Celebrating 40 Years

Founded in 1979, Allegheny Educational Systems provides innovative, technology-based educational systems and professional services to over 2,000 schools, colleges and universities throughout Pennsylvania, New York and New Jersey.

Through our network of manufacturing partners, we provide the most up-to-date curriculum resources, software, equipment, furniture, professional development and customer support available today, for a wide range of STEM and Career and Technical Education areas.
## WHAT IS A MAKERSPACE?

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What is a MakerSpace / Fab Lab?

MakerSpaces have spread from inner-city Boston to rural India, from South Africa to the North of Norway. Activities in MakerSpaces range from technological empowerment to peer-to-peer project-based technical training to local problem-solving to small-scale high-tech business incubation to grass-roots research. Projects being developed and produced in MakerSpaces include solar and wind-powered turbines, thin-client computers and wireless data networks, analytical instrumentation for agriculture and healthcare, custom housing, and rapid-prototyping of with the use of rapid-prototyping machines.

MakerSpaces share core capabilities, so that people and projects can be shared across them. This currently includes:

- A computer-controlled lasercutter, for press-fit assembly of 3D structures from 2D parts
- A larger (4’x8’) numerically-controlled milling machine, for making furniture- (and house-) sized parts
- A signcutter, to produce printing masks, flexible circuits, and antennas
- A precision (micron resolution) milling machine to make three-dimensional molds and surface-mount circuit boards
- Programming tools for low-cost high-speed embedded processors

These work with components and materials optimized for use in the field, and are controlled with custom software for integrated design, manufacturing, and project management.

http://fab.cba.mit.edu

What can a Maker Space / Fab Lab do?

Here at Allegheny Educational Systems, we help organizations create educational spaces that are functional incubators for ideas, creativity, and learning. These spaces, sometimes referred to as Fab (Fabrication) Labs, Makerspaces, or Techshops, are an excellent investment that will prepare students for future STEM careers while becoming a source of revenue for schools.

PROFIT OPPORTUNITY! Look for George and our new Profit Opportunity items throughout the following pages, then find out more information and gain inspiration for fundraising projects in our new Profit Center section on Pages 28-31.
MAKER SPACE LAYOUT EXAMPLE

Layout Includes:

**FABRICATION**
- Roland Vinyl Cutter Plotter
- uPrint 3D Printer Work Table (x2)
- Fortus 450 mc 3D Printer
- Connex 500 3D Printer Air Assist Pump (x2)
- Helix Laser Engraver Fume Extractor (x2)
- Epilog Laser Engraver
- FANUC Cert Delta Robot Artec 3D Scanner

**MANUFACTURING**
- Sink Cleaning Station Wall Bench with Storage (x2)
- DW 780 12" Sliding Compound Miter Saw DW 788 Scroll Saw (x2)
- DWS 780 12" Sliding Compound Miter Saw
- Saw Stop 10" Table Saw with 52" Ext. Table & Mobile Base
- Horizontal/Vertical Band Saw
- Work Table (x2) CNC Mill CNC 1000 Cert Cart
- Mobile Computer Cabinet Grinder with Stand
- Mobile Computer Cabinet 4’ x 4’ CNC Plasma Cutter Cold Saw with Stand

**STORAGE**
- Storage Cabinets Open Shelves Overhead Wall Mounted Storage
Ultimaker

Fueling innovation-driven education

Ultimaker's products and solutions encourage students to address real-world problems, regardless of the grade level. It’s Ultimaker's goal to set the engineers, artists and designers of the future on the right path, and to support their learning along the way. Ultimaker 3D printing solutions are the perfect accompaniment to developing key skills in science, technology, engineering, art and math (STEAM).

Design freedom with industrial-grade materials

Ultimaker’s range of materials are formulated to achieve superior results. Optimized Cura profiles offer the best print settings per material and recognize which print core and material you’re using. The open filament system lets you experiment with new materials and test the latest market developments.

The world's most advanced 3D printing software

Cura is a free, open-source slicing software solution, designed to produce reliable, high-quality print results. Ultimaker’s preconfigured Cura profiles ensure a seamless printing experience, with auto-adjust functionality per material and print core.

<table>
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<tr>
<th>Printer &amp; printing properties</th>
<th>Ultimaker S5</th>
<th>Ultimaker 3 and Ultimaker 3 Extended</th>
<th>Ultimaker 2+ and Ultimaker 2 Extended+</th>
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<tr>
<td>Technology Print head</td>
<td>Fused Deposition Modeling Dual extrusion print head with an auto-nozzle lifting system and swappable print cores</td>
<td>Fused Deposition Modeling Dual extrusion print head with a unique auto-nozzle lifting system and swappable print cores</td>
<td>Fused Deposition Modeling Swappable nozzle</td>
</tr>
<tr>
<td>Build volume</td>
<td>XYZ: 330 x 240 x 300 mm (left or right nozzle, or dual extrusion)</td>
<td>Ultimaker 3 215 x 215 x 200 mm (left or right nozzle) 197 x 215 x 200 mm (dual extrusion)</td>
<td>Ultimaker 2+ 223 x 223 x 205 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ultimaker 3 Extended 215 x 215 x 300 mm (left or right nozzle) 197 x 215 x 300 mm (dual extrusion)</td>
<td>Ultimaker 2 Extended+ 223 x 223 x 305 mm</td>
</tr>
<tr>
<td>Layer Resolution</td>
<td>0.25 mm nozzle: 150 - 60 micron 0.4 mm nozzle: 200 - 20 micron 0.8 mm nozzle: 600 - 20 micron</td>
<td>0.4 mm nozzle: 20 - 200 micron</td>
<td>0.25 mm nozzle: 150 - 60 micron 0.40 mm nozzle: 200 - 20 micron 0.60 mm nozzle: 400 - 20 micron 0.80 mm nozzle: 600 - 20 micron</td>
</tr>
<tr>
<td>Supported materials</td>
<td>PLA, Tough PLA, Nylon, ABS, CPE, CPE+, PC, TPU 95A, PP, PVA, Breakaway</td>
<td>Nylon, PLA, ABS, CPE, PVA</td>
<td>PLA, ABS, CPE, CPE+, PC, Nylon, TPU 95A</td>
</tr>
<tr>
<td>Software</td>
<td>Ultimaker Cura software</td>
<td></td>
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NEW!

