



*TII Technical
Education
Systems*

Teaching Technology for Tomorrow.

TECHNOLOGY FUNDAMENTALS



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ABOUT

TII Technical Education Systems (TII) is an internationally known leader in providing integrated, hands-on learning systems. Since our founding in 1964, we have excelled at producing innovative laboratory equipment and curricula geared toward technical training, workplace skills, and industrial certifications for schools, industry and government agencies worldwide.

We're incorporating the newest technology with an extensive curriculum for academic success, preparing students for today's modern employers.

Pneumatic Robotic System - MB500

READ. SHOW. DO.

At TII, we believe a hands-on approach should be the cornerstone of every technical training program.

Statistics prove that hands-on training creates the highest learning retention rate for students.

We recall 25% of what we hear, 45% of what we see, and 70% of what we DO.

That's why all of our programs have a hands-on focus and are supported by a comprehensive instructional curriculum: Read. Show. Do.

All of TII's training programs follow this three-step training method. This in-depth combination of coursework, demonstrations, and hands-on exercises achieves the greatest retention rate and promotes productivity, integral to the development of a Technology Fundamentals skill set.

Principles of PLCs - MB665ML-S

TECHNOLOGY FUNDAMENTALS

TII's Technology Fundamentals series is designed to introduce students to the basic principles of technology. This series emphasizes many career-focused, hands-on learning fundamentals with STEM applications. TII's Technology Fundamentals series delivers an interactive learning program consistent with the needs of a technology-driven world.

Each of TII's Fundamentals learning systems include background study, observational and hands-on experiments, and application exercises for student understanding and retention. Our globally popular Technology Fundamentals trainers are attractive, durable, and completely enclosed in a portable and lockable impact-resistant polyethylene case. Each complete, stand-alone system includes an experiment station, component kit, visual aids, and courseware. All necessary hardware and components are included, for easy plug-and-play start up and success.

TII'S CURRICULA

Our technical training solutions are user-friendly and customizable for a clear and concise learning experience. TII's curricula have been designed and reviewed by a panel of experienced secondary and post-secondary educators. Each program has received input from industry experts and has been tested by industry and educational professionals.

Students will discover the functions of the individual technology components and combine them to mimic real world operating systems. They will then master the application of learned principles through mathematic and scientific concepts, the driving forces behind each of TII's learning systems.

Fundamental Learning with TII

- Emphasizes industry-focused, hands-on learning with STEM applications
- Delivers a program consistent with a technology-driven world
- Professionally written programs increase instructor efficiency and student results
- Comprehensive 25-hour curriculum
- Easy to use instructor guide with student manuals
- Designed for individual or group study
- Stand-alone training systems
- Assessment testing included

Visit our website for more information
on TII's curriculum: www.tii-tech.com

OUR LEARNING SYSTEMS

Common features to most of the MB Series learning systems:

- Suitcase for easy portability when not in use
- Flexible use: Experiments can be conducted within the suitcase, or system panels are removable for wall mount or table-top use
- Silk-screened panels for easy identification of learning system components and symbols
- Small-scale components mimicking real world equipment and applications
- Fast and easy setup of experiments: Focus on experiment objectives, not a lengthy setup process
- All components, supplies, power system, and curriculum are included: no extras needed

ELECTRICITY & ELECTRONICS MB100

This learning system familiarizes students with electricity through an introduction to electronics applications. Our trainer provides a foundational understanding of how electricity works by illustrating how electricity is distributed throughout a variety of inputs and outputs.

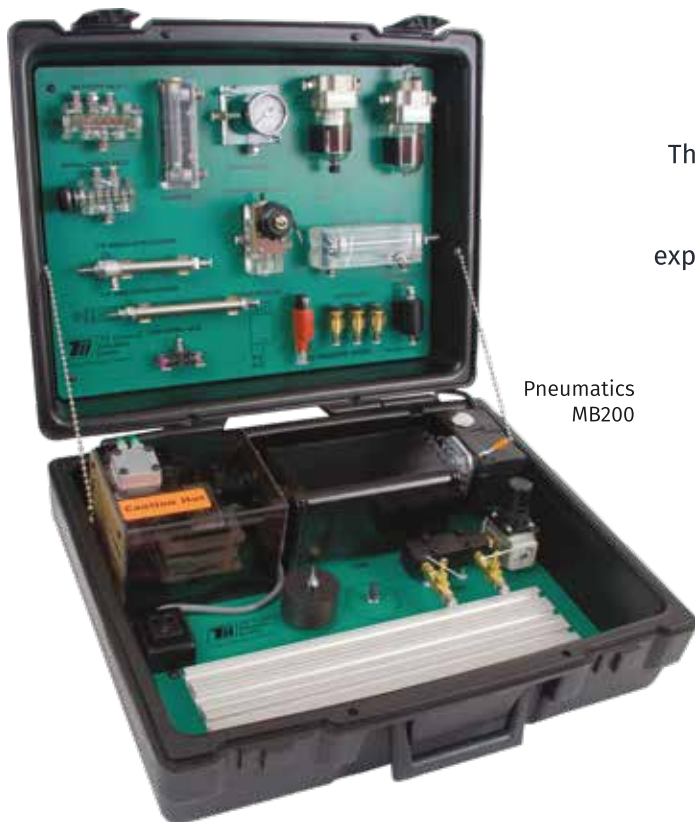
Students will learn about magnetism, electrical components (resistors, diodes, capacitors), progress to instrumentation, AC / DC power and schematics.

They will learn how to construct and measure series and parallel circuits, apply electrical principles and physical properties, including Ohm's Law, to the developed circuits.

- Experimentation station is protected with an internal fuse and circuit breaker
- Maximum voltage is limited to 12 VDC for student safety
- Component and circuit protection
- Banana jack and patch cords for easy wiring



Electricity & Electronics - MB100
Shown in upright stand option
instead of standard suitcase.



PNEUMATICS MB200

This trainer introduces students to pneumatic technology and its applications. Each lesson requires students to conduct an experiment in pneumatic technology using one or more of the 20+ components including different types of valves, cylinders and measuring instruments.

Students will learn about air preparation, vacuum and pressure regulation. They will understand how to directionally control air flow using manual, solenoid, and air piloted control valves to operate actuators and other devices in order to generate useful work. They will construct pneumatic circuits replicating real-world applications. Students will apply Pascal, Charles, and Boyle Gas Laws to pneumatic circuits.

