



## MACHINING

A shortage of skilled workers demands programs that can deliver the knowledge and training necessary to educate a qualified workforce. Intelitek's career and technology training programs deliver these critical skills combined with soft skills to help students integrate into the workforce and be productive in the 21st century.

Intelitek Machining Training Programs are blended learning solutions that combine industrial-grade hardware with engaging e-learning content to prepare students for rewarding careers in industry. Students acquire the knowledge and practical skills to understand, operate, program and manage CNC Machines for rapid prototyping and production in industrial environments.

CNC MILLING	CTC 5
CNC TURNING	CTC 5
CAD/CAM DESIGN	CTC 6
CNC ROUTING	CTC 7
MACHINING SOFTWARE PACKAGES	CTC 8
MACHINING HARDWARE SOLUTIONS	CTC 12



## Intelitek Pedagogic Values

The delivery of skills training is a heavy burden that technical schools carry – educators need to select the disciplines industry will require while guiding students in the soft skills they need to succeed in today's increasingly technology dependent and fast moving world.

How do you train a workforce for jobs that do not exist yet? By teaching skills, not tasks, that will transfer from one industry to another, and by teaching in ways that are as flexible as tomorrow's workforce is expected to be.

The CNC Machining Training teaches specialized skills required for metal cutting, machining and for roles that manufacture prototypes or production components.

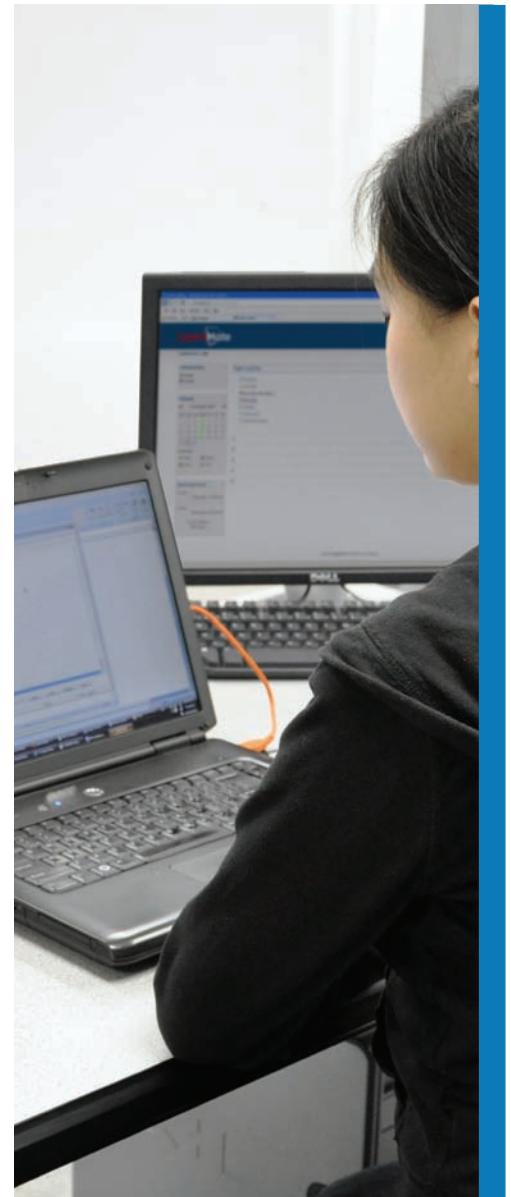
Intelitek provides a superior blended learning solution by combining industrial-grade components with engaging e-learning content integrated into programs that educate students to solve problems, embrace change and develop collaborative working environments.

Intelitek's unique hands on approach using state-of-the-art industrial grade equipment to deliver skills driven programs that combine projects, challenges and creative thinking enables programs that turn out technicians and not workers. Graduates of these programs develop the core knowledge and the soft skills to succeed in industry and deliver value to employers.

## Complete Training Packages

With project and problem-based learning as essential education strategies, Intelitek content employs authentic activities and scenarios. This provides an immersive instructional experience that engages students and enhances the learning experience.

- Training packages including curriculum, operating software, CAD/CAM software, real-time simulation, manuals, teacher guides, professional development training and more together with the education optimized machines that have a full range of tooling and machining accessories.
- Curriculum incorporate multiple instructional strategies by immersing students in exciting scenarios.
- The standards-based curriculum feature in-depth coverage of the manufacturing process from design to production.
- Projects simulate the entire production/change order process used in manufacturing environments, providing an authentic learning experience.
- By working with the same process found in manufacturing environments, students learn leadership, communication, teamwork and global thinking.
- Students learn creative problem solving skills and discover how manufacturing careers enable them to change the world around them.



## Equipment Optimized for Education

From simple engraving to rapid prototyping to production machining, Intelitek offers a range of benchtop and standalone turning, milling, and routing solutions for advanced manufacturing training. Our interactive skills-based curriculum and superior classroom equipment is the gold standard in schools, universities and training facilities worldwide, and is used by leading organizations including SkillsUSA and Project Lead the Way.

