2026-2027

Training & Innovation Solutions Guide







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X-Cal Corp. is one of three companies founded by Tim and Dede Brown to address the increasing demand for technical and vocational workforce training. Serving New Mexico, Colorado, Utah, Idaho, Montana, and Wyoming, X-Cal was established to provide regional expertise and direct support to educational institutions and industry partners.

Working alongside a broad network of leading manufacturers, X-Cal delivers modern training systems, industry-recognized certification pathways, interactive curriculum, lab design support, professional development, and long-term customer service across a wide range of STEM and Career and Technical Education disciplines.

With a focus on workforce alignment and program sustainability, X-Cal supports institutions in preparing learners for careers in advanced manufacturing, automation, energy, transportation, and the skilled trades.

This catalog includes select solutions offered by **TecSolutions**, a woman-owned business established in 2009 by **Dede Brown** to specialize in engineering-focused teaching apparatus and educational resources for colleges and universities.



Solutions Center

Our 14,000 sq. ft. Solutions Center located in Katy, Texas includes demonstration areas, training rooms, and a 6,000 sq. ft. warehouse. The warehouse provides a demonstration area for our larger pieces of equipment and allows us to keep an inventory of popular products, and spare parts to shorten the delivery cycle and minimize equipment downtime. Additionally, we added state-of-the-art training rooms and a conference center.

We invite you to visit for a firsthand tour of our comprehensive solutions in Engineering, CTE, Robotics, Additive Manufacturing, Certifications, Industry 4.0, STEM, Medical Simulators, and more!

Mobile Solutions Center

Our Mobile Solutions Center is on the road to give customers a firsthand look at many of our solutions!

Contact us to schedule a hands-on demo of our solutions or to get added to our mailing list for up-coming events.



See it. Try it. Plan it.

Whether at our Solutions Center or through a mobile demo at your school, we make it easy to explore hands-on training solutions.

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AMATROL® MSSC™

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APT MANUFACTURINGsolutions MOD-WELD

Limited Training Space?

Check out Amatrol's portable learning systems!



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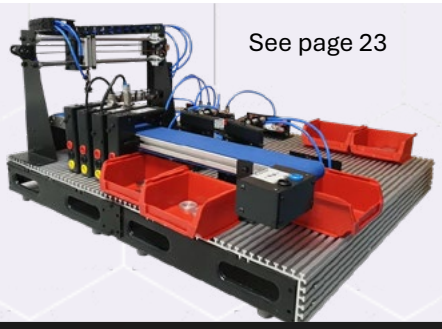
Career Tech News

Stay up-to-date on the latest CTE News!

Customer Spotlight

Real Training. Real Impact.





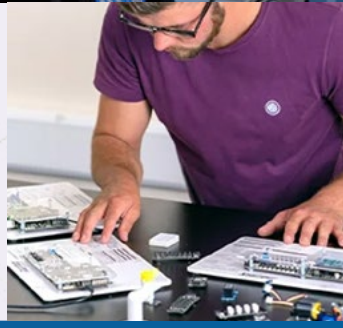
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Multi-Purpose Labs, Electronics Curriculum, and Industry 4.0 Trainers

From single-discipline projects to full smart factories, Matrix TSL delivers flexible lab design for any program.

MATRIX

Available through: TecSolutions



Solving the Skills Gap with Industry-Recognized Credentials

Nationally recognized, industry-endorsed certifications to prepare learners for in-demand careers.

Industry credentials validate the knowledge and hands-on skills required for today's advanced manufacturing, logistics, and technical careers. These stackable, portable certifications give employers confidence in worker readiness while creating clear career pathways for students. Backed by leading industry associations, accreditation standards, and employer demand, certifications bridge the gap between classroom learning and workplace performance.

Manufacturing Skill Standards Council (MSSC)

The Manufacturing Skill Standards Council (MSSC) offers **ISO/IEC 17024** accredited certifications endorsed by the **National Association of Manufacturers** (NAM). Designed for advanced manufacturing and logistics, MSSC credentials validate the core skills of both entry-level and incumbent workers. These portable, stackable certifications help students advance their careers while reducing recruitment and training costs for employers. Recognized nationwide, MSSC standards are adopted by the U.S. Departments of Labor, Education, Defense, and Veterans Affairs, along with Job Corps and federal and state correctional systems.

Advanced Manufacturing Certifications

Certified Production Technician (CPT) 4.0

The CPT 4.0 certification covers four core modules, with an optional Green Production module, to prepare learners for the realities of modern manufacturing:

- **Safety:** Focuses on workplace and equipment safety, OSHA compliance, and hazard awareness to ensure safe practices on the shop floor.
- **Quality Practices & Measurement:** Builds skills in measurement tools, data collection, and quality systems to support continuous improvement and product reliability.
- **Manufacturing Processes & Production:** Teaches lean principles, production workflows, and process optimization to improve efficiency and reduce waste.
- **Maintenance Awareness:** Introduces basic equipment maintenance, predictive maintenance concepts, and troubleshooting to reduce downtime.
- **Green Production (optional):** Promotes sustainable practices, including energy efficiency, materials management, and waste reduction strategies.



Skill Boss – CPT+ Certification

The Amatrol Skill Boss is a tabletop automated system that validates over **55 hands-on production skills** for the Certified Production Technician Plus (CPT+) credential.

- Safety, quality, production, and maintenance tasks
- Assembly and process operations
- Preventive and corrective maintenance skills
- Industry 4.0 integration: sensors, automation, PLC interaction



Certified Forklift Technician (CFT) Program

Developed by **MSSC in partnership with MHEDA**, the Certified Forklift Technician (CFT) program addresses the growing demand for skilled forklift service technicians. The program combines a **55-hour online course, a 92-question assessment**, and a **hands-on performance evaluation** covering 20 key maintenance and repair activities. Candidates may also earn the **Certified Forklift Associate (CFA)** credential after completing the online portion. This nationally recognized certification gives technicians the tools to succeed in the material handling industry.

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Logistics & Supply Chain Certifications

Certified Logistics Technician (CLT) 4.0

A two-tier stackable credential: learners earn the Certified Logistics Associate (CLA) foundational certificate before advancing to CLT. Both levels embed Industry 4.0 elements such as automation, robotics, and digital systems.

Certified Technician – Supply Chain Automation (CT-SCA)

Prepares technicians to install, operate, maintain, and upgrade automated material-handling equipment. Candidates complete three certifications—Equipment Maintenance, Equipment Repair, and Network Repair—assessed with **Skill Boss Logistics**, a trainer replicating 100+ real-world automation tasks.

Skill Boss Logistics – CT-SCA Certifications

Skill Boss Logistics replicates a working automated distribution system for MSSC's Certified Technician – Supply Chain Automation (CT-SCA) pathway. It is the official assessment device for three certifications:

- Equipment Maintenance (CTSCA-EM)
- Equipment Repair (CTSCA-ER)
- Network Repair (CTSCA-NR)

Features include:

- Package tracking, automatic queuing, and priority release
- Electro-pneumatic sorting and system control
- Assessment of 100+ supply chain automation skills



Performance-Based Assessment & Hands-On Training

Amatrol's Skill Boss and Skill Boss Logistics provide the required performance assessments for MSSC certifications. These portable, industry-relevant trainers replicate real-world operations so learners demonstrate not only knowledge but also practical skills.

Why Skill Boss?

- MSSC-required for CPT and CLT certifications
- Compact, mobile design for flexible classrooms and labs
- Built with Amatrol's durable, industry-grade components

Beyond MSSC: Advanced Robotics Training

For programs ready to advance beyond MSSC certification, Amatrol offers the **87-SWPF1V Smart Robot Logistics Palletizing Workcell.** This system integrates a FANUC 6-axis robot, Allen-Bradley safety PLC, conveyors, barcode scanning, and vision programming to teach advanced skills in robotic palletizing, logistics, and Industry 4.0.

Nationally-Recognized Robotics & CNC Certifications

FANUC is the global leader in robotics and CNC systems, powering automation across industries. In partnership with **NOCTI**, FANUC certifications validate both classroom learning and hands-on skills with industry-standard assessments. Together, they provide learners with stackable, **ISO 17024–aligned credentials** that employers require.

FANUC Certified Robot Certifications

FANUC Certified Robot Operator (Entry-Level)

Validate core skills for entry-level roles: safe robot operations, frame setup, creating/modifying motion programs, backups/restores, and ROBOGUIDE® simulation.

- **FCR-O1 (Written):** Knowledge-based exam covering robot operations, frame setup, motion programs, program offsets, backups/restores, and simulations.
- **FCR-O2 (Performance):** Hands-on assessment where learners demonstrate real robot operation, setup, and programming.

FANUC Certified Robot Technician (Technical Level)

Advance into technical roles with single-axis mastering, pick-and-place programs for load/unload, and 2D iRVision® setup and inspection.

- **FCR-T1 (Written):** Exam covering advanced robot operations, pick-and-place applications, single-axis mastering, and 2D iRVision setup.
- **FCR-T2 (Performance):** Hands-on assessment demonstrating vision-guided part offset/inspection and technical system components.

FANUC CERT Program

Robot Cells Made for Classrooms

Bring industrial robotics safely into the classroom. Through CERT, instructors receive professional training and curriculum that introduce students to real-world robot applications, including integrated vision systems (iRVision®), logic controller programming, and ROBOGUIDE® simulation software.

Each CERT package equips schools with the same FANUC robots, controls, and software trusted by manufacturers worldwide. With classroom-ready training cells and innovative tooling packages, programs deliver hands-on learning experiences that directly mirror industry—helping students graduate with the knowledge and skills employers demand.





Expand Robot Training with Industrial Integration

Industrial Learning System (ILS)

- Add up to 12 interchangeable modules
- Integrates with any FANUC robot via Ethernet/IP (wired or wireless)
- Customize with blank panels for your own designs
- Compact mobile base fits through standard doorways

See page 26.



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FANUC CNC Certifications & Training Systems

Empower students with industry-proven CNC skills using the world's leading control platform.

FANUC leads the global CNC market—with over 3 million systems installed, it remains the manufacturing industry standard. The Certified Education Training Program gives learners the advantage of learning on real FANUC controls, approved curriculum, and genuine hardware—they're workforce-ready from day one.



FANUC Educational CNC Solutions

CNC Simulator & Machining Simulator

- **CNC Simulator** – A desk-mounted unit replicating the Series 0i-MODEL F Plus control. Supports both milling and turning, with MANUAL GUIDE i conversational programming, full QWERTY keyboard, USB/ Ethernet connectivity, and realistic CNC interface interaction.
- **Machining Simulator** – Adds internal PC and simulation software for full virtual machining with 3D visuals, collision detection, and tool-path simulation.

Full & Desktop CNC Machine Tools

- **Desktop Mills & Lathes** – Powered by FANUC CNC, these compact systems offer real machining capability at modest cost. Examples include the Levil EDU Mill (with optional 3D-print head) and LTC-F30 Lathe.
- **Full-sized CNC Machines** – Industry-standard FANUC CNC systems, featuring ROBODRILL α-DiB machining centers that teach advanced programming, setup, and automation readiness.



Curriculum & Support

- FANUC offers CNC curriculum structured around ten key concepts in both milling and turning, available in online or classroom formats with labs and assessments. NCGuide (PC-based FANUC CNC software) is used for programming practice before production.

ROBODRILL -DiB Plus (3-, 4-, 5-Axis)

- High-speed vertical machining centers with optional robotic integration. The 5-axis configurations offer advanced machining capabilities with FANUC's iHMI interface.

Hands-On CNC & Robotics Integration

Machine Tending Education Cell (MTEC)

- A classroom-ready, Fanuc-certified system combining a FANUC robot (LR Mate or CRX cobot) with a ROBODRILL. Students learn robot-to-CNC integration, pick-and-place automation, and basic vision-guided material handling. Comes with curriculum, templates, and optional iRVision for advanced flexibility.

MTEC-SIM (Simulator Version)

- A compact, mobile all-in-one cell that pairs a robot with a FANUC CNC Simulator, allowing students to practice CNC programming and robot integration without full machinery. Ideal for space-constrained labs.



Smart Automation Certification Alliance

The Smart Automation Certification Alliance (SACA) is a non-profit organization whose mission is to develop and deploy modular industry 4.0 certification for a wide range of industries. The modular and stackable framework of these certifications allow learners to begin at any level—whether just starting a career or building upon existing expertise—progressing as their goals evolve.

SACA
SMART AUTOMATION CERTIFICATION ALLIANCE

Stackable Micro-Credentials

Micro-Credentials provide targeted recognition of specific technical competencies. Learners can earn these smaller credentials to showcase proficiency in key domains. Multiple domains stack together to earn **Specialist** or **Professional** certifications. This model offers both short-term career benefits and a clear path for advancement in Industry 4.0.

Associate

Prepares individuals for success as Industry 4.0 production technicians.

- Ideal for IT professionals applying digital skills on the plant floor
- Valuable for incumbent maintenance technicians seeking Industry 4.0 knowledge

Certifications

- Basic Operations
- Advanced Operations
- Robot Systems
- IIoT, Networking, and Data Analytics

Specialist

Validates advanced technical skills in troubleshooting, programming, maintaining, and integrating Industry 4.0 systems.

- Built on stackable Micro-Credentials
- Earned by combining targeted micro-credentials to meet certification requirements

Certifications

- Automation Systems
- Electrical Systems
- Mechanical Systems
- Control Systems
- Electro-Fluid Power Systems
- Instrumentation Systems
- Robotics Systems
- Network Systems
- Operations
- Production Systems
- IT Systems
- Semiconductor Operations

Professional

An engineering-level credential focused on the design and optimization of Industry 4.0 systems.

- Modular structure with more electives and fewer core requirements
- Adaptable to specialized career paths and advanced roles

Certifications

- Industry 4.0 Professional

Silver & Gold Levels

Each SACA certification can be earned at two levels: **Silver**, for passing the online exam, or **Gold**, for passing both the exam and a hands-on performance assessment.



Why SACA?

Industry-Driven

Built with and for industry, aligned to global standards, ensuring credentials reflect current workplace expectations and emerging technologies.

Hands-On + Knowledge

Written exams plus hands-on testing at the Gold level, validating both theoretical knowledge and practical application on real equipment.

Future-Proof

Reviewed annually to match evolving Industry 4.0 needs, keeping programs aligned with the latest technologies and workforce requirements.

Flexible & Modular

Earn individually or stack toward higher certifications, allowing learners and workers to build customized career pathways.

Recognized & Trusted

Backed by experts and rigorous validation, SACA credentials are valued by schools, employers, and industry leaders nationwide.

Affordable

SACA membership and certifications use a tiered pricing model designed to fit schools, colleges, universities, and industry.

SACA Membership

Schools and industry partners can join SACA to train and certify their people, access the latest Industry 4.0 developments, network with leaders, and share best practices. Membership opens the door to delivering certifications, expanding curriculum, and supporting workforce readiness across industries.

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AWS Welding Certifications

Prepare students for in-demand welding careers with AWS SENSE–aligned training. Schools can integrate:

- **APT MOD-WELD Systems** – advanced robotic welding with FANUC CRX cobots and industry power sources.
- **Lincoln Electric VRTEX® Simulators** – immersive VR welding practice with measurable results.
- **ClassMate® Robotic Welding Trainers** – turnkey robotic welding education cells with full curriculum.

SENSE is a comprehensive set of minimum standards and guidelines for welding education programs. Schools can incorporate SENSE into their curriculum to help attain Perkins funding and to ensure consistent training quality nationwide. The American Welding Society fully supports this program.



*See page 32 for **Welding** and **Robotic Welding** equipment details.*

Stratasys Additive Manufacturing Certification Program

Additive manufacturing is transforming every industry. The Stratasys Additive Manufacturing Certification Program, developed in partnership with NOCTI, gives students validated credentials in the design, setup, and operation of professional-grade 3D printing technologies.

- **Industry-Endorsed:** Developed with Stratasys and delivered through NOCTI, the national leader in career and technical certification testing.
- **Career-Ready Skills:** Includes certification at both the FDM Level 1 (entry into fused deposition modeling) and the PolyJet Level 2 (multi-material, full-color prototyping) to match industry needs.
- **Funding & Recognition:** Accredited certifications can strengthen grant opportunities and Perkins funding support for schools.
- **Institutional Benefits:** Certified programs enhance school reputation, attract students, and help form industry partnerships for internships and research

With NOCTI-validated Stratasys certifications, students gain an edge in engineering, design, medical modeling, and advanced manufacturing careers.

stratasys
AM Certification for Education
CERTIFIED

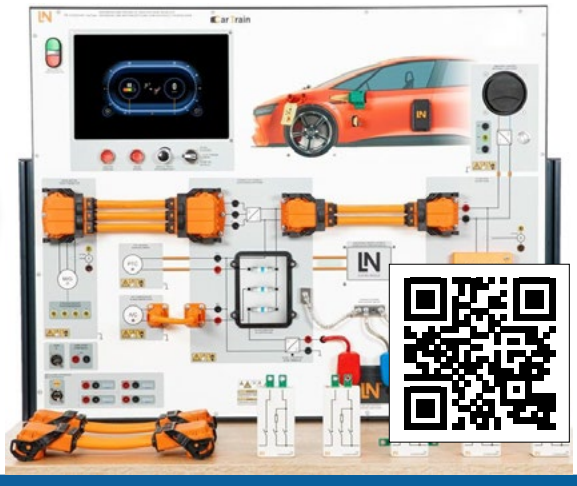
(See page 58 for available printers.)

Automotive & Transportation

The automotive industry is rapidly evolving, with demand for technicians trained in electrification, diagnostics, and advanced driver assistance systems (ADAS). Lucas-Nuelle and ASE certifications support these needs with:

- ASE L4 ADAS Certification alignment
- Hands-on ADAS calibration trainers and EV service systems
- Complete automotive electronics and diagnostics curriculum

Students earn nationally-recognized credentials and gain the skills to work on today's connected, electric, and autonomous vehicles.



See Automotive section on page 42 for full solutions.

Manufacturing & Industry Training

Turnkey Solutions for Building Essential Workforce Skills

From mechanical and electrical systems to fluid power, process control, and industrial maintenance, our training partners deliver the tools students need to succeed. These solutions combine durable hardware, interactive curriculum, instructor resources, and optional eLearning to prepare learners for industry certifications and in-demand careers.

Amatrol Mechanical Systems



Mechanical Drives Series (970-ME)

Step-by-step training in power transmission fundamentals

Covers belt, chain, and gear drives through advanced topics like clutches, conveyors, shaft alignment, and vibration analysis. Students gain practical skills in installation, operation, and troubleshooting using industry-standard components.

Pump Systems (95-PM1)

Comprehensive training in pump operation and maintenance

Learners work with centrifugal, gear, piston, peristaltic, diaphragm, magnetic, and turbine pumps, practicing installation, flow/pressure measurement, troubleshooting, and disassembly—from single-pump basics to advanced multi-pump applications.

Piping Systems (950-PS1)

Practical training for industrial piping installation and repair

Teaches cutting, threading, bending, and fitting metal and plastic piping, plus valve installation and schematic reading. Adjustable obstacles simulate real-world layout and troubleshooting challenges.

Central Lubrication System (950-CL1)

Hands-on skills for lubrication and preventive maintenance

Covers centralized lubrication operation, valve sequencing, distribution, and troubleshooting to build essential maintenance skills and reduce equipment wear.

See Industrial Maintenance (p. 17) for training in vibration analysis, laser alignment, rigging, and troubleshooting with FaultPro®.

Looking for Portable Options?

Many training systems are available in compact formats—perfect for classrooms, mobile labs, or tight spaces. See page 18.



AMATROL®

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Hands-On Training for Power Transmission and Industrial Maintenance

DAC Worldwide Mechanical Drives Training Systems provide a comprehensive, hands-on learning experience that allows students to safely explore real industrial components while developing the practical troubleshooting and maintenance skills required in modern industry.

These training systems combine industrial-grade mechanical components with structured curriculum and instructor resources, giving educators the tools needed to teach core mechanical power transmission concepts with confidence.



Hands-On Industrial Components

DAC training systems use real industrial hardware, allowing students to develop skills that translate directly to the workplace.

Typical components include:

- Electric motors
- Belts and pulleys
- Roller chains and sprockets
- Spur and helical gears
- Flexible and rigid couplings
- Shafting systems
- Bearings and bearing mounts
- Adjustable bases and drive frames



Students learn how to **assemble**, **align**, and **troubleshoot** mechanical drive systems just as they would in real industrial environments.

Curriculum and Learning Resources

DAC Worldwide training systems are supported by comprehensive instructional materials designed to guide both instructors and students through the learning process.

Curriculum typically includes:

- Instructor guides
- Student learning activities
- Lab exercises and hands-on tasks
- Assessment tools and quizzes
- Illustrated technical references



These resources help instructors deliver structured lessons while **reinforcing critical mechanical maintenance skills**.

Ideal For

DAC Mechanical Drives training systems are widely used in:

- Industrial Maintenance programs
- Mechatronics programs
- Advanced Manufacturing programs
- Mechanical Technology programs
- Workforce development training
- Apprenticeship programs



They are ideal for **high schools**, **technical colleges**, **community colleges**, **universities**, and **industry training centers**.

Why Educators Choose DAC Worldwide

- Real industrial mechanical components
- Hands-on troubleshooting and assembly exercises
- Industry-relevant maintenance skills training
- Structured curriculum and instructor resources
- Durable systems designed for repeated classroom use

These systems help prepare students for careers in **industrial maintenance**, **manufacturing**, **mechanical technology**, and **mechatronics**.

Electrical Systems: Wiring, Control, and Power Distribution

Build electrical skills from fundamentals to troubleshooting.

Amatrol and DAC Worldwide deliver comprehensive electrical training solutions that mirror real-world industry. Students begin with AC/DC circuits and motors, then progress into motor control, wiring, power distribution, and variable frequency drives. Each system uses industrial components, giving learners hands-on experience in installation, programming, diagnostics, and troubleshooting while developing a strong foundation in electrical safety and applied theory.

Amatrol Electrical Systems

Step-by-step training in electrical theory, wiring, and troubleshooting.

Amatrol's electrical training systems build skills progressively—from basic AC/DC principles to advanced power distribution and VFD integration. Using durable hardware, interactive curriculum, and industry-standard components, learners practice installation, programming, and fault diagnosis to prepare for certifications and careers in electrical maintenance.