- Many see-through components allow for student observation and increased understanding of system functions
- Built in power supply includes air compressor 60 PSI with a safety relief valve
- Quick connect fittings, hoses, for easy assembly of experiments

MECHANISMS MB300

The Mechanisms learning system provides a comprehensive look at power transmission and the basic elements found in all machines. Each lesson includes an experiment that requires students to construct and operate a simple machine or device. Among the 30+ mechanical components are a variety of gears, pulleys, and assemblies. Students will use the components to design their own solutions to meet common problems that occur in industrial and everyday situations.

Experiments will teach about simple machines and their application: first, second, and third class levers; inclined plane, screw, wheels and axles, as well as pulleys and gears to generate mechanical advantage. They will use these machines to design and build a variety of mechanical systems—gear and drive trains, block and tackle systems, linkage motion, and cam operation. Principles learned will be applied to the physical properties of mechanisms including force, work, power, friction/efficiency, kinetic and potential energy.

Visit our website for more information
on TII's curriculum: www.tii-tech.com

MECHANISMS MB300

- No power is needed: All experiments are operated manually to enhance the understanding of simple machine operation and mechanical advantage.
- Curriculum uses simple machines as "building blocks" to construct compound machines
- Variety of commonly used gear types and sizes included



Mechanisms
MB300

HYDRAULICS MB400

This trainer familiarizes students with hydraulic technology and its applications. Each lesson requires students to conduct an experiment in hydraulic technology using one or more of the 20+ components including different types of valves, cylinders and measuring instruments. Students will use these components to emulate industrial applications. Students will develop skills in problem solving, data management, hydraulic concepts, and unit conversion.

Students will learn about hydraulic fluid and filtration, how to control and direct hydraulic fluid using pressure control devices, directional valves, and flow control valves. They will use the components and schematics to construct hydraulics systems commonly found in industry like a hydraulic press, jack or positioner applications. They will study the physical properties of force, work, power, and energy used in these applications.

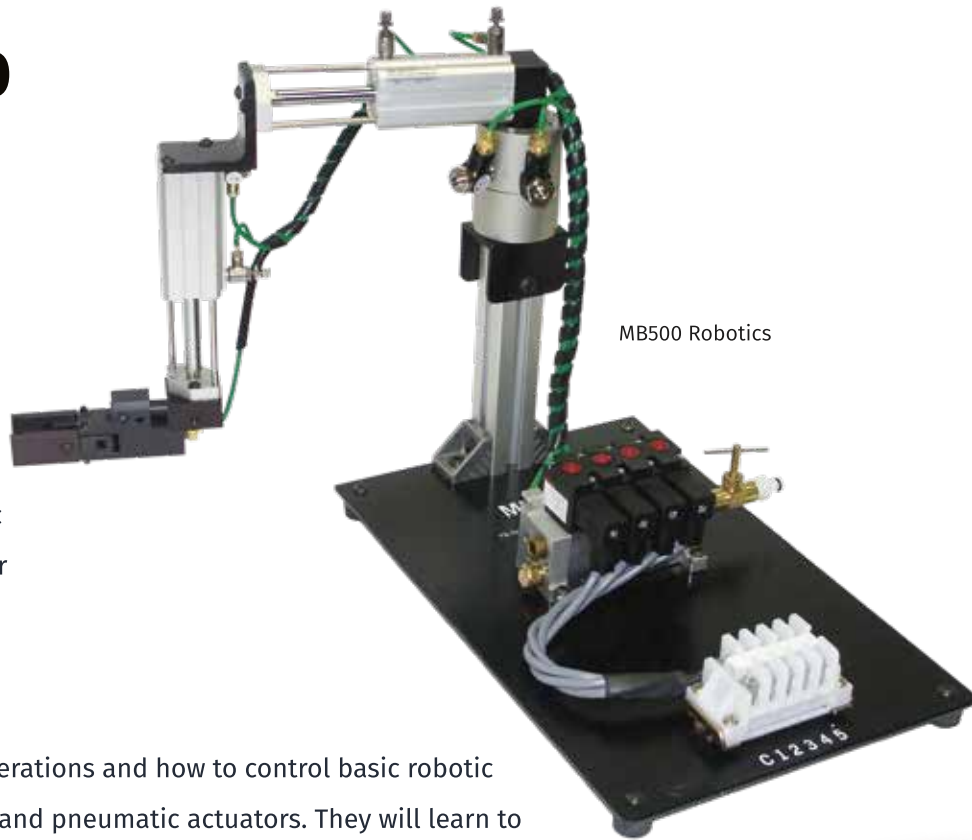
- Many see-through components allow for student observation and increased understanding of system functions
- Built in centrifugal pump with hydraulic reservoir set at 25 PSI maximum
- Quick connect fittings for easy assembly of experiments
- Reservoir and hoses pre-filled with hydraulic fluid



Hydraulics
MB400

ROBOTICS MB500

The MB500 Pneumatic Robotics Module teaches PLC control, robotic technology, and pneumatic applications. This module is designed to provide students with an understanding of how pneumatic components work together in a pick-and-place robotic arm application. Learn how to control robotic motion using a pendant or programmable logic controller (PLC) featuring ladder logic computer programming software to create, edit, run, and monitor robot programs.



Students will learn the principles of robotic operations and how to control basic robotic motion using an electrical solenoid valve pack and pneumatic actuators. They will learn to control each robot motion separately: base rotation, linear shoulder extension, linear elbow elevation, and gripper open/close. Then develop a robot motion map by combining the robot motions into a series of robot actions.

- Robotic Arm has three axes of motion and four degrees of freedom
- Each degree of freedom is individually controllable
- Safe air operating pressure of 60 PSI

Visit our website for more information
on TII's curriculum: www.tii-tech.com

SENSORS MB600

The MB600 Sensors trainer offers a comprehensive approach to industry sensing devices. This system simulates the many uses of sensors in automated manufacturing. With 29 learning units, this trainer familiarizes students with sensor systems through interactive experiments. This versatile learning system can also be used with motors, lighting systems, conveyors, or as part of an automation system. Any electrically compatible PLC can be interfaced to the MB600.

Students will learn about the basic sensor types commonly used in industry including photoelectric (infrared and fiber optic), proximity (inductive), and limit switches. They will learn the advantages and disadvantages of each, as well as when to use the different sensor types based on the application. Sensors, with included target and output devices, are electrically connected by quick connect fasteners to a controller base unit. When the sensor is "tripped," the corresponding output is activated.