The CNC and routing machines fit comfortably into any classroom and require no assembly, arriving at your facility ready to run. All machines are designed for student use with safety features for beginner users.

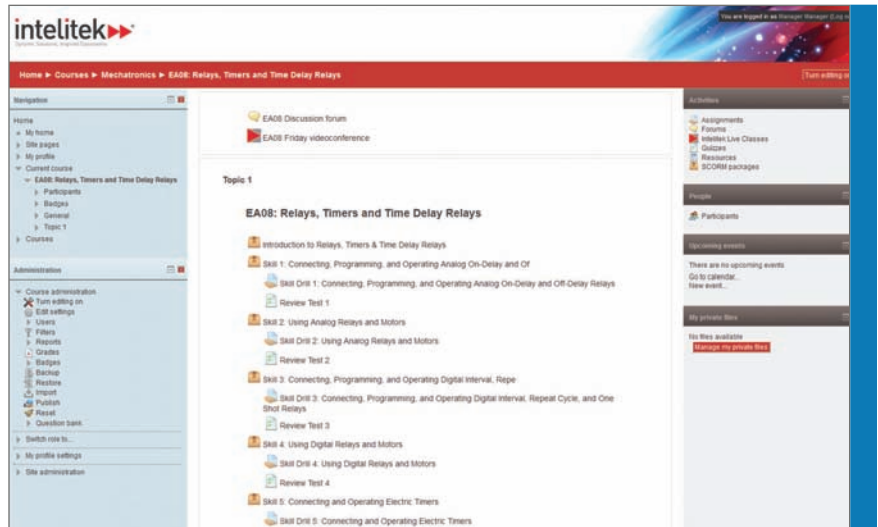
Just like in larger industrial machines, the Intelitek machines use EIA, ISO, and FANUC-compatible G&M code programs to cut parts in a variety of materials.

# E-Learning Content

Intelitek milling, turning, routing and CAD/CAM courses are deployed through LearnMate®, Intelitek's learning management system (LMS). LearnMate, provides an easy-to-implement and easy-to-use LMS for education organizations of all types that provides the best technology and capabilities without the burden of IT support and maintenance. LearnMate provides everything needed for the ultimate blended learning experience:

- SCORM-compliant interactive content
- Anytime, anywhere accessibility
- Student and classroom management
- Flexible content options for continuous updates

Intelitek e-learning content combines 30 years of experience developing vocational education programs with advanced interactive simulation and world-class hardware. Lab courses feature interactive online curriculum and robust hardware for the ultimate hybrid learning experience! Curriculum are fully integrated with our lab equipment, including the ability to launch software directly from the content.



## Control and Simulation Software for Education

Using custom developed software designed for education or industry software packages suited for the task, Intelitek programs prepare students with the fundamental capabilities to program and operate machines. Heavy use of live simulation capabilities enhances the user's ability to understand and get virtual experience prior to using programs on real machines and materials.

- **CNCBase** is a tool for learning the fundamentals of CNC machining. This user-friendly control software provides users the ability to write and edit standard G&M code programs and view the simulated machining operation on-screen before cutting. CNCBase includes FANUC Control simulation software, one of the most popular industrial CNC controls.

- **CNCMotion** integrates interactive 3D simulation with CNCBase machine control software for dynamic simulation and graphic tracking of CNC mills and lathes machines.
- **SpectraCAM** Milling and Turning Software and **SpectraCAD** Engraving Software introduce students to the fundamentals of CAD/CAM programs and their use in industry.

