Oregon CTE

Manufacturing: Machining

Demonstrate knowledge of technology and materials FA-MNMF01	**A** Describe key material properties as they relate to machining efficiency FA-MNMF01.A
	B Explain material properties and tooling processes to created finished products FA-MNMF01.B
	C Describe the different types and uses of metal (e.g., ferrous metals, non-ferrous metals, high temperature metals and rare metals) and woods (e.g., hardwood, softwood) FA-MNMF01.C
	D Determine the hardness values of different materials FA-MNMF01.D
	E Explain types of tool wear and their consequences FA-MNMF01.E
	F Discuss which parameters to change to improve unfavorable tool failures and/or poor surface finish of parts FA-MNMF01.F
Demonstrate ability to interpret blueprints and layout FA-MNMF02	**A** Examine and interpret engineering drawings to manufacture an object FA-MNMF02.A
	B Apply knowledge of engineering drawing to machining process FA-MNMF02.B
	C Use modern-day electronic systems to look up most current version of engineering drawings need for manufacturing FA-MNMF02.C
	D Define the information necessary to complete a machining task such as materials to be used, required surface finish, tolerances, quantity of units etc. FA-MNMF02.D
	E Distinguish between detail and assembly drawings FA-MNMF02.E
	F Use precision measuring and layout instruments and inspection processes to ensure quality of a finished product FA-MNMF02.F
Demonstrate knowledge of machining operation and control FA-MNMF03	**A** Manage and coordinate the operation of the cutting pieces, feeds, and mounts associated with both manual and computer-numerical controlled (CNC) machining tools to complete advanced projects involving mills, lathes, and grinders FA-MNMF03.A

	B Correctly, safely, and efficiently schedule, configure, administer, and verify heattreatments to machined parts according to blueprint specifications FA-MNMF03.B
	C Demonstrate the following higher functions: cutter diameter compensation; comfort with built-in risk management systems FA-MNMF03.C
	D Demonstrate how to inspect and assess the condition of tools and maintain them so that they are safe and operational FA-MNMF03.D
Demonstrate knowledge of machining production and processing FA-MNMF04	**A** Describe and demonstrate various machining techniques including procedures on drill press, lathe, saw grinders, and milling machines FA-MNMF04.A
	B Solve manufacturing-related problems by analyzing and weighing the constraining factors including schedule, cost, materials, and equipment, as well as productivity, regulations, maintenance, and quality FA-MNMF04.B
	C Employ statistical quality control test methods and techniques, especially on large volume processes, to minimize defects and waste due to poor quality FA-MNMF04.C
Demonstrate knowledge of tool setup and required best-practices FA-MNMF05	**A** Demonstrate tool and holder assembly with use height gage and pre-setter FA-MNMF05.A
	B Demonstrate tool and holder balancing to required standards FA-MNMF05.B
	C Follow best practices for assembly of tools using: Shrink Fit system, Collet systems, Weldon-Flats, and bold on systems FA-MNMF05.C
	D Rotate inserts on indexable cutting tools FA-MNMF05.D
Demonstrate ability to use CNC machines to manufacture parts FA-MNMF06	**A** Produce parts to specifications or drawings provided on a computer numerical controlled mill or lathe FA-MNMF06.A
	B Employ basic G and M Programming focusing on the use of the Cartesian coordinate system and machine axis FA-MNMF06.B
	C Demonstrate methods by which programs can be entered into a controller FA-MNMF06.C
	D Demonstrate the setup and safe operation of a CNC turning or milling center FA-MNMF06.D
	E Demonstrate a tool change and tool selection to complete a multistep process on a CNC milling or turning center FA-MNMF06.E
	F Demonstrate operation and preventive daily maintenance of a CNC Lathe machine FA-MNMF06.F

	G Demonstrate operation and preventive daily maintenance of a CNC Mill machine FA-MNMF06.G
Apply quality control tools and techniques to manufacturing processes, systems, and products FA-MNMF07	**A** Analyze production controls and manufactured parts specifications using quality control techniques and precision measuring tools FA-MNMF07.A
	B Measure, weigh, and visually inspect machine parts, surface finish measurements FA-MNMF07.B
	C Use the appropriate instrumentation to measure tolerances as required in the engineering drawings FA-MNMF07.C
	D Apply data collection for part buyoff and related documentation FA-MNMF07.D
	E Validate that a provided part meets specifications from its engineered drawing by comparing specifications FA-MNMF07.E
	F Record and compare data to given project specifications; interpret results FA-MNMF07.F
	G Demonstrate ability to prove out a program using single block, lowered rapid rates, and using Distance to Go screen on control FA-MNMF07.G
Describe knowledge of lifting devices FA-MNMF08	**A** Demonstrate safe use of lifting devices and rigging equipment (e.g., cranes, jibs, slings, magnets, specialized lifting devices) FA-MNMF08.A
	B Demonstrate ability to use lift trucks, stackers, pallet jacks for moving material FA-MNMF08.B
Apply mathematical and measurement concepts to the machining process FA-MNMF09	**A** Select appropriate tools and accurately measure solid shapes and parts FA-MNMF09.A
	B Perform basic mathematical calculations and/or calibrations using tools such as micrometers, verniers, and gages FA-MNMF09.B
	C Calculate the speeds, feeds, and depth of cut for various machines and materials FA-MNMF09.C
	D Determine the appropriate units and record accurate and repeatable measures of length, diameter, and thickness to complete projects using appropriate tools FA-MNMF09.D
	E Apply principles of trigonometry, Cartesian geometry, and/or polar geometry, distinguishing which principles apply to a given machining tool and when FA-MNMF09.E
	F Use angle gages, a plate contractor, a universal bevel protractor with vernier scale, square and/or a sine bar and gage clocks or adjustable parallel FA-MNMF09.F

G **Determine the appropriate units and record accurate and repeatable measurement of material properties such as hardness, pH, and load elongation test curves of stress, strain, modulus and yield** FA-MNMF09.G

H **Interpret test values and curves and use calculated results to make informed decisions** FA-MNMF09.H