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# TECHNICAL & ENGINEERING TRACK

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# Machinist/Technician

The Machinist/Technician works under close supervision to carry out structured work while adhering closely to standard work instructions and procedures. He/She sets up and operates special purpose equipment/machines to fabricate components and parts. In the process, he/she is required to read and interpret sketches, drawings, manuals and specifications to determine the dimensions and tolerances of finished work pieces, sequence of operations and set-up requirements.

He/She also observes the machines, detects malfunctions and makes the necessary adjustments to ensure smooth operations. He/She must also be able to select, align and secure holding fixtures, cutting tools, attachments, accessories and materials.

The Machinist/Technician works in a team to achieve production and quality targets, while complying with and reporting deviances in Workplace Safety and Health requirements.

Skills Category	Skill
<b>Analytical, Conceptual and Evaluative</b>	<ul style="list-style-type: none"> <li>• Demonstrate Initiative and Enterprising Behaviour</li> <li>• Solve Problems and Make Decisions at Supervisory Level</li> </ul>
<b>Interpersonal</b>	<ul style="list-style-type: none"> <li>• Communicate and Relate Effectively at the Workplace</li> <li>• Work in a Team</li> </ul>
<b>Manufacturing Productivity and Innovation</b>	<ul style="list-style-type: none"> <li>• Apply 5S Techniques in Manufacturing</li> <li>• Apply Continuous Process Improvement Techniques</li> <li>• Perform Basic Productivity Practices</li> </ul>
<b>Personal Management and Development</b>	<ul style="list-style-type: none"> <li>• Adapt to Change</li> <li>• Apply Emotional Competence to Manage Self at the Workplace</li> <li>• Develop Personal Effectiveness at Operations Level</li> <li>• Maintain Personal Presentation and Employability at Operations Level</li> </ul>
<b>Precision Manufacturing Processes</b>	<ul style="list-style-type: none"> <li>• Apply Basic Workshop Practices</li> <li>• Apply Biomedical Products Assembly Skills</li> <li>• Install Electrical Sensors</li> <li>• Operate Hydraulic Systems</li> <li>• Operate Programmable Logic Controller</li> <li>• Perform Cleanroom Practices</li> <li>• Perform CNC Milling and Programming</li> <li>• Perform CNC Turning and Programming</li> <li>• Perform Electrical Discharge Machining (EDM) - CNC Wire Cut Machine Operations</li> <li>• Perform General Assembly</li> <li>• Perform General Machining (includes turning, grinding, milling)</li> </ul>
<b>Quality</b>	<ul style="list-style-type: none"> <li>• Apply Quality Systems</li> </ul>
<b>Service Excellence</b>	<ul style="list-style-type: none"> <li>• Provide Go-the-Extra-Mile Service</li> <li>• Respond to Service Challenges</li> </ul>
<b>Technical and Engineering Fundamentals</b>	<ul style="list-style-type: none"> <li>• Handle Common Measurement Instruments</li> <li>• Interpret Technical Drawings and Blue Prints</li> <li>• Operate Basic Measurement Devices</li> <li>• Operate Pneumatic Systems</li> <li>• Perform Dimensional and Geometric Measurement</li> <li>• Use Hand Tools</li> <li>• Use Precision Measuring Equipment</li> </ul>
<b>Workplace Safety and Health</b>	<ul style="list-style-type: none"> <li>• Apply Workplace Safety and Health in Metal Work</li> <li>• Apply Workplace Safety and Health Policies</li> <li>• Identify Hazards and Maintain Risk Control Measures</li> </ul>

# Senior Machinist/Senior Technician

The Senior Machinist/ Senior Technician operates a variety of equipment/ machines to fabricate components and parts. He/She also adapts procedures to troubleshoot and diagnose routine problems, and handles the maintenance of machines.

He/She actively contributes to innovation by suggesting areas of improvement to enhance productivity and efficiency of work processes.

He/She works in a team to achieve production and quality targets, while complying with and reporting deviances in Workplace Safety and Health requirements.