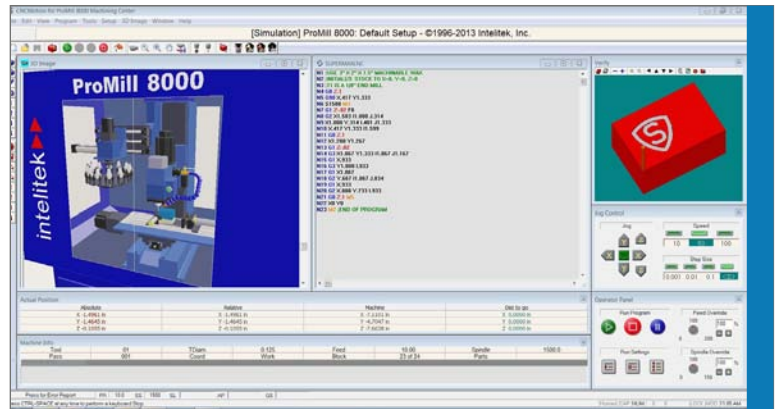


# CNC Milling

TYPE  

LANGUAGES  

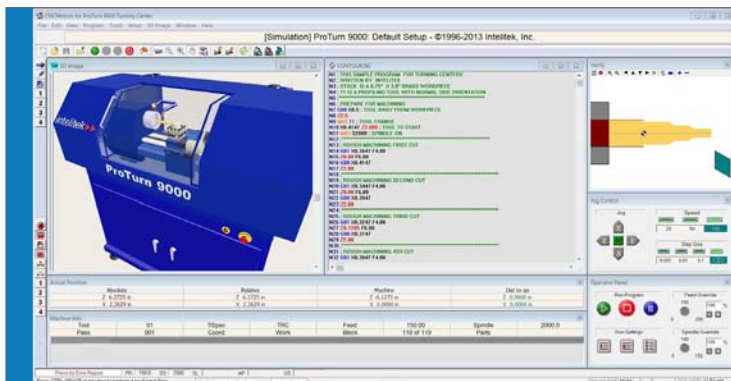
The CNC Milling Technology course introduces students to the fundamentals of CNC (Computer Numerical Control) milling. Students learn the fundamentals of CNC milling by working with the Intelitek BenchMill 6100 or ProMill 8000 to accurately machine a series of complex parts. Students observe and experience CNC's superiority over time-consuming, less accurate, manually controlled machine tools. Activities challenge students to develop and edit programs, and machine assorted parts.



## COURSE OUTLINE

- Introduction to CNC
- Safety Fundamentals
- CNCMotion Control Software
- Mounting the Workpiece
- Tooling
- Reference Positions
- Verifying a Program
- Running a Program
- Fundamentals of NC Programming
- Project #1 - Programming the House
- Arc Programming
- Project #2 - Programming the Star
- Project #3 - Programming Your Initials
- Final Project

# CNC Turning



TYPE  

LANGUAGES  

The CNC Turning Technology course introduces students to the fundamentals of CNC (Computer Numerical Control) turning. Students learn all about CNC turning by working with industrial-based equipment to accurately machine a series of complex parts. Students observe and experience CNC's superiority over time-consuming, less accurate, manually controlled machine tools.

Students learn the CNC process through a series of projects. Each project teaches job setup, drawing construction, tool path generation, tool path verification, and NC code generation. Project activities challenge students to develop and edit programs, and machine assorted parts using the BenchTurn 7000 or ProTurn 9000.

## COURSE OUTLINE

- Introduction to CNC
- Safety Fundamentals
- CNCBase Control Software
- Securing the Workpiece
- Tooling
- Reference Positions
- Verifying a Program
- Running a Program
- Fundamentals of NC Programming
- Programming a Taper Machining
- Project #1 - Machining
- Arc Programming
- Project #2 - Programming
- Project #3
- Final Project

# CAD - Computer-Aided Design with SpectraCAD Engraver

TYPE LANGUAGES  En Es

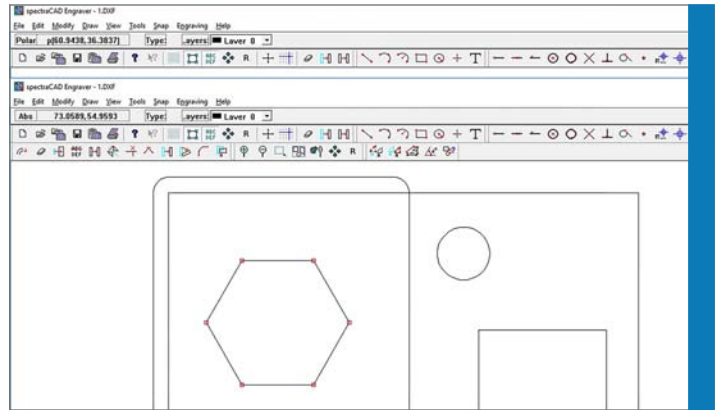
Students are introduced to the basic elements of computer-aided design, such as arcs, lines, rectangles, text, and circles. Students use polar, relative, and absolute coordinates to construct various designs and broaden their learning experience.

Once students have created their CAD drawings, SpectraCAD Engraver's unique engraving feature enables them to easily and quickly generate NC files.

The package includes an engraving tool set and name badge milling stock so that students can produce their NC programs on a CNC milling machine.

## COURSE OUTLINE

- Using SpectraCAD
- Managing Files
- Creating the LMC Project
- Drawing the M
- Drawing the C
- Speaker Design Project
- Creating the Speaker Cone
- SpectraCAD Engraver
- Generating an NC File
- NC Files and Coding
- Pocketing
- Pocket Toolpaths and SpectraCAM



# CAM - Computer-Aided Manufacturing with SpectraCAM

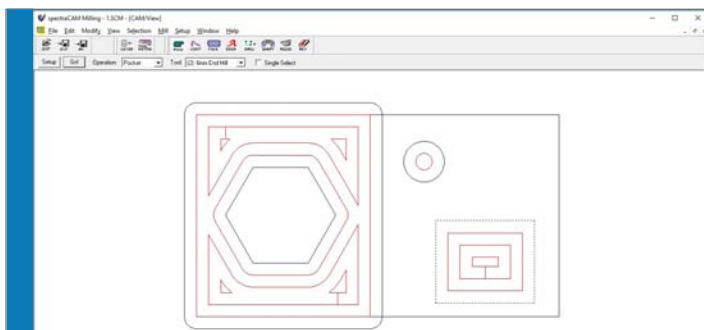
TYPE LANGUAGES  En Es

Computer-Aided Manufacturing (CAM) introduces students to the fundamentals of CAM programs and their use in industry. Students use the SpectraCAM software, which converts CAD drawings into numerical control (NC) files that can be used to produce parts on a CNC. The SpectraCAM software features an integrated CAD drawing package that allows a seamless and easy working environment and includes a graphic tool path simulation package for immediate part proofing.

