TSC Category	Precision Manufacturing Process					
TSC	Welding					
TSC Description	Manage the application of welding, as a specialised subset of technologies, tools and processes for joining of metallic parts and components in manufacturing operations					
TSC Proficiency Description	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	**Level 6**
	PRE-OPR-1063-1.1	**PRE-OPR-2063-1.1**	**PRE-OPR-3063-1.1**	**PRE-OPR-4063-1.1**	**PRE-OPR-5063-1.1**	
	Perform welding operations using appropriate welding processes	Perform welding inspections to verify conformance to required standards	Plan and supervise welding operations for compliance with welding specifications	Develop weld designs and specifications to meet requirements	Apply applications of welding technology to enhance welding processes for manufacturing	
Knowledge	• Workplace safety and health (WSH) requirements • Safe working practices, parameters and rules to observe when operating welding equipment • Welding processes and related factors • Weld requirements from shop drawings and/or specifications • Selection of filler materials • Effects of impurities on welding • Properties of ferrous and non-ferrous metals, in terms of their influence on weldability • Heat treatment related to welding • Corrective actions on welded faults • Types and purposes of maintenance documentation	• Personal protective equipment and safety data sheets (SDS) • Welding processes, equipment and operations • Welding metallurgy, materials specifications and/or properties • Construction and design of welded joints • Welding consumables specifications • Welding procedure specifications and procedure qualifications • Welding codes, specifications and standards commonly used in industry • Destructive and non-destructive testing of welds • Production planning and quality control in welding • Handling of non-conformance with requirements of applicable welding codes, specifications and standards • Methods for preparing materials testing samples	• Requirements of material and consumables • Organisational and manufacturers' welding procedures • Welding processes, standards and specifications • Safety data sheets (SDS) • Concepts of joint designs • Welding techniques and equipment • Welding acceptance criteria • Types of weld defects • Workplace safety and health (WSH) requirements	• Principle of metallurgy and weld property requirements • Weld defect formation and mechanisms • Pre- and post-weld heat treatments • Types of non-destructive tests (NDT) • Selection criteria for weld types and identification of weld defects • Criteria for process mechanisation and selection of suitable approaches • Principles of welding processes and cost evaluation of welding operations • Principles of residual stress formation in weldment and correlation among welding process parameters, residue stresses and distortions • Purpose and classification of fixtures used in welding operations • Concepts of quality assurance and control in welding operations	• Types of welding heating sources and mechanisms • Welding process techniques and equipment • Characteristics of laser welding processes • Characteristics of blazing processes • Characteristics of electrode arc welding processes • Welding metallurgy concepts and weld defects • Parameters and factors affecting the joining of stainless steels • Selection criteria for weld types and identification of weld defects • Types of welding joint configurations, welding processes, non-destructive testing (NDT), and welding joint evaluations • Principles of welding metallurgy and weld property requirements	

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		• Workplace safety and health (WSH) requirements				
Abilities	• Apply safety practices at the workplace when performing welding operations • Review maintenance documentation and technical manuals to determine required tasks • Prepare parts for welding in accordance with material specifications, job requirements and organisational procedures • Select the type of welding to be used in the repair process, in accordance with technical manuals • Operate weld equipment to deposit weld metal, in accordance with technical manuals • Check for distortions, in accordance with technical manuals • Measure components and/or parts to verify conformity with job specifications • Check quality of welded parts, in accordance with technical manuals • Identify defective welded parts by visual examination and workshop tests • Take corrective actions to address the causes of weld faults, in accordance with technical manuals • Process required maintenance documentation in	• Interpret welding requirements based on work instructions and repair manuals • Verify welding procedure specifications • Carry out welding inspections immediately before, during and after welding work, in accordance with approved welding codes, specifications or standards • Verify and/or witness that the required visual and other non-destructive examinations and destructive testing of test samples are carried out, according to specified procedures • Prepare inspection reports • Check all records for completeness and accuracy, in accordance with organisational requirements • Verify that inspection records and results of examinations are maintained and distributed to relevant persons	• Interpret engineering blueprints • Plan welding operations • Supervise welding operations • Perform quality control for welding operations • Manage risks in welding processes	• Analyse on manufacturing process requirements to determine need for welding • Determine appropriate welding processes, principles and techniques relevant to particular applications • Develop welding specification plans, based on selected welding processes • Incorporate testing methods into specification plans • Design and set up quality control procedures to address aspects of product quality and compliance to regulatory requirements • Evaluate effectiveness of weld designs and general specifications during post-application • Review and update welding implementation during post-application for improvements	• Review different welding technologies and systems for relevance to different applications • Determine joint requirements to meet design specifications • Evaluate welding processes for suitability to application requirements • Design and develop welding procedure specification plans, in accordance with workplace and legislative procedures • Design and set up quality control procedures to address product quality and compliance to regulatory requirements • Verify accuracy of calculations and applications of scientific principles in welding solutions	

	accordance with regulatory requirements					