

BENSHAW®
ADVANCED CONTROLS & DRIVES

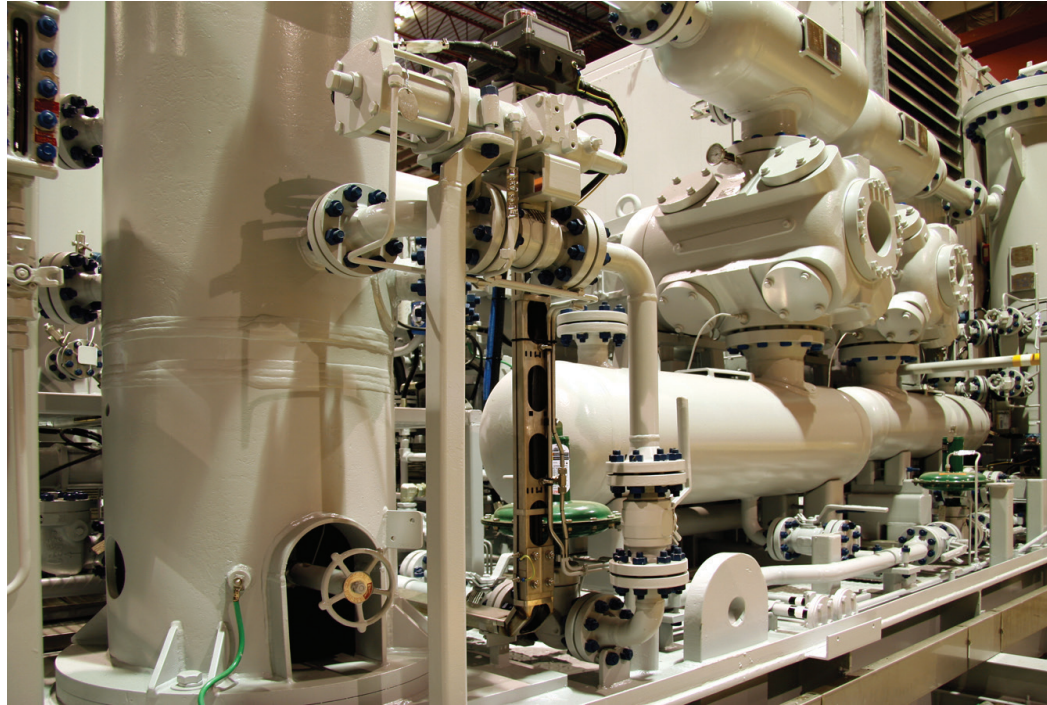
A member of UNICO Technologies Group



Motor Control System Retrofits

Benefits of Retrofitting

Equipment in heavy industry is expected to work for 20+ years. While it is often the case that medium voltage equipment can operate for long periods of time, many other factors change during that time period. Electrical costs and penalties go up, requiring more efficient equipment. Innovation in monitoring and protection features makes modern equipment safer for personnel and for mechanical equipment. Maintenance parts become more expensive and obsolete to the point where critical operations could face significant downtime due to a minor part failure. Full replacements of large equipment are significantly more expensive than just the cost of the equipment — cost of disposal, new installation and wiring can cause the scope to creep up to 3x or more the cost of the equipment alone. Starters, switchgear and MCCs include many expensive power components, and it's wasteful to throw out working, operational equipment to



gain new features. Often, the entire factory or equipment room was designed around the existing equipment. Putting in a brand-new line-up could be a logistical nightmare. Benshaw understands the need to upgrade equipment for modern features and serviceability, without investing in a large CapEx project.

Benshaw offers a wide variety of solutions to all of your retrofit needs. Our team of Application Engineers and Service Technicians will review your current equipment and provide recommendations to upgrade your existing equipment with minimal cost and impact.

Benshaw is able to reuse existing equipment, enclosures and stub-ups from a variety of different manufactures. For very intricate projects, Benshaw will send an engineering or technical representative to your site to obtain full measurements and understand the scope. Benshaw will then design a custom retrofit to fit your needs and your budget. Before you spend significant money to replace existing working equipment, contact Benshaw to see what our team can do for you.

Retrofit: The Smart Alternative

Extend the life of your motor and controls without the expense of replacing the entire structure by choosing to retrofit with Benshaw.