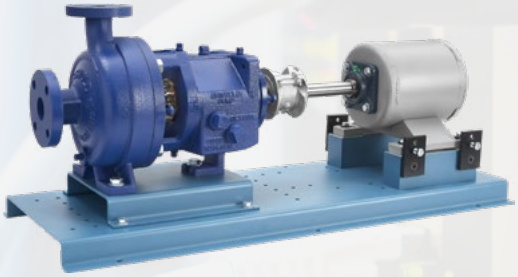
- **Basic Electrical Training**
  - AC/DC Electrical Systems (T7017)
  - Basic Electrical Machines (85-MT2)
- **Motor Control & Wiring**
  - Motor Control (85-MT5)
  - Electrical Wiring Training (850-MT6B)
  - Electrical Power Distribution (85-MT7-B)
  - Power Distribution Panels (85-MT6B)
- **Variable Frequency Drives**
  - VFD Training System (85-MT6)
  - Siemens VFD Option (85-MT6S)
- **Troubleshooting & Maintenance**
  - Electrical Maintenance Troubleshooting (950-MT1)

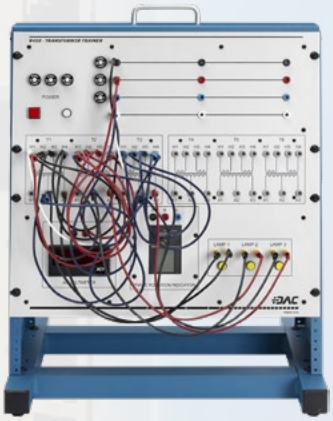
DAC Worldwide Electrical Systems

Hands-on training with dissectibles, cutaways, and wiring trainers.

DAC Worldwide complements Amatrol by focusing on real industrial hardware. With transformer wiring trainers, motor and gearbox cutaways, and sample boards, students see exactly how electrical systems are built and maintained. Dissectibles and troubleshooting aids reinforce installation skills, diagnostics, and component-level understanding—making abstract concepts tangible.

- **Basic Electrical Training**
  - Transformer Wiring Training System (408-000)
  - Electrical Wiring Training System (420-000)
  - AC Motor Cutaway (275-015)
  - DC Motor Cutaway (275-025)
  - Transformer Dissectible (273-020D)
- **Motor Control & Wiring**
  - Switchgear Cutaways (260-series)
  - Breaker / Contactor Cutaways (260-110 / 260-115)
  - Switch Sample Board (817-PAC)
- **Variable Frequency Drives**
  - Motor / Drive Cutaways for VFD integration (e.g., AC Motor Cutaway 275-015, Gearbox Cutaway 275-005)
- **Troubleshooting & Maintenance**
  - Fuse Sample Board (816-PAC)
  - Bearing / Motor Cutaways for failure analysis
  - Vibration Analysis (203-000, complements electrical maintenance diagnostics)





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Fluid Power Training Systems

Hands-on training in hydraulics, pneumatics, pumps and piping

Amatrol and DAC Worldwide offer comprehensive fluid power solutions that teach learners how to operate, maintain, and troubleshoot hydraulic and pneumatic systems. Learners progress from basic principles of pressure and flow to advanced circuits, electro-fluid power, and system diagnostics.



Amatrol Fluid Power Systems

From fundamentals to advanced fluid power and troubleshooting.

Amatrol's fluid power training systems build skills step by step, starting with the basics of hydraulics and pneumatics before advancing into electro-fluid power, troubleshooting, and system-level maintenance. Trainers are available in portable, single-sided, and double-sided formats, all featuring industry-grade components and interactive multimedia curriculum.

- **Hydraulics**
  - Basic Hydraulics (850-H1 / 850-HD1)
  - Intermediate Hydraulics (85-IH)
  - Advanced Hydraulics (85-AH)
  - Electro-Hydraulics (85-EH)
- **Hydraulic Maintenance & Troubleshooting**
  - Hydraulic Maintenance (950-HM1)
  - Basic Hydraulic Troubleshooting (950-HTB1)
  - Hydraulic Troubleshooting (950-HT1)
- **Pneumatics**
  - Basic Pneumatics (850-P1 / 850-PD1)
  - Intermediate Pneumatics (85-IP)
  - Advanced Pneumatics (85-AP)
  - Electro-Pneumatics (85-EP)
- **Pneumatic Troubleshooting & Construction**
  - Pneumatic Troubleshooting (950-PT1)
  - Pneumatic Fitting Construction (94-PFC-1)
- **Pumps & Piping**
  - Centrifugal Pump Systems (950-PM1, plus Turbine, Diaphragm, Peristaltic, Piston, Gear, Magnetic Pump options)
  - Piping Systems (950-PS1)

page 18

DAC Worldwide Fluid Power Cutaways

Real components, sectioned for hands-on learning.

DAC's Cutaways use authentic industrial components that have been restored and precision-sectioned to expose internal parts and functions. Mounted on durable steel baseplates, these models let learners see exactly how pumps, valves, cylinders, and gauges operate inside real hydraulic and pneumatic systems. Perfect for enhancing system-level training, they provide unmatched insight into component operation, maintenance, and troubleshooting.





- **Hydraulic Cutaways**
  - Component Cutaway Set (710)
  - Pressure Gauge Cutaway (773-050)
  - Filter Cutaway (773-055)
  - Flow Control Valve Cutaway (773-210)
  - Manual Flow Control Valve w/ Reverse Check Cutaway (773-210V)
  - Check Valve Cutaway (773-211)
  - Pilot-Operated Check Valve Cutaway (773-212)
  - Sequence Valve Cutaway (773-213)
  - Directional Control Valve Cutaway (773-215)
  - Pressure Relief Valve Cutaway, Balanced Piston-Type (773-217)
  - Bladder Accumulator Cutaway (773-195)
- **Pneumatic Cutaways**
  - Pneumatic Component Cutaway Set (760C)

Process Control and Instrumentation

Workforce-ready skills in process control and plant operations

Process control is the backbone of modern manufacturing, energy, and chemical industries. Amatrol, DAC Worldwide, Bayport, and Pignat provide complementary training solutions that teach learners how to measure, regulate, and troubleshoot pressure, flow, level, and temperature systems. From foundational skills to advanced unit operations, these tools prepare students for careers in process technology, instrumentation, and plant operations.

Amatrol T5550 Process Control Trainers

From single-loop fundamentals to advanced process readiness

The T5550 family focuses on one variable—pressure (T5552), flow (T5553), level (T5554), or temperature (T5555). These trainers build a solid foundation in measurement, calibration, and control before learners advance to multi-variable systems.

Key Skills:

- Single-variable measurement & calibration
- Step-by-step skill-building for careers
- Loop tuning and control basics
- Intro to PID control

Advanced Options

- Smart Flow Transmitter (T5552-F1)
- Ultrasonic Liquid Level (T5552-L1)
- HART Process Control (T5552-H1)
- Visualization Process Control (T5552-S1)

Connect All Four Systems to Create an Entire Process Plant!



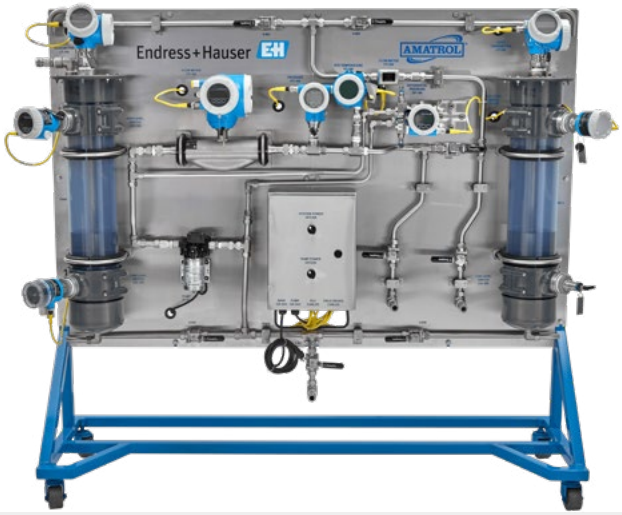
Amatrol T5600 Process Control Learning System

Comprehensive training in pressure, flow, level, and temperature control.

The T5600 integrates multiple variables into one system, allowing learners to study real-world process interactions. Students practice PID, cascade, and ratio control, plus advanced troubleshooting with fault-insertion.

Key Skills:

- Multi-variable process integration
- PID, cascade, and ratio loop control
- Hands-on troubleshooting with faults
- Training with industrial instruments



Smart Process Sensor Training

Industry 4.0 requires technicians fluent in digital instrumentation. Amatrol's line of Smart Process Sensor training options introduces learners to IO-Link, HART, and advanced calibration tools. Students practice configuration, diagnostics, and troubleshooting on the same technologies used in today's smart plants.

See Industry 4.0 and Smart Factory Solutions, p. 23

Certification Pathways

Amatrol's process control trainers are mapped to SACA Industry 4.0 certifications and related process technology credentials. This ensures students develop verifiable, workforce-ready skills for careers as process technicians, instrument specialists, and maintenance professionals.

See Certifications That Launch Careers, p 8.

page 18

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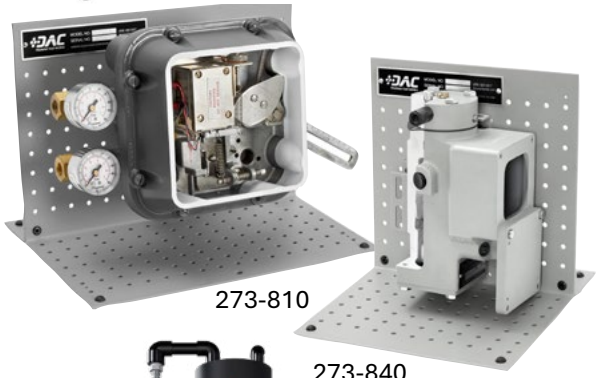
DAC Worldwide Process Control Systems

Hands-on troubleshooting and instrumentation with real industrial hardware.

DAC Worldwide complements Amatrol by providing **real industrial hardware** that makes instrumentation and process concepts tangible. With control loop trainers, transmitter cutaways, and calibration panels, students gain direct experience with the same tools they'll see in the field.



603-000



273-810

273-840



Training Systems

Comprehensive trainers that replicate industrial process loops and measurements.

- 4-Variable Advanced Process Control System (603-000EH / 603-PACEH)
- Smart Process Plant System (603-SP)
- Analytic Process Control System (605-000)
- Control Valve Characteristics System (618-000 / 618-CTL)
- Portable Calibration Training System (616-PAC)
- Level Measurement Training System (617-000 / 617-CTL)
- Flow Measurement Training System (619-000 / 619-PAC)

Cutaways

Industrial components sectioned for inspection and learning.

- Process-Type Pressure Regulator (273-110)
- Solenoid Valve (273-440)
- Venturi Flow Meter (273-710)
- Differential Pressure Transmitter (273-820)
- Shell & Tube Heat Exchanger (273-610)

Models

Scaled process hardware for classroom demonstration.

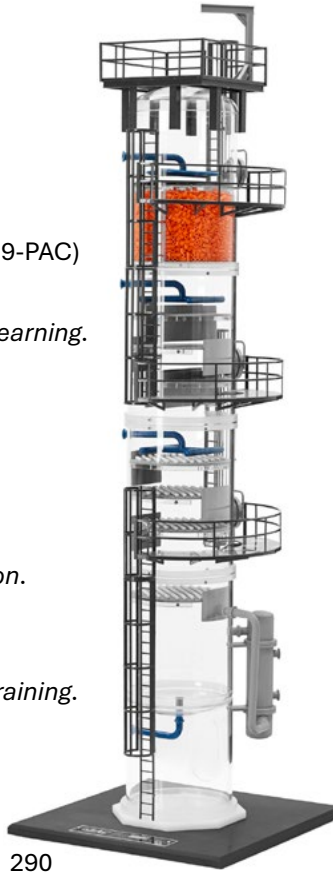
- Distillation Column Model (290)

Dissectibles

Teardown and reassembly for true component-level training.

- Control Valve Dissectible (255K / 255KE)
- Liquid Level Gauge Dissectible (272-475)
- Variable Area Flow Meter Dissectible (272-718)

Full list available upon request.



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MATRIX | PROCESS CONTROL

Benchtop PID trainers, available through TecSolutions.

BAYPORT TECHNICAL

Compact, Hands-On Process Control

Bayport's benchtop systems combine flow, level, and instrumentation fundamentals with options for remote supervision and customization.

- Custom Flow Level Control Trainer (120-CFLCD)
- Custom Process Trainer with Remote Supervision (120-CPT)
- Instrumentation Process Trainer (120-IPT)



Chemical Processing & Unit Operations

From tabletop experiments to advanced pilot plants.

Pignat provides complete chemical engineering training solutions for universities, technical institutes, and research centers. From bench-top experiments to pilot-scale systems, learners gain hands-on experience with the same operations used in chemical, petrochemical, pharmaceutical, and environmental industries. Each unit combines real instrumentation, durable construction, and optional data acquisition to connect theory with practice.

Distillation, Separation

- Distillation systems from bench-top to pilot plants, including crude oil and multifunction units.
- Absorption, extraction, crystallization, and adsorption systems for mass transfer studies.
- Filtration and ebulliometer units for purification and equilibrium analysis.

Heat Transfer & Energy

- Shell-and-tube, plate, and fin heat exchangers for comparing designs.
- Evaporation and condensation units from single to multi-effect and short-path.
- Energy recovery and efficiency demonstrators for sustainable operations.

Reactor Systems

- Batch, continuous, catalytic, and fluidized-bed reactor trainers.
- Specialized reactors for calorimetry, synthesis, and biodiesel esterification.
- Options from entry-level lab units to automated pilot systems.

Environmental & Sustainability Systems

- CO_2 recapture and gas absorption systems.
- Water and wastewater treatment trainers, including reverse osmosis.
- Air pollution control and scrubbing systems.



DVI/100

From Tabletop to Pilot Scale

- **Compact tabletop** trainers for quick experiments.
- **Bench-scale** systems for laboratory study.
- **Pilot platforms** and **configurable plants** with full instrumentation and data acquisition.


DVI/3000

ABS/2000





CO_2 Recapture & Gas Absorption

Hands-on training in carbon capture and sustainability

Pignat's CO_2 recapture units demonstrate the principles of gas absorption and regeneration used in modern carbon capture systems. Students explore solvent selection, mass transfer efficiency, and process optimization while connecting classroom concepts to real-world environmental applications. These trainers prepare learners to tackle today's sustainability challenges in chemical, energy, and environmental industries.

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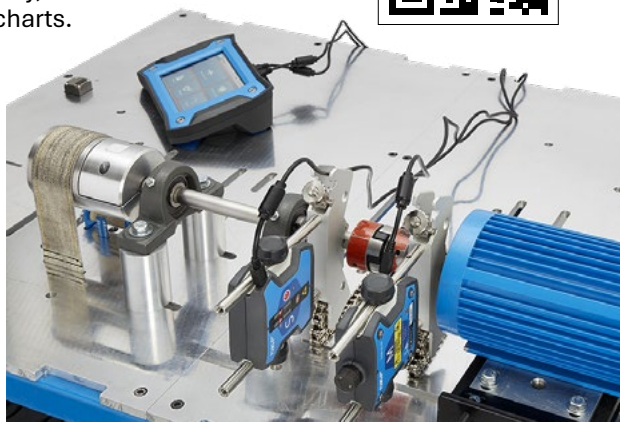
Cross-Disciplinary Training for Maintenance Careers

Hands-On Troubleshooting • Preventive Skills • Job-Ready Training

Industrial maintenance technicians keep operations running smoothly by ensuring equipment performs safely and reliably. Amatrol and DAC Worldwide deliver authentic, real-world training tools that prepare learners to install, operate, maintain, and troubleshoot the systems that keep industry moving.

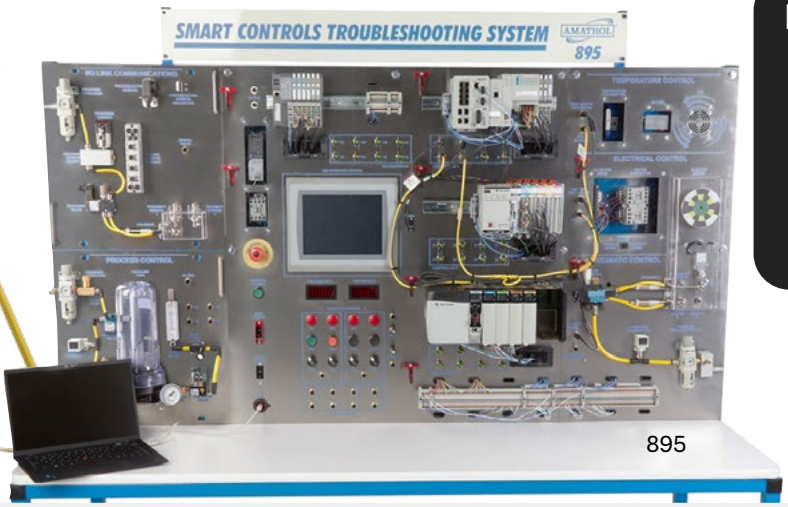
Amatrol Industrial Maintenance Systems

- **Expansions for Mechanical Drives (970-ME Series, see p. 10)**
  - **Vibration Analysis & Predictive Maintenance (97-ME5A):** Frequency, velocity, acceleration, isolation, and condition-based troubleshooting with severity charts.
  - **Laser Alignment (97-ME2A):** Precision shaft alignment, error analysis, soft-foot correction, and laser safety.
- **Fluid Power Toubleshooting (950-HTB1 / 950-PT1):** Hydraulic and pneumatic fault insertion, schematic interpretation, and systematic troubleshooting of fluid power systems.
- **Mechanical Fabrication (950-MPF1):** Assembly with torque wrenches, pipe threading, pneumatic fabrication, and fastening tools.
- **Rigging Systems (950-RGB1 / 95-RGB2 / 95-RGB3):** Safe lifting and load handling with hoists, slings, cranes, load calculations, knots, and equipment movement.
- **Electrical/Electronic Troubleshooting (895):** Fault insertion and guided diagnostics to build advanced troubleshooting skills across circuits and systems.





950-RGB1



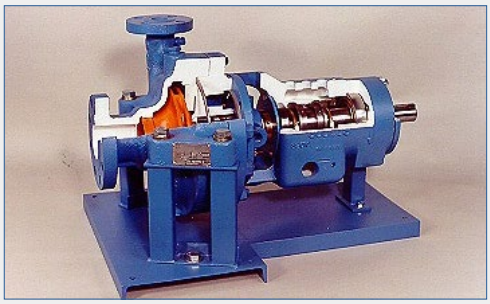
895

Key Features

- Industry-demanded skills
- Durable workstations
- Interactive curriculum
- FaultPro® troubleshooting
- Scalable training

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DAC Worldwide complements Amatrol Training



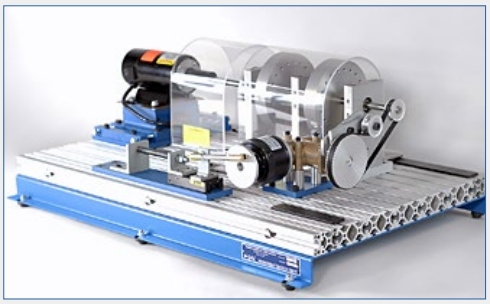
Cutaways & Dissectibles

Expose internal components for learning. Pumps, motors, bearings, gearboxes, and valves are precision-sectioned to reveal internal operation, while dissectibles allow teardown and reassembly.



Sample Boards

Mounted collections of bearings, seals, couplings, and fasteners give learners side-by-side comparisons to practice identifying, inspecting, and selecting the right components.



Alignment & Vibration Trainers

Durable trainers provide hands-on practice in shaft alignment, vibration analysis, and balancing—essential competencies for predictive maintenance and industrial reliability.

Amatrol Portable Training Systems

Train anywhere, without compromise.

Amatrol's **Portable Trainers** deliver industrial-quality technical training in almost any environment. Compact and easy to move, they provide the same authentic, hands-on skills as full-size
systems — without the space or transportation challenges.



Portable systems are ideal for:

- **Schools with limited lab space** – store in a closet, set up in minutes, and switch classrooms over just as fast.
- **Programs on the move** – trainers fit in a car and are easy to transport between locations.
- **High school programs** – low footprint and cost-effective entry point into advanced skills.
- **Supplemental training** – add troubleshooting or advanced topics without dedicating new lab space.

Students build skills in **electrical**, **electronics**, **fluid power**, **mechanical**, **motor control**, and **process control technologies**, with optional **FaultPro® electronic fault insertion** for realistic troubleshooting. Built with **industrial-grade components** and paired with Amatrol's **interactive multimedia curriculum**, portable systems ensure learners gain **job-ready skills** they can immediately apply.

Electrical

- **AC/DC Electrical (990-ACDC1):** Voltage and current principles; resistance, inductance, capacitance; circuit protection, breakers, and testers.
- **Relay Control (990-EC1 / 990-EC1F*):** Control logic, relay operation, time-delay relays, and machine modes.
- **Motor Control (990-MC1 / 990-MC1F* / 990-MC1FSL*):** Ladder logic, reversing motor control, input devices. The SL version features Siemens hardware.

Electronics

- **AC Motor Drives (990-DRV1 / 990-DRV1F* / 990-DRV1FM*):** Fundamentals of AC drives, 2- and 3-wire motor control, braking methods, drive vs. line starting. The FM version features Mitsubishi hardware.
- **Electronic Sensors (990-SN1):** Electronic sensor advantages and components; inductive, capacitive, magnetic reed sensors; sensor measurement and applications.
- **Power & Control Electronics (990-ELE1):** Power supply regulation, sensors, solid-state devices, speed & power control.
- **PLC – Allen-Bradley (990-PAB53A / 990-PAB53AF* / 990-PABCL1F*):** PLC operation, programming, PanelView Plus HMI, analog I/O.
- **PLC – Siemens S7-1200 (990-PS712 / 990-PS712F*):** PLC and HMI programming, motor control, event sequencing.
- **PLC – Mitsubishi (990-PM5UF*):** PLC troubleshooting with Mitsubishi FX5U PLC, FaultPro® electronic fault insertion, sequencing, and diagnostics.



Spotlight: *Portable Hydraulics Training*

Skill-Building for Basic Hydraulics Applications

- Topics include basic hydraulic circuits, pressure control circuits, hydraulic schematics, and sequence valves.
- Includes gauges, manifolds, cylinders, valves, flow meter, and hydraulic motor.
- Includes schematic symbols for each component, creating the ability to read and draw their own hydraulic schematics.

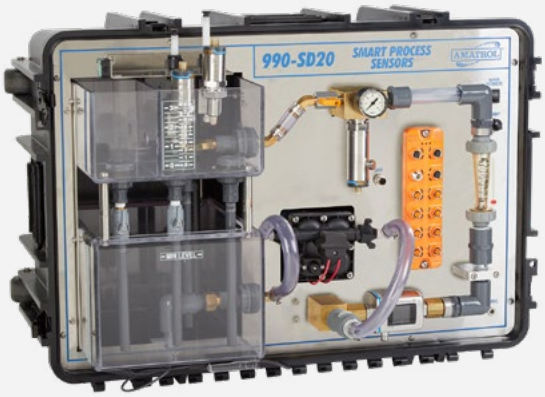


Go to tech-labs.com/portable for more information!

