TSC Category	Precision Engineering					
TSC	Cutting					
TSC Description	Manage and implement material removal processes and activities to manufacture components and products.					
TSC Proficiency Description	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	**Level 6**
	AER-DES-1040-1.1	**AER-DES-2040-1.1**	**AER-DES-3040-1.1**	**AER-DES-4040-1.1**		
	Produce sheet metal components using computer numerical control (CNC) wire cutting, water-jet, laser and other types of non-conventional cutting processes	Perform high-speed machining processes for mass material removal	Review different combinations of cutting tools, technologies and machining strategies to select optimal parameters for improving machining productivity and achieve required product specifications	Evaluate high-speed cutting tools and machining processes for suitability to mass material removal, and to achieve highest quality output through efficiency		
Knowledge	• Workplace safety and health requirements, types and application of proper personal protective equipment (PPE) associated with cutting • Types of materials and processes commonly used in manufacturing components • Types of non-conventional cutting methodologies and approaches • Operating principles and features of non-conventional cutting machines • Selection criteria of cutting parameters • Operating procedures and techniques used to produce computer-aided design (CAD) models • Applications of computer-aided manufacturing (CAM) in non-conventional cutting	• Definitions and characteristics of high-speed machining • High-speed cutting parameters, tools and techniques • Types of work materials, cutting tool materials, cutting tool designs and cutting tool failures • Strategies for high-speed machining • Influence of machining techniques on material removal • Machining quality evaluation methods • Measures of surface roughness	• Cutting tool geometry and tool materials • Chip formation and heat generation in metal cutting • Tool wear and tool life • Selection of machining conditions • Machining process optimisation	• Conventional machining mechanics and machining fundamentals • Principles of machine tool dynamics • Definitions and characteristics of high-speed machining • Types of work materials and tool materials • Principles of tool designs, tool failures and tool selection criteria • High-speed machining strategies and techniques • Definitions of machined surface integrity • Machining quality evaluation methods • Measures of surface roughness		

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	• Applications of ISO codes, addresses, work coordinates and subroutines • Types of cutting defects, their causes and remedies • Methods of inspection					
Abilities	• Select and use suitable PPE appropriate to job requirements • Interpret engineering drawings to extract relevant information to set up machine configuration of cutting parameters • Conduct pre-operational checks and inspections to verify working conditions of tools and equipment according to job requirements • Perform CAD and CAM programming according to job requirements • Perform profile cutting simulations to eliminate cutting errors and improve process efficiency • Set up machine for profile cutting operations, according to safe working practices • Set up components for profile cutting operation according to job requirements • Produce profile cut of components according to the given specifications • Perform quality checks of finished components for compliance with required specifications	• Assess high-speed machining techniques for appropriateness to specific component designs • Identify potential of using high-speed machining techniques for three-dimensional (3D) component fabrication • Determine suitable cutting tools for conducting high-speed machining • Assess high-speed machining conditions for appropriateness to tasks, based on machine tool dynamics • Assess high-speed machining strategy for appropriateness to a specific component • Determine appropriate diagnostic methods for machining quality evaluation • Assess appropriate surface integrity of high-speed machined components	• Assess tool wear mechanisms and analyse factors affecting tool life to improve efficiency • Evaluate cutting tool material characteristics for correct machining applications • Identify conditions affecting the formation of chips • Create optimised tool paths using computer-aided manufacturing (CAM) software for computer numerical control (CNC) machining • Produce CNC programmes that minimise the cycle time for fabricating components using CNC machines • Review optimum milling processes by evaluating and selecting appropriate machining parameters	• Determine tooling requirements, in accordance with required surface finishes • Assess appropriateness of various high-speed machining techniques for specific component designs • Assess potential effects of work materials on machining behaviour • Determine appropriate high-speed machining conditions, based on machine tool dynamics • Determine suitable tools for conducting of high-speed machining • Review the steps to analyse failures • Determine appropriate diagnostic methods for machining quality evaluations • Assess appropriate surface integrity of high-speed machined components		

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	and ensure free from defects					