SENSORS MB600

- Work surface can be removed from case for setting up sensor experiments with other equipment
- Output devices: lights and horn
- Targets: Metal (Steel, Aluminum, Copper), Colorboard (black, white, silver)



Sensors - MB600



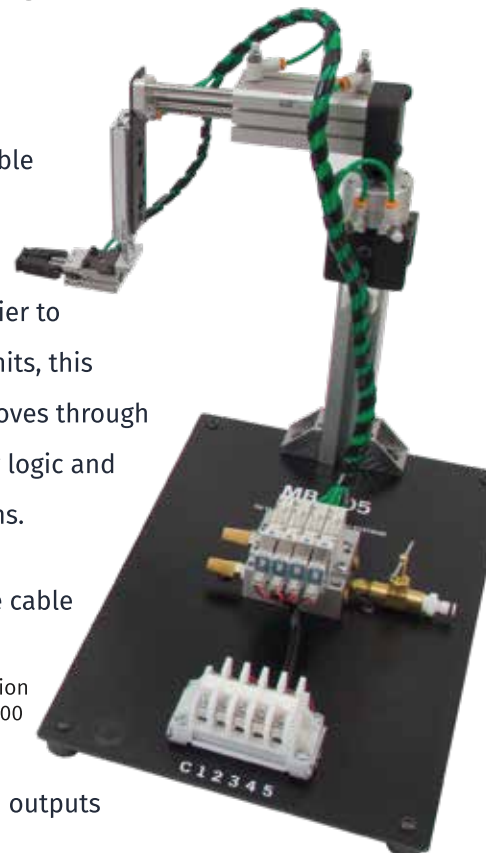
Micro Controllers - MB640A

MICRO CONTROLLERS MB640A

This introductory PLC training system enables students to develop competence in operating and programming an industrial programmable controller. TII's Micro Controllers offers students experience with an electronic control relay with PLC-like features: built-in logic, timer, counter, and real-time clock functionality. The Micro Controller is easier to use and program than a traditional PLC. Featuring over 20 learning units, this system's curriculum begins with basic wiring concepts and quickly moves through series and parallel circuits, Boolean Algebra, inputs / outputs, ladder logic and programming. Compatible with TII's MB500 and MB600 training systems.

- Programmable keypad with LCD display or software with computer interface cable
- Digital Inputs: 4
- Analog Inputs: 2
- Relay Outputs: 4
- Banana jack and patch cords for easy connect and disconnect of inputs and outputs

Robotics PLC Application
MB500





PRINCIPLES OF PLCs

MB665ML-S

Our Principles of PLCs trainer offers students a complete PLC training system featuring the Allen-Bradley MicroLogix PLC with two built-in applications: traffic intersection and bi-directional motor controlled slide. This system enables learners to develop experience in operating, programming and troubleshooting a true industrial programmable logic controller (PLC) and applying that knowledge to the included applications. Our curriculum begins with basic wiring concepts and quickly moves through series and parallel circuits, Boolean Algebra, inputs / outputs, ladder logic and programming. Each of our 23 learning units simulate PLC operations and applications within an industrial setting.

- Contains Allen-Bradley MicroLogix PLC
- Digital Inputs: 10
- Analog Inputs: 2
- Digital Outputs: 6
- RSLogix 500 Programming Software
- Banana jack and patch cords for easy connect and disconnect of inputs and outputs

ABOUT TII'S OTHER SYSTEMS

Technology Fundamentals serves as the building block for a career-focused education experience. Our uniquely designed training systems can function as stand-alone modules or integrated with other TII products to provide a more comprehensive training program.

From the entry-level student to the experienced professional looking to further their skills, our programs are designed to meet a wide variety of career-oriented needs.

ADVANCED SYSTEMS

The Advanced Systems series provide the components and hands-on training required to effectively troubleshoot and repair systems used by today's employers in modern industry. This series offers comprehensive instruction in two major concentrations of advanced industrial skills training: Industrial Fluid Power and PLC-focused Industrial Controls.

Industrial Fluid Power Series:

- Pneumatics
- Hydraulics
- Electro-Pneumatics
- Electro-Hydraulics



Industrial Controls Series:

Advanced PLCs

- Allen-Bradley
- Siemens
- Custom

PLC Applications

- HMI
- Ancillary Devices
- Machine Processes
- Analog Processes
- PAS Simulation Modules

AC Drives

Motor Control Troubleshooting

Advanced Electronic Sensors

Electro-Hydraulic EXP4

INTEGRATED AUTOMATION

The Integrated Automation series offers complete mobile Computer Integrated Manufacturing Systems (CIM, FMS, Mechatronics) for a wide range of integrated automated training configurations. Trainees will gain authentic industrial automation knowledge and skills on programming, system set up, HMI, system troubleshooting, and more on real world hardware. This series uses Windows-industrial based software communications and interfacing, real world inputs and outputs, creating industry-ready graduates.

- Mechatronics
- Multi-Station FMS
- Single Axis CIM Cell
- Dual Axis CIM Cell
- System Integration
- Supervisory Software
- Application Robotics
- Local Area Networking
- Programming, HMI and Controls



Modular Multi-Table Flexible Automation System
FMS800

Visit our website for more information
on TII's curriculum: www.tii-tech.com

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CONSTRUCTION HANDS-ON WORKSTATIONS ZONE



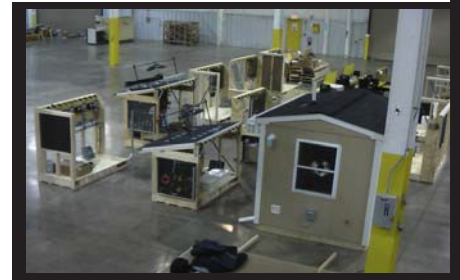
Hands-On Trainers for Construction Trades and Energy Technologies

TII Technical Education Systems
Questech, Inc.
Gilberts, IL

www.constructionzones.com

Hands-On Trainers for the Building Trades

Hands-on trainers that come
COMPLETE with training package, workstation, tools, equipment, and consumable supplies.



