Nuclear Products & Nuclear Parts Center General Capabilities

View In-Stock Parts at the Nuclear Parts Center (NPC) CIS Website
www.framatome.com/npc
NPC OFF-HOURS Cell Phone Coverage:
434-610-3880
Framatome’s Journey of Excellence

Culture & Behaviors

Accountability

Outcome

Standards of Operational Excellence
Framatome can supply Parts, Products, and Services

**Electrical Distribution Equipment**
- Electrical Dedicated Parts
- Low & Medium Voltage Breakers & Parts
- Molded Case Circuit Breakers
- Instrument, Control, & Protective Relays
- Starters / Contactors / Overload Relays
- Fuses and Fuse Blocks
- Switches/Pushbuttons/Indicating Lights

**Integration ALARA Tools**

**Instrumentation & Controls**
- Digital Control Rod Drive Control System (DCRDCS)
- Electronic Equipment Restoration (EER)
- In-Core Detectors
- Flux Thimble Tubes
- Loose Parts Monitoring System (LPMS)
- Reactivity Measurement & Analysis System (RMAS)
- Schneider Electric (Foxboro DCS, Spec 200, Triconex)
- Spent Fuel Pool Level Instrumentation (SFPLI)
- Teleperm XS (TXS)

**Filtration Solutions**

**BIRNS Lighting Solutions**

**Stearns-Roger Refueling Equipment**

**Technofast Tensioning Equipment**

**Variable Frequency Drives and Parts**

**Valves & Actuators**
- ASCO Hydromotors
- ASCO Pressure / Temperature Switches
- ASCO Solenoid Valves
- Chesterton Packing & Mechanical Seals
- Conval Valves
- Crosby (Yarway) Valves
- Limtorque Parts, Motors, Actuators
- TopWorx Switches
- Velan Valves

**April 2020 Rev 19**
Mechanical Parts and Lubricants
- Mechanical Dedicated Parts
- Couplings, Fittings, & Mechanical Seals
- Hardware, Adapters, & Raw Materials
- O-Rings, Packing & Gaskets
- Piping, Tubing, & Hoses
- Greases, Oils, & Epoxies

Mechanical Equipment
- Cooling Tower Optimization
- Chillers
- SAFER FLEX Program

Monitoring & Diagnostics
- EMPATH™ Motor Diagnostics
- Meggitt H2/O2 Analyzers
- Ultracheck™ Valve Monitoring

Motors and Motor Parts (NEMA/ANEMA)
- Siemens (Allis-Chalmers/Siemens-Allis)
- Jeumont Electric
- Baldor/Reliance Electric
- Bearings, Rotors, & Cooling Coils

NSSS Equipment
- ASME Code Components
- B&W NSSS Parts
- Control Rod Drive Mechanisms
- Jeumont Reactor Coolant Pump Seals
- Nuclear Grade Air Traps (NGATs)
- Pressurizer Heaters
- Specialty Cabling
Strategic Supplier Partnerships

- Continuously developing and expanding
- Strengthens our product and services offerings
- Adds significant depth to our product, technical and scientific expertise
Safety-related inventory meets applicable requirements of:

- 10CFR50 Appendix B
- 10CFR21
- NCA 3800

Manufacturers audited and approved by Framatome

Level B storage facility


ANSI N45.2.6 qualified inspectors

ISO 9001 and 18001 certified

ASME Code Parts and Equipment

ASME “N”, “NPT”, and “NR” Certificates of Authorization

Contaminated Equipment Refurbishment Facility

Nuclear Parts Center
General Information
All parts are receipt inspected at the NPC Warehouse. Inspection includes a 100% visual inspection of all accessible areas for FME related issues.

All parts are cleaned and packaged for long term storage. The cleaning process also helps identify presence of foreign material, if any.

During the shipping process, another over-check is performed to insure the parts have maintained their integrity during storage. This over-check includes a visual examination of the part to be shipped, to verify again that there is no foreign material in the final shipment.
Customer Benefits of NPC

- Responsiveness – 24 Hours/Day – 365 Days/Year
- Reduced O&M Costs
  - Minimize Carrying Costs by Relying on NPC Inventory
  - No Rejected Parts or Data Packages
  - Reduced QA Costs
- Inventory Ready to Ship
  - Material Procured and Delivered As-Needed
- Strong Technical Support
  - Extensive experience in Nuclear, Technical, and Quality Requirements
- Customer Inquiry System (CIS)
  - Real Time Access to Price and Availability through the Internet
  - Updated NPCis (Nuclear Parts Center Inquiry System) released in late 2020
- Guaranteed Stocking Arrangements
- Committed to Customer Success
  - Service and Quality
- Supply Chain Management Support
- Extension of the Plant Warehouse
- Long Term Agreements
  - Blanket Orders
  - Standard Requirements
Framatome Nuclear Products & Nuclear Parts Center

