

# SLO Presentation

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MTT

Date: 09/11/2019

<b>TECHNOLOGY</b>
MTT
<b>Machine Tool Technology--AA</b> <ul style="list-style-type: none"><li>• Students apply industry standard safety practices and specific safety requirements for different machining operations.</li><li>• Students calculate necessary tolerances to plan for his machine sequences.</li><li>• Students create the digital geometry necessary for machine programming.</li><li>• Students inspect the produced part to ensure completion per blueprint requirement.</li><li>• Students interpret blueprint information and translate it into actionable items.</li><li>• Students perform basic setup and operation of a CNC lathe &amp; mill.</li><li>• Students perform setup and operation of manual machines, such as band saw, lathe, mill, and drill press.</li></ul>
<b>Machinist--Cert</b> <ul style="list-style-type: none"><li>• Students apply industry standard safety practices and specific safety requirements for different machining operations.</li><li>• Students calculate adjust speed, feed and other parameters to properly produce the part.</li><li>• Students calculate necessary tolerances to plan for his machine sequences.</li><li>• Students inspect the produced part to ensure completion per blueprint requirement.</li><li>• Students interpret blueprint information and translate into actionable items.</li><li>• Students perform setup and operation of manual machine, such as band saw, lathe, mill, and drill press.</li></ul>
<b>Numerical Control Machine Operator--Cert</b> <ul style="list-style-type: none"><li>• Students apply industry standard safety practices and specific safety requirement for different machining operations.</li><li>• Students complete industry standard inspection report.</li><li>• Students inspect the produced part to ensure completion per blueprint requirement.</li><li>• Students interpret blueprint information and translate it into actionable items.</li><li>• Students perform basic setup and operation of CNC lathe &amp; mill.</li><li>• Students perform setup and operation of manual machines, such as band saw, lathe, mill, and drill press.</li></ul>
<b>Numerical Control Tool Programmer--Cert</b> <ul style="list-style-type: none"><li>• Students apply industry standard safety practices and specific safety requirement for different machining operations.</li><li>• Students create the digital geometry necessary for machine programming.</li><li>• Students generate a tool path and verify its execution.</li><li>• Students inspect the produced part to ensure completion per blueprint requirement.</li><li>• Students interpret blueprint information and translate into actionable items.</li><li>• Students perform basic setup and operation of CNC lathe &amp; mill.</li></ul>
<b>Tool and Die Maker--Cert</b> <ul style="list-style-type: none"><li>• Students apply industry standard safety practices and specific safety requirement for different machining.</li><li>• Students calculate adjust speed, feed and other parameters to properly produce the part.</li><li>• Students complete industry standard inspection report.</li><li>• Students inspect the produced part to ensure completion per blueprint requirement.</li><li>• Students interpret blueprint information and translate into actionable items.</li><li>• Students perform the set up and operation of manual machines, such as band saw, lathe, mill, and drill press.</li></ul>

**CSLO****MTT51 - MasterCAM Milling**

- Students can create basic geometry needed for machining on a CNC milling machine.
- Students can access the proper toolpath to machine the part according to the blueprint.
- Students can modify instructor's tool paths after verify simulation on a virtual CNC milling machine.
- Students backplot their part to see how long it will take to machine it on a CNC milling machine
- Students modify the tool parameters they used if they see a need for it
- Students modify their toolpaths after they simulate the machining on a virtual CNC milling machine
- Students modify the tool parameters they used if they see a need for it.
- Students select the proper stock for simulation on a virtual CNC milling machine.
- Students simulate their machining operations to check that the part is being machined correctly on the CNC milling machine
- Students post process the information for a specific CNC milling machine to generate G&M codes

**MTT52 - Setup and Operation of CNC Milling Machines**

- Students know how to turn on the CNC milling machine safely.
- The students will be able to produce a workpiece within tolerances of the blueprint using a CNC milling machine and a CNC program of moderate complexity.
- Students setup the X and Y axis for their part on the CNC milling machine.
- Students setup several tool height offsets on the CNC milling machine.
- Students understand how to use an edgefinder.
- Students can retrieve programs from a USB drive and load them onto the CNC milling machine.
- Students simulate the program they will be running on the CNC milling machine.
- Students run the first article safely on the CNC milling machine.
- Students modify the speed and feed of the program using the controller if necessary.
- Students load tools properly in the tool holders.
- Students align a fixture if required for operation.

**MTT56 - CNC Shop Inspection**

- Analyze dial caliper measurements to ensure compliance with the blueprint.
- Analyze micrometer measurements to ensure compliance with the blueprint.
- Identify and select proper measuring instruments to meet blueprint accuracy requirement

**MTT57 - Setup and Operation of CNC Lathes**

- Students know how to turn on the CNC lathe safely.
- Students setup the X and Z axis for their part on the CNC lathe
- Students use manual data input to face their part.
- Students understand how to modify their setup if the diameter of their part is too small or too large.
- Students can retrieve programs from a USB drive and load them onto the CNC lathe.
- Students run the first article safely on the CNC lathe.
- Students can run the first article safely on the CNC lathe.
- Students can modify the speed and feed of the program using the controller.

