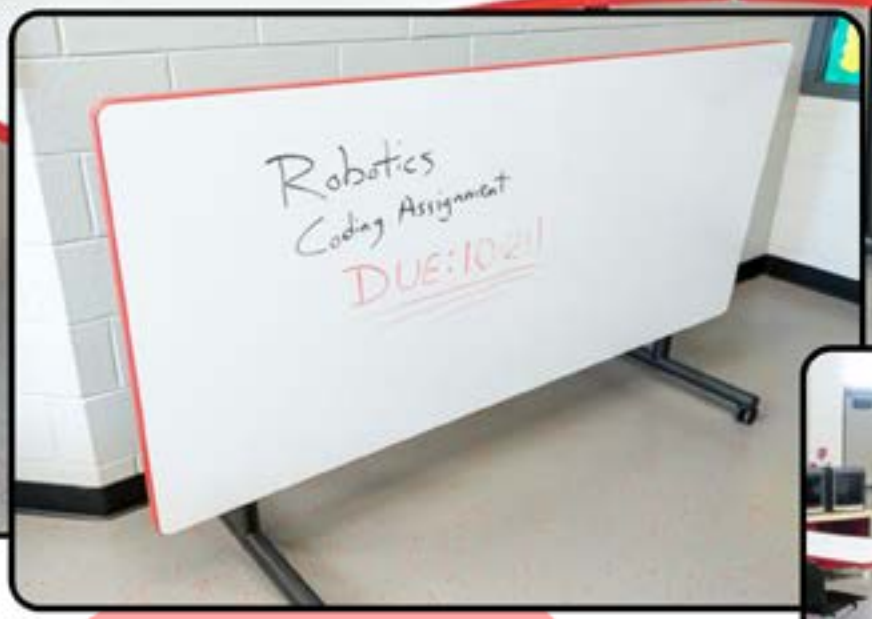
STEM



Carl J. Renton Jr. High Case Study

BES SOLUTIONS
Your Investment. Our Solutions. Their Future.

Renton JHS made an investment in the future of their students when they launched a new STEM classroom. This classroom was a major investment for the school. Renton was looking to pair quality furniture solutions with their new technology. Interior Concepts delivered. Renton's new STEM classroom gives students a chance to explore vocational training. It's also a great stepping stone as students transition into high school. All furniture in the room is mobile, so students and teachers can rearrange the room as needed. Having the flexibility to move furniture with heavy equipment is a great solution for this type of classroom!

Product Information Sheet

Engineering Construction Kit

LJCREATE Learning for life

The Engineering Construction Kit is a classroom-based resource for investigating designing, building and programming robotic and automated machinery in a range of areas of technology. These areas include engineering design, agricultural technology, medical technology, mechatronics, industrial robotics, mobile robotics and transportation technology.

The Engineering Construction Kit includes simple, yet sophisticated, programming software to allow students to design flowchart programs to bring their models to life

The Engineering Construction Kit is used within our Design and Technology program to help students develop solutions to a range of practical real-world problem-solving tasks and activities within a classroom or lab environment.

Features:

- Unique 3D cube-based construction kit
- A sophisticated programmable control unit with 12 input/output ports and 4 DC motor ports
- A wide range of sensors, motors and actuators
- Flowchart-based programming software
- Curriculum-based learning content

Typical Project Activities Include:

- Design a railroad crossing control system
- Design a medical scanning system
- Design a fairground ride
- Design automated agricultural machines
- Design a container crane
- Design semi-automated vehicles
- Design mobile robots
- Design industrial machines and robotic systems

Items Included:

- Construction Kit
- Sensors and Motors
- Programmable Controller
- Programming Software
- Curriculum-Based Learning Content

Other Items Required:

- Computer

General Information:

Power Requirements: 110 – 240V 50-60Hz
Kit Dimensions: 470 x 354 x 234 mm (WxHxD) per kit
Packed Volume: Approx. 0.05 m^3 per kit
Packed Weight: Approx. 5 kg per kit

Product Information Sheet

Green Technology Teaching Set

Our STEM learning packages have been designed provide practical real world problem solving tasks and activities within the classroom or lab environment.

These activities will provide an engaging approach that helps instructors show contextualized linkages between Science, Technology, Engineering, and Mathematics.

