Houston Service Center
Medium Voltage Service and Aftermarket Solutions
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Outstanding aftermarket support is one of the many reasons customers choose ABB. To increase ABB's ability to respond to growing customer needs, a localized service center has been opened to provide greater responsiveness to valued customers. ABB's customers have come to expect extraordinary responsiveness in providing direct replacement circuit breakers, authentic breaker and switchgear components for maintenance, upgrades, life extension projects, and field services.

ABB Medium Voltage Service recognizes that circuit breakers and switchgear have different service needs depending on factors such as age, maintenance, application, and duty cycle. That's why ABB has a variety of aftermarket solutions that extend the life of, and in many cases reduce the maintenance requirements of, switchgear. Plus, ABB has qualified personnel to perform the aftermarket field services required to keep electrical equipment operating properly and safely.

ABB’s worldwide leadership and manufacturing excellence in medium voltage circuit breakers, switchgear, and related products allows ABB to provide a variety of aftermarket solutions and services for a wide variety of applications.

**In-shop solutions and service**
- Circuit breaker refurbishments breakers
- Protective relaying and control service and support
- Power service and support
- Training

**Medium voltage service support solutions**
- Medium voltage roll-in replacement circuit breakers
- Engineering/safety solutions
ABB’s factory trained technicians provide refurbishment services for both low and medium voltage circuit breakers. ABB refurbishes circuit breakers to a “like new operating condition” and provides a full one year warranty that covers parts and labor.

**Refurbishment program**
ABB offers an exclusive refurbishment program for almost all vintage circuit breakers. The useful life of vintage low and medium voltage power circuit breakers can be extended and enhanced through refurbishment. Heavily damaged power circuit breakers can also be revived and re-introduced into the distribution system after refurbishment.

**Refurbishment process**
1. “As received” inspection of major assemblies and testing to verify breaker operation
2. Circuit breaker is completely disassembled for inspection and cleaning
   − Non-current parts are cleaned by methods that remove all foreign material, but don’t compromise the material’s dielectric or structural properties
   − Current carrying components are cleaned by methods that do not deteriorate original plating
3. Parts are inspected for cracks and deterioration utilizing approved acceptance criteria
4. Parts are replaced, re-painted and/or re-plated as required to meet the original design life of the breaker
   − If more than 50% of the main contact surface is damaged, worn, or cracked, the main contact will be replaced
5. All old lubricants are removed, the mechanism and all non-current carrying pivot points are re-lubricated with Mobil 28 or Anderol 757 lubricant per customer specification
6. Circuit breaker is reassembled per assembly drawings
7. Circuit breaker is “final” tested as a new breaker in accordance with applicable ANSI standards
8. Each refurbished circuit breaker is labeled for traceability
9. Test report is supplied that includes results obtained from “as received” and “final” testing along with a list of replaced parts

**Customer service solutions**
In addition to providing excellent circuit breaker refurbishments, ABB works with customers to create refurbishment programs to meet specific needs and timeframes. Examples of customer service solutions include:
− Loaner / spare breakers available for refurbishment rotation and minimized down time
− Reusable shipping crates to protect breakers during transit can be supplied or free breaker pickup within 50 miles of the Sugarland facility
− Ability to refurbish ABB lineage and other manufacturers’ low and medium voltage circuit breakers
− Combination of service-oriented personnel and factory capabilities assures the most cost-effective and timely breaker refurbishments
− Work performed by professional technicians in a controlled environment and supported by design and product engineers
− Refurbishments validated by full production testing to original specifications and industry standards
− Localized shop allows for better customer communication and visibility to project progress. Customers are always welcome to perform site visits during any step of the refurbishment process
Protective relay & control service and support

The reliability threat posed by aging electric power systems and the need to reduce operating costs increases the importance of protective relays in existing substations and power plants. With the legacy Westinghouse electromechanical, solid state, and microprocessor-based protective relay systems, ABB is uniquely positioned to provide expert relay solutions due to a large installed base, application diversity, access to engineering designs, and global development capabilities. MV Service provides customers with engineering and technical support in every aspect of system protection, from testing to managing complete turnkey projects.

Relay system maintenance

mV Service offers maintenance on relays and relay systems used for the protection of generation, transmission, transformer, and distribution systems. The ABB field service technicians are factory trained to maintain all manufacturers’ relays and all types of relays including electromechanical, solid state, and microprocessor. Typical maintenance packages include an initial inspection of the relays, “as found” testing, cleaning, recalibration, and “as left” testing. All of the findings and test results are documented and reported.