Product Lines Offered
Electrical Distribution Equipment
Electrical Dedicated Parts

Complete Line of Electrical Distribution Equipment and Components

- Motor Control Centers and MCC Bucket Replacements
- Low and Medium Voltage Air / Vacuum Breakers
- Low and Medium Voltage Breaker Reconditioning, Training, and Spare Parts Support
- Low and Medium Voltage Switchgear
- Molded Case Circuit Breakers and Retrofit Kits (Eaton - HFD/HMCP, Siemens)
- Relays (D26, AR/ARD, NBF/NBFD, Struthers-Dunn)
- Starters, Contactors (Eaton - A200, Freedom, ME)
- Pushbuttons / Switches (Type 10250T, E30, E22, OT)
- Fuses (Eaton-Bussmann, Mersen-Ferraz Shawmut)
- Loadcenters / Panelboards
- Emergency Diesel Generator / Exciter Parts
- Transformers

Framatome acquired Cutler-Hammer Nuclear Programs in 2003 from Eaton
Eaton OEM for all former Westinghouse Distribution and Control Equipment
LV Breaker Solutions
Eaton & Siemens

- **Replacement Breakers**
  - Designs available for variety of vintages
    - ITE K-line, GE AK, W DS
  - Fully enclosed maintenance free operating mechanism
  - Direct connection to switchgear bus stabs
  - Analog or digital trip unit

- **DS Circuit Breaker Program (SR or NSR)**
  - New breakers, parts, or upgrade kits are available
  - MILES Testing Program w/ Synthetic Lubrication supports 14yr Maintenance Interval on the Mechanism

- **Low Voltage Vacuum Starters**
  - Replace over-dutied breaker with fused vacuum starter
  - More than 130,000 operations
  - Eliminate maintenance reconditioning costs, payback within one refurbishment cycle

- **Breaker Refurbishment**
  - Offerings to cover virtually entire installed base of LV breakers
  - Framatome MILES-14 program available on DS refurbishments

Property of Framatome Inc. © Framatome Inc. All rights reserved, see liability notice
MV Power Breaker Solutions
Eaton and Siemens

- Replacement Breakers
  - Designs available for variety of vintages
    - W DHP, ITE HK, GE MagnaBlast, Allis Chalmers MA
  - Brand new replacement breaker – not a retrofit
  - Solves obsolescence
  - Reduce part count and inventory
  - SURE CLOSE & MOC Saver Technology
  - One Standard Operator
  - Reduce maintenance cost and increase reliability - 14 yr MILES Maintenance Interval

- Breaker refurbishment
  - Includes Framatome MILES-14 program
  - Same EQ and CGD rigor as breaker replacement

Framatome is the industry leader and technical expert with supply of over 950 Vacuum Replacements to nuclear industry over 15 years of service
Panelboard Solutions

- **AC/DC Panelboards & Switchboards**
  - **Challenge:** OEM equipment obsolete (no spares) & constant assembly design issues resulting in failures and high maintenance costs
  - **Solution:** Framatome developed custom retrofit panel chassis design with:
    - Proven/Common OEM components (eliminate future obsolescence concerns)
    - Custom solid bus bar assembly design (eliminate assembly issues and associated maintenance costs)
    - Allows for re-use of existing box and wiring to eliminate time and cost during installation
Intellegration ALARA Tools
Integration ALARA Tools

- Reliable light weight durable tools designed specifically for work on reactor cavity and spent fuel pool underwater applications and in high radiation areas
- Locking handle ensures positive grip
- Adjustable jaws allow grip on various diameter objects such as cables, hoses, and filters
- Contamination Swipe Survey Tools (SWIPE Heads) available for use with the same handle
- Modular design allows for various length and gripper head configurations
- Custom design capability to meet specific customer needs
Instrumentation & Controls
Plus Associated Spare Parts
Digital Control Rod Drive Control System (DCRDCS)

- **Control Rod Drive Control System (CRDCS)**
  - A non-safety system to control rod motion into and out of reactor core, which controls reactivity in core
  - Provides status of control rods and components within system

- **Digital CRDCS (DCRDCS)**
  - Modular Upgrade for PWR CRDCS
    - Higher reliability
    - Simplified maintenance
    - Streamlined system configuration

- **DCRDCS is redundant for all critical functions**
  - Single rod power supply
  - TMR controller
  - I/O modules
Electronic Equipment Restoration (EER)

- Framatome’s services include:
  - Repairs
  - Reverse Engineering & Re-Engineering
  - Refurbishment/Restoration
  - Equivalency evaluations, Equipment dedication, Testing, Spare Parts
  - Manufacturing and fabrication and replacement-in-kind systems