Skills Category	Skill
<b>Analytical, Conceptual and Evaluative</b>	<ul style="list-style-type: none"> <li>• Demonstrate Initiative and Enterprising Behaviour</li> <li>• Solve Problems and Make Decisions at Operations Level</li> </ul>
<b>Interpersonal</b>	<ul style="list-style-type: none"> <li>• Communicate and Relate Effectively at the Workplace</li> <li>• Work in a Team</li> </ul>
<b>Maintenance</b>	<ul style="list-style-type: none"> <li>• Diagnose and Rectify Faults in Equipment and Circuits</li> <li>• Maintain and Repair Hydraulic Systems</li> <li>• Maintain and Repair Pneumatic Systems</li> <li>• Maintain Common Tools and Workshop Equipment</li> </ul>
<b>Manufacturing Productivity and Innovation</b>	<ul style="list-style-type: none"> <li>• Apply Basic Lean Techniques in the Workplace</li> <li>• Apply Lean Thinking in the Workplace</li> </ul>
<b>Personal Management and Development</b>	<ul style="list-style-type: none"> <li>• Adapt to Change</li> <li>• Apply Emotional Competence to Manage Self at the Workplace</li> <li>• Develop Personal Effectiveness at Operations Level</li> <li>• Maintain Personal Presentation and Employability at Operations Level</li> </ul>
<b>Precision Manufacturing Processes</b>	<ul style="list-style-type: none"> <li>• Assemble Simple Drive Mechanism</li> <li>• Implement Programming of Programmable Logic Controllers</li> <li>• Perform Advanced Gas Tungsten Arc Welding</li> <li>• Perform Diffusion Bonding of Material</li> <li>• Perform Geometric Tolerance and Inspection</li> <li>• Perform Machining</li> <li>• Perform Material Hot Processing</li> <li>• Perform Non-conventional Cutting Process</li> <li>• Perform Non-destructive Testing</li> <li>• Perform Optical Digitising</li> <li>• Perform Surface Coating</li> <li>• Perform Surface Preparation and Finishing</li> </ul>
<b>Quality</b>	<ul style="list-style-type: none"> <li>• Apply Quality Systems</li> <li>• Perform Dye/Liquid Penetrant Testing</li> <li>• Perform Eddy Current Testing</li> <li>• Perform Magnetic Particle Testing</li> </ul>
<b>Service Excellence</b>	<ul style="list-style-type: none"> <li>• Provide Go-the-Extra-Mile Service</li> <li>• Respond to Service Challenges</li> </ul>

## TECHNICAL & ENGINEERING TRACK - SENIOR MACHINIST/SENIOR TECHNICIAN

Skills Category	Skill
<b>Technical and Engineering Design</b>	<ul style="list-style-type: none"><li>• Apply Machine Elements</li><li>• Design Electric Drives and Electro-Mechanical Systems</li><li>• Design Handling Systems in Industrial Automation</li></ul>
<b>Technical and Engineering Fundamentals</b>	<ul style="list-style-type: none"><li>• Apply Computer and Information Technology</li><li>• Apply Computer-aided Drafting and Design</li><li>• Apply Computer-aided Manufacturing (CAM) Processes</li><li>• Handle Machine Tools and Apply Lubrication</li><li>• Set Up and Operate Coordinate Measuring Machine</li><li>• Write Software Programmes</li></ul>
<b>Workplace Safety and Health</b>	<ul style="list-style-type: none"><li>• Apply Workplace Safety and Health in Metal Work</li><li>• Apply Workplace Safety and Health Policies</li><li>• Identify Hazards and Maintain Risk Control Measures</li></ul>

# Process Specialist/Shift, Group, Team Leader

The Process Specialist/Shift, Group, Team Leader applies principles, practices and procedures to produce precision parts and provide end-to-end solutioning for customers. He/She also diagnoses faults, maintains machines and oversees the housekeeping of machine tools and devices.

The Process Specialist/Shift, Group, Team Leader coordinates the day-to-day operations of a team and may adapt procedures, processes, tools, equipment and techniques to meet the more complex requirements of the production process.

The Process Specialist/Shift, Group, Team Leader supervises and guides a team of machinists/senior machinists to meet production and quality standards, while ensuring compliance with Workplace Health and Safety procedures. He/She also works with the team to assess the feasibility of improvements to enhance productivity and efficiency at the workplace.

Skills Category	Skill
<b>Analytical, Conceptual and Evaluative</b>	<ul style="list-style-type: none"> <li>• Foster Initiative and Enterprise in Teams</li> <li>• Solve Problems and Make Decisions at Operations Level</li> </ul>
<b>Interpersonal</b>	<ul style="list-style-type: none"> <li>• Facilitate Effective Communication and Engagement at the Workplace</li> </ul>
<b>Maintenance</b>	<ul style="list-style-type: none"> <li>• Apply Operational Maintenance of Machines and Equipment</li> <li>• Coordinate Maintenance</li> </ul>
<b>Manufacturing Productivity and Innovation</b>	<ul style="list-style-type: none"> <li>• Apply Basic Lean Techniques in the Workplace</li> <li>• Apply Lean Thinking in the Workplace</li> <li>• Implement Continuous Improvement Processes</li> <li>• Supervise Work Improvement Processes</li> </ul>
<b>Personal Management and Development</b>	<ul style="list-style-type: none"> <li>• Apply Emotional Competence to Manage Self and Team at the Workplace</li> <li>• Develop Personal Effectiveness at Supervisory Level</li> <li>• Foster Team Adaptability</li> <li>• Maintain Personal Image and Employability at Supervisory Level</li> </ul>
<b>Precision Manufacturing Processes</b>	<ul style="list-style-type: none"> <li>• Apply Mechanics for Engineering Solutions</li> <li>• Implement Good Documentation Practices</li> <li>• Perform Cutting Processes</li> <li>• Perform In-process Inspection</li> </ul>
<b>Quality</b>	<ul style="list-style-type: none"> <li>• Apply Failure Mode and Effect Analysis Techniques</li> <li>• Apply ISO 9001 Quality Management System to Audit Requirements</li> <li>• Apply Root Cause Analysis</li> <li>• Conduct Risk Assessment</li> <li>• Implement Quality Systems</li> <li>• Supervise Quality Procedures</li> </ul>
<b>Service Excellence</b>	<ul style="list-style-type: none"> <li>• Establish Relationships for Customer Confidence</li> <li>• Provide Go-the-Extra-Mile Service</li> <li>• Respond to Service Challenges</li> </ul>
<b>Technical and Engineering Design</b>	<ul style="list-style-type: none"> <li>• Operate and Maintain Automation Process Control Systems</li> </ul>