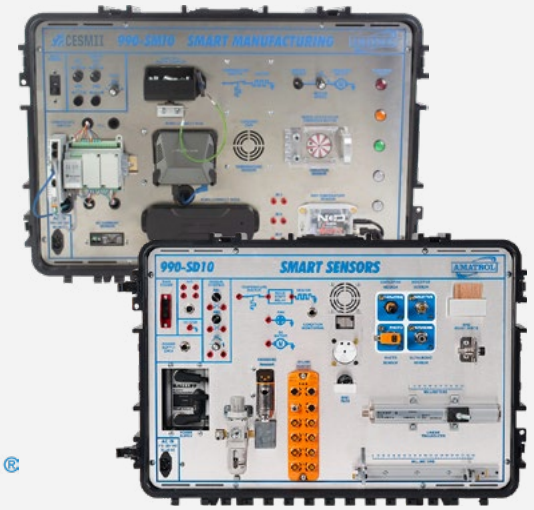
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Smart Factory / Industry 4.0

- **Smart Machine Sensors (990-SD10):** IO-Link master, PC software, and applications for analog pressure, proximity, RFID, linear position, and condition monitoring.
- **Smart Process Sensors (990-SD20):** IO-Link master and applications for analog flow, level, and hi/lo level sensing.



- **Smart Manufacturing – Micro820 (990-SM10):** Allen-Bradley Micro820 PLC with applications for temperature, energy efficiency, vibration monitoring, and production quality.
- **Smart Manufacturing – CompactLogix (990-SM10CL):** Rockwell CompactLogix PLC with applications for monitoring and production quality.
- **Smart Manufacturing – Phoenix Contact (990-SM10PH):** Phoenix Contact PLC with applications for temperature, energy efficiency, vibration monitoring, and production quality.



Visit page 23 for more Smart Factory training solutions.

Fluid Power

- **Basic Hydraulics (990-BH1):** Circuits, pressure and flow principles, speed and pressure control, troubleshooting basics.
- **Pneumatics (990-PN1):** Pneumatic circuits, valves, compressors, air logic, flow control, and maintenance.
- **Pneumatic Troubleshooting (990-PTB1*):** Troubleshooting regulators, vacuum, air prep, and machine sequence faults.

Mechanical

- **Mechanical Drives (990-ME1M):** Shaft speed, torque, power measurement; belts, chains, gears, alignment, installation, and analysis. Available in imperial and metric configurations.

Process Control

- **Process Control – Level & Flow (990-PC1 / 990-PC1F*):** Concepts, instrumentation, loop controllers, level/flow measurement & control.

Quality Assurance

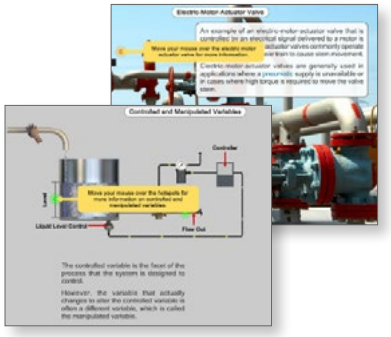
- **Measurement Tools (990-MES1):** Tape, dial, and digital calipers; measurement conversion; dimensional gauging.
- **Precision Gauging (990-PG1):** Tolerances, Go/No-Go gauging, and precision measurement applications.





Blended Learning

Combine portable hardware with engaging eLearning for a complete, flexible training solution.



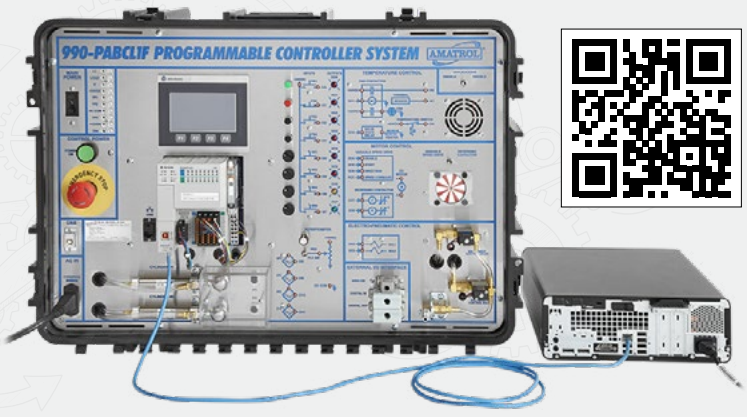
*Amatrol FaultPro® For Portables

Realistic Troubleshooting

- Safely insert realistic faults in motors, relays, PLCs, and circuits
- Hundreds of instructor-controlled failure scenarios
- Students practice troubleshooting anywhere training takes place

Portable systems + FaultPro = job-ready skills on the go!

*FAULTPRO
COMPUTER-BASED FAULT INSERTION SOFTWARE



When Safety Is Non-Negotiable, Train in VR

Workplace safety is the foundation of every successful manufacturing operation. People learn best by doing, and virtual environments provide a safe, immersive space where students build behavior-based safety habits that last. Paired with hands-on hardware trainers, these solutions help learners recognize hazards, follow procedures, and meet OSHA standards before entering the workplace.

Hard Hat VR – Immersive Safety Training

Hard Hat VR provides an engaging, risk-free environment where students experience real-world hazards across manufacturing, logistics, and construction. With a library of 20+ courses, learners practice hazard recognition and response in scenarios that mirror the job site.

Training Topics

- **General Industry & Construction Safety**: Confined Space Entry, Fall Protection, Ladder Safety, Scaffolding, Working at Heights
- **Fire & Emergency Preparedness:** Fire Evacuation, Fire Extinguisher Use, Fire Hazard Awareness, Chemical Spill Cleanup, First Aid & CPR/AED
- **Electrical & Industrial Safety:** Electrical Hazards, Lockout/Tagout (Electrical Room), Switchboard Operations, Magnum DS Breaker, Medium Voltage Switch (coming soon)

New courses can be developed to fit program requirements.

Key Outcomes

- Builds confidence in hazard recognition and safe response
- Reinforces OSHA and ANSI safety standards
- Combines hands-on and immersive training methods
- Helps reduce workplace accidents and downtime

Why VR Training Works

With VR, learners digest and retain complex information faster. By supporting multiple learning styles, VR training improves comprehension, boosts engagement, and reduces costly mistakes.

- Increases Learning Retention
- Reduces Costly Mistakes
- Flexible Learning Styles
- Increases Engagement
- Trackable Results







Real-World Lockout/Tagout Practice, Zero Risk

DAC Worldwide's **Lock-Out/Tag-Out Training System** (811-000) features a realistic, simulated working process environment that facilitates introductory training with hands-on activities related to the process of identifying and locking out sources of dangerous potential energy in an industrial setting.



Lock-Out/Tag-Out Training System

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eLearning, Virtual Training & Assessment

Flexible, Scalable Training for Every Classroom

Amatrol's digital training tools let schools teach advanced technical skills anytime, anywhere. From interactive online lessons to digital twin VR Smart Factory environments, these solutions expand access, boost engagement, and deliver measurable results.

Interactive eLearning

Amatrol's award-winning eLearning combines 3D graphics, animations, and simulations to make complex concepts engaging and accessible. Courses can stand alone or be paired with hands-on training for a complete blended solution.

Virtual Reality (VR)

The VR Smart Factory creates a digital twin of Amatrol's Mechatronics system. Learners observe system operation, adjust sensors and regulators, and troubleshoot in immersive environments. VR expands access, saves space, and builds Industry 4.0 familiarity in a safe, repeatable format.

Virtual Simulators

Many courses include embedded virtual trainers that mirror real equipment. Students can safely practice setup, operation, and troubleshooting skills online, gaining confidence and reducing risk before transitioning to hands-on hardware.

eAssessment

Amatrol's Learning Management System (LMS) integrates flexible testing tools, including pre- and post-tests, diagnostics, and skill tracking. Instructors can monitor progress, create customized learning paths, and generate reports to measure performance and mastery.

eLearning Highlights

- Over 1,100 modules / 287 courses
- More than 3,300 hours of content
- Courses take 2–3 hours each
- Flexible delivery — in-class, blended, or remote
- Interactive multimedia with knowledge checks & self-reviews
- Custom LMS branding available
- Pre- & post-tests plus eAssessment tools
- Endorsed by MSSC & NIMS for certification preparation



Benefits at a Glance

- Learn anytime, anywhere — ideal for blended or remote classrooms
- Safe, repeatable practice before entering the lab
- Boosts engagement with interactive, visual content
- Tracks student progress with real-time reporting
- Reduces cost by supplementing hardware with virtual tools
- Scales easily from a single classroom to district-wide programs

High School | Amatrol

Curriculum + Hands-On Training + Virtual Simulation + Project-Based Learning

Mastering Manufacturing for the Next Generation

Ignite: Mastering Manufacturing is Amatrol's turnkey high school program designed to spark student interest in advanced manufacturing and Industry 4.0 careers. Developed in collaboration with **LIFT**, **America Makes**, and **MxD**, and aligned with certifications like **SACA** and **MSSC**, Ignite blends career exploration, technical training, and project-based learning into one complete solution.

Curriculum Pathway

A six-course sequence that can be delivered as a 1-, 2-, or 3-year program.

- Introduction to Advanced Manufacturing
- Introduction to Systems
- Mechatronic Systems
- Digital Manufacturing Systems
- Advanced Materials & Design
- IIoT, Data Analytics & Networking

Each course includes eLearning, design projects, simulations, and labs with Industry 4.0 technologies.

Technical Skills

Students build a foundation in:

- Smart Automation, PLCs, and Robotics
- CAD/CAM, CNC, and Additive Manufacturing
- Electrical, Mechanical, Fluid Power, and Safety
- Networking, Cloud Data, Cybersecurity, and Analytics

Hands-On Technology

IGNITE workstations feature real industrial components:

- Smart sensors, HMI & PLC controls
- CAD/CAM integration with 3D printing and CNC
- Data analytics software and networking tools
- Interactive eLearning with embedded virtual trainers

Capstone & Employability Skills

Students apply what they've learned in team-based projects such as:

- Hovercraft
- Smart House
- Hydroponics System
- Solar-Powered Fueling Station

Alongside technical training, Ignite builds teamwork, communication, problem solving, and professionalism.

Premier High School Programs | Quick Access

Amatrol offers a wide range of high school programs to fit your needs — whether you want a 1-, 2-, 3-, or 4-year sequence. Supported by interactive eLearning and hands-on skill development, these programs prepare students for real careers in advanced technology.

Engineering Technology

Hands-on training with industrial components across automation, electrical, electronics, fluid power, materials, mechanical, process control, and HVACR. Includes print and multimedia curriculum, teacher guides, assessments, and instructor training.

Green Energy Technology

Focused training in wind turbine and solar energy systems. Students begin with foundational technical skills in electrical and mechanical systems, then progress into specialized renewable energy applications in installation, operation, and maintenance.

Construction & Maintenance Technology

Hands-on curriculum paired with simulators featuring real industrial components. Learners gain electrical, mechanical, and quality assurance skills that prepare them for success in both construction trades and industrial maintenance careers.

Integrated & Pre-Engineering Programs

- **Integrated Systems Technology (IST):** Pre-engineering program blending project-based learning with hands-on technical skills.
- **Integrated Technology Concepts (ITC):** A 1- to 4-year program where students complete team-based thematic projects to learn enterprise processes, technical skills, and employability skills.

Specialized Programs

- **Mechanical Maintenance and Industrial Maintenance Technology**: preparing students for critical technician careers.
- **CNC Machine Operator**: advanced machining skills including set-up, SPC, and inspection.
- **Precision Agriculture**: technical training in modern agricultural systems.
- **Biotechnology**: learning systems for biotech industry applications.

Amatrol high school programs deliver career exploration and job-ready skills in today's most in-demand industries.



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Smart Factory, Automation & Industry 4.0

Integrated Solutions for the Connected Workforce

From mechatronics and robotics to IIoT, logistics, and cyber-physical systems, our training partners deliver the resources educators need to build future-ready skills. These solutions combine advanced hardware, digital twins, interactive curriculum, and industry certifications to prepare learners for the smart manufacturing careers driving Industry 4.0.

Electronics Foundations

Building Blocks for Smart Factory Skills

Electronics knowledge underpins every Industry 4.0 system. From circuits and semiconductors to sensors and IoT devices, these trainers prepare learners for PLCs, robotics, and advanced automation.

Amatrol 970-DRV1 | Electrical Drives Learning System

The 970-DRV1 builds hands-on skills in operating, wiring, and troubleshooting AC electronic drives. Students learn to configure variable frequency drives (VFDs), adjust parameters, and test performance under load while emphasizing safety, diagnostics, and real-world applications.



Learners build critical skills in:

- Installing and wiring VFDs
- Configuring and programming drive parameters
- Monitoring performance under load conditions
- Troubleshooting faults safely and effectively
- Controlling torque, acceleration, and deceleration
- Applying energy-efficient drive strategies

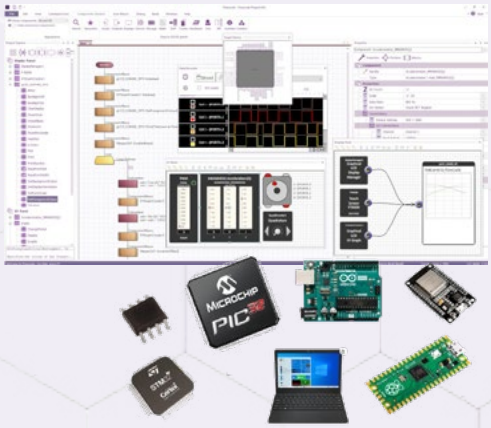
These skills provide essential preparation for advanced PLC integration, mechatronics, robotics, and Industry 4.0 careers.

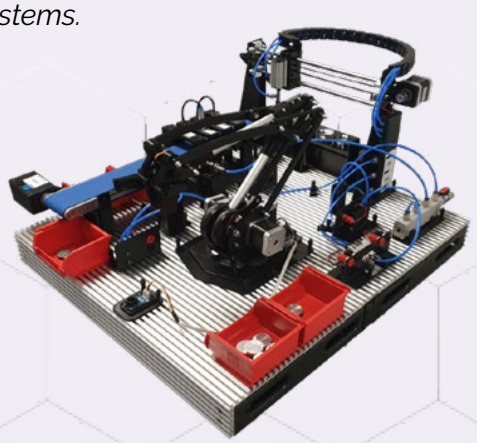
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Matrix TSL: *Building the Industry 4.0 Skillset*

Curriculum-driven labs for electronics, automation, IoT, and connected smart systems.







E-Blocks 2

Modular microcontroller platform with Arduino, PIC, and FPGA options, plus Grove® sensors for teaching electronics, programming, and IoT.

Flowcode

Visual programming software that lets students design, simulate, and debug microcontroller and automation projects quickly and effectively.

Smart Factory

Scalable lab cells that replicate Industry 4.0 environments with IoT connectivity, sensors, and integrated curriculum.

MATRIX

Available through: TecSolutions

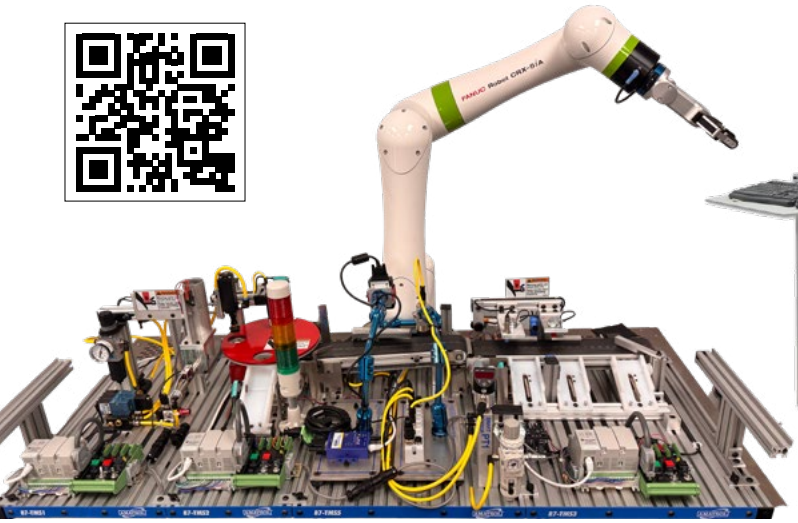
Also available: Industrial Maintenance, Micro CNC. See page 66 for more Matrix TSL solutions.

Amatrol Smart Factory Systems

From Tabletop Training to Full Enterprise Integration

Amatrol's Smart Factory training systems provide scalable pathways to Industry 4.0 skills. Each system aligns with specific curriculum objectives, allowing schools and workforce programs to build programs from foundational skills to advanced applications.

From the compact **Tabletop Mechatronics** system to the fully connected **Smart Factory Enterprise,** Amatrol's training solutions allow training facilities to scale their labs to fit space, budget, and curriculum goals. Each platform reinforces essential Industry 4.0 competencies—automation, data analytics, networking, and cybersecurity—while preparing students for **SACA-aligned certifications** and modern careers in advanced manufacturing.





Tabletop Mechatronics

Compact Automation for Any Lab

The Tabletop Mechatronics system introduces learners to the core technologies behind automated manufacturing. Modular stations feature conveyors, sensors, pneumatic actuators, and PLC control—delivering real-world skills in a compact format perfect for classrooms with limited space.

- Mechanical, electrical, and pneumatic integration
- PLC and HMI operation
- Basic system troubleshooting
- Component alignment and part transfer

> **Pathway:** Prepares students for advanced mechatronics and Smart Factory integration.

Industrial Smart Factory Mechatronics

Hands-On Training for Industry 4.0 Skills

The 870 Series replicates an industrial production line with interconnected stations for sorting, assembly, testing, and inventory control. Learners gain hands-on experience operating, maintaining, and optimizing automated manufacturing systems.

- Operating automated production cells
- Integrating PLCs, sensors, and HMIs
- Pneumatic and electrical troubleshooting
- Applying lean and predictive maintenance principles

> **Pathway:** Forms the core of Smart Factory training—expandable to advanced **Allen-Bradley** or **Enterprise systems**.

Earn Industry-Recognized Certifications with SACA

The **Amatrol Smart Factory (870 Series)** aligns directly with the **Smart Automation Certification Alliance (SACA)** to support stackable credentials in automation, networking, and Industry 4.0 technologies. Through SACA's structured certification pathway, students can validate skills in sensors, PLCs, robotics, and data analytics while gaining real-world experience on Amatrol's Smart Factory systems.

> SACA credentials are recognized by employers nationwide and designed in partnership with industry leaders to ensure training matches workforce demand.

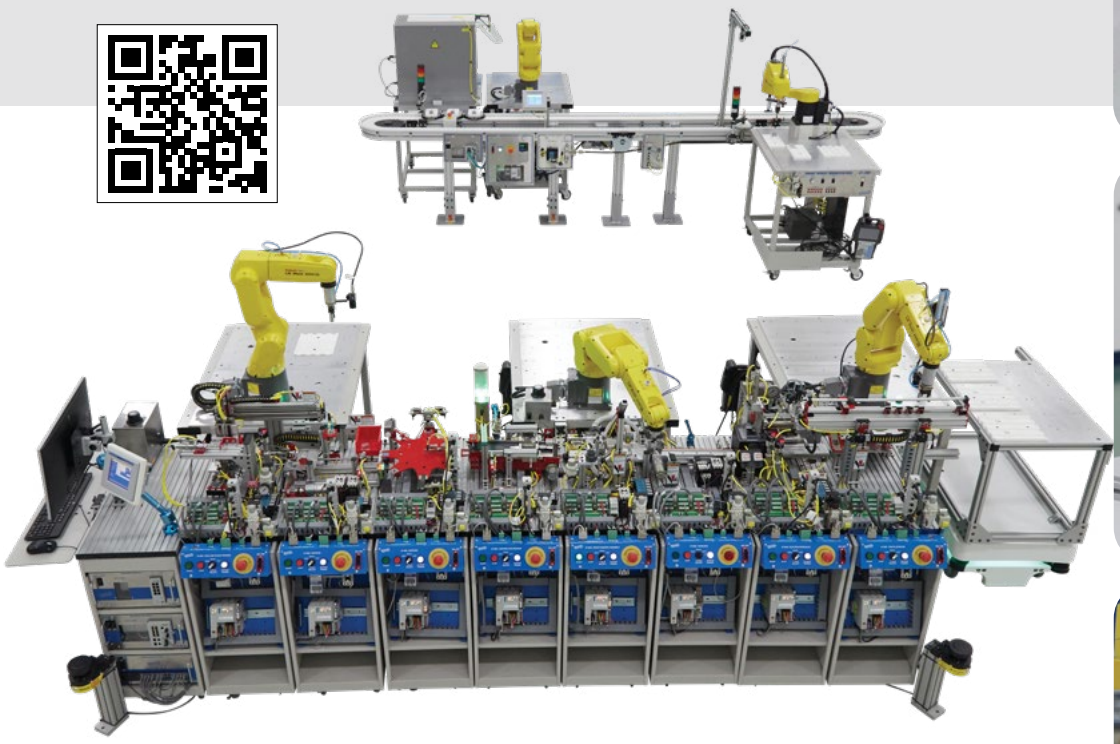
See page 8 to learn more.

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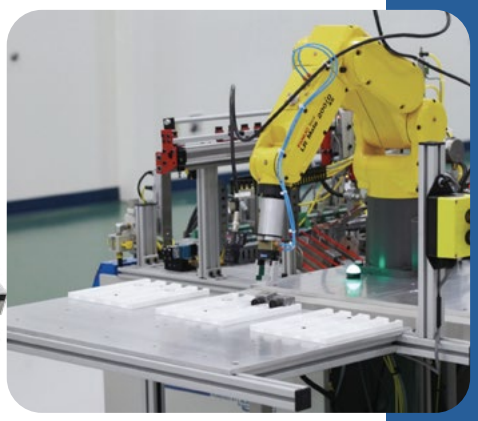
From Factory Floor to Enterprise Intelligence

Smart Manufacturing, Material Handling, and Robotics

- Autonomous Mobile Robot
- Smart Conveyor System
- Smart Robot Workcells
- Machining Center
- Smart Product ID / RFID Barcode
- Ethernet Communications & Network Security
- Integration & Flexibility









Smart Factory Enterprise System

Linking the Factory Floor to the Cloud

At the highest level, Amatrol's Smart Factory Enterprise integrates multiple smart factory systems into a unified enterprise. Learners explore **MES**, **ERP**, and **cloud-based data integration**, connecting operational data to business decisions across an entire organization.

- Enterprise resource planning and scheduling
- Production monitoring and remote diagnostics
- Data analytics and performance optimization
- Cybersecurity and cloud connectivity

Pathway: Demonstrates how Industry 4.0 technologies unify automation, data, and management for full digital transformation.

Next-Level Industry 4.0 Training

Step inside Industry 4.0 with the Amatrol VR Smart Factory (VR870-AB).