- Defined
  - Reverse engineering: producing a replica of the original module using the same design approach as the original.
  - Module Re-Engineering: producing a module that duplicates the same form/fit/function as the original, but internally uses a different design approach as the original.
  - Card Refurbishment
    - Restore obsolete electronic equipment to original specifications and like-new condition
    - Goal is to refurbish utility supplied spare stock to extend shelf life.
    - Generally involves capacitor and relay replacement, cleaning of connectors, visual inspections, testing to OEM test procedures.
Fixed In-Core Detectors

- MK-B Fixed In-Core Detector Assemblies Bottom mounted from seal table
- 1 Core Exit Thermocouple, 1 Background Detector, and 7 Self-Powered Neutron Detectors (SPND) with rhodium emitters
Framatome’s solution is to provide new motors and new controls to update a plant’s FMS or TIPS, leaving the mechanical components (e.g., incore tubing) and detectors in place.

The FMS is a non-safety related system except for the pressure boundary of the incore tubes.

Framatome uses commercial available equipment to the maximum extent possible for the FMS upgrade helping to assure the plant of better availability of spare parts.

Framatome’s upgraded FMS controls use Siemens PLC’s.

Framatome’s upgraded FMS motors use SEW-Eurodrive motors, a leading company in the global market for electrical drive engineering.
Flux Thimble Tubes

- Flux Thimble Tube Assemblies
- Bottom mounted from seal table
- 3 redundant Core Exit Thermocouples with reduced size Flux Thimble Tube
- Allows use of a smaller diameter fission chamber for flux mapping
Loose Parts Monitoring Systems (LPMS)

- Loose Parts Monitoring Systems have been developed to monitor for, detect and evaluate metallic loose parts in the primary coolant system.
- Loose parts can contribute to component damage, material wear, and partial flow blockage.
- Plants licensed according to Nuclear Regulatory Guide RG 1.133 require functioning Loose Parts Monitoring systems at all times.
- Framatome has continued development of this non-safety related product for replacing the obsolete installed LPM systems.

Key Features of the System:
- Automatic capture of data on all channels for each event.
- Immediate display of time waveforms for on-site analysis.
- Alarm and background trended plots.
- Convenient system testing.
- Based on industry standard Windows OS platform.
Reactivity Measurement and Analysis System (RMAS)

- RMAS is comprised of several major system components linked together
  - Reactimeter - core of the RMAS which performs the reactivity calculation, provides interface with plant signals, and distributes information for analysis
  - Current Measurement Instrument (CMI) - interfaces with nuclear detectors and other plant signals
  - RMAS Analysis Software – consists of applications designed to facilitate individual ZPPT requirements. The software includes features for signal conditioning and alarms to ensure quality data

- What is RMAS?
  - Used during Zero Power Physics Testing (ZPPT) validates new Core Design Predictions
  - Data acquisition and analysis
  - PWR Reactors only
  - Framatome has continued to develop the Reactivity Measurement and Analysis System (RMAS) to aid plants in the execution of their Physics Tests Programs over the past 20 years
  - RMAS configurations can differ on a plant to plant basis due to different plant equipment and plant procedures
  - Framatome has used advances in Programmable Logic Controllers (PLC) and PC technology to create a flexible and robust solution to aid in Startup Physics Testing
Schneider Electric Nuclear I&C

- Framatome Acquired Instrumentation and Control Nuclear Business of Schneider Electric

- The acquisition expands Framatome’s instrumentation and control (I&C) offerings. These systems are the central nervous system of a nuclear power plant, allowing operators to control reactor operations. Modernizations, upgrades and ongoing support are vital to manage economic, long-term operation of nuclear power. More than 80 safety I&C systems have been installed by Framatome on 44 reactors in 17 countries across the world, and approximately 250 automation systems have been installed or are being installed by Schneider Electric.

- Controls Systems
  - I/A (Intelligent Automation)
  - SPEC 200 / 200M
  - Tricon
Spent Fuel Pool Level Instrumentation (SFPLI)
Through-Air Radar Level Measurement

Advantages of the VEGA Through-Air Radar Solution

- No parts in the pool
- No moving parts, very few parts and simple overall.
- No organic parts or electronics in the SFP room
- Independent from room pressure changes.
- Very rugged: explosion proof, all metal housing
- Extremely low power consumption, can be operated using standard “C” size batteries
- No calibration needed; very simple if desired (swivel flange to turn horn for calibration)
- Widely used, mature devices *(300,000+ sold worldwide with more than 30 units sold to Nuclear Stations)*
- Most Reliable, 50+ Year MTBF
- Self Diagnosing (Smart Error Messages)
TELEPERM XS
Digital I&C (TXS)