**TECHNICAL & ENGINEERING TRACK - PROCESS SPECIALIST/SHIFT, GROUP, TEAM LEADER**

Skills Category	Skill
<b>Technical and Engineering Fundamentals</b>	<ul style="list-style-type: none"><li>• Apply 3D Computer Modelling and Programming</li><li>• Apply CNC Programme Optimisation</li><li>• Apply Engineering Mathematical Concepts</li><li>• Apply Manufacturing Technology Process</li></ul>
<b>Workplace Safety and Health</b>	<ul style="list-style-type: none"><li>• Supervise Manufacturing Work for Workplace Safety and Health</li></ul>

# Associate Engineer/Assistant Engineer

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.

Skills Category	Skill
<b>Additive Manufacturing</b>	<ul style="list-style-type: none"> <li>• Apply Additive Manufacturing Technology</li> </ul>
<b>Analytical, Conceptual and Evaluative</b>	<ul style="list-style-type: none"> <li>• Solve Problems and Make Decisions at Managerial Level</li> <li>• Support the Establishment of a Framework for Initiative and Enterprise</li> </ul>
<b>Business Analytics</b>	<ul style="list-style-type: none"> <li>• Solve Problems using Operations Research Techniques</li> </ul>
<b>Business Negotiation</b>	<ul style="list-style-type: none"> <li>• Participate in Negotiations</li> </ul>
<b>Communication</b>	<ul style="list-style-type: none"> <li>• Present Information</li> <li>• Write Reports</li> </ul>
<b>Info-Communication Technologies</b>	<ul style="list-style-type: none"> <li>• Perform Advanced Spreadsheet Functions</li> </ul>
<b>Interpersonal</b>	<ul style="list-style-type: none"> <li>• Develop a Work Team</li> <li>• Lead a Virtual Team</li> <li>• Lead Workplace Communication and Engagement</li> </ul>
<b>Laser and Optics</b>	<ul style="list-style-type: none"> <li>• Apply Laser Machine Technology</li> </ul>
<b>Manufacturing Productivity and Innovation</b>	<ul style="list-style-type: none"> <li>• Apply Root Cause Analysis</li> <li>• Implement Continuous Improvement Processes</li> <li>• Manage Continuous Improvement</li> </ul>
<b>Personal Management and Development</b>	<ul style="list-style-type: none"> <li>• Apply Emotional Competence to Manage Self and Others in a Business Context</li> <li>• Contribute towards a Learning Organisation</li> <li>• Manage Workplace Challenges with Resilience</li> </ul>
<b>Precision Manufacturing Processes</b>	<ul style="list-style-type: none"> <li>• Apply Assembly of Mechanical Machines</li> <li>• Apply Cleaning Technologies</li> <li>• Apply Mechanical Fixtures Design</li> <li>• Apply Mould Design</li> <li>• Apply Precision Machining</li> <li>• Apply Polymer Materials Technology</li> <li>• Apply Sensors and Actuators in Automation</li> <li>• Implement Engineering Activities and Processes</li> <li>• Perform Advanced Polymer and Polymer Composites Processing</li> <li>• Perform Protective Coating Inspection</li> </ul>

## TECHNICAL & ENGINEERING TRACK - ASSOCIATE ENGINEER/ASSISTANT ENGINEER

Skills Category	Skill
<b>Project Management</b>	<ul style="list-style-type: none"><li>• Manage Project Costs</li><li>• Manage Project Procurement</li><li>• Manage Project Quality</li><li>• Manage Project Resources</li><li>• Manage Project Risk</li><li>• Manage Project Scope</li><li>• Manage Project Team</li><li>• Manage Project Timeline</li></ul>
<b>Quality</b>	<ul style="list-style-type: none"><li>• Apply Measurement Metrology in Quality Assurance</li></ul>
<b>Robotics and Automation</b>	<ul style="list-style-type: none"><li>• Apply Robotics Fundamentals</li></ul>
<b>Sales and Marketing</b>	<ul style="list-style-type: none"><li>• Understand Sales and Marketing in a Manufacturing Organisation</li></ul>
<b>Strategy Planning and Implementation</b>	<ul style="list-style-type: none"><li>• Understand Business Management</li></ul>
<b>Technical and Engineering Design</b>	<ul style="list-style-type: none"><li>• Apply Advanced Materials Technology</li><li>• Apply Automation Control for Machines</li><li>• Apply Materials Technology</li><li>• Design and Build Industrial Machine Electrical System</li><li>• Design for Manufacture and Assembly</li><li>• Design Mechanism Unit of Machine</li></ul>
<b>Technical and Engineering Fundamentals</b>	<ul style="list-style-type: none"><li>• Apply Geometric Dimensioning and Tolerancing</li><li>• Apply Materials Characterisation</li><li>• Apply Vibration Design and Control for Precision Engineering</li><li>• Determine Heat Transfer Loads for Processing Equipment</li><li>• Perform Engineering Simulation for Design Verification</li></ul>
<b>Workplace Safety and Health</b>	<ul style="list-style-type: none"><li>• Apply Workplace Safety and Health Policies</li><li>• Implement Workplace Safety and Health Systems</li><li>• Manage Workplace Safety and Health Systems</li><li>• Supervise Manufacturing Work for Workplace Safety and Health</li></ul>