**Air Conditioning / Refrigeration
Architectural Structures**

Bricklayer

Building from Blueprints

Carpenter

Cement Mason

Construction Measurement

Drywall Installer

Electric Motor Repair

Electrician / Electrical Wiring

Glazier / Window Installation & Repair

Insulation Installer

Machinist

Plumber

Power Mechanics/Small Engine Repair

Residential Plumbing

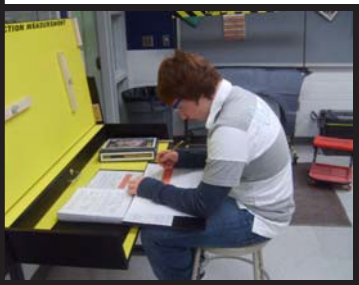
Residential Wiring

Roofer

Sheet Metal Worker

Tile Setter

Welder



Teaching Technology for Tomorrow.

tii-tech.com



Hands-On Trainers for the Construction Trades and Energy Technology



- ◆ The Questech Construction Zone product line consists of 30 trainers, representing 21 different skilled trades, including four in the renewable energy sector.
- ◆ Each trainer provides a safe, hands-on work experience and ships complete with Questech's Career Training Package, workstation, tools of the trade, equipment, and consumables.
- ◆ Students work in teams using the professional tools of each trade. STEM-based training manuals with full color photographs and diagrams provide career information with projected salaries; promote safety and standard trade practices; and guide the students through the hands-on activities.
- ◆ Construction Zone trainers allow students to explore different crafts and can lead to an apprenticeship that opens up lucrative career opportunities.



For pricing and further information, please call 800-451-2169, outside USA 1-847-428-3085 or request information at tii-tech.com or constructionzones.com.

Workstation Descriptions

Essential Knowledge Trainers

These hands-on trainers provide essential information that prepares students for the construction industry.

Building from Blueprints	Page 5
Construction Measurement	Page 6

Most Popular Trainers for the Trades

These hands-on trainers represent the dominant trades across the country and often form the core of a construction lab.

Air Conditioning / Refrigeration	Page 7
Carpenter	Page 8
Cement Mason	Page 9
Electrician	Page 10
Plumber	Page 11
Residential Plumbing	Page 12
Residential Wiring	Page 13

Construction Technology and Additional Trainers for the Trades

These hands-on trainers provide technical information that is useful in many different construction careers.

Architectural Structures	Page 14
Bricklayer	Page 14
Drywall Installer	Page 15
Electric Motor Repair	Page 15
Glazier / Window Installation & Repair	Page 16
Insulation Installer	Page 16
Machinist	Page 17
Power Mechanics/Small Engine Repair	Page 17
Roofer	Page 18
Sheet Metal Worker	Page 18
Tile Setter	Page 19
Welder	Page 19

Green Technology Trainers

These hands-on trainers prepare students for careers in green construction and energy technology. They are being used across the country in high schools, community colleges, universities, and adult training.

Solar Panel Installer	Page 22
Solar Thermal Technician	Page 22
Weatherization Technician	Page 22
Wind Turbine Technician	Page 22

BUILDING FROM BLUEPRINTS

(CZ036)

This workstation teaches construction and framing techniques, as well as basic blueprint reading. Students construct a 1/12 scale balsa wood model of a corner section of a wood framed building. The model includes window and door framing, joist layout, sub-flooring, and roof truss construction. Students read and interpret blueprints to cut and install lumber components.



TOOL DRAWER

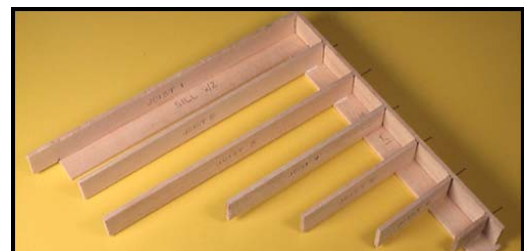
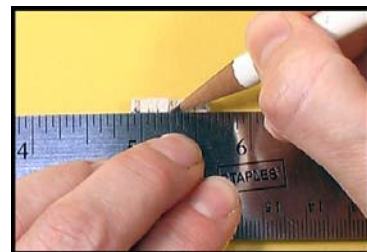
Safety glasses, miter box, razor saw, utility knife, glue, ruler, assembly board, floor patterns, gusset patterns.

EQUIPMENT/CONSUMABLE MATERIALS

Set of blue prints, corner wall, floor, and truss kit.

HANDS-ON ACTIVITIES

- Measure and cut studs and other framing members
- **Mark lumber** for assembly
- Follow blueprints to install lumber for two exterior walls and an interior wall
- Construct window and door frames
- Construct floor assembly including header, sills, joists, and sub-flooring
- Cut angles with miter box and razor saw to construct roof trusses



CONSTRUCTION MEASUREMENT

(CZ026)

Students learn to read standard and metric rulers, tape measures, and practice using other measurement equipment used in the construction industry, including a sight level.



TOOL DRAWER

Safety glasses, string, line block, line level, torpedo level, master ruler, protractor, 16'-5m tape measure, folding ruler, marking gage, bevel square, chalk line, framing square, and aprons.

EQUIPMENT/CONSUMABLE MATERIALS

Sight level, tripod, grade stick, set of measuring boards (A-E), and chalk refill.

HANDS ON ACTIVITIES

- Use standard and metric rulers
- Use tape measure and folding ruler to measure predetermined points and record measurements
- **Use chalk line to snap a straight line between two measured points**
- Use marking gauge to scribe a straight line to be used as a cut line
- Use framing square to identify square boards and to determine roof and/or truss pitch
- Use line and level to show a level line for a brick mason to follow
- Demonstrate use of a torpedo level to plum and level supplied fixtures
- Use sliding T-bevel to transfer unknown angles to be measured
- **Use protractor to measure known and unknown angles**
- Demonstrate setup, use, care, and adjustment of sight level, tripod, and grade stick

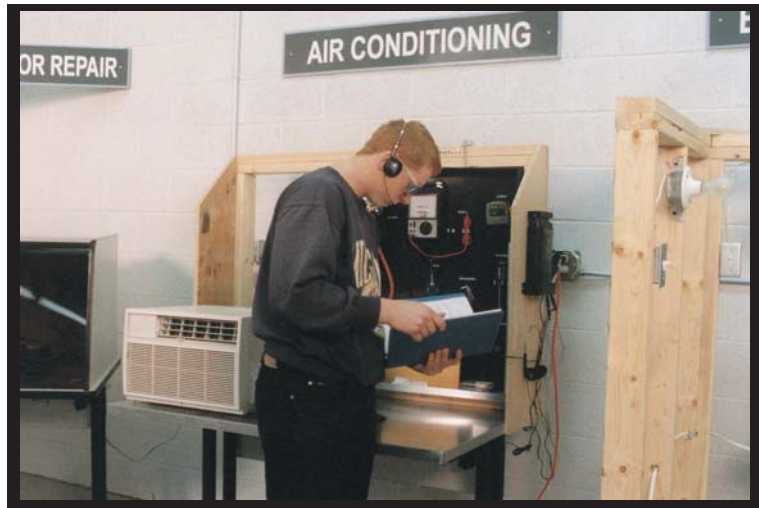


AIR CONDITIONING AND REFRIGERATION

(CZ056)

Students test and service an air conditioning unit, perform electrical, mechanical, and maintenance tasks. They also learn about the installation, maintenance, and operation of residential air conditioning and refrigeration systems.