Portable Smart Manufacturing Training



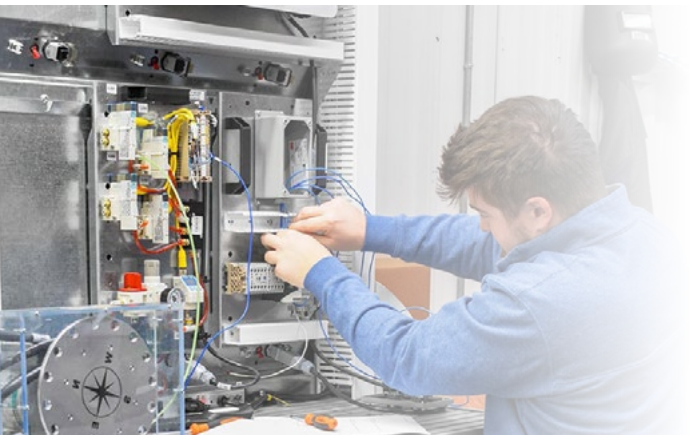
CESMII

page 18

Mechatronics & Smart Manufacturing Trainers

Bridging Classroom Learning and Real-World Automation

APT Manufacturing Solutions delivers hands-on mechatronics and smart manufacturing systems that connect PLC, robotics, and automation skills to real industrial environments. Designed for flexibility and scalability, these trainers complement Amatrol's Smart Factory and PLC/HMI systems, giving schools a complete pathway from foundational control to advanced Industry 4.0 integration.



iLS at a Glance

Scalable & Flexible Design
Start with core labs, then add PLCs, HMIs, sensors, or motor control on mobile or desktop benches with air and power.

Multi-Use, Modular Workstations
Interchangeable modules support electrical, pneumatic, and safety training.

Real-World Components
Built with industrial hardware and tools for true hands-on learning.

Seamless Integration
Connect with the APT PLC/HMI Trainer or FANUC robots for advanced automation.

Electromechanical Systems Trainer
iLS – Industrial Learning System

Hands-On Learning for Industrial Automation and Controls

The iLS is a flexible, industry-approved workstation for teaching **industrial automation controls, programming logic and interfacing, wiring and circuitry, fluid power, motor drives,** and **machine safety**. This multi-use platform features interchangeable lab modules that expand with your program. Add or swap modules anytime to introduce new labs or customize your setup.



Mobile Workstation

- Full-size bench with integrated air and power.
- Supports up to 12 modules plus tabletop devices.
- Modules hang, connect, and interlink to form functional control systems.

Desktop Workstation

- Compact, foldable, and portable for flexible classroom use.
- Connect multiple desktops for group or system-level exercises.

> **Module Categories:** Logic & PLCs · HMI Interfaces · Sensors & Electronics · Motor Controls · Fluid Power · Safety Systems · Custom Blanks & T-Slot Panels

PLC/HMI Trainer | iCC – Industrial Controls Center

Comprehensive Control and Integration Training

- Hands-on platform for PLC/HMI programming, ladder logic, and device integration.
- Teaches sequence-based control, EtherNet/IP networking, and robot integration.
- Available preassembled or as a student wiring kit for hands-on builds.
- Includes CompactLogix 5000 PLC, PanelView 5000 HMI, Ethernet switch, wireless bolt, and configurable I/O.
- Optional sensor, pneumatic, and conveyor kits expand into motion and data control.
- Compatible with FANUC CERT and Rockwell Automation EDU Toolkit.



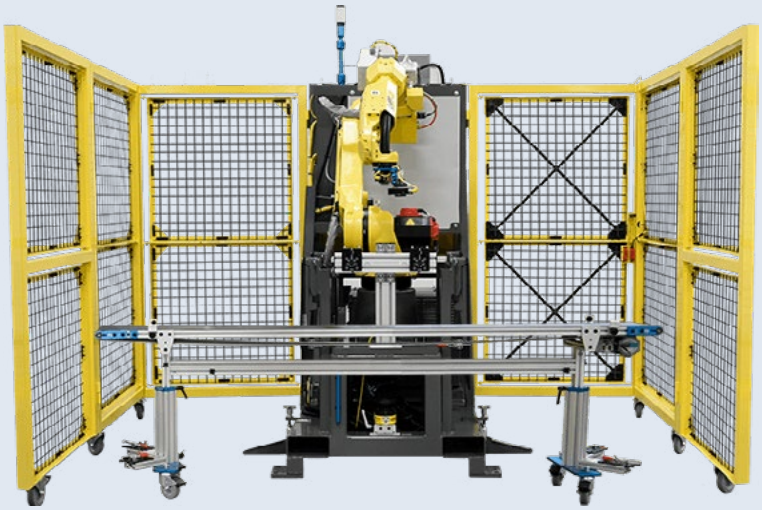
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Mechatronics Trainer

Integrated Automation System for Hands-On Learning

- Complete workstation combining **sensors, actuators, conveyors,** and **PLC control**.
- Teaches system integration across **mechanical, electrical,** and **automation components**.
- Supports real-world troubleshooting and control logic exercises.
- Ideal bridge between PLC/HMI training and full Smart Factory systems.





Advanced Manufacturing Material Handling

Robotics and Conveyor-Based Automation Training

- Modular cell featuring **robotic pick-and-place** and **smart conveyor operations**.
- Students learn **programming, motion control**, and **data-driven process flow**.
- Expandable for team projects or system-level automation labs.
- Perfect for illustrating **Industry 4.0 material handling** concepts.

CSM™ – Smart Manufacturing Training System

Integrated Automation System for Hands-On Learning

- Advanced cell integrating **PLCs**, **robotics**, **sensors**, and **data analytics**.
- Demonstrates **networked control**, **machine communication**, and **IIoT integration**.
- Provides real-world experience with **smart sensors** and **data collection**.
- Aligns with **Industry 4.0** and **SACA certification** pathways.



OnRobot

OnRobot WebLytics, Sensors, and Vision Tools

Intelligence at the Edge of Automation

OnRobot's **grippers**, **sensors**, and **vision** systems expand the capabilities of collaborative robots and automated workcells. Students explore how smart end-effectors enhance precision, flexibility, and safety in automated handling and assembly tasks.

WebLytics provides live performance dashboards, quality analytics, and predictive insights—linking robotics and data to real-world manufacturing performance.

AI, Robotics & Machine Vision

Preparing Learners for Intelligent Automation

This section highlights robotics, AI-enabled systems, autonomous technologies, and vision tools that are transforming modern manufacturing and logistics. It's the bridge between Smart Factory and emerging automation fields.

Industrial Robotics & Cobots

FANUC

Train with the Same Robots Used in Industry

FANUC's educational robotics solutions bring real-world automation into the classroom. Built on the same hardware and software trusted by manufacturers worldwide, these systems give students hands-on experience with robotic programming, vision systems, and collaborative automation.

FANUC CRX Collaborative Robots

Lightweight, safe, and easy to use, the **FANUC CRX cobot** allows learners to program and operate robots in shared workspaces. The intuitive **teach pendant** with drag-and-drop interface helps students quickly understand motion control, path creation, and end-effector integration—no coding experience required. Pair with **OnRobot grippers**, **sensors**, or **vision tools** for realistic Industry 4.0 applications.

Integration & Pathways

FANUC robots integrate seamlessly with **APT PLC/HMI Trainers**, **Amatrol Smart Factory** systems, and **OnRobot end-effectors**. Together, they create a complete automation ecosystem for developing workforce-ready skills in **robotics**, **vision systems**, and **intelligent manufacturing**.





Shown with OnRobot end of arm tools.

FANUC CERT Cart

A portable, turnkey robotics training system featuring **FANUC HandlingTool** and **iRVision** software. Students learn setup, programming, and fault recovery using industry-standard methods and equipment. The CERT Cart supports **FANUC Certifications** in HandlingTool Operations, iRVision, and Material Handling.

Available Options: Fenceless CRX-5iA and CRX-10iA Cobot CERT Carts, ArcMate 50iD/7L, SR-3iA SCARA, and ER-4iA (Enclosed or Fenceless) CERT Carts, plus a K-12 Introductory Robotics Package.

Programming + Vision Integration

Building Intelligent Automation Skills

FANUC Teach Pendant Programming

- Intuitive, icon-driven interface for motion control and path creation.
- Supports drag-and-drop or code-based programming (TP language).
- Teaches startup, troubleshooting, and I/O configuration used in industry.
- Students learn sequence logic, end-effector control, and safety setup.



FANUC iRVision

- Integrated 2D/3D vision system that gives robots the ability to "see."
- Teaches part recognition, inspection, alignment, and quality verification.
- No external hardware—fully embedded in the robot controller.
- Ideal for learning AI-driven automation and adaptive manufacturing.

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Levil RoboMill

Bridging CNC Machining and Robotics Training

Levil's RoboMill combines a compact **CNC milling machine** with a **collaborative robotic arm** to create a fully integrated automation cell for education. Students learn real-world machine tending, part loading, and precision machining while programming both the robot and CNC in a unified environment. The RoboMill provides hands-on experience with industrial automation concepts—ideal for introducing the link between machining, robotics, and smart manufacturing systems.



Training Benefits

- Teaches CNC machining, robot programming, and coordinated operation
- Safe, compact, and classroom-ready for hands-on learning
- Supports Industry 4.0 and mechatronics curriculum integration
- Expands naturally into FANUC CERT and automation pathways

View More CNC Training Systems → See page 34.

Whether you're teaching basic G-code programming or exploring advanced robotic automation, the EDU RoboMill makes it possible—all from a single compact system.

APT MANUFACTURINGsolutions

Any robot you choose. One **OnRobot** system.

Now equip your robots with **plug-and-produce OnRobot end-effectors** for collaborative and light industrial applications. Choose from a wide range of grippers, sensors, and vision tools to quickly adapt to changing lab projects. Add the OnRobot **Compute Box**, **I/O Tester**, or **WebLytics** analytics to create simulation and proof-of-concept exercises—without taking robots or workstations offline.





onrobot

From Automation to Welding Robotics

Bridge robotics and fabrication with automated welding cells that teach programming, motion coordination, and process integration.

Learn More → See page 34: Robotic Welding Systems.



From Mobility to Perception

Training the Future of Intelligent Systems.

STOKES EDUCATION

Stokes Robotics – AI & Autonomous Platforms

Building Skills in Mobility, Autonomy, and Intelligent Systems

Stokes Robotics develops cutting-edge robotic platforms that bring artificial intelligence, mobility, and autonomy into education. Designed for K–12, college, and technical training programs, these systems emphasize navigation, perception, and real-world problem solving through hands-on learning. Each platform includes integrated curriculum and educator support, helping students build programming, robotics, and AI control skills for tomorrow's workforce.



Stokes Robotics at a Glance

- **AI** & **Autonomous Platforms** for education and training.
- **SHEP** – Quadruped robot for safety, inspection, and response.
- **LIMO** – Compact AI robot for mapping and path planning.
- **GIGI** – Wheeled robot for navigation, mapping, and inspection.
- Teaches **mobility**, **autonomy**, and **AI-driven decision-making**.
- Includes **curriculum**, **programming tools**, and **educator support**.

SHEP



SHEP is a four-legged, AI-enabled robot designed for **safety**, **inspection**, and **emergency-response training**. It features a secure operating system, wireless connectivity, and flexible programming for classroom or field use. Students can program autonomous patrols, hazard detection, and response missions while gaining hands-on experience with real-world robotics and AI navigation.

GIGI



GIGI is a **humanoid robot** that teaches students the principles of **artificial intelligence**, **programming**, and **human-robot collaboration**. Using vision, speech, and motion control, it can recognize faces, respond to gestures, and interact through conversation or coded behaviors. Students use **Python**, **ROS**, or **Blockly** to program GIGI and explore topics in **AI perception**, **communication**, and **adaptive learning**.

LIMO



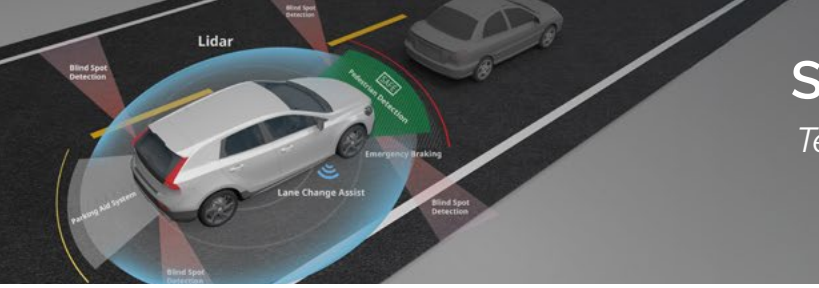
LIMO is a **compact**, **vision-based robot** for teaching **AI navigation**, **mapping**, and perception. Outfitted with **LIDAR**, **depth cameras**, and **ROS control**, it allows students to program **autonomous driving**, **obstacle detection**, and **path-planning operations**. Its portable, classroom-friendly design makes it ideal for hands-on projects in robotics and autonomous mobility.

Education & Integration

Stokes Robotics provides complete curriculum packages, training programs, and educator support to ensure successful implementation at every level—from middle school to advanced technical colleges. Each system integrates with AI, vision, and sensor technologies for comprehensive robotics education aligned with real-world industry standards.



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Smart Vehicle & LIDAR Systems

Teaching the Technology Behind Driverless Mobility

Lucas-Nuelle's Advanced Driver Assistance Systems (ADAS) trainers bring autonomous and connected vehicle technology into the classroom. Students explore how **LIDAR**, **radar**, **cameras**, and **communication networks** work together to perceive surroundings, interpret data, and control intelligent mobility systems.

Hands-on experiments simulate real-world applications such as **Adaptive Cruise Control**, **Lane Keeping Assist**, and **Traffic Sign Recognition**, integrating theory with **diagnostics** and **calibration exercises** that prepare learners for advanced automotive and mechatronics careers.

Each system combines **UniTrain hardware**, **interactive software**, and **authentic automotive components** to deliver a complete understanding of **autonomous mobility**, **safety systems**, and **sensor integration**.

LUCAS-NUELLE

Core ADAS Training Systems

Front-Facing Camera System – Lane Assistance

Teaches lane keeping, centering, and departure warning through camera-based image processing and steering feedback control.

LIDAR – Autonomous Driving Trainer

Demonstrates optical distance measurement, 3D mapping, and object detection in self-driving environments.

Gesture Control & Capacitive Touch Interface

Introduces intuitive input systems through touch and gesture-based interaction found in modern vehicles.

Park Assist System with Rear-View Camera

Combines ultrasonic and camera sensors to teach obstacle detection, diagnostics, and automated parking maneuvers.

Radar – Adaptive Cruise Control (ACC) with Emergency Braking

Uses radar signals to maintain safe following distance and initiate braking when collisions are detected.

Traffic Sign Recognition (TSR) & Preemptive Speed Control

Camera-based AI identifies and interprets road signs, integrating with speed regulation for predictive control.

Calibration of Driver Assistance Systems – Front Camera & Radar

Hands-on station for sensor alignment, testing, and fault correction—critical for ADAS service and maintenance.



CAN Bus Communication Trainer

Teaches the fundamentals of **Controller Area Network (CAN Bus) communication**, the backbone of modern vehicles. Students analyze live sensor and ECU data, practice message decoding, and perform network diagnostics to understand how ADAS components share information across connected systems.

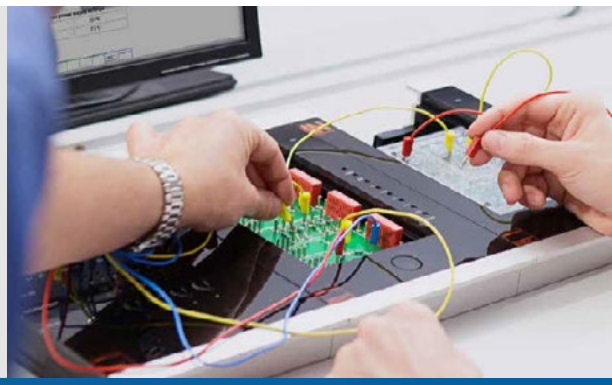
Key Skills

- Sensor fusion with LIDAR, radar, and vision systems
- ADAS diagnostics and calibration
- CAN/LIN communication analysis
- Object detection, mapping, and vehicle control

Powered by UniTrain

The Complete Digital Learning Platform from Lucas-Nuelle

All Lucas-Nuelle training systems are built on the UniTrain platform—a modular blend of hands-on hardware, interactive software, and multimedia curriculum. UniTrain allows students to perform real measurements, simulations, and fault diagnostics while connecting theoretical knowledge to practical automotive and mechatronic applications.



Mod-Weld Robotic Welding Training System

Hands-On Robotic Welding for Education & Workforce Training

APT MANUFACTURINGsolutions

MOD-WELD

The **APT Mod-Weld Training System** delivers real-world robotic welding experience in a compact, classroom-ready format. Designed for schools and workforce centers, this modular cell integrates **FANUC's industry-standard robot** and **Fronius' advanced TPS/i welding technology**, giving learners direct exposure to the same hardware and software used on modern production floors.

The Mod-Weld system combines **automated process control**, **offline programming**, and **live welding** capabilities to bridge the gap between manual skills and robotic automation. It supports **MIG/MAG**, **TIG**, and **advanced pulse processes**, enabling learners to master everything from part setup and fixture design to path teaching and weld quality analysis.

Training Advantages

- Provides realistic **hands-on welding automation** experience with integrated safety enclosure
- Features **FANUC CRX** or **LR-Mate robot options** with intuitive teach pendant and simulation software
- Incorporates **Fronius TPS/i Smart Welding Platform** for adaptive arc control and digital parameter monitoring
- Teaches robot **programming**, **torch positioning**, **weld sequencing**, and **process optimization**
- Compact, mobile design for classroom, lab, or SkillsUSA competition environments
- Ideal for programs aligned with **AWS**, **SACA**, and **NIMS** certifications

Expandability & Integration

Pair the Mod-Weld with Amatrol's Robotic Welding eLearning, or integrate into a Smart Factory or Mechatronics Lab to provide a complete Industry 4.0 welding automation pathway. Optional vision systems and multi-robot configurations prepare students for advanced robotic fabrication careers in automotive, aerospace, and heavy manufacturing.

Technical Training Outcomes

Students learn to:

- Operate and maintain industrial robots and welding equipment
- Develop and test welding programs offline and on the robot
- Adjust and optimize welding parameters for material types
- Apply safety standards for automated cells
- Troubleshoot robotic and welding system errors

Perfect For

- High school advanced manufacturing programs
- Technical colleges and universities
- Workforce development & upskilling centers
- Industrial apprenticeship programs







Mobile robotic welding.
Real-world skills.

Core System Components

- APT Mod-Weld Robotic Welding Cell
- FANUC Industrial Robot (CRX-10iA, CRX-5iA, or LR Mate 200iD)
- Fronius TPS/i Welding Power Source
- APT Modular Welding Table & Fixture Kit
- Safety Enclosure with Light Curtain
- Simulation & Offline Programming Software

Fronius

FANUC

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Lincoln Electric Welding Education Solutions

Training the Next Generation of Skilled Welders

Lincoln Electric delivers a complete welding training experience — from virtual simulation to real-world application. With VRTEX® Simulators, ClassMate® Workstations, Prism® Fume Extraction, and Plasma Cutting Tables, educators can build safe, engaging, and industry-relevant welding labs.

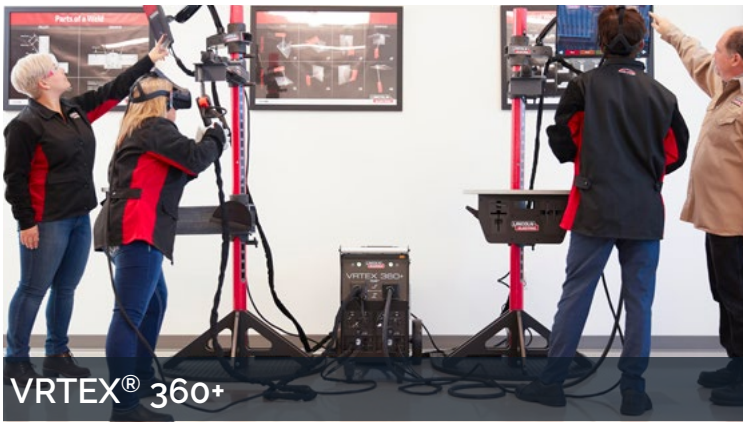
VRTEX® Virtual Welding Simulators

Realistic. Repeatable. Cost-Effective.



VRTEX® 360 Compact

The VRTEX® 360 Compact offers the same high-fidelity welding simulation in a smaller, mobile footprint designed for classrooms, labs, and recruitment events. It supports multiple welding processes, realistic coupons, and detailed scoring, while drastically reducing consumable costs and lab setup time. Perfect for portable training applications and blended learning environments preparing students for AWS or SACA certification pathways.



VRTEX® 360+

The VRTEX® 360 is an advanced virtual welding simulator, delivering highly realistic arc behavior, sound, and motion tracking to teach GMAW, SMAW, FCAW, and GTAW processes in a safe, repeatable environment. Instructors can monitor progress, track performance data, and reinforce welding fundamentals without consuming materials or producing fumes. Ideal for programs focused on **AWS** or **SACA-aligned** skill development and performance-based assessment.

DAC Worldwide Weld Fault Kit

- Real welded samples with intentional defects
- Teaches visual inspection and quality evaluation
- Aligns with AWS weld inspection standards
- Reinforces weld fault identification and classification



Welding Booths

Lincoln Electric welding booths create safe, organized workstations for hands-on welding training, helping protect students and instructors while supporting professional shop layout and safety standards.



Welding Lab Layouts That Boost Engagement and Safety for Students

Educational & Entry-Level CNC

From Classroom Concepts to CNC Confidence

Students begin their machining journey with foundational CNC mills and lathes from Levil Technology and Denford, supported by FANUC CNC simulators and control panels that teach authentic G-code programming before cutting a single chip. Together, these systems provide a complete pathway from virtual training to real machining.



Levil Technology

Compact, Capable, and Classroom-Ready

Levil's desktop CNC systems combine industrial performance with education-focused design. These durable machines let students learn real machining processes in a compact footprint that fits any lab.

- **EDU MiNi MiLL:** Compact 3-axis CNC milling machine designed for hands-on classroom training.
- **EDU MiLL:** Combines CNC milling and 3D printing for hybrid manufacturing education.
- **MiniLathe:** Compact CNC turning center that introduces students to lathe operations, programming, and part production using real cutting tools in a safe, desktop-sized system.
- **LMV-300 / LMV-400:** Advanced training mills that teach tool setup, offsets, and part programming using real aluminum stock.
- **LTC-30 Turning Center:** Classroom-safe CNC lathe for introducing multi-axis turning fundamentals.



Training Benefits

- True 3-axis, 4-axis, and 5-axis machining options in a compact footprint
- Real cutting capability for both milling and turning applications
- Intuitive interface and cloud-ready control software
- Optional tool changers, probing systems, and accessories for advanced training
- Smooth progression to FANUC CNC simulators and industrial machining systems



Denford CNC

Design to Manufacture in One Platform

Denford's range of CNC routers, mills, and lathes—paired with **Fusion 360** or **QuickCAM PRO**—helps students learn the full workflow from CAD design to finished part. Ideal for high schools, Fab Labs, and maker education, Denford systems bridge design thinking and technical precision.