This resource is supplied with a curriculum CD containing practical tasks and activities that offer a wide range of interactive learning opportunities via the easy to use software and hardware resources included.

The trainer can also be used in conjunction with our optional cloud-based software packages. These offer online practical tasks as well as interactive theory presentations, investigations, and assessments, which link directly to the practical activities carried out using this resource.

Students will start out investigating the technology and methods behind both fossil fuel and sustainable energy production techniques.

Using an interactive games based app, students will design their own energy production solution for a range of geographical situations, employing the most appropriate green energy production systems.

Once submitted, the student's proposal is analysed by the app, and given a gold, silver, or bronze award for the performance of their solution.

Worksheets are also provided to allow learners to document, record, and report upon their findings, justifying their decisions throughout their work.

Example – Wind Energy Production Solution for Port City

During the activities the learner has access to interactive study guides. These allow them to investigate some of the technologies available, and help inform them while they consider their proposal.

LJ Create –Product Information Sheet (Continued)

Green Technology Teaching Set

Once learners have an understanding of how energy can be created and distributed, the focus can then turn to methods used to reduce energy consumption in the home.

The eco-house model lets the class explore the energy requirements of a range of home appliance including elelctric heating, air conditioning and lighting.

Students can then learn about the ways in which energy can be saved, including the use of insulation, efficient lighting and double glazing.

Eco-house – Controlled and monitored via a computer and whiteboard

Renewable energy generation devices are included in the form of solar water heating, a solar electric (PV) system and a wind turbine. These devices help students to recognise the benefits and limitations of different forms of renewable energy.

The included interface software provides a real time graphical display of power and energy use (from the grid and from renewables), room temperatures, light levels and hot water system temperature.

Example – Showing power usage and temperatures in the eco-house

Typical Simulator Activities Include:

- Harnessing Solar and Wind Power
- Hydroelectric Power for an Island
- Creating Power from Biomass
- Geothermal Challenge
- Nuclear Power
- National Grid Challenge

Typical Practical Activities Include:

- Investigating Energy Use in Buildings
- Home Wind Turbines
- Solar Electric Systems
- Energy for Heating Buildings
- Solar Water Heating
- Insulation and Glazing Performance
- Heat Pump Principles

Items Included:

- Eco-house
- Wind turbine
- Sun simulation lamp
- 3-speed desk fan
- Interface software, USB lead and power supply
- Curriculum CD

Other Items Required:

- Computer with DVD Drive and Spare USB Port

Also Recommended:

- EXS-AL Exploring STEM Software Library - Annual Site License

General Information:

Dimensions: 650 x 510 x 490 mm (W x H x D) Max Height with lamp assembly 1030 mm
Power Requirements: 110 – 240V 50-60Hz
Packed Volume: Approx. 0.36 m^3
Packed Weight: Approx. 25 kg

Product Information Sheet

Injection Molding Trainer

Use with a **3D printer** for rapid prototyping, tooling, and manufacture

Our STEM learning packages have been designed to provide practical real world problem solving tasks and activities within the classroom or lab environment.

These activities will provide an engaging approach that helps instructors show contextualized linkages between Science, Technology, Engineering, and Mathematics.

Students will have access to hands on learning opportunities within our optional cloud-based STEM curriculum software packages. This easy to use software also contains theory presentations, virtual investigations, and support materials to underpin the practical tasks.

The Injection Molding Trainer offers a classroom-based resource for investigating the techniques used to create thermo-plastic products.

Students initially use the trainer to mold a variety of items, including a model car and different designs of door handles.

Using the trainer alongside a 3D printer allows students to follow rapid prototyping and tooling techniques, including:

- 3D printing, evaluation and improvement of prototypes
- 3D printing of injection molds
- Injection molding of the final product

Students apply these techniques to develop various items including a headphone cord wrap and a multi-part gear mechanism.

Students will see how a good grasp of the science of material properties is needed to select appropriate materials and methods for production. They will also gain an understanding of how mathematics is required to develop production costs and propose selling costs.

The trainer includes a curriculum disc containing theory and practical learning tasks, as well as tutor support materials.