Relay commissioning:

Settings installed
- Computerized acceptance tests
- Test reports

Testing & commissioning services

mV Service has the expertise to test and commission relays and relay systems at a customer’s location to ensure that the relays are properly operating and wired correctly. Specific job scopes are developed based on customer requirements. Factory trained engineers and technicians verify that the relay settings are correct and perform system functional tests to verify the integrity of the system. The relays are run through trip checks to make sure they pass acceptance testing. In-service tests can also be performed. System wiring is verified against as built drawings. Documentation on findings, including test reports, is provided.

System commissioning:
- System functional test
- Trip checks
- In-service tests
- As installed drawings

Retrofit

Existing relay and control panels are modified and retrofitted at the Houston Service Center or at the customer’s location. ABB replaces old, troublesome relays with new microprocessor relays in the existing panels. ABB furnishes the necessary engineering, documentation, relay settings, and commissioning per customer requirements.

Turnkey

MV Service supplies complete protective relay system turnkey services. Commercial services include development of the bid proposal and contract negotiation assistance. Engineering finalizes the system design, develops electronic drawings, and provides technical support throughout the project. Once the relay system arrives, ABB installs the system, and performs the commissioning and testing on the system. System documentation and training of operating personnel is provided. A project manager oversees the complete turnkey project.
Field services
Low and Medium Voltage Service factory-trained technicians offer comprehensive field maintenance and repair services for planned and emergency work, 24 hours a day, 365 days a year. Service personnel have direct contact with the factory for authentic parts, original equipment drawings, and technical support. Services include switchgear and circuit breaker commissioning, inspection, testing and refurbishment, replacement of breakers, relays and control components, primary bus upgrades, and related switchgear services. ABB also offers maintenance and repair training from product orientation for new equipment to advanced repairs and life extension programs.

- Emergency repairs
- Installation/maintenance
- Supervision
- Start-up and commissioning
- Bus modifications
- Maintenance agreements
- Specific turnkey installation/maintenance
- Spare/obsolete parts support
- Breaker upgrades
- Retrofit solutions
- Retrofit/upgrade
- Reliability assessment
- Engineered solutions

Asset management
The primary benefits of an asset management program are increased asset availability and performance, along with maximized operations and maintenance effectiveness. That is, extend the asset’s life, reduce its operational costs, and ensure its availability. Low and Medium Voltage Service has the experience and knowledge to provide asset management programs for low and Medium voltage switchgear and circuit breakers. The program starts with an evaluation of the existing equipment. The evaluation process uses a numerical analysis to determine the condition of the equipment from a service perspective. Factors such as age, application criticality, new and used parts availability, ability to be refurbished, technology employed, maintainability, and safety are all evaluated. A simple visual inspection of each breaker can also be performed, providing valuable additional evaluation data.

Once each switchgear and circuit breaker is evaluated, it is divided into four categories:

- Resolve - high critical application - high evaluation score
- Manage - high critical application - low evaluation score
- Monitor - low critical application - high evaluation score
- Accept - low critical application - low evaluation score

After the equipment is categorized, MV Service works with customers to determine the corrective actions and timelines for each of the categories. As with service projects, ABB provides flexible work scopes to meet customer needs.
Training

MV Service’s “hands-on” training programs educate customers on the proper maintenance and service of ABB electrical power equipment. MV Service has a large selection of specialized training programs available and training programs can be tailored to meet the specific needs of customers. The training programs are developed for operators, engineers, and technicians to become proficient in the application, installation, operation, maintenance, testing, and commissioning of ABB switchgear, circuit breakers, relays, and relay systems.

Power service training
Power service training focuses on switchgear and circuit breakers. Circuit breaker and switchgear training covers all product aspects. Training can also include tearing down breakers, identifying components that need to be replaced, and rebuilding.

Relay service training
ABB has comprehensive relay training programs for all relay types including electromechanical, solid state, and microprocessor relays. Class participants learn everything about relays from calibration to troubleshooting techniques. ABB also has relay training programs that teach detailed protective relaying such as symmetrical components and fault analysis, distribution and transmission protection, along with protection for many electric power component applications.

Training programs cover:
- Product orientation
- Installation
- Calibration
- Operation
- Inspection
- Maintenance
- Testing
- Commissioning
- Troubleshooting
- Safety
Low and Medium Voltage Service is a leading producer of aftermarket low and medium voltage roll-in replacement circuit breakers that are designed to directly replace existing circuit breaker types. A comprehensive portfolio positions MV Service to provide new aftermarket roll-in replacement circuit breakers for most major manufacturers’ switchgear brands.

ABB has extensive global manufacturing and technology resources to provide new replacement circuit breakers that are built to the latest standards and utilize the latest electric power technologies to provide improved reliability, enhanced performance, and increased safety. This translates into extended switchgear life, increased personnel and property safety, and reduced ownership costs.

