

# KMAT-0250 Advanced Lathe

## Author

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## Competencies and Learning Objectives

1. Demonstrate how to turn between center
  - Demonstrate how to turn a center
  - Demonstrate moving the compound to a 30-degree angle
  - Demonstrate setting up a drive dog
  - Demonstrate supporting the workpiece with a drive dog
2. Demonstrate how to bore using a lathe
  - Prepare workpiece to be bored
  - Demonstrate boring a workpiece to blueprint specifications
3. Demonstrate how to part off
  - Demonstrate how to properly align the part-off tool.
  - Demonstrate parting off technique.
4. Demonstrate how to create a worm gear shaft
  - Demonstrate how to turn a .001 tolerance to create a worm gear shaft.
  - Demonstrate how to turn a 3A thread using the plunge method, to create a worm gear shaft.
  - Measure thread pitch diameter of worm gear shaft.
5. Demonstrate how to chuck a workpiece to maintain parallelism
  - Use parallels as stop points when chucking a workpiece.
  - Demonstrate chucking 2nd side to maintain parallelism.
  - Demonstrate taking cleanup cut.
  - Measure for parallelism.
6. Demonstrate how to knurl and turn fine pitch clamp screw threads
  - Demonstrate how to properly align the knurling tool.
  - Set speeds and feeds for knurling.
  - Qualify zero for workpiece.
  - Demonstrate passing workpiece through knurling tool.

- Demonstrate turning a fine thread.
7. Solve problems using algebra and trigonometry for machinists
- Solve basic algebra problems
  - Solve basic trigonometry problems
  - Solve problems using the pythagorean theorem
  - Solve problem using sine, cosine, tangent

## Course Description

This course will continue to explore how to use a lathe in a machine shop. Turning, boring, parting off, knurling and relevant mathematics will be covered.

## Competencies

Upon completion of the course, you will be rated as MC (Mastered Competency) or NM (Not-Mastered Competency) based on ability to demonstrate the established competencies for the course. You will:

- Demonstrate how to turn between center
- Demonstrate how to bore using a lathe
- Demonstrate how to part off
- Demonstrate how to create a worm gear shaft
- Demonstrate how to chuck a workpiece to maintain parallelism
- Demonstrate how to knurl and turn fine pitch clamp screw threads
- Solve problems using algebra and trigonometry for machinists

## Assessment

During the course you be given written and performance exams.

Lab Final 1

Lab Final 2

Lab Final 3

Lab Final 4

Lab Final 5

Lab Final 6

Written Exam

You must pass with at least a score of 80% or higher on each summative assessment to be considered Master Competent and complete the course.

## Course work

The course work for this class will be available partially online and partially in the lab. You will need to complete both the online and classroom portions to obtain the all of the course information.

## Safety

In this course, you are expected to utilize safe behaviors and safety equipment for a machine shop. Safety will be evaluated in all performance exams.

### Flexibility

If you feel that you are ready to do the lab final or exams without completing the course modules, please contact your instructor.

## Contact and Assistance

If you need additional assistance with course material, you may consult with your instructor during open lab times Mon-Thur from 5pm to 9pm.

If you have questions about coursework outside of lab hours you may contact your instructor via text/voice 347-920-1047 or email [darrell.smith@slcc.edu](mailto:darrell.smith@slcc.edu).

If you have technical issues with Internet access, computer labs, applications, BruinMail, Printing, or software navigate to <http://www.slcc.edu/student/help.aspx>

If you have technical issues with Canvas, navigate to <https://faculty.slcc.edu/elearning/canvas.aspx>

## Syllabus

The expectations for this course are described in detail in the course syllabus. (Link to syllabus)

## Course Navigation *(Instructions for the learning management system)*

In the left navigation bar is a Course Tools menu. It provides information about what tools you need for the course, and how to navigate in Canvas. Start the course with the first module below. You can also click on the Modules link in the left navigation bar to navigate through the course.

## Modules

### Module 1: Turning Between Centers

#### **Module 1: Overview**

Introduction to the Module: This module will cover turning between centers using a lathe. You will have access to learning materials and activities including a video demonstration, lab

instructions, and blueprints. You will also complete a lab activity in the shop. Assessment of competencies in this module will take place in a lab final in Module 6 to be taken when you have completed modules 1-6.

The course work in this module, combined with class sessions should prepare you to:

Demonstrate how to turn between centers using a lathe.

1. Demonstrate how to turn a center
2. Demonstrate moving the compound to a 30-degree angle
3. Demonstrate setting up a drive dog
4. Demonstrate supporting the workpiece with a drive dog

### **Module 1: Video Demonstration**

Watch the video titled: Turning Between Centers

Information included in this video demonstration

1. [How to turn Between Centers](#)

Click this link to view the video.