DESKTOP 3D PRINTERS

MakerBot Method
The First Performance 3D Printer

Bridging the gap between Industrial and Desktop 3D printing.

Developed from the ground up by improving upon several patented industrial technologies from Stratasys – technologies that empowered the DNA of an industrial 3D printer from the onset. Combined with MakerBot’s industry-leading accessibility and smart workflow features, Method screams past desktop 3D printers while ensuring dimensional accuracy and industrial 3D printing reliability.

Key Features

Circulating Heated Chamber
Controls the heat of every layer as it’s printed to provide dimensional accuracy, improved layer adhesion and greater part strength.

Dual Performance Extruders
Maximize material flow rate at high speeds while providing consistent and reliable extrusion across every layer.

Precision Dissolving PVA Supports
Enables fast and easy support removal without compromising part design or dimensional accuracy.

Ultra-Rigid Metal Frame Construction
A structurally-optimized metal frame runs the full length of the body to offset flexing - meaning more consistent prints with better part accuracy and fewer failures.

Smart Sensors & Connectivity
A network of 21 intelligent sensors embedded throughout the printer gives you full control while making material and print management easy and accessible.

Dry-Sealed Material Bays
Forms a near-perfect seal to keep material free of damaging humidity. Built-in sensors provide that your material is stored in its optimal environment.

Industrial Reliability & Precision
• Match design dimensions
• Dimensional accuracy of ± 0.2mm

Fastest CAD to Part
• Up to 2x faster than desktop 3D printers
• Seamless printing workflow

Maximum Innovation & Minimal Investment
• Accelerate your design process and reduce risk while reclaiming time and money
The F123 Series

All-in-one power.
All-new possibilities.

Now there’s a more capable, more affordable professional 3D printing solution for education - from the leader in 3D printing. The Stratasys F123 series combines powerful FDM technology with design-to-print GrabCAD software for the most versatile and intelligent solution available. Produce highly accurate, reliable prototypes, student projects, production parts and more. Do it all without the need for dedicated expert staffing. And share it across classrooms, campuses and a variety of your academic programs.

F123 Series features:

• Easy to operate and maintain for all experience levels.
• The three printers in the platform, the Stratasys F170™ F270™ and F370™, support nearly any capability or budget your curriculum requires.
• Auto-calibration ensures you spend less time troubleshooting and more time 3D printing.
• Fast and easy material swaps streamline the transition time between projects, so nothing slows you down.
• Smart software - GrabCAD Print™ software simplifies the entire 3D printing process with an intuitive CAD-like application anyone can use.
• Only the Stratasys F123 series gives the option of up to five different materials, along with easy-to-remove soluble support. (The Stratasys F170 and F270 models support PLA, ABS-M30, ASA and TPU 92A* materials; the Stratasys F370 supports PLA, ABS-M30, ASA, PC-ABS and TPU 92A* materials. PLA uses breakaway support only.)
• The all-new fast-draft mode prints twice as fast as standard build mode while consuming just a third of the material on average.

TPU 92A elastomeric material available for F123 Series!

*TPU 92A is standard on F370, and as an optional upgrade on F170 and F270.
Fortus 3D Production Systems produce accurate, durable prototypes and production-grade parts using high-performance thermoplastics. Each of our digital manufacturing solutions offers:

**Sophisticated software and technology** • **Production-grade materials**

**Large build capacity** • **Fast, accurate and repeatable parts**

Only Fortus FDM (Fused Deposition Modeling) Technology combines tough, production-grade thermoplastic materials with state-of-the-art hardware and software. Compared to other additive manufacturing systems, Fortus offers unprecedented versatility and capabilities.

Fortus 3D Production Systems use powerful Insight Software to turn CAD files into accurate, stable and durable prototypes, workholding tools or end-use parts. This advanced software automatically generates support structures and build paths. With Fortus digital manufacturing, you can create parts that are up to 300% stronger than those made with other 3D printers, even when using the same materials.

<table>
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<tr>
<th>Product Specifications</th>
<th>Fortus 380mc</th>
<th>Fortus 450mc</th>
<th>Fortus 900mc</th>
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<td><strong>Build Envelope</strong></td>
<td>14 x 12 x 12 in (355 x 305 x 305 mm)</td>
<td>16 x 14 x 16 in (406 x 355 x 406 mm)</td>
<td>36 x 24 x 36 in (914 x 610 x 914 mm) Platen supports two build zones for either a small or large build sheet</td>
</tr>
<tr>
<td><strong>System Size and Weight</strong></td>
<td>50 x 35.5 x 76.5 in (1270 x 901.7 x 1943.1 mm) 1,325 lbs (591 kg)</td>
<td>50 x 35.5 x 76.5 in (1270 x 901.7 x 1943.1 mm) 1,325 lbs (591 kg)</td>
<td>109.1 x 66.3 x 79.8 in (2772 x 1683 x 2027 mm) 6,325 lbs. (2,869 kg)</td>
</tr>
<tr>
<td><strong>Achievable Accuracy</strong></td>
<td>Parts produced within an accuracy of: ± .005 in. (± .127 mm) or ± .005 in/in. (± .005 mm/mm), whichever is greater.*</td>
<td>Parts produced within an accuracy of: ± .005 in. (± .127 mm) or ± .0015 in/in. (± .0015 mm/mm), whichever is greater.*</td>
<td>Parts produced within an accuracy of: ± .005 in (± .127 mm) or ± .005 in/in/ (± .005 mm/mm), whichever is greater.*</td>
</tr>
<tr>
<td><strong>Software</strong></td>
<td>All Fortus systems include Insight™ and Control Center™ job processing and management software. Compatible with GrabCAD Print for use with job reports, scheduling and remote monitoring.</td>
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* Accuracy is geometry dependent. Achievable accuracy specification derived from statistical data at 95% dimensional yield.
HIGH PRECISION 3D PRINTERS

Objet Connex3
Multi-Material Color 3D Printers

With the ability to 3D print the full range of Digital Materials including color, the Objet Connex3 3D Production Systems create precise production parts with unprecedented versatility.