## MILLING COURSE OUTLINE

CAM Milling activities focus on toolpath generation, contouring, engraving, pocketing, machining operations for ruled and swept surfaces, and code generation.

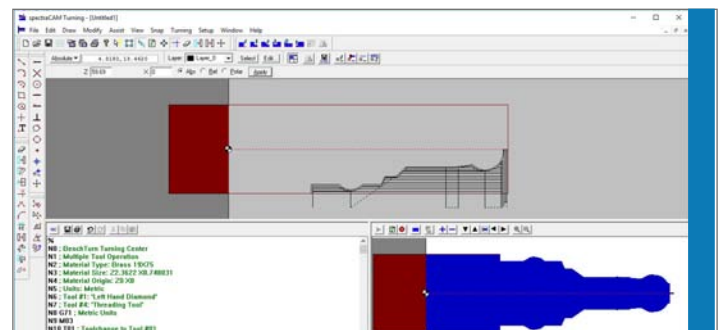
- Using SpectraCAM
- Starting the LMC Project
- Generating Tool Paths
- Contouring and NC File Generation
- Speaker Design Project
- First Pocket Operation
- Second Pocket Operation
- Engraving Text and Generating Code
- Advanced Operations and Advanced Operations Setup
- Ruled Surfaces
- Swept Surfaces
- Final Steps



## TURNING COURSE OUTLINE

CAM Turning activities focus on turning-related cutting operations such as roughing, facing, grooving, threading, cut-off procedures and code generation.

- Using SpectraCAM
- Starting a Project
- Creating the CAD Drawing
- Geometry Duplication and Rough Tool Path Generation
- Finish Tool Path and NC File Generation
- Advanced Project Setup
- Creating the Part Drawing
- Final Geometry and Tool Paths
- Tool Paths and NC Code
- Creating the Lighter Geometry
- Final Geometry and Tool Paths
- Final Tool Paths and NC Code

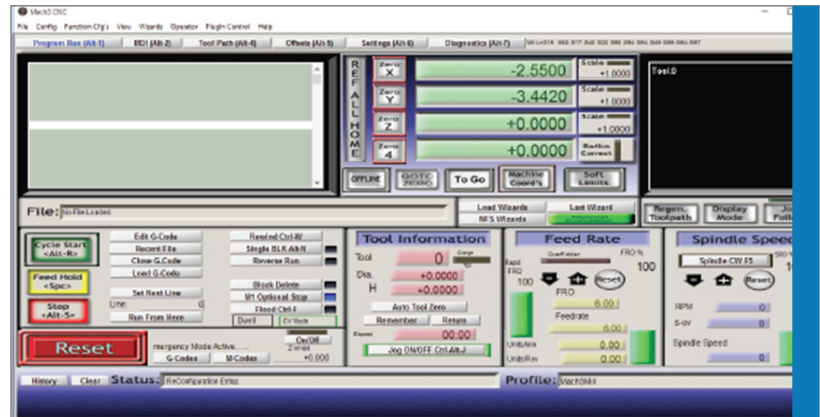


# CNC Routing

TYPE 

LANGUAGES  En  Es

Intelitek's CNC Router curriculum is a project-driven course that enables students to bring objects they create to life quickly and motivates them to complete other projects. They will learn terminology related to CNC Routing and set up the router using the Mach3™ control software. This is followed up by five projects using Vectric VCarve Pro to produce amazing results.



## BENEFITS

- Allows visualization of assembly of 2D object in 3D space
- Provides students the ability to create impressive, large scale projects at a very low cost
- Fast paced project-based learning allows students to produce results quickly to keep them motivated
- Cut most projects in less than 30 minutes
- Teach G-Code - an industry standard that is used with other CNC mills and lathes
- Manufacture impressive projects using up to 4ft x 8ft sized materials
- Includes 30 seats of V-Carve Pro CAD/CAM software - allowing the entire class to utilize the program

## COURSE OUTLINE

- Getting Started with Routers
- Basic Terminology
- Axis of Travel
- Securing the Work Piece
- Installing a Tool
- Spoil board
- Dust Collection
- Mach3 Layout
- Homing the Router
- Jogging the Router
- Setting Part Zero
- G-Code Editing
- Cutting a Sample Part
- Introduction to Vectric VCarve Pro
- Making a Gear Clock Drawing
- Importing Pictures
- Importing a Drawing DXF/DWG/SVG
- 3D Dinosaur Project



# Machining Software Packages

## CNCBase®

CNCBase software is an ideal tool for learning the fundamentals of CNC machining. The user-friendly interface and online help allow users of all levels to control and monitor Intelitek's machining centers, and to write, edit and run NC programs.