### **Module 1: Lab Instructions and Blueprints**

The links below will give you access to the Job Traveler instruction sheet and blueprints for the Turning Between Centers Lab. You may print a copy to bring to class or keep a digital copy to use during the lab.

1. Job Traveler and Turning Between Centers blueprint

### **Module 1: Check in Lab 1**

Now that you have completed the learning materials for Module 1, check in with your instructor for information about Lab 1: Turning Between Centers.

## Module 2: How to Bore Using a Lathe

### **Module 2: Overview**

Introduction to the Module: This module will introduce you to the boring process, using a lathe. You will have access to learning materials and activities including a video demonstration. You will also complete lab activities in the shop in Module 3. Assessment of competencies in this module will take place in a lab final at the end of Module 3.

The course work in this module, combined with class sessions should prepare you to:

Demonstrate how to bores using a lathe.

1. Prepare workpiece to be bored
2. Demonstrate boring a workpiece to blueprint specifications

## Module 2: Video Demonstrations

Watch the video titled: How to Bore Using a Lathe

Information included in this video demonstration

1. [How to prepare a workpiece for boring](#)
2. [How to bore to blueprint specifications](#)

Click this link to view the video.

## Module 2: Check in

Now that you have completed the learning materials for Module 2, check in with your instructor if you have questions, or move on to Module 3.

## Module 3: How to Part Off

### Module 3: Overview]

Introduction to the Module: This module will cover the correct procedure for parting off. You will have access to learning materials and activities including a video demonstration, lab instructions, and blueprints. You will also complete a lab activity in the shop. Assessment of competencies in this module will take place in a lab final at the end of this module.

The course work in this module, combined with class sessions should prepare you to:

Demonstrate how to turn between centers using a lathe.

1. Demonstrate how to properly align the part-off tool.
2. Demonstrate parting off technique.

### Module 3: Video Demonstration

Watch the video titled: Turning Between Centers

Information included in this video demonstration

1. [Demonstrate how to align the part-off tool.](#)
2. [Demonstrate parting-off technique.](#)

Click this link to view the video.

### Module 3: Lab Instructions and Blueprints

The links below will give you access to the Job Traveler instruction sheet and blueprints for the Turn 2ea. Small Bushings lab and Turn 2ea. Large Bushings final lab. You may print copies to bring to class or keep digital copies to use during the lab.

1. Turn 2ea. Small Bushings blueprint
2. Turn 2ea. Large Bushings blueprint

### **Module 3: Check in Lab 2**

Now that you have completed the learning materials for Modules 2 and 3, check in with your instructor for information about lab 2, Turn 2ea. Small Bushings.

### **Module 3: Check in Lab Final 1**

Now that you have completed the learning materials for Modules 2 and 3, check in with your instructor for information about Lab Final 1, Turn 2ea. Large Bushings.

## Module 4: How to Create a Worm Gear Shaft

### **Module 4: Overview**

Introduction to the Module: This module will cover how to create a worm gear shaft. You will have access to learning materials and activities including a video demonstration, lab instructions, and blueprints. You will also complete a lab activity in the shop. Assessment of competencies in this module will take place in a lab final at the end of this module.

The course work in this module, combined with class sessions should prepare you to:

Demonstrate how to turn between centers using a lathe.

1. Demonstrate how to turn a .001 tolerance to create a worm gear shaft.
2. Demonstrate how to turn a 3A thread using the plunge method, to create a worm gear shaft.
3. Measure thread pitch diameter of worm gear shaft.

### **Module 4: Video Demonstrations**

Watch the video titled: Turning Between Centers

Information included in this video demonstration

1. [How to machine a worm gear shaft](#)
2. [How to measure thread pitch diameter](#)

Click this link to view the video.

### **Module 4: Lab Instructions and Blueprints**

The links below will give you access to the Job Traveler instruction sheet and blueprints for the Rough Turn Worm lab, the Finish Turn Worm, and Turn 1.00-8 UNC 3A Threads final labs. You may print copies to bring to class or keep digital copies to use during the lab.

1. Rough Turn Worm blueprint
2. Finish Turn Worm blueprint
3. Turn 1.00-8 UNC 3A Threads blueprint

### **Module 4: Check in Lab 3**

Now that you have completed the learning materials for Module 4, check in with your instructor for information about lab 4: rough turn worm.

### **Module 4: Check in Lab Finals 4 & 5 and Lab Final 2**

Now that you have completed the learning materials and labs for Module 4, check in with your instructor for information about Lab Final 2: Rough Turn Worm lab and the Finish Turn Worm, and Lab final 3 Turn 1.00-8 UNC 3A Threads.