**MTT59 - MasterCAM Turning**

- Students machine the lathe part on the blueprint virtually with the appropriate cutting tools and processes.
- Students can create basic geometry needed for machining on a CNC lathe.
- Students can modify their turning machining process if the result produced is not accurate.
- Students can access the proper toolpath to machine the part according to the blueprint.

- Students can setup their stock and geometry accurately in preparation for milling processes.
- Students select the proper tool to machine their part on a virtual CNC lathe.
- Students can backplot instructor's part to see how long it will take to machine it on a CNC lathe.
- Students backplot their part to see how long it will take to machine it on a CNC lathe.
- Students modify the tool they used if they see a need for it.
- Students copy, offset, mirror or do whatever operation they can think of to create the part faster.
- Students can select the proper stock for simulation on a virtual CNC lathe.
- Students simulate their machining operations to check that the part is being cut correctly on the virtual CNC milling machine.
- Students post process the information for a specific CNC lathe to generate the G&M codes

### **MTT62 - Fixture Tooling**

- Analyze whether the design and construction of a new a fixture is justified for a selected machining operation.
- Determine the correct cutting force requirements to select the proper fixture components.
- Prepare a written checklist of parameters to take into consideration while preparing the design of a fixture.

### **MTT68 - Computer-Assisted Inspection Using Verisurf**

- Perform size inspections using two planes.
- Determine the proper alignment by creating the appropriate targets.
- Perform a flatness inspection according to the blueprint

### **MTT71 - MasterCam Multi-Axis Milling**

- Know how to define differences between tool planes and construction planes
- Know how to orient part in various world coordinate systems

### **MTT72 - MasterCAM Multi-Axis Turning**

- A. Select cutting tools, feeds, and speeds that are appropriate for the material machined and produce a virtual part within appropriate time constraints
- B. Determine the correct multi-axis tool paths to complete a virtual job correctly and simulate the chosen tool path correctly
- C. Set up the virtual machine correctly and produce a first article that is accurate and produces no collision

### **MTT75 - GibbsCam Multi-Axis Machining**

- Select cutting tools, feeds and speeds that are appropriate for the material machined and produce a part within appropriate time constraints
- Determine the correct multi-axis tool paths to complete a job correctly and simulate the chosen tool path correctly
- Set up the virtual machine correctly and produce a first article that is accurate and produces no collision

### **MTT76 - GibbsCam Milling**

- Students machine the mill part on the blueprint virtually with the appropriate cutting tools and processes.
- Students can modify their milling machining process if the result produced is not accurate.
- Students can setup their stock and geometry accurately in preparation for milling processes.

### **MTT78 - Tool Building Using Verisurf**

- Apply probe compensation to complex virtual models.
- Build complex assembly tooling and fixture.
- Learn how to set tolerances and control feature projection.
- Set tolerances and control feature projection
- Set up tools and apply inspection knowledge to physical models.

### **MTT91L - CNC Mill Machining Laboratory**

- Students produce an inspection report that describes both the measured dimensions and the methods of setup of the CNC lathe.
- Students determine the correct tool paths to complete a job correctly on the CNC milling machine and provide the correct program.

- Students setup the CNC mill correctly and produce a first article that is accurate according to the blueprint.

### MTT92L - Mastercam Laboratory

- Students are able to plan the sequence of operations to machine the part on MasterCam using the operations manager.
- Students can modify an operation using the operations manager.
- Students can create the geometry necessary to machine the part on MasterCam.
- Students know what tolerances are required for their finished part.
- Students find the information they need to select the proper drill before they tap a hole if required.
- Students setup the correct tools needed to machine their part on MasterCam.
- Students can decide if they need to machine the part in several operations.
- Students can use the help function of the software to find an answer to a common MasterCam problem.
- Students can find out how much time it will take to machine the part using the backplot function of MasterCam.
- Students know how to recognize a tool collision during the machining simulation.

### MTT93L - Virtual Gibbs Laboratory

- Machine the part on the blueprint virtually with the most appropriate cutting tools
- Produce an accurately machined part with efficiency in mind
- Separate operations for easy processing of operations

### MTT94L - Manual Machining Lab

- Students produce an inspection report that describes both the measured dimensions and the methods of setup of the lathe and/or mill.
- Students determine the correct tool paths to complete a job correctly on the lathe and/or mill.
- Students setup the lathe and/or mill correctly and produce a first article that is accurate according to the blueprint.

