| Unit/Standard Number | pennsylvania DEPARTMENT OF EDUCATION<br>High School Graduation Years 2010, 2011 and 2012<br><br>**Machine Tool Technology/Machinist**<br>**CIP 48.0501**<br>**Task Grid** | Proficiency Level Achieved: (X) Indicates Competency Achieved to Industry Proficiency Level |
|---|---|---|
| | **Secondary Competency Task List** | |
| **100** | **ORIENTATION / SAFETY** | |
| 101 | Identify & explain machine processes and proper operating procedures. | |
| 102 | Identify & explain safety equipment and procedures. | |
| 103 | Identify & explain general safety precautions. | |
| 104 | Identify & explain personal/lab safety requirements. | |
| 105 | Identify and explain Right to Know Law. | |
| 106 | Identify and explain location of MSDS. | |
| 107 | Identify and explain potential hazardous trade materials. | |
| | | |
| **200** | **PERFORMING LAYOUT WORK** | |
| 201 | Develop process plan. | |
| 202 | Prepare materials for layout. | |
| 203 | Identify and use basic & precision layout tools. | |
| | | |
| **300** | **PART INSPECTION** | |
| 301 | Identify, care and use of precision measuring instruments. | |
| 302 | Calibrate precision measuring instruments. | |
| 303 | Demonstrate application of a quality plan. | |
| | | |
| **400** | **BENCH WORK** | |
| 401 | Demonstrate bench work safety procedures. | |
| 402 | Cut material with a hand hacksaw. | |
| 403 | File work to specifications. | |
| 404 | Cut threads with hand taps and dies. | |
| 405 | Assemble and disassemble parts. | |
| 406 | Identify and use bench hand tools. | |
| 407 | Identify & use a hand arbor and/or hydraulic press. | |

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# CIP 48.0501
# Task Grid

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|---|---|---|
| | | |
| **500** | **DRILL PRESSES** | |
| 501 | Demonstrate drill press safety precautions. | |
| 502 | Demonstrate the uses of drilling machines. | |
| 503 | Calculate speeds and feeds. | |
| 504 | Select & change tool holding devices. | |
| 505 | Demonstrate the use of center drills. | |
| 506 | Select & demonstrate proper use of drill sizes for various applications. | |
| 507 | Pre-drill & ream various size holes. | |
| 508 | Demonstrate counterboring, spotfacing & countersinking. | |
| 509 | Pre-drill and tap holes. | |
| 510 | Grind and use flat bottom drill. | |
| 511 | Sharpen various size twist drills. | |
| 512 | Select & demonstrate workholding devices. | |
| | | |
| **600** | **OPERATE GRINDING MACHINES** | |
| 601 | Identify and demonstrate pedestal grinding safety procedures. | |
| 602 | Identify parts of pedestal grinder. | |
| 603 | Demonstrate the proper way to test, mount and dress grinding wheels. | |
| 604 | Grind various single point lathe face and turning tools. | |
| 605 | Grind and use flat bottom drills. | |
| 606 | Sharpen various size twist drills. | |
| 607 | Grind 30 degree external and internal threading tools. | |
| 608 | Grind single point radius and parting tool setters. | |
| 609 | Identify & demonstrate surface grinding safety procedures. | |
| 610 | Identify parts of surface grinder. | |
| 611 | Grind surfaces flat & parallel using a magnetic chuck. | |
| 612 | Grind work surfaces square with a vise or angle plate. | |

