

CTESTAR™ Course Task List

Pathway

Engineering/Manufacturing and Industrial Technology

Course

Machine Trades Main

Instructor

Terry Morse

Number

267

Section

2

Host School

Bay-Arenac Career Center

Facility

BACC

01 JOB PLANNING AND MANAGEMENT

01.01 Job Process Planning

01.01.01 Develop a process plan for a part requiring sawing, milling, drilling, turning, and/or grinding.

01.01.02 Develop a process plan detailing the required materials, machinery and measuring tools.

01.01.03 Fill out an operation sheet detailing the process plan and required speeds and feeds.

02 JOB EXECUTION

02.01 Manual Operations: Benchwork

02.01.01 Using aluminum or mild steel, hand drill and hand tap holes.

02.01.02 Use hand drills, hand taps, tap wrench, files, .

02.01.03 Use arbor presses to perform press fits.

02.01.04 Use bench vises and hand tools appropriately.

02.01.05 Locates, understands, and interprets written technical and non-technical information for the purpose of finding the correct tools for the job.

02.02 Manual Operations: Layout

02.02.01 Layout the location of hole centers and surfaces within an accuracy of +/- .015.

02.02.02 Use common layout tools to scribe horizontal, vertical, angled lines and radiuses. within an accuracy of +/- .015

02.02.03 Locates, understands, and interprets written technical and non-technical information for the purpose of constructing lines, arcs, angles...

02.03 Turning Operations: Between Centers Turning

02.03.01 Setup and carry out between centers turning operations for ALL turning.

02.03.02 Clean and lubricate machine.

02.03.03 Align tail stock using test bar and indicator.

02.03.04 Cut diameters to specifications using power feed.

02.03.05 Square shoulders using parting tools to specifications.

02.03.06 Cut under cuts to specifications using proper tools.

02.03.07 Cut threads to specifications using single point tools.

02.03.08 Cut tapers using taper attachment.

02.03.09 Cut taper using tail stock off-set method.

02.03.10 Machine knurl

02.03.11 Perform lathe filing.

02.03.12 Polish surface finish to specifications using emery cloth.

02.03.13 Locates, understands, and interprets written technical and non-technical information to carry out the various operations performed during turning, threading...

02.04 Turning Operations: Chucking

02.04.01 Setup and carry out chucking operations for turning.

02.04.02 Properly install chucking device.

02.04.03 Properly mount work piece in chuck.

02.04.04 Perform face cuts.

02.04.05 Demonstrate difference between qualifying cut and clean-up cuts.
02.04.06 Turn diameters to specifications.
02.04.07 Turn shoulders at right angles.
02.04.08 Turn shoulders at angles other than 90 degrees.
02.04.09 Turn shoulders leaving radius in corner.
02.04.10 Part under cuts to print specifications.
02.04.11 Center drill, drill, ream and tap.
02.04.12 Cut threads to specifications using single point tool .
02.04.13 Machine knurls to specifications.
02.04.14 Machine tapers using compound slide.
02.04.15 Machine tapers using taper attachment.
02.04.16 Bore hole to specifications.
02.04.17 Cut internal under-cuts to specifications.
02.04.18 Cut internal threads to specifications using single point tools.
02.04.19 Mount work in collet chuck.
02.04.20 Mount work in four jaw chuck. Indicat to within .001 run out.
02.04.21 Mount work using face plate.
02.04.22 123
02.04.23 Locates, understands, and interprets written technical and non-technical information to perform various turning, threading, boring... operations.
02.05 Milling: Square Up a Block
02.05.01 Set up and perform squaring up the six surfaces of a block to within +/- .002 and .002 over 4.5" squareness.
02.06 Vertical Milling
02.06.01 Setup and operate vertical milling machines.
02.06.02 Perform routine milling, and location of hole centers within +/- .005".
02.06.03 Clean, lubricate and adjust milling machine.
02.06.04 Mount and align work holding devise.
02.06.05 Mount work piece to table using proper clamping devises.
02.06.06 Align mill head to table with in .002 TIR over 8 inch swing arm.
02.06.07 Aling milling maching work holding attachment using test indicator.
02.06.08 Align milling machine fixture using test indicator.
02.06.09 Machine steps to specifications.
02.06.10 Machine key seats and slots to specifications.
02.06.11 Machine angluar surfaces to specifications using sine bar or angle paralles.
02.06.12 Locates, understands, and interprets written technical and non-technical information to perform various milling operations.
02.07 Surface Grinding, Grinding Wheel Safety
02.07.01 Ring test grinding wheels, perform visual safety inspection, mount and dress a grinding whee in preparation for surface grinding.
02.08 Surface Grinding, Horizontal Spindle, Reciprocating Table
02.08.01 Setup and operate manual surface grinders with an 8" and smaller diameter wheel.
02.08.02 Perform routine surface grinding, location of surfaces, and squaring of surfaces.
02.08.03 Perform wheel dressing.
02.08.04 Locates, understands, and interprets written technical and non-technical information to perform various grinding operations.
02.09 Drill Press
02.09.01 Setup and operate drill presses.
02.09.02 Perform routine drill press operations.
02.09.03 Clean and lubricate drill press
02.09.04 Counter bore hole to specific depth.
02.09.05 Counter sink hole to specific depth.