# Engineer

The Engineer adapts and applies engineering principles and techniques to design and develop machinery and components, generate prototypes and/or implement system modifications.

He/She leverages on his/her technical and engineering skills to resolve technical and engineering issues and manage simple engineering projects. The Engineer also implements plans for improvements in production efficiency and effectiveness, while ensuring compliance with Workplace Safety and Health procedures and other regulatory requirements.

He/She possesses good interpersonal skills to lead Associate Engineers/ Assistant Engineers, and may be required to collaborate with other departments.

Skills Category	Skill
<b>Additive Manufacturing</b>	<ul style="list-style-type: none"> <li>• Review Additive Manufacturing Process to Determine Suitability of Manufacturing Metallic Components</li> <li>• Review Additive Manufacturing Process to Determine Suitability of Manufacturing Polymeric Components</li> <li>• Review Feasibility of Additive Manufacturing to Satisfy Component Requirements</li> </ul>
<b>Analytical, Conceptual and Evaluative</b>	<ul style="list-style-type: none"> <li>• Apply Systems Thinking in Problem Solving and Decision Making</li> </ul>
<b>Business Analytics</b>	<ul style="list-style-type: none"> <li>• Operationalise Analytics Models</li> </ul>
<b>Business Negotiation</b>	<ul style="list-style-type: none"> <li>• Manage and Direct Negotiations</li> </ul>
<b>Communication</b>	<ul style="list-style-type: none"> <li>• Conduct Presentations to Senior Management</li> <li>• Establish and Maintain Strategic Business Partner Relationships</li> </ul>
<b>Design Thinking</b>	<ul style="list-style-type: none"> <li>• Implement Design Thinking</li> </ul>
<b>Human Resource</b>	<ul style="list-style-type: none"> <li>• Develop On-the-Job Training Programmes</li> <li>• Develop Workplace Learning Plans</li> </ul>
<b>Info-Communication Technologies</b>	<ul style="list-style-type: none"> <li>• Produce Advanced Spreadsheet Outputs using Spreadsheet Applications</li> </ul>
<b>Intellectual Property</b>	<ul style="list-style-type: none"> <li>• Apply Basic Knowledge of Intellectual Property to Support IP-related Organisational Procedures</li> </ul>
<b>Interpersonal</b>	<ul style="list-style-type: none"> <li>• Manage Cross Functional and Culturally Diverse Teams</li> </ul>
<b>Laser and Optics</b>	<ul style="list-style-type: none"> <li>• Apply Advanced Laser Systems and Manufacturing Techniques for Creation of Structures</li> <li>• Apply Engineering Optics and Optical Metrology</li> <li>• Review Feasibility of Advanced Optical Metrology to Satisfy Manufacturing Requirements</li> <li>• Use Laser Beam Technology Systems in Manufacturing</li> </ul>
<b>Leadership and People Management</b>	<ul style="list-style-type: none"> <li>• Cultivate Workplace Relationships and Diversity</li> <li>• Develop Self to Maintain Professional Competence at Managerial Level</li> <li>• Develop Team Leaders through Capability Development and Coaching</li> <li>• Facilitate Innovation and Lead Team Leaders to Implement Change</li> <li>• Lead Team Leaders to Develop Strategies and Governance Management</li> <li>• Monitor and Reward Performance across Teams to Support Achievement of Results</li> </ul>