Retrofit Benefits

- Increase expected lifetime
- No or low downtime of critical equipment during retrofit work
- Capital costs are minimal
- New technology
- Optimized investment
- Speed of execution
- Improved safety standards
- Enhanced reliability
- Minimization of downtime including shutdowns/outages
- No need to change location — foundation is not disturbed
- No need for re-routing of power/control cables
- Easy procurement of spare (stock) parts

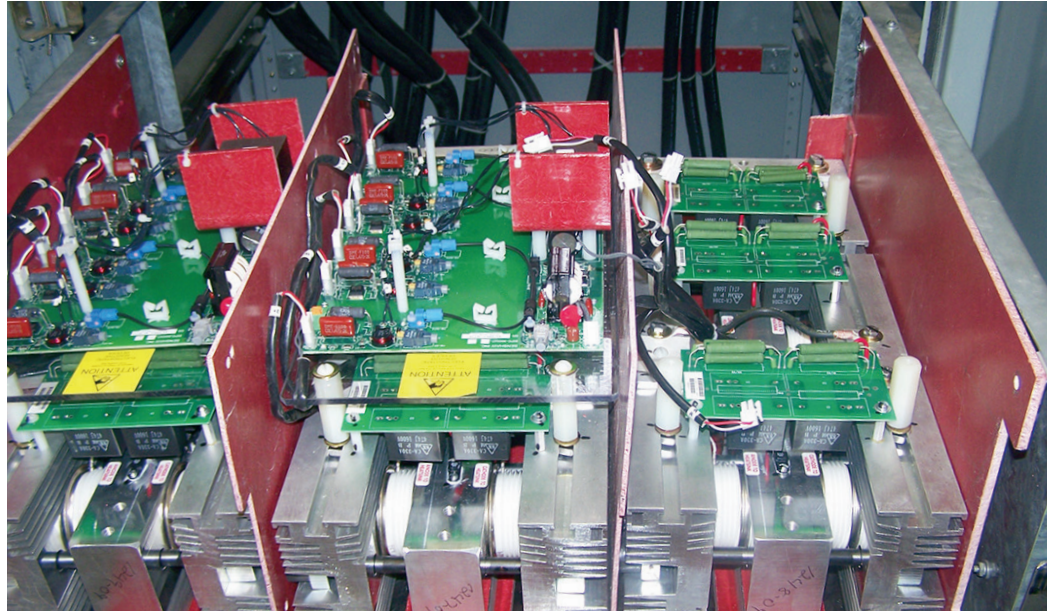


Scope of MV Retrofit	Methodology
Replacement of contactors, fusing/all other components as required	Defining required performance parameters
Upgrading of panels with respect to current and voltage rating	Study of existing system
Conservation of fixed type circuit breaker soft start draw out type, transformer feed to fusing, to contactor, to motor, etc.	Identifying problem areas
Installation cost, downtime, space requirements	Providing solutions based on the best technology
Upgrade protection devices—additional programmable motor protection	Execution with minimal downtime



Quick-Ship Retrofits — MX³ Upgrades

Benshaw stocks standardized low and medium voltage kits for emergency retrofits to upgrade your equipment in an emergency situation to the latest MX³ technology, and offers engineered retrofits for units that do not require the time-sensitive urgency of emergency kits. Benshaw's qualified team of Application Engineers will review your equipment and verify that the quick-ship retrofit will work in your situation. For situations where a customized solution better fits your needs, the Application Team will provide a quote to meet your specifications.



The emergency quick-ship retrofit is available for both low and medium voltage starters, but at this time is not available for all product types.

It is intended to replace:

- Benshaw soft starters using the following control board platforms: AK, DMS, Micro II and MX
- Examples of part numbers begin with:
 - LV: RSM6, RS6, RSD6, RSE6, RXE6, RCM, RBM1, RBM2, RBM3, RC2, TBX, TCX, RBX, MXPC, MXPB, RBX2, RBX3,
 - MV: MVRSE12, MVRSE18, MVRSM12, MVRSM18

Note: This is not a complete list of model numbers. Additional model numbers may qualify.