- Safety Related Digital Platform
- Reduced O&M Costs – more reliable, reduced maintenance, eliminates mid-cycle surveillances
- Addresses Obsolescence – new technology, spares available, eliminates risk of non-repairable failure
- Increases Safety/Reliability – Avoids Spurious Actuation
- Improves Maintainability
- Reduced Startup Time
- System Self Diagnostics
- Automated Testing
- Enables On-Line Maintenance
- Technology Supports Younger Workforce – digital versus analog
- Framatome can supply replacement RVLIS/ICCM systems using the TXS platform

Framatome has more digital systems installed globally than any other supplier
- 14 Reactor Types
- 16 Countries
- 81 Units at 43 stations
Filtration Solutions
Framatome offers a line of high quality replacement filter cartridges that provide exceptional capacity for trapping foreign substances while maintaining interchangeability with original equipment cartridges.

Framatome Replacement Cartridge Filters

- All Framatome filter cartridges will fit existing filter housings without modification
- Available for a wide variety of plant applications, including
  - Primary side letdown and makeup water
  - Steam generator blowdown
  - Spent fuel pool
  - Auxiliary cooling water systems
  - Reactor coolant system
  - Chemical volume and control system
  - Seal injection
- Stocking programs for quick delivery
- High quality filter media
  - Configurable with glass fiber, polypropylene and Nanofiber® media
  - High dirt holding capacity
  - Low clean water pressure drop
  - High wet strength and radiation resistance
  - No unloading or carry-over of media or residue

 Tested to meet the following requirements:
- Exposed to 3 mega-rads of radiation (glass fiber & polypropylene) and 10 mega-rads of radiation (Nanofiber) without reduction in overall integrity
- Independently tested and certified for efficiency using ASTM F795-88 – the filtration industry consensus standard
- Tested and certified to contain no more than 150-ppm of leachable chlorides, fluorides and sulfur
Designed to fit directly into existing Tri Nuclear Corp. filter housings, offering the same fit, form and function as the Pall 140 Series filters.

- Constructed with type 304 stainless steel end caps and a perforated stainless steel outer shroud

- Designed for inside-to-outside flow and can be used in both vacuum and pressure applications

- Removes suspended solids from the fuel pool, fuel transfer canal, suppression pool

- Reduces frequency of change-outs, resulting in less radiological waste
Framatome Filtration Systems

- Custom Filtration Systems to reduce amount of dose throughout the plant
- Optimizer™
  - Designed to increase the capture rate of sub-micron source terms, allowing the filter to be more efficient
  - Supplied with VFD controls
  - Can be used with the Decom-EX™ for additional low-level clean up
- Decom-EX™
  - Decontamination system to capture large volume of low-level radioactive waste solids in a clean-up operation
  - Intended to be used for large-scale cleanup
  - If radiation is an issue, Framatome STER™ is recommended
- STER™ (Source Term Extended Reduction)
  - Combines engineered filter media with a controlled flow process, extending the life of the filter
  - Self-contained system scalable to meet the plant’s footprint requirements
- Skid Mounted High Filtration and Media (HFM) System
  - Designed to support refueling cavity and spent fuel pool water clarity and overall reduction in water contamination and radiation levels
  - Reduces critical path time – one lift to install and remove, and reduces need for filter replacement during refueling operations
BIRNS Lighting Solutions
BIRNS Lighting

- High Bay LED Lights
  - BIRNS Quantum
- Emergency Lights
  - BIRNS Emergency Light
  - BIRNS Emergency Light-LED
  - BIRNS Remote Power Unit
- Underwater Floodlights
  - BIRNS Kelvin
  - BIRNS Dual Kelvin
  - BIRNS Corona
  - BIRNS Corona Major
- Underwater 360° Lights
  - BIRNS TubeLight
  - BIRNS Curie II
  - BIRNS Refueling Light

Framatome NPC is the exclusive Distributor for the nuclear energy industry in U.S and Canada.
Stearns-Roger Fuel Handling
Stearns Roger Fuel Handling Equipment

- Framatome acquired Stearns Roger Services in July 2002
- Stearns Roger is OEM of 47 PWR Refueling / Transfer Systems and 14 BWR Refueling Machines
- Stearns Roger provides fuel handling equipment, field service engineers, modifications and upgrade design and installation

Features:
- Safe, Reliable equipment
- Removed obsolescence
- Parts availability
- Fleetwide similarity
- Expert resources to support fuel handling equipment
- Most experienced in the industry
- Increased speeds
Technofast Tensioning Equipment
Technofast Tensioning Products for Critical Bolting