Principals of air conditioning and refrigeration are explained, including gas expansion and compression, heat transfer, evaporation, condensation, thermostatic control, motors and electrical circuitry. Students calculate cooling requirements and perform hands-on electrical, mechanical, and maintenance tasks in a realistic job simulation.



EQUIPMENT/CONSUMABLE MATERIALS

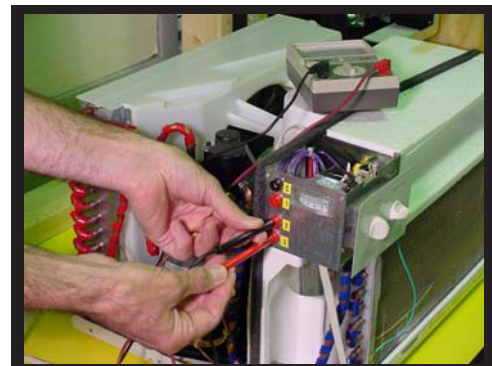
Mounted 5000 BTU window air conditioner, test ports, pierce valves, and aprons.

TOOL CABINET

Safety glasses, inductive pick-up multi meter, manifold gauge, fin comb, parts pan, #2 phillips screwdriver, tape measure.

HANDS ON ACTIVITIES

- ➡ Test electrical systems
- ➡ Disassemble and assemble parts of an air conditioning unit
- ➡ Test system pressures and temperature
- ➡ Fill out work order
- ➡ Calculate the cooling load for a given space

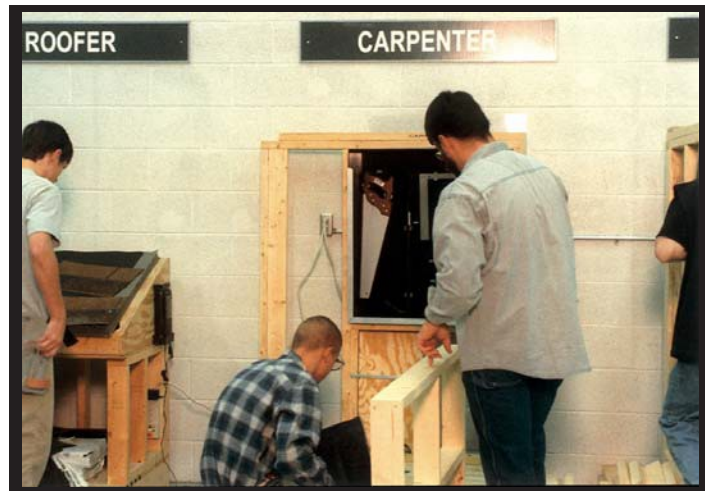


CARPENTER

(CZ014)

Students construct two wall sections, learning to lay out, erect, install, and repair wooden structures and fixtures using hand tools.

Workstation includes instruction in common systems of framing, construction materials, estimating, and blueprint reading.



EQUIPMENT/CONSUMABLE MATERIALS

Set of saw horses, aprons, carpenters nail apron, (2) 5# box double head nails, (3) 5# box 16D sinkers, lumber pack, carpenters pencil.

TOOL CABINET

Safety glasses, hand saw, 16 oz. Hammer, crow bar, 2' level, framing square, tape measure, carpenter pencil.

HANDS-ON ACTIVITIES

- Read and interpret a blueprint
- Measure and cut the studs and fire stops in a standard construction wall
- Lay out the parts of the construction wall and nail them together
- Tilt up the construction wall into place and nail it to the floor and adjacent wall
- Check the vertical ("plumb") of the wall
- Disassemble the wall and prepare the work area for the next user. A second wall is built to include window framing



CEMENT MASON

(CZ012)

Students learn the components and chemistry of concrete, and the four phases of concrete work. They explore a variety of job tasks of a cement mason by mixing wet concrete, placing it in a metal form, and finishing the surface to create a stepping stone. They then assemble a wood form for a footing and column, and create and set steel reinforcement.



TOOL CABINET

Safety glasses, hack saw, Phillips screwdriver, hammer, lineman's pliers, utility knife, wood screed, wood float, metal trowel, metal edger, metal jointer, tape measure, markers, cold chisel.

EQUIPMENT/CONSUMABLE MATERIALS

31/2" bench vise, 2 buckets, mortar pan, shovel, mortar hoe; wood form sets, plywood for base boards with cleats, sieves, bending jig, bending bar, sand, cement, gravel, stone, reinforcement rod, chair wire, tie wire, pre-blended concrete mix, oil, utility knife blades, hack saw blades, building felt.

DRAWERS

Aprons, gloves, face masks, plastic rag container, oiled rags, 16 oz squeeze bottle, chair wire jig, plastic slump test containers, metal forming pans, aluminum forms, measuring containers, scrub brush.

HANDS ON ACTIVITIES

- Prepare concrete components
- Pour concrete into metal and wood forms
- Use professional tools to finish wet concrete
- Prepare forms; create reinforcement chairs; cut and bend steel rods
- Perform a slump test



ELECTRICIAN

(CZ008)

This workstation introduces students to installation, maintenance, and repair of electrical systems. The student learns about the power lines that transmit electricity from its source of generation to its place of consumption. They explore a variety of job tasks in wiring an actual house circuit. The workstation is a section of a stud wall. The student is exposed to electrical terms and the procedures necessary to complete a basic house circuit. This workstation provides an understanding of job environment and an assessment of interest and ability as an electrician.



TOOL CABINET

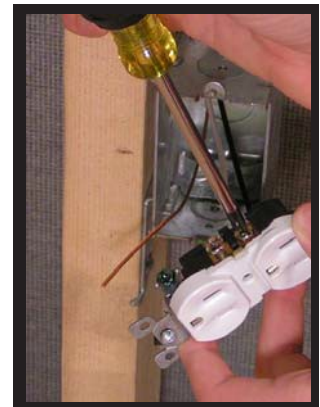
Safety glasses, tool pouch w/belt, crank handle screwdriver, 3/16" insulated screwdriver, #2 phillips insulated screwdriver, wire stripper, cable ripper, needle nose pliers, 12 volt tester, 3/8" electric drill motor, 1" spade bit, awl, tape measure, and hammer.