Choose from a wide range of material properties, from rubber to rigid, transparent to opaque, neutral to vibrant, and standard to bio-compatible.

3D print custom jigs, assembly fixtures and gauges, and tooling with ultra-fine accuracy and smooth surfaces quickly and easily - no assembly required. Connex3 delivers triple-jetting efficiency with the power to serve diverse needs from one system.

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<th>Objet350 Connex3</th>
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<tr>
<td>Max. Build Size</td>
<td>10 x 9.9 x 7.9 in (255 x 252 x 200 mm)</td>
<td>13.4 x 13.4 x 7.9 in (342 x 342 x 200 mm)</td>
<td>19.3 x 15.4 x 7.9 in (490 x 390 x 200 mm)</td>
</tr>
<tr>
<td>System Size and Weight</td>
<td>34.2 x 47.2 x 29 in (870 x 1200 x 735 mm)</td>
<td>55.1 x 49.6 x 43.4 in (1400 x 1260 x 1100 mm)</td>
<td>55.1 x 49.6 x 43.4 in (1400 x 1260 x 1100 mm)</td>
</tr>
<tr>
<td>Layer Thickness</td>
<td>Horizontal build layers as fine as 16 microns (.0006 in.)</td>
<td>Up to 200 microns for full model size (for rigid materials only, depending on geometry, build parameters and model orientation)</td>
<td></td>
</tr>
<tr>
<td>Model Material Options</td>
<td>• Vibrant blended colors in Rigid Opaque • Translucent colored tints • Rubber-like materials in a variety of Shore A values • Digital ABS Plus™ for durability, including blends with rubber • Simulated polypropylene materials with improved heat resistance</td>
<td></td>
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<tr>
<td>Software</td>
<td>Objet Studio</td>
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Unleash your imagination with never-before-seen multi-material capabilities

The Stratasys J750 and J735 3D Printers deliver unrivaled aesthetic performance including true, full-color capability with texture mapping and color gradients.

Create prototypes that look, feel and operate like finished products, without the need for painting or assembly, thanks to the Stratasys J750/J735’s wide range of material properties.

With an astounding 500,000+ color combinations to choose from and multi-material capabilities, the J750/J735 allows you to bring even your most imaginative ideas to life.

Product Specifications

| Model Materials | Vero™ family of opaque materials including neutral shades and vibrant colors like VeroMagentaV and VeroYellowV  
| Digital Model Materials | Unlimited number of composite materials including:  
  - Over 500,000 colors  
  - Digital ABS Plus and Digital ABS2 Plus™ in ivory and green  
  - Rubber-like materials in a variety of Shore A values  
  - Translucent color tints  
  - User-developed digital materials with GrabCAD Voxel Print  
| Build Size | Stratasys J735: 13.8 x 13.8 x 7.9 in. (350 x 350 x 200 mm)  
  Stratasys J750: 19.3 x 15.35 x 7.9 in. (490 x 390 x 200 mm)  
| Layer Thickness | Horizontal build layers down to 14 microns (0.00055 in.)  
| Achievable Accuracy | Up to 200 microns for full model size  
  (for rigid materials only, depending on geometry, build parameters and model orientation)  
| Build Modes | High Speed: up to 3 base resins, 27-micron (0.001 in.) resolution  
  High Quality: up to 6 base resins, 14-micron (0.00055 in.) resolution  
  High Mix: up to 6 base resins, 27-micron (0.001 in.) resolution  
| System Size and Weight | 55.1 x 49.6 x 43.4 in. (1400 x 1260 x 1100 mm); 948 lbs. (430 kg)  
  Material Cabinet: 26.4 x 46.1 x 25.2 in. (670 x 1,170 x 640 mm); 335 lbs. (152 kg)  
| Software | GrabCAD Print, including the optional add-on GrabCAD Voxel Print™  
www.alleghenyedusys.com • 800-232-7600
Formlabs Form 2
Engineered for precision. Designed for reliability.

Create rugged engineering prototypes, intricate artwork or complex, watertight structures. The Form 2 is your team’s tool to innovate.

Key Features

Incredible Resolution and Surface Finish
Using industrial-grade stereolithography (SLA) technology, the Form 2's powerful optical engine delivers laser-sharp prints with spectacular detail.

Versatile, Functional Prototyping
Formlab's ever-growing library of resins enables functional prototyping for a variety of applications, continually expanding the Form 2's capabilities across industries.

Designed for Reliability and Accessibility
The Form 2's entire print process is designed to be intuitive—from free PreForm software that helps set files up for successful printing to hardware that's easy for anyone to use.

Connected Printing
The Form 2 comes with wireless connectivity and a touchscreen display. Upload over WiFi, manage consumables and track your print history through our cloud-based Dashboard tool and receive notifications when your prints complete.

Streamlined Post-Processing
3D printing doesn’t end once a print is complete: add Form Wash and Form Cure to streamline and automate post-processing to consistently produce high-quality parts, with less time and effort.

Standard Resins
- Carefully-engineered resins capture the finest details.
- Create accurate and robust parts, ideal for rapid prototyping and product development.
- Clear, White, Grey and Black available.

Engineering Resins
- Designed to simulate a wide range of end-use materials from rubber to rigid.
- Tough, Flexible, High Temp and Durable Resins available.

Jewelry Resins
- Burns out cleanly with no ash or residue.
- Ideal for jewelry, metalworking, and engineering applications.
- Developed specifically with investment casting in mind.

Dental Resins
- Dental SG: Class 1 biocompatible material
- Dental Model: Matte surface, Contacts within ±35 microns
- Dental LT Clear: Class 2 biocompatible material
METAL 3D PRINTERS

The Desktop Metal DM Studio System+ is the world’s first affordable, office-friendly metal 3D printing system. Safe and simple to use, the DM Studio System+ was designed to bring metal 3D printing to the shop floor by allowing engineering and design teams to make metal parts faster, without the need for special facilities or dedicated operators.

**Studio System+**

The Desktop Metal DM Studio System+ is the world's first affordable, office-friendly metal 3D printing system. Safe and simple to use, the DM Studio System+ was designed to bring metal 3D printing to the shop floor by allowing engineering and design teams to make metal parts faster, without the need for special facilities or dedicated operators.