- Lower costs, reduce downtime and minimize dose with advanced hydraulic fastener systems
- Exclusive, patented hydraulic seal and secondary release mechanism available in three different options
  - EzTite TR Hydraulic Nut
  - CamNut
  - CamBolt
- Enhanced hydraulic seal design to minimize failures and stuck bolts
- Ability to tension all bolts simultaneously minimizes dose, downtime, and potential for improper torqueing/tensioning
EZTite TR Hydraulic Nut

- Precision engineered, high pressure, hydraulically operated bolt tensioning device
- Ideal for applications with elevated operational temperatures where periodic removal and replacement is required, and for difficult or confined spaces
- Direct replacement for existing product
- Operating temperature from -4°F to 1200°F
- 100% tensioning
- Can be used on bolts of large diameter not suited for wrench tightening, such as pump and steam valves
CamNut & CamBolt

- Extends benefits of hydraulic bolt tensioning to applications that were not previously possible
- Eliminates need to replace expensive studs or nuts to provide sufficient grip length
- Modular construction reduces overall tool weight
- CamNut is ideal for applications where longer bolts for standard bolt tensioners are not available or desirable
- CamBolt is ideal for applications where shorter nuts for standard nut tensioners are not available or desirable
Variable Frequency Drives
Framatome Variable Frequency Drives (VFDs)

- **Reduced house load** ($0.5M - $1.8M annual savings)
  - Increased Recirc system efficiency
    - Removal of low efficiency MG Sets and replacement with high efficiency VFDs (from 82% to 96.5% depending on MG set specs)

- **Reduced Maintenance costs** ($0.6M - $2M annual savings)
  - Eliminates MG Set “drive train” and associated issues
    - Eliminates older technology electro-mechanical drive train
    - Eliminates older parts obsolescence issues
  - Eliminates MG Set lube oil system
    - Eliminates maintenance on lube oil pumps
    - Eliminates heat exchanger and heat load to cooling system

- Full array of spare parts and upgrades available
Valves & Actuators
ASCO Hydramotor® Actuators and Parts

- **Nuclear Qualified Replacement Parts**
  - Inventory of new NH90 Series OEM Actuator Parts
  - Certification to Original Equipment Qualification
  - Level B Storage Facility
  - Internet Access to Inventory

- **Actuator Refurbishment**
  - Using Original OEM Parts
  - Tested to Original Factory Requirements
  - Certification to Original Equipment Qualification
  - Technicians Trained and Certified Under Direction of ASCO

- **Hydramotor® Rotational Program**
  - Scheduled rebuilds of plant actuators to coincide with outage requirements
  - Utility spares stocked at Service Center, shipped “just-in-time”

- **Training Services for Utility Personnel Available**
- **Access to OEM Design Information**
- **Commercial AH Actuator Parts and Services Available**
ASCO Pressure/Temperature Switches

- Monitoring pressure and temperature of various medias
  - Pressure switches to 8000 psi, vacuum, differential or level control
  - Temperature switches ranging from -30°F to 510°F
  - Adjustable, fixed, and two-stage fixed dead-band
  - Watertight or explosion-proof enclosures
  - Designed for safety-related applications outside the containment area
  - IEEE qualified
ASCO Solenoid Valves
(Nuclear and Commercial)

- Over 250 different 3-way and 4-way “NP” solenoid valves stocked, both AC and DC, and various 3-way “NT” solenoid valves stocked. “NS” solenoid valves are available.

- Over 30 different coil kits for “NP” solenoid valves stocked
  - Screwed terminal
  - 18 inch, 72 inch, 240 inch lead lengths
  - 125 VDC, 120 VAC

- NPC can convert stocked valves to meet most utility “NP” and “NT” valve requirements

- All valves are Nuclear Qualified to ASCO reports (as applicable) -- Meeting IEEE 323, 344, 382, and 627:
  - AQS 21678/TR, Rev. A
  - AQR 67368, Rev. 1
  - AQR 67484, Rev. 0

- Engineering capabilities for sizing and selection

- Large selection of commercial valves (AC and DC) stocked

- Nuclear qualified 3-way “NT” solenoid valves are now available designed for integration into digital controls, with Quick Disconnect electrical connector

- On-site solenoid valve training
ASCO Solenoid Valves For BWRs – DCV and NTSSPV

- Direction Control Valves (DCV) for BWR HCU Rod Drives Air Cleaning Units
  - Proven design installed in plants around the world
  - Supplied with or without integral flow control device
  - Zero minimum operating pressure differential

- Safety System Scram Solenoid Pilot Valves (NTSSPV) for HCU
  - Replacement for BWR OEM supplied Legacy Scram Solenoid Pilot Valves
  - Qualified for 40 years at 100°F ambient
  - Proven to maintain its reaction time over long periods of time
  - Envelops all plant parameters for Legacy Scram Solenoid Pilot Valves

- On-site solenoid valve training
Chesterton Valve Packing and Mechanical Seals
Fluid Sealing Solutions

- Framatome NPC is the prime channel to market for AW Chesterton Company Valve Packing and Mechanical Seals including safety-related and augmented quality applications

**Chesterton 442 Split Seal**
High-performance seals available in large diameters

**Chesterton 442C Cartridge Split Seal**
Enhanced design for simple installation and greater sealing reliability

**Chesterton 1601 Solution**
The 1601 packing combines layers of graphite strands braided into one. Each strand is reinforced by an Inconel® mesh covering and is braided to form a dense pliable packing. The 1601 is then impregnated with high-temperature blocking agents, lubricants and a passive corrosion inhibitor.

