



Machining

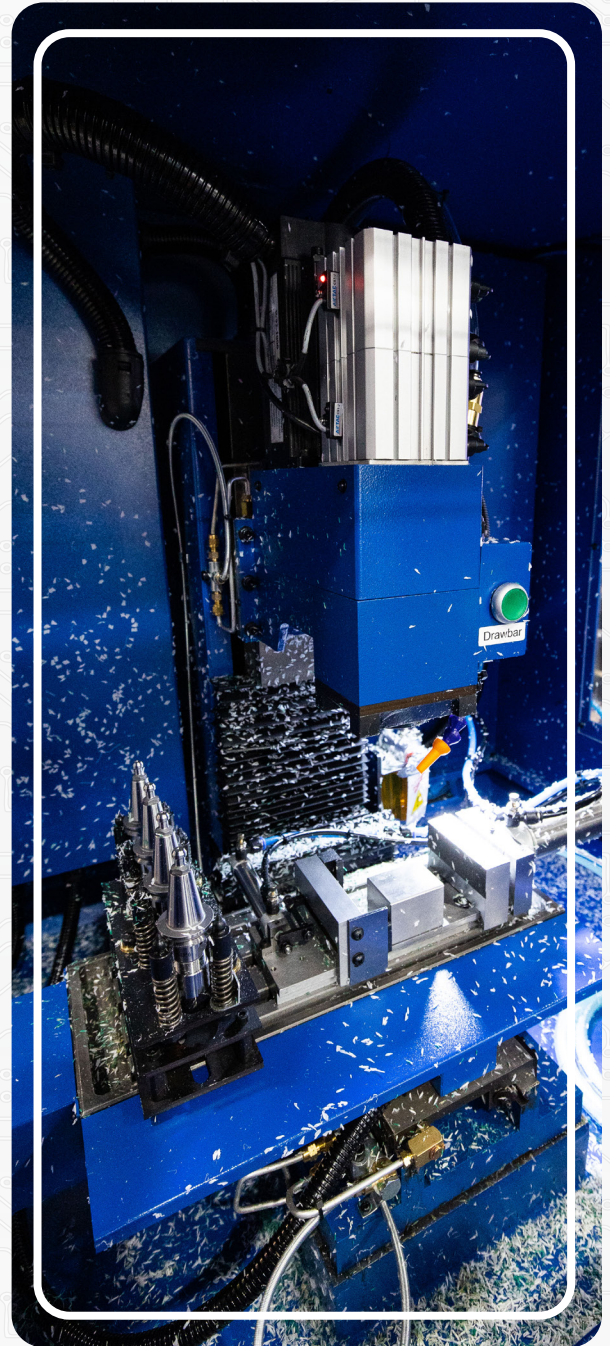
The global shortage of skilled workers demands career tech education programs that can deliver the knowledge and training necessary to deliver a qualified workforce.