**The Desktop Metal difference**

The DM Studio System+ printer is similar to the safest and most widely used 3D printing process, Fused Deposition Modeling (FDM). Unlike laser-based systems, the DM Studio System+ printer extrudes bound metal rods - similar to how plastic FDM printers work. This eliminates safety and facility requirements associated with traditional metal 3D printing, while enabling new features like closed-cell infill for lightweight strength.

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**Print**

The Studio System+ printer extrudes bound metal rods, shaping the "green part" through Bound Metal Deposition™. This process is similar to the safest and most widely-used 3D printing process—Fused Deposition Modeling (FDM) and eliminates safety concerns associated with metal 3D printing.

**Debind**

The green part is transferred to the Studio System+ debinder where it is immersed in Desktop Metal's proprietary debinding fluid. The primary binding material is removed in order to prepare the part for sintering. The debinder is safe for use in an office environment and does not require any external ventilation.

**Sinter**

The Studio System+ furnace heats parts to just below their melting point, fusing metal particles to form fully dense parts without residual stresses introduced in laser-based processes. Fully automated and sized to fit through a doorway, the furnace delivers industrial-strength sintering in an office-friendly package.
BOFA leads the way in the development of innovative fume extraction systems with award-winning technology and a diverse range of sectors including lasers, printing, and 3D printing.

Standard Features for the BOFA 3D PrintPRO Series include filter change indicator, 3 level filtration - Pre, HEPA and chemical filters, hose kits included, low noise levels, powder coated for durability, small footprints, compact size and CE approvals.

Models include:

3D PrintPRO 2 - For open framed 3D printers
Low cost unit which extracts fumes generated by open framed 3D printers without causing the filament deposition area to be cooled.

3D PrintPRO 3 - For table top enclosed/partially enclosed 3D printers
Incorporates externally mounted plenum system manifolds, effectively capturing fumes.

3D PrintPRO 4 - For large enclosed 3D printers
High fume evacuation and filtration rate when connected to a large enclosed 3D printer.

3DPRINTCLEAN is the total safety solution for 3D printing. Carefully designed, manufactured, tested, and assembled in the U.S.A. and trusted by major educational, corporate, and government users worldwide.

Features include:

- **Filtration** - Eliminates harmful emissions with proprietary filtration system
- **Fire Retardant Plastic** - Polycarbonate, shatterproof windows
- **Locking Doors** - Prevent unauthorized use, theft, and keeps small hands away from hot parts
- **Sealed Doors** - Five points of contact to ensure maximum enclosure seal
- **Thermal Runaway Cutoff** - Enclosure monitors temperature and if needed terminates power
- **Shatterproof Windows** - Impact-resistant windows ensure printer protection
- **Aluminum Frame** - Industrial-strength design assures years of protection and reliability
- **Automatic Fire Suppression** - Once temperature reaches 250°F, system activates and fills the enclosure with ABC fire suppressant
Artec Eva Lite & Artec Eva

Artec Eva 3D scanner is the ideal choice for those that need to receive a quick, textured and accurate scan of medium sized objects such as a human bust, an alloy wheel, or motorcycle exhaust system. Eva doesn't require markers or calibration. It captures objects quickly in high resolution and vibrant color, which allows for almost unlimited applications.

Artec Eva Lite 3D scanner is the budget version of the bestselling white light Artec Eva 3D scanner. It features the same accuracy specs, but with reduced functionality: Eva Lite has geometry only tracking and capture. As a result, this affordable 3D scanner can be used for making high quality textureless 3D scans when scanning geometrically rich objects, such as the human body.

And for schools and universities, providing students with high tech professional equipment has now become even more affordable. As part of the Artec Educational Package, the price for Eva Lite is even more accessible and also includes 20 licenses of Artec Studio, two years free upgrade and a two year guarantee.

Artec Space Spider

Artec Space Spider is a high-resolution 3D scanner based on blue light technology. It is perfect for capturing small objects or intricate details of large industrial objects in high resolution, with steadfast accuracy and brilliant color.

The scanner’s ability to render complex geometry, sharp edges and thin ribs sets our technology apart. It is an ideal industrial 3D scanner for high resolution capturing of objects such as molding parts, PCBs, keys, coins or even a human ear, followed by the export of the final 3D model to CAD software.
Epilog Laser Engravers/Cutters

Laser Engravers/Cutters are the ideal tool for engraving and cutting a wide variety of materials. Use a laser to create a wide variety of products for many different educational applications.

Epilog Zing 16: Entry-level model combining affordability with a convenient small size and 16" x 12" engraving and cutting area. Power choices of 30 or 40 watts.

Epilog Zing 24: Move up to the Epilog Zing 24 for a larger 24" x 12" work area and Radiance High Definition Optics. Power choices up to 60 watts to engrave faster and cut through thicker materials.

Epilog Mini 18 and 24: Epilog Mini 18 is an entry-level model providing a 18" x 12" work area. Though it’s more compact, the engraving and cutting results is the same high quality as the large format lasers. Move up to the Epilog Mini 24 for a larger 24" x 12" work area that holds most standard engraving stock materials.

All Mini Systems Feature:
- High speed servo motors and linear encoder drivers
- Automatic focusing to the perfect focal distance from the lens
- Engrave at 1200 dots per inch quality
- Easy-Access Drop-Down Door for loading jigs from the front of the machine
Epilog Helix 24: For engravers looking to work with larger pieces or products, the Epilog Helix is an ideal choice. The Helix’s generous 24” x 18” x 8.5” (610 x 457 x 216 mm) work area will allow you to engrave multiple pieces as well as process thicker materials.