- Safe, enclosed systems perfect for classrooms
- Ideal foundation for progression to industrial CNC

FANUC CNC Education Tools

FANUC CNC Simulators and Control Panels

These classroom-ready systems replicate the authentic FANUC 0i-F Plus experience, allowing students to learn G-code programming, tool setup, and part editing on real hardware before progressing to full machining centers.

- Genuine FANUC interface and controls
- Portable, safe, and ideal for classrooms
- Prepares students for certification and hands-on machining
- Perfect bridge between CAD/CAM and physical CNC systems



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FANUC CNC & Integrated Automation

From CNC Programming to Automated Production

FANUC CNC controls power more than half of the world's industrial machines — and with education systems from APT, schools can deliver the same experience in the classroom. From simulation and programming to full machining and robot-tending cells, students gain the real-world skills to operate and automate precision manufacturing systems.

FANUC CNC Training Systems

FANUC Education Systems Deliver Real-World CNC Experience

FANUC's scalable training solutions—from simulators to full machining centers—give students practical experience in CNC setup, programming, and operation using authentic FANUC controls. Courses integrate with the CERT curriculum and align with SACA and NIMS certifications to prepare learners for advanced manufacturing careers.



Training Benefits

- Industry-standard FANUC controls used in global manufacturing
- CERT curriculum with guided programming and machining exercises
- Supports SACA and NIMS certification pathways
- Scalable systems for introductory through advanced CNC training
- Seamless transition into robotics and smart factory applications

ROBODRILL -DiB Machining Center

High-speed 3- or 5-axis machining solution powered by genuine FANUC controls. Designed for advanced technical and college-level programs, it delivers true cutting performance and automation readiness in a compact, energy-efficient footprint.

CNC Control Training Panel

Stand-alone control console that mirrors the FANUC 0i-F Plus interface. Students can learn diagnostics, part program editing, and machine operation through hands-on interaction with authentic hardware — the same system used in global manufacturing facilities.

CNC Education Packages

Comprehensive turnkey bundles that combine hardware, software, and FANUC's CERT curriculum. Available in modular configurations, these packages provide schools with everything needed to teach machining, programming, and integration with FANUC robotics and Industry 4.0 systems.

APT CNC & Machine Tending Systems

Bridging CNC Machining and Automation

APT's CNC solutions combine FANUC CNC technology with industrial automation, providing scalable training systems. Options range from stand-alone machining centers to complete robot-tending cells.

- **CNC Vertical Machining Center:** Compact industrial mill powered by FANUC controls; ideal for advanced machining programs.
- **Robot Machine Tender & Vertical CNC:** Integrated training cell pairing a FANUC robot with a CNC machining center for real-world automated manufacturing experience.
- **Robot Machine Tender & CNC Simulator:** Portable setup combining robot control and CNC simulation for programming and workflow training without cutting materials.



FANUC LR Mate ER-4iA robot (above)

FANUC CRX-5iA cobot (left)

Training Benefits

- **Teach full production workflow:** CNC programming, machining, and part handling
- Aligns with **FANUC CERT** and **SACA** Industry 4.0 certifications
- Modular, space-efficient design for labs and classrooms
- Expandable to include robotic welding, palletizing, and smart factory applications



SimSpray® Virtual Painting & Coating

Real-World Painting Skills—Developed in a Virtual Environment

SimSpray® delivers immersive, hands-on training for spray painting and coating, combining virtual reality, motion tracking, and performance analytics to build real-world skills—without the cost, waste, or environmental impact of traditional paint booths. Students practice HVLP, Airless, Air-Assisted Airless, and Powder Coating applications in a safe, controlled, and repeatable environment.

> SimSpray® replicates authentic spray gun operation, distance, and technique—allowing learners to master fundamentals like overlap, speed, and angle while instructors track performance metrics, material usage, and transfer efficiency.

	SimSpray®	SimSpray Go®
Purpose	Full-featured VR training system for advanced coating programs	Compact, portable trainer for introductory and outreach programs
Training Modes	HVLP, Airless, Air-Assisted Airless, Powder Coating	HVLP and Powder Coating fundamentals
Applications	Technical colleges, apprenticeship programs, and advanced finishing labs	High schools, recruitment events, and career exploration programs
Setup	65” display, large spray booth environment	Laptop-based system with lightweight headset
Performance Tracking	Real-time scoring, data logging, replay, and skill analytics	On-screen feedback and guided instruction
Mobility	Fixed or mobile cart configuration	Ultra-portable—set up in under 10 minutes

SimSpray® and SimSpray Go® help educators and workforce programs prepare the next generation of painters and coaters—*safely*, *efficiently*, and *sustainably*.

Training Benefits

- Reduce materials, cleanup, and environmental waste
- Build muscle memory and spray technique through repetition
- Shorten learning curves for novice painters
- Reinforce OSHA and EPA-friendly practices
- Track progress through objective performance metrics
- Expand capabilities over time with modular parts and industry-specific content packs



Diverse part library for realistic spray scenarios

Train Green!®

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Virtual Reality Nursing & EMS Training Solutions (VRNA)



Immersive, Scalable, and Aligned with Real-World Healthcare Practice

VRNA delivers a fully immersive virtual reality environment for healthcare and emergency response training. Designed for CNA, EMS, and allied health programs, VRNA allows students to perform clinical and field care procedures safely and repeatedly using a lightweight VR headset.

Each module provides guided instruction, skill assessment, and real-time feedback—building confidence and competency across patient care, trauma, and life-support scenarios. Instructor dashboards and the Performance Portal® track student progress and skill mastery while aligning with state and national certification standards.

By reducing instructor workload and material costs, VRNA extends training capacity and improves learning outcomes for healthcare and first responder programs.



Benefits for Educators

- Scalable simulations that reduce cost and setup time
- Built-in analytics for skill assessment and reporting
- Standardized instruction across campuses and cohorts
- Customizable modules to match curriculum objectives
- Compatible with blended and LMS-based learning

Benefits for Students

- Realistic, scenario-based skill practice in a safe environment
- Immediate performance feedback and progress tracking
- Builds critical thinking and situational awareness
- Strengthens readiness for clinical rotations and certification exams
- Increases confidence in patient care and emergency response

Applications

- **Nursing Education:** Patient care, triage, medication administration, communication
- **EMS Training:** Scene assessment, trauma management, and emergency response
- **Allied Health:** Interprofessional collaboration and critical thinking development

Skills Covered

Each skill listed below is included in one or more of VRNA's scenario-based VR modules, providing comprehensive training across nursing and EMS competencies.

Patient Care

Ambulation Assist (Cane, Crutches, Walker)
Assist with Anti-Embolism Stockings
Bed Bath / Shower Assist
Bedpan & Urinal Assist
Blood Pressure
Catheter Care / Collect Urine Sample / Measure Intake & Output
Denture Care
Dressing
Hand Hygiene & Gloving
Height & Weight
Indirect Care
Making Bed (Occupied & Unoccupied)
Massage Back
Meal Assist
Mouth Care (Conscious & Unconscious)
Nail Care / Shaving
Obstructed Airway Response
Passive Range of Motion
Perineal Care
Positioning (Side, Supine)
Pulse & Respiration
Temperature (Oral, Axillary, Tympanic)
Transfer Assist

EMS

CPR / AED
Assist with Non-Complicated Childbirth
BVM Ventilation of an Apneic Adult
Bleeding Control / Shock Management
Long-Bone & Joint Immobilization
Oxygen Administration by NRB
Patient Assessment (Trauma & Medical)
Spinal Immobilization (Seated & Supine)
Vehicle Extrication

VRNA EMS

TacMed Simulation Training Solutions

Realistic Trauma, Tactical, and K9 Medical Training

TacMed Solutions develops high-fidelity simulators that prepare responders to perform critical, life-saving interventions in realistic environments. Designed for military, law enforcement, fire/EMS, and veterinary applications, TacMed simulators combine anatomical accuracy, rugged construction, and modular wound systems to replicate high-stress emergency conditions.

TacMed's range of trauma trainers, human simulators, and K9 models equip learners with progressive, hands-on experience—building the skills and confidence needed to perform under pressure when every second counts.

Task Trainers

Cost-effective foundational skill development for classroom and crawl-phase training.

TacMed Task Trainers focus on essential trauma and medical procedures that form the foundation of lifesaving care. Each standalone simulator allows repeated practice in specific skills—such as hemorrhage control, airway management, and intraosseous infusion—helping learners build precision and confidence before advancing to full-mission simulation.

Packable Wound Trainer (PWT)

A lifelike wound simulator for practicing bleeding control techniques such as wound packing, direct pressure, and compression. Realistic synthetic skin and internal wound paths provide true haptic feedback for developing confidence and proper technique.

- Simulated hemostatic wound with tactile resistance
- Teaches packing, compression, and hemorrhage control
- Durable synthetic skin for multiple uses
- Suitable for individual or group skill stations

Hemorrhage Control Skills Trainer – Classroom (HCST-C)

A classroom-based trainer for tourniquet application and wound packing. Anatomical accuracy and lifelike materials deliver realistic feedback that builds muscle memory and reinforces decision-making under pressure.

- Realistic limb construction and tissue feel
- Develops proper tourniquet and packing technique
- Strengthens critical thinking and treatment selection
- Durable for repeated institutional use



Train. Repeat. Respond with Confidence.

Chest Trainer

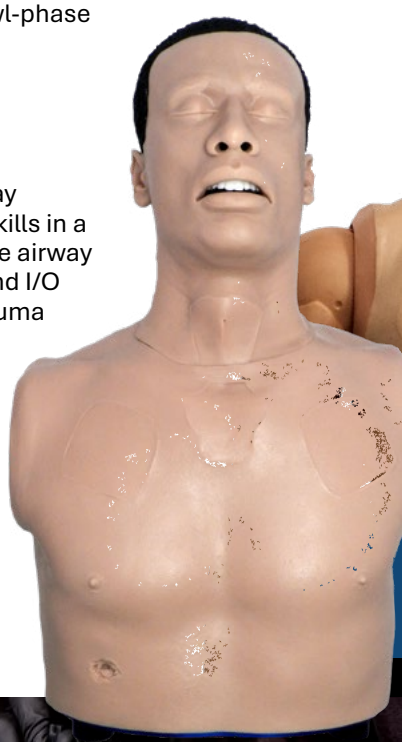
A durable, anatomically accurate simulator for teaching needle decompression and intraosseous (I/O) infusion. Lifelike skin and landmarks help learners locate insertion points and perform procedures with precision.

- Realistic landmarks for accurate needle placement
- Supports decompression and I/O infusion skills
- Replaceable components for cost-effective reuse
- Ideal for classroom, lab, or crawl-phase training

AirwayPlus Lifecast – Classroom (APL-C)

A compact trainer for teaching airway management and decompression skills in a classroom setting. Students practice airway maintenance, cricothyroidotomy, and I/O infusion while learning essential trauma procedures.

- Supports airway, decompression, and cricothyroidotomy practice
- Includes I/O infusion capability
- Quick setup for classroom use
- Builds foundational airway and trauma response skills



Key Features

- Realistic synthetic skin and anatomical fidelity
- Durable construction for indoor and outdoor environments
- Replaceable wound and skin components for extended use
- Real-time feedback for instructors on advanced models
- Modular design allows combining upper and lower trainers
- Integrated bleeding and airway systems for realistic trauma simulation

Applications

- Fire & EMS Training
- Law Enforcement
- Military & Tactical Medics
- Active Shooter & Trauma Response
- Operational Canine First Responders
- Veterinary & Veterinary Technician Programs

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Whole-Body Human Simulators

Progressive Trauma Training

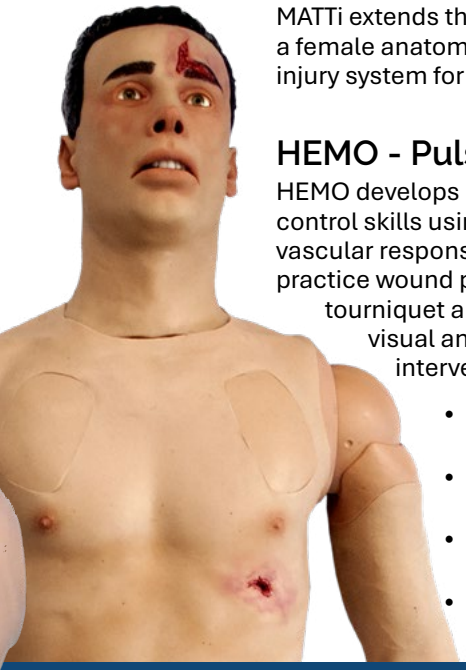
TacMed's Human Simulators deliver scalable realism across all levels of medical and tactical training. From basic hemorrhage control to advanced resuscitation and full-mission trauma care, each system provides high-fidelity simulation for effective, repeatable training in classroom, field, and operational environments.



MATT - Pulses/Breathing

The MATT (Multiple Amputation Trauma Trainer) is a rugged full-body simulator replicating lower-body blast injuries and amputations. With realistic bleeding, palpable pulses, and chest rise, MATT supports hemorrhage control, tourniquet use, wound packing, IV/IO access, and airway procedures in realistic field conditions.

- Simulates lower-extremity blast trauma and hemorrhage
- Pulses and breathing provide lifelike feedback
- Replaceable wound and skin components
- Built for tactical and field-based trauma training



MATTi extends the proven MATT platform with a female anatomical design and modular injury system for expanded training diversity.

HEMO - Pulses/Breathing

HEMO develops advanced hemorrhage control skills using realistic bleeding and vascular response systems. Learners practice wound packing, direct pressure, and tourniquet application while receiving visual and tactile feedback on intervention effectiveness.

- Variable bleeding and vascular response system
- Realistic tissue and wound construction
- Durable for repeated classroom or field use
- Ideal for hemostatic and trauma management training

EMITT – Tactical Medical

The EMITT (Enhanced Multi-Integrated Tactical Trainer) delivers high-fidelity simulation for tactical medicine and trauma care. Trainees can perform advanced procedures including chest decompression, cricothyroidotomy, intubation, and IV/IO infusion in fully immersive, scenario-based exercises.

- Active breathing, bleeding, and pulse simulation
- Multiple trauma sites including chest and extremities
- Engineered for rugged terrain and environmental realism
- Compatible with TacMed control and feedback systems

CRU – Clinical Response - Resuscitate

The CRU-R is a modular full-body simulator that focuses on trauma management, airway intervention, and resuscitation procedures. It includes active breathing, bleeding control, IV and IO access, CPR feedback, and integrated physiological monitoring. The upper and lower sections can be connected or separated, allowing both full-body and upper-body training configurations.

- Full-body simulator with detachable upper and lower components
- Airway management, decompression, and CPR functionality
- Integrated bleeding and vital signs simulation
- Instructor control for real-time feedback and assessment

Prepare. Respond. Save Lives.

Upper and lower body configurations available across select TacMed models to expand training capability. Contact us for a full list of models available.

K9 Simulators

Prepare operational canine first responders and veterinary personnel for emergency interventions.

K9 Hero

A high-fidelity canine medical trainer that enables airway management, bleeding control, IV and I/O infusion, CPR, and wound care practice. Designed for durability and realism, K9 Hero provides accurate anatomy and lifelike tactile feedback for effective field and classroom training.

K9 Diesel (DSL)

The most advanced canine medical trainer, featuring active breathing, audio cues, and over 28 intervention sites. Interchangeable limbs and realistic wounds create versatile, high-fidelity training scenarios with full instructor control and performance feedback for tactical, EMS, and veterinary programs.

First Responder & Public Safety Training Solutions

Simulation • Technical Response • Digital Investigation

Build confidence, coordination, and critical decision-making with realistic training systems designed for emergency professionals. From law enforcement and fire response to post-incident analysis and electric vehicle safety, these solutions deliver immersive, hands-on preparation for today's complex public safety challenges.

Emergency Response Simulation





PatrolSim™

Law Enforcement Driving Simulator

Prepare officers for real-world patrol and pursuit operations in a safe, controlled environment. The PatrolSim™ features lifelike motion cues, realistic traffic behavior, and customizable urban or rural environments. Integrated Replay Studio™ software enables detailed after-action review for measurable skill development.

- Realistic emergency and pursuit driving scenarios
- Customizable maps and policy-based training modules
- Instructor feedback and performance tracking with Replay Studio™

FireSim™

Emergency Vehicle Operations & Fire Apparatus Training

The FireSim™ system provides authentic driver-training experiences for fire and emergency response vehicles. Trainees learn situational awareness, apparatus handling, and high-pressure coordination skills through data-driven simulation.

- Emergency vehicle operations under stress conditions
- Configurable weather, time, and visibility settings
- Replay Studio™ for post-incident evaluation
- Ideal for academies and municipal fire departments

Key Features

- True-to-life controls and immersive vehicle environments
- Scenario-based training paths and customizable curriculum
- Multi-vehicle configuration and modular hardware options
- Performance tracking, feedback, and reporting tools
- Durable build quality with options for classroom or mobile setups

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Electric & Hybrid Vehicle Safety for Emergency Services

As electric and hybrid vehicles become increasingly common, first responders must be prepared to handle high-voltage systems safely during rescue and recovery operations. Lucas-Nuelle's First Responder Battery Trainer provides a hands-on environment for learning to identify, isolate, and deactivate EV battery systems without risk — bridging the gap between automotive technology and emergency response.



Learners practice key safety procedures such as high-voltage disconnection, grounding, and stabilization using realistic battery modules and fault scenarios. The system integrates with Lucas-Nuelle's eLearning and diagnostic software, allowing instructors to demonstrate both the electrical theory and the practical steps needed to prevent accidents during EV emergencies.

Training Benefits

- Teaches safe high-voltage isolation and shutdown
- Realistic simulation of damaged or unstable battery conditions
- Visual indicators for voltage, current, and grounding status
- Supports group or individual instruction
- Expands understanding of EV systems for fire, EMS, and rescue personnel





System Features

- Fully functional high-voltage battery replica with service disconnects
- Modular fault insertion for common EV incident scenarios
- Integrated measurement points for live testing and diagnostics
- Supports Lucas-Nuelle's UniTrain eLearning platform for blended instruction
- Portable, classroom-ready design with protective safety covers



Applications

- Electric & hybrid vehicle extrication training
- Fire and rescue academy EV awareness programs
- Post-accident safety and recovery instruction
- Technical education for municipal and industrial response teams

Equip responders with the knowledge to manage high-voltage vehicle incidents — safely, confidently, and without compromise.

Automotive, Diesel & Logistics Systems

Train tomorrow's workforce for advanced vehicle systems, sustainable transportation, and logistics technologies.

Prepare students for careers in automotive service, diagnostics, and repair. From engine and brake systems to hybrid powertrains and refinish technologies, our trainers cover every major ASE-aligned area—mechanical, electrical, and body repair—using equipment from LJ Create, Lucas-Nuelle, Amatrol, and SimSpray®.

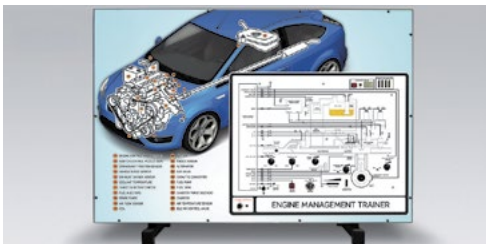
Automotive Systems & Service Fundamentals

Build strong foundations in vehicle technology, diagnostics, and repair.

LJ Create's Automotive Training Systems combine interactive theory with hands-on experimentation to teach students how real vehicle systems work. From engines and brakes to electronics and emissions control, these trainers provide an engaging bridge between classroom learning and industry-level service skills.

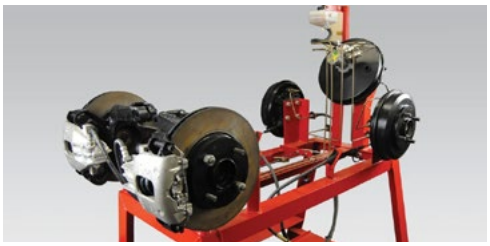
LJ CREATE™
Learning for life

Core Automotive Trainers



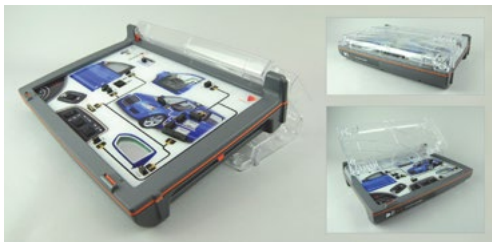
Engine Systems & Diagnostics

Explore gasoline and diesel engine operation, components, control systems, and fault diagnosis techniques.



Braking & Suspension Systems

Teach hydraulic braking systems, ABS theory, suspension fundamentals, steering geometry, and wheel alignment procedures.



Vehicle Electrical Systems

Cover starting, charging, lighting, and CAN Bus network communications, with emphasis on diagnosis and service procedures.



Climate Control (HVAC) Systems

Train students in heating, ventilation, and air-conditioning operation, servicing, and system diagnostics for comfort and efficiency.



Transmission & Driveline Systems

Develop understanding of manual and automatic transmissions, clutch operation, torque converters, and driveline components.



Electronics & Diagnostics

Learn to test and troubleshoot sensors, actuators, control modules (ECUs), and multiplexed data systems across the vehicle network.

Automotive Repair eLearning Curriculum

Gain shop-ready skills for today's automotive workforce.

LJ Create's Automotive eLearning program empowers learners with shop-ready expertise through nearly 4,000 ASE-aligned lessons covering every major automotive system—engine repair, hybrid/electric vehicles, transmissions, brakes, electronics, and more. With task checklists, marking sheets, and interactive resources, students develop real-world troubleshooting skills and technical knowledge at MLR, AST, and MAST levels. The curriculum also supports essential workplace skills in math, English, business, and problem solving, making it a comprehensive solution for modern automotive education and technician certification success.



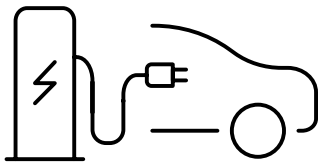
Our practical automotive curriculum takes your students from beginner to shop-ready with nearly 4,000 ASE-aligned lessons in automotive technology and repair skills, covering every topic area in the ASE Education Foundation Task List.

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Advanced Vehicle Systems & Emerging Technologies

Prepare learners for the future of sustainable and connected mobility.

LJ Create's advanced vehicle systems training expands automotive programs into hybrid, electric, and alternative-energy technologies. Students gain practical experience in diagnostics, power electronics, and high-voltage safety—building the essential skills for modern vehicle maintenance and repair.