It is not intended to replace:

- OEM specialty product lines
- Synchronous motor starters utilizing Benshaw supplied field controls
- Enclosures less than 36" wide (for MV)
- DC injection braking or reversing units

Note: These products can be retrofitted with Benshaw's engineered retrofit solution.

Quick-Ship Retrofits — MX³ Upgrades

To determine if your starter is applicable, please complete the checklist and contact the Benshaw Inside Sales Team.

Existing Starter Information:

Serial Number: _____

Model Number: _____

Horsepower: _____

Voltage: _____

Enclosure Size: _____ **H:** _____ **W:** _____ **D:** _____

Y **N** Verify available depth from the existing control board mounting surface to the inside of the enclosure door. Approximately four inches (4") is required for the MX3 control boards.

Y **N** Verify if Benshaw BIBPC-720LT (L or T) integral contactors are included in chassis. (LV only)

Notes:

If enclosure does not have sufficient depth, the MX³ control boards may be mounted in another location. SCR leads may be extended to a maximum of 6 feet. MX³ control board must be located in an enclosure section that contains only low voltage power. MX³ control board should not be mounted in sections with medium voltage power.

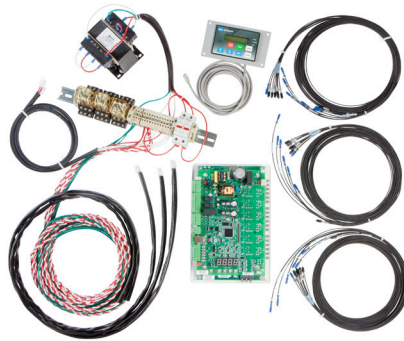
If possible, take photos of the control boards and heatsink/CR assemblies.

If yes to BIBPC contactors, customer can replace entire chassis, or purchase a separate definite purpose or full rated contactor for separate mounting (space permitting).

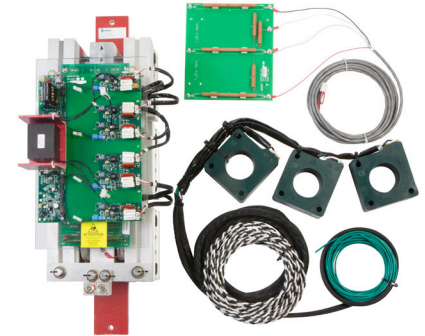
Additional Customer Notes: _____

Emergency Quick-Ship Retrofits — MX3 Upgrades

Kit Components



Low Voltage Retrofit Kit



Medium Voltage Retrofit Kit

RTFT-490000-00 LV Retrofit Kit Assembly

- NEMA 3R keypad
- Keypad mounting plate
- Keypad 3 meter cable with ferrite
- MX³ control card on Lexan® mounting plate
- MX³ LV manual
- MX³ LV installation guide

RTFT-490001-00 MV Retrofit Kit Assembly

- NEMA 3R keypad
- Keypad mounting plate
- Keypad 3 meter cable with ferrite
- MX³ control card on Lexan® mounting plate
- 415 A power stacks (qty. 3)
- Terminal strip with terminals, relays and wiring
- 120:24 VAC control power transformer
- Fiber optic kit
- CT assembly (see following page for part numbers)
- MX³ MV manual
- MX³ MV installation guide

Engineered Retrofits

For units that do not qualify for the Emergency Quick-Ship Retrofit program, Benshaw also offers engineered retrofit solutions. Engineered retrofits allow for full customization, which can provide expedited installation time, add or change the control logic, or even retrofit non-Benshaw units.

Units that Qualify for the Engineered Retrofit Program:

