

Specification of Competency Standards
for the Manufacturing Technology.
Unit of Competency.

Functional Area - Product Manufacturing

Title	Conduct advanced CNC multi-axis precision milling, master various machining parameters, and improve quality of mould components
Code	106589L4
Range	This unit of competency is applicable to the process design and development departments and product manufacturing departments / production departments of companies engaged in the tooling industries. Practitioners should be capable to understand the knowledge of advanced CNC multi-axis milling and are able to operate multi-axis CNC milling machines to perform advanced multi-axis precision milling
Level	4
Credit	6
Competency	Performance Requirements - Understand relevant knowledge of advanced CNC multi-axis milling processes - Understand computer-aided milling programming software (CAM) applicable to four and five-axis machines, including model programming methods and the application of input and output interface systems - Understand methods for advanced programming in CNC multi-axis milling - Understand operation methods and related programming techniques for the fourth and fifth axes - Understand impact of various parameters in CNC multi-axis milling on the milling performance and finished products - Understand characteristics and usage of a tool setter in multi-axis machining - Understand machining and measurement methods for complex parts such as Raffle and turbine blades - Understand types and applications of advanced standard fixtures - Understand functions, structures, types, and safety precautions of various fixtures used in multi-axis CNC milling machines - Understand functions of various cutting fluids and their applications in multi-axis milling - Understand methods for handling metal chips - Understand relationship between different machining parameters in multi-axis processing and tool life - Understand methods and techniques for calibrating and correcting the accuracy of multi-axis CNC milling machines - Understand intelligent solutions applicable to multi-axis CNC milling machines, including data collection, data organisation, and predictive maintenance - Conduct advanced CNC multi-axis precision milling - Able to operate CAM software to prepare multi-axis milling processes based on the requirements of finished products - Able to use various measuring instruments to accurately measure finished products - Able to set appropriate multi-axis milling parameters, such as cutting speed, cutting depth, and feed rate, in accordance with engineering drawings - Able to calculate suitable multi-axis milling parameters, including feed step and cutting speed, to optimise milling efficiency - Able to set up and use a tool setter for automatic tool path correction

	• Able to manage and select cutting tools for multi-axis CNC milling machines, and set or modify tool life data • Able to design and manufacture specific fixtures according to instructions and requirements • Able to apply simulation programs to verify the feasibility and applicability of milling programs • Able to use special fixtures to secure thin sheet workpieces and complex-shaped workpieces and perform calibration • Able to perform various types of advanced CNC multi-axis precision milling, such as Raffle and turbine blades, in accordance with engineering drawings • Able to set appropriate parameters, including cutting speed (Cutting Speed), cutting depth (Cutting Depth), and feed rate (Feed Rate), according to engineering drawings • Able to extend tool life by using suitable machining parameters • Able to measure positioning accuracy, Analyse causes of machining errors, and input appropriate compensation values to enhance machining precision • Able to estimate machining time based on various conditions, such as drawings, tool movement, and milling parameters • Able to process and Analyse data collected from multi-axis CNC milling machines to assess milling quality and equipment performance, and adjust production parameters in real-time to optimise production • Able to extract production data from the PLC or external sensors of the manufacturing equipment 3. Professional handling of advanced CNC multi-axis precision milling • Able to follow the safety guidelines (including the handling of metal chips generated during the milling process) and relevant procedures for advanced CNC multi-axis precision milling, and to perform the milling in accordance with design drawings, specifications, and production efficiency requirements
Assessment Criteria	The integrated outcome requirements of this unit of competency are: • Able to write multi-axis CNC milling programs and perform advanced multi-axis precision milling on complex parts • Able to conduct multi-axis precision milling on complex components and finished products while using appropriate parameters to extend tool life • Able to measure positioning accuracy and use suitable compensation values to improve the precision of multi-axis CNC milling
Remark	This is the updated version of UoC 106589L5 Individuals who possess the above knowledge and competency are also required to possess the knowledge and competency of “ Perform advanced CNC milling and master various machining parameters to improve quality of mould components (106509L3) ”