Eaton's Electrical Engineering Services & Systems

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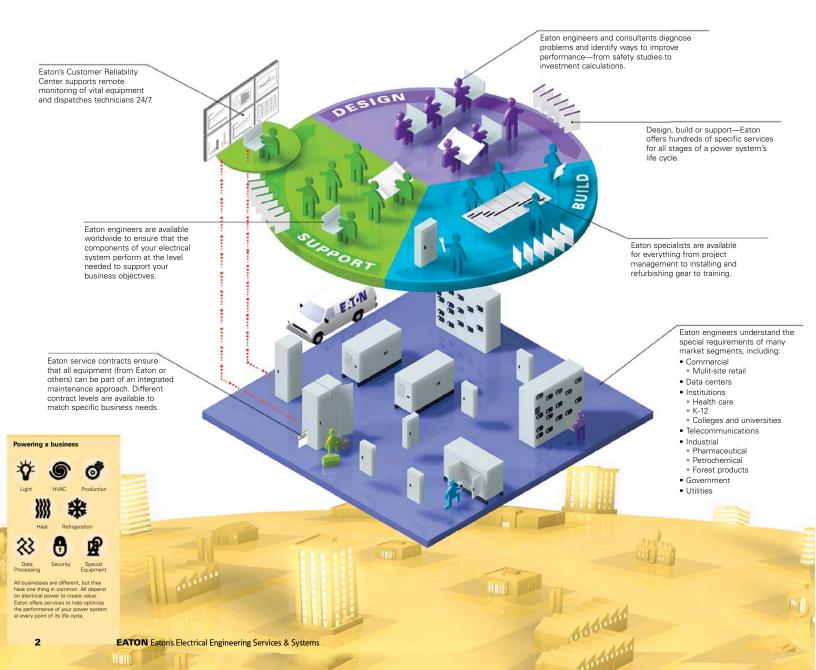
BUIL

At your service



Design, build, support. Eaton's mission

Design—Engineering and consulting services focus on understanding your requirements and setting strategies for your power system in order to satisfy your business needs. **Build**—Modernization and turnkey power system services deploy personnel in the field to complete projects, from upgrading an existing installation to building a brand-new facility. **Support**—Contract and support services provide the maintenance, parts and service needed to get the best performance from your existing power system.



Eaton's engineering and consulting services focus on understanding your business requirements and optimizing your power system to meet your needs. Our engineers and consultants can help diagnose problems, identify ways to improve performance or transform concepts into flexible, practical solutions that can improve productivity and use of capital. We can help keep your power system safe, efficient, reliable and up-to-date. The Eaton global service team is one of the largest and most experienced teams of power system engineers in the industry, with industry-standard software and advanced modeling and analysis capabilities at their fingertips. Our comprehensive portfolio of design services includes safety studies and energy management, power quality and reliability audits.

With Eaton's help defining strategies for your power system, you'll witness a range of business benefits, from reduced costs to a more effective use of capital. Our engineering and consulting services help you manage your power system as a strategic resource that can give you a competitive advantage.

PowerChain equipment modernization projects

Working at your site, Eaton engineers can quickly identify, assess and quantify the problem areas to improve reliability, energy efficiency and safety. A PowerChain™ audit provides you with a road map to correct the issues and quickly maximize performance so you see immediate results.

A PowerChain equipment modernization solution from Eaton delivers major benefits before, during and after construction. With Eaton at your side, you have a reliable, expert partner at every stagefrom the upfront design and installation of your electrical system to commissioning and life cycle management. Because construction projects are complex, we help mitigate the risks through a single point of accountability that eliminates the guesswork and fingerpointing to keep your project on track and on budget. Eaton's expertise can also lead to a more efficient use of your capital by optimizing the design of your facility's electrical system and reducing the total capital required for electrical infrastructure. With Eaton's ability to bring the project online rapidly, your new asset delivers revenue to the bottom line sooner.

Eaton's Electrical Engineering Services & Systems

Electrical power is more than just a convenience; it's an essential element of doing business today.