- Radiance™ High-Resolution Optics for a smaller laser spot size across the table
- Easy-Access Drop-Down Door for loading from the front of the machine
- Easy-Access Storage Stand to easily move your laser throughout your office, workshop or school
- 30, 40, 50, 60 or 75 watt CO₂ laser

Fusion Pro

- 32” x 20” and 48” x 36” models available
- 50, 60, 75 or 120 watt CO₂ laser
- Fiber and dual source available
- Camera with simplified calibration comes standard and will work with both cutting and engraving.
Techno CNC Routers & Plasmas

Techno CNC Systems family of CNC routers represents 30 years of CNC research and development. Since 1986, Techno CNC Systems has been solving the toughest manufacturing challenges by helping sign makers, woodworkers, general fabricators and more with their production needs. Techno CNC equipment is designed to route, carve, drill, and engrave in wood, plastic, foam, aluminum and more for a wide range of applications.

**HD II Tabletop CNC Router**
- 21" x 36" Process area
- Precision ball screws on all three axes
- 2 HP HSD high frequency collet spindle
- Brushless micro stepper motors and controls
- Vacuum T-slot table for easy part fixturing
- Automatic tool calibration pad
- Linear rails and bearings

**BT1212 Benchtop CNC Router**
- 11.8" x 11.8" x 4.0" Process area
- Precision ball screws on all three axes
- 800 Watt (1 HP) Kress variable speed spindle (8,000-24,000 RPM)
- Brushless micro stepper motors and controls
- Aluminum T-slot table
- Compatible with G code and M code
- Heavy duty construction

**Atlas Series CNC Router**
- 4’ x 4’, 4’ x 8’ and 5’ x 10’ stock sizes
- 4 HP HSD high-frequency collet spindle
- Maintenance free brushless stepper drive motors
- Vacuum table with main control gate valve
- Easy to use hand-held controller
- Open architecture works with all industry standard CAD/CAM software
CNC ROUTERS & PLASMA CUTTERS

Titan Series CNC Router
- 12 HP HSD high frequency automatic tool changer spindle
- Maintenance free brushless motors and drives
- Vacuum t-slot table with main control gate valve
- Pneumatic material pop-up pins
- Automatic tool length calibration via closed loop touch pad
- Automatic z-zero via secondary touch pad
- Easy-to-use hand held controller (optional PC based system available)
- Open architecture works with all industry standard CAD/CAM software

HDII CNC Plasma Cutter
- 4’ x 4’, 4’ x 8’, and 5’ x 10’ sizes
- PC based WinCNC Controller
- Brushless micro stepper motors and drives (servo optional)
- Precision helical Rack-n-Pinion on X and Y axes with ballscrew on the Z axis
- Unique design, easy to learn and operate
- Water table / Steel slats / Down drafts
- All steel construction for rigid platform
- Cuts up to 1.5” thick steel capacity
- High-speed cutting up to 800 IPM
- Magnetic Torch break away
- Multiple torch options available
Forest Scientific Corporation CNC Routers

Forest Scientific Corporation manufactures high-quality CNC Routers, Mills & Lathes, and Plasma Cutters that are the perfect choice for your school. Made right here in the USA and made to last, each machine has precision THK linear ways and bearings to ensure stability; welded steel frames and structural aluminum to ensure alignment over time; and powerful stepper & servo motors to increase reliability and high resolution on each pass.

They are designed to be updated inexpensively as technology changes and all machines use industry standard Fanuc-style G&M codes such as Mastercam, Surfcam, Edgecam, Vcarve, Fusion 360, SolidWorksCam and more.

To ensure that you have successful results, Forest Scientific offers on-site training as well as Project Based Learning curriculum and tutorials with written and video modalities for teachers and students.

Invest with confidence knowing that you have purchased a Forest Scientific CNC system that is of high quality, well supported, and ensures your success in teaching marketable skills.

Available products include:

- **FabBot Series Routers and Plasma Cutters** - Created for home shops and schools on a very limited budget
- **Convert-A-Table Plasma Cutter/Routers** - Easily changes from a CNC Router to a CNC Plasma Cutter
- **Maker-Fab Series Routers and Plasma Cutters** - Cost effective, heavy duty machines
- **HS Series Router and Plasma Cutters** - Standard model for education and small shop
- **The Michaelangelo 3D Modeler** - Innovative CNC Router designed for classroom use
- **The LuthierMax Series Guitar Making CNC Routers** - Designed in collaboration with engineers from Fender Guitars and www.guitarbuilding.org
- **The Mitey Series** - Machines for educational training, prototyping, design, and production worldwide
Forest Scientific LuthierMax Series

The LuthierMax Series of CNC routers was designed for guitar making in collaboration with engineers from Fender® Guitars (who are using this model) and www.guitarbuilding.org to make this machine student friendly and robust. Fixtures built into the table make it easy to machine your own guitar necks and bodies for both standard size and longer base guitars. Travels X49" Y20" Z8.5"

LuthierMax CNC Router Models:
- LuthierMax CNC Router 110V,20A
- LuthierMax CNC Router Hy Servo
- LuthierMax PRO with ATC CNC Router

LuthierMax CNC Options:
- Vacuum Table System
- Guitar Making Class Start-up Kit
- Guitar Making CNC Bit Kit

Forest Scientific CNC Plasmas

The Forest Scientific CNC Plasmas are cost effective heavy duty machines made of structural aluminum or welded steel. Each of the CNC Plasma cutters include a Torch Break Away system, Automatic Torch Height, integrated water table, CAD/CAM software, Hypertherm 45 Plasma system, and control computer with arm for a Turn-Key package. Just plug the system into your electric and you're ready to go.

All plasma tables have replaceable leafs that you can easily make by shearing steel so you won't need to buy expensive table parts and pay to ship them across the country.
Mastercam delivers CAD/CAM software tools for all types of programming, from the most basic to the extremely complex. 2-axis machining, multiaxis milling and turning, wire EDM, router applications, free-form artistic modeling and cutting, 3D design, drafting, surface and solid modeling – whatever your machining needs, there is a Mastercam product for your budget and application.

There are more curricula available for Mastercam than any other CAM system. The Educational Division continually provides exceptional teacher training and educator support. Years of experience in the educational market has helped Mastercam to understand the specific needs of instructors, schools, and students. Since Mastercam is the most widely used CAM software in the world, the products are industry proven. Mastercam has been designed for any level of skill or machining. From middle school exploratory classes to a university research lab making complex molds, Mastercam provides the tools to fit the application.

