24th Annual Vendor/Contractor Profile Special Section

Pages 46–106 contain advertisements and "advertorial" information about products and services provided by the companies in the nuclear industry listed below:

framatome

Framatome completes major refurbishment of 31 reactor coolant pump motors

Framatome recently completed the refurbishment of 31 reactor coolant pump motors for three southeastern nuclear energy facilities. From 2002 to May 2018, the company modified and upgraded these components, which resulted in a 100 percent reliability and zero-failure performance record since being re-installed.

The motors in reactor coolant pumps help move coolant around the primary circuit of a nuclear reactor core. This keeps the reactor from overheating while ensuring the safe heat transfer from a reactor core to steam generators.

"The success of this refurbishment campaign is a tribute to Framatome's dedicated and experienced employees," said Craig Ranson, senior vice president of the Installed Base Business Unit at Framatome in North America. "Their unmatched expertise, bolstered by access to world-class facilities, allows us to provide our customers with solutions that, in many cases, are more innovative and cost effective than their plant's original equipment manufacturer."

Members of Framatome's Installed Base services team worked with the plants' personnel to remove each motor. They then brought the motors to the company's 70,000 square-foot Pump and Motor Service Center in Lynchburg, Virginia. While at the center, experts inspected the components, completed necessary repairs and replacements, and tested each motor. Such refurbishments allow these components, and thus their nuclear facilities, to operate safely and reliably for longer durations.

Following successful testing, pump and motor specialists re-installed the motors and assessed their performance on-site.

YouTube

www.framatome.com/us

Breaker modification for DC application

Custom designed and manufactured 5KV switchgear

State-of-the-art 10' x 10' triaxial seismic simulator testing motor control center

AZZ Nuclear

Headquartered in Fort Worth, Texas, with major facilities in Fort Worth and in Suwanee, Georgia, AZZ Nuclear combines the capabilities of Engineered Solutions, Specialty Welding, and other AZZ business units that supply equipment to the nuclear industry. With the primary goal of keeping nuclear plants operating safely, AZZ Nuclear supplies critical equipment and performs highly technical services aimed at extending the life of plant systems.

AZZ Nuclear Engineered Solutions (formerly NLI) supports the global nuclear industry with equipment solutions for obsolescence, equipment maintenance and qualification services. Engineering, design, manufacturing, testing and qualification are all performed in a 200,000-square-foot state-of-the art manufacturing and testing facility located in Fort Worth, Texas. In addition to third-party supply, AZZ Nuclear is an OEM for certain equipment types, a manufacturer of other equipment, and routinely dedicates commercially available products. AZZ Nuclear's mission is to provide the worldwide nuclear industry with critical and safety related equipment, equipment maintenance, equipment qualification and engineering services, in a manner that causes the least impact to nuclear plant resources, at the lowest long-term cost, and deliver expeditiously to meet demanding schedules.

AZZ Specialty Welding (formerly WSI) is a leading global provider of technologically advanced maintenance, repair and overhaul services. With a long track record of enhancing safety, reducing risk and improving plant productivity and performance, AZZ Specialty Welding has delivered planned and emergency response solutions to a wide range of nuclear facilities around the world. With repairs successfully performed in more than 130 nuclear power plants around the world, whatever the location, material and size of the asset, AZZ Specialty Welding can offer a field upgrade to your component at the time that repairs are required, ensuring nuclear plants are working at their best. Reducing outages and increasing uptime for nuclear and industrial applications globally.

Nuclear Equipment Services

With best-in-class testing to ensure operation under worst-case scenarios, AZZ Nuclear's Qualification and Dedication programs include thermal aging, radiation testing, EMI/RFI testing, LOCA testing, seismic testing, and software V&V.

Nuclear Equipment Supply

Encompassing thousands of products ranging from Electrical, Mechanical, Instrumentation and Control, HVAC and even specialty one-of-a-kind items, AZZ Nuclear supplies the nuclear industry with everything but fuel.

