



Case Study: Eastern Washington University

Designing New University-Level Curriculum to Meet Industry Needs



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Department Chair

Profile: In September 2004, Eastern Washington University (EWU) became the first and only of Washington State's public comprehensive universities to be granted permission by the Higher Education Coordinating Board to offer the electrical engineering degree. Prior to legislation passed in 2003, only public research universities were authorized to grant engineering degrees. Department Chair Mr Donald Richter knew he wouldn't have second chances. This new program needed to be a success both for the students, the University, and all of the industries of Eastern Washington.

Engineering & Design Facilities

After consulting many industries, EWU focused on the primary objective of the electrical engineering program, which is to prepare students to enter and progress in electrical engineering positions in business, industry, and government. Graduates are generally expected to work in the research and development of ideas, products, and processes by applying engineering principles to the solution of practical problems in the electrical engineering field. But how would they guarantee that the students would have adequate hands-on in such fields as electrical machines, transmission lines, protective relaying, power electronics and process control?



New Computing & Engineering Building, 93,000 square foot, \$26 million, was completed in time for fall quarter 2005 classes. It functions as a "living lab", by providing access to various probes and sensors that detect such things as flow measurements of the HVAC system, current loads, power ratings, and power factor corrections.

Power Lab Powered by Lab-Volt Stations



Professor Bruce Barnes in his new lab

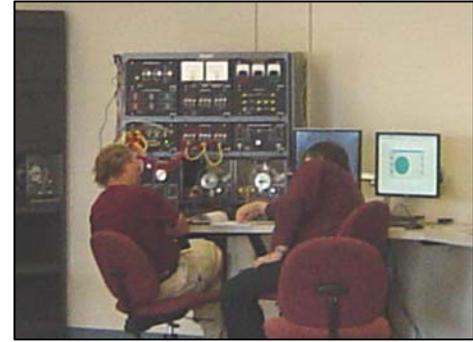
Lab-Volt's Electric Power and Controls system has been a hallmark of electrical power training for over four decades. Our modular approach to the study of basic and advanced electric power technology gives instructors the flexibility to customize their own training needs, while our dedication to the highest quality product provides instructors and institutions with decades of reliable performance. Lab-Volt's EMS provides the means for solving the needs of our academic and industry partners by providing the most flexible,

and educationally relevant solution to Electric Power and Controls training.

In this lab, AC/DC motors, generators, and transformers of various powers, as well as a few electromechanical training systems are provided to students. Various speed control equipment for AC/DC motors is installed. Experimental kits for power electronics such as power transistors, thyristors, inverters, SCRs (silicon-controlled rectifiers), etc., are incorporated into this lab. This lab will support several classes, such as Energy Systems (ENGR 350), Electromagnetism (PHYS 401), and Electronics I and II (ENGR 330/331).

EWU POWER LAB: 5 Stations Featuring

- **8006:** Computer-Assisted 0.2-kW Electromechanical Training System with additional motors
- **8007:** Protective Relaying Training System
- **8032:** 0.2-kW Power Electronics Training System
- **8045:** Control of Industrial Motors - Training System
- **8055:** 0.2-kW Electric Power Transmission Training System
- **8060:** Synchro-Servo Training System
- **8970:** Electromechanical Systems Simulation Software (LVSIM®-EMS)
- Dual monitor computers
- All books (student and teacher manuals) in electronic format (campus license) as well as hard copies.



Prof. Barnes and a colleague working in the Power Lab

Eight Key Points about Lab-Volt Electro-Mechanical Systems

1. Broad & Proven Appeal:
 - Decades of satisfied use
 - Has proven effective in the instruction of electromechanical systems from vocational to the four-year engineering level.
2. Long Life:
 - Solid design and construction
 - Built to last for decades in the classroom
 - These units simply don't break down.
3. Modularity:
 - Maximizes flexibility and variety for experimentation
 - Allows endless possibilities for expansion and customization
4. Lab-Volt's Motors:
 - Designed and constructed at Lab-Volt to make learning the basic principles of motors and generators realistic and engaging.
 - Time proven
 - Set of 17 fractional HP motor-generators, identical in size, power, and construction
 - Provide the characteristics of a great variety of large off-the-shelf machines.
5. Safety:
 - Only safety leads for where significant voltage exists
 - All electrical connections are protected
 - Motors designed to be overloaded
 - Coupled behind the safety of protective Plexiglas
 - Almost impossible to achieve this level of safety with commercially available motors
6. Expandable:
 - EMS is the nucleus of an entire line of electric power and control training equipment
 - ✓ Control of industrial Motors
 - ✓ Faultable Industrial Controls
 - ✓ Motor Drives
 - ✓ Power electronics
 - ✓ Electrical Power Transmission
 - ✓ Special Motors (Dahlinder, 2-speed, Constant Torque, Linear, Brushless AC generator, biphas, etc.)
 - ✓ Electric control of Hydraulic and/or Pneumatic Devices
 - ✓ PLC (Programmable Logic Controllers), PLC Simulators
 - ✓ Protective Relaying System
 - ✓ Dissectible Machines
 - ✓ Winding Kit
 - ✓ Magnetic Circuits and Transformers
7. Courseware:
 - Available as traditional lab manuals, as computer interfaced data acquisition laboratory, or through Lab-Volt's award winning TechLab interactive, computer-based curriculum
8. Simulation:
 - Great classroom demo
 - Actual results
 - Same steps as real equipment