Skills Category	Skill
<b>Manufacturing Productivity and Innovation</b>	<ul style="list-style-type: none"> <li>• Apply Root Cause Analysis</li> <li>• Develop Lean Manufacturing using Six Sigma</li> <li>• Implement Overall Equipment Effectiveness (OEE) to Improve Manufacturing Operational Productivity</li> <li>• Manage Lean Manufacturing for Productivity Improvement</li> </ul>
<b>Personal Management and Development</b>	<ul style="list-style-type: none"> <li>• Develop Personal Effectiveness at Managerial Level</li> <li>• Develop Professional Image and Competence to Achieve Personal Career Goals</li> </ul>
<b>Precision Manufacturing Processes</b>	<ul style="list-style-type: none"> <li>• Develop Component Cleaning Process Plan to Determine Appropriate Cleaning Process for Manufacturing</li> <li>• Develop Finishing Process Plan to Determine Appropriate Finishing Process for Manufacturing</li> <li>• Develop Forming Process Plan to Determine Appropriate Forming Process for Manufacturing</li> <li>• Develop Joining Process Plan to Determine Appropriate Joining Process for Manufacturing</li> <li>• Develop Machining Process Plan to Determine Appropriate Precision Machining Process for Manufacturing</li> <li>• Develop Shop Floor Tracking and Control Plan through Management Execution Systems</li> <li>• Design Tools, Jigs and Fixtures to Support Precision Machining and In Accordance to Machining Requirements</li> <li>• Develop Welding Inspection Specification Plan to Determine Adherence to Joining Requirements</li> <li>• Evaluate and Apply Traditional Machining Processes to Satisfy Precision Machining Requirements</li> <li>• Evaluate Surface Coating Technologies to Satisfy Corrosion Prevention Requirements</li> <li>• Evaluate Surface Coating Technologies to Satisfy Finishing and Wear Prevention Requirements</li> <li>• Review and Apply Laser Cutting Machine Technology to Enhance Precision Machining Process</li> <li>• Review Application of Adhesive Bonding Technologies to Satisfy Precision Joining Requirements</li> <li>• Review Application of Welding Technologies to Satisfy Precision Joining Requirements</li> <li>• Review High Speed Machining Processes and Cutting Tools to Optimise Precision Machining Process</li> <li>• Review Plastic Injection Moulding Process to Determine Appropriate Forming Process for Manufacturing</li> </ul>
<b>Project Management</b>	<ul style="list-style-type: none"> <li>• Establish Project Feasibility</li> <li>• Establish Project Scope</li> </ul>

# Engineer

Skills Category	Skill
<b>Quality</b>	<ul style="list-style-type: none"> <li>• Develop Contamination Control Plan in Manufacturing to Satisfy Quality and Safety Requirements</li> <li>• Develop Plan to Determine Appropriate Inspection and Measurement Processes for Quality Assurance</li> <li>• Manage Quality Systems and Processes</li> </ul>
<b>Robotics and Automation</b>	<ul style="list-style-type: none"> <li>• Design Automation Control Modules for Machine Systems to Automate and Support Manufacturing Processes</li> <li>• Integrate Computer Network Modules in Machine Systems to Automate and Support Manufacturing Processes</li> <li>• Integrate Engineering Optics and Optical Measurement Modules to Inspect Components and Support Manufacturing Processes</li> <li>• Integrate Sensor and Actuator Modules in Machine Systems to Support Manufacturing Processes</li> </ul>
<b>Sales and Marketing</b>	<ul style="list-style-type: none"> <li>• Understand Sales and Marketing Fundamentals</li> </ul>
<b>Strategy Planning and Implementation</b>	<ul style="list-style-type: none"> <li>• Understand Business Management</li> </ul>
<b>Technical and Engineering Design</b>	<ul style="list-style-type: none"> <li>• Apply Design Principles for Manufacturing to Determine Design Approach</li> <li>• Design Mechanical and Electrical Systems for Automated Industrial Machines to Automate and Support Manufacturing Processes</li> <li>• Establish Product Specifications for Clients to Satisfy Product Requirements</li> <li>• Provide Design Solutions for Products to Satisfy Product Requirements</li> </ul>

## TECHNICAL & ENGINEERING TRACK - ENGINEER

Skills Category	Skill
<b>Technical and Engineering Fundamentals</b>	<ul style="list-style-type: none"><li>• Analyse and Model Engineering Situations to Solve Precision Engineering Problems</li><li>• Apply Computer-aided Design (CAD) Techniques</li><li>• Apply Computer-aided Manufacturing (CAM) Techniques</li><li>• Apply Engineering Metrology Principles to Determine Measurement Requirements</li><li>• Analyse Technical Drawings and Blue Prints to Apply Engineering Solutions</li><li>• Analyse the Impact of Geometric Dimensioning and Tolerancing (GD&amp;T) on Manufacturing Processes to Select Appropriate Engineering Interventions</li><li>• Evaluate Characterisation of Metals to Determine Suitability of Materials for Manufacturing</li><li>• Evaluate Characterisation of Non-Metals to Determine Suitability of Materials for Manufacturing</li><li>• Review Metal Heat Treatment Process to Determine Suitability of Treatment Process for Improving Characteristics</li><li>• Evaluate Operational Performance using 'OMNI' Methodology</li><li>• Evaluate the Behavioural Characteristics of Static and Dynamic Engineering Systems to Select Appropriate Engineering Systems for Application in Manufacturing</li></ul>
<b>Value Engineering</b>	<ul style="list-style-type: none"><li>• Develop Cost Reduction Strategies</li></ul>
<b>Workplace Safety and Health</b>	<ul style="list-style-type: none"><li>• Design and Lead Workplace Safety and Health Systems</li></ul>

# Master Craftsman

The Master Craftsman possesses advanced knowledge and experience in manufacturing techniques and leverages on these to resolve complex technical issues, while serving as an expert resource to others. He/She optimises production activities, processes and systems with a view to increase manufacturing productivity improvements.

