

TSC Category	Technology Road Mapping					
TSC	Robotic and Automation Technology Application					
TSC Description	Integrate robotic and automation technologies in engineering services, including construction, operations and maintenance so as to enhance productivity and precision and to reduce reliance on manual tasks					
TSC Proficiency Description	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
		EGS-TEM-2007-1.1-1	EGS-TEM-3007-1.1-1	EGS-TEM-4007-1.1-1	EGS-TEM-5007-1.1-1	EGS-TEM-6007-1.1-1
		Apply procedural knowledge of robotic and automation technologies to execute tasks	Interpret workflow plan and manufacturer's recommendations for the use of automatic technologies and systems	Review performance of robotic and automation technologies so as to assess improvements in engineering services	Formulate new processes that adopt robotic and automation technologies so as to enhance operational efficiency	Explore wide applications of robotic and automation technologies in the organisation so as to transform engineering services
Knowledge		<ul style="list-style-type: none"> Types of robotic and automation technologies and process control systems Methods of operating robotic systems for construction, operations and maintenance tasks Procedures of safe machinery operation Types of sensors and actuators Procedures for installing actuators and sensors 	<ul style="list-style-type: none"> Organisational workflows Principles of robotic and automation technologies Procedures for setting up and inspecting robotic systems and automation technologies Approaches to oversee tasks that use robotic systems and automation technologies Principal of process control algorithms Types and applications of control loop components and controllers 	<ul style="list-style-type: none"> Range of applications of robotic and automation technologies Methods of evaluating resources and skills to carry out tasks using robotic and automation technologies Principles of electro-pneumatics Types of logic control programs Concepts pertaining to performance specifications and analysis Best practices in robotic and automation Components of a robot Principles of path and trajectory planning Types of programming skills of a robot 	<ul style="list-style-type: none"> Organisation's products, services and processes Organisation's quality and Workplace Safety and Health (WSH) guidelines Methods of developing detailed operating procedures for robotic and automation technologies Methods to influence adoption of new technologies Impact of robotic and automation on engineering services Principles of change management 	<ul style="list-style-type: none"> Applications of emerging robotic and automation technologies in engineering services Industry best practices and applications of new technologies adoption in the industry Impact of robotic and automation on engineering services Benefits and trade-offs of advanced robotic and automation Financial cost of introducing robotic and automation to processes Automation cost benefits analysis methods Methodology of return-on-investment (ROI) analysis Methods of conducting research and development in robotic and automations Robotic and automation legislative requirements Principles of change management
Abilities		<ul style="list-style-type: none"> Operate robotic and automation technologies by following 	<ul style="list-style-type: none"> Oversee use of robotic and automation technologies 	<ul style="list-style-type: none"> Evaluate various automation technologies and robotic systems to 	<ul style="list-style-type: none"> Determine range of application, resources, skill requirements and 	<ul style="list-style-type: none"> Synthesis innovation developments in the

		<p>manufacturer's instructions and operating procedures</p> <ul style="list-style-type: none"> Follow safety procedures when operating robotic and automation technologies Identify and report any issues with the robotic and automation technologies Install sensors and actuators for process control in specified locations 	<ul style="list-style-type: none"> Diagnose faults in the use of robotic and automation technologies for processes and suggest solutions Interpret and extract relevant process parameters from given specifications Apply corrective actions for automatic and manual shut-down during critical and emergency situations Review feedback on operation of robotic and automation technologies and incorporate into updated operating procedures 	<p>compare strengths and limitations of the automation technologies</p> <ul style="list-style-type: none"> The feasibility of robotic and automation systems in engineering services Apply optimisation techniques to improve automated processes' efficiency and product quality Assess improvements in engineering services and processes Evaluate the benefits and trade-offs of implementing advanced optical metrology to the business 	<p>feasibility for robotic and automation technologies</p> <ul style="list-style-type: none"> Develop technical operating procedures for robotic and automation Formulate processes and procedures for engineering services using robotic and automation Drive automation technology and robotic systems into day-to-day operations Ensure procedures and operations are implemented according to plan and WSH requirements Refine parameters of robotic and automation processes to improve operational efficiency Determine post-processing procedures for engineering services using robotic and automation 	<p>engineering services sector</p> <ul style="list-style-type: none"> Anticipate macro trends and their impact on speed, process or automation requirements Evaluate the benefits and trade-offs of implementing advanced robotic and automation to the business Assess the cost and return on investment of automating processes Develop robotic and automation application strategies Analyse alternative approaches to robotic and automation to enhance precision and productivity Identify potential opportunities to improve robotic and automation approaches in the organisation Prepare a business case for implementing advanced robotic and automation to satisfy business and legislative requirements
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