

Precision Machining



Program / Hours: CIP 48.0501 – 2 Year Half Day Program

Course Description: A program that prepares individuals to apply technical knowledge and skills to plan, manufacture, assemble, test, and repair parts, mechanisms, machines, and structures in which materials are cast, formed, shaped, molded, heat treated, cut, twisted, pressed, fused, stamped, or worked.

Learning Activities / Modes of Assessment:

- Small Group
- Large Group
- Independent Work
- One-on-One
- Classwork Activities
- Presentations
- Research Projects
- Research Papers
- Technology Use
- Tests and Quizzes

Individual Resources:

- Textbooks
- Workbooks
- Online Resources
- PowerPoint Presentations
- Computer Applications
- Proprietary Precision Machining Software
- Precision Machining Equipment and Tools
- Precision Machining Lab Simulations

Year / MP	Task #	K - Know	U - Understand	D - Do
Yr 1 – MP 1	101	Follow Occupational Safety and Health Administration (OSHA) regulations.	Safe work practices are essential to prevent injury, protect equipment, and meet industry standards.	Demonstrate and consistently apply required safety procedures during all related operations.
Yr 1 – MP 1	301	Use precision measuring instruments.	Accurate measurement ensures parts meet specified tolerances and quality standards.	Measure components using appropriate precision instruments within specified tolerances.
Yr 1 – MP 1	302	Calibrate precision measuring instruments.	Measurement tools must be verified to ensure reliable and accurate results.	Calibrate measuring instruments using appropriate standards and procedures.
Yr 1 – MP 1	406	Select and use hand tools.	Proper tool and equipment selection directly impacts quality, safety, and efficiency.	Select appropriate tools, materials, or settings for the given machining operation.
Yr 1 – MP 1	1201	Use the decimal equivalent chart.	Accurate calculations and reference use ensure machining precision and proper setup.	Perform required calculations and correctly use charts or references to support machining tasks.
Yr 1 – MP 1	1202	Calculate speeds and feeds.	Accurate calculations and reference use ensure machining precision and proper setup.	Perform required calculations and correctly use charts or references to support machining tasks.
Yr 1 – MP 1	1203	Use tap and drill charts.	Accurate calculations and reference use ensure machining precision and proper setup.	Perform required calculations and correctly use charts or references to support machining tasks.
Yr 1 – MP 1	1204	Use Machinery handbook and/or shop references to locate information.	Understanding proper machining procedures ensures quality, safety, and industry readiness.	Perform the required task accurately, safely, and within specified tolerances.
Yr 1 – MP 1	1301	Identify orthographic views and projections.	Understanding machine components and symbols improves safe operation and technical comprehension.	Accurately identify and describe required components, symbols, or systems.
Yr 1 – MP 1	1303	Identify the alphabet of lines and symbols.	Understanding machine components and symbols improves safe	Accurately identify and describe required components, symbols, or systems.