**Chesterton 5800 WedgeSeal™ Solution**
The WedgeSeal packing system reduces stem friction and gland loads. The WedgeSeal arrangement transfers gland force with predictable precision. Patented, WedgeSeal sealing rings are available in low friction, PTFE mesh over graphite construction or pure graphite. Both meet API 589 Fire Test requirements.

**Chesterton 5300 Solution**
The 5300 sealing system meets the sealing requirements of MOVs. These valves are often difficult to seal due to their demanding services and physical size. MOVs are often critical to plant operation and safety and leave no margin for error. Chesterton 5300 is sealing hundreds of thousands of valves across the globe with both leak- and problem-free performance.
Conval Valves

- CLAMPSEAL® valves are designed to meet the exacting requirements of our customers.
- Conval globe valves are provided in three body styles: Y, Angle and T-pattern, in various pressure classes and standard materials.
- The easy interchangeability of parts means that an entire plant installed population can be supported with a very low parts inventory.
Emerson Crosby
Yarway Valves

- Yarway 5600 Series WelBond Globe valves stocked
- Yarway 5500 series and 5600 series WelBond Globe valve parts stocked
- Manual, 2” and smaller
  - Carbon steel and stainless steel
  - ANSI 1700#
- Procured under Framatome ASME III QA Program 56-1151178
- Standardized design specification – DS-6113
- ASME B&PV Code, Section III, Class 1
- Utility Specification Reconciliation provided
- ASME Code Reconciliation provided
Limiterque Actuators, Parts, and Motors

- Over 1700 different Limitorque SMB actuator parts stocked. Both safety and non-safety related.
- Over 75 different Limitorque motors for SMB actuators stocked.
  - AC - 208, 460, 575 volts; 1800 & 3600 RPM
  - DC - 125, 250 volts; 1900 RPM
- Complete SMB and HBC safety-related actuators stocked.
- Additional inventory of HBC, SB, and SBD parts stocked.
- All safety related parts and motors are nuclear qualified to Limitorque Qualification Reports (as applicable)

<table>
<thead>
<tr>
<th>B0058</th>
<th>B0234</th>
</tr>
</thead>
<tbody>
<tr>
<td>B0037</td>
<td>B0027</td>
</tr>
<tr>
<td>600376A</td>
<td>B0212</td>
</tr>
<tr>
<td>600456</td>
<td>B0119</td>
</tr>
<tr>
<td>B0009</td>
<td>B0114</td>
</tr>
<tr>
<td>B0003</td>
<td>B0115</td>
</tr>
</tbody>
</table>

- All safety related equipment procured under Framatome 10CFR50 Appendix B QA Program.
- All safety related equipment inspected at Limitorque by ANSI N45.2.6 qualified inspectors.
- All equipment receipt inspected by ANSI N45.2.6 qualified inspectors.
- All equipment stored in Framatome Level B controlled warehouse.
TopWorx™ Proximity Switches

- Enhance safety and lower costs by eliminating direct contact actuation, with the C, H, M, and SV series GO Switches

- C, H, M and SV switches for different qualification requirements
  - C-Series (Containment)
    - Designed for use in containment
    - LOCA and post-LOCA conditions for one year
    - Certified to meet the highest vibration and seismic requirements
    - 106-year qualified life at 120°F
  - H-Series (Harsh)
    - Containment qualified (Non-LOCA)
    - 500°F peak
  - SV-Series (Severe)
    - HELB/MSIV qualified
    - 500°F HELB peak
  - M-Series (Mild)
    - Qualified for outside containment applications
    - Operates continuously up to 250°F

- TopWorx GO Switch TW180 to enhance safety and lower costs with new all-in-one qualified proximity retrofit kit for limit switches

- TopWorx GO Switch TW180
  - Fit, form and function retrofit requirements
  - 106-year qualified life
  - Features reliable GO Switch technology
  - U-shape design for easy installation