### STANDARD FEATURES

#### PROGRAMMING AND CONTROL

- Compatibility with EIA RS274-D standard G&M codes.
- CAD/CAM compatibility.
- Advanced NC code editing functions, including automatic block numbering, comment management and code verification.
- Absolute and incremental programming.
- Supports canned cycles for drilling and boring.
- Programmable tool offsets and cutter compensation.
- Supports metric and English units.
- Unlimited number of programs can be open simultaneously.
- Unlimited number of program blocks.

#### PROGRAMMING VERIFICATION

- Quick verification of G&M code to ensure correct and complete syntax during program editing.
- Graphic verification of the tool path ensures precise programming.
- Estimate runtime command to calculate the approximate amount of time necessary to machine your part, and the approximate distance the machine travels.

#### MANUAL HARDWARE CONTROL

- Movement along each axis at customized speed and step settings.
- Spindle activation and speed control.
- Movement control from dialog box and keyboard.

#### REAL-TIME DATA DISPLAY

- Real-time display of current hardware setup, including cross-slide and tool positions, tool in use, machining parameters.
- Real-time display of program execution, including block being executed and program run time.

#### PARAMETERS FOR ADJUSTING CONTROLLER OPERATION

- Manual override of programmed spindle speed and feed rate.
- Configurable soft limits for safe machining.
- Parameters can be easily viewed and manipulated.

#### USER INTERFACE

- NC code color editor
- Setup tool library

#### TWO OPERATING MODES:

- Online: CNCBase communicates with the controller
- Simulation: When not connected, you can simulate the machining process with graphic verification and simulated machining.







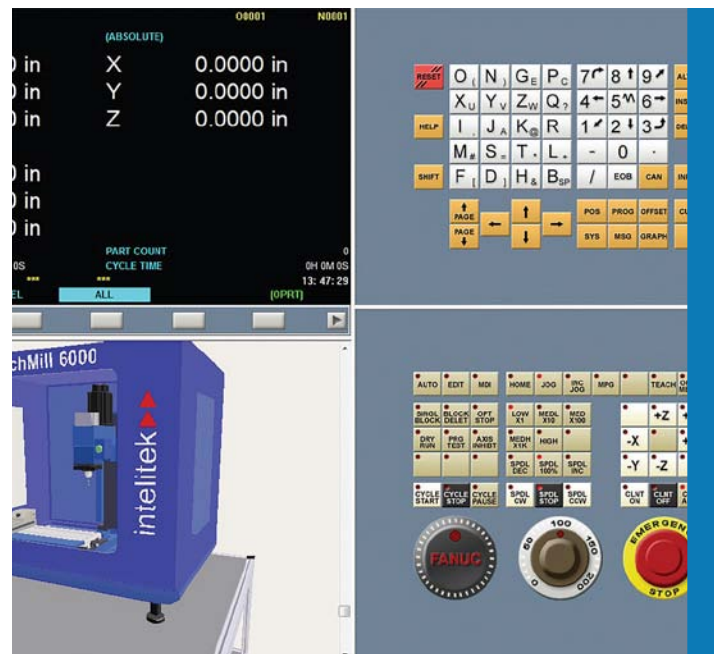
## CNC Programming with FANUC 21i Controller Emulator

Intelitek CNCBase and CNCMotion software packages for machine control include emulation for the FANUC 21i Controller – an industry leading and popular industrial control software. The FANUC Control emulator for Intelitek machines provides hardware-based FANUC control, in addition to FANUC simulation software.

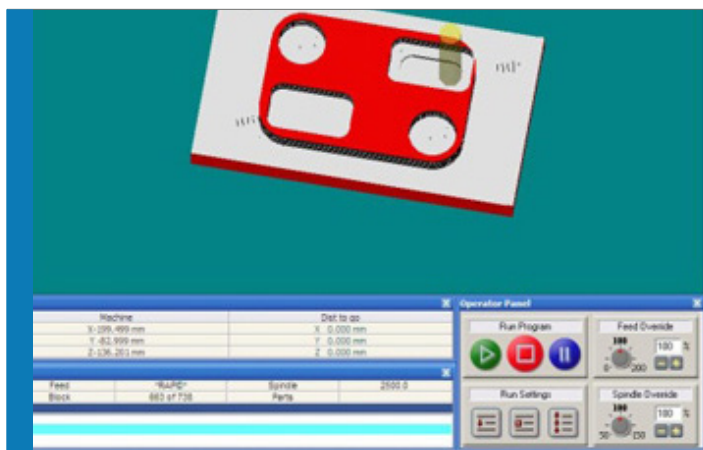
The FANUC emulator replicates the FANUC 21i CNC controller. This controller and its subset, the FANUC 16i and 18i controllers, are the most popular CNC controls used in industry. Whether you are operating the actual machine or the virtual machine simulator, you can teach industrial CNC controls in addition to the G & M codes offered on our CNC machines.