### MTT95L - CNC Lathe Machining Laboratory

- Students produce an inspection report that describes both the measured dimensions and the methods of setup of the CNC lathe.
- Students determine the correct tool paths to complete a job correctly on the CNC lathe.
- Students set up the CNC lathe correctly.
- Students produce a first article that is accurate according to the blueprint.

### MTT96L - CNC Multi-Axis Mill Machining Laboratory

- Produce an inspection report that is complete and describes both the measured dimensions and the methods of setup
- Determine the correct multi axis tool paths to complete a job correctly and provide the correct program
- Setup the machine correctly and produce a first article that is accurate according to the blueprint

### MTT97L - CNC Multi-Axis Turning Laboratory

- A. Produce an inspection report that is complete and describes both the measured dimensions and the methods of setup
- Determine the correct multi-axis tool paths to complete a job correctly and provide the correct program
- Set up the machine correctly and produce a first article that is accurate according to the blueprint

### MTT100 - Machine Tool Introduction

- Students can read the basic blueprints that were given to them in MTT 100
- Students know what tools to use to machine the type of parts in MTT 100.
- Students understand the importance of safety in machine tool technology.
- Students set up basic feeds and speeds on their machine.
- Students understand that different materials require different feeds and speeds.
- Students use a dial caliper to measure the parts they made in MTT 100.
- Students can read a Vernier micrometer.
- Students can use a bandsaw to cut the raw material they need.

- Students can perform basic operations on the lathe.
- Students can perform basic operations on the mill.

#### **MTT110 - Industrial Maintenance of Machine Tools**

- A. Identify the principal components of machine tools
- B. Determine the proper electrical load for machine tool operation
- C. Differentiate between different types of sub systems on machine tools
- D. Sketch the principal components of machine tools
- E. Compare and contrast manual versus CNC machine tool maintenance
- F. Compare preventive and curative maintenance of machine tools

#### **MTT111 - Programmable Logic Controllers In Automated Manufacturing**

- Produce a cost-effective production plan for an automated manufacturing problem
- Document inputs and outputs, rationale for process evaluation, parts to be used, and product cost based on list price
- Obtain three commercial quotations for selected solution
- Explain selection to a group of peers
- Identify potential maintenance issues for an automated manufacturing system

#### **MTT112 - Variable Frequency Drives in Automated Manufacturing**

- Produce a plan for the commissioning of a variable frequency drive (VFD) in automated manufacturing
- Produce a simple connection to a programmable logic controller (PLC)
- Produce a simple connection to an human machine interface (HMI)
- Develop a simple VFD application using the operator panel
- Identify various components of VFDs

#### **MTT120 - Fanuc Multi-Axis Robotics**

- A. Identify the principal components of multi-axis robots
- B. Determine the proper sequence for start-up and shut down of the multi- axis robots
- C. Differentiate between different types of cellular systems
- D. Single step test a program of low complexity for a typical machined part
- E. Compare and contrast robot inputs and outputs
- F. Identify the basics steps to follow to troubleshoot a fault in the robot program

#### **MTT168 - Advanced Computer-Assisted Inspection Using Verisurf**

- Best-fit virtual models to captured data
- Measure the true position of holes
- Perform size inspections that are applicable to a specific problem
- Create reports of their measured data and compare it to virtual data
- Utilize laser tracker to inspect complex geometry
- Edit report objects for standardized output

#### **MTT177 - Advanced GibbsCam**

- Students are able to machine the complex mill part on the blueprint virtually with the appropriate cutting tools and processes.
- Students modify their complex milling machining process if the result produced is not accurate.
- Students setup the stock and geometry accurately in preparation for complex milling processes.

#### **MTT180 - Robotics for Computer Numerically Controlled Machines**

- Students will machine a part of medium complexity on a CNC mill and use a robot to move the part from the CNC machine to an inventory location defined by the instructor.
- Students will learn how to plan an automation project by differentiating between digital inputs/outputs and analog inputs.

- Students will learn mass properties of various objects.
- Students will program a close-loop control system.
- Students will program an open-loop control system.
- Students will describe the motions of a robot program.
- Students will machine a part of medium complexity on a CNC mill and use a robot to move the part from the CNC machine to an inventory location defined by the instructor.

### **MTT278 - Mastercam Advanced**

- Students can create a tool plane as needed in 3D space.
- Students can create 3D geometry necessary for machining a part.
- Students can modify 3D geometry as needed.
- Students can identify geometry on the blueprint to decide what toolpaths to use.
- Students can create surfaces needed for machining.
- Students can create solids using Boolean operations.
- Students can rough machine 3D parts.
- Students can finish machine 3D parts.
- Students can edit toolpaths to save time in 3D machining.
- Students can post process toolpaths for the proper CNC machine.