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|---|---|---|
| 613 | Grind precision angles using a sine plate or sine bar. | |
| | | |
| **700** | **OPERATING LATHES** | |
| 701 | Identify and demonstrate lathe safety procedures. | |
| 702 | Mount and true work piece in 3-jaw and 4-jaw chucks. | |
| 703 | Align centers. | |
| 704 | Face workpiece. | |
| 705 | Turn outside diameters. | |
| 706 | Turn inside and outside diameters to shoulders. | |
| 707 | Turn tapers. | |
| 708 | Demonstrate knurling. | |
| 709 | Part off & groove workpiece. | |
| 710 | Chase external threads. | |
| 711 | Chase internal threads. | |
| 712 | Demonstrate gun tapping. | |
| 713 | Demonstrate filing & polishing. | |
| 714 | Demonstrate die thread cutting. | |
| 715 | Demonstrate boring. | |
| 716 | Select & demonstrate use of various tool holders. | |
| 717 | Demonstrate use of a steady rest and/or follower rest. | |
| 718 | Demonstrate use of collet attachment. | |
| | | |
| **800** | **MILLING MACHINES** | |
| 801 | Identify & demonstrate milling machine safety procedures. | |
| 802 | Demonstrate tramming of head. | |
| 803 | Select, mount & indicate vise. | |
| 804 | Machine angles. | |
| 805 | Machine keyways. | |
| 806 | Demonstrate fly cutter operations. | |
| 807 | Demonstrate indexing head calculations & use. | |
| 808 | Demonstrate use of digital readout. | |

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|---|---|---|
| 809 | Demonstrate use of edge finder. | |
| 810 | Demonstrate climb and conventional milling. | |
| 811 | Demonstrate gun tapping. | |
| 812 | Demonstrate use of adjustable boring head. | |
| 813 | Calculate speeds and feeds. | |
| | | |
| **900** | **POWER SAW** | |
| 901 | Identify & demonstrate power saw safety procedures. | |
| 902 | Demonstrate cutting and welding saw blades. | |
| 903 | Remove and replace saw blades. | |
| 904 | Demonstrate accurate sawing to a scribed line. | |
| 905 | Select and set speeds for saw operations. | |
| | | |
| **1000** | **MAINTAINING MACHINES AND TOOLS** | |
| 1001 | Demonstrate proper lubrication and maintenance of machinery. | |
| 1002 | Clean and store hand tools, cutters, fixtures and attachments. | |
| 1003 | Inspect & adjust machine guards. | |
| 1004 | Select, prepare & store coolants, cutting oils or compounds. | |
| 1005 | Inspect, clean, & maintain a safe working area. | |
| | | |
| **1100** | **METALLURGY** | |
| 1101 | Identify & explain metals classifications. | |
| 1102 | Identify & explain metal property applications. | |
| 1103 | Identify & explain heat-treating processes. | |
| | | |
| **1200** | **USE OF CHARTS AND REFERENCES** | |
| 1201 | Use the decimal equivalent chart. | |
| 1202 | Use speed and feed charts. | |
| 1203 | Utilize thread charts. | |
| 1204 | Demonstrate use of the Machinery's Handbook. | |
| | | |

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| **1300** | **BLUEPRINT READING** | |
| 1301 | Identify & explain views and projections. | |
| 1302 | Demonstrate basic sketching and dimensioning. | |
| 1303 | Identify & explain lines, dimensions, tolerances and fits. | |
| 1304 | Calculate material sizes based upon job needs. | |
| 1305 | Identify & interpret geometric dimensioning and tolerancing. | |
| | | |
| **1400** | **CNC PROGRAMMING** | |
| 1401 | Demonstrate CNC safety procedures. | |
| 1402 | Demonstrate basic use of G & M codes. | |
| 1403 | Demonstrate use of numerical controls. | |
| 1404 | Identify & demonstrate use of Cartesian & polar coordinate systems. | |
| 1405 | Demonstrate absolute & incremental positional. | |
| 1406 | Demonstrate dry run of program. | |
| 1407 | Identify & explain advantages & disadvantages of CNC machining. | |
| 1408 | Calculate & apply machine feeds and speeds. | |
| 1409 | Set part zero and tool offsets. | |
| 1410 | Post & transfer files to and from a CNC machine. | |
| 1411 | Identify and demonstrate use of MDI applications. | |
| | | |
| | **ADDITIONAL SUGGESTED ITEMS** | |
| **1500** | **SHOP MATH** | |
| 1501 | Perform mathematical operations with fractions. | |
| 1502 | Formulate metric conversions. | |
| 1503 | Calculate speeds and feeds. | |
| 1504 | Calculate angles and dimensions using right angle trigonometry. | |
| 1505 | Calculate indexing patterns. | |
| 1506 | Apply fundamentals of geometry. | |
| 1507 | Calculate tapers using degrees, TPI, & TPF. | |
| 1508 | Plot points using a coordinate system. | |