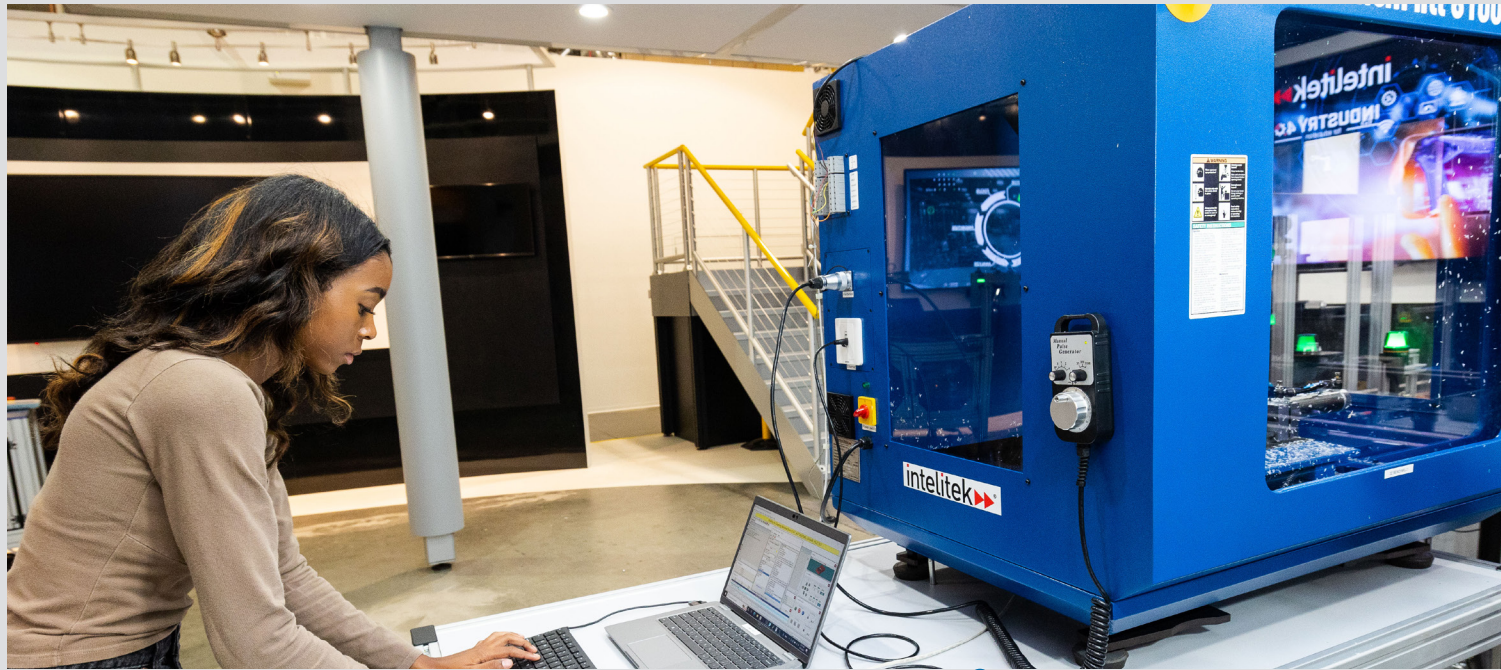
Intelitek's technology training programs deliver the critical manufacturing and soft skills needed to help students integrate into the modern manufacturing workforce.

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.

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Training for Automated Manufacturing and Machining

The delivery of skills training is a heavy burden that technical schools carry – educators must focus on the disciplines industry will require while guiding students in the soft skills needed to succeed in today’s increasingly technology-dependent and fast-moving world.

The Problem

Career training for the manufacturing industry needs technicians and engineers with a complete understanding of the design and manufacturing process and the technologies around them to be productive contributors to the company’s business.

The Solution

The Intelitek Automated Machining Training program teaches specialized skills required for employees who will be involved in the design and manufacture of prototype parts or production components.

Intelitek provides a blended learning solution combining theory, simulation and hands-on training. The program covers CAD, CAM, and CNC Machining and educates students to solve problems, embrace change and develop collaborative working environments.

Intelitek’s unique hands-on approach uses industrial-grade equipment to deliver skills-driven programs that combine projects, challenges, and creative thinking that enable programs to turn out experienced workers. Participants of these programs develop the core knowledge and soft skills to succeed in industry and deliver value to employers.

Complete Package for Education

Intelitek blended learning is an immersive instructional experience that engages students and enhances the learning experience with content and authentic activities and scenarios.

- Includes curriculum, operating software, CAD/CAM software, real-time simulation, manuals, teacher guides, education optimized machines.
- Projects simulate the entire production/change order process used in manufacturing environments, providing an authentic learning experience.
- Students learn creative problem-solving skills and discover interesting, in-demand, manufacturing careers.

Equipment Optimized for Education

Intelitek benchtop and standalone turning, milling, and routing solutions for advanced manufacturing training accompany interactive skills-based curriculum and are the gold standard in schools, universities, and training facilities worldwide. Intelitek equipment is used by leading organizations like SkillsUSA and Project Lead the Way.