The Master Craftsman supervises a team to meet production targets and product quality standards while ensuring compliance to Workplace Safety and Health and other regulatory requirements. As a subject matter expert, the Master Craftsman conducts training needs analysis, develops training programmes, and trains and coaches machinists, senior machinists and process specialists.

Skills Category	Skill
<b>Additive Manufacturing</b>	<ul style="list-style-type: none"> <li>• Apply Advanced Design for Additive Manufacturing</li> <li>• Manage Advanced Additive Manufacturing Technologies and Applications</li> <li>• Manage Innovative Product Development Using Additive Manufacturing</li> </ul>
<b>Analytical, Conceptual and Evaluative</b>	<ul style="list-style-type: none"> <li>• Apply Systems Thinking in Problem Solving and Decision Making</li> </ul>
<b>Business Analytics</b>	<ul style="list-style-type: none"> <li>• Operationalise Analytics Models</li> </ul>
<b>Business Negotiation</b>	<ul style="list-style-type: none"> <li>• Manage and Direct Negotiations</li> </ul>
<b>Communication</b>	<ul style="list-style-type: none"> <li>• Conduct Presentations to Senior Management</li> <li>• Establish and Maintain Strategic Business Partner Relationships</li> </ul>
<b>Engineering Project Management</b>	<ul style="list-style-type: none"> <li>• Manage Engineering Projects (CAM and CNC Machining)</li> <li>• Manage Engineering Projects (Mould Design and Process)</li> </ul>
<b>Human Resource Management</b>	<ul style="list-style-type: none"> <li>• Develop On-the-Job Training Programmes</li> <li>• Develop Workplace Learning Plans</li> </ul>
<b>Info-Communication Technologies</b>	<ul style="list-style-type: none"> <li>• Produce Advanced Spreadsheet Outputs Using Spreadsheet Applications</li> </ul>
<b>Intellectual Property</b>	<ul style="list-style-type: none"> <li>• Apply Knowledge of Intellectual Property to Support IP - related Organisational Procedures</li> </ul>
<b>Interpersonal</b>	<ul style="list-style-type: none"> <li>• Manage Cross Functional and Culturally Diverse Teams</li> </ul>
<b>Leadership and People Management</b>	<ul style="list-style-type: none"> <li>• Cultivate Workplace Relationships and Diversity</li> <li>• Develop Self to Maintain Professional Competence at Managerial Level</li> <li>• Develop Team Leaders through Capability Development and Coaching</li> <li>• Facilitate Innovation and Lead Team Leaders to Implement Change</li> <li>• Lead Team Leaders to Develop Strategies and Governance Management</li> <li>• Monitor and Reward Performance Across Teams to Support Achievement of Results</li> </ul>

## TECHNICAL & ENGINEERING TRACK - MASTER CRAFTSMAN

Skills Category	Skill
<b>Manufacturing Productivity and Innovation</b>	<ul style="list-style-type: none"><li>• Manage Continuous Improvement</li><li>• Manage Manufacturing Productivity Improvement</li><li>• Manage Process Improvement</li><li>• Manage Productivity Improvement Tools</li></ul>
<b>Personal Management and Development</b>	<ul style="list-style-type: none"><li>• Develop Personal Effectiveness at Managerial Level</li><li>• Develop Professional Image and Competence to Achieve Personal Career Goals</li></ul>
<b>Precision Manufacturing Processes</b>	<ul style="list-style-type: none"><li>• Apply Automatic Control for Machines</li><li>• Apply Mechanical Components and Peripherals in Automated Equipment</li><li>• Apply Pedagogy Methodology for the Workplace</li><li>• Apply Pedagogy Methodology in On-the-Job Training and Information Technology</li><li>• Apply Solid Modelling and Drafting for Machine Parts</li><li>• Develop Mechanical Fixtures Design</li><li>• Manage Advanced CNC Machining</li><li>• Manage Advanced Mould Design</li><li>• Manage Advanced Tool-room Machining</li><li>• Manage Plastics Injection Moulding</li><li>• Manage Plastics Materials Technology</li><li>• Manage Process Optimisation and Cutting Technologies</li><li>• Manage Shop Floor Monitoring and Processes</li></ul>
<b>Project Management</b>	<ul style="list-style-type: none"><li>• Establish Project Feasibility</li><li>• Establish Project Scope</li></ul>
<b>Quality</b>	<ul style="list-style-type: none"><li>• Manage Advanced Metrology and Quality Assurance</li><li>• Manage Quality Systems</li></ul>
<b>Risk Management</b>	<ul style="list-style-type: none"><li>• Manage Risk in the Business Unit</li></ul>
<b>Sales and Marketing</b>	<ul style="list-style-type: none"><li>• Understand Sales and Marketing in a Manufacturing Organisation</li></ul>
<b>Strategy Planning and Implementation</b>	<ul style="list-style-type: none"><li>• Understand Business Management</li></ul>

# Master Craftsman

Skills Category	Skill
<b>Technical and Engineering Design</b>	<ul style="list-style-type: none"><li>• Apply Mechanics in Design Solutions</li></ul>
<b>Technical and Engineering Fundamentals</b>	<ul style="list-style-type: none"><li>• Apply Advanced Manufacturing Technology and Process</li><li>• Apply Mathematical Concepts in Engineering Solutions</li><li>• Evaluate Advanced Materials Technology</li><li>• Manage Computer-aided Design (CAD) Techniques</li><li>• Manage Computer-aided Manufacturing (CAM) Techniques</li></ul>
<b>Workplace Safety and Health</b>	<ul style="list-style-type: none"><li>• Manage Workplace Safety and Health Systems</li><li>• Supervise Manufacturing Work for Workplace Safety and Health</li></ul>

# Senior Engineer

The Senior Engineer plans, conducts and directs research and/or development work on complex projects, necessitating the origination and application of new and unique approaches. He/She also engages with internal and external parties in the design and development, costing and recommendations of new machinery and/or components.