EQUIPMENT/CONSUMABLE MATERIALS

Aprons, storage jars, junction boxes, standard boxes, 15 amp breaker, keyless light fixtures, light switches, outlets, switch covers, outlet covers, junction covers, 12 volt light bulbs, yellow wire nuts, 250' roll 14-2 wire, 1 1/4" screws.

HANDS-ON ACTIVITIES

- ➡ Install wire as instructed
- ➡ Thread through studs
- ➡ Split and strip electrical wire
- ➡ Make electrical connections
- ➡ Install light switch and fixture
- ➡ Inspect circuitry



PLUMBER

(CZ002)

Students assemble, install, and repair plumbing fixtures and pipe in a section of stud wall, then determine labor and material costs. Students will learn to assemble, install, and repair pipes, fittings, and fixtures of heating, water, and drainage systems, according to specifications and plumbing codes. Students are exposed to typical plumbing using plastic, copper, and galvanized pipe.



EQUIPMENT / CONSUMABLE MATERIALS

Mounted chain vise, hose bib, drip pan, 4" copper nipple, PVC 4" nipple, 1/2" galvanized flange, aprons, hose bib cutaway, 2 qt. metal pail, drip pan, 90 degree copper and galvanized elbows, 8" PVC vent pipe, PVC p-trap, 1 1/2" PVC waste tee, 1 1/2" PVC couplers, copper couplers, galvanized-copper adapters, galvanized nipples, 4" copper nipples, PVC 4" nipple, roll paper towels, 1/2" copper couplers, rubber washers, roll emery cloth, pipe dope, roll non lead solder, 1/2"x24" copper pipe and galvanized pipe, 1 1/2"x24" PVC pipe, and solder flux.

TOOL CABINET

Safety glasses, 8" adjustable wrench, tape measure, pipe reamer, 10" pipe wrench, flux brush, 1/2" die & head, propane torch kit, leather gloves, pipe cutter, tubing cutter, pipe threader ratchet, #2 phillips screw driver, bottle of cutting oil, and paper towel holder.

HANDS-ON ACTIVITIES

- ➡ Disassemble a water faucet
- ➡ Replace a seat gasket
- ➡ Reassemble a faucet
- ➡ Clamp galvanized pipe in vise
- ➡ Cut thread and ream pipe
- ➡ Cut copper tubing
- ➡ Clean tubing for soldering application
- ➡ Light and adjust torch
- ➡ Apply solder paste and solder copper fitting to pipe



RESIDENTIAL PLUMBING

(CZ046)

Students learn about residential plumbing components and complete actual plumbing hookups, including supply lines, shower head and gas line.



ACTIVITY/WORK PANEL

2 handle kitchen faucet, sink basket/strainers, 2 handle shower valve kit, hose bib, tub drain kit, 1/2 black pipe floor flange, bathroom faucet.

TOOL DRAWER

Safety glasses, 8" wrench, 3/16 screwdriver, #2 phillips screwdriver, pipe wrench, channel lock, tubing cutter, level, tape measure, and teflon tape.

STORAGE CONTAINER/CONSUMABLES

Double sink P trap, 24" flex supply lines, chrome shut offs, PVC 1/4 turn x 1/2" shut offs, PVC 1/2" standard shut off, 1/2 black pipe 4" nipple, 1/2 black pipe street 90 degree, 1/2 shut off (lever style), 1/2 flex gas line, waste tees, PVC 90*, clean out adpt 1 1/2" PVC, trap adpt PVC 1 1/2", clean out cap, tub spout, 3 piece shower assembly, 1/2" tee fittings-CPVC, 1/2" 90* elbow-CPVC, CPVC valve adapters, 1/2" NPTx 12" flare fittings, 10"x1/2" CPVC pipe, and teflon tape.

HANDS ON ACTIVITIES

- ➡ Install tub drain stopper and drain cover
- ➡ Install drain and traps
- ➡ Complete supply line hookups, pipes, and hoses
- ➡ Install shower head and spout
- ➡ Complete gas line hookup for stove/oven or gas dryer
- ➡ Disassemble and reassemble hot and cold valves for standard bathroom faucet



RESIDENTIAL WIRING

(CZ086)

Students learn about basic electricity; how electricity is generated and transferred to homes; and how it travels around the home to be used. They have a hands-on work experience as a residential electrician, routing wire and hooking up electrical fixtures.



ACTIVITY/WORK PANEL

12 volt power supply, 3 prong pig tail plug, 2-button doorbell kit, power supply enclosure, octagon boxes, and electrical boxes.

TOOL DRAWER

Safety glasses, #2 phillips screwdriver, 3/16 screwdriver, 1/8 screwdriver, 16' tape measure, wire stripper, 6" needle nose plier, 6" linesman plier, 12 volt test light, cable ripper, and aprons.

STORAGE CONTAINER/CONSUMABLES

15 amp breakers, bulb socket w/plug end, wire nuts, ground screws, single pole switches, outlets, switch cover plates, outlet covers, plastic light fixtures, octagon box covers, doorbell wire, romex 14-2, and 12 volt light bulbs.

HANDS-ON ACTIVITIES

- ➡ Identify types of wires
- ➡ Identify types of electrical boxes
- ➡ Run wire from service panel to electrical components
- ➡ Connect wires to complete circuit
- ➡ Wire a 3-way circuit
- ➡ Wire a doorbell circuit



ARCHITECTURAL STRUCTURES

(CZ004)

Students learn and practice traditional drawing techniques, and build and test basic architectural shapes. They learn and apply the concepts of load, span, stress, and rigid geometry, and investigate the strength of different materials. Units emphasize application of the scientific method, use of tables and formulas, and the importance of making accurate records and measurements.

HANDS ON ACTIVITIES

- Learn basic structural concepts of load, span, stress, tension, and compression stress
- Test different materials and shapes
- Complete scaled drawings of arched doorway and roof truss
- Build, test, and compare basic structural shapes: lintels, cantilever, compression truss, tension truss, suspension span
- Evaluate tests



BRICKLAYER

(CZ012)

Students learn to mix their own mortar and learn to lay a course of brick. Students explore a variety of job tasks in laying a course of brick. Workstation includes instruction in laying, spacing, determining vertical or horizontal alignment, cutting, shaping, and notching to construct and repair. One student acts as the helper while the other lays a course of brick. The roles are then reversed. When finished they disassemble and clean up the workstation and tools.

