

**SKILLS FRAMEWORK FOR PRECISION ENGINEERING
TECHNICAL SKILLS AND COMPETENCIES (TSC) REFERENCE DOCUMENT**

TSC Category	Precision Manufacturing Process					
TSC	Material Joining					
TSC Description	Fabricate components and construct different structures by bringing together parts of different properties, dimensions and compositions					
TSC Proficiency Description	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
	PRE-OPR-1060-1.1	PRE-OPR-2060-1.1	PRE-OPR-3060-1.1	PRE-OPR-4060-1.1		
	Execute prescribed joining techniques for manufacturing of components under close supervision and in compliance with safety requirements	Oversee joining operations to ensure that tasks are carried out in accordance with manufacturing workflow plans, using appropriate techniques, measurement standards and materials in compliance with relevant safety parameters	Interpret design specifications and drawings to determine where joining is required, and evaluate various joining technologies to plan work requirements	Optimise applications of joining methodologies for materials used in precision manufacturing		
Knowledge	<ul style="list-style-type: none"> Types of joining techniques and equipment Storage, handling and use of consumables and gases related to joining operations Types of filler materials Types of joint designs Methods of joint and surface preparation Types of joining defects, their implications and methods of rectification Applications of destructive and non-destructive testing (NDT) and bond tests Workplace safety and health (WSH) requirements Quality assurance and quality control (QA/QC) requirements related to joining works 	<ul style="list-style-type: none"> Joining process parameters Types of joining procedure specifications and data sheets Types and characteristics of joining deformation Acceptance criteria and inspection methods for joining works Principles and procedures for surface preparation Concept of stress relief in materials Methods of dimension control, corrective actions and rectifying distortion control Types of joint defects 	<ul style="list-style-type: none"> Applications of joining standards, codes and statutory requirements Mechanical and physical properties of materials used in manufacturing Factors affecting the joining materials used in manufacturing Types and characteristics of joining processes Types of deformations and associated characteristics Joining process parameters Materials processes related to joining operations Types and limitations of non-destructive testing (NDT) and bond tests for joints processes Workplace safety and health (WSH) requirements 	<ul style="list-style-type: none"> Principles of precision engineering Methods and tools for evaluating engineering processes Criteria for evaluating engineering processes Types and impact of recommendations on engineering processes Organisational and legislative requirements Workplace safety and health (WSH) requirements 		

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<p>Abilities</p>	<ul style="list-style-type: none"> • Select and use suitable personal protective equipment appropriate to job requirements • Interpret technical drawings and specifications to extract relevant information to prepare and set up joining materials and equipment • Conduct pre-operational checks and inspections to verify working conditions of joining tools and equipment, according to job requirements • Perform joints and surfaces preparation, according to job requirements • Set up joining equipment according to safe working practices • Set up components using appropriate jigs and fixtures according to job requirements • Perform joining operations and adjust appropriately to achieve required quality • Rectify joining defects using appropriate processes to meet specifications 	<ul style="list-style-type: none"> • Interpret technical drawings and specifications to extract relevant information on joint requirements • Develop joining process plans for application • Select appropriate techniques and equipment, based on joint requirements • Supervise joining processes to ensure required solutions are achieved • Evaluate joining processes and advise on identified defects • Assess joint quality for compliance with standards and requirements 	<ul style="list-style-type: none"> • Determine joining techniques and associated technologies to be applied, based on component design and functional requirements • Review design specifications, drawings and joint strength calculations to verify the suitability of chosen joining techniques • Prepare joining procedure specifications • Prepare joining inspection specification plans • Set up quality control procedures to address product quality and compliance to regulatory guidelines • Review properties of joints and perform corrective processing 	<ul style="list-style-type: none"> • Verify analyses and selections of joint requirements, in accordance with design specifications • Verify selections of joining processes for suitability to application requirements • Verify accuracy of joint strength calculations, in accordance with design specifications • Evaluate suitability and effectiveness of joining process plans for particular applications • Evaluate the effectiveness of quality control procedures in addressing product quality and compliance to regulatory requirements • Prepare full evaluation reports on effectiveness of engineering process plans in meeting functional requirements 		
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