Typical Topics Include:

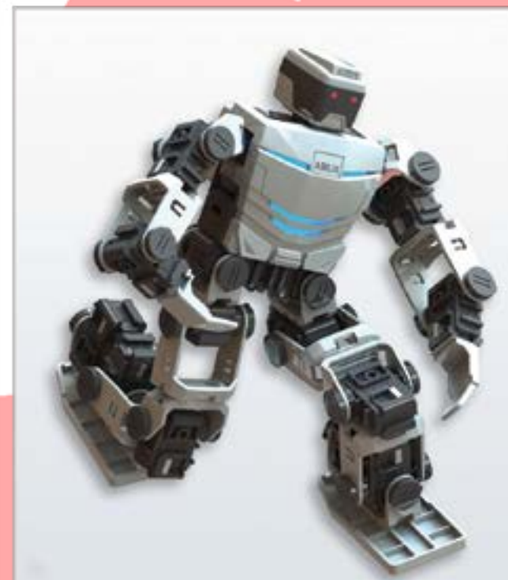
- Plastics
- Design
- Materials
- Material Properties
- Testing Properties of Materials
- Injection Molding
- Tools and Fabrication
- Suitable Product Materials
- Waste, Recycling and Cost
- Problem Solving
- 3D Printing Materials and Applications
- 3D Printing Process
- Rapid Prototyping
- Rapid Tooling

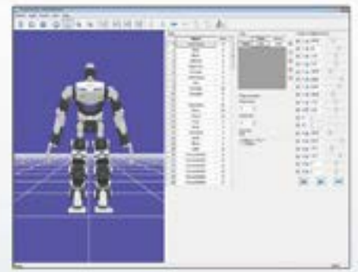
Typical Practical Activities:

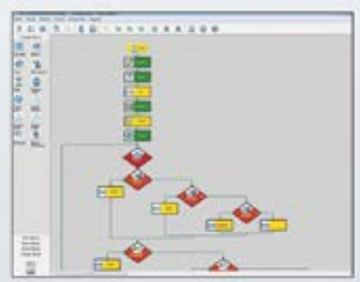
- Injection mold the parts for a model car
- Mold different doorknob designs and test each one for strength
- Investigate why a mold must be securely clamped
- Mold a plastic handled screwdriver with a metal blade
- Adapt an existing mold design to make a corn cob holder
- Use a 3D printer to print a test object
- 3D print a prototype of a headphone cord wrap
- 3D print an injection mold tool for the cord wrap
- Evaluate the quality of the molded part
- Adapt the 3D printed mold tool to overcome molding problems such as flashing, surface finish and shrinkage
- 3D print a mold for a multi-part gear mechanism and test the design
- Explore the benefits of adding a draft angle to a mold
- Investigate the effects of component undercuts and overhangs on mold tool design
- Design project – design a new component suitable for mass production

Product Information Sheet – Programming & Robotics

Educational Robotics Invention Kit (ERIK)







The Educational Robotics Invention Kit or ERIK provides students with an environment that motivates them to learn abstract computer science concepts in a bid to solve practical problems with physical outcomes. The combination of engineering and programming creates a dynamic environment that helps students develop problem-solving skills that involve mathematics, engineering, science and logic.

The Robotic Hardware consists of intelligent servo motors, sensors, a programmable controller and a range of construction parts allowing students to design, build and program a wide range of robotic systems. The modular hardware has been designed for ease of use, no tools are required for construction.

With a wide range of example models including walking humanoid and multi-limbed robots, as well as autonomous wheeled vehicles, students quickly develop the skills needed to build and program their own models.

Typical Project Activities Include:

- Languages, machines, and computation
- Algorithms and abstraction
- Inputs and Outputs
- Data, Variables and Constants
- Control Structures
- Testing and debugging
- A series of open ended design projects to allow students to get creative

Features:

- Unique quick-fit construction kit
- A sophisticated programmable control unit with Bluetooth communications and an internal gyroscope, capable of storing 2 programs and controlling 253 Intelligent Motors
- Intelligent Motors either operate as servos moving ±150° degrees in 0.29° increments, or as standard motors with 1023 speed steps in both directions
- Bus based wiring
- Sensor module able to measure light, sound, distance and IR
- Flowchart, C code and 3D based programming software
- Curriculum-based learning content

Items Included:

- Construction Kit
- 1×Sensor block and 18×Motors
- Programmable Controller
- Programming Software
- Curriculum-Based Learning Content

Other Items Required:

- Windows XP or later based Computer

General Information:

Power Requirements: 110 – 240V 50-60Hz
Kit Dimensions: 450 × 300 × 220 mm (W×H×D) per kit
Packed Volume: Approx. 0.03 m^3 per kit
Packed Weight: Approx. 5 kg per kit

MOTION

FLIP-TOP OPTION

Tables you'll flip for. By their very nature, classrooms, training rooms, breakrooms, and multi-purpose rooms are constantly changing. Enter our Motion flip-top tables. They accommodate rooms with diverse functions and group sizes, or situations where tables are shared between rooms and need to easily pass through doorways. Equipped with a durable quick-release handle, the flip-top worksurface rotates and locks vertically for space-saving nesting.

Select from arch (far right) or T-leg (below).

Tables easily nest to create an open area — great for multi-purpose rooms.

Or choose a half-round design; available in 24" x 48" or 30" x 60" sizes.

Flip-top tables up to 72" wide feature a quick-release handle — easy for one person to flip.

ADJUSTABLE-HEIGHT OPTION

In need of an altitude adjustment?

With a simple pin-clip system, users can adjust the table height without a single tool. And with two height-range options available, tables can easily accommodate different age groups or work purposes while maintaining a unified aesthetic. Simply lock in the desired height, and everyone is comfortably back in business.

Height-Range Options
- 26"–35"
- 29"–42"

MOTION

COLLABORATIVE TABLE

Unique shapes for unique needs. From small-team collaborations to large-group discussions, Interior Concepts supports the way people work and learn.

Collaboration Table
60" W x 68.5" D with 24" W ends

TECH LAB CART

Lab and technology spaces often need durable workbenches that can accommodate heavy, large, or messy experiments and equipment. Topped with a non-reactive maple butcher block, our carts will withstand the demands of any workshop environment for years. Built-in lower storage also simplifies equipment or supply storage — one side features a locking cabinet and the other an open cubby with adjustable shelf. To allow carts to be grouped for even larger worktops, or easily moved for cleanup, heavy-duty locking casters are standard.

FEATURES

- Maple butcher block or laminate top
- Overall size: 3' D x 4' W and either 30"/34"/38" H
  3' or 4' D x 6' W and either 30"/34"/38" H
- Locking storage cabinet *(lock cores can be matched)*
- Adjustable storage shelf
- Heavy-duty locking casters
- Limited lifetime warranty
- MAS® Certified Green
- Made in the USA

OPTIONS

- Numerous color options *(to view, visit the Resources Section at interiorconcepts.com)*

Interior Concepts™
solutions that fit.

AFINIA 3D

H800+ 3D Printer

The new Afinia H800+ has a build area 5x larger (10 x 8 x 8 inches) than the H480, and has many additional enhancements:

- Fully-enclosed system with HEPA filtration
- Fully-automated platform leveling and height sensing
- WiFi Connectivity
- Power loss print recovery and “out of filament” pause switch
- Customizable nozzle and platform temperatures
- 30% faster
- Ultra-fine 100-micron print resolution
- One button filament color changing
- Upgraded printhead and gantry system
- Smart support material technology
- Easy filament spool loading

Out-of-the-Box 3D Printing

The Afinia H-Series 3D Printers provide a true “Out-of-the-Box 3D Printing Experience” as the 3D Printers comes fully assembled with easy to install software for both the PC and Mac. The Afinia H-Series 3D Printers can prototype a part or model, within .10mm (4 thousandths of an inch) accuracy, that have 30% of the strength of injection molded parts.

Easy to Use, Powerful Software

The 3D Printer Software features an easy-to-use interface for laying out, orienting, duplicating, and scaling parts. Simply use the included utility to calibrate the printhead height, and within minutes you are printing. It easily imports STL files, and the output can be customized in terms of the amount of support material and “raft” (base support) printed. Breakaway support material is simple to remove, and tools for aiding the breakaway are included. Design files for 3D printing can be created using online software, professional software such as SolidWorks™, or by downloading from the extensive online 3D printer community for free.