HANDS ON ACTIVITIES

- Mix mortar (non-curing mix so bricks may be cleaned and reused)
- Apply moisture to bricks
- Spread mortar
- Butter bricks
- Lay brick to a level line
- Plumb to a line
- Finish joint with joint trowel



DRYWALL INSTALLER

(CZ011)

Students fit and apply wall board to a wall section, apply tape and compound, then sand to a smooth surface. Workstation includes instruction in lathing, surface preparation, smoothing, and finishing. Students explore a variety of job activities in executing a series of tasks performed by a person in this trade.

HANDS-ON ACTIVITIES

- Measure and cut out an opening for an electrical outlet
- **Fasten wallboard to wall studs**
- Finish a joint with compound and tape
- Nail up corner beading for an outside corner
- Finish the outside corner
- **Remove wallboard from the wall**



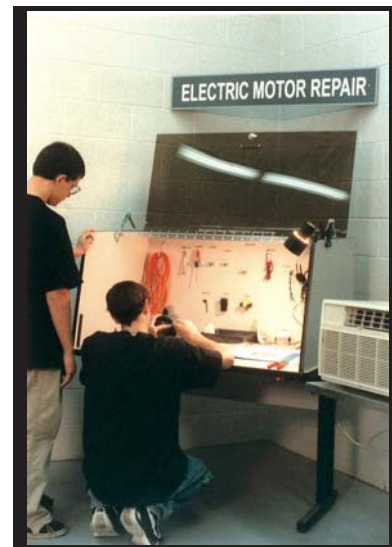
ELECTRIC MOTOR REPAIR

(CZ031)

This workstation prepares students to assemble, install, test, maintain, and repair electric motors. Students disassemble motor, test circuits, and replace parts in a hands-on introduction to principals of operation of electric motors. An electric motor is provided to teach electric motor principles of operation. Students perform the following tasks in repairing an electric motor: motor disassembly, identification of parts, changing the direction of rotation, re-assembly, and changing the capacitor.

HANDS-ON ACTIVITIES

- Remove motor from its mounting and disassemble it using hand tools
- **Test the internal circuits and switch**
- Reassemble and test the motor, replace the power cord and receptacle plug on the motor
- Reverse the motor's direction of rotation
- Complete a wiring diagram of the motor
- Identify motor characteristics from the motor label
- Complete worksheet showing parts used, costs, labor time, and charges for repair.



GLAZIER/WINDOW INSTALLATION & REPAIR

(CZ053)

This workstation provides students with hands-on experience in proper installation of a window unit, glass cutting, and replacement of plexiglass windows. Students will be introduced to the construction process and the role of the glazier in that process.

HANDS ON ACTIVITIES

- Prepare and cut glass
- Nibble glass edges
- Disassemble the window and sash
- Remove and replace plexiglass
- Clean and install sash
- Complete a work order



INSULATION INSTALLER

(CZ055)

Students learn to install batt, blanket, board, loose fill, and other forms of insulation in residential, commercial, and industrial buildings. Hands-on experience includes calculating ratings for installation, measuring, cutting, and stapling up fiberglass insulation.

HANDS-ON ACTIVITIES

- Measure wall space for installing insulation.
- Measure fiberglass blanket insulation, cut it to size, and set in place in wall
- Cut out an opening for an electrical outlet box in the insulation
- Staple up the insulation
- Figure material cost for an insulation job on a worksheet



MACHINIST

(CZ018)

Students use tools and jigs to machine raw materials into finished products. They learn to shape metal parts using a drill press, bending jig and drilling jig that will ensure accuracy and teach the techniques of machine operations. Instructions include making computations related to dimensions and layout of parts. Using bench tools and equipment, students make a padlock key ring from aluminum. Special drilling jig and bending fixture is utilized. Apprenticeship programs and related training are emphasized.

HANDS ON ACTIVITIES

- ➡ Use machine tools to convert a block, rod, and nuts into a padlock ring
- ➡ Clean and chalk the file
- ➡ File and bevel the block
- ➡ Use drilling jig, hand drill, and drill press
- ➡ Cut threads and bend rod
- ➡ Build a clamping fixture to support and transfer a block of metal casing material



POWER MECHANICS/SMALL ENGINE REPAIR

(CZ025)

Students study and inspect a small gasoline engine, and then disassemble service and operate a working engine. They will be introduced to the general theory of internal combustion engine operation, learn the fundamentals of power mechanics, become familiar with important engine parts and gain hands-on experience with small engines.

HANDS ON ACTIVITIES

Disassembly and inspection of:

- ➡ engine
- ➡ governor
- ➡ cooling fins
- ➡ spark plug
- ➡ cylinder head and gasket, crankshaft piston
- ➡ valve & springs
- ➡ cam gear
- ➡ cylinder walls
- ➡ breather assembly



ROOFER

(CZ057)

Students learn about various roof types, equipment and materials, and then shingle a section of roof according to building codes. They also explore a variety of tasks in roofing materials (other than metal) to make them waterproof including composition shingles or sheets, wood shingles and asphalt and gravel.

HANDS-ON ACTIVITIES

- Cut and install drip edge
- Measure and cut shingles
- Install row of starter shingles
- Install rake edges
- Shingle roof
- Tear down roof



SHEET METAL WORKER

(CZ066)

Students layout and fabricate an item made of sheet metal. Using professional tools, they practice laying out, cutting to size, bending and riveting of sheet metal in fabrication.

HANDS ON ACTIVITIES

- Use template to mark metal
- Use awl to mark metal
- Use template to make punch marks
- Scribe lines in metal
- Cut metal to shape and file
- Punch holes in plate and strip
- Bend metal using bar folder
- Install and set rivet



TILE SETTER

(CZ021)

Students learn how to apply tile to walls, floors, and ceilings. Workstation includes instruction in spreading mastic and adhesive base and in cutting, arranging, and setting tile. Students explore a variety of job tasks in setting a small section of tile on a piece of masonite by using the same tools and materials used by a tile-setter. The student becomes acquainted with various methods of tile application and the skills required.

