virtual team members and managing virtual team's performance towards common goals and objectives set.		
Knowledge and Analysis <i>It refers to gathering, cognitive processing, integration and inspection of facts and information required to perform the work tasks and activities.</i>	<p>The ability to understand:</p> <ul style="list-style-type: none"> • Concept of virtual collaboration • Types of virtual teams • Diversity issues and their implications on virtual collaboration • Critical success factors for leading virtual teams 		
Application and Adaptation <i>It refers to the ability to perform the work tasks and activities required of the occupation, and the ability to react to and manage the changes at work.</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Analyse the need for virtual collaboration in achieving organisational goals and objectives • Establish a virtual team in line with intended goals and objectives • Establish an infrastructure to operationalize virtual collaboration based on collaborative tools and training programmes 		
Innovation and Value Creation <i>It refers to the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned</i>	<p>The ability to:</p> <ul style="list-style-type: none"> • Formulate appropriate strategies to address shortfalls in virtual team's performance 		

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<i>to organisational</i>	
<p>Social Intelligence and Ethics</p> <p><i>It refers to the ability to use affective factors in leadership, relationship and diversity management guided by professional codes of ethics.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Foster cohesion and commitment among virtual team members towards common goals and objectives
<p>Learning to Learn</p> <p><i>It refers to the ability to develop and improve one's self within and outside of one's area of work.</i></p>	<p>The ability to:</p> <ul style="list-style-type: none"> • Identify and assess one's leadership responsibilities to manage virtual team's performance in line with goals and objectives set
<p>Range of Application (where applicable)</p> <p><i>It refers to the critical circumstances and contexts that the skill may be demonstrated.</i></p>	<p>Types of virtual teams must include:</p> <ul style="list-style-type: none"> • Networked teams <ul style="list-style-type: none"> ○ Geographically distributed and not necessarily from the same organization ○ Frequently created and just as frequently dissolved; depending on the complexity of the issue, additional members to the team may be added at any time ○ Usually formed to discuss specific topics where members from the area of expertise, possibly from different organizations, pitch their ideas in the same discussion ○ Existence period of these teams may vary significantly depending on how fast or slow the issue is resolved • Parallel teams <ul style="list-style-type: none"> ○ Highly task-oriented teams that usually comprise specialized professionals ○ Generally only required for very short span of time; however, they are not dissolved after completion of the tasks ○ May be either internal or external to the organisation • Project development teams <ul style="list-style-type: none"> ○ Geographically distributed and may operate from different timezones ○ Mainly focused on creating new products, information systems or organizational processes for users and/or customers

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	<ul style="list-style-type: none">○ Have added autonomy to make decisions, on top of recommendations○ May add or remove members of their team at any point in time, as needed for their area of expertise● Work, production or functional teams<ul style="list-style-type: none">○ Totally function specific, working only on a particular area within an organization (i.e. finance, training, research, etc).○ Operate virtually from different geographical locations, these teams exist to perform regular or on-going tasks● Service Teams<ul style="list-style-type: none">○ Geographically located in different timezones and are assigned to a particular service such as customer support, network upgrades, data maintenance, etc.○ Each team works on providing the particular service in their daylight hours and at the end of day, work is delegated to the next team which operates in a different timezone so that service is available on a 24/7 basis
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Version Control

Version	Date	Changes Made	Edited by
1.0	12 October 2016	Initial Version	SSG and EDB

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Definitions of the Five (5) Domains

Domain	Definition
Knowledge and Analysis	Knowledge includes the gathering of facts and information through traditional and digital forms. Analysis involves the cognitive processing, integration and inspection of single or multiple sources of facts and information required to perform work tasks and activities and takes into consideration, the work contexts in which the tasks and activities are carried out. The result of knowledge and analysis produce judgements on work tasks/activities/issues/areas, and the conceptualisation of solutions to solve problems at work.
Application and Adaptation	Application involves the ability to perform work tasks and activities defined by the requirements of the occupation. Adaptation involves the ability to react to and manage the changes in the work contexts. The result of application and adaptation leads to the production of psycho-motor actions and behavioural reactions to the work tasks/activities/issues/areas, and the execution of the planned solutions to solve problems at work.
Innovation and Value Creation	Innovation includes the ability to generate purposive ideas to improve work performance and/or enhance business values that are aligned to the organisational goals. As a result of innovation, the organisation is able to reap the values from individual or team contributors to achieve organisational growth.
Social Intelligence and Ethics	Social intelligence includes the ability to appreciate and use affective factors in leadership, relationship and diversity management guided by professional codes of ethics as effective individuals or team contributors.
Learning to Learn	Learning-to-learn includes the ability to improve on self-development within and outside of one's area of work. It involves the continual inspection of one's knowledge, analytical, application, adaptive, innovative and social skills that are needed to perform the work optimally and/or solve problems effectively.