

TSC Category	Precision Engineering					
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
	AER-DES-1041-1.1	AER-DES-2041-1.1	AER-DES-3041-1.1	AER-DES-4041-1.1		
	Perform dimensional and geometric measurements of machined parts and components, using a range of measuring tools and equipment	Perform geometrical tolerancing and inspections of components for evaluation of acceptability	Apply geometric dimensioning and tolerance (GD&T) analysis to inspect and verify the straightness, perpendicularity, concentricity and circular runout of components	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 datum references 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"> Concepts of GD&T and graphic analysis Concept of tolerance grades for mating parts and fundamental dimensioning rules Datum selection methodology Parts of feature control frame Concept of tolerancing positions or locations Strategies for parts tolerancing 	<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 		

**SKILLS FRAMEWORK FOR AEROSPACE
TECHNICAL SKILLS AND COMPETENCIES (TSC) REFERENCE**

<p>Abilities</p>	<ul style="list-style-type: none"> • Select and use suitable personal protective equipment appropriate to the job requirements • 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 • Measure components using appropriate techniques • Calibrate measuring instruments and equipment • Record results and findings • Maintain measuring tools and equipment 	<ul style="list-style-type: none"> • 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 • Make decisions to accept or reject components based on measurements • Update documents according to the approved formats 	<ul style="list-style-type: none"> • Apply concepts of GD&T in terms of features, mating, modifiers and symbols, bonus tolerance, inner and outer boundary and virtual condition • Specify the correct tolerance for the mating parts as per application requirements • Select and specify datum, as well as when and how to apply maximum material condition (MMC), least material condition (LMC) and regardless of feature size (RFS) • Apply various GD&T control technologies • Specify the GD&T symbols for the control of size, form, shape, orientation on a part and an assembly • Use basic gauges, fixtures, optical equipment, to inspect common tolerances such as straightness, perpendicularity, concentricity and circular run out 	<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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