Our CNC machines fit comfortably into any classroom and require no assembly. All our machines are specially-designed for student use with safety features for beginners

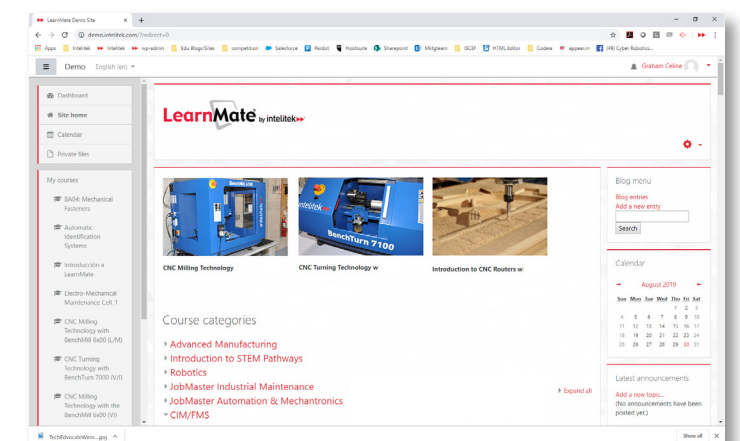


E-learning Content

Intelitek milling, turning, routing and CAD/CAM courses are delivered through LearnMate®, Intelitek’s online learning management system (LMS). The curriculum are fully integrated with our simulation tools and our lab equipment with the ability to launch software directly from the content and program and operate the machine.

Control and Simulation Software

Intelitek programs use live simulation software so students can practice virtually before moving to hands on labs with the actual equipment. This enables remote learning and enhances the user’s ability to understand and get virtual experience prior to using programs on real machines and materials.



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 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.

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.

FEATURES

- 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 7100 CNC Turning Center

The BenchTurn 7100 is a benchtop CNC turning machine for learning. The BenchTurn 7100 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 7100 uses EIA, ISO, and FANUC-compatible G&M code programs to cut parts in a variety of materials.

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 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.

FEATURES

- 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

ProRouter2000/2100 CNC Routing Center

The ProRouter 2000 and 2100 have large cutting areas in addition to enhanced features to introduce CNC equipment and cutting large flat objects. These routers arrive ready to use with dust collection, cutters, and project-based curriculum to get cutting fast. The ProRouter 2000 and 2100 are great peripherals for any woodshop classroom, engineering lab, or FabLab.

FEATURES

- ProRouter 2000 - cutting area: 4ft (1.2m) x 4ft (1.2m)
- ProRouter 2100 - cutting area: 4ft (1.2m) x 8ft (2.4m)
- 220V 2.2KW PC controlled spindle
- Real spindle Air Cooled
- X-Y cutting @ 600ipm (15240mm/min)
- Ethernet connection
- 1" (25.4mm) thick MDF table
- Starter Cutting Tools Kit
- Shop vacuum and dust foot
- G-Code sample projects
- Mach 3 control software with V-Carve Pro (30 Seats)



SkillsUSA Advanced Manufacturing Technology Competition (AMT)

For over 30 years, Intelitek has chaired the Advanced Manufacturing Technology competition at the SkillsUSA National Leadership & Skills Competition

The competition uses the BenchMill 6100, and the CNCBase and CNCMotion software capabilities. The equipment is used in schools nationwide to prepare for the national competition.

About the Advanced Manufacturing Technology Competition

In the event, contestants plan, design and manufacture a part. The contest evaluates teams for employment in integrated manufacturing technology fields of computer aided drafting/design (CAD), computer aided manufacturing (CAM), and computer numerical controlled machining (CNC).

Teams of three students must generate a drawing file (CAD) that will be used. The team must program the design to be machined (CAM) and then finally the part must be manufactured on the CNC machine. The CAD operator constructs the part geometry; the CAM operator generates the tool paths; and the CNC operator sets up and machines the part.



Curriculum

CNC Milling

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.

Learning Topics

15 hrs

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

Activity 1: Introduction to CNC

Welcome to the CNC Milling Technology course!

CNC Machining is very common in the manufacturing industry, and we hope that this course offers you with an insightful prelude to this important class of technology.

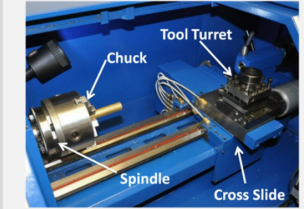
At any time, you can click the [Home button](#) to return to the machine selection page.