Powering a business

To deliver the competitive advantage that our customers demand, Eaton helps enterprises take a proactive approach to measuring and managing the power system as a strategic, integrated asset. Eaton provides the solutions that your power system needs to operate safely, reliably and efficiently so you can concentrate on your core business. The Eaton Electrical Engineering Services & Systems team offers a comprehensive portfolio of support tailored for every stage of a power system's life cycle. Through our design, build and support services, we are dedicated to understanding your challenges and ensuring that your entire electrical infrastructure functions at its highest level.



Servicing industries around the world

As a global leader in power quality, Eaton is a premier provider of design, build and support services for domestic and multinational customers. Our expertise extends across a wide range of industries, including:

- Automotive and assembly
- Commercial properties
- Forest products
- Government
- · Health care and education
- Manufacturing
- Petrochemical
- Pharmaceutical labs
 and biotech
- Retail
- Data centers
- Telecommunications
- Utility
- Wastewater treatment facilities
- Mining
- Alternative energy
- Semiconductor

Dedicated service partner

Effective management of power requires strategic thinking, intelligent system design, integration, coordination and control. As a dedicated service partner, Eaton brings the knowledge and expertise necessary for on-site and remote access diagnostics, installation, modernization and predictive maintenance. Whether you have a single power strategy application or a comprehensive integrated system, we deliver the best solutions to enhance power performance, reduce operating costs and maximize the reliability, safety and integrity of your electrical equipment and system. Our design, build and support services integrate and optimize all elements of a power system to ensure that it is aligned with your business goals.









The power of experience

Eaton's electrical businessone of the world's leading suppliers of electrical control products and power distribution equipment—is backed by 100 years of history and a dedicated pool of alliances and partners. Our experience has resulted in more than 25,000 innovations in distribution and industrial control products, and each incorporates industry-leading technologies that provide the highest value to our customers. With our proven track record of completing everything from complex, custom industrial and commercial applications to innovative residential components, Eaton is clearly the best choice for your electrical design, build and support service requirements.

The power you need

Eaton solutions are a bold, strategic approach to what has traditionally been a tactical process of designing, installing and managing electrical systems. At Eaton, we understand the consequences of ineffective power management and ad hoc design that lead to inefficiencies and higher costs. Our systemwide approach and perspective allow us to assess your needs quickly, develop a solution and help you realize measurable improvements to your power system's performance and organization's productivity, while reducing costs at the same time. When choosing a partner to manage your power system, Eaton is the clear choicethe company that offers a full spectrum of design, build and support services.

The power of expertise

Our achievements as a singlesource, full-line manufacturer of recognized global brandsincluding Westinghouse,® Cutler-Hammer,® Powerware,® Holec,® MEM,® Tabula,® Elek,® Durant[®] and Heinemann[®]have made us an industry leader recognized for reliable products and innovative services and ideas. Eaton's extensive products, solutions and services meet global electrical standards such as IEEE,® NFPA,® UL,® ANSI, IEC, NEMA® and CNCA. Our knowledge base and technical insights ensure that we will continue to deliver the solutions that you need as your business evolves.

The power of Eaton

Call 1-800-498-2678 to learn more about expert support for powering and controlling your business, or visit: www.eaton.com/EESS.

Design: Engineering and consulting services

Eaton's engineering and consulting services focus on understanding your business requirements and optimizing your power system to meet your needs. Our engineers and consultants can help diagnose problems, identify ways to improve performance or transform concepts into flexible, practical solutions that can improve productivity and use of capital.

The Eaton global service team is one of the largest and most experienced teams of power system engineers in the industry, with industry-standard software and advanced modeling and analysis capabilities at our fingertips. Our comprehensive portfolio of analysis and design services includes safety studies and energy management, power quality and reliability audits.

With Eaton's help defining strategies for your power system, you'll witness a range of business benefits, from reduced costs to more effective use of capital. Our engineering and consulting services help you manage your power system as a strategic resource that can give you a competitive advantage.

Professional consulting services

Our engineering and consulting services provide upfront analysis and design prior to project implementation. Through a PowerChain audit, our power system engineers can diagnose problems quickly or proactively identify ways to improve the performance and operation of your electrical system.