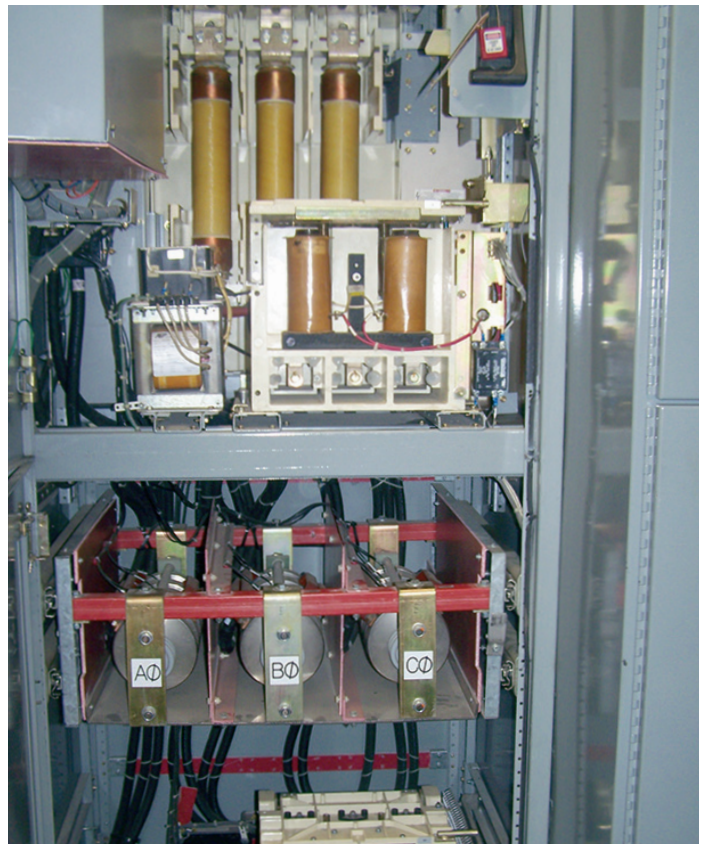
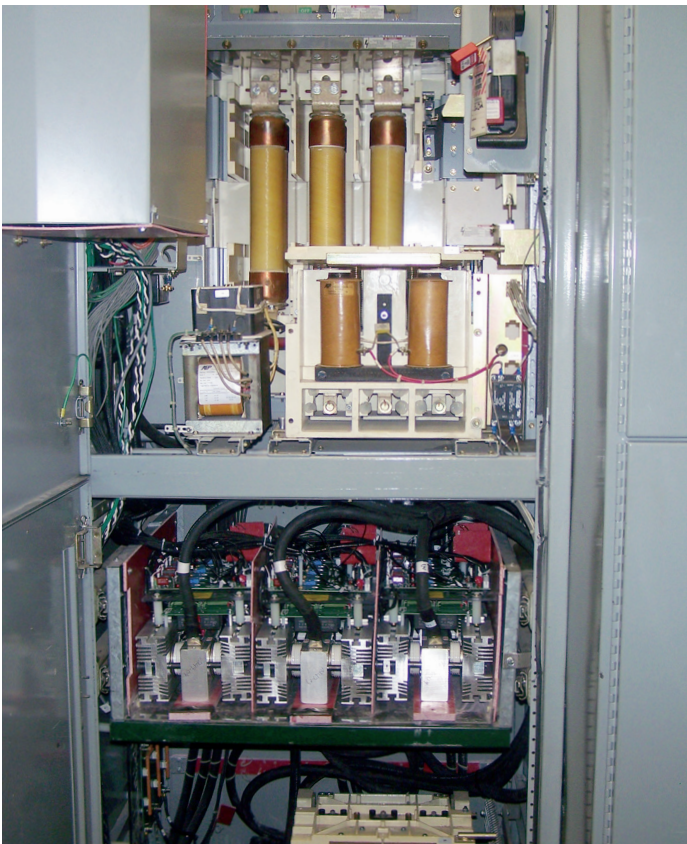
- Synchronous starters using Benshaw-supplied field controls
- Benshaw starters rated above 4800 V
- Benshaw starters rated for greater than 3000 HP at 4160 V
- Non-Benshaw starters

Process:

To receive a quotation, please provide the following information to the Benshaw Sales Team:

- Serial number (for Benshaw units)
- Drawings (for non-Benshaw units)
- Model number
- Equipment rating (HP, voltage, FLA)

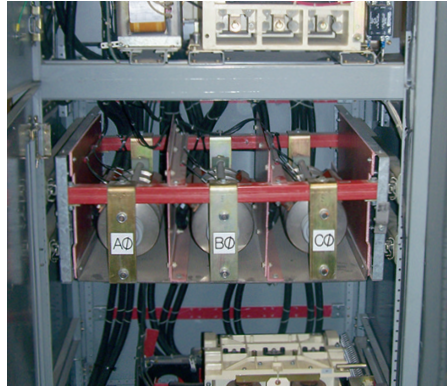
Upon review by the Benshaw Inside Sales and/or Application Engineering team, a quotation will be issued, or a site visit will be requested if additional details are needed.