- This activity includes the following topics:
- What is CNC?
 - What is a Mill?
 - The components of your mill



Your Turning Center

In this course, you will learn about CNC lathes through use of a BenchTurn 7x00 Turning Center. While lathe operation may vary from lathe to lathe, the concepts used to operate a CNC lathe are the same for all lathes. Working with the BenchTurn 7x00 (or the simulated equivalent) will provide you with an excellent insight into CNC turning.



CNC Turning

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 7100 or ProTurn 9000.

Learning Topics

15 hrs

- 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: Machining
- Arc Programming
- Project: Programming
- Project: Final Project

CAD - Computer-Aided Design with SpectraCAD Engraver

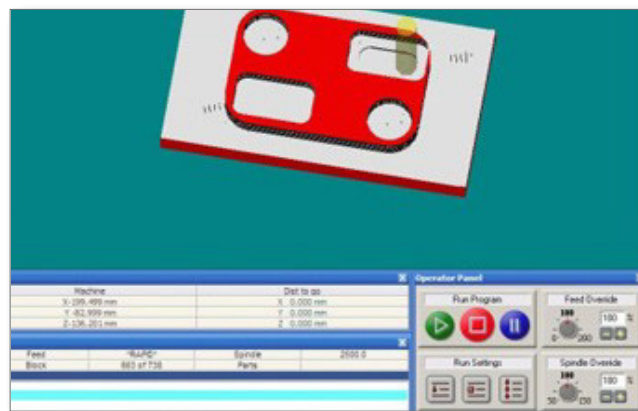
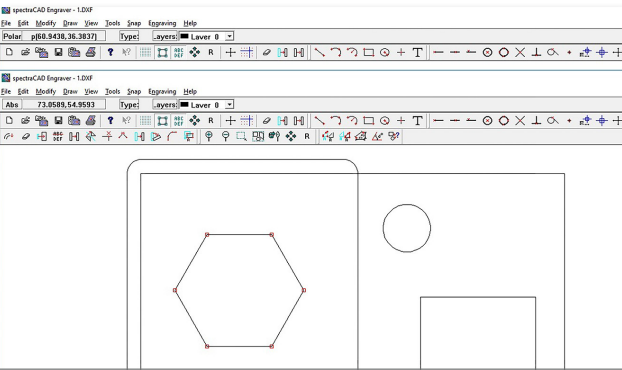
Students are introduced to the basic elements of computer-aided design, such as arcs, lines, rectangles, text, and circles. Students use polar, relative, and absolute coordinates to construct various designs and broaden their learning experience.

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.

Learning Topics En Es 15 hrs

- 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

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.

Learning Topics En Es 15 hrs

MILLING

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

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

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.

Students will

- ▶ Learn visualization and assembly of 2D object in 3D space
- ▶ Create impressive, large-scale projects at a very low cost
- ▶ Produce results quickly to keep them motivated
- ▶ Cut projects in less than 30 minutes
- ▶ Program G-Code - an industry standard used with CNC

Learning Topics En Es 15 hrs

- 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



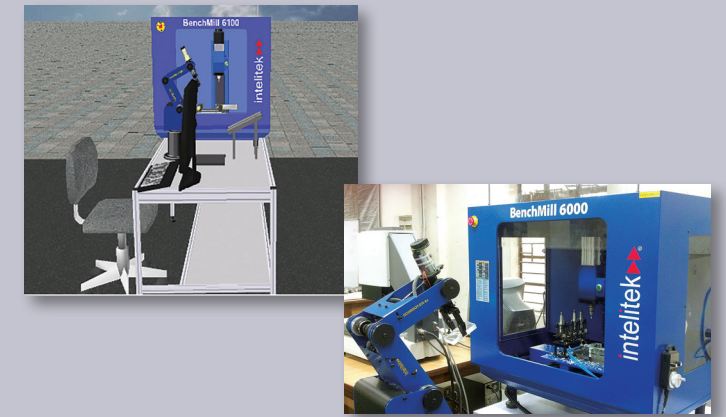
Flexible Manufacturing Systems (FMS)

BRIDGING THE GAP BETWEEN CLASSROOM AND INDUSTRY

Smart Factories are transforming and modernizing manufacturing processes. Employers need workers who are tech literate, process savvy, and natural problem solvers to take a role in the on-going design and improvement of manufacturing systems.