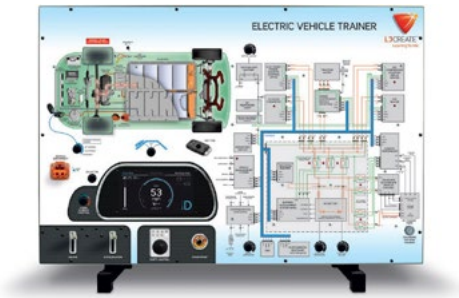


Hybrid & Electric Vehicle Trainers



Hybrid Vehicle Systems Trainer

Demonstrates hybrid energy flow, regenerative braking, power-split control, and diagnostic fault insertion.



Electric Vehicle Systems Trainer

Covers battery management, on-board diagnostics, charging systems, and high-voltage safety protocols.



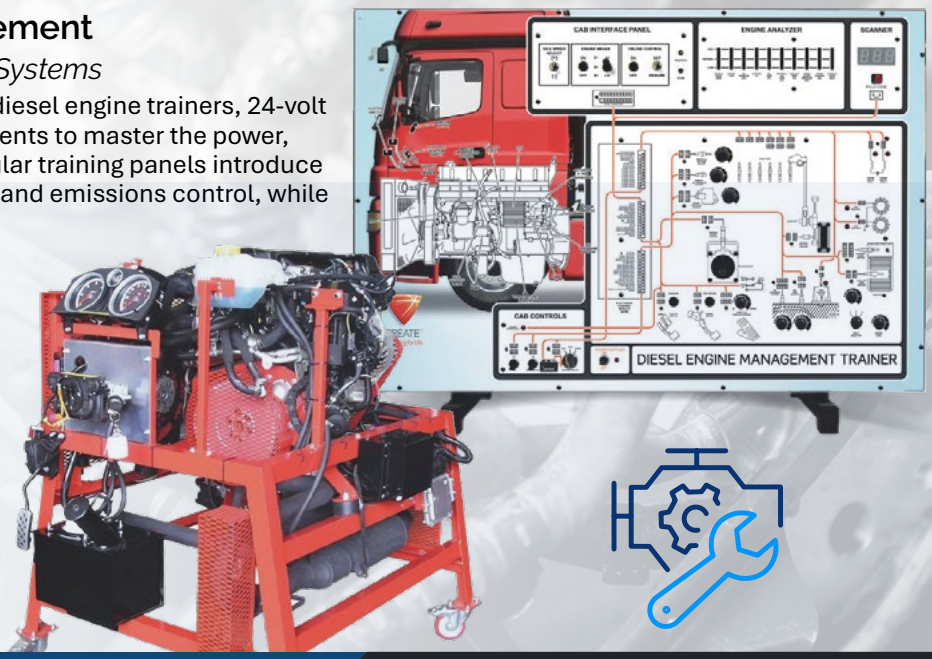
EV Power Electronics Trainer

Develops understanding of inverter function, DC-DC conversion, and electric motor control.

Diesel Technology & Engine Management

Automotive Medium/Heavy Vehicle Training Systems

Students gain hands-on experience with full-scale diesel engine trainers, 24-volt electrical systems, and pneumatic braking components to master the power, efficiency, and reliability of diesel technology. Modular training panels introduce key concepts such as fuel injection, turbocharging, and emissions control, while fault-insertion features enhance diagnostic skills. These adaptable labs serve CTE programs and workforce development initiatives, preparing graduates for careers in medium and heavy vehicle service.



Diesel Engine Systems Trainer

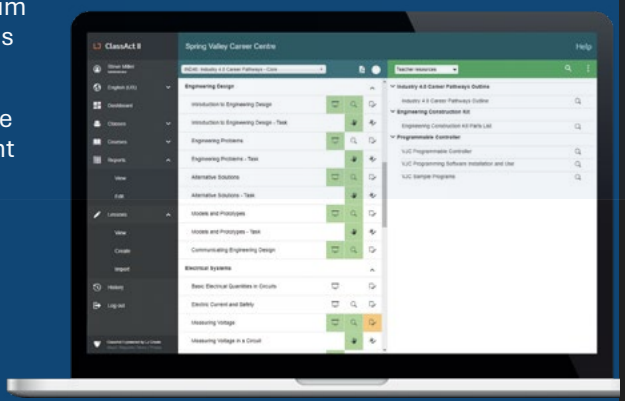
Simulates electronic control systems, including turbocharging, fuel injection, and emissions management.

Common Rail Diesel Diagnostics Trainer

Provides fault simulation for real-world troubleshooting of ECU-controlled diesel systems.

Instructor Resources

- Cloud-based curriculum with interactive lessons and simulations.
- Integrated data capture for student assessment and performance tracking.
- Expandable modules designed for both classroom and mobile training environments.



Training Benefits

- Aligned with ASE and NATEF service standards.
- Combines digital coursework with physical trainers and fault insertion.
- Modular design for scalable classroom-to-workshop integration.
- Supports blended learning through LJ Create's cloud-based Learning Management System.

Hands-On Training Systems for ASE L3 & L4

Prepare Technicians for the Future of Electric and Autonomous Vehicle Service

Lucas-Nuelle's **ASE-aligned** training systems combine real vehicle components, guided eLearning, and safe diagnostic simulation—empowering learners to confidently service high-voltage and driver-assistance technologies.

CarTrain — *Real-World Automotive Training Systems*

CarTrain replicates authentic workshop conditions with real vehicle components, live fault simulation, and OBD diagnostics. These hands-on systems are ideal for teaching hybrid and high-voltage technologies aligned with ASE L3 standards.





Diagnosis, Service & Repair of HV Vehicles

The CarTrain ASE L3 platform combines real high-voltage components with interactive eLearning and guided diagnostics. Trainees perform full shutdown and restart procedures, analyze energy flows, and complete realistic repair tasks.

Key Learning Areas: HV system deactivation · Pre-charge circuits · OBD diagnostics · Energy flow · Safety procedures

HV Battery Trainer with Cell Balancer

Students gain hands-on experience diagnosing and servicing real HV battery modules. The system enables fault simulation, isolation procedures, and cell replacement using a live cell balancer for realistic maintenance training.

Key Learning Areas: Battery diagnostics · Cell analysis · Thermal monitoring · Safety protocols

UniTrain — *Interactive eLearning Meets Hands-On Experimentation*

UniTrain merges multimedia coursework with modular hardware to teach everything from electrical fundamentals to ADAS technologies. Compact, computer-connected modules provide real-time data, fault simulation, and guided experiments that support ASE L3 and L4 training.

Electric Drives in Cars, Trucks & Two-Wheelers

Compact and modular, this system teaches inverter function, motor diagnostics, and battery interaction. Built-in fault simulation enables realistic troubleshooting in a safe environment.

Safe Handling of HV Systems

Interactive training to teach safe diagnostic practices and grounding techniques for technicians working with live high-voltage systems.

Table-Top Panels – Measurement & Diagnosis on the Electric Drive

Portable tabletop modules demonstrate insulation, resistance, and inductance measurement for EV motors—ideal for introductory coursework or blended labs.

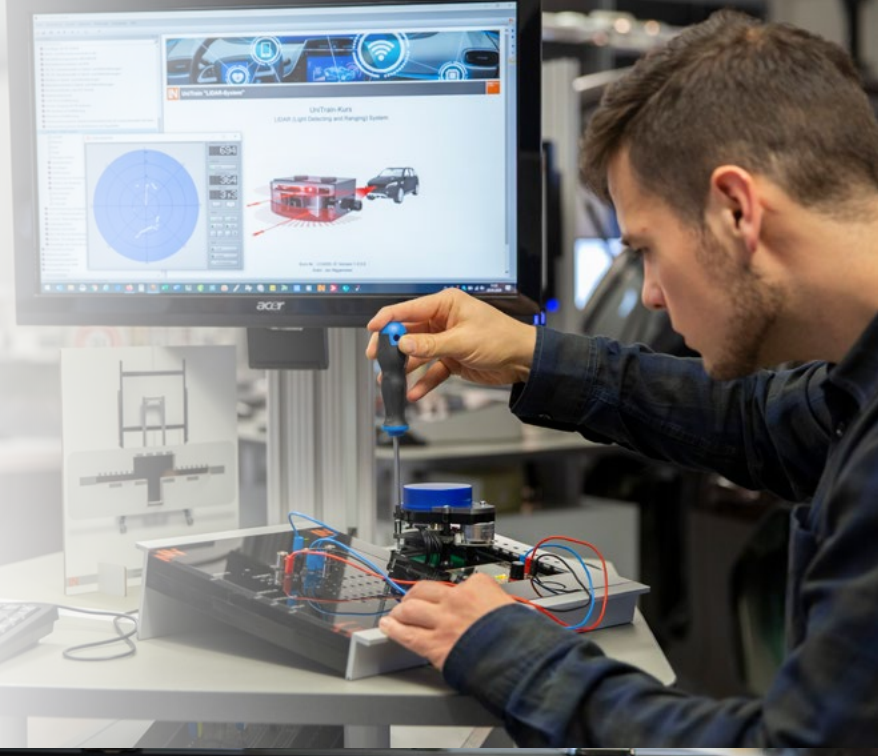




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ASE L4: Advanced Driver Assistance & Autonomous Vehicle Specialist

Lucas-Nülle's UniTrain ADAS and communication modules provide an in-depth understanding of the sensors, networks, and control systems that enable today's autonomous and connected vehicles. Students learn how radar, LIDAR, cameras, and CAN/Ethernet communication integrate for adaptive cruise control, lane assistance, and vehicle stabilization functions. These advanced modules support ASE L4 certification training by combining hands-on calibration, diagnostics, and system analysis using the UniTrain eLearning platform.



Detailed product descriptions appear under **"Smart Vehicle & LIDAR Systems"** on page 31.

LUCAS-NUELLE

MobileTrain
EV Charging Station Trainer

A portable training system covering EVSE installation, testing, and load management across Level 1–3 charging infrastructures.

Key Learning Areas: Load management · Code compliance · Communication testing · Troubleshooting



Why Choose LN's ASE Training Systems

- Fully aligned with ASE L3 & L4 certification standards
- Real components with integrated fault simulation
- eLearning support via RXlea and UniTrain platforms
- Modular design for scalable labs and mobile setups

See also:

CarTrain – First Responder Trainer, page 44

Smart Vehicle & LIDAR Systems, page 44

TruckTrain Smart Farming 4.0

The *TruckTrain Smart Farming 4.0 trainer* specializes in agricultural technology based on **ISOBUS and CAN-bus standards**, enabling hands-on learning in **Precision Farming with Section Control**—all within a classroom setting. Real components such as a Universal Terminal, sensors, actuators, ECU, and diagnostic interfaces let students simulate and troubleshoot advanced farm-machinery processes. Trainees analyze GPS telemetry, understand information flow in networked systems, and master fault-finding and updates—supported by comprehensive eLearning resources.



Simulation for Logistics, Material Handling & Transportation

As automation, e-commerce, and global trade accelerate, the demand for well-trained logistics and transportation professionals continues to rise. Simulation-based training provides a safe, cost-effective bridge between classroom instruction and real-world operation—building essential skills for warehouse, port, and fleet environments while reducing equipment wear and training risk.

From forklifts and lift trucks to container cranes and commercial vehicles, these simulators deliver measurable performance, repeatable practice, and confidence on the job.

Simlog: Material Handling Simulators

Simlog's PC-based simulators make warehouse and distribution training accessible for any program. Each system uses authentic USB-ready controls to replicate real equipment behavior, allowing learners to develop precision handling and spatial awareness in a **safe, cost-effective environment**.



Forklift Personal Simulator

Train operators in core forklift driving skills including load handling, stacking, and maneuvering in confined warehouse spaces.

Stand-Up Counterbalanced Lift Truck Simulator

Build familiarity with counterbalanced trucks commonly used in fulfillment centers, emphasizing safe load movement and tight-aisle navigation.

Reach Lift Truck Simulator

Prepare students for high-bay warehouse operations with realistic mast extension, pallet placement, and racking procedures.



For more Simlog heavy equipment simulators—such as Wheel Loader, Backhoe, and Bulldozer—see Construction & Skilled Trades, page 53.

Multi-Purpose Configurations

Simlog's Personal Simulators are recognized for delivering one of the **lowest cost-per-station** rates in the industry—especially when programs leverage **shared control configurations**. Many Simlog simulators use the same USB-ready control hardware, allowing institutions to **run multiple training applications on a single workstation**.

This **multi-software capability** maximizes budget efficiency and lab flexibility, enabling quick transitions between forklift, lift truck, and material handling training modules without additional hardware investment.

Transportation & Fleet Simulation

Acron Aviation simulators prepare students for careers in commercial driving, transit, and last-mile delivery. Each system features realistic vehicle dynamics, traffic AI, and Replay Studio™ after-action review software for measurable performance feedback.

TranSim™ — Commercial truck driving simulator for CDL training and long-haul operations.

TransitSim™ — Bus operations and passenger transport training with advanced traffic scenarios.

DeliverySim™ — Last-mile logistics simulator for fleet and e-commerce delivery programs.



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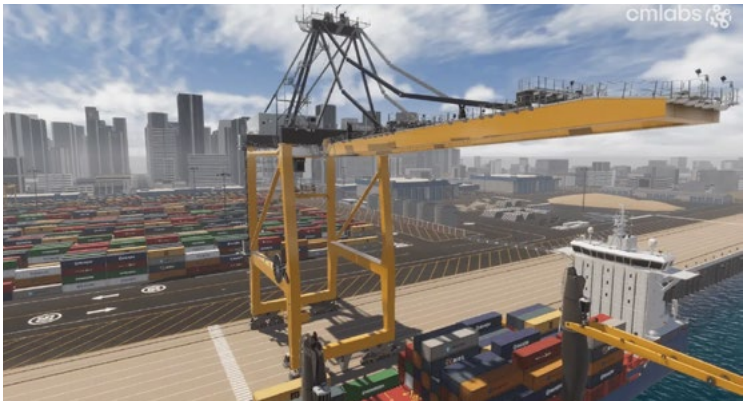
CM Labs Simulations: Port Equipment Training Systems

Realistic Training for Yardside & Quayside Operations

Modern ports depend on seamless coordination between quayside vessel operations and yardside container movement. CM Labs' Port Equipment Simulators, powered by the Vortex® physics engine, deliver the industry's most realistic port training experience—developing the precision, situational awareness, and safety habits required for efficient terminal logistics.

These systems replicate the complete container-handling cycle, from ship-to-shore transfers to inland stacking and loading, helping operators master complex controls before working in live port environments.





Intellia Yard-Side Training Packs

CM Labs' Yard-Side simulators focus on equipment used to move, stack, and stage containers within the port terminal. Each training pack supports skill development in load management, vehicle coordination, and yard traffic flow.

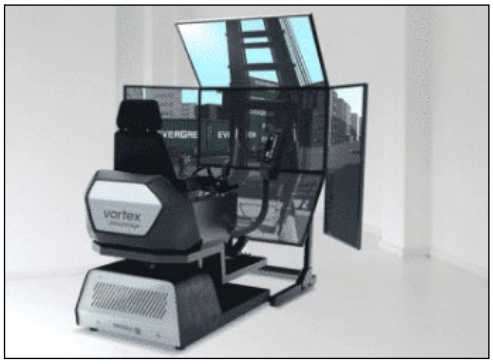
Available Training Packs: Forklift, Empty Container Handler, Reach Stacker, Straddle Carrier, Internal Transfer Vehicle, Rubber-Tired Gantry (RTG) Crane

Vortex Quayside Training Packs

Quayside simulators recreate the critical ship-to-terminal operations that define port efficiency. Operators learn precision load handling, crane coordination, and communication between vessel and dock crews—all within a safe, simulated maritime environment.

Available Training Packs: Mobile Harbor Crane Simulator, Ship Pedestal Crane Simulator, Ship-to-Shore (STS) Crane Simulator

Simulator Hardware for Port Simulators



Vortex Advantage

Versatile training station

The Vortex Advantage is a training simulator that's been developed to stay relevant to your training goals — today, as well as tomorrow. Featuring a wide field of view and a dynamic motion platform, the Vortex Advantage is a perfect fit for training programs of all sizes.

**Vortex Edge Plus also available.*



Vortex Master

High-fidelity training experience

The Vortex Master is CM Labs' full suite training simulator, providing operators with an unparalleled, high-fidelity training experience. Featuring a full view of machine operations via multiple scalable screen configurations (9 to 13 displays), a fully adjustable V-cut Spohn & Burkhardt seat as found in the real machinery, and a 3-degree of freedom motion platform, the Vortex Master moves beyond immersive.



Vortex Advantage

Most immersive simulator available

This full-immersion training simulator, develops transferable skills. With OEM hot-swappable controls sets and pedals, and options for different screen configurations, the Vortex Advantage delivers high-quality training and flexibility.

See **Construction & Skilled Trades**, page XX, for CM Labs' full line of heavy equipment simulators.

Electrical Training Systems

Building Foundational Electrical Skills for Real-World Construction Applications

Electrical systems training is essential across construction, maintenance, and facilities careers. Amatrol's industry-standard systems provide hands-on skill-building in wiring, motor control, power distribution, and troubleshooting—aligning with electrical apprenticeship and NCCER program objectives.



Highlighted Trainers for Construction & Building Trades:

AC/DC Electrical Systems (T7017A)

Covers the basic principles and hands-on applications of AC and DC circuits, focusing on voltage, current, resistance, and power measurement. Includes safe operation, installation, and troubleshooting of circuits used in residential, commercial, and industrial settings with industrial-grade components for real-world practice.

Electrical Wiring Training (850-MT6B)

Provides hands-on training in residential, commercial, and industrial wiring techniques. Learners install control wiring in panels, wire switches and solenoids, select proper protection devices, and perform conduit bending, panel wiring, and splicing while following safety protocols.

Electrical Power Distribution (85-MT7-B)

Teaches installation and maintenance of electrical power distribution systems, including circuit protection, load balancing, conduit sizing, and raceway installation. Features real-world components such as junction boxes, bus bars, and multiple motors on a mobile workstation.

Electrical Fabrication 1 (T7021)

Builds foundational wiring and fabrication skills using real-world components. Learners interpret schematics, assemble panels, install terminals, and mount components safely while developing practical skills for industrial and maintenance applications.

Motor Control (85-MT5)

Focuses on electric relay control of AC motors in industrial and commercial systems. Learners design, operate, and troubleshoot manual and automatic control circuits, including interlocks and reversing controls, using timers, relays, and overload protection.

See the "Manufacturing & Industry Training" section (page12) for advanced electrical, motor control, and troubleshooting systems.





HVAC/R Training Systems

Developing Practical HVAC Skills for Today's Workforce

HVAC/R systems are essential in building and facility maintenance programs, preparing learners to install, service, and troubleshoot heating, cooling, ventilation, and refrigeration systems. Amatrol's hands-on HVAC training solutions use real components and fault-based scenarios to build practical competencies in air flow, pressure, temperature control, and energy efficiency for residential and commercial systems.

Amatrol's integrated eLearning and simulator-based curriculum connects theory to application—covering refrigeration cycles, heat pump operation, and electrical control circuits. With real equipment and FaultPro software, students gain valuable troubleshooting experience that supports HVAC/R certifications and employment in high-demand skilled trades.

Together, these systems create a complete pathway for HVAC/R education—from foundational thermal science and refrigeration to advanced heat pump and control technologies—equipping learners with the technical, safety, and diagnostic skills required by modern industry and apprenticeship standards.

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Thermal Science Training (T7081)

Refrigeration, Compressor, & Evaporator Skills

Introduces the science of heat transfer, thermodynamics, and phase change. Students explore temperature and pressure measurement, thermal expansion, and gas laws while building a foundation for all HVAC/R systems.



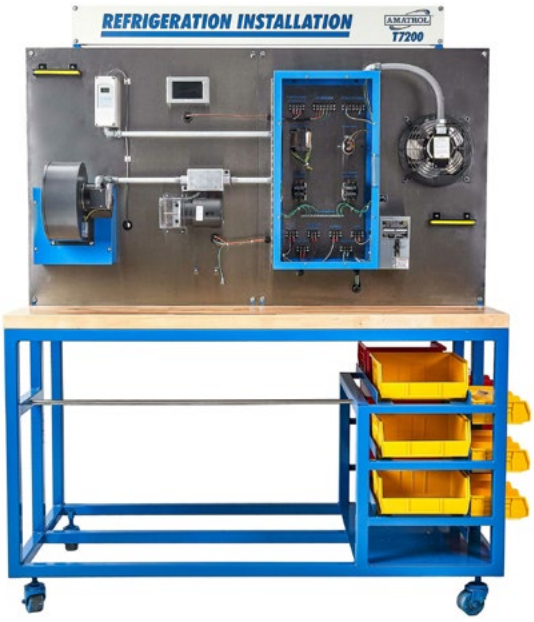
Basic Refrigeration Training System (T7045)

Hands-On HVAC/R Skills for Technicians

Covers the refrigeration cycle, compressor function, and energy transfer principles. Learners measure temperature and pressure, study condensers, evaporators, and auxiliary components, and analyze system performance.

Refrigeration & Charging Training Systems





Refrigerant Recovery & Charging Training System (T7031/T7032)

Provides hands-on training in refrigerant handling, recovery, recycling, and charging using either **R-134A (T7031)** or **R-410A (T7032)** refrigerant. Learners practice leak detection, pressure testing, and system charging methods while following current environmental and safety regulations.

Refrigerant Recovery & Charging Training System for R-454B (T7034)

Adds training on new-generation, low-GWP refrigerants used in environmentally sustainable systems. Includes proper recovery, charging, and storage procedures for R-454B.

Combined Refrigeration Installation (T7200)

Covers the refrigeration cycle, compressor function, and energy transfer principles. Learners measure temperature and pressure, study condensers, evaporators, and auxiliary components, and analyze system performance.

Optional **T7033 Digital Gauge Manifold** for advanced wireless diagnostics.



Heat Pumps & Air Conditioning



Air Conditioning/Heat Pump Training (T7082)

Delivers hands-on practice in the operation, thermodynamics, and troubleshooting of heat pump and air conditioning systems.

Air Conditioning & Heat Pump Troubleshooting Training (T7082A)

Covers the same core principles as the T7082 but adds integrated troubleshooting capability with FaultPro®, Amatrol's electronic fault insertion software for real-world diagnostic training.