			operation and technical comprehension.	
Yr 1 – MP 2	103	Follow safety procedures.	Safe work practices are essential to prevent injury, protect equipment, and meet industry standards.	Demonstrate and consistently apply required safety procedures during all related operations.
Yr 1 – MP 2	401	Apply bench work safety procedures.	Safe work practices are essential to prevent injury, protect equipment, and meet industry standards.	Demonstrate and consistently apply required safety procedures during all related operations.
Yr 1 – MP 2	402	Cut material with a hand hacksaw.	Understanding proper machining procedures ensures quality, safety, and industry readiness.	Perform the required task accurately, safely, and within specified tolerances.
Yr 1 – MP 2	403	File work to specifications.	Understanding proper machining procedures ensures quality, safety, and industry readiness.	Perform the required task accurately, safely, and within specified tolerances.
Yr 1 – MP 2	404	Cut threads with hand taps and dies.	Lathe operations require precision setup and dimensional control to ensure part function.	Set up and operate the lathe to perform required operations within print tolerances.
Yr 1 – MP 2	501	Apply drill press safety procedures.	Safe work practices are essential to prevent injury, protect equipment, and meet industry standards.	Demonstrate and consistently apply required safety procedures during all related operations.
Yr 1 – MP 2	502	Operate drill press work holding devices.	Understanding proper machining procedures ensures quality, safety, and industry readiness.	Perform the required task accurately, safely, and within specified tolerances.
Yr 1 – MP 2	505	Select correct drill sizes for drill press application.	Proper tool and equipment selection directly impacts quality, safety, and efficiency.	Select appropriate tools, materials, or settings for the given machining operation.
Yr 1 – MP 2	507	Demonstrate counterboring, spotfacing, reaming, and countersinking.	Understanding proper machining procedures ensures quality, safety, and industry readiness.	Perform the required task accurately, safely, and within specified tolerances.
Yr 1 – MP 2	901	Apply power saw safety procedures.	Safe work practices are essential to prevent injury, protect equipment, and meet industry standards.	Demonstrate and consistently apply required safety procedures during all related operations.

Yr 1 – MP 2	904	Follow the 3-tooth rule.	Understanding proper machining procedures ensures quality, safety, and industry readiness.	Perform the required task accurately, safely, and within specified tolerances.
Yr 1 – MP 2	905	Saw work piece.	Understanding proper machining procedures ensures quality, safety, and industry readiness.	Perform the required task accurately, safely, and within specified tolerances.
Yr 1 – MP 2	907	Identify parts of power saw	Understanding machine components and symbols improves safe operation and technical comprehension.	Accurately identify and describe required components, symbols, or systems.
Yr 1 – MP 2	1401	Apply CNC safety procedures.	Safe work practices are essential to prevent injury, protect equipment, and meet industry standards.	Demonstrate and consistently apply required safety procedures during all related operations.
Yr 1 – MP 2	1404	Use Cartesian coordinate systems.	Understanding proper machining procedures ensures quality, safety, and industry readiness.	Perform the required task accurately, safely, and within specified tolerances.
Yr 1 – MP 2	1406	Prove a CNC program.	CNC operations rely on accurate setup, coordinate systems, and program verification.	Set up, verify, and operate CNC equipment safely and within specified tolerances.
Yr 1 – MP 2	1409	Set part zero and tool offsets.	CNC operations rely on accurate setup, coordinate systems, and program verification.	Set up, verify, and operate CNC equipment safely and within specified tolerances.
Yr 1 – MP 2	1410	Transfer data files to and from a CNC machine.	CNC operations rely on accurate setup, coordinate systems, and program verification.	Set up, verify, and operate CNC equipment safely and within specified tolerances.
Yr 1 – MP 2	1411	Use CNC control functions.	CNC operations rely on accurate setup, coordinate systems, and program verification.	Set up, verify, and operate CNC equipment safely and within specified tolerances.
Yr 1 – MP 2	1413	Select and use workholding devices.	Proper tool and equipment selection directly impacts quality, safety, and efficiency.	Select appropriate tools, materials, or settings for the given machining operation.
Yr 1 – MP 2	1414	Identify parts of CNC lathe	Understanding machine components and symbols improves safe operation and technical comprehension.	Accurately identify and describe required components, symbols, or systems.