Intelitek's FMS (Flexible Manufacturing System) solutions are designed to teach skills that introduce technical and engineering classrooms to the industrial automation and real applications used in modern plants. FMS systems encompass hardware, software, simulation and curriculum that can be used to teach the fundamentals of manufacturing including robotics, machining, control, system programming, and materials handling. Following the curriculum, students will learn design, manufacturing, maintenance and operation of a system.

FMS workcells typically include a CNC machine, an industrial robot, materials handling and mobility components. Bundled systems can begin with a very simple configuration and expand to much more complex multi-machine solutions that include linear slide bases, mills, lathes, or engravers as well as larger robots or even multiple robots.



The FMS course teaches students to integrate and operate the industrial workcell. Students develop and edit programs, record precise robotic positions, accurately mill parts, and synchronize mill and robot operation. Students gain "virtual hands on" experience in CNC and robot programming, especially in I/O commands.

Learning Topics En Es 15 hrs

- Introduction to FMS
- CNC Machining
- RoboCell Simulation and Control Software
- Designing an FMS Workcell
- Expanding the Workcell
- Writing a Program
- Programming Mill Operations
- Conditional Programming

Machining Software

CNC Base

CNCBase is a tool for learning the fundamentals of CNC machining. The user-friendly interface allows users of all levels to control and monitor Intelitek's machining centers, and to write, edit and run NC programs. CNCBase is the control software for the family of CNC machines and is integrated with the curriculum.

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 imperial 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

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 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

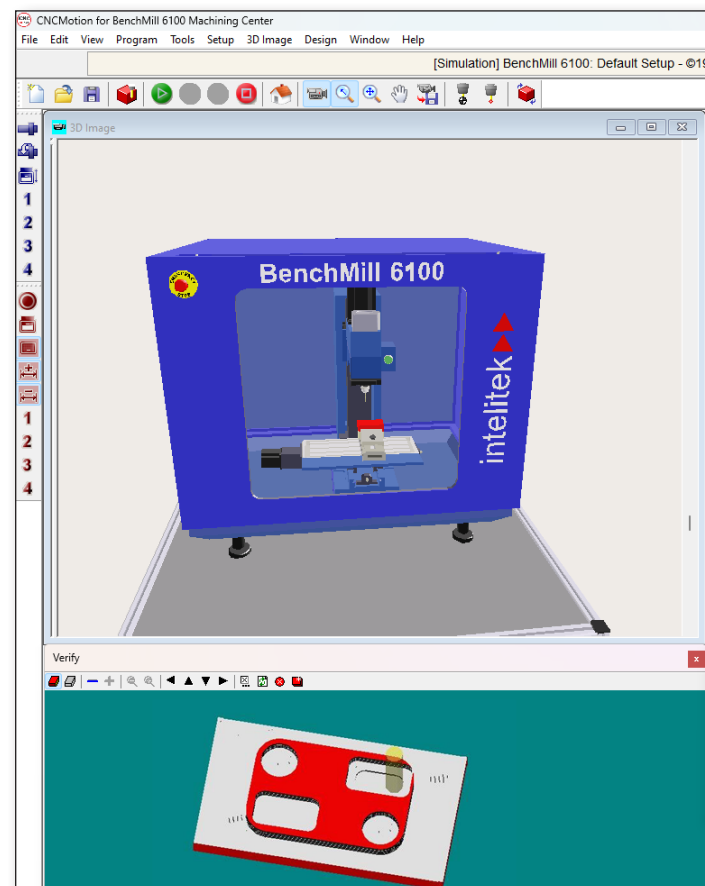
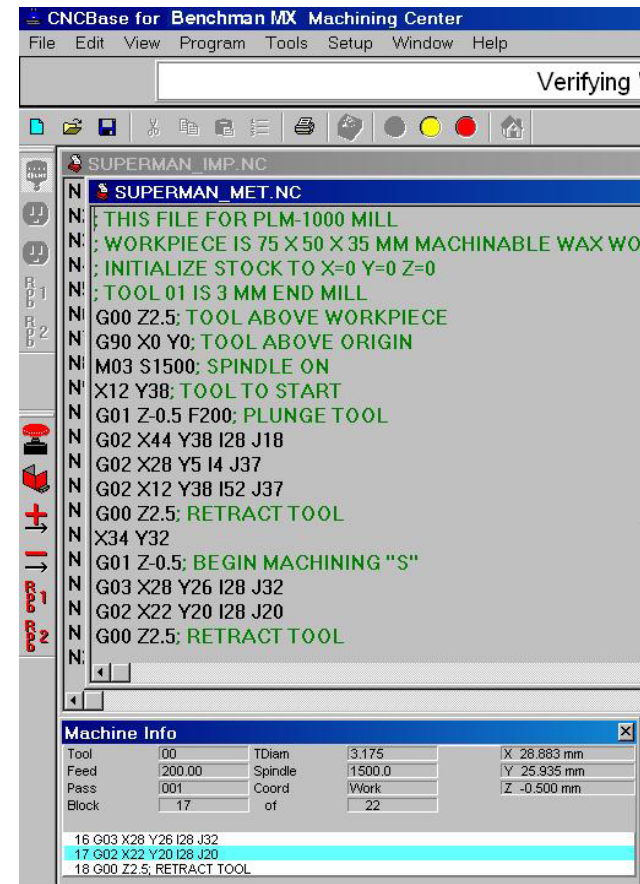
- Manual override of programmed spindle speed and feed rate
- Configurable soft limits for safe machining
- Parameters can be easily viewed and manipulated