## Module 5: How to Chuck a Workpiece

### **Module 5: Overview**

Introduction to the Module: This module will give over how to correctly chuck a workpiece. You will have access to learning materials and activities including a video demonstration, lab instructions, and blueprints. You will also complete a lab activity in the shop. Assessment of competencies in this module will take place in a lab final at the end of this module.

The course work in this module, combined with class sessions should prepare you to:

Demonstrate how to turn between centers using a lathe.

1. Use parallels as stop points when chucking a workpiece.
2. Demonstrate chucking 2nd side to maintain parallelism.
3. Demonstrate taking cleanup cut.
4. Measure for parallelism.

### **Module 5: Video Demonstrations**

Watch the video titled: How to Chuck a Workpiece to Maintain Parallelism

Information included in this video demonstration

1. How to use parallels as stop points to maintain parallelism

Click this link to view the video.

### **Module 5: Lab Instructions and Blueprints**

The links below will give you access to the Job Traveler instruction sheet and blueprints for the Turn Gear OD and ID Width final lab. You may print copies to bring to class or keep digital copies to use during the lab.

1. Turn Gear OD and ID Width blueprint

### **Module 5: Check in Lab 5**

Now that you have completed the learning materials for Module 5, check in with your instructor for information about Lab 5: Turn Gear OD and ID Width.

## Module 5: Check in Lab Final 4

Now that you have completed the learning materials and lab for Module 5, check in with your instructor for information about Lab Final 4: Turn Gear OD and ID Width.

## Module 6: Knurling

### Page: [Module 6: Overview]

Introduction to the Module: This module will cover knurling using a lathe. You will have access to learning materials and activities including a video demonstration, lab instructions, and blueprints. You will also complete a lab activity in the shop. Assessment of competencies in this module will take place in a lab final at the end of this module.

The course work in this module, combined with class sessions should prepare you to:

Demonstrate how to knurl turn fine pitch clamp screw threads.

1. Demonstrate how to properly align the knurling tool.
2. Set speeds and feeds for knurling.
3. Qualify zero for workpiece.
4. Demonstrate passing workpiece through knurling tool.
5. Demonstrate turning a fine thread.

### Module 6: Video Demonstration

Watch the video titled: Knurling

Information included in this video demonstration

1. [How to align the knurling tool](#)

Click this link to view the video.

### Module 6: Lab Instructions and Blueprints

The links below will give you access to the Job Traveler instruction sheet and blueprints for the Clamp Screw Knurl/Crown, Clamp Screw Major ODs, Turn Clamp Screw Threads final labs. You may print copies to bring to class or keep digital copies to use during the lab.

1. Clamp Screw Knurl/Crown blueprint
2. Clamp Screw Major ODs blueprint
3. Turn Clamp Screw Threads blueprint

### Module 6: Check in Lab

Now that you have completed the learning materials for module 6, check in with your instructor for information about Lab 6: Clamp Screw Knurl/Crown, Clamp Screw Major ODs/Threads.



## **Module 6: Check in Lab Finals 5 & 6**

Now that you have completed the learning materials and labs for Module 1-6, check in with your instructor for information about Lab Finals 5 & 6: Clamp Screw Knurl/Crown, Clamp Screw Major ODs/Threads.

## Module 7: Algebra and Trigonometry

### **Module 7: Overview**

Introduction to the Module: This module will cover algebra and trigonometry for machinists. You will have access to learning materials, activities, and quizzes located in the Tooling U modules. Assessment of competencies in this module will take place in a final exam at the end of this module.

The course work in this module, combined with class sessions should prepare you to:

1. Solve basic algebra problems
2. Solve basic trigonometry problems
3. Solve problems using the pythagorean theorem
4. Solve problem using sine, cosine, tangent

### **Module 7: Tooling U**

The learning resources listed below will give you an overview of the algebra and trigonometry used by machinists. It is recommended that you complete all of the Tooling U modules listed below within one week. \* Each Tooling U module contains learning material and a practice quiz.

Click the resource link to get started.

1. Shop Algebra Overview
2. Shop Trig Overview
3. Trig: Pythagorean Theorem
4. Trig: sine, Cosine, Tangent
5. Speed and Feed Selection

\*Note: Modules vary in length so budget your time wisely.

### **Module 7: Written Exam**

Once you have reviewed the learning materials and activities for Module 7, take the exam to see what you have learned.

### **Module 7: Check in**

Now that you have completed Module 7, check in with your instructor to discuss results for the final labs and exam, and completion of the course.