TSC Category	Technology Application Management					
TSC	Robotic and Automation Technology Application					
TSC Description	Integrate robotic and automation technologies in manufacturing workflows, including process operations, maintenance, logistics and plant surveillance, to enhance productivity and precision and reduce reliance on manual tasks					
TSC Proficiency Description	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	**Level 6**
		ECM-TEM-2003-1.1	ECM-TEM-3003-1.1	ECM-TEM-4003-1.1	ECM-TEM-5003-1.1	ECM-TEM-6003-1.1
		Apply procedural knowledge of robotic and automation technologies to execute manufacturing tasks	Interpret workflow plans and manufacturers' recommendations for the use of automatic technologies and systems	Review performance of robotic and automation technologies to assess improvements on the manufacturing workflow and products	Formulate new manufacturing processes that adopt robotic and automation technologies to enhance operational efficiency	Explore wide applications of robotic and automation technologies of manufacturing in the organisation to transform manufacturing processes
Knowledge		• Types of robotic and automation technologies and their process control systems utilised in manufacturing tasks • Methods of operating robotic systems for manufacturing tasks • Procedures of safe machinery operation • Types of sensors and actuators • Procedures for installing actuators and sensors	• Organisational manufacturing workflows • Principles of robotic and automation technologies • Procedures for setting up and inspecting robotic systems and automation technologies • Approaches to oversee manufacturing tasks that use robotic systems and automation technologies • Principles of process control algorithms • Types and applications of control loop components and controllers	• Range of applications for robotic and automation technologies • Methods of evaluating resources and skills to carry out manufacturing tasks using robotic and automation technologies • Principles of electro-pneumatics • Types of logic control programmes • Concepts pertaining to performance specifications and analyses • Best practices in robotics and automation • Components of a robot • Principles of path and trajectory planning • Types of robot programming languages	• Organisational products and processes • Organisational quality and Workplace Safety and Health (WSH) guidelines • Methods of developing detailed operating procedures for robotics and automation technologies • Methods to influence the adoption of new technologies • Impact of robotics and automation on manufacturing operations • Principles of change management	• Applications of emerging robotic and automation technologies in the energy and chemicals industry • Industry best practices and applications of new technology adoption in the industry • Impact of robotics and automation to manufacturing operations • Benefits and trade-offs of advanced robotics and automation • Financial costs of introducing robotics and automation to manufacturing processes • Automation cost-benefit analysis methods • Methodology of return on investment analyses • Methods of conducting Research and

Effective Date: October 2017, Version 1.1

						Development (R&D) in robotics and automation • Robotics and automation legislative requirements • Principles of change management
Abilities		• Operate robotics and automation technologies by following manufacturers' instructions and operating procedures • Follow safety procedures when operating robotics and automation technologies • Identify and report any issues with robotics and automation technologies • Install sensors and actuators for process control in specified locations	• Oversee use of robotics and automation technologies • Diagnose faults in the use of robotics and automation technologies for manufacturing 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 and incorporate feedback on the operation of robotics and automation technologies into updated operating procedures	• Evaluate various automation technologies and robotic systems to compare strengths and limitations of automation technologies • Evaluate the feasibility of robotics and automation systems for manufacturing processes • Apply optimisation techniques to improve automated processes' efficiency and product quality • Assess improvements to products and manufacturing processes • Evaluate the benefits and trade-offs of implementing advanced optical metrology to the business	• Determine range of application, resources, skill requirements and production feasibility for robotics and automation technologies • Develop technical operating procedures for robotics and automation • Formulate processes and procedures for manufacturing components using robotics 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 robotics and automation processes to improve operational efficiency • Determine post-processing procedures for manufacturing components using robotics and automation	• Synthesise innovation developments in the energy and chemicals industry • Anticipate macro trends and their impact on speed, processes or automation requirements in the energy and chemicals industry • Evaluate the benefits and trade-offs of implementing robotics and automation to the business • Assess the costs and returns on investment of automating production processes • Develop robotics and automation application strategies • Analyse alternative approaches to robotics and automation to enhance manufacturing precision and productivity • Identify potential opportunities to improve robotics and automation approaches in the organisation • Prepare business cases for implementing robotics and automation to satisfy business and legislative requirements