

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

TSC Category	Precision Manufacturing Process					
TSC	Plastic Injection Moulding					
TSC Description	Design and implement injection moulding systems to manufacture polymer-based products					
TSC Proficiency Description	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
		PRE-OPR-2061-1.1	PRE-OPR-3061-1.1	PRE-OPR-4061-1.1	PRE-OPR-5061-1.1	
		Perform hot processing operations for the manufacturing of plastic components	Prepare and set up thermoplastic polymer, polymer composite and/or thermoset polymer processing and computer-aided engineering (CAE) simulations for plastic mould injections	Perform plastics injection moulding process set up, optimisation and control to produce parts in accordance with specifications	Create accurate digital prototypes during the process design stage of manufacturing polymer-based products	
Knowledge		<ul style="list-style-type: none"> Types of furnaces for plastic injection moulding Operating principles of furnaces Application of die sets Principles of hot forming Principles of super-plastic forming Types of surface defects arising from hot forming processes Workplace safety and health (WSH) requirements 	<ul style="list-style-type: none"> Techniques of polymer and polymer composite processing Principles of precision injection moulding process Principles of twin screw extrusion process Processing factors affecting good mould replication for micro feature components and/or biomedical micro components Processing factors affecting compounding of short-fibre reinforced thermoplastic composite Principles and techniques of thermoset composite processing Methods for defect minimisation during thermoset processing Applications of specialty materials in thermoset composite processing Principles of fabrication for thermoset fibre 	<ul style="list-style-type: none"> Fundamentals of injection moulding processes Applied plastic injection moulding Process control and automation in injection moulding Types of polymer moulding techniques Cleanroom moulding fundamentals Workplace safety and health (WSH) requirements 	<ul style="list-style-type: none"> Principles of design for machining criteria Principles of rapid prototyping and rapid tooling Factors causing product variations Optimisation of process parameters Process automation and integration Types and principles of various polymer moulding techniques Workplace safety and health (WSH) requirements 	

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			<p>reinforced composite laminates from fibre-only preforms</p> <ul style="list-style-type: none"> Principles and applications of finite element method for polymer flow analyses 			
Abilities		<ul style="list-style-type: none"> Select and use suitable personal protective equipment (PPE) appropriate to the job requirements Interpret engineering drawings to extract information for setting up equipment configurations Conduct pre-operational checks and inspections to verify working conditions of tools and equipment, according to job requirements Set up furnaces with correct parameters, according to job requirements Set up die and components for hot forming operations, according to job requirements and safe working practices Perform hot processing operations, monitor and adjust appropriately to achieve required quality Check finished components for compliance with required specifications and ensure free from defects Perform rework as required to achieve desired product outcomes 	<ul style="list-style-type: none"> Prepare polymers and composites for processing Set up processes for compounding and moulding Apply specialty materials and processing principles for processing of thermoset composite laminates from fibre-only preforms Evaluate moulding simulation techniques for improvement opportunities Review gating, runner system and cooling design improvement opportunities 	<ul style="list-style-type: none"> Establish injection moulding processes, in accordance with specifications Carry out procedures for mould inspection, preparation and mould set-up, with relevant safety precautions Perform mould set-up to ensure stable and efficient injection moulding processes Verify the quality of moulded parts against requirements Troubleshoot moulding defects to assure quality of products 	<ul style="list-style-type: none"> Review manufacturing processes to identify areas to implement injection moulding Evaluate rapid prototyping, as a direct manufacturing process, for influences of system selection on final part quality Select appropriate types of plastic injection moulding processes to meet requirements for specific jobs Design assembly plans and identify bottlenecks in assembly processes Review designs for assembly techniques to determine average assembly time and costs Perform cost analyses for implementing injection mould designs 	