

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

TSC Category	Engineering and Manufacturing Fundamentals					
TSC	Geometric Dimensioning and Tolerancing					
TSC Description	Define and verify acceptable engineering tolerances of products' and parts' geometry					
TSC Proficiency Description	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
		PRE-EPM-2066-1.1	PRE-EPM-3066-1.1	PRE-EPM-4066-1.1		
		Perform dimensional and geometric measurements of machined parts and components, using a range of measuring tools and equipment	Perform dimensional and geometrical measurements and inspection of manufactured components for evaluation of acceptability	Use tolerance stack-up methods to analyse the cumulative effects of tolerances to determine appropriate engineering interventions		
Knowledge		<ul style="list-style-type: none"> • Component reference datum • Types and applications of measuring tools, gauges and equipment • Types of measuring errors • Operation and function of measuring and testing equipment • Cleaning of measuring instruments and components to be measured • Workplace safety and health (WSH) guidelines and regulations relating to conduct of dimensional and geometric measurements • Concepts of allowable and outside allowable tolerances, and limits of permissible error • Principles and approaches to adjusting deviations in tolerance • Organisational procedures and hygiene standards for reinstating work areas 	<ul style="list-style-type: none"> • Workplace safety and health (WSH) guidelines and regulations relating to conduct of dimensional and geometric measurements • Specifications and acceptance criteria • Principles and approaches to adjusting deviations in tolerance • Tolerance stack-up in assemblies • Use of inspection fixtures and dial indicators • Types of dimensional measuring gauges and applications • Importance of calibration for dimensional measuring gauges and fixtures • Types of visual defects • Records of inspection results 	<ul style="list-style-type: none"> • Principles of precision engineering • Definitions, concepts principles and rules of geometric dimensioning and tolerancing (GD&T) • Types of GD&T symbols in engineering drawings • Definitions and principles of fit functions • Concept of worst-case tolerance stack • Concept of statistical variation tolerance stack • Definitions and principles of GD&T systems • Methods of reducing or eliminating tolerance accumulation • Concept of engineering productivity and economics • Organisational and legislative requirements 		

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<p>Abilities</p>		<ul style="list-style-type: none"> • Verify that correct versions of reference drawings are used • Interpret geometrical tolerances, symbols, notations and surface finish reference charts • Set up, locate and secure components to be measured • Select appropriate measuring tools and equipment for the components to be measured • Determine the appropriate techniques to measure components • Calibrate measuring instruments and equipment • Record results and findings • Make decisions to accept or reject components based on measurements • Maintain measuring tools and equipment 	<ul style="list-style-type: none"> • Select and use suitable personal protective equipment appropriate to the job requirements • Interpret engineering drawings to determine acceptable dimensional and geometrical tolerances • Conduct pre-operational checks and inspections to verify working conditions of tools and fixtures, according to job requirements • Perform calibration checks on measuring gauges • Report incidences of equipment abnormalities to be rectified • Set up components within inspection fixtures securely to achieve accurate measurements • Update documents according to the approved format 	<ul style="list-style-type: none"> • Analyse engineering drawings to interpret GD&T requirements • Perform worst-case tolerance stack analyses on the degree and variation of fit of design assemblies, to determine maximum expected variation • Perform statistical variation tolerance stack analyses on the degree and variation of fit of design assembly, to determine expected variation • Determine optimal component tolerances, in accordance with requirements • Determine methods of reducing or eliminating tolerance accumulation, to meet optimal component tolerances • Report on component tolerances using GD&T systems 		
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