Specification of Competency Standards
for the Manufacturing Technology
Unit of Competency

Functional Area - Product Manufacturing

Title	Perform advanced CNC milling and master various machining parameters to improve quality of mould components
Code	106509L3
Range	This unit of competency is applicable to the product manufacturing departments / production departments of companies engaged in the tooling industries. Practitioners should be capable to understand the principles of advanced CNC milling, and are able to operate CNC milling machines to perform precision advanced milling operations
Level	3
Credit	4
Competency	**Performance Requirements** 1. Understand relevant knowledge of advanced CNC milling processes • Understand CNC milling software (CAM), include 3D model programming methods and input / output interface systems • Understand advanced CNC milling programming methods, include 2.5D and 3D arc and contour programming, fixed programs, loop programs, and subprograms • Understand impact of various CNC machine parameters on milling performance and final product quality • Understand features and operation of tool setters • Understand principles and connection methods of direct numerical control (DNC) • Understand settings and optimisation methods for high-speed milling, include cutting speed, feed rate, and tool path programming essentials • Understand use and safety precautions of various clamping fixtures, include spindle chucks • Understand types and applications of advanced standard fixtures • Understand functions and applications of cutting fluids in 3D and high-speed milling, as well as metal chip disposal methods • Understand relationship between machining parameters and tool life • Understand CNC machine calibration and accuracy correction • Understand intelligent solutions applicable to CNC milling, include data acquisition, data enterprise, and predictive maintenance 2. Perform advanced computer numerical control (CNC) milling precision machining • Able to operate CAM software (include 3D CAM) to program 2.5D and 3D milling operations according to product requirements • Able to use various measuring instruments to initially assess the dimensions of finished parts • Able to set suitable machining parameters, such as cutting speed, cutting depth, and feed rate, under guidance, according to engineering drawings • Able to design and fabricate specific fixtures according to different requirements, under guidance • Able to calculate appropriate machining parameters, such as feed rate and cutting speed, to optimise milling efficiency, under guidance • Able to perform direct numerical control (DNC) at appropriate times, under guidance

	• Able to set up and use tool setters to automatically correct tool paths • Able to manage CNC machine tools, include setting and modifying tool life data, under guidance • Able to secure thin sheet and complex-shaped workpieces using special fixtures, and perform machine calibration • Able to perform precision CNC milling operations according to engineering drawings, include face milling, side milling, angular milling, step milling, • groove milling, dovetail milling, T-shaped groove milling, and 2.5D and 3D contour milling (form milling) • Able to perform precision boring, reaming, and high-speed machining operations • Able to measure positioning accuracy, analyse machining errors under supervision, and input appropriate correction values to improve machining accuracy • Able to collect and organise milling data, assess machining quality and equipment performance, and adjust production parameters in real-time to optimise production, according to departmental requirements 3. Professional handling of advanced CNC milling precision machining • Able to follow safety guidelines for advanced CNC milling operations, include metal chip handling, and comply with design drawings, specifications, and production efficiency requirements
Assessment Criteria	The integrated outcome requirements of this unit of competency are: • Able to program complex 2.5D, 3D, high-speed CNC milling operations under guidance, perform precision milling on complex parts and finished products • Able to adjust appropriate parameters to extend tool life during complex CNC milling operations, under guidance
Remark	This is the updated version of UoC 106509L4 Individuals who possess the above knowledge and competency are also required to possess the knowledge and competency of " Perform basic computer numerical control (CNC) milling machining and master various machining data to improve quality of mould components (106402L3)"