He/She manages, trains and mentors a team of Engineers and/or Assistant Engineers. The Senior Engineer works in consultation with other department heads as an advisor of technologies which may lead to improvements in productivity and efficiency.

Skills Category	Skill
<b>Additive Manufacturing</b>	<ul style="list-style-type: none"> <li>• Develop Integration Plan for Additive Manufacturing Processes to Satisfy Manufacturing Requirements</li> <li>• Review High Speed Additive Manufacturing Process to Determine Suitability of Manufacturing Metallic Components</li> <li>• Review Liquid-based Polymeric Additive Manufacturing to Determine Suitability of Manufacturing Components</li> </ul>
<b>Business Analytics</b>	<ul style="list-style-type: none"> <li>• Analyse Data and Identify Business Insights</li> </ul>
<b>Business Negotiation</b>	<ul style="list-style-type: none"> <li>• Manage Dispute Mediation</li> </ul>
<b>Change Management</b>	<ul style="list-style-type: none"> <li>• Direct End-to-End Change Management</li> </ul>
<b>Communication</b>	<ul style="list-style-type: none"> <li>• Resolve Conflicts with Stakeholders</li> </ul>
<b>Design Thinking</b>	<ul style="list-style-type: none"> <li>• Apply a Holistic User-centric Approach for Strategic Design Thinking</li> </ul>
<b>Human Resource</b>	<ul style="list-style-type: none"> <li>• Conduct Interviews and Make Hiring Decisions</li> </ul>
<b>Info-Communication Technologies</b>	<ul style="list-style-type: none"> <li>• Produce Advanced Spreadsheet Outputs using Spreadsheet Applications</li> </ul>
<b>Intellectual Property</b>	<ul style="list-style-type: none"> <li>• Apply Knowledge of Intellectual Property to Support IP-related Organisational Procedures</li> </ul>
<b>Laser and Optics</b>	<ul style="list-style-type: none"> <li>• Develop Integration Plan for Advanced Optical Metrology Processes to Satisfy Manufacturing Requirements</li> </ul>
<b>Leadership and People Management</b>	<ul style="list-style-type: none"> <li>• Develop Self to Maintain Professional Competence at Senior Management Level</li> <li>• Foster Business Relationships and Organisational Diversity</li> </ul>
<b>Manufacturing Productivity and Innovation</b>	<ul style="list-style-type: none"> <li>• Evaluate Organisation's Approach to Lean Enterprise to Enhance Competitiveness</li> <li>• Perform Virtual Modelling and Simulation to Achieve Manufacturing Productivity Improvements</li> </ul>
<b>New Product Development</b>	<ul style="list-style-type: none"> <li>• Create Engineering Designs</li> <li>• Identify Engineering Design Requirements of Clients</li> </ul>



# Senior Engineer

Skills Category	Skill
<b>Precision Manufacturing Processes</b>	<ul style="list-style-type: none"> <li>• Evaluate Advanced Surface Coating Technologies to Satisfy Corrosion Prevention Requirements</li> <li>• Evaluate and Apply Non-traditional Machining Processes to Satisfy Precision Machining Requirements</li> <li>• Evaluate Application of Advanced Joining Processes to Enhance Joining Process for Manufacturing</li> <li>• Evaluate Application of Advanced Metal Welding Processes to Enhance Welding Process for Manufacturing</li> <li>• Evaluate Component Cleaning Process Plan to Determine Appropriate Cleaning Process for Manufacturing</li> <li>• Evaluate Finishing Process Plan to Determine Appropriate Finishing Process for Manufacturing</li> <li>• Evaluate Forming Process Plan to Determine Appropriate Forming Process for Manufacturing</li> <li>• Evaluate Machining Process Plan to Determine Appropriate Precision Machining Process for Manufacturing</li> <li>• Review Integrated Forming Process Technology for Metals to Optimise Forming Process</li> </ul>
<b>Project Management</b>	<ul style="list-style-type: none"> <li>• Lead Programme and Project After Action Review</li> </ul>
<b>Quality</b>	<ul style="list-style-type: none"> <li>• Integrate Quality Principles and Methodology into Manufacturing Processes to Enhance Engineering Performance</li> </ul>
<b>Robotics and Automation</b>	<ul style="list-style-type: none"> <li>• Enhance Control Performance of Precision Machines to Satisfy Manufacturing Requirements</li> </ul>
<b>Strategy Planning and Implementation</b>	<ul style="list-style-type: none"> <li>• Establish Business Strategies for the Business Function</li> </ul>
<b>Technical and Engineering Design</b>	<ul style="list-style-type: none"> <li>• Design Precision Machinery to Satisfy Manufacturing Requirements</li> <li>• Evaluate New Product Designs for Manufacture and Assembly to Satisfy Project and Product Requirements</li> <li>• Manage Product Design and Development to Satisfy Project and Product Requirements</li> </ul>