Design and engineering services

Because Eaton's power system engineers have extensive skills and expertise in power system design, your power system will be optimized to operate at peak performance. Active membership in the national IEEE and other related agencies that write standards ensures that our engineers are up-to-date in design capabilities and stay consistent with today's state-ofthe-art techniques.

Power system studies

Power system studies offer the most focused and systematic approaches available to enhance power system performance and identify inefficient system designs, incorrect equipment selection and potential problems between your equipment and the rest of the power system.



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Professional Consulting Services					
Design and Engineering Services					
Power System Studies					
Power Quality and Reliability Studies					
Safety Studies					
Automation Engineering Studies					
Energy Management Studies					
Business Continuity Studies					
Selective Coordination Review					
PowerChain Audits					





Eaton employs one of the industry's largest groups of electrical engineering professionals, most with more than a decade of experience working on the equipment of multiple manufacturers. Eaton service engineers perform a host of on-site studies and analytical services for customers through numerous types of power system studies, design engineering, power quality studies, failure analysis and on-site investigations. Additional related services cover technical training, customized high resistance grounding systems, partial discharge applications and power systems automation.

Power quality and reliability studies

We use power quality and reliability studies to evaluate the safety levels and the reliability of your electrical infrastructure. These studies usually include harmonic, grounding, voltage flicker and surge suppression analyses to ensure that sensitive circuits operate effectively.

Safety studies

Working together with you, we identify and correct deficiencies in the power system, enhance personnel safety and reduce insurance costs. Arc flash studies are also a critical component of our safety analysis.

Automation engineering studies

Working with you, our automation specialists determine if your system could benefit from monitoring. Eaton then designs a power systems automation solution that integrates power distribution, generation and delivery of hardware, software and communication networks to perform as a seamless entity. This unique alternative to the conventional manufacturerintegrator-contractor team offers project management and a single point of responsibility direct from Eaton.

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Energy management studies

Eaton has the expertise to help you successfully integrate green measures into your power system. Our energy management studies analyze your system's capability to supply energy to the connected load under steady-state conditions and provide optimal power factor correction. With a simple energy audit, we identify wasteful patterns in total consumption of energy from all sources, including electricity, gas, steam and compressed air. We then present recommendations that provide cost-effective solutions to shrink energy usage. For more information on sustainable solutions from Eaton, please visit www.eaton.com/greenbuildings.

Business continuity studies

At Eaton, we understand the potentially devastating impacts that result from a crisis or disaster, especially those impacting plant equipment. In the aftermath of such incidents, a rapid response is critical. Within hours, we can deploy a team of engineers and technicians that act as prime contractors to act instantly and mobilize and coordinate the experience and resources needed to assess the problem and provide a comprehensive plan for every phase of restoration. In addition, we can conduct a study to identify immediate and midterm actions that your site personnel should implement in the event of a crisis.

Selective coordination review

To maximize the efficiency of your facility, we evaluate portions of new electrical power systems to determine compliance with Selective Coordination requirements as mandated by the 2014 National Electrical Code® (NEC®). Based on manufacturers' test data and published overcurrent protection characteristics, recommended modifications to the system design are outlined to achieve complete coordination up to the available short-circuit current.

PowerChain audits

Through analysis, monitoring and equipment audits, Eaton's experienced engineers uncover existing problems and develop strategies to prevent future system distress. We have the expertise to identify design weaknesses, determine the reason that something failed to operate properly, find economic means of resolving system safety or performance and implement cost-effective improvements. In addition, Eaton can train your employees to both maintain your system's wellness and preserve the integrity of your facility's operating and maintenance strategy.

Build: Modernization and turnkey services

Eaton's modernization and turnkey power system services place personnel in the field to complete a variety of undertakings such as managing a construction project from start to finish, reconditioning or upgrading equipment or modernizing your power system.

With our project management services, you'll have a single point of accountability and reduced risk of project delays and failures. The result is a safer, more reliable and cost-efficient power system.

So that support is there when and where you need it, Eaton has experienced engineers and field technicians located throughout the world. In addition, we also provide support from regional product centers for specialized services like equipment reconditioning.