Yr 1 – MP 2	1415	Identify parts of CNC mill	Understanding machine components and symbols improves safe operation and technical comprehension.	Accurately identify and describe required components, symbols, or systems.
Yr 1 – MP 3	407	Use a hand arbor and hydraulic press.	Understanding proper machining procedures ensures quality, safety, and industry readiness.	Perform the required task accurately, safely, and within specified tolerances.
Yr 1 – MP 3	601	Apply pedestal and surface grinding safety procedures.	Safe work practices are essential to prevent injury, protect equipment, and meet industry standards.	Demonstrate and consistently apply required safety procedures during all related operations.
Yr 1 – MP 3	801	Apply milling machine safety procedures.	Safe work practices are essential to prevent injury, protect equipment, and meet industry standards.	Demonstrate and consistently apply required safety procedures during all related operations.
Yr 1 – MP 3	802	Tram a mill head.	Proper setup and alignment determine milling accuracy and surface finish.	Set up and operate the milling machine to produce parts meeting print specifications.
Yr 1 – MP 3	803	Mount and indicate vise.	Understanding proper machining procedures ensures quality, safety, and industry readiness.	Perform the required task accurately, safely, and within specified tolerances.
Yr 1 – MP 3	804	Mill angles.	Proper setup and alignment determine milling accuracy and surface finish.	Set up and operate the milling machine to produce parts meeting print specifications.
Yr 1 – MP 3	805	Mill keyways.	Proper setup and alignment determine milling accuracy and surface finish.	Set up and operate the milling machine to produce parts meeting print specifications.
Yr 1 – MP 3	809	Use an edge finder.	Understanding proper machining procedures ensures quality, safety, and industry readiness.	Perform the required task accurately, safely, and within specified tolerances.
Yr 1 – MP 3	810	Differentiate between climb milling and conventional milling.	Proper setup and alignment determine milling accuracy and surface finish.	Set up and operate the milling machine to produce parts meeting print specifications.
Yr 1 – MP 3	811	Use an adjustable boring head.	Understanding proper machining procedures ensures quality, safety, and industry readiness.	Perform the required task accurately, safely, and within specified tolerances.

Yr 1 – MP 3	813	Install and remove cutting tool holders.	Understanding proper machining procedures ensures quality, safety, and industry readiness.	Perform the required task accurately, safely, and within specified tolerances.
Yr 1 – MP 3	814	Select cutting tool for milling operations.	Proper tool and equipment selection directly impacts quality, safety, and efficiency.	Select appropriate tools, materials, or settings for the given machining operation.
Yr 1 – MP 3	815	Square part.	Understanding proper machining procedures ensures quality, safety, and industry readiness.	Perform the required task accurately, safely, and within specified tolerances.
Yr 1 – MP 3	816	Select cutting tool for drilling operations.	Proper tool and equipment selection directly impacts quality, safety, and efficiency.	Select appropriate tools, materials, or settings for the given machining operation.
Yr 1 – MP 3	817	Identify parts of manual milling machine	Understanding machine components and symbols improves safe operation and technical comprehension.	Accurately identify and describe required components, symbols, or systems.
Yr 1 – MP 4	701	Apply lathe safety procedures.	Safe work practices are essential to prevent injury, protect equipment, and meet industry standards.	Demonstrate and consistently apply required safety procedures during all related operations.
Yr 1 – MP 4	702	Indicate work piece in a 4-jaw chuck.	Understanding proper machining procedures ensures quality, safety, and industry readiness.	Perform the required task accurately, safely, and within specified tolerances.
Yr 1 – MP 4	703	Align centers.	Understanding proper machining procedures ensures quality, safety, and industry readiness.	Perform the required task accurately, safely, and within specified tolerances.
Yr 1 – MP 4	704	Face workpiece.	Lathe operations require precision setup and dimensional control to ensure part function.	Set up and operate the lathe to perform required operations within print tolerances.
Yr 1 – MP 4	706	Turn inside and outside diameters to shoulders.	Lathe operations require precision setup and dimensional control to ensure part function.	Set up and operate the lathe to perform required operations within print tolerances.
Yr 1 – MP 4	707	Turn tapers.	Lathe operations require precision setup and dimensional control to ensure part function.	Set up and operate the lathe to perform required operations within print tolerances.