### FANUC COURSE OUTLINE

- Emulator Installation
- Navigating the FANUC Screen
- Controlling the Display
- Operating the Virtual Machine Using FANUC Control
- Verifying a Program
- Operating the Virtual Machine using the 3D Image Screen
- Defining Tools
- Setting the Workpiece Origin
- Entering a New Program



- Using MDI (Manual Data Interface)
- Manual Machining
- Using Incremental Jogging
- Using the Manual Pulse Generator
- Importing an NC Program into FANUC



### SPECTRACAM STANDARD FEATURES

- Drawing options: arc, circle, line, point, rectangle, text.
- Editing options: break, copy, delete, explode, fillet, mirror, move, offset, rotate, scale, trim/extend.
- Built-in tool and material libraries; automatically pre-selects the optimal speed rates, feed rates and plunge rates for machining part.
- Multiple views of geometry and tool paths.
- Online, context-sensitive help.
- Input and output DXF file format.
- Output standard G&M code NC part programs.

## SpectraCAM Milling and Turning Software

SpectraCAM Milling and Turning software introduces students to the fundamentals of CAM programs and their use in industry. SpectraCAM software converts CAD drawings into numerical control (NC) files that can be used to produce parts on a CNC Milling or CNC Turning center. The SpectraCAM software features an integrated CAD drawing package that allows a seamless and easy working environment and includes a graphic tool path simulation package for immediate part proofing.

### MILLING FEATURES

- Milling operations: contouring, drilling, engraving, facing and pocketing.
- Surface machining operations: revolutions, ruled and swept.

### TURNING FEATURES

- Turning operations: facing, roughing, finishing, grooving, cut-off.

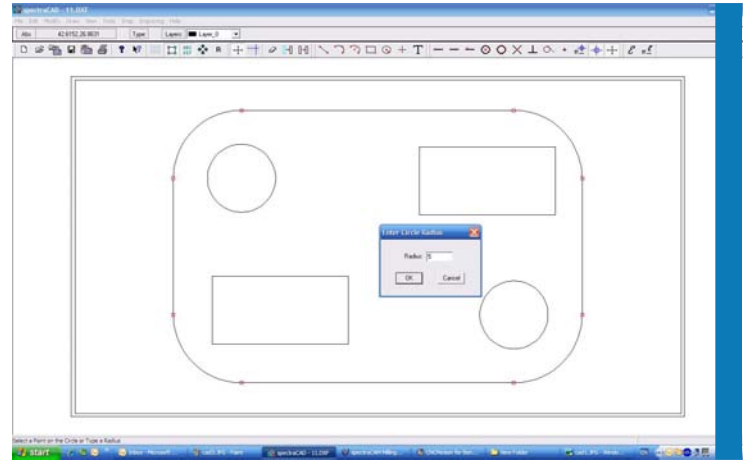
## SpectraCAD Engraving Software

SpectraCAD Engraver software is a CAD drawing package and is delivered with SpectraCAM.

Computer Aided Design (CAD) is a way to draw complex shapes easily and accurately using a computer. CAD enables rapid, accurate drawing, easy revisions, and electronic transmission of files.

### SPECTRACAD ENGRAVER STANDARD FEATURES

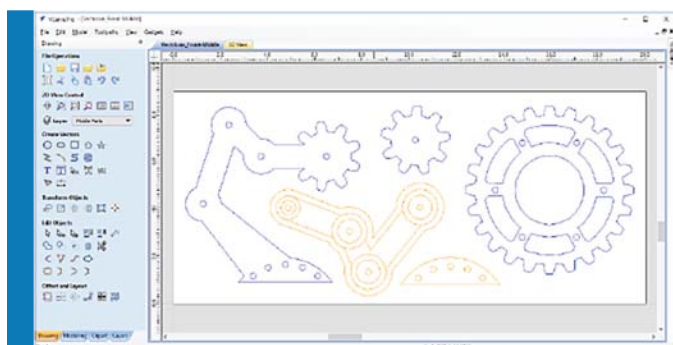
- Converts CAD drawings to NC part program files.
- Enables creation of CAD drawing files and export to HPGL plot file.
- Integrated engraving capabilities, accessible via a pull-down menu.
- Enables selection of machining parameters: feed and plunge rates, depth of cut.
- Drawing options: arc, circle, point, rectangle, line, text.
- Editing options: break, copy, fillet, mirror, explode, offset, delete, move, rotate, scale, trim, extend.
- Intuitive graphic user interface. Simple graphic buttons and tool bars enable the user to start working immediately.
- CAD can display the geometry in a number of different ways and provide printed output for user inspection.
- Bidirectional DXF file transfer capability enables compatibility with other applications such as AutoCAD®.
- When integrated with CAM software, users can automatically generate facing, drilling, contour milling, pocketing with islands, engraving, surface of revolutions, ruled surfaces and swept surfaces with cutter compensation.