Turnkey project implementation

We offer centrally coordinated management of all procurement, installation, testing and commissioning of the products and systems required to implement unique power system solutions. Whether you have one site or multiple sites, Eaton has the capabilities and the expertise to function as your single-source service provider.

Project management

Eaton's project management group relieves you from the burden of multi-supplier coordination by serving as a single point of accountability for all technical, financial and commercial coordination within the scope of the project. Additionally, our turnkey engineers manage the technical and commercial risk inherent to meeting project objectives, including performance, cost and time goals. Depending on your needs, Eaton manages either designated or all aspects of your system design and development.

Power system projects

Eaton can help you improve the performance, reliability and efficiency of your existing electrical distribution system as well as extend the useful life of all equipment by modernizing your electrical infrastructure.



	Greater Reliabil	Enhanced Safet	Effective Use of	Cost Efficiencie	Risk Mitigation
BUILD	Great	Enhai	Effect	Cost	Risk I
Turnkey Project Implementation					
Project Management					
Power System Projects					
Power Quality and Reliability Projects					
Energy Management Projects					
Safety and Risk Management Projects					
Equipment Reconditioning Services					
Modernization Projects					





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Power quality and reliability projects

Every facility has an electrical infrastructure that drives the business. As such, every wire, circuit breaker, loadcenter, panelboard, transformer and piece of switchgear-as well as the sensors, monitoring systems, uninterruptible power systems (UPS) and generators that support it-need to operate seamlessly and without problems. Today, a typical facility experiences 50 power quality events a year, at least 12 of which are severe enough to cause significant problems, costing hundreds of thousands of dollars in downtime and equipment damage. 0

Electric Power Research Institute (EPRI) Distribution Power Quality (DPQ) Study, 2003. Eaton is here to help. Our system engineers are experts in identifying the symptoms of power quality problems, analyzing the source and applying the necessary knowledge and experience to provide a total solution.

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ater Reliability nanced Safety

We have performed thousands of audits at mission-critical facilities, and have teamed up with other manufacturers to design custom solutions that have helped protect millions of dollars worth of equipment.

Because clean, continuous and reliable power is critical to our customers' success, Eaton has invested significant time and resources into understanding the ever-changing power requirements of facilities.

Power Systems Experience Center (PSEC)

We designed and built a state-of-the-art Power Systems Experience Center in Pittsburgh, PA, which is used to demonstrate and test power quality problems and solutions. The PSEC is a safe, controlled environment where you can participate in training and observe product demonstrations firsthand. At the PSEC, you are able to see the most advanced approaches to power quality, energy management and arc flash safety. Our goal is to help take the mystery out of electrical power systems. For more information or to schedule your visit, go to www.eaton.com/experience.



Build: Modernization and turnkey services

With Eaton's help defining strategies for your power system, you'll witness a range of business benefits, from reduced costs to more effective use of capital. Our engineering and consulting services help you manage your power system as a strategic resource that can give you a competitive advantage.

Energy management projects

We excel at monitoring, measuring and controlling the power that flows through your facility and turning it into a competitive advantage for you by helping to reduce energy and operating costs while also improving uptime and reliability. Eaton can use our expertise to design an effective power management program for your facility. Because the systems installed in your facility often operate on mutually exclusive platforms, it can be difficult to obtain the critical data you need. Getting these systems to work together to support a facility or enterprise power management strategy is not easy, but it can be when you enlist the experts from Eaton. As a full-service systems integrator focused on power system applications, Eaton can assess your facility's electrical system and present you with cost-effective power management solutions.

Safety and risk management projects

Eaton solutions stress three safety requisites:

- Prevention, which reduces the need for people to interact with dangerous electrical hazards
- Protection, which focuses on safe equipment design
- Preparation, which provides training for people working in energized areas and specifies standards that keep your workers safe and you in compliance

Equipment reconditioning services

Eaton's equipment reconditioning services enhance the useful life and total performance of the existing switchgear. We can provide everything from Class 1 reconditioning of low voltage (LV) and medium voltage (MV) breakers to completely new switchgear lineups, as well as new replacement vacuum breakers.