Stress Corrosion Mitigation

Stress corrosion cracking affects nearly every plant and mitigation strategies are an essential component of plant life extensions. AZZ Nuclear employs several strategies, such as weld overlays and waterjet peening to mitigate the effects of stress corrosion cracking.

Quality Assurance

The AZZ Nuclear quality assurance program has become an industry standard, ensuring our products and services meet the most demanding expectations.

AZZ™ NUCLEAR

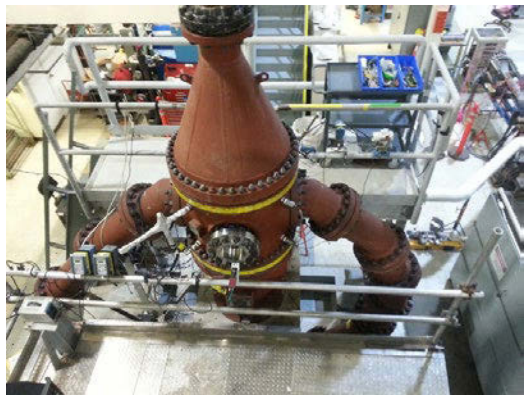
Learn more at azznuclear.com or call (800) 448-4124.

AN UPDATE FROM CANADIAN NUCLEAR LABORATORIES: SUPPORT FOR REACTOR COMPETITIVENESS, SUSTAINABILITY, AND MODERNIZATION

Canadian Nuclear Laboratories (CNL) is dedicated to enhancing the competitiveness, sustainability, and modernization of both heavy and light water reactors. Through strategic investment in our capabilities and workforce, and through engagement with our customers, CNL is working harder than ever to bring our world-class services to utilities around the globe. We would like to take this opportunity to highlight a few of our recent projects.

CNL Research Contributes to Steam Generator Performance and Longevity

Steam generator (SG) performance and longevity are essential to sustainable reactor operations. In order to better understand what factors contribute to the degradation of SG tubing, the US Electric Power Research Institute (EPRI) looked to CNL for help. Using our unique facilities and expertise in vibration and thermalhydraulics, CNL designed and completed the first phase of an experiment to determine which conditions produce damaging levels of SG vibration. The results will enable the industry to establish clearer safety margins for both new and existing SG units.

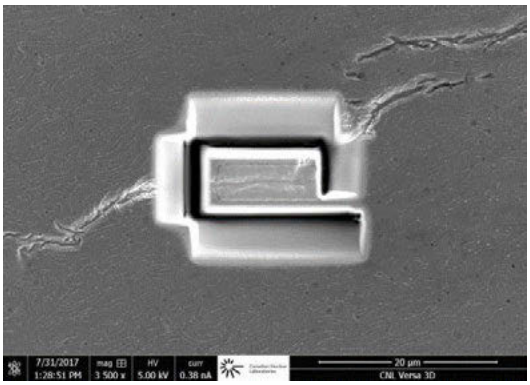


The multi-span U-bend test rig at CNL

Predicting the remaining service life of ex-service cables

CNL completed a study of low voltage cables removed from a reactor that had been operating for over thirty years in order to validate assumptions made as part of their initial Environmental Qualification (EQ) process and to predict their remaining service life. CNL researchers carefully selected cables based on environment, then assessed them through a series of mechanical and electrical integrity tests, supported by existing reference data. CNL researchers confirmed the validity of EQ service life estimates for the majority of cables, and also identified environments that had a significant impact on cable longevity. This study revealed a need to test additional cables from the same reactor, and a broader need to test cables at other reactors.

CNL continues to build its irradiated material analysis capabilities



A 10 micron sample milled along a crack by the FIB

Studying the microstructure of highly irradiated materials is valuable for identifying radiation damage and its impact on the material's mechanical properties and performance. To enhance our capabilities in this area, CNL commissioned a Thermo Scientific Versa 3D dual beam focused ion beam (FIB), and a JEOL F-200 Transmission Electron Microscope (TEM). In combination, these facilities allow CNL researchers to extract micro-specimens from