

TSC Category	Technology Application Management					
TSC	Robotic and Automation System Maintenance					
TSC Description	Maintain robotic and automation systems to meet operation requirements and propose strategies for improvements to the automation system's performance					
TSC Proficiency Description	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
	ECM-TEM-1002-1.1	ECM-TEM-2002-1.1	ECM-TEM-3002-1.1	ECM-TEM-4002-1.1	ECM-TEM-5002-1.1	
	Carry out autonomous maintenance activities on machines and equipment	Perform inspections and plan for any parts replacement needed due to wear and tear	Maintain robotic and automation systems, and interpret system performance metrics for performance verification	Manage major robotic and automation system maintenance and troubleshoot abnormalities to ensure prompt system recovery	Formulate strategies for robotic and automation system performance improvement through analysing robotic and automation system performance metrics	
Knowledge	<ul style="list-style-type: none"> • Steps in autonomous maintenance • Equipment cleaning and inspection techniques and standards • Common hand tools used • Common equipment abnormalities • Corrective actions to eliminate abnormalities identified 	<ul style="list-style-type: none"> • Principles of electronics • Principles of mechatronics • Principles of pneumatics • Safety procedures • Non-destructive inspections of static components • Proper handling of tools applicable to robotics and automation • Tension of timing belts and chain systems • Mechanical parts lubrication 	<ul style="list-style-type: none"> • Types and functionalities of robotic and automation systems • System safety requirements • Robotics and automation operational requirements • Concepts and applications of maintenance for robotics and automation • System performance metrics 	<ul style="list-style-type: none"> • Interaction between robotic and automation systems with production tools and process equipment • Types of alarms or faults • Concepts and applications of major maintenance for robotics and automation • Automation system performance metrics 	<ul style="list-style-type: none"> • Problem-solving techniques • Robotic and automation system performance metrics 	

**SKILLS FRAMEWORK FOR ENERGY AND CHEMICALS
TECHNICAL SKILLS AND COMPETENCIES (TSC) REFERENCE DOCUMENT**

<p>Abilities</p>	<ul style="list-style-type: none"> • Conduct equipment cleaning and inspection activities • Carry out corrective actions against abnormalities 	<ul style="list-style-type: none"> • Maintain robotic and automation systems uptime performance • Interpret robot performance data and maintenance schedules • Interpret electrical schematics and mechanical design diagrams • Maintain automated material handling system (AMHS) equipment by disassembling and replacing worn parts 	<ul style="list-style-type: none"> • Identify robotic and automation system functions in manufacturing operations • Prepare robotic and automation systems for maintenance • Troubleshoot robot issues • Verify robotic and automation system performance against specifications • Release automation systems for operations 	<ul style="list-style-type: none"> • Prepare robotic and automation systems for maintenance • Conduct major maintenance • Troubleshoot complex robot issues and optimise robot functions • Verify robotic and automation system performance against specifications • Troubleshoot any abnormalities detected • Release robotic and automation systems for operations 	<ul style="list-style-type: none"> • Analyse robotic and automation system performance metrics in accordance with specifications • Select appropriate projects that will enhance robotic and automation system performance • Define robotics and automation enhancement projects' scope of work and man-hours, based on business requirements • Execute robotics and automation enhancement projects in accordance with project plans • Evaluate project effectiveness, in accordance with project objectives • Recommend follow-up actions 	
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