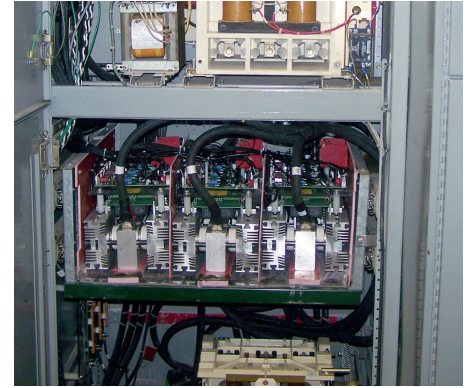
Retrofit: The Smart Alternative

GE Limit Amp Draw-out Stacks

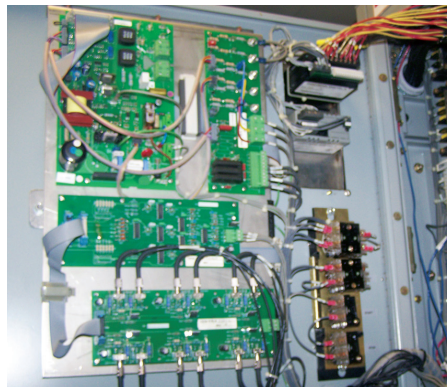
With a Benshaw custom engineered Retrofit, our customer was able to upgrade an obsolete full-voltage starter with the latest solid state starter technology. Benshaw was able to reuse all existing power components, wiring, and enclosures which saved the customer significant money and kept the lay-out of the existing equipment. The draw-out ATL section was replaced with a solid state power chassis, and the control section was upgraded to the latest MX³ controls. The customer now has a more efficient starting solution with cuts down on utility charges, easy to find spare parts to support their equipment, and the advanced monitoring and control functions.



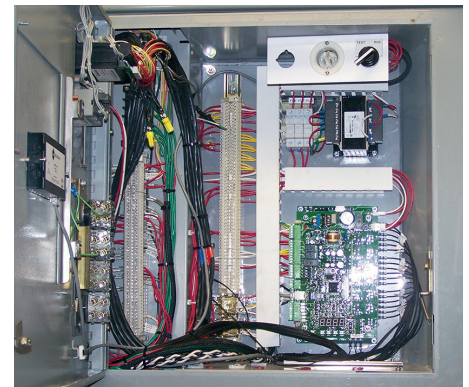
Before: obsolete power section



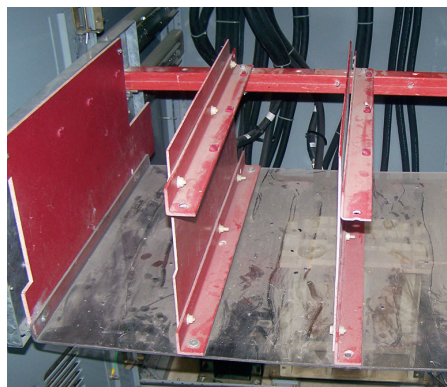
After: new state-of-the-art 3000 HP power section