Vectric software is designed to make cutting parts on a CNC an enjoyable and productive experience, the combination of power and simplicity lets you efficiently generate or manage your design, then quickly create precise toolpaths to drive your CNC.

Products Include:
- **Cut2D** - Vector drawing & editing tools for CNC routing, milling & engraving
- **VCarve** - Complete software solution for cutting on a CNC Router
- **Aspire** - Draw & build 3D component models for machining
- **Cut3D** - Converts 3D models into CNC toolpaths
- **PhotoVCarve** - Converts photos and images into high quality toolpaths for CNC and engraving machines
Roland Desktop 3D Milling Machines

Widely used in the industry and recognized for ease-of-use and versatility, Roland MDX milling machines offer students a fast learning curve to get them producing finished prototypes that require little to no finishing.

Modela MDX-540 CNC Milling Machine
Enhanced production on a 19.6"x15.7"x6"(z) work area at an affordable price. MDX-540 3D milling machines are some of the fastest, most accurate and accessible devices on the market, ideal for producing everything from functional and snap-fit parts and prototypes to light metal molds and custom jewelry. Available in standard and enhanced models with optional 4th axis and automatic tool changer, MDX-540 benchtop milling machines offer advanced CNC milling at an affordable price. Project Based Learning available.

Modela MDX-50 CNC Milling Machine
Precise, automated milling combined with unmatched ease-of-use on a 15.8"x12"x5.3(z) work area. 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. Project Based Learning available.

Modela MDX-40A CNC Milling Machine
An intuitive and easy-to-use rapid prototyping device on a convenient 12"x12"x4"(z) work area. The small footprint fits into any Fab Lab, workshop, office or classroom and allows both novice and advanced users to create precision 3D models. Additional features include a rotary axis for unattended milling and a contact-scanning unit for reverse engineering projects. Project Based Learning available.

monoFab SRM-20 CNC Milling Machine
As a small milling machine, the SRM-20 offers compact size, 8"x6"x2.38"(z), and powerful functionality at an affordable price. Production of realistic parts and prototypes is made simple and convenient with a device that fits into any office, home, or classroom environment. For users looking for advanced milling capabilities without the need for expert operating skills, the SRM-20 is the easiest and most precise CNC mill in its class. Project Based Learning available.
**Metaza MPX-95**
**Photo Impact Printer**

Photo impact printer technology makes gift personalization and direct part marking of tools and medical instruments a clean, quiet and hassle-free experience. Affordable and effortlessly easy-to-operate, the MPX series of devices from Roland DG provide stunning results on metal materials that include titanium, platinum, silver, copper and gold. They are the perfect solution for gift personalization, industrial part marking, and ensuring UDI compliant medical instruments.

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**VersaSTUDIO BT-12**
**Direct-to-Garment Printer**

Print directly onto cotton t-shirts, apparel, tote bags and other products in minutes from the comfort of your desktop. The affordable VersaStudio BT-12 printer allows you to get into the profitable world of custom apparel immediately, with a device that’s as easy-to-use as an office printer and offers stunning results.

**Highlights**

- With a simple 3-step process, you can automatically print your design and cure the ink in one smooth workflow.
- Brilliant inks and images provide sharp and color-brilliant results
- A clean and fully-enclosed process - safely print onto garments without coming into contact with chemicals, steam or heat.
- Includes super-easy design software for users of all abilities
Roland Printers/Cutters

Roland printers/cutters are real world devices, providing real world graphic applications for your students. These devices can print and cut an incredible variety of jobs on a full spectrum of media.

VersaStudio BN-20 Desktop Printer/Cutter
One compact device for apparel, packaging, posters and more - features 8-channel printheads for outstanding photographic and vector output. Project Based Learning curriculum available.

VersaCAMM VS-300i Large-Format Printer/Cutter
The VersaCAMM VS-300i provides everything you need to produce just about any job imaginable. It delivers exceptional print quality and features advanced print head technology and high-performance inks that include White, Metallic, and Light Black ink options. It also offers integrated contour-cutting for streamlined production and a host of user-friendly features to boost efficiency. 30” model available.

TrueVIS SG Series Printer/Cutters
Whether you’re just starting out or wanting to expand production, new TrueVIS SG series printer/cutters offer all the quality and versatility of a Roland, at an unbeatable price. TrueVIS ushers in a new era of integrated printing and contour cutting. Available in 30” and 54” models. Project Based Learning curriculum available.

TrueVIS VG-64, VG-540 Large-Format Printer/Cutters
Available in 64-inch and 54-inch models, TrueVIS VG series inkjet printer/cutters feature FlexFire™ printheads and TrueVIS INK that combine to produce vibrant colors and stunning details. Efficient and productive TrueVIS VG printers enable users to produce dynamic decals, brilliant banners, striking signs, and vibrant vehicle graphics on demand.
Introducing the amazing LEF benchtop UV flatbed printers. Print directly on dimensional objects such as awards, giftware, packaging and products with spectacular results. Instant drying and flexible ECO-UV inks deliver high color density and a wide gamut for exceptional images print after print. Specialty inks, including white and clear, allow printing on clear, reflective and colored surfaces and finish graphics with dazzling embossing and varnishing effects. Project Based Learning curriculum available.

Roland Vinyl Cutters
Offering plug-and-play ease, technological sophistication, compact convenience, and the reliability you expect from Roland, these high performance vinyl cutters accelerate your ability to create professional signs, displays, vehicle graphics, decorated apparel and window tinting. Each comes with all the hardware and software you need to get started immediately — right out of the box.

Models Available:
- CAMM-1 GR-640, GR-540, GR-420
  Large Format Cutters
  Available in 42”, 54” and 64” model sizes, GR cutters are powerful, easy-to-operate devices. Packed with advanced and versatile new features, they are designed for a whole new level of sign, apparel, vehicle graphics and packaging production.
- GS-24 Desktop Cutter
  Desktop cutter boasts 350g of downforce, making the cutting of magnetic materials, corrugated cardboard and other thick substrates child’s play. 22.9” maximum cutting area. Project Based Learning curriculum available.
- STIKA Desktop Design Cutters
  The STIKA makes it easy to create every thing from POP displays and iron-on graphics for T-shirts to vehicle graphics. Available with 8”, 12”, and 15” maximum cutting areas.
Project Based Learning (PBL)
Roland's step-by-step tutorials work seamlessly with Roland software and machines, making it easy for educators to teach and for students to learn design and engineering skills.