User Interface

- NC code color editor & setup tool library

Two Operating Modes

- Online: CNCBase communicates with the CNC machine controller
- Simulation: Virtual simulation of the machining process with graphic verification and simulated machining.



CNC Motion

CNCMotion integrates interactive 3D simulation with CNCBase machine control software for dynamic simulation and graphic tracking of CNC mills and lathes machines.

The virtual machines in CNCMotion respond to errors and environmental conditions in the same way as safeguards, on real machines, preventing injury and damage. Safety measures include halting NC program execution upon impact or axis limit, and warnings of unsafe hardware conditions (e.g., safety shield open, tool missing, tool impact on the cross-slide or holding device). As a powerful visualization tool, the software enables testing and debugging of programming, as well as full machine setup, prior to actual CNC machining and turning.

FEATURES

Graphic Setup

- Interactive graphic setup enables customization of machines, including various machine tools and fixtures
- Configures definitions and properties of clamps, vices, and chucks; both pneumatically or manually operated
- Define tool offsets for up to 20 predefined and user-defined tools
- Define manual tool holders or automatic tool changer/tool turret
- Definitions and properties of workpieces: material, color, and size
- All definitions are verified by software to ensure compatibility with actual hardware and physical environment

Milling Options:

- All standard-size tooling
- 4" precision vice, single axis air vise, or dual axis air vise
- 4-station ATC or 12-tool carousel ATC
- Rotary worktable (4th axis) with 3-jaw chuck
- Coolant system
- Automatic shield opener

Turning Options:

- All standard-size tooling
- 3-jaw chuck, or air chuck
- 4-station automatic tool turret
- Tailstock
- Coolant system
- Automatic shield opener

Programming with FANUC 21i Controller Emulator

CNCBase and CNCMotion 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.

SpectraCAD Engraving Software

SpectraCAD Engraver software is a CAD drawing package and is used in the curriculum and to draw complex shapes easily and accurately. SpectraCAD enables rapid, accurate drawing, easy revisions, and electronic transmission of files.