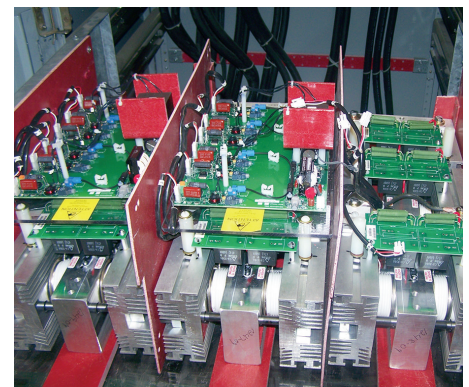
Before: obsolete controls



After: new MX³ fiber optic controls



Pull-out design



Easy access

Wound Rotor Motor Starter Technology Retrofit



5 kV medium voltage lineup



Before: full voltage starter



After: Solid state reduced voltage starter

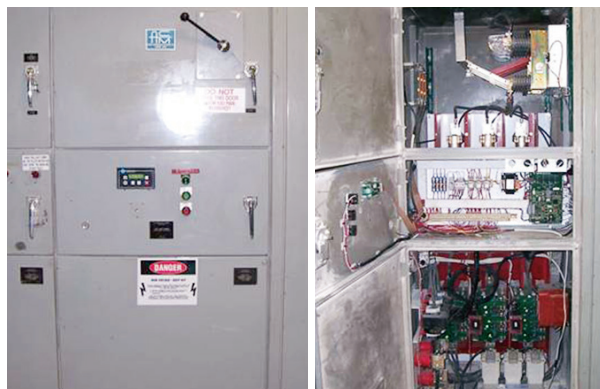


Only Benschaw has over 30 years of experience starting wound rotor motors. By upgrading from a full-voltage to a solid state solution, our customers only need two-steps with one resistor bank for starting their wound rotor motor. When starting a wound rotor motor at full voltage, often 5+ steps with corresponding resistor banks are needed along with a custom, complex control system to bring the different resistors into the system with correct timing. Benschaw's solution only requires one bank of resistors and the standard MX3 controls the timing of bringing the resistor bank out of the system. Moving to a solid state solution significantly cuts down on the components cost and complexity of wound rotor motor starting. Contact Benschaw for all your wound rotor motor starting and control needs.

Full Voltage Technology Retrofit



Before: full-voltage starter



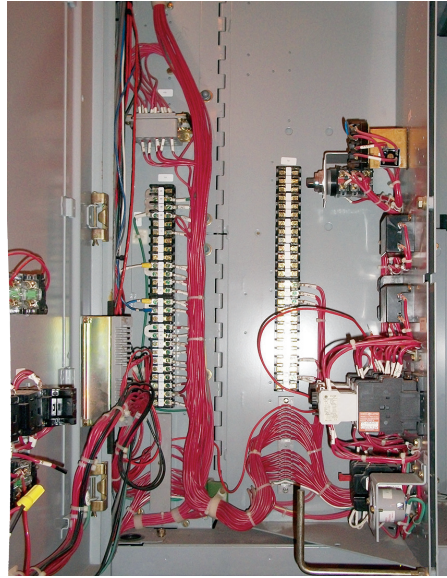
After: solid state reduced voltage starter

Going from a full-voltage to a solid state solution will bring a lot of benefits to your system. Solid state starting reduces supply voltage drops, satisfies utility constraints, improves power quality, and prevents branch circuit protection trips. Solid state starting extends your motor life by reducing rotor and stator stress up to 50%, and improves system performance by allowing more starts-per-hour. Benschaw's experienced team can review your existing solution and recommend a custom engineered retrofit solution to upgrade to solid state starting with minimal changes to your existing equipment.