Medium Voltage roll-in replacement circuit breakers
- Uses AMVAC magnetic operating mechanism or the VD4 EL spring charge mechanism
- Uses ABB vacuum interrupters
- Vacuum interrupter and current carrying assemblies are fully encapsulated in epoxy, for most frame sizes, to provide maximum protection from dirt and humidity, greatly reducing the potential for tracking and partial discharge
- Built with all new parts
- Modification of the existing circuit breaker switchgear compartment is usually not necessary
- Switchgear interlocking safeguards are incorporated
- Circuit breaker frame is constructed of rugged steel and counter weighted to easily and safely connect during the racking process
- The AMVAC uses an electromagnetic flux shifting device that exceeds the retaining force of permanent magnets to change the position of the operating shaft
  - Minimal lubrication and maintenance required
  - Specifically designed to operate with vacuum interrupters
  - Incorporates the latest technology in rotating spiral contact designs to maximize contact life and are rated for 30,000 full load operations and over 100 full short circuit operations

1 Medium voltage roll-in replacement for GE Type AM | 2 AMVAC magnetic actuator operating mechanism
Roll-in replacement circuit breakers

Low voltage roll-in replacement circuit breakers
low voltage replacement breakers use state-of-the-art EMAX circuit breakers. This modular and compact circuit breaker is extremely reliable with over 250,000 global installations, making it a perfect fit for replacement applications.

The EMAX circuit breaker:
– Self-contained air magnetic breaker with stored energy operating mechanism
– Safe breaker with double insulated live parts and total phasesegregation
– Robust components, including a metal frame structure
– Rated at 20,000 mechanical operations and 10,000 electrical operations at 800 amperes
– Levels of circuit breaker microprocessor trip unit intelligence:
  – Complete set of protection and control functions
  – Measurements signaling and data storage
  – Communication capabilities for use in automation and control systems
  – Bluetooth capabilities providing safe remote circuit breaker interrogation

Cradle-in-cradle
low voltage replacement breakers are typically either direct replacements, where the EMAX breaker is mounted directly into the switchgear cubicle, or a cradle-in-cradle replacement. The cradle-in-cradle replacement is an increasingly popular option, because it provides the ability to standardize on the ABB EMAX circuit breaker for all low voltage replacements regardless of the switchgear manufacturer. The cradle-in-cradle is a double Interface frame with inner and outer interfaces. The outer interface mounts physically and electrically in the switchgear cubicle. The inner interface matches up with the EMAX draw out breaker, allowing for quick and easy installation and removal.

Cradle-in-cradle benefits
– Easy to standardize on EMAX and reduce inventory across different switchgear types
– Simplifies personnel training and increases personnel safety through standardization
– Fits into and strengthens breaker cubicles that may have settled or shifted over time
– Allows for the replacement EMAX breaker to easily rack into and out of the cubicle
– Avoids misalignments of circuit breaker connections

Standards & testing of roll-in replacement circuit breakers
– Designed, built, and tested according to latest applicable ANSI standards
– Circuit breakers are “type tested” and each breaker undergoes full production testing
– Tested in a switchgear cell to ensure integrity and fit
– Nuclear certification available

Orientation & training
ABB knows that orienting customers on the technology, operation and maintenance of aftermarket roll-in replacement circuit breakers saves time and money. That is why Low and Medium Voltage Service provides one day of technical supervision and training for customers with the purchase of a new roll-in replacement circuit breaker type.

1 Low voltage cradle-in-cradle replacement with the EMAX for GE Type AKR | 2 ABB has dedicated resources to professionally repair and refurbish all low and medium voltage circuit breakers to like new operating condition, in a controlled factory environment
Engineering solutions and training

**Short circuit studies**
short circuit studies are usually performed when changes are made to an existing system, including the installation of new power equipment or the reconfiguration of existing equipment. MV Service has the expertise to provide these studies to ensure the proper coordination and protection settings related to the electrical equipment and system.

**Arc flash studies**
arc flash studies reveal the potential arc flash temperature at a particular piece of equipment in the event of a fault. These studies are performed to determine the necessary level of protective equipment or clothing to be worn by workers in close proximity to these potential arcs. These studies also help determine the proper application of any arc flash mitigation equipment to be installed.

**Integration studies**
integration studies find the most efficient and economical approach to the integration and application of ABB and other manufacturer’s equipment into a site installation. This includes identifying system protection requirements and the proper devices to provide system protection.

**System reliability studies**
System reliability improvement studies involve the general analysis of an electrical power system to determine the cause of power system failures or reduced reliability. ABB will recommend configuration changes and additional equipment necessary to correct system failures and improve overall system reliability.

**Safety Upgrades**
Through the use of ABB’s engineering capabilities and wide range of products, ABB can assist in the identification and mitigation of safety hazards that may exist within electrical equipment and systems. These safety issues require a thorough understanding of the hazards and the system involved to provide the best personnel protection while maintaining system reliability and operability.
For more information about ABB services, please contact your sales representative or call one of the numbers listed below:

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