A Simply Smart Solution
Fun, simple-to-understand, hands-on engineering, design and art projects promote intuitive learning — teaching digital fabrication to students of all skills and abilities.

Made for Teachers
PBL tutorials reduce time-consuming prep and planning. They help teachers develop lessons that support curriculums and solve issues associated with teaching digital fabrication to large classroom sizes.

Made for Students
PBL tutorials allow students to work at their own pace and without strict supervision — offering student's fast results and an immediate sense of achievement.

Foundation For Success
Each web-based PBL package contains a series of device specific tutorials to quickly familiarize students with hardware and software — key safety and machine maintenance topics are also covered.
After you and your students feel comfortable using your digital fabrication equipment, it’s time to take it to the next level! Get the ideas flowing and start earning money for your school using your educational space!
Create shirts for your school’s upcoming football or basketball game against your rival team. Design and print customized shirts for the Spanish Club’s annual banquet. Make bags featuring the school logo for the Band’s fundraiser!

Your imagination is the limit for all that you can do and earn with your Roland DGA Printers and Vinyl Cutters!

**Roland Vinyl Cutters**

*Ideal for:* Simple, one or two color graphics

*Find it!* Page 26

*Additional Equipment:*

*Tip! Our Vinyl Starter Packs come with every thing you need to get started!*

**Roland Print/Cutters**

*Ideal for:* Full color graphics, light and dark colored fabrics

*Find it!* Page 25

*Additional Equipment:*

**Roland Direct-to-Garment Printers**

*Ideal for:* Full color graphics, light colored fabrics

*Find it!* Page 24

*Additional Equipment:*
None! The Roland BT-12 is a complete direct-to-garment printing system!
Custom, personalized phone cases, golf balls and awards will be a huge hit at your school and in your community! Sell cases with your school’s mascot at athletic events or take design requests as custom orders. Local businesses will be coming back regularly for branded golf balls and awards for the next golf outing.

Roland DGA LEF UV Printers are designed to print onto a virtually limitless choice of three-dimensional media!

**Custom Digital Cases**

*Ideal for:* Phone and small electronic device cases

*Find it!* Page 26

*Additional Equipment:* BOFA Filter, Device template

*Tip!* Check with us about available device templates!

**Branded Golf Balls**

*Ideal for:* School and local businesses promotional events

*Find it!* Page 26

*Additional Equipment:* BOFA Filter, Golf Ball Template

*Tip!* Check with us about available device templates!

**Awards and Plaques**

*Ideal for:* School Clubs and Associations

*Find it!* Page 26

*Additional Equipment:* BOFA Filter, Award template
Engrave water bottles and keytags for your hometown team and embellish luxe fleece jackets with your school mascot. Produce themed glassware for holiday sales and special events.

Engrave your custom message on a variety of materials - from glass to metal and so much more! Epilog Laser Engravers give you options when it comes to profit!

**Fabric Marking**

**Ideal for:** Fleece, Sweatshirts, Denim, and some Linens

**Find it!** Pages 16-17

**Additional Equipment:**
- BOFA Filter

**Waterbottles/Keytags**

**Ideal for:** Aluminum waterbottles and keytags

**Find it!** Pages 16-17

**Additional Equipment:**
- BOFA Filter, Epilog Rotary Attachment and/or tag template

**Glassware**

**Ideal for:** Glasses, mugs, cutting boards, vases, etc.

**Find it!** Pages 16-17

**Additional Equipment:**
- BOFA Filter, Epilog Rotary Attachment
MOBILE STEM CART

MobilemakerEd Cart
The Mobile Fabrication Lab for Education

Bringing the empowering maker learning experience to any classroom

Alliance for adfab:ED
Digital Fabrication Education
Taking Making Into Classrooms Curriculum Available!

Topics covered include:

- The Maker Movement And Its Place In North American Lives
- Making The Connection: Designing, Making, And A New Culture Of Learning
- Design Challenges: Prompts For Learning And Hard Fun
- Assessment: Reimagining Ways To Value Process, Product, Creativity, And Learning
- Honouring The Parts That Make The Process Whole
- Why We Need Our Students To Be Design Thinkers
- Intent And Choosing A Maker Experience For Your Classroom
- And much more!

<table>
<thead>
<tr>
<th>3D Printer</th>
<th>Ultimaker S3, Makerbot Replicator Plus, Print wash system</th>
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</thead>
<tbody>
<tr>
<td>Laser Cutter</td>
<td>Epilog Mini 16, Air compressor</td>
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<tr>
<td>3-axis Milling Machine</td>
<td>Roland SRM-20</td>
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<td>Fume Extractor</td>
<td>BOFA, AD350</td>
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<tr>
<td>Vinyl Cutter</td>
<td>Roland SV-12</td>
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<tr>
<td>Computer Hardware and Software</td>
<td>Dell XPS-15 laptop, Wireless high-gain antenna, 3D Design software, CAM</td>
</tr>
<tr>
<td>Tools</td>
<td>Common hand tools, Soldering station, Cordless power tool system with drill, saw and oscillating tool</td>
</tr>
<tr>
<td>Maker Electronics</td>
<td>Set of 12 Arduinio physical computing kits, 12 Grove sensor kits, Flora wearable electronics, Collection of standard electronic building components</td>
</tr>
<tr>
<td>Mobile Cart</td>
<td>Custom designed mobile workstation with drawers, table, equipment slides and locking compartments, Internal fume extraction, 2400w power conditioner, Retractable electric power tether, All steel construction, Powder-coated finish</td>
</tr>
<tr>
<td>Materials</td>
<td>2 Filament cartridges, Assorted milling material, Assorted laser material types</td>
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<tr>
<td>Dimensions</td>
<td>28.25”W x 65”D x 60”H</td>
</tr>
<tr>
<td>Weight</td>
<td>350 lbs</td>
</tr>
<tr>
<td>Power Requirement</td>
<td>25 amps at full operation</td>
</tr>
</tbody>
</table>
An interactive approach to teaching STEM Education through Robotics

MINDS-i Robotics Education is designed to give students an interactive approach to applied science, technology, engineering and math (STEM). MINDS-i is rocking the Robotics Education world with a high-technology platform that is simple to use, extraordinarily durable, infinitely modifiable, and will prepare students with the skills they need to excel in the 21st century.