Print technology:	Melted Extrusion Modeling (MEM)
Build volume:	10”W x 8”H x 8”D (255 x 205 x 205 mm)
Print head:	Single
Layer thickness:	0.1(100 micron)/0.15/0.20/0.25/0.30/0.35mm
Supporting structure:	Smart Support Technology: automatically generated, easy to remove and fine-tunable
Platform leveling:	Automatic nozzle height detection, software-assisted leveling
Build platform type:	Heated, with Perforated Print Board or Afinia Flex Print Board
Consumables	1.75mm ABS, PLA, Flexible Plastic Filament, PETG
Additional features:	HEPA Air filtration, Active heartbeat mood lighting (provides print status indication), on-board file storage, one-button filament color changing, power loss print recovery, “out of filament” pause switch, WiFi connectivity

VersaStudio BN-20

Desktop Inkjet Printer/Cutter

The BN-20 packs everything into one, powerful, profit-producing package. With award-winning eco-solvent inks including metallic and white options, a range of material compatibility and integrated contour cutting, the BN-20 is easily the most versatile print device in its class. The BN-20 is perfect for creating t-shirt graphics, poster prints, stickers and decals – all from the comfort of your desktop.

Achieve So Much More

Not only does the BN-20 desktop inkjet printer/cutter open up a world of graphics possibilities, but it does it with the highest level of quality. Featuring a piezo inkjet print head that prints up to 1440 dpi, the BN-20 delivers exceptional quality prints with smoother gradations, richer density and deeper image saturation for photographic and vector output.

Print and Cut in One Integrated Workflow

The VersaStudio streamlines the production process by automatically contour cutting its printed output and eliminating the need to reload and reposition graphics. For laminated graphics, our Quadralign® four-point optical registration system allows users to remove prints, laminate and reload them for cutting. Quadralign automatically realigns the cutting path and compensates for skew and distortion.

Printing method / Cutting method		Piezoelectric inkjet / Grit roller feed
Acceptable media	Width	5.9 to 20.3 in. (150 to 515 mm)
	Thickness	Printing: Maximum 39 mil (1.0 mm) with liner Cutting: Maximum 16 mil (.4 mm) with liner
	Roll Weight	Maximum 13.2 lbs (6 kg)
	Roll Outer Diamater	Maximum 5.9 in (150 mm)
	Core Diamater	2 in (50.8 mm)or 3 in (76.2 mm) cores
Printing/cutting width		Maximum 18.9 in (480 mm)
Ink cartridges		**Type**
Ink Cartridges	Type & Capacity	Roland ECO-SOL MAX or FPG Aqueous, 220 ml only
	Colors	5 Color – CMYK+Mt (Cyan, Magenta, Yellow, Black and Metallic Silver) or CMYK+Wh (Cyan, Magenta, Yellow, Black, and White)
		4 Color - CMMYK (Cyan, Magenta, Yellow, Black)
Printing resolution		Max 1440 dpi
Cutting Blade		Roland CAMM-1 series cutter blade
Cutting speed		0.4 (10 mm/s) to 5.9 in/s (150 mm/s)
Blade force		30 to 300gf
Connectivity		USB 2.0
Dimensions/Weight		39.2” W x 23” D x 11.5” H (995 W x 585 D x 291 H mm), 79.4 lbs (35 kg)
Included Items		Power cord, USB cable, blade, blade holder, Roland-software Package9, Software RIP (VersaWorks), User’s Manual, etc

MODELA MDX-50

Benchtop CNC Mill

The MDX-50 benchtop CNC mill combines precise, automated milling and unmatched ease-of-use. An ideal solution for short-runs and prototypes, the MDX-50 reduces operation time and simplifies production so users of all abilities can mill functional parts with incredible quality on a wide range of materials.

Automatic Tool Changer

The MDX-50 increases performance with an expanded machining area and increased operating speeds, while reducing production time with faster job processing and a 5-station Automatic Tool Changer for continuous operation without stopping to change milling tools.

Operator-Friendly Control and Software

Become a 3D milling expert almost immediately with the MDX-50’s simple yet powerful built-in control panel and virtual control panel (VPanel), and bundled SRP Player CAM software that’s easy-to-use and simplifies operation.

With the control panel at the front of the unit, almost all operations can be completed from the unit itself without having to go back to a PC. The VPanel interface operates seamlessly with the MDX-50 and allows users to make changes to spindle rotation or speed during operation.