## TECHNICAL & ENGINEERING TRACK - SENIOR ENGINEER

Skills Category	Skill
<b>Technical and Engineering Fundamentals</b>	<ul style="list-style-type: none"><li>• Apply Computer-integrated Manufacturing to Support Precision Engineering Manufacturing Processes</li><li>• Apply Finite Element Method/Analysis to Analyse Manufacturing Problems</li><li>• Evaluate Characterisation of Advanced Materials to Determine Suitability of Materials for Manufacturing</li><li>• Evaluate Embedded Systems to Apply in Manufacturing Systems</li><li>• Review Advanced Metal Heat Treatment Process to Determine Suitability of Treatment Process for Improving Characteristics</li><li>• Review Advanced Metrology Systems to Determine Measurement Requirements</li></ul>
<b>Value Engineering</b>	<ul style="list-style-type: none"><li>• Evaluate Organisation's Value Stream to Reduce Waste</li></ul>
<b>Workplace Safety and Health</b>	<ul style="list-style-type: none"><li>• Manage Workplace Safety and Health Systems</li></ul>

# Chief Engineer

The Chief Engineer establishes the organisation's technical vision and leads in all aspects of technology development while providing directions in all technology-related issues.

He/She possesses a high level of technical and engineering competence, as well as social and leadership skills to champion organisational development interventions, and is able to address ethical and professional issues which the organisation faces, in accordance with current professional and/or ethical codes of practice.

Skills Category	Skill
<b>Additive Manufacturing</b>	<ul style="list-style-type: none"> <li>Develop Additive Manufacturing Application Strategy and Evaluate Integration Plan for Additive Manufacturing Processes to Satisfy Manufacturing Requirements</li> </ul>
<b>Business Negotiation</b>	<ul style="list-style-type: none"> <li>Direct Negotiation Policy and Develop Negotiation Limits</li> </ul>
<b>Change Management</b>	<ul style="list-style-type: none"> <li>Lead Change Management</li> </ul>
<b>Communication</b>	<ul style="list-style-type: none"> <li>Direct Relationships with Stakeholders</li> <li>Establish Internal Communications Platforms and Channels</li> </ul>
<b>Human Resource</b>	<ul style="list-style-type: none"> <li>Align Human Resources with Business Needs</li> <li>Promote Harmonious Tripartite Relations</li> </ul>
<b>Laser and Optics</b>	<ul style="list-style-type: none"> <li>Develop Advanced Optical Metrology Application Strategy and Evaluate Integration Plan for Advanced Optical Metrology Processes to Satisfy Manufacturing Requirements</li> </ul>
<b>Leadership and People Management</b>	<ul style="list-style-type: none"> <li>Develop Self to Maintain Professional Competence to Lead an Organisation</li> <li>Establish Organisational Relationships and Lead Organisational Diversity</li> </ul>
<b>New Product Development</b>	<ul style="list-style-type: none"> <li>Carry Out Design of Experiments</li> <li>Develop a Research Methodology for Engineering</li> <li>Verify New Product Designs using a Physical Model</li> </ul>
<b>Precision Manufacturing Processes</b>	<ul style="list-style-type: none"> <li>Evaluate Precision Manufacturing Processes and Technologies to Satisfy Manufacturing Requirements</li> </ul>
<b>Project Management</b>	<ul style="list-style-type: none"> <li>Steer Programme</li> </ul>
<b>Quality</b>	<ul style="list-style-type: none"> <li>Evaluate Quality Engineering Processes to Satisfy Business and Legislative Requirements</li> <li>Integrate Quality Planning throughout Product Life Cycle to Incorporate Quality Management from Product Conception to Disposal</li> </ul>
<b>Strategy Planning and Implementation</b>	<ul style="list-style-type: none"> <li>Establish Business Strategies for the Business Function</li> </ul>

## TECHNICAL & ENGINEERING TRACK - CHIEF ENGINEER

Skills Category	Skill
<b>Technical and Engineering Design</b>	<ul style="list-style-type: none"><li>• Develop a Strategy for the Engineering Design Process to Satisfy Market and Legislative Requirements</li><li>• Evaluate Engineering Designs of Machinery and Systems to Satisfy Manufacturing Requirements</li></ul>
<b>Technical and Engineering Fundamentals</b>	<ul style="list-style-type: none"><li>• Apply Advanced Precision Engineering Concepts and Principles to Solve Complex Precision Engineering Problems</li></ul>
<b>Workplace Safety and Health</b>	<ul style="list-style-type: none"><li>• Evaluate Workplace Safety and Health Systems</li></ul>