Environmental Applications Training (T7083)

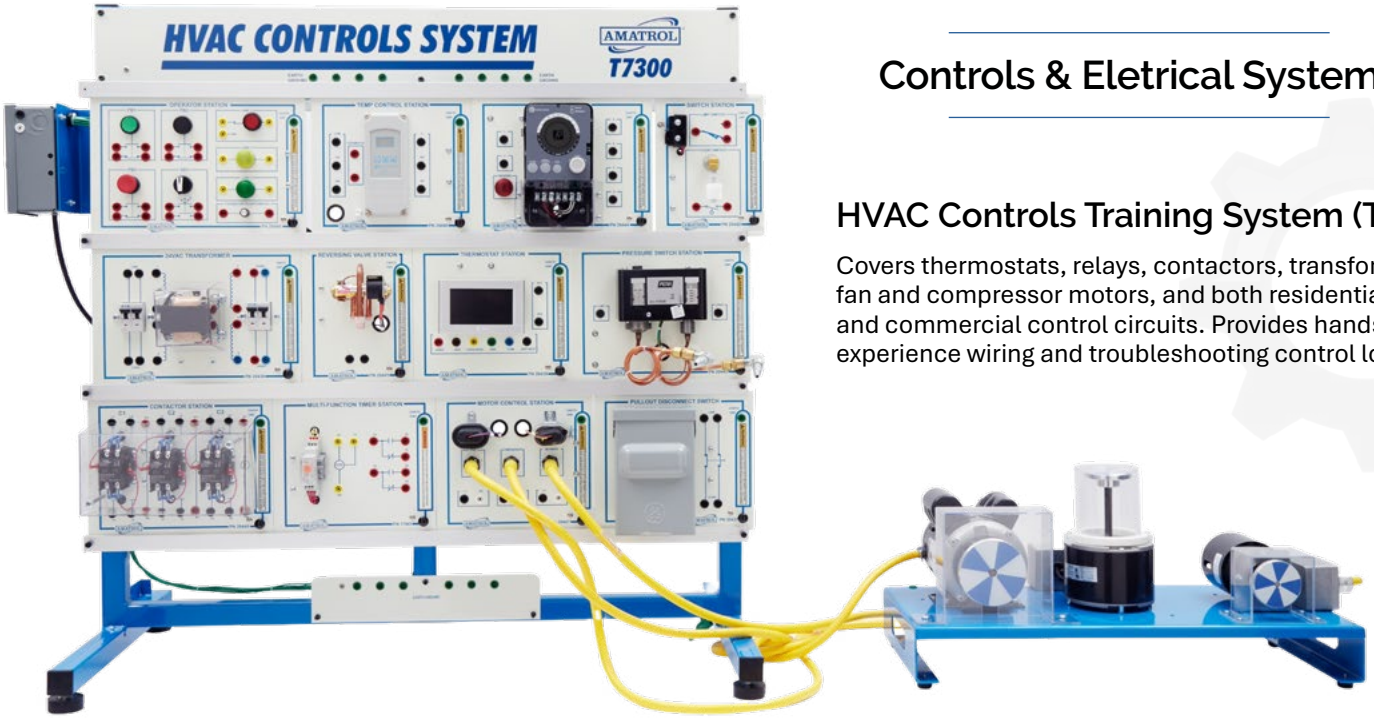
Expands T7082 or T7082A to include psychrometrics, insulation, air distribution, and residential performance testing.

Residential Heat Pump Troubleshooting Training System (T7100)

Focuses on residential heat pump operation, component testing, and pressure-temperature measurement. Learners troubleshoot real faults using practical diagnostic procedures.

Residential Mini-Split Heat Pump Learning System (T7130)

Explores mini-split and ductless systems, emphasizing smart controls, variable-speed compressors, and compact design troubleshooting.



Controls & Eletrical Systems

HVAC Controls Training System (T7300)

Covers thermostats, relays, contactors, transformers, fan and compressor motors, and both residential and commercial control circuits. Provides hands-on experience wiring and troubleshooting control logic.

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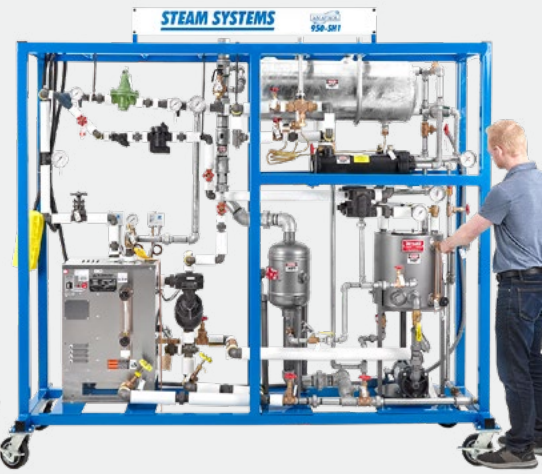
Advanced & Industrial HVAC/R Systems

Preparing Technicians for Complex Commercial and Industrial Applications

Build on foundational training by introducing large-scale, multi-zone, and smart-controlled refrigeration systems used in commercial and industrial environments. Learners progress from component-level operation and control to full-system troubleshooting and automation.







Commercial Refrigeration Training System (T7400)

Explores the design, operation, and troubleshooting of multi-zone commercial refrigeration systems. Students work with semi-hermetic compressors, electronic expansion valves, smart controllers, and defrost systems to simulate modern commercial setups. Training includes mechanical and electrical control components, wiring connections, and programming for electronic expansion and defrost sequences.

Industrial Refrigeration Training System (T7500)

Delivers advanced training in industrial chiller and multi-zone refrigeration systems with integrated smart controls, Ethernet/Wi-Fi communication, and system visualization software. Learners develop high-level troubleshooting skills on mechanical and electrical components while exploring the role of automation and data monitoring in large-scale HVAC/R applications.

Steam Systems 1 | Operation, Maintenance, and Repair (950-SH1)

Teaches the fundamentals of steam system operation and maintenance, including pressure regulation, condensate removal, and thermal energy transfer. Students perform practical exercises in system start-up, troubleshooting, and efficiency optimization for building and industrial environments.



Renewable & Geothermal Systems

Geothermal Troubleshooting Training with Desuperheater (950-GEO2D)

Provides hands-on experience with geothermal heating and cooling, including system charging, pressure testing, and desuperheater operation for water heating.

Geothermal Flush Cart Training | Pressurize a Geothermal Source Circuit (95-GEO3)

Teaches the process of flushing, filling, and pressurizing geothermal loops. Used in conjunction with 950-GEO2D for complete system installation training.

For additional training systems focused on renewable energy generation, smart grid integration, and energy efficiency, see the **Smart Infrastructure & Sustainability** section (pg. 55).

Simulation for Heavy Equipment & Crane Operations

As construction sites grow more complex, the demand for operators with advanced technical and safety skills continues to rise. Simulation-based training provides an efficient, scalable way to develop those skills—offering real-machine accuracy, repeatable scenarios, and measurable performance outcomes without the fuel cost or risk.

From earthmoving and lifting to material handling and site coordination, CM Labs and Simlog simulators deliver immersive experiences that prepare learners for real-world operation and industry-recognized certifications.

Simlog: Earthmoving & Mining Simulators

Simlog's PC-based heavy-equipment simulators bring real-world construction training into the classroom with an affordable, scalable approach that mirrors actual job-site tasks. Each simulator uses authentic USB-ready controls, realistic visuals, and measurable performance metrics to help trainees build coordination, machine awareness, and safe operating habits before stepping into live equipment. These systems give programs a cost-effective way to introduce earthmoving and lifting fundamentals while reducing training risks and equipment wear.







Hydraulic Excavator

Teaches digging, trenching, bench loading, and truck loading with realistic soil behavior and bucket control. Trainees learn precision movement, depth control, and safe positioning for a wide range of job-site environments.

Bulldozer

Prepares operators for grading, pushing, slope work, and earthmoving techniques. Users gain experience managing blade height, pitch, and load while learning to read ground conditions and maintain stable machine positioning.

Skid Steer Loader

Introduces new operators to one of the most common machines on construction and landscaping job sites. Trainees work on bucket control, maneuvering, pallet work, and safe operation in tight or complex work areas.

Wheel Loader

Builds skill in loading, hauling, and pile work. Learners practice bucket control, approach angles, load management, and cycle-time efficiency to prepare for material handling tasks across construction and mining projects.

Backhoe Loader

Combines loader and excavator training into one versatile system. Students practice trenching, loading, and fine-grading while learning to operate in confined spaces and manage two control modes.

Mobile Crane

Provides foundational crane operation skills, including boom control, swinging, hoisting, and load placement. Ideal for programs wanting to introduce lifting fundamentals before advancing to larger crane platforms.

Also available: Off-Highway Truck • Mining Truck • Electric Rope Shovel • Drill Jumbo • Tower Crane • Harvester • Forwarder

Flexible Setup Options

Simlog simulators integrate easily into classrooms, labs, or mobile training spaces with no special infrastructure required. Systems can be configured as single-station setups or multi-unit labs, offering scalable training options as programs grow. This flexibility makes it easy to create high-impact environments within limited space.

Training Alignment

Simlog simulators support construction, heavy equipment, and mining programs needing an affordable way to introduce hands-on operator training. They reinforce foundational skills, task-based practice, and performance assessment before students work with real machines. This alignment helps learners build confidence and job-ready proficiency.

Multi-Purpose Configurations

Shared USB-ready controls allow multiple Simlog training modules to run on the same workstation. Programs can switch easily between simulators, reducing equipment costs and simplifying lab setup. This multi-purpose design delivers broad training capability within a compact footprint.

For warehouse and logistics equipment, see Automotive, Diesel & Logistics Systems, page 46.

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CM Labs: Heavy Equipment Simulators

Powered by the **Vortex® Studio** physics engine, CM Labs Simulations are trusted worldwide by contractors, training centers, and unions to build real-world skills safely. Each simulator replicates authentic machine behavior, control response, and environmental conditions to create the most realistic training possible.

Ideal Education/Training Alignment: Designed for construction technology, heavy equipment operation, and crane certification programs. Suitable for technical colleges, apprenticeship training centers, and industry workforce initiatives.

Instructor Software: Pair with Intellia Instructor to manage trainee sessions, assign tasks, and track performance analytics across individual or networked stations.

See **Automotive, Diesel & Logistics Systems**, page 47, for CM Labs Port Equipment simulators.





Construction Equipment

Simulators help trainees master safe digging, grading, loading, lifting, and dumping techniques through guided lessons, open practice scenarios, and performance-based evaluations. Learners build essential habits such as precision control, spatial awareness, and cycle-time efficiency long before operating real machines. By developing these skills in a controlled, repeatable environment, students gain the confidence and readiness needed for productive field performance—reducing the learning curve and improving job-site safety.

Utilities Equipment

Realistic simulation prepares operators for trenching, pole setting, underground infrastructure work, and overhead line tasks using equipment-accurate controls and targeted exercises. Trainees practice coordination, load management, situational awareness, and communication skills in environments that mirror real utility projects. This risk-free training reinforces safety procedures, builds equipment proficiency, and helps operators respond to complex situations—strengthening workforce readiness and reducing costly field errors.

Earthmoving & Sitework Equipment

- Excavator
- Wheeled Excavator
- Backhoe Loader
- Wheel Loader
- Compact Track Loader
- Dozer
- Motor Grader
- Articulated Dump Truck

Crane & Lifting Equipment

- Mobile Crane
- Boom Truck
- Tower Crane
- Luffing Tower Crane
- Crawler Crane
- Telehandler
- Digger Derrick
- Forklift

Simulator Hardware



Vortex Edge Plus

Portable desktop training simulator

A lightweight, compact system capable of running CM Labs' full catalog of equipment modules. Ideal for mobile training labs, workforce centers, and introductory simulation-based instruction.



Vortex Edge Max

Compact motion-based simulator

A transportable motion platform that adds tactile realism to simulations. Perfect for organizations entering simulation or needing flexible, scalable training capacity.



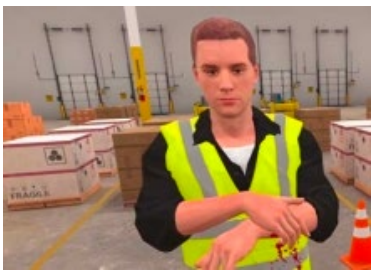
Vortex Advantage

Full-immersion, multi-screen simulator

CM Labs' premier platform featuring an adjustable multi-monitor setup, OEM-style hot-swappable controls, and foot pedals. Designed for maximum realism and skill transfer for novice to advanced learners.

Virtual Reality Construction Site Skills Training

HardHatVR, a cutting-edge VR training solution for construction trades, is an innovative program offers immersive, realistic simulations that enhance safety awareness, skill mastery, and cost savings. With a range of construction trade modules, customization options, scalability, and hardware packages, we provide a one-stop solution for our customers, helping them revolutionize workforce training and embrace the future of construction trade education.



First Aid: Bloodborne Pathogens



Chemical Spill Cleanup



Confined Space Entry



Fall Protection



First Aid: CPR and AED



Ladder Safety



Lockout Tagout: Electrical Room



Responding to Anger

Electrical



Lockout Tagout: Electrical Room



Magnum DS Breaker



Medium Voltage Switch



Switchboard Operations



VR training is proven to help increase employee retention rate to 90.48%. The same study also found that 41.00% fewer errors were made by those trained with VR. This means the gap between the time it takes to implement new employees and procedures effectively closes with VR training.

HARDHATVR

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Renewable Energy & Smart Infrastructure Training

Today's energy workforce needs advanced skills in renewable power, smart grid technologies, and modern infrastructure systems. As electrification accelerates across every industry, programs must prepare learners to install, maintain, and troubleshoot the clean-energy technologies. This section brings together hands-on training systems for **solar PV, solar thermal, wind turbine technologies, smart grid/SCADA, energy storage, electric vehicle charging infrastructure,** and **green building systems**. Designed for high schools, colleges, and workforce programs, these solutions align with state and federal energy initiatives while supporting real-world technician skill development.



Solar PV Training Systems

- Solar PV Installation Learning System (950-SPF1)
- Solar PV Troubleshooting Learning System (950-SPT1)

Key Competencies:

- PV system design and installation
- Wiring, grounding, and power measurement
- System diagnostics, array issues, and inverter faults
- Safety practices and performance testing

> Renewable Energy, Electrical Technology, Facilities Maintenance, Sustainability Programs.

Solar Thermal Systems

- Solar Thermal Installation Learning System (950-STF1)
- Solar Thermal Troubleshooting Systems
  - Closed-Loop (950-STCL1)
  - Open-Loop (950-STOL1)

Key Competencies:

- Collector installation & angle optimization
- Heat transfer and system hydraulics
- Troubleshooting circulators, sensors, and controllers
- System performance evaluation

> HVAC/R, Sustainability, Energy Efficiency, Green Building Programs.

Solar Concepts eLearning

The **Solar Concepts Training** (950-SC1) is Amatrol's introductory online curriculum designed to build foundational knowledge in solar energy technologies. Through interactive multimedia lessons, learners explore both photovoltaic and thermal concepts, including how geographic location, sunlight, and system design influence real-world performance.

This eLearning curriculum provides essential background theory for students preparing to advance into hands-on solar PV or solar thermal installation and troubleshooting systems. Ideal for renewable energy, electrical, and sustainability programs seeking a strong conceptual starting point.





Wind Energy & Energy Storage

Wind Turbine Technology

- Wind Turbine Generator Control System
- Turbine Nacelle Troubleshooting (950-TNC1)
- Turbine Electric Hub Troubleshooting (950-TEH1)

Key Competencies

- Electrical power generation
- Pitch, yaw, and braking systems
- Nacelle diagnostics & mechanical systems
- Real-world fault scenarios & maintenance procedures

> Wind Energy • Industrial Maintenance • Engineering Technology



Wind Concepts eLearning



The **Wind Concepts Learning System** (950-WC1) provides an introductory, theory-based foundation in wind energy technology through Amatrol's interactive online curriculum. Learners explore how wind systems operate, the principles behind converting wind into electrical power, and the key factors that influence turbine performance. This eLearning module is ideal for students beginning a wind energy pathway or any renewable energy program needing essential background knowledge before advancing into hands-on wind turbine or electrical power systems training.

AMATROL®

Wind Energy & Energy Storage

LUCAS-NUELLE®

Lucas-Nuelle's renewable energy and power engineering systems provide hands-on training in wind generation, battery storage, and grid-connected power technologies. These modular trainers help learners understand how renewable energy is produced, conditioned, stored, and integrated into modern smart grids.

EWG 1 – Wind Power Plant with DFIG

- Variable-speed wind generation with double-fed induction generator
- Active/reactive power control
- Grid synchronization & fault behavior

EWG 2 – Small Wind Power Plant

- Introductory turbine operation and characteristics
- Wind influence and power curve analysis
- Basic generator performance and grid-connection concepts

Energy Storage Systems

- **EBS 2 – Battery Storage Systems for Smart Grids**
  - Charge/discharge management
  - Storage efficiency & capacity testing
  - Integration of storage with renewable generation
- **ET Series – Battery Technology Modules**
  - Battery chemistry & electrochemical principles
  - Cycle behavior, capacity, and safety
  - Fundamentals of storage for microgrid environments

> Renewable Energy • Power Engineering • University Engineering Labs • Smart Grid Programs



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Smart Grid, SCADA & Sustainable Power Systems

Smart Grid Training Systems

Lucas-Nülle's Smart Grid portfolio provides a complete, modular environment for studying modern power generation, distribution, protection, and automation. These systems replicate real-world load flow, distributed energy behavior, and grid-connected renewable integration.



Instructional Areas

- Grid Monitoring & Protection
- Smart Grid Automation
- Distributed Energy Resource (DER) Integration
- PLC + SCADA-Based Power Distribution
- Renewable Energy Integration (Wind / Solar / Storage)

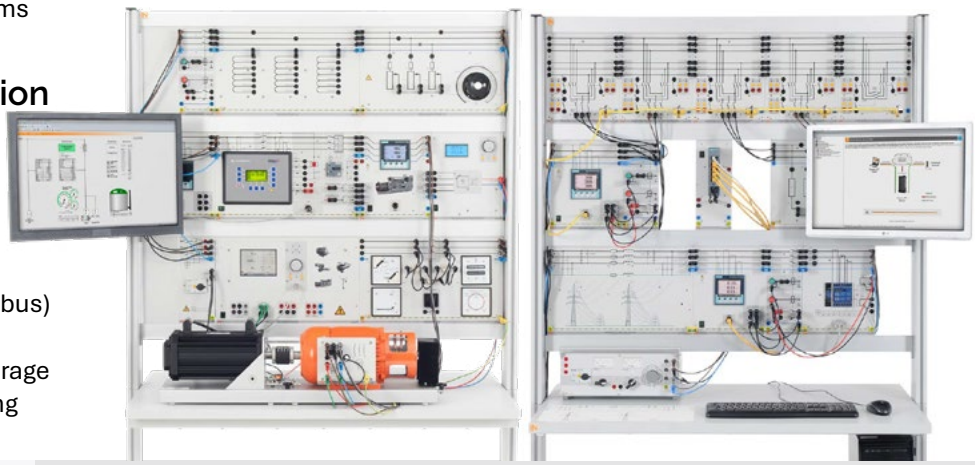
Key Competencies

- Grid stability, load management, & power flow
- DER control and communication
- Smart metering technologies
- Protocols: Profibus, Profinet, Modbus, IEC standards
- SCADA operation & cybersecurity awareness

Engineering Technology • Power Utilities • Smart Infrastructure • University-Level Energy Programs

SCADA & Industrial Power Distribution

Lucas-Nülle's SCADA-ready power engineering systems enable learners to operate, automate, and protect modern electrical networks.



- Real-time grid simulation
- IoT-enabled power monitoring
- Automation networks (Profibus, Profinet, Modbus)
- Fault creation & protection mechanisms
- Integration with renewable generation and storage
- Industry 4.0, Smart Factory, and Smart Building alignment



Electric Vehicle Charging Systems (EMT Series)

Lucas-Nülle's eMobility trainers prepare students for careers in EV infrastructure installation, commissioning, and maintenance.

- **Featured Systems**
  - EMT 4 – EV Charging Station Trainer (Wallbox)
  - EMT 1 – AC/DC Power Systems Foundations
- **Key Competencies**
  - Charging standards (CCS, CHAdeMO, Level 1/2)
  - Installation & commissioning procedures
  - Electrical protection & system testing
  - Diagnostics, maintenance, and safe troubleshooting

Automotive • Electrical Technology • Building Maintenance • Energy Programs

Advanced Additive Manufacturing for Education

Professional 3D printing for design, engineering, manufacturing, and advanced CTE.

Stratasys sets the standard for professional additive manufacturing across engineering, design, and technical education. With proven reliability, advanced material capabilities, and workflows used in industry, Stratasys technologies help schools and training centers prepare students for real-world careers in advanced manufacturing, product development, and Industry 4.0.

- Industry-recognized reliability and part accuracy
- Curriculum libraries supporting CTE & university programs
- Alignment with Industry 4.0 and advanced manufacturing pathways
- Qualification for funding: Perkins, JET, WIOA, and NSF programs

stratasys

Engineering Applications

Precision. Strength. Production-Grade Performance.

Stratasys technologies bring industrial-level accuracy to engineering classrooms, giving students hands-on experience with prototyping, testing, and end-use parts used across major industries.

- Engineering-grade FDM materials for functional parts
- High-quality surfaces with SAF and SLA processes
- Prototypes, fixtures, jigs, and test components
- Aligns with advanced manufacturing and Industry 4.0

Product Design

Multi-Material • High Detail Concept-to-Prototype Workflow

Stratasys enables fast iteration and high-quality visualization for design programs, supporting everything from concept modeling to polished, multi-material prototypes.

- Multi-material detail with J35 Pro workflows
- Smooth surfaces using SLA and P3 technologies
- Rapid visualization for design and biomedical work
- Ideal for CAD, engineering graphics, and innovation labs

Career & Technical Education

Scalable, Classroom-Ready Additive Manufacturing

Stratasys 3D printers provide dependable, easy-to-use solutions for CTE programs, aligning with key standards and preparing students for manufacturing and STEM careers.

- Reliable, low-maintenance F170 printers for daily use
- Curriculum and educator resources for CTE programs
- Supports Perkins, JET, WIOA, and similar funding
- Fits intro through advanced additive coursework

Stratasys offers diverse materials, multiple AM technologies, and industry-backed certifications—creating a complete pathway for teaching real-world design, engineering, and advanced manufacturing.

Why 3D Printing Belongs in Every Technical Education Program

Ultimaker for Education

UltiMaker provides a dependable, classroom-ready ecosystem for STEM, CTE, design, and engineering programs. With intuitive workflows, safe operation, and broad material compatibility, the newest S-Series printers, MakerBot Sketch solutions, and the industrial-grade Factor 4 help schools teach real-world additive manufacturing skills at every level.

Why Ultimaker Fits Educational Programs

- Simple for beginners; capable for advanced work
- Low maintenance and built for daily use
- Flexible curriculum with open materials
- Supports design thinking and prototyping
- Strong entry point for AM pathways

UltiMaker



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Featured Stratasys Platforms



F170 - *Classroom-Ready Industrial FDM*

A dependable entry system for STEM labs, engineering courses, and foundational AM training.

- Reliable, low-maintenance operation
- Safe, quiet, enclosed for classrooms
- Prints PLA, ABS-M30, ASA, and TPU 92A

F370 CR – *Advanced Engineering & Composites*

A high-performance platform for engineering programs needing composite-capable production.