Yr 1 – MP 4	708	Demonstrate knurling.	Understanding proper machining procedures ensures quality, safety, and industry readiness.	Perform the required task accurately, safely, and within specified tolerances.
Yr 1 – MP 4	709	Part off and groove workpiece.	Understanding proper machining procedures ensures quality, safety, and industry readiness.	Perform the required task accurately, safely, and within specified tolerances.
Yr 1 – MP 4	710	Cut internal and external threads.	Lathe operations require precision setup and dimensional control to ensure part function.	Set up and operate the lathe to perform required operations within print tolerances.
Yr 1 – MP 4	712	File and polish workpiece.	Understanding proper machining procedures ensures quality, safety, and industry readiness.	Perform the required task accurately, safely, and within specified tolerances.
Yr 1 – MP 4	714	Perform boring operations.	Understanding proper machining procedures ensures quality, safety, and industry readiness.	Perform the required task accurately, safely, and within specified tolerances.
Yr 1 – MP 4	715	Install and remove tool holders.	Understanding proper machining procedures ensures quality, safety, and industry readiness.	Perform the required task accurately, safely, and within specified tolerances.
Yr 1 – MP 4	716	Select and apply work holding devices.	Proper tool and equipment selection directly impacts quality, safety, and efficiency.	Select appropriate tools, materials, or settings for the given machining operation.
Yr 1 – MP 4	719	Select gears for lathe operations.	Proper tool and equipment selection directly impacts quality, safety, and efficiency.	Select appropriate tools, materials, or settings for the given machining operation.
Yr 1 – MP 4	720	Perform drilling operations.	Understanding proper machining procedures ensures quality, safety, and industry readiness.	Perform the required task accurately, safely, and within specified tolerances.
Yr 1 – MP 4	721	Identify parts of engine lathe	Understanding machine components and symbols improves safe operation and technical comprehension.	Accurately identify and describe required components, symbols, or systems.
Yr 1 – MP 4	1002	Clean and store equipment.	Understanding proper machining procedures ensures quality, safety, and industry readiness.	Perform the required task accurately, safely, and within specified tolerances.
Yr2 – MP 1	106	Follow Safety Data Sheets (SDS).	Safe work practices are essential to prevent injury, protect	Demonstrate and consistently apply required safety

			equipment, and meet industry standards.	procedures during all related operations.
Yr2 – MP 1	201	Perform layout work.	Understanding proper machining procedures ensures quality, safety, and industry readiness.	Perform the required task accurately, safely, and within specified tolerances.
Yr2 – MP 1	303	Create quality control procedures.	Understanding proper machining procedures ensures quality, safety, and industry readiness.	Perform the required task accurately, safely, and within specified tolerances.
Yr2 – MP 1	602	Identify parts of pedestal grinder.	Understanding machine components and symbols improves safe operation and technical comprehension.	Accurately identify and describe required components, symbols, or systems.
Yr2 – MP 1	603	Test, mount, and dress grinding wheels.	Grinding operations achieve high precision, surface finish, and geometric accuracy.	Set up and operate grinding equipment to achieve specified tolerances and finishes.
Yr2 – MP 1	604	Grind and sharpen tools.	Grinding operations achieve high precision, surface finish, and geometric accuracy.	Set up and operate grinding equipment to achieve specified tolerances and finishes.
Yr2 – MP 1	608	Identify parts of surface grinder.	Understanding machine components and symbols improves safe operation and technical comprehension.	Accurately identify and describe required components, symbols, or systems.
Yr2 – MP 1	609	Grind surfaces flat and parallel using a magnetic chuck.	Grinding operations achieve high precision, surface finish, and geometric accuracy.	Set up and operate grinding equipment to achieve specified tolerances and finishes.
Yr2 – MP 1	610	Grind work surfaces square with a vise or angle plate.	Grinding operations achieve high precision, surface finish, and geometric accuracy.	Set up and operate grinding equipment to achieve specified tolerances and finishes.
Yr2 – MP 1	611	Grind precision angles using a sine plate or sine bar.	Grinding operations achieve high precision, surface finish, and geometric accuracy.	Set up and operate grinding equipment to achieve specified tolerances and finishes.