Acceptable materials	Resins such as chemical wood and modeling wax (metal not supported)
Operating range	X: 15.80in (400mm) Y: 12.00in (305mm) Z: 5.315in (135mm)
Table size	W: 15.80in (400mm) D: 12.00in (305mm)
Loadable workpiece size	X: 15.80in (400mm) Y: 12.00in (305mm) Z: 3.90in (100mm)
Axis drive	Stepper Motor
Feed rate	XY: 0.3in to 141.7 in/min (7 to 3600mm/min) Z: 0.3 to 118.1 in/min (7 to 3000 mm/min)
Spindle motor	Brushless DC motor
Spindle rotation speed	4500 - 15000 rpm
Tool chuck	Collet
Tool Change Method	AutomaticTool Changer (ATC)
ATC Magazine Capacity	5 Tools + 1 Detection pin (6 Position Capacity)
Tool Shank Diameter	0.250in, 0.125in (6.35, 3.175mm)
Interface	USB
External Dimensions	Width X Depth x Height: 29.92 × 35.43 × 28.82 in (760 × 900 × 732 mm)
Weight	269lb (122kg)

Mini 24
Laser Engraver

Features
- Made-in-the-USA Quality
- Accupoint™ Motion Control System
- Accupoint™ High Speed Servo Motors
- Accupoint™ Linear Encoders
- Long-Life Lenses Rated to 500 Watts
- Long-Life Steel Bearings
- Kevlar Drive Belts
- Motorized Table
- Radiance™ Higher Resolution Optics
- CO2 Waveguide Laser Tubes by Epilog
- Memory in the Machine
- Super-Silent™ Cooling Fans
- Easy Cleanup with the Crumb Tray

Engraving Area	24” x 12” (610 x 305 mm
Maximum Material Thickness	5.5” (140 mm) With Table Removed 8” (203 mm) with a 23.5” x 11.75” (597 x 298 mm)
Laser Wattage	30, 40, 50, or 60 watts
Air Assist	Attach an air compressor to our included Air Assist to remove heat and combustible gases from the cutting surface by directing a constant stream of compressed air across the cutting surface.
Laser Dashboard	The Laser Dashboard™ controls your Epilog Laser’s settings from a wide range of software packages - from design programs to spreadsheet applications to CAD drawing packages.
Red Dot Pointer	Since the laser beam is invisible, the Red Dot Pointer on Epilog’s Mini and Helix Lasers allows you to have a visual reference for locating where the laser will fire.
Relocatable Home	When engraving items that are not easily placed at the top corner of the laser, you can set a new home position by hand with the convenient Movable Home Position feature on the Legend Series Lasers.
Operating Modes	Optimized raster, vector or combined modes.
Resolution	User controlled from 75 to 1200 dpi.
Print Interface	10 Base-T Ethernet or USB Connection. Compatible with Windows® XP/Vista/7/8/10.
Size (W x D x H)	34.5” x 26” x 16” (876 x 660 x 406 mm)
Weight	90 lbs (41 kg) 120 lbs (55 kg) w/stand
Electrical Requirements	Auto-switching power supply accommodates 110 to 240 volts, 50 or 60 Hz, single phase.
Maximum Table Weight	Static table weight of 50 lbs (22.7 kg) and a lifting table weight of 25 lbs (11.5 kg).
Ventilation System	350 - 400 CFM (595-680 m3/hr) external exhaust to the outside or internal filtration system is required. There is one output port, 4” in diameter.

Next Wave Automation

CNC SHARK HD4 EXTENDED

The All New CNC Shark HD4® Extended now with Color Pendant Controller and CNC Shark HD4® Exclusive Auto Alignment features a heavy duty gantry reinforced with plate aluminum and a rigid interlocking aluminum table. It has anti-backlash, wear-compensated high precision lead screws on all 3 axis and is built to handle large 2-1/4HP routers such as the Porter Cable 890 series, Bosch 1617 series or the new water-cooled spindle from Next Wave Automation. To accommodate even greater torque levels, it features adjustable bearings to give more stability during heavy cutting. Perfect for carving and machining a large variety of projects made from wood, soft metals or plastics. Simply supply a PC computer with USB 2.0 port and any of the routers listed below, connect the USB cable to the controller box and load the software. Includes VCarve Pro V9 Design software, Vector Art 3D Sampler Pack, and CNC Shark control software.