Arc flash safety

The reduction of arc flash risks and hazards is of great concern to customers who deal with high levels of electrical energy. An arc flash event releases a tremendous amount of energy in the form of thermal heat, toxic fumes, pressure waves, blinding light, sound waves and explosions that can result in serious injury including critical burns, collapsed lungs, loss of vision, ruptured eardrums, puncture wounds and even death.

Power system modernization provides simple ground-andtest (G&T) devices for most manufacturers' medium voltage ANSI-rated switchgear breakers. These G&T devices test and ground medium voltage circuits to protect personnel from injury when performing maintenance on de-energized circuits.

Eaton offers a broad range of arc flash-related products and services, including arc flash hazard analysis, training and compliance and mitigating products and systems. If you let Eaton develop a total arc flash safety solution for your facility, you can protect what you value most. For more information, please visit www.arcflashsafetysolutions.com.



Support: Contract and support services

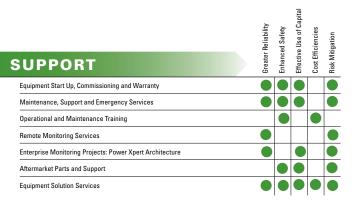
Eaton's contract and support services provide the maintenance, parts and service you need to get the best performance from your equipment already in place.

Our field technicians and customer support engineers can perform field acceptance testing, commission equipment, perform planned maintenance, monitor performance and diagnose problems remotely, as well as respond to emergencies 24 hours a day, 7 days a week, 365 days a year. In addition, our customer support centers are available around-the-clock to schedule services, monitor equipment, send spare parts and provide emergency support. With optimal maintenance and support, your business will have more reliable, higher quality and cost-effective power. Our support services help businesses make the most of their existing electrical equipment by optimizing performance and extending the life of existing facilities.

Equipment startup, commissioning and warranty

Eaton's field service engineers can install, acceptance test, start up and commission any manufacturer's power equipment to precise standards with minimal disruption to ongoing facility operations. Our service engineers are well trained on efficient, standardized processes that get a system commissioned quickly, providing beneficial operation sooner. Moreover, we will add an additional one-year warranty on any Eaton equipment that we design, build and support. Also, after the factory warranty period is over, EESS offers extended warranty service agreements up to 60 months from the date of ship, which includes equipment inspections every 18 months and replacement or repaired parts for the life of the agreement.









Maintenance, support and emergency services

In the event that you need OEM equipment serviced and upgraded, Eaton has the expertise and the ability to work on virtually all manufacturers' equipment. With an outstanding electronic library of OEM user and maintenance manuals, we can deliver the best maintenance program to your equipment every time. With extensive field experience, Eaton can develop a customized application quickly to schedule and document essential system services. By implementing predictive maintenance software with complete monitoring capabilities, equipment outages can be anticipated and averted before they happen. Our predictive diagnostic services apply the latest technologies to support the online condition assessment of critical AC and DC electrical distribution equipment. Our applications can use existing electrical components for predictive diagnostic measurements.

Our service teams are on call throughout the year, providing unrivaled services ranging from troubleshooting to disaster recovery. All it takes is one call to 800-498-2678, and a group of Eaton service engineers will respond quickly.

Operational and maintenance training

Eaton offers both standardized and customized training programs that reflect the full range of electrical system engineering disciplines, including distribution systems analysis, power quality and grounding, arc flash safety and electrical equipment maintenance. Taught by an experienced instructor at one of our training facilities or on-site, these courses involve classroom instruction complemented by hands-on exercises that reflect real workplace situations. Additionally, many courses award CEU credits.

Remote monitoring services

Eaton offers remote monitoring of electrical distribution equipment, including critical failure indicators such as humidity, dust, temperature, water, smoke and motion, as well as critical operating conditions such as the opening of a main circuit breaker, transfer of power or starting of emergency generation.

Our remote monitoring services may also include power quality measurement thresholds from existing or new metering or relays, including harmonics, surges, sags, or other preprogrammed relay or meter outputs. Multiple communication options are available to meet your operational needs.

To help users better preserve the longevity of their power system, Eaton's GearGardSM solution not only provides immediate alarms for problem conditions, but also notifies users when it is time to perform an inspection or when maintenance is recommended.