FEATURES

- Converts CAD drawings to NC part program files
- Enables creation of CAD drawing files and export to HPGL plot file
- Integrated engraving capabilities
- Selection of machining parameters: feed/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
- CAD can display the geometry in a number of different ways and provide printed output for user inspection
- Bi-directional DXF file transfer compatible with other applications
- Automatically generate facing, drilling, contour milling, pocketing with islands, engraving, surface of revolutions, ruled surfaces and swept surfaces with cutter compensation

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. SpectraCAM 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.

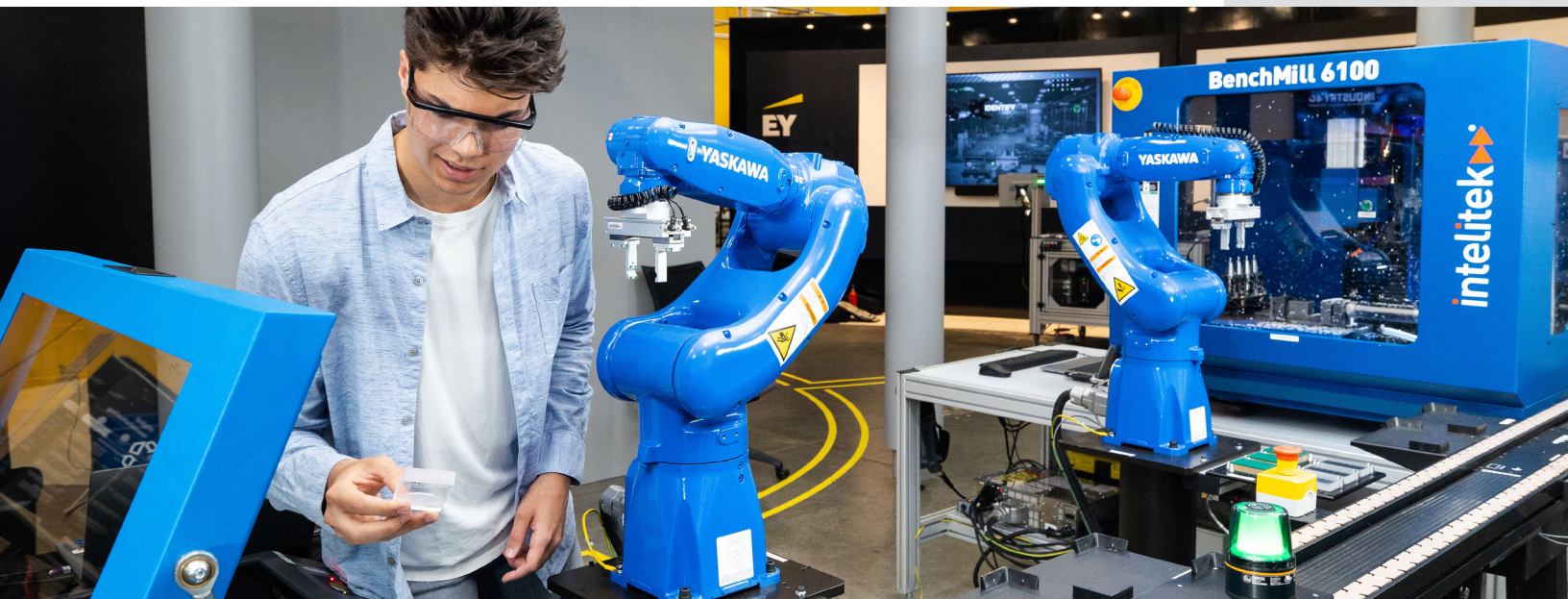
FEATURES

- 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
- Milling operations: contouring, drilling, engraving, facing and pocketing
- Turning operations: facing, roughing, finishing, grooving, cut-off


Intelitek Industry 4.0 Training Program

Industry 4.0 is a concept where industrial processes and manufacturing plants take advantage of the most advanced technologies and leverage data collected in real-time from the factory floor to monitor, maintain, and optimize the operation in real-time.

The Intelitek training programs for Industry 4.0 focus on three aspects of training: first, the core technology skills so students can understand the technologies and how they work; second, the interdependence of systems, the communications, automation, and interaction of systems within an industry 4.0 environment; and third, the benefits of integrated industry 4.0 systems and the employability skills required to work in this new, collaborative world of industry.



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