02.09.06 Drill hole to specific depth and diameter.

02.09.07 Drill hole using automatic feed.

02.09.08 Drill work piece with drill jigs.

02.09.09 Mount work in V-blocks

02.09.10 Ream hole to size.

02.09.11 Spot face to specifications.

02.09.12 Tap hole with tapping attachment

02.09.13 Locates, understands, and interprets written technical and non-technical information to perform various drilling operations.

02.10 CNC Programming

02.10.01 Using the principles of cartesian coordinates develop a program for the manufacture of a simple part.

02.10.02 Use G code and M function to create tool path.

02.10.03 Make Tool Off Sets and Work Coordinate Set to locate part.

02.10.04 Use off line software to create programs. Load program to machine control using transfer devise.(3.5 floppy)

02.10.05 Load program directly to control using DNC.

02.10.06 Make revisions to program and save back to floppy or computer.

02.10.07 Locates, understands, and interprets written technical and non-technical information to write programs for a tool path.

03 QUALITY CONTROL AND INSPECTION

03.01 Part Inspection

03.01.01 Develop an inspection plan and inspect simple parts using precision tools and techniques.

03.01.02 Prepare reports on the compliance of the parts.

03.02 Process Control

03.02.01 Follow a sampling plan.

03.02.02 Inspect the samples for the required data.

03.02.03 Enter the data on appropriate charts.

03.02.04 Graph the data.

03.02.05 Respond to the warning conditions indicated by the process charts.

04 PROCESS ADJUSTMENT AND IMPROVEMENT

04.01 Process Adjustment-Single Part Production

04.01.01 Analyze the performance of a single-part production process.

04.01.02 Formulate process adjustments or improvements where appropriate.

04.01.03 Where appropriate, notify supervision of the proposed adjustment and/or improvement.

04.01.04 Where authorized, carry out the strategies for process adjustment and/or improvement.

04.02 Participation in Process Improvement

04.02.01 As a member of a process team, analyze the performance of a production process.

04.02.02 With the team formulate process adjustments or improvements where appropriate.

04.02.03 Where appropriate, notify supervision of the proposed adjustments and/or improvement.

04.02.04 Where authorized, carry out the strategies for process adjustment and/or improvement.

05 GENERAL MAINTENANCE

05.01 General Housekeeping and Maintenance

05.01.01 Keep the duty station clean and safe for work.

05.01.02 Keep the tools, workbenches, and manual equipment clean, maintained, and safe for work.

05.02 Preventive Maintenance, Machine Tools

05.02.01 Inspect and assess the general condition of an assigned machine tool.

05.02.02 Make routine adjustments as necessary and as authorized.

05.02.03 Report problems to supervision which are beyond the scope of authority.

05.02.04 Carry out daily, weekly, and/ or monthly routine upkeep chores cited on checklists for a given machine tool.

05.02.05 Use maintenance chart to inspect and report condition of machine.

05.02.06 Develop a maintenance plan for each machine type.

05.03 Tooling Maintenance

05.03.01 Inspect and assess the condition of tooling.

05.03.02 Refurbish tooling where appropriate. (drills, lathe and mill cutters)

05.03.03 Refer tooling for repair or regrind where appropriate.

06 INDUSTRIAL SAFETY AND ENVIRONMENTAL PROTECTION**06.01 Machine Operations and Material Handling**

06.01.01 Carry out assigned responsibilities while adhering to safe practices in accordance with OSHA requirements and guidelines.