GearGard relies on proprietary algorithms and historical performance data displayed by each group of power distribution equipment. These unique algorithms are created based on the local environment and loading and heating time constants.

Support: Contract and support services

Eaton's contract and support services provide the maintenance, parts and service that you need to get the best performance from your equipment already in place.

Enterprise monitoring projects: Power Xpert Architecture

In most organizations, many elements of the critical facility infrastructure are not monitored, and those that are monitored may not communicate with each other. It is impossible to see the big picture, to correlate events across the power system or to drill into detail for quick diagnosis and action.

IT and facility managers need a framework to integrate and analyze data from all their power equipment and the tools to determine appropriate action. As the backbone of Eaton's solutions, Power Xpert® Architecture provides this framework, allowing for excellence in the monitoring of your electrical infrastructure and electrical energy management.

Power Xpert Insight

Focused on power and energy monitoring, Power Xpert Insight's customer-centric interface was developed after extensive user testing, and the system is designed to be both easy to use and easy to install. Power Xpert Insight allows you to view the device information you want to see, easily manage alarms and view and compare trend data. It is designed to scale easily from a small school or data center to a global manufacturing operation, providing greater value over time.

For more information, go to www.eaton.com/insight.

Foreseer[®] Software Services

This software offering is the solution for those looking to get their entire facility on one screen. Regardless of size, city or country, this enterprise solution provides insight to the entire power and environmental infrastructure. The vast repertoire of existing device interfaces (more than 1000 available and the ability to create more) allows Foreseer Class Software to be customized by gualified service professionals to deliver exactly the integrated solution you need. Designed as a one-stop monitoring solution for missioncritical facilities, the Power Xpert Foreseer Class Software features an unparalleled data handling engine, sampling an unprecedented number of data points from thousands of devices.

The proactive data gathering algorithm means data is continuously collected. Unlike other systems where only preselected data is stored or stored only after an event occurs, the aggressive monitoring engine gathers all data and archives it safely offsite for fast and seamless retrieval and analysis later. This state-of-the-art Web-based system creates a cohesive, responsive and proactive monitoring solution that can be easily expanded across the corporate platforms.











Equipment life extension and modernization

The useful life and performance of vintage or damaged motor controls and power distribution equipment can be extended and enhanced through our Aftermarket Centers of Excellence (ACE) and Power Breaker Centers (PBC). Strategic locations enable rapid response through a cost-effective program of selective hardware upgrades and reconditioning. Eaton strictly adheres to all national standards and quality processes. Field service experts use evolving technology to ensure the most advanced retrofit upgrade possible.

Eaton's Aftermarket Business Unit offers a host of solutions for aging power systems to extend the useful life of electrical power systems. These range from reconditioning to equipment replacement and additions to existing systems that improve reliability and safety.

- Class 1 breaker reconditioning LV and MV
- Solid state LV trip retrofits and upgrades
- LV air replacement breakers
- MV vacuum replacement breakers
- LV-VSR (breaker-to-motor starter replacements)
- MV-VSR (breaker-to-motor starter replacements)
- Upgrade equipment front door metering and relaying
- · Horizontal main bus upgrades
- High resistance grounding systems
- RPR-2 remote power racking

Equipment life extension and modernization also encompass the ACE locations that specialize in Class 1 reconditioning of power circuit breakers. Eaton provides a comprehensive offering of life extension, modernization and engineered solutions for the installed base of electrical distribution and control equipment. These solutions include upgrading to the most current control and circuit protection technology and extending the life of existing equipment with genuine renewal parts, replacement components, factory remanufacture and repair and other services. Eaton is a leader in supporting the installed base of other manufacturers' equipment, as well as those original manufacturers no longer in business.

Eaton is dedicated to ensuring that reliable, efficient and safe power is available when it's needed most. With unparalleled knowledge of electrical power management across industries, experts at Eaton deliver customized, integrated solutions to solve our customers' most critical challenges.

Our focus is on delivering the right solution for the application. But, decision makers demand more than just innovative products. They turn to Eaton for an unwavering commitment to personal support that makes customer success a top priority. For more information, **visit www.eaton.com/electrical** and **www.eaton.com/eess**.



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