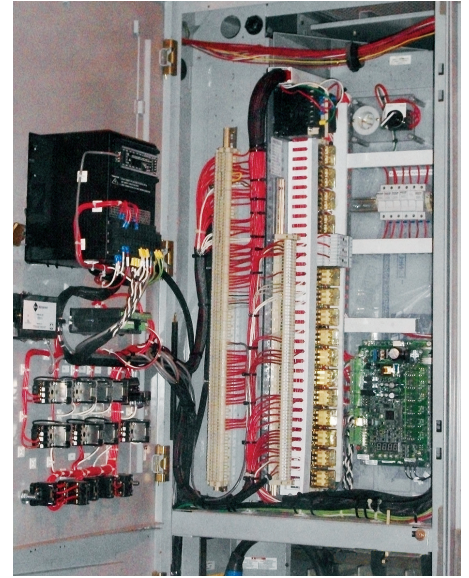
Retrofit: The Smart Alternative

GE Limit Amp Auto Transformer Retrofit

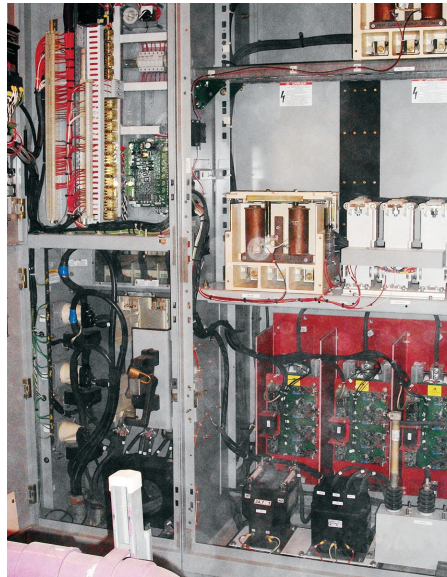
Going from an autotransformer to a solid state solution cuts down on maintenance costs, and will improve the life the motor. Autotransformers can not easily adjust to load conditions or compensate for input variations. Autotransformers put more mechanical shock into the system which reduces motor life. Autotransformers starting relies on contractors to “step” through the transformer taps, leading to higher maintenance costs. Benshaw will review your current autotransformer solution, and design a custom retrofit kit with new controls and upgraded power chassis section that will replace the autotransformer in the existing system.



Controls before



Controls after



Completed starter



New front panel controls

Square D Synchronous Motor Starter Technology Retrofit

New field discharge resistor



Load break disconnect

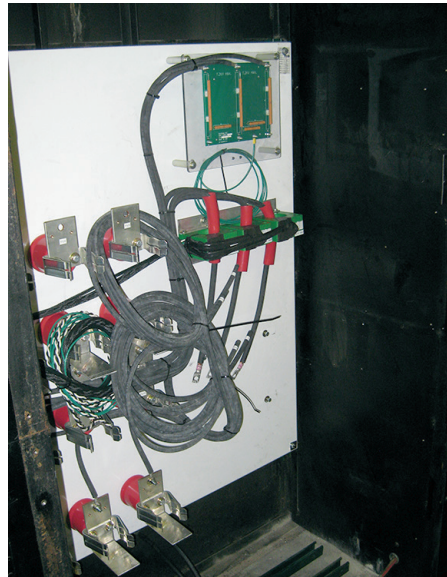
Smart ATL and SEP control keypads

Completed controls

Benshaw's years of experience with all types of motors lead them to develop their own Synchronous Excitation control Package (SEP) using their benchmark MX2 technology. The Benshaw SEP controls solution is the most compact and easy to use solution on the market. The Benshaw team will review your current synchronous motor starter, and provide a custom engineered retrofit using either full-voltage or solid state starting and the SEP MX2 control package. Benshaw's field technicians will review all existing equipment, and reuse all equipment in good working condition. Benshaw's team will put together a custom RFQ to meet your needs with the latest synchronous motor controls.



Before



Retrofit in progress

Advanced Controls and Drives

Full Voltage Controls

Variable Frequency Drives

Low Voltage Solid State Starters

Medium Voltage Drives

Medium Voltage Controls

Medium Voltage Switchgear

UNICO Technologies Group

Power and Precision in Motion

Taking care of our customers' power needs has been our single focus for 88 years. Our two leading brands bring innovative control and electrical solutions to solve your challenges. Through thousands of systems in a broad array of applications, we've learned what it takes to make your system live up to its potential.

At a glance: With facilities in 12 countries, we combine the convenience of local service with the economies-of-scale and efficiency of a large global organization.

Innovative solutions via technology:

We bring you mission-critical motor control and protection products, designed and built with expertise and precision to maximize your output and minimize downtime.

Engaged and knowledgeable: We like to think of ourselves as "Application Smart," which always includes critical dependencies such as standards, compliance and regulatory issues.



Visit us online at unicotg.com, or contact:

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After Hours Tech Support

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24/7 Technical Support

- 24/7 hotline support from Pittsburgh (USA) and Listowel (Canada)
- Overnight parts shipment
- Coordination of all service capabilities — repair, spare parts, field engineering, retrofit and training

Repairs

- Trained, experienced, field personnel
- Equipped with the latest diagnostic and test equipment
- Start-up commissioning, field repairs, field analysis/data collection and preventative maintenance

Benshaw Product Line

- Solid state starters fractional to 30,000 HP at 15 kV
- LV AC drives to 700 HP
- MV AC drives to 12,000 HP
- Electromechanical controls to 800 A

Benshaw Express

- 24/7 online inventory and order system for authorized Benshaw distributors
- 24/7 shipment
- Air or truck delivery

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