- Prints carbon-fiber-reinforced materials
- Exceptional accuracy
- Ideal for AM pathways

J35 Pro – *Multi-Material Design & Modeling*

A compact PolyJet system for high-quality visual and functional prototypes.

- Full-color, multi-material capability
- Smooth, detailed surfaces without finishing
- Perfect for design, biomedical, and visualization labs

Ultimaker S8

Large-Format Dual Extrusion

Big build volume, reliable performance, and safe enclosed printing for makerspaces, engineering labs, and capstone projects.

MakerBot Sketch Sprint

Fast, Classroom-Focused Printing

Designed specifically for education, Sketch Sprint offers simplified workflows, safe operation, and fast print speeds—making it ideal for K–12 STEM and introductory CTE programs.

Ultimaker S6

High-Precision Classroom Printing

Easy to use, dependable, and highly accurate with broad material compatibility—ideal for STEM, CTE, and design programs.

UltiMaker Factor 4

Industrial-Grade Performance

Built for advanced programs, research labs, and industry-aligned training environments. Delivers engineering-grade materials, process control, and production-level reliability for high-performance applications.



Creaform ACADEMIA – 3D Scanning Solutions for Education

Empowering the Next Generation of Innovators with Professional 3D Scanning Tools

Creaform ACADEMIA™ is a comprehensive educational suite designed for forward-thinking teachers and researchers to inspire, collaborate, and drive innovation using the latest advancements in 3D measurement technologies. More than a teaching tool, it's a complete academic solution that develops student skills in **STEM**, **additive manufacturing**, **design**, **engineering**, and **metrology**.

The ACADEMIA package provides access to **metrology-grade 3D scanners, Creaform's powerful software ecosystem**, and **didactic resources** built specifically for education. With portable scanners trusted by industry leaders, students gain hands-on experience in **reverse engineering**, **inspection**, **CAD/CAM modeling**, and **quality control workflows**.

CREAFORM / AMETEK



What's Included

Creaform 3D Scanners

- **Go!SCAN 3D™** – Fast and intuitive color 3D scanner ideal for capturing complex shapes and textured objects.
- **HandySCAN 3D™** – Portable, metrology-grade handheld scanner providing high-accuracy data for precision parts, prototypes, and engineering studies.
- **MetraSCAN 3D™** – Optical CMM solution offering high-speed, high-precision scanning for larger components and complex assemblies in labs or workshops.
- **Peel 3D™** – Affordable, entry-level scanner perfect for introducing students to professional 3D measurement and digital design workflows.
- **HandyPROBE™** – Wireless portable CMM that complements scanning systems for accurate dimensional measurements and alignment applications.





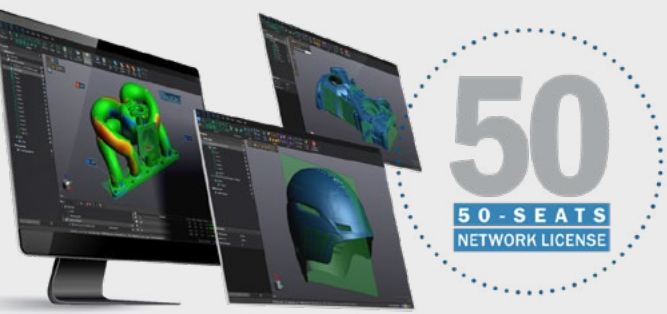
Creaform ACADEMIA Software Package

- **Creaform.OS™** – 3D measurement platform for seamless operation
- **Scan-to-CAD Pro Module** – Reverse engineering and design validation
- **Inspection Module** – Dimensional inspection and analysis
- **Integrity Suite™** (optional) – Non-Destructive Testing (NDT) capabilities

Teaching & Support Resources

- Complementary lesson plans and didactic material aligned with STEM and engineering programs
- E-learning courses for hardware operation and software proficiency
- Two-year hardware warranty and five-year software update plan

Empower students to turn ideas into reality with professional 3D measurement tools.



Why Choose Creaform ACADEMIA

- Built for academic use — **reliable, portable, and classroom-ready**
- Supports **STEM** and **engineering curriculum** from **high school** to **university research**
- Includes **50-seat educational software license** for multi-student access
- Made in **North America** and backed by the most trusted handheld 3D scanning brand

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Laser Cutting & Engraving for STEM, CTE, and Engineering

Laser cutters and engravers are essential tools for digital fabrication labs, engineering programs, architecture studios, and CTE makerspaces. Universal Laser Systems (ULS) delivers precise, reliable cutting and engraving across a wide range of materials, making it a versatile solution for prototyping, fabrication, and instruction. With modular hardware, intuitive software, and broad material compatibility, ULS systems are an excellent fit for schools building or expanding their fabrication capabilities.

UNIVERSAL® LASER SYSTEMS



Key Benefits

- High-accuracy cutting and engraving across wood, acrylic, plastics, and composites
- Enclosed, classroom-safe operation with intuitive workflow
- Modular design for easy maintenance and long-term readiness
- Ideal for engineering design, architecture modeling, robotics, and makerspace projects

Popular Education Models

- **VLS Series** – Compact, affordable platforms for CTE and STEM labs
- **PLS Series** – Larger work area with higher power options for advanced programs
- **ULTRA Series** – Industrial-grade performance for universities and R&D spaces

Extraction & Filtration Systems

Clean, Safe Air Management for Laser Labs

BOFA provides reliable filtration for laser cutting environments. Their systems remove particulates, odors, and VOCs, ensuring safe operation in classrooms, shared STEM labs, and fabrication studios.



Key Benefits

- High-efficiency filters for safe, compliant classroom operation
- Extends laser cutter lifespan by protecting internal components
- Quiet, compact systems ideal for makerspaces and engineering labs

Recommended Models for Education

- **BOFA AD Nano** – Compact entry-level filtration for small labs.
- **BOFA AD Base** – Designed to sit beneath a laser cutter to save space.
- **BOFA AD Oracle IQ** – High-performance filtration for mid-size labs.
- **BOFA AD 500** – Large-capacity system for higher-volume environments.

BOFA™

3D Printing in Healthcare

3D printing enables educators to create clinically relevant, anatomically accurate models that enhance medical training and simulation. These models closely replicate the look and feel of real human tissue, allowing students and clinicians to practice procedures, improve skills, and expand training opportunities without relying on cadavers or animals. This technology supports universities, nursing programs, and healthcare training centers in delivering high-impact, repeatable, and accessible hands-on learning experiences.



Career Exploration & Awareness

Helping learners discover careers before choosing a pathway

Career Exploration & Awareness solutions are designed to introduce learners to career options, industries, and technologies before they commit to a specific program of study. These tools focus on discovery, engagement, and context, helping students answer the question: "*What could I do — and what would I enjoy?*"

Rather than teaching advanced technical skills, these solutions emphasize exposure, curiosity, and confidence-building, supporting informed decision-making and stronger pathway enrollment.

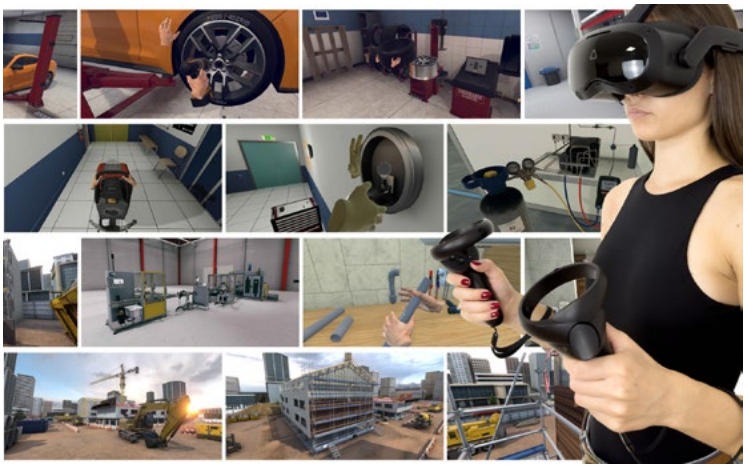


Key Outcomes

- Increased awareness of STEM and technical careers
- Improved student engagement and motivation
- Reduced pathway switching later in high school or college
- Stronger alignment between student interests and workforce demand

Ideal Learning Environments

- Middle school career exploration courses
- STEM labs and makerspaces
- Exploratory electives and rotations
- Career days, fairs, and outreach events
- Enrichment and summer programs





Mimbus

LJ CREATE™
Learning for life

MIMBUS Discover – Career Exploration

MIMBUS Discover is an immersive virtual reality career exploration solution that allows students to experience a wide range of skilled trade and service careers through short, guided VR scenarios. Designed for easy setup and broad appeal, MIMBUS Discover helps learners explore real-world work environments, understand job tasks, and build career awareness—without tools, prior experience, or safety risks. Ideal for career fairs, class rotations, STEM labs, and exploration programs.

LJ Create – STEM Career Exploration

LJ Create's STEM Career Exploration solutions introduce students to engineering, technology, and Industry 4.0 pathways through hands-on, project-based learning. Using guided activities and real-world technologies, students explore how STEM concepts connect to modern careers while building problem-solving, collaboration, and critical-thinking skills. These modular systems are well suited for middle school and introductory high school programs focused on career awareness and pathway discovery.

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Immersive Curriculum & Labs

Helping learners discover careers before choosing a pathway

Minds-i Education provides hands-on **STEM exploration platforms** that introduce students to **robotics**, **automation**, and **systems thinking** through approachable, real-world learning experiences. Designed for exploration rather than mastery, Minds-i solutions help learners understand how modern technologies work while building confidence, curiosity, and foundational problem-solving skills.

These systems are ideal for programs looking to **spark early interest in technical careers** without the complexity or cost of industrial-grade equipment.



What Students Explore

- Basic robotics and automation concepts
- Sensors, actuators, and control logic
- Mechanical and electrical system interaction
- Real-world problem solving and teamwork

Education Labs & Curriculum

Minds-i Education Labs combine **physical hardware** and **structured curriculum** to support exploratory STEM learning.

Key Characteristics

- Designed for entry-level exploration
- Modular and scalable across programs
- Supports inquiry-based, project-focused learning
- Flexible for classroom, lab, club, or enrichment use

Why Minds-i

- Low barrier to entry for students and instructors
- High engagement through hands-on interaction
- Clear pathway into advanced robotics and mechatronics
- Strong fit for STEM and CTE foundation programs

Autonomous Systems & Robotics

Exploring self-driving and intelligent machines

Autonomous Self-Driving Farming Lab (45 Hour)

Introduces autonomous vehicle concepts through agriculture applications, including sensing, navigation, and decision-making.

Autonomous Self-Driving Mars Rover Lab (45 Hour)

Explores autonomous robotics using space exploration challenges focused on navigation, sensing, and control logic.

UAVs, Drones & Aerial Systems

Hands-on exploration of flight, control, and drone applications

STEM Robotics Drones Lab – UAV (45 Hour)

Introduces drone operation, control systems, and sensing with real-world industry applications.

UAV Competition Kit

Team-based drone challenges that reinforce flight dynamics, problem-solving, and applied STEM skills.

UAV Drone Gimbal Rig

Explores stabilization, mechanics, and motion control used in drone-mounted camera systems.

MINDS-i FAA 107 Certification Prep (45 Hour)

Foundational knowledge supporting commercial drone operations and aviation career awareness.

Robotics Foundations & Coding

Building core skills in robotics, electronics, and control

STEM Robotics Foundations Lab – 4x4 (90 Hour)

Comprehensive, hands-on robotics lab focused on motion, sensing, and control logic.

Arduino 2-in-1 Robot Kit

Introductory robotics platform for learning coding, electronics, and hardware-software interaction.

Electric & Smart Transportation

Exploring future mobility and energy systems

Electric Car Lab (45 Hour)

Introduces electric vehicle systems, controls, and energy efficiency concepts tied to modern transportation careers.

Physics, Engineering & Design

Hands-on mechanics and applied problem-solving

MINDS-i Catapult Lab – Classroom 10 Pack

Explores force, motion, and engineering design through interactive, classroom-ready experiments.

STEM & Industry 4.0 Career Pathways

Prepare Students for Success in Industry 4.0

Industry 4.0 represents the convergence of automation, data, smart systems, and advanced technologies across modern industries. LJ Create's Industry 4.0 learning systems, supported by Tech-Labs, help educators deliver hands-on STEM experiences that connect classroom learning to real-world technical careers.

These structured, project-based learning pathways introduce students to the core principles behind smart manufacturing, digital systems, energy technologies, and data-driven decision making—without requiring prior technical experience.







Industry 4.0 Learning Themes

Students build foundational knowledge across key Industry 4.0 domains:

- Sensors & Control Systems
- Data & Analytics
- Energy Technologies
- Materials & Manufacturing Concepts
- Computation & Systems Thinking

> These themes reflect the real skills increasingly required across advanced manufacturing, construction, logistics, IT, energy, and healthcare industries.

Program Structure: Flexible & Scalable

Core + Pathway Model

- **Industry 4.0 Core (≈45 hours)**
  Introduces Industry 4.0 concepts, design thinking, safety, electrical principles, mechatronics, and data measurement.
- **Career Pathway Extensions**
  Programs can expand into focused sector pathways such as:
  - Manufacturing
  - Construction
  - Information Technology
  - Logistics & Supply Chain
  - Agriculture
  - Health & Biomedical Technology

> These themes reflect the real skills increasingly required across advanced manufacturing, construction, logistics, IT, energy, and healthcare industries.

Project-Based Learning Approach

LJ Create systems emphasize hands-on, team-based projects that mirror real engineering and technical challenges.

Students develop:

- Critical thinking & problem solving
- Collaboration & communication
- Computational thinking
- Applied STEM knowledge
- Career awareness and technical confidence

> Projects integrate academic standards while reinforcing 21st-century workplace skills.



Ideal For

- Middle & High School STEM programs
- Career & Technical Education (CTE) pathways
- Pre-engineering and pre-automation programs
- College bridge and workforce readiness initiatives

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STEM Learning Solutions

NeuroMaker® brings cutting-edge neuroscience, biomedical engineering, and artificial intelligence into the classroom through hands-on, project-based learning. Developed by BrainCo, a global leader in brain-computer interface (BCI) and prosthetics technology, NeuroMaker allows students to build, code, and control real hardware while exploring how the human brain and body interact with technology.



What Students Learn

- Biomedical & Prosthetic Engineering
- Neuroscience & Brain-Computer Interfaces (BCI)
- Artificial Intelligence & Data Processing
- Programming (block-based and text-based)
- Engineering Design & Human-Centered Innovation

NEUROMAKER

Core Learning Tools

- **NeuroMaker Hand 2.0** – Programmable prosthetic hand kit
- **AI-Powered BioSensor Kit** – EMG, motion, temperature, color, and more
- **NeuroMaker BCI** – EEG headband for brainwave-controlled projects
- **NeuroRacing** – Brain-controlled competition experience



Curriculum & Instruction

- 100+ hours of interdisciplinary curriculum
- Bilingual content (English & Spanish)
- Project-based learning with real-world challenges
- Capstone projects focused on accessibility and social impact
- Minimal setup; browser-based tools (ideal for Chromebooks)

Ideal For

- Middle School & High School STEM programs
- Career & Technical Education (CTE) pathways
- Makerspaces & Innovation Labs
- Engineering, biomedical, and computer science programs

Educator Support

- One-page and comprehensive lesson plans
- Student lab notes, assessments, and presentation decks
- Professional development and on-demand e-learning
- Ongoing technical support and implementation resources

Result: Students gain transferable, future-ready skills while engaging with industry-inspired technology that connects STEM learning to real-world careers and human impact.

Lucas-Nülle UniTrain STEM Learning System

UniTrain is a modular, multimedia desktop lab designed to support hands-on STEM instruction through guided experimentation and measurement-based learning.

- Hands-on experiments in physics and electrical fundamentals
- Modular training boards for repeatable, scalable instruction
- Built-in measurement and data analysis tools
- Safe, low-voltage platform for classroom use
- Supports inquiry-based, experiment-driven learning

LUCAS-NUELLE



Engineering & Automation Tools

Build the Foundations for Automation, Mechatronics & Industry 4.0

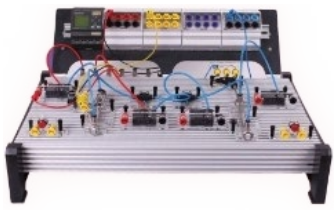
Modern automation doesn't start on the factory floor—it starts with a deep understanding of engineering systems, controls, and integration. The Engineering & Automation Tools category brings together hands-on learning systems that help students develop the technical thinking required for today's automated and intelligent systems.

These Matrix TSL solutions focus on engineering fundamentals that bridge theory to application, preparing learners for advanced training in Smart Manufacturing, Robotics, Mechatronics, and Industrial Automation.

What Students Learn

- Engineering systems thinking and problem-solving
- Electrical and electronic fundamentals that support automation
- Electromechanical integration and control concepts
- Sensor operation, feedback, and basic control logic
- Materials behavior and structural performance

Core Matrix TSL Learning Systems



Automatics

Introduces automatic control concepts, sequencing, and system response through hands-on experimentation.



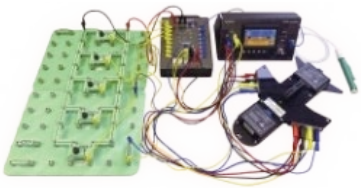
Structures

Demonstrates structural behavior, loads, and material response in real-world applications.



Materials

Examines material properties and performance to support informed engineering decisions.



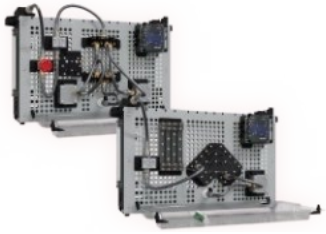
EFIS Trainer

Builds understanding of instrumentation, monitoring, and system feedback principles.



Process Control

Explores control loops and feedback systems foundational to automation and industry.



Fluid Mechanics

Covers fluid behavior, pressure, and flow used in hydraulic and pneumatic systems.



Electrical Machines

Introduces motors, generators, and electromechanical energy conversion concepts.



Robot Arm

Introduces robotic motion, control, and coordination without industrial complexity.



Fundamental Mechanics

Explores forces, motion, and energy principles that govern engineered systems.



Sysblocks

Teaches systems logic and signal flow using modular, visual learning blocks.



Renewables

Examines renewable energy generation and system integration fundamentals.



Locktronics

Teaches electronic logic and signal processing through hands-on experimentation.

Designed for Education. Built for Progress.

Trusted worldwide for their durability, curriculum alignment, and instructional flexibility, making them ideal for:

- Middle school through postsecondary programs
- Engineering and engineering technology pathways
- Career-connected learning and workforce preparation

Available through:

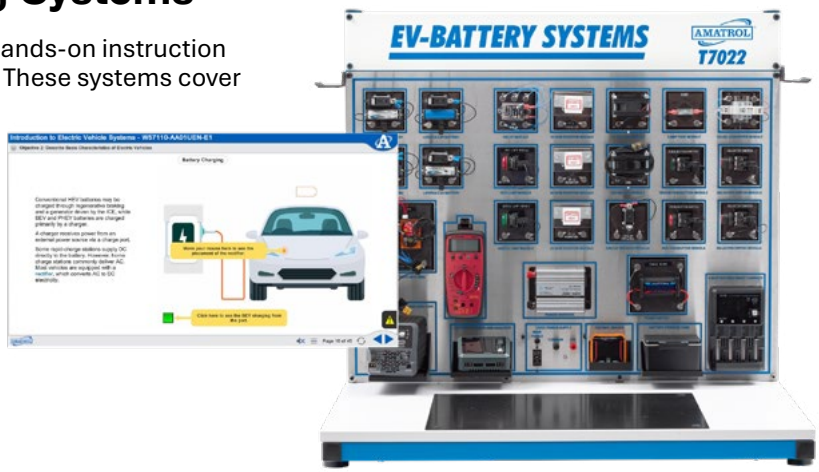
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Emerging Technologies & Advanced Industries

Amatrol EV Manufacturing Training Systems

Amatrol electric vehicle (EV) manufacturing trainers provide hands-on instruction aligned to modern automotive production and electrification. These systems cover key EV manufacturing processes such as electric motors, power electronics, battery fundamentals, automation, and industrial controls—preparing learners for roles in advanced automotive, battery, and mobility manufacturing. Designed for both education and workforce training, these solutions help programs stay aligned with the rapidly evolving EV industry.





Amatrol Mitsubishi Automation Training Systems

Amatrol's Mitsubishi automation training solutions deliver industry-relevant instruction using real-world industrial components from Mitsubishi Electric. Learners gain hands-on experience with PLCs, HMIs, variable frequency drives, and integrated automation systems commonly used in advanced manufacturing environments. These trainers support mechatronics, industrial maintenance, and automation programs by bridging classroom learning with the technologies found on today's factory floors.

990-DRV1FM – Portable AC Variable Frequency Drive Troubleshooting Learning System (Mitsubishi)

Portable training system that teaches AC variable frequency drive configuration, operation, and troubleshooting using Mitsubishi industrial components and FaultPro.

990-PM5UF – Portable PLC Troubleshooting Learning System (Mitsubishi FX5U)

Hands-on PLC programming and troubleshooting training using a Mitsubishi FX5U PLC, GX Works3 software, and FaultPro fault insertion for real-world diagnostics.

Semiconductor Manufacturing & Technician Training Solutions

Semiconductor training solutions support the development of a skilled technician workforce for modern semiconductor manufacturing. These systems focus on core competencies such as cleanroom protocols, safety, tool operation, process control, electronics, and equipment maintenance—skills essential to semiconductor fabrication environments. Designed for technician-level and advanced manufacturing programs, these solutions align with industry-recognized credentials and workforce initiatives supporting domestic semiconductor production.

SACA Semiconductor Credentials (Snapshot)

- Cleanroom Protocols and Safety
- Semiconductor Tool Operation (Overview & Process Applications)
- Semiconductor Manufacturing Process Control (SPC)
- Semiconductor Equipment Installation & Maintenance
- Semiconductor Facility Operation & Maintenance

The X-Cal Difference

For new construction and renovation projects, X-Cal combines a clear vision of your goals with our professional consulting, planning, implementation and support services, to maximize your results:

Consulting

Before the space planning begins, our staff will meet with you to understand your objectives, and help to define a successful and sustainable program implementation.

Planning

Next, we will assist in the careful planning of a complete learning environment – not just a "lab." We'll work with your team and architects to help layout your space, and provide you with detailed lab drawings and product specifications.

Implementation

When your building is ready, our factory-trained technicians will complete your furniture and equipment installation on time, and within budget. And our manufacturing partners will provide effective professional development for your faculty and lab support staff, either on-site or at our training facilities.

Support

Once your program is up-and-running, our team of outside service technicians and inside support staff will work with you to ensure that your program continues to function as specified, and is kept up-to-date, for many years to come.

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Our mission is to offer evolving technology, advanced equipment, and curriculum designed to support every learner in achieving success in the technologically advanced careers of tomorrow.

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