

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

Functional Area - Product Manufacturing

Title	Advanced computer numerical control (CNC) precision turning and ultra precision machining
Code	106590L5
Range	This unit of competency is applicable to the production department of the corporation of Tooling Manufacturing Industry. Practitioners should be capable to understand the knowledge of advanced computer numerical control (CNC) turning, operate multi-axis CNC turning machine and ultra-precision diamond single head cutting machine to carry out precision and ultra precision turning
Level	5
Credit	6 (For Reference Only)
Competency	<p>Performance Requirements</p> <p>1. Understand the techniques and technologies of advanced computer numerical control (CNC) turning</p> <ul style="list-style-type: none"> • Understand the CAM turning software and the application of output and input interface system CAM • Understand the advanced toolpath programming of carrying out CNC milling machines • Understand the application methods of four axis or above, and the relevant programming methods of turning • Understand the impact of multi-axis CNC turning machines on turning/ milling effect and finished goods • Understand the characteristics and using methods of all kinds of Tool Setter • Understand the function, structure type and safety precautions of all kinds of special tools and carriage • Understand the types and applications of advanced standard fixtures • Understand the functions and applications of all kinds of cutting fluid on turning and multi axis milling and the handling methods of metal scraps • Understand the relationship between the different processing parameters and tool life • Understand the methods and techniques of calibration and precision correction of CNC multi axis turning machines • Understand the types, structures, applications and operating principles of ultra precision turning machines, such as Single Point Diamond Turning Machine • Understand the environmental requirements of ultra precision turning, such as thermostat temperature range, humidity control and environmental cleaning requirements • Understand requirements of type, preventive maintenance and maintenance methods of ultra precision turning tools • Understand the parameter setting and optimisation of ultra precision turning • Understand the waste dust treatment and control methods of ultra precision cutting <p>2. Carry out advanced computer numerical control (CNC) precision turning and ultra precision machining</p> <ul style="list-style-type: none"> • According to the finished goods requirements, use CAM software to compile turning program • Apply all kinds of measuring instruments, including optical measuring instrument, interferometer to measure finished goods • Calculate and set the appropriate milling, multi-axis turning and ultra precision turning machining parameters, including upgrades and cutting speed, so as to optimise the cutting efficiency • Set and use the automatic tool path correction of Tool Setter

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	<ul style="list-style-type: none"> • Manage the tools of multi-axis and CNC milling machine, set and modify the tool life data • According to engineering design requirements to carry out multi-axis CNC precision turning / milling • According to the needs, apply fourth and five-axis of multi-axis CNC machines • Select the appropriate Single Point Diamond Turning or other tools, carry out ultra precision turning • Carry out preventive maintenance and maintenance for ultra precision turning machine tools • Design and manufacture specific fixture in accordance with different requirements • Apply simulation program to confirm the availability and feasibility of the program • Select the appropriate tools and machining conditions as milling, multi-axis turning and ultra-precision turning as a foundation to estimate working hours • According to the drawings, tool motions and turning conditions to estimate the processing time <p>3. Professional handling of advanced computer numerical control (CNC) precision turning and ultra precision machining</p> <ul style="list-style-type: none"> • Follow safety guidelines of advanced CNC precision turning and ultra precision machining, such as handling the metal scrap produced in the process of milling, multi-axis turning and ultra precision turning and related Code of Practice, and in accordance with design drawings, specifications and production efficiency requirements, carry out CNC precision machining
Assessment Criteria	<p>The integrated outcome requirements of this unit of competency are:</p> <ul style="list-style-type: none"> • Capable to compile complex CNC milling, multi axis turning and ultra precision turning program • Capable to carry out ultra precision turning and multi axis turning precision processing for complex parts and finished goods, with the appropriate parameters to extend the tool life • Capable to carry out micron scale nano scale ultra precision turning for ultra precision components and products, and carry out preventive maintenance of machines and tools
Remark	<p>Person who has the above knowledge and ability should also obtain the knowledge and ability of Intermediate computer numerical control (CNC) precision turning (106510L4) at the same time.</p>