## VCarve Pro CNC Routing Software

VCarve Pro provides a powerful but intuitive software solution for cutting parts on Intelitek CNC Routers. VCarve Pro creates the files used by the router to bring projects to life. This software works with 3D / 2D files created by your favorite CAD software and popular graphics files like JPEG and SVG for those more artistically inclined.

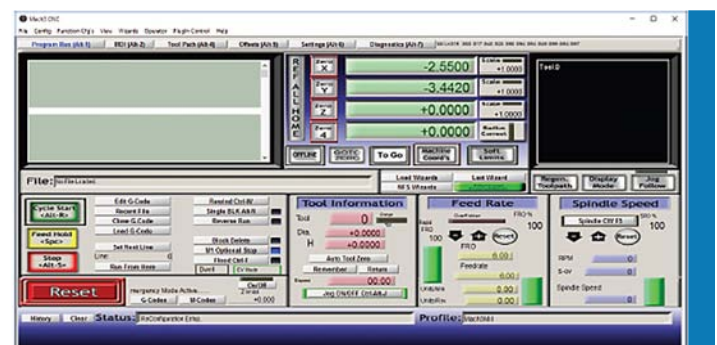
VCarve Pro includes the functionality demanded for complex work while remaining incredibly easy to use. The software is used by cabinet makers, wood workers, sign makers, prop makers, plastic fabricators, hobbyists and in many other applications.



## Mach3 CNC Control Software

Mach3 is a CNC Control Software Package used for controlling the BenchRouter 1000 and the ProRouter 2000 and 2100. It is very rich in features and provides great value.

Mach3 has become the popular choice for use with light duty CNC routers; it is feature-rich and provides a great solution for a CNC control package. Mach3 controls the motion of the router by processing G-Code into physical movement while offering many advanced features found in more complex control systems.



# Machining Hardware



## BenchMill 6100 CNC Milling Center

The BenchMill 6100 is a versatile PC-based benchtop CNC machining center that enables you to deliver robust instruction in computer numerical control and advanced manufacturing for your students. The BenchMill 6100 comes equipped with Ethernet-based motion control, 3-axis stepper motors, ball screws, a variable speed spindle motor, and ISO20 taper tooling. This CNC system requires no assembly, arriving at your facility ready to run on an Ethernet port on a standard PC, and fits comfortably into any classroom, without sacrificing features.

As seen in larger industrial machines, the BenchMill 6100 uses EIA, ISO, and FANUC-compatible G&M code programs to cut parts in a variety of materials.

### STANDARD FEATURES

- Ethernet-based control
- Brushless spindle motor
- Full enclosure with pneumatic shield
- Automatic diagnostics and power cut-off protection
- PC-based CNC software
- Coolant ready
- Jog pendant ready
- 4th-axis ready



## ProMill 8000 CNC Milling Center

The ProMill 8000 is a powerful floor standing CNC machining center. The ProMill 8000 has a 3-axis AC servo motor, with an optional 4th rotary axis and includes a 12-tool carousel ATC.

- Pneumatic drawbar
- Pneumatic door opener
- Robotic integration ready with 6 inputs, 6 outputs
- No assembly required
- Internal work light
- One-shot lubrication system
- Accessory package with tools and fittings





## BenchTurn 7000 CNC Turning Center

The BenchTurn 7000 is a benchtop CNC turning machine for learning environments. The BenchTurn 7000 comes equipped with 2-axis stepper motors, ball screws, a variable speed brushless spindle motor, limit/home switches, and an MT3 taper spindle with MT2 taper tailstock. This system requires no assembly, arriving at your facility ready to run on an Ethernet port on a standard PC, and fits comfortably into any classroom without sacrificing features. As seen in larger industrial machines, the BenchTurn 7000 uses EIA, ISO, and FANUC-compatible G&M code programs to cut parts in a variety of materials.

### STANDARD FEATURES

- Ethernet-based control
- Full enclosure with automatic safety door lock
- Tailstock
- Automatic diagnostics and power cut off protection
- PC-based CNC software
- Coolant-ready
- Jog pendant-ready



## ProTurn 9000 CNC Turning Center

The ProTurn 9000 is a powerful floor standing CNC turning machining. The system uses powerful AC drive motors on the spindle and both axes, for part cutting in a variety of materials. The ProTurn 9000 is the perfect training solution, with exceptional ease-of-use, safety features and reliability.