April 2020 Rev 19
- Over fifty different ASME Section III, Class 1 valves stocked
- Gate & Globe valves, manual, 2” and under
  - Carbon steel and stainless steel
  - ANSI 800#, 1690#, and 2680#
  - Non-cobalt trim
- Piston Check, 2” and under
  - Carbon steel and stainless steel
  - ANSI 800#
  - Non-cobalt trim
- Bellows seal valves, 2” and under
- Ball Valves, 2” and under
- Framatome ASME III QA Program 56-1151178
- Standardized design specifications - VNDS-001, VNDS-002, VNDS-003
- Utility Specification Reconciliation provided
- ASME Code Reconciliation provided
- Evaluation of Utility’s installed and inventoried small valves for potential replacement with Framatome stock
- Commercial Velan valves available in all sizes
Mechanical Parts & Lubricants
Mechanical Dedicated Parts

- Actuators & Lever Arms
- Adhesives, Sealants, & Tapes
- Bearings & Bushings
- Belts
- Brackets, Clamps, & Supports
- Couplings, Fittings, & Mechanical Seals
- Fans
- Filters & Filter Housings
- Hardware
- Instrumentation
- Lubricants
- O-Rings, Packing, & Gaskets
- Piping, Tubing, & Hoses
- Pumps
- Valves & Regulators
Mechanical Equipment
Customer Problem Statement

- Existing cooling tower design creates turbulent flow conditions in the inlet area which restricts optimum air flow. Restricted air flow limits Cooling Tower performance

Framatome Solution

- Modifications to the cooling tower can be made that increase Plant power output by modifying the cooling tower lower edge and the ground elevation the ground surface to promote laminar flow into the cooling tower inlet
  - The laminar flow profile promotes increased air velocity and heat removal capability

Optimize Your Cooling Tower for 3-5MW More Power Output

Better Air Flow → Better Cooling → More MW!
Mechanical Equipment (Chillers)

- **Customer Problem Statement**
  - Chillers are operating beyond the design life. R-12 has been the refrigerant of choice for heat pump and air-conditioning systems for more than four decades. As stockpiles of R-12 depletes over the coming years new SR Chillers will be needed to replace older and obsolete units.

- **Framatome Solution**
  - Framatome has successfully teamed with a Safety Related Chiller manufacturer. We have recently been awarded a contract in Spain for Control Room and Switchgear Room Chillers.
Mechanical Equipment (National SAFER Response Centers)

- Perform oversight, management and logistic coordination for the industry National SAFER Response Centers’ (NSRC) Control Center.
- Manage the training, qualifications and call out of the emergency response personnel responsible for staffing the SAFER Control Center for drills and for actual emergency response
  - Including deployment of equipment and personnel to the site to support implementation of the industry FLEX operations to mitigate beyond design basis events.

The SAFER Response Centers maintain equipment for site deployment to address beyond design-bases events that may occur under extreme natural conditions.
Monitoring & Diagnostics
EMPATH (Motor Diagnostics)

- Non-intrusive, remote motor testing
- Available as Portable System or Continuous Monitoring Platform (ECMS)
- Complementary to vibration measurement
  - Torsional load fluctuations
  - Detect rotor problems
- All types of electric machines
  - Motors (AC and DC)
  - Generators
  - Transformers
  - VFD’s
- All types of machinery
  - Rotating
  - Reciprocating

Diagnostic Capabilities

**Motor**
- Rotor health
- Stator health
- Motor bearing health
- Current / voltage imbalance
- Air gap variation
- Heat, noise, etc.

**Driven Load**
- Bearings
- Gears
- Belts
- Blades, vanes
- Timing, synchronization

**Power Supply**
- Harmonic distortion
- Feedback
- Power factor
- Efficiency
- Motor vs. driven load

*Note: Noise floor is -40 db.
**Note: Matching RB and S5 peaks in high freq spectrum
***Note: Sub-synch, peaks detected in demod data*
Meggitt H2/O2 Analyzer Parts
(Containment Atmosphere Monitoring Systems)

- Spare Parts for Hydrogen and Oxygen Nuclear Analyzers
- MSSI Nuclear Analyzer Systems meet 10CFR50.44 “Amended Rule” and 10CFR50.65 “Maintenance Rule”
UltraCheck Valve Diagnostics

- Non-Intrusive Means of Determining Valve Performance & Operability
- Testing Primarily Performed On-Line
- Reduced Maintenance/Replacement Costs
- Shorter Down Time
- Lower Dose
- Performance Tracking and Trending

- **UltraCheck “A”**
  (Air-Operated Valves)
- **UltraCheck “C”**
  (Check Valves)
- **UltraCheck “L”**
  (Leak Detection)
- **UltraCheck “M”**
  (Motor-Operated Valves)
- **UltraCheck “RV”**
  (Relief Valves)
- **UltraCheck “SPT”**
  (Spring Pack Tester)
- **PLDA**
  (Power Line Data Acquisition)
Motors & Motor Parts
Motors (Electric) - Siemens, Reliance, and Jeumont Electric