Also Includes:
The CNC Shark HD4® Extended also includes the Virtual Zero software. This CNC SHARK exclusive software “maps” the surface of your table or workpiece and uses the map as a dynamic reference point. This eliminates problems caused by warped or bowed workpieces and small inconsistencies in the table. It also allows you to carve and machine stock that is intentionally convex to begin with. A new electronics package expands the capabilities of the CNC Shark and allows attachments like Laser, 4th Axis, and water cooled spindle control.

Table dimensions’	28” x 63’
XYZ travel	25” x 50” x 7”
Overall dimensions	36-1/4” W x 63” L x 24-1/2” H

- New anti-backlash, wear-compensated leadscrews on all axes
- New, stronger interlocking table designed for accuracy and less table flex.
- Detachable, rotating cradles allow different attachments
- Enhanced hardware controllers with expansion ports and pendant ability
- Improved design on Z axis to allow heavier applications (like spindles)
- Reinforced to handle larger routers such as the Porter Cable 890 series or Bosch 1617 series (up to 2-1/4 HP router)
- Adjustable bearings give more stability during heavy cutting X and Y axes have supported linear guides.
- Aluminum and high-density polyethylene construction is designed for heavy use.
- Automatic on and off software control of router Controller box with aluminum case and push button E-stop Pendant control capability included (designed for numeric laptop keypad)
- Mount for router included (router sold separately)
- USB interface Simply supply a PC computer with USB 2.0 port and any of the routers listed below
- Includes VCarve Pro V9 w/built in Cut 3-D capabilities and 60 3D models
- Includes the Virtual Zero technology-(requires optional touch plate accessory)
- One year warranty on parts and labor from date of purchase, special shipping exclusions apply.
- Fully compatible with the following routers (sold separately): Bosch 1617 and 1618 Porter Cable 890 Series Porter Cable 690 Series (6902VS must be manually started) DeWalt 610, 616, 618

Tech Carts

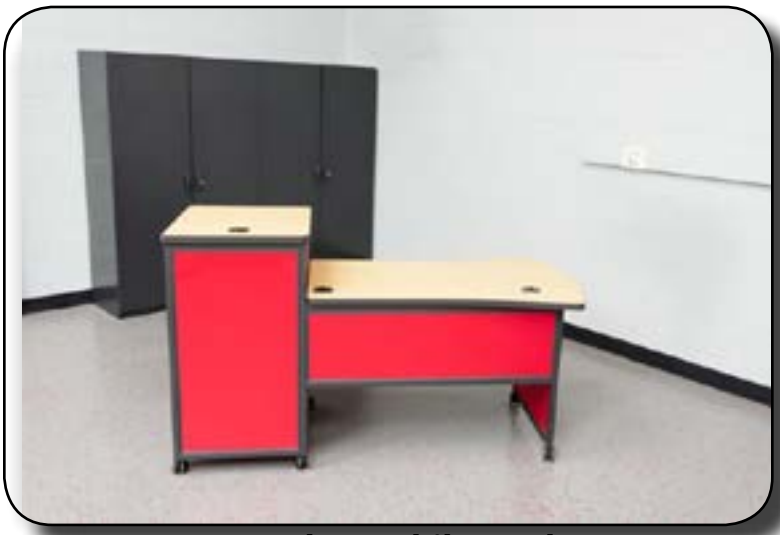
Renton JRHS chose butcher block tops for their mobile carts to support their substantial equipment.

Collaboration Tables

Monitor arms were mounted on the back of collaboration tables to create engaging spaces for small groups.

Motion Flip-Top Tables

Motion Flip-Top tables are easy to flip, simply pull the trigger handle! Complement school colors with edging and laminate colors.



Traveler Mobile Desk

The instructor at Renton JRHS chose this style because of the combined sitting and standing work area.

Motion Multi-Purpose Tables

Renton chose Motion Tables to provide flexible spaces for their students.This configuration works well for lectures.

Motion Multi-Purpose Tables

This table layout works well for small groups. Combine more tables in a u-shape or rectangle for larger groups.