- Robotic integration-ready with 6 inputs, 6 outputs
- No assembly required
- 4" 3-jaw chuck with key
- 4-station automatic tool turret
- One shot lubrication system
- Internal work light
- Accessory package with tools and fittings

# BenchRouter 1000 CNC Routing Center

The Intelitek BenchRouter 1000 is an affordable introduction to CNC equipment and cutting large flat objects. Combined in a turnkey fashion including dust collection, cutters, and project based curriculum to get cutting fast. This is a great peripheral for any woodshop classroom, engineering lab, or FabLab.

## STANDARD FEATURES

- Cutting area: 24in (60cm) x 16in (40cm)
- Mach 3 control software
- USB connection
- 800W liquid spindle PC controlled
- Real spindle Air Cooled
- 1in (25.4mm) thick MDF table
- X-Y cutting at 200ipm / (5080mm/min)
- Starter Cutting Tools Kit
- Shop vacuum and dust foot
- G-Code sample projects
- 2 Spare pieces of 24in x 16in x1in MDF
- 110v / 220v
- V-Carve Pro (30 Seats)
- Manufactured in the USA



# ProRouter 2000/2100 CNC Routing Center

The ProRouter 2000 and 2100 have larger cutting areas in addition to some enhanced features for this larger and stronger machine

## PRO FEATURES:

- ProRouter 2000 - cutting area: 4ft (1.2m) x 4ft (1.2m)
- ProRouter 2100 - cutting area: 4ft (1.2m) x 8ft (2.4m)
- Ethernet connection
- 220V 2.2KW PC controlled spindle
- X-Y cutting @ 600ipm (15240mm/min)



## Curriculum

77-3140-0001	CNC Milling w/BenchMill 6100, Virtual, Imperial
77-3140-0002	CNC Milling w/BenchMill 6100, Virtual, Metric
77-8140-0001	CNC Milling w/BenchMill 6100, Lab, Imperial
77-8140-0002	CNC Milling w/BenchMill 6100, Lab, Metric
77-3142-0001	CNC Milling w/ProMill 8000, Virtual, Imperial
77-3142-0002	CNC Milling w/ProMill 8000, Virtual, Metric
77-8142-0001	CNC Milling w/ProMill 8000, Lab, Imperial
77-8142-0002	CNC Milling w/ProMill 8000, Lab, Metric
77-3141-0001	CNC Turning w/BenchTurn 7000, Virtual, Imperial
77-3141-0002	CNC Turning w/BenchTurn 7000, Virtual, Metric
77-8141-0001	CNC Turning w/BenchTurn 7000, Lab, Imperial
77-8141-0002	CNC Turning w/BenchTurn 7000, Lab, Metric
77-3143-0001	CNC Turning w/BenchPro 9000, Virtual, Imperial
77-3143-0002	CNC Turning w/ BenchPro 9000, Virtual, Metric
77-8143-0001	CNC Turning w/ BenchPro 9000, Lab, Imperial
77-8143-0002	CNC Turning w/ BenchPro 9000, Lab, Metric
77-8160-0001	Intro to CNC Routers with VCarve Pro
77-3004-0001	Computer-Aided Drafting with SpectraCAD Engraving (Imperial)
77-3004-0002	Computer-Aided Drafting with SpectraCAD Engraving (Metric)
77-3005-0001	Computer-Aided Manufacturing with SpectraCAM Milling (Imperial)
77-3005-0002	Computer-Aided Manufacturing with SpectraCAM Milling (Metric)
77-3007-0001	Computer-Aided Manufacturing with SpectraCAM Turning (Imperial)
77-3007-0002	Computer-Aided Manufacturing with SpectraCAM Turning (Metric)

## Hardware

00-5505-N110	BenchMill 6100 - 110 VAC
00-5505-0220	BenchMill 6000 - 220 VAC
00-5504-0110	BenchTurn 7000 - 110 VAC
00-5504-0220	BenchTurn 7000 - 220 VAC
00-5509-0110	ProMill 8000 ATC - 110 VAC
00-5509-0220	ProMill 8000 ATC - 220 VAC
00-5501-0110	ProTurn 9000 - 110 VAC
00-5501-0220	ProTurn 9000 - 200 VAC
CNC-1000-STND	BenchRouter 1000
CNC-2000-STND	ProRouter 2000
CNC-2100-STND	ProRouter 2100

## Software

63-6789-1000	CNCMotion® Simulation Software for Intelitek CNC & FANUC emulator
63-6723-0000	SpectraCAD Engraver
63-6733-0000	SpectraCAM Milling
63-2000-VCRV	vCarve Pro CNC Software

# Intelitek Learning Solutions

Intelitek transforms education across the globe with comprehensive technology learning solutions. Our innovative tools and technologies empower instructors and inspire students to improve the world around them. We understand the changing needs of your career and technology classrooms and design flexible solutions that meet those needs.

With sustainable support and professional development to ensure the continued success of your programs, Intelitek programs deliver the competencies needed for in-demand careers.

At Intelitek we are producing results for students, teachers, nations and economies.