06.01.02 Document safety activities as required.

06.02 Hazardous Materials Handling and Storage

06.02.01 Handle and store hazardous materials as assigned while adhering to safe practices in accordance with OSHA and EPA requirements and guidelines.

06.02.02 Document safety activities as required.

07 CAREER MANAGEMENT AND EMPLOYMENT RELATIONS**07.01 Career Planning**

07.01.01 Develop and explain a short-term career plan and resume.

07.01.02 Create and present information related to Occupations in manufacturing including skill levels, salary levels, local opportunities for employment, benefits and drawbacks for type of employment.

07.02 Job Application and Interviewing

07.02.01 Complete job application form and demonstrate interviewing skills.

07.03 Teamwork and Interpersonal Relations

07.03.01 Demonstrate appropriate interpersonal skills in job performance evaluations, group communication and decision-making, and conflict resolution.

07.04 Organizational Structures and Work Relations

07.04.01 Identify and explain the major departments or functions in a metalworking company and how they affect production units.

07.05 Employment Relations

07.05.01 Understand and explain employment rights and responsibilities in metalworking companies.

08 WRITTEN AND ORAL COMMUNICATION**08.01 Reading**

08.01.01 Locates, understands, and interprets written technical and non-technical information in documents commonly found in the metalworking industry. These documents contain short and simple sentences, paragraphs and passages, phrases, quantitative information

08.02 Writing

08.02.01 Communicates technical and non-technical information, messages, and ideas in writing using standard English commonly found in the metalworking industry. This writing includes the completion of forms, information sheets, reports, group meeting materials

08.02.02 Write a detailed report on how to set up and operate a piece of equipment.

08.03 Speaking

08.03.01 Communicates technical and non-technical detailed information, messages, multi-step directions and ideas through oral communication using standard English and related cues and communication aids in conversations, discussions, and group meetings.

08.03.02 Understands and responds to listener feedback and asks questions when needed in two-way and group conversations.

08.03.03 Demonstrate ability to communicate with other professionals using telephone etiquette.(order materials for class)

08.04 Listening

08.04.01 Listens for, receives, interprets, and recalls specific details, ideas, and multi-step instructions in verbal presentations, conversations, discussions, and group meetings conducted in standard English and supported by written materials and other commun

08.04.02 Uses active listening skills in comprehending simple technical and non- technical verbal information.

09 MATHEMATICS

09.01 Arithmetic

09.01.01 Performs addition, subtraction, multiplication, and division of whole numbers without a calculator, and performs calculation of fractions and decimals, as well as conversion to metric measurement with or without a calculator.

09.01.02 Uses addition to make calculations

09.02 Applications of Geometry

09.02.01 Understands and applies basic geometric concepts and terminology which form the analytical foundation of job planning and execution including planes perpendicularity, Cartesian coordinates, concentricity, parallelism, straightness, flatness, circularity

09.03 Applications in Algebra

09.03.01 Uses standard formulas and arithmetic operations to make required calculations with or without a calculator.

09.03.02 Can solve for an unknown in a trade formula.

09.04 Applications in Trigonometry

09.04.01 Uses standard formulas and arithmetic operations to make required calculations with or without a calculator, solving for unknowns in right triangles.

09.04.02 Uses standard formulas and arithmetic operations to make required calculations with a calculator, solving for unknowns in right triangle

09.05 Applications of Statistics

09.05.01 Uses standard formulas and arithmetic operations to calculate means, medians, modes, and ranges with or without a calculator.