We inspire a rigorous college and career relevant experience through STEM Robotics in the everyday classroom in a format that can impact each and every student.

LAB Kits Include:

MINDS-i Catapult LAB

STEM Robotics DRONES LAB

STEM Robotics FOUNDATIONS LAB 4X4

STEM Robotics FOUNDATIONS LAB 6X6
Fun and affordable STEM education programs

Kid Spark gives your students the skills and confidence to solve everyday challenges through technology. The elementary and middle school STEM education programs are a fun, effective, and affordable way to develop your students’ STEM Identity and Technology Fluency.

The Kid Spark curriculum follows the NGSS Three Dimensions of Science Learning; Crosscutting Concepts, Science and Engineering Practices, and Disciplinary Core Ideas.

Kid Spark PK - 8 STEM Programs

Kid Spark offers comprehensive, applied STEM programs for elementary and middle school that include curriculum, professional learning, and mobile STEM labs. The Kid Spark curriculum consists of four progressive learning phases that span from PK to 8th grade.

ROK Blocks
Grades: PK-5
Core lab for Elementary School Programs
• Ideal for learning the Kid Spark Elementary Program and/or for students needing foundational fluencies

Engineering Pathways
Grades: 4-8
Core lab for Elementary and Middle School Programs
• Ideal for introducing students to computer sciences and robotics as well as teaching systems thinking

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Exploring STEM Activity Kits
Active Learning - bringing STEM together with project-based learning

Curriculum material uses Active Learning to foster a range of important skills across the core STEM subjects. The Presentations and Investigations promote processing, questioning and analyzing information.

The Simulations and Practical Tasks involve problem solving, creativity and critical thinking, while enhancing manipulative skills.

Finally, each course concludes with a Design Project, to develop computer programming skills, and promote communication and interpersonal skills through team working.

Elementary Kits such as:
- Tactic Construction Kits
- Problem-Solving Kits
- Math & Science Kits
- Electrical Circuits Kits and More!

Middle Level Kits such as:
- Engineering & Design
- Manufacturing Technology
- Mechatronics
- Agriculture
- Mobile Robotics
With Hann Manufacturing furniture you will never say “...they don’t build them the way they used to.” Hann uses time tested methods and materials to construct furniture that will hold its own in the classroom year after year. Hallmarks of quality such as mortise and tendon joinery and dovetailing are present in every piece built.

For 40 years, Shain by Diversified Woodcrafts, Inc. has been providing quality maple furniture, built by craftspeople that take pride in building furniture used by teachers and students. In fact, many of the employees grew up using Shain products in their classrooms and that is where they learned their craft.

Today that same workforce uses cutting edge technology to produce innovative and quality products for the education, art, and technical markets. Quality maple hardwoods and veneers and fine details like fully dovetailed drawers are signature hallmarks of Shain’s product line.

Higher education is not a one size fits all approach — and neither is the furniture or design. It goes without saying that today’s students and instructors require furniture that allows collaboration and looks professional. But facilities managers want solutions that can withstand years of use, look great, and maximize space available in both old and new buildings.

Interior Concepts delivers on all counts. Furniture that meets the demands of students and staff. Specializing in educational furniture for over 20 years consistently delivering quality solutions in environments such as lecture halls, classrooms, instructor spaces, computer labs, and administrative areas — Interior Concepts furniture solutions are just plain smart.
The Stewart Storage Cart

Want a great addition to your makerspace, classroom, art class or any other area where you need mobile storage? Then the Stewart Cart is perfect! This thoughtful design was created by students with makerspace in mind! The Stewart Storage Cart comes in two different sizes; a double sided 10 bin cart or a compact single sided 5 bin cart. Either cart features a peg board side and 5” heavy duty casters. Optional lids and dividers are available for the storage bins and an additional peg board can be added to the other side.

The Multi-Maker Cart

This compact, feature-rich Multi-Maker Cart has a small footprint with a big impact. The Multi-Maker Cart can be used as a presentation cart, a great addition to your Makerspace room, or a charging and storage solution for a classroom or media center. Let the Multi-Maker Cart help you organize so you can teach and make!

The Quad Pod

The Quad Pod is a revolutionary concept in educational furniture design! Allows you to customize your table according to the storage and functionality needs that you may have in a makerspace or classroom!

Pick a Pod! Choices include:
- Basic Adjustable Shelf Storage with 2 shelves included
- Storage Bins - 3 bins with lids
- 15 Slot Device Storage & Charging
- Trash Bin (grommet hole in tabletop)

Pods are placed inside steel frame (as shown). Pods create the base which is secured by the butcher block top.
The IDEA Island

The creation of the IDEA Island was inspired by the many makers in schools, libraries and museums across the nation that are dedicated to inspiring creativity and discovery. The marriage of industrial design with warm wood, strength, and innovation, immediately inspires when you step up to the IDEA Island. It can be ordered basic as table only, or can be dressed up with technology and seating for up to 8 people.

The Ed Table

With breakthrough solutions packed into every inch, the Ed Table truly embodies a spirit of invention. The Ed Table provides the most complete maker experience available. Maximizing creative time while minimizing the amount of logistical preparation work and clean-up was the driving factor behind the design concept. For schools and teachers interested in project-based learning, the Ed Table is a natural extension and fundamental element for engaging learners.

The Butcher Block Table

The Butcher Block Table for makerspace environments allows students to design and build creative projects and empowers students to work together. By offering a hardy work surface, adjustable height legs for sitting or standing, optional power unit and monitor arm, the sky is the limit.

ADA Compliant

www.alleghenyedusys.com  •  800-232-7600
A is for Allegheny.

Allegheny Educational Systems has provided Pennsylvania Educators with the highest quality products and after-sale support for over 40 years.

Our services include lab layout and design, curriculum implementation, installation and training for all products that we offer.