THERMWOOD

5-Axis Machine Training

Price per Seat	**$1,500.00 US Dollars**
Instructor	**TBD**

All times are Central Time (CST)
Meeting Time(s)   M 8:00 - 4:00; TWT 7:00-4:00; F 7:00 – Approx. 12:00pm

Office Hours
Monday – Friday   7:00am – 4:00pm

Office Phone	**800.533.6901**
	812.937.4476

Course Description

This course is a beginner level course designed to cover basic machine operation procedures as well as CNC programming with the EIA language. The course is a comprehensive combination of lecture on topics in a classroom environment followed by "hands-on" exercises in the adjacent training lab. Each course is limited to 10 students. Each student will be provided with their own workstation complete with computers and necessary workbooks/notebooks in the classroom, and will have access to one of the five training machines in the lab. Due to variance in class sizes, you may be paired with another student when using one of the five training machines. The class will be specialized to cover all the options you have purchased with your machine.

Course Objectives/Outcomes

The objectives of this course are to provide the student with the fundamental skills to operate or program a Thermwood router in a skillful, accurate, and safe manner. Upon completion of this course the student should be comfortable with the basic operational procedures involved with running and setting up a Thermwood CNC router. They should be able to accurately set up a program weather it was created manually or through the use of a CAD/CAM software package. It is our goal to cover topics such as, but not limited to: manual program creation with the HHP, ability to understand and interpret the M and G code language, successfully utilize the options purchased with the machine (i.e. dual table), proper program alignment/machine setup, tooling setup, and tool changer setup. This is a fast-paced, condensed course on programming and operating a Thermwood router. In order to receive the most from your time in the course, the student should be attentive and ready to learn.

Required Materials

All workbooks and reference manuals are provided for each student. A notebook and pencil are also provided. The students are encouraged to take notes, create quick reference charts, and even flash cards. Tools such as highlighters and page tabs may also be used at the student's discretion. A flash drive will also be provided at the end of the week to allow each student to back up his/her completed course work to provide examples for future reference.

Class Methods/Strategies

Lecture w/aid of projector, Class Discussion, Individual and Group Challenges, Hands-on Laboratory exercises for each individual as well as the group.

Course Requirements

1.) Attendance is mandatory.
2.) It is STRONGLY recommended to have at least a basic level of computer skills in order to keep up with the pace of the course.
3.) Students must be fluent with the English language.
4.) Cell Phones/pagers are necessary tools, but as a common courtesy to others, the device should be set to an appropriate mode as to not interrupt the class and your classmates from learning.

Changes in Syllabus

This Syllabus is intended to be a guide for the course and is subject to change without notice at the discretion of the Instructor.

Course Outline (Subject to Change)

This is a basic course outline and is subject to change at the discretion of the Instructor to accommodate the machine options purchased and the amount of material that must be covered.

Monday

- Introduction
- Machine Configuration
- A New Language (Intro to M and G codes)
- Dimension Modes (Absolute and Incremental)
- Hardware/Communication Components
- Power up/down
- Thermwood Operating Screen
- Supercontrol Control Panel Functions
- Electronic Manual
- System Hot Keys
- File Management Concepts
- Thermwood Software Editing Features
- Introduction to Fixture offsets
- Hand Held Programmer

Tuesday

- Working with TCP
- The G52 Fixture Offset
- Analyzing Program Code
- Cutting Conventions
- Tool Radius Compensation
- Programming with Absolute Coordinates

- Editing Files with a File Editor (Student programming exercise)
- Working with Planes and Incorporating Rotation (Student Exercise)
- Determining Pivot Distance
- Rotary Helix (Student Exercise)

Wednesday

- Simple and Compound Plunges using Axis 0
- 3-Point Arcs with Rotary Axes (Student Exercise)
- Tool Setup
- Toolchanger Setup
- Label Routines – Multiple Part Programming
- The G92 Fixture Offset
- Sub-Programs
- Timer Sub-Program
- Tool Length Measurement Sub-Program
- Fly-Cut Program

Thursday

- Using the World Coordinate Reference
- Programs with Continuous Loops
- Programming Dual Tables/Progressive Fixture Concepts
- Introduction to Basic AFL Commands
- 3D Circle Macros (Student Exercise)
- Automatic Tool Measurement Sensor (Student Exercise)
- Fixture Placement Compensation
- Digitizing Parts using Splines (3-axis Student Exercise)
- Cad Path Utility

Friday

- Improving Cut Quality
  - Tangency Factor
  - Acceleration Macro
- Splines Incorporating Rotation (5-axis Student Exercise)
- File Back up
- Course Conclusion

NOTE: Additional options purchased will be covered throughout the course of the week at the instructor's discretion. These options include, but are not limited to:

- Safety Enclosures
- Part Measurement Probe
- Pause Mats