- Framatome provides Jeumont Electric, Reliance and Siemens motors
- Broad Scope Of Safety & Non-safety Related Nuclear Class Motors
  - 250,000 Ratings, types, styles, and sizes
  - 1/4 to 10,000 HP including AC motors designed to operate with the most advanced variable speed drive technology
  - Fan, pump, compressor, and valve applications
  - Class 1E, mild or harsh environment locations
  - Application specific requirements

- Motors Built To Industry Standards
- Full array of spare parts including Bearings, Rotors, Cooling Coils, and more
- Equivalency Studies

New Replacement Motors
(Fractional to 10,000 HP+)
NSSS Components
NSSS Parts and ASME Code Components

- Critical Plant NSSS Spares
  - Steam Generators
    - Studs/Nuts/Washers/Closure Hardware/Cover Plates
  - Pressurizer
    - Studs/Nuts/Washers/Closure Hardware/Cover Plates
  - RV Closure Heads – Studs/Nuts/Gaskets
  - IHA Spares for Framatome Designs
  - TECSA Closure Spares
  - Inventory of ASME Code Material
    - Bar/Plate
CRDMs for B&W, Westinghouse, & CE Plants

- **B&W Plant – CRDMs**
  - **Inventory**
    - Position Indicators
    - Stator & Water Jacket Assemblies
    - Select Piece Parts – Commonly Replaced Outage Items
    - Complete CRDMs
  - Framatome is System Designer, Manufacturer and Service Provider

- **W & CE Plants – CRDMs**
  - **JSPM – Design & Manufacturing Capabilities**
    - All Components except Position Indicators
    - Integrated Latch Housing Upgrade with Framatome Head Replacements
  - Spares / Replacement CRDMs / Coil Stacks
Seals
- Hydrostatic seals for existing Westinghouse RC Pumps
- Passive shutdown sealing system
  - SBO Mitigation seals

OEM capabilities to provide direct seal replacements
- Full scale test loops for #1, #2, #3 Seal (cold and hot loops)
- Hot machining, inspection, and test capabilities
- Qualified high temperature o-rings for SBO
- ASME N-stamp, 10CFR50 Appendix B program

Pump Internals
- OEM capabilities to provide direct internals replacement
- Internals refurbishment capabilities at SOMANU and Lynchburg
- (machining, assembly, balancing, etc.)
- Comprehensive Design Capabilities
- Full scale test loop

Motors
- Over 230 motors manufactured as OEM
- Improved stator design can extend motor inspections to 15+ years
- Extended capabilities to supply direct replacement for motor hardware
Nuclear Grade Air Traps (NGATs)

- NGAT is the only complete solution that meets NRC Generic Letter 2008-01 requirements for all US plants:
  - Accumulates gas within emergency core cooling systems
  - Measures gas within these systems
  - Removes 100% of gas from these systems
  - Verifies the systems are 100% full (no gas)

- Features of the NGAT:
  - Passive (no electricity)
  - Simple Design
  - Promotes ALARA principles
  - Eliminates the need for UT evaluations
  - 10CFR50 Appendix B safety related quality (ASME NQA-1)

- Framatome is the exclusive channel to the nuclear market for NUCCORP’s Nuclear Grade Air TrapTM
Pressurizer Heater Total Solution

- Framatome Can Provide Complete Heater Solutions
  - Develop ASME Code Design Specification for Utility
  - Design & Fabricate Replacement Heaters
  - Provide Design Change Package
  - Install Replacement Heaters

- Framatome Heater Design
  - Heater Designs
    - Various Diameters (0.660”, 0.875”, 1.245”)
    - 13.16 kW to 52.5 kW, 1Ø and 3Ø, 460 VAC to 575 VAC
    - Over 1000 heaters Supplied in US
  - Pressure Boundary Sheath - No Known Sheath Failures
    - Not Susceptible to stress corrosion cracking
  - Thermocoax Heater Internals Design
    - Significant PWR Operating Experience World Wide (> 4500)
    - Double Barrier between RCS and MgO
    - Amount of MgO Significantly Less
  - Design Life Verification Testing – NOP / NOT
    - Framatome Test Loop in Karlstein, Germany
High Quality, Nuclear Wire and Cable

- Safety Related
- 1E, EQ (IEEE 323, 383)
- Power, Instrumentation, Control, Thermocouple, Communication
- Coaxial, Triaxial, Twinaxial
- Fiber Optic
- Low and Medium Voltage
- 90°C, 125°C, 250°C
- Armored or Flex Conduit Available
- Specialty Applications
- Pressurizer Heater Cable
- 3 Hour Fire Rated
- Updated Qualification to New Plant Criteria