10 DECISION MAKING AND PROBLEM SOLVING

10.01 Applying Decision Rules

10.01.01 Can follow a set of instructions laid out in a sequence.

10.01.02 Can interpret and follow if....then.... instructions.

10.01.03 Basic Problem Solving

10.01.04 Can establish new responses to unexpected problems of a simple nature.

10.01.05 Can formulate the new responses into a sequence of instructions or a set of "if ... then ..." rules.

11 SOCIAL SKILLS AND PERSONAL QUALITIES

11.01 Social Skills

11.01.01 Identify and demonstrate the appropriate social skills and related personal qualities in the performance of major duties requiring cooperative relations with supervisors, team leaders, and team members.

11.02 Personal Qualities

11.02.01 Identify and demonstrate the appropriate personal qualities in performing major job duties and maintaining positive employment relations.

11.02.02 Report to class on time.

11.02.03 Take break at scheduled time.

12 ENGINEERING DRAWINGS AND SKETCHES

12.01 Standard Orthographic Prints

12.01.01 Interprets orthographic blueprints.

12.01.02 Read and answer questions specific to orthographic drawings.

12.02 GDT Orthographic Prints

12.02.01 Interprets GDT orthographic prints.

12.02.02 Read and answer questions specific to GDT.

12.03 Datums, Symbolology and Tolerances

12.03.01 Identify the common symbols, the use of datum references and tolerances used in GD&T.

12.03.02 Read and answer questions specific to datums, symbolology and tolerances.

13 MEASUREMENT

13.01 Basic Measuring Instruments

13.01.01 Recognizes and applies basic measuring instruments such as rules, protractors, and basic transfer tools such as simple inside and outside calipers.

13.01.02 Read and answer questions specific to basic measuring instruments.

13.02 Precision Measuring Instruments

13.02.01 Recognizes and applies precision measuring instruments such as micrometers, vernier, dial, and electronic calipers, dial indicators, precision transfer tools such as telescoping gages and adjustable parallels.

13.02.02 Use and read inside micrometers to $\pm .001$.

13.02.03 Use and read outside micrometers to .0001 inch.

13.02.04 Use and read depth micrometers to $\pm .001$

13.02.05 Use and read vernier, dial and digital calipers to $\pm .001$

13.02.06 Use and read vernier, dial and digital height gage to $\pm .001$

13.02.07 Use and read dial height gage to $\pm .001$

13.02.08 Use and read bevel protractors.

13.02.09 Calculate proper gage block stack up for specific dimension to .0001 inch.

13.02.10 Use dial and test indicators to transfer dimensions.

13.02.11 Demonstrate proper care of precision measuring tools.

13.02.12 Demonstrate proper calibration of precision measuring instruments.

13.02.13 Read and answer questions specific to precision measuring instruments.

13.03 Surface Plate Instruments

13.03.01 Recognizes and applies appropriately precision tools and instruments for surface plate work such as precision angle plates and tool blocks, precision transfer gages, and precision height gages.

13.04 Metric Conversion

13.04.01 Convert all measurements to metrics.

14 METALWORKING THEORY

14.01 Cutting Theory

14.01.01 Understands and can explain the ideas of heat, shock, friction, zone of distortion, cutting interface, machinability, cutter presentation, cutter geometry, and chip-holding capacity as they relate to machining applications.

14.02 Tooling

14.02.01 Recognizes a wide variety of cutting tools, tool holding devices, and work holding devices.

14.02.02 Understands the appropriate application of these cutters and devices.

14.03 Material Properties

14.03.01 Recognizes common materials and their principal properties relevant to machining tasks.

14.03.02 Recognizes differences between ferrous and non-ferrous, magnetic, and ductile materials.

14.03.03 Understands the changes which heat-treat imparts to materials.

14.04 Machine Tools

14.04.01 Recognizes the common classes of machine tools, understands the function of the major subsystems of the machine tools, selects and applies a given machine tool appropriately.

14.05 Cutting Fluids and Coolants

14.05.01 Recognizes, selects, and applies appropriate coolants and coolant delivery systems.

15 CAD/CAM

15.01 Use software to create part shape.

15.01.01 Create simple two dimensional shape using cad/cam software.

15.01.02 Create tool path using cam software.

15.01.03 Open file from another cad system and create tool path using cam software.

15.01.04 Post program according to machine system available.

15.01.05 Make changes to drawing and revise tool path.

15.01.06 Read and answer questions specific to cad/cam software.