HANDS ON ACTIVITIES

- Create and lay out a pattern with colored floor tile
- Record a design and figure tile costs on a worksheet
- Spread mastic on a wall surface
- Set wall tiles in mastic
- Mix and apply grout
- Clean and finish surface



WELDER

(CZ033)

Students employ welding processes to braze and weld metal parts according to specifications. Activities include pattern selection, cutting, bending, assembly, arrangement of holding devices, brazing, welding and torch cutting of metal. Each student will take home a project completed at this workstation.

HANDS ON ACTIVITIES

- Design welding project
- Cut required metal parts
- Bend and form parts on jigs
- Set up holding assembly for brazing parts
- Light torch and adjust flame
- Clean and flux parts
- Braze parts into finished project
- Cut metal with torch in specified pattern
- Torch shutdown and tank shutoff



Stand-up Workstation with see-through locking cabinet

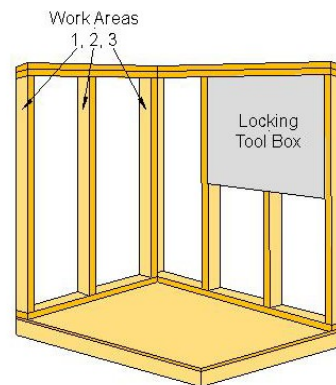
Stand-up workstations are designed to represent a home or other structure in a rough construction phase.

All stand-up workstations are built from construction grade, kiln dried dimensional lumber and plywood. They are designed to represent a home or other structure in a rough construction phase. A large drawer in the base provides room for supply storage. A see-through locking tool cabinet, built into one wall of the workstation, has a clear polycarbonate door, which is removable for easy access to tools.

STANDARD 4' x 3' STAND-UP WORKSTATION



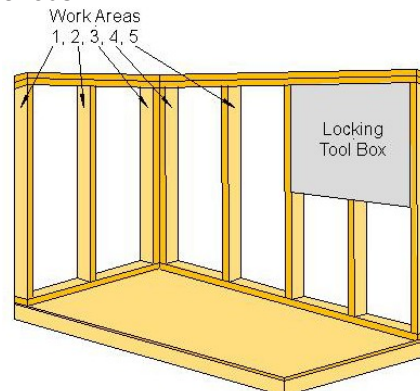
Our standard stand-up workstation is 67"H x 49"L x 36"W. The platform of the workstation is 4' x 3' and is built to accommodate three individual class periods, each with a separate work area.



OPTIONAL 6' x 3' ENLARGED PLATFORM



Our optional stand-up workstation is 67"H x 73"L x 36" W. The platform of the workstation is 6' x 3' providing a larger work area and is built to accommodate five individual class periods.



- Enlarged platform is an available option for the standard 3 class period stand-up workstation.
- Some assembly required.

Stand-up Workstation with see-through locking cabinet

The desk 44"H x 48"L x 30"W (56" H w/panel), is made of Formica covered, industrial grade particle board. All edges are covered with "T"-molding and/or banding. The desk is mounted on powder coated cantilever steel legs with adjustable leveling feet. The locking tool drawer is made of thermal formed ABS plastic.



Residential Plumbing Workstation



Residential Wiring Workstation

Residential Wiring and Residential Plumbing come with a separate removable activity panel. Optional additional activity panels are available.



Removable Activity Panel



Removable Activity Panel

Construction Measurement and Building From Blueprints come with a removable activity panel and can accommodate unlimited class periods with no additional activity panels required.



Construction Measurement



Building From Blueprints

Green Collar Zone Workstation Styles

All workstations are built from construction grade, kiln dried dimensional lumber and plywood. They are designed to accommodate three individual class periods. A see-through locking tool cabinet, built into one wall of the workstation, has a clear polycarbonate door, which is removable for easy access to tools.



Solar Panel Installer

Solar Panel Installer workstation is 75"L x 51"W x 80"H. The platform of the workstation is 72" x 36" and is built to accommodate three individual class periods, each with a separate work area.



Wind Turbine Technician

Wind Turbine Technician workstation is 110"L x 36"W x 67"H. The platform of the workstation is 72" x 36" and is built to accommodate three individual class periods, each with a separate work area.



Weatherization Technician

Weatherization Technician workstation is 104"L x 80"W x 98"H. The workstation is built to accommodate three individual class periods, each with a separate work area.



Solar Thermal Technician

Solar Thermal Technician workstation is 75"L x 51"W x 84"H and is built to accommodate three individual class periods, each with a separate work area.

Green Collar Zone Workstation Styles

Questech's hands-on energy trainers prepare students for careers in the growing green economy and are being used across the country in high schools, community colleges, universities, and adult training.



Questech, Inc. has been one of our leading partners in the development of real-world application scenarios for students. The equipment that we provide our students is exactly what they are going to see and face in the workplace, so they get a chance to demonstrate those skills and apply the technologies while they're in the laboratory setting. Questech has been a national leader in curriculum development for many years.

Bryan Albrecht
President, Gateway Technical College
Kenosha, WI

We have been using the Construction Zone trainers for over ten years. They've been great for our CTE classes, giving the students hands-on work experiences. We recently added Green Collar energy trainers to expand our program. The Questech team has always been supportive and helpful.

Bill Ferrara
Assistant Principal/CTE
Monroe High School
Monroe, MI

Green Collar Zone Trainers:

- Come complete with career training package, workstation, professional tools of the trade, equipment, and consumable supplies
- Are turn-key and self-contained
- Have 20 hour, STEM based curriculum
- Provide secure locking storage for tools and equipment
- Are equipped for three individual class periods
- Provide step-by-step instructions for hands-on activities
- Stress safe work practices
- Provide career information
- Can be combined with Construction Zone trainers



Questech, Inc.(www.questechzone.com) is committed to providing quality hands-on products to Career and Technical educators that challenge students and provide skills to prepare them for the careers of today and tomorrow. Questech products are **made in the USA**, manufactured at our facility in Gilberts, Illinois.



Construction Zone (www.constructionzones.com) product line prepares students and adults for careers in the construction trades. Hands-on workstations provide a safe work experience, using professional tools of each trade. Math, science, reading, and writing skills are integrated into the curriculum to give students real world examples of their use in daily life and on the job.



Green Collar Zone (www.greencollarzone.com) prepares students and adults for jobs in the emerging energy sector with workstations that first explain the history and technology of sustainable energy, then provide hands-on activities to prepare them for careers in the growing green economy. Curriculum is STEM (Science, Technology, Engineering, and Mathematics) based. Included are wind trainers, solar trainers, weatherization trainers, and solar thermal trainers.

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