

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

<b>TSC Category</b>	Product Development					
<b>TSC</b>	New Product Introduction					
<b>TSC Description</b>	Support new production by validating build plan to achieve cost-effective production and assembly as well as meeting design specifications					
<b>TSC Proficiency Description</b>	<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>	<b>Level 4</b>	<b>Level 5</b>	<b>Level 6</b>
		<b>PRE-PMN-2008-1.1-1</b>	<b>PRE-PMN-3008-1.1</b>	<b>PRE-PMN-4008-1.1</b>	<b>PRE-PMN-5008-1.1</b>	<b>PRE-PMN-6008-1.1-1</b>
		Oversee installations of new product manufacturing processes and conduct pre-production trials	Develop build plan for the manufacture and assembly of a new product designs using a systematic approach to design	Review production trial results to achieve requisite product quality and production requirements	Guide new product introduction by evaluating build plan for the manufacture and assembly of a new product design, using a systematic approach to design and evaluate the practicality of design	Lead new product introduction through the conduct of design of experiments
<b>Knowledge</b>		<ul style="list-style-type: none"> <li>Tools and techniques for planning and monitoring equipment installation processes</li> <li>Construction design management techniques used in the installation processes</li> <li>Procedures used in installation planning exercises</li> <li>Methods to evaluate trial results</li> <li>Methods to measure production rates and usage of materials</li> <li>Methods to improve production efficiency</li> <li>Limits and criticalities of machine settings</li> <li>Critical paths during the pre-production processes</li> <li>Methods to calculate production resource requirements</li> <li>Sample development and costing methods</li> </ul>	<ul style="list-style-type: none"> <li>Principles of electronics engineering</li> <li>Product and equipment specifications used in manufacturing and assembly processes</li> <li>Types of design constraints</li> <li>Different types of build plans</li> <li>Principles and techniques of design for manufacture (DFM)</li> <li>Principles and techniques of design for assembly (DFA)</li> <li>Principles and techniques of process failure mode and effects analysis (PFMEA)</li> <li>Principles of risk assessment</li> <li>Organisational and legislative requirements</li> </ul>	<ul style="list-style-type: none"> <li>Product specifications and production requirements</li> <li>Trial objectives and results</li> <li>Re-trial objectives and results</li> <li>Criteria for analysing trial and re-trial results</li> </ul>	<ul style="list-style-type: none"> <li>Principles of electronics engineering</li> <li>Types of manufacturing processes</li> <li>Component and/or part design</li> <li>Principle of design rules</li> <li>Product and process design for easy assembly</li> <li>Design for easy assembly</li> <li>Design of assembly systems</li> </ul>	<ul style="list-style-type: none"> <li>Design of experiments concept and benefits</li> <li>Methods to determine scope of experiments</li> <li>Tools, techniques and methods for carrying out design of experiments</li> <li>Data required to carry out design of experiments</li> <li>Alpha and beta risks in carrying out design of experiments</li> <li>Methods for calculating sample sizes in design of experiments</li> <li>Workplace safety and health (WSH) requirements</li> </ul>

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		<ul style="list-style-type: none"> <li>Workplace safety and health (WSH) requirements</li> </ul>				
<b>Abilities</b>		<ul style="list-style-type: none"> <li>Determine organisational availability of in-house equipment against the planned manufacturing layout</li> <li>Create delivery plans for in-house or new equipment and resources against the planned manufacturing layout</li> <li>Determine removal plans for redundant services and equipment from the planned manufacturing area</li> <li>Construct master plans for the installation of the new manufacturing processes against agreed floor play layout</li> <li>Supervise the installation of the new manufacturing processes against the master plans</li> <li>Develop critical paths of activities at each stage of the pilot</li> <li>Evaluate the outcomes of pre-production trials for bulk processing potential</li> <li>Calculate estimates on materials usage and production rates of bulk processing</li> <li>Update and maintain accurate records and documentation</li> </ul>	<ul style="list-style-type: none"> <li>Perform analysis of product requirements and determine suitable manufacturing and assembly process</li> <li>Perform analysis and determine design, manufacturing and assembly constraints</li> <li>Develop a build plan for the manufacture and assembly of the new product</li> <li>Determine feasibility of achieving desired build plan</li> <li>Record details of build plan, consultation, evaluation process</li> <li>Present build plan to seek endorsement</li> <li>Monitor and track implementation of build plan</li> <li>Evaluate the build plan against DFM and DFA criteria</li> </ul>	<ul style="list-style-type: none"> <li>Confirm trial objectives as a basis for comparison</li> <li>Review trial product quality results and compare with trial objectives to identify variations</li> <li>Specify re-trial objectives and priorities to procedures</li> <li>Carry out re-trial variations to achieve trial objectives</li> <li>Record trial results to procedures</li> </ul>	<ul style="list-style-type: none"> <li>Review engineering components build plan for structural integrity and Design for manufacturing and assembly (DFMA)</li> <li>Evaluate materials selection in accordance with DFMA principles</li> <li>Evaluate machining plan in accordance with DFMA principles</li> <li>Evaluate assembly plan in accordance with DFMA principles</li> <li>Formulate and propose an engineering solution in dealing with complex and/or vaguely defined design tasks</li> <li>Submit a full evaluation report on whether the engineering design meets functional requirements</li> </ul>	<ul style="list-style-type: none"> <li>Determine appropriate processes, scope and parameters of design for experiments</li> <li>Utilise sample size selection to ensure statistical validity of experiments</li> <li>Determine sampling plans to reduce systematic errors</li> <li>Carry out design of experiments utilising appropriate tools and techniques</li> <li>Analyse data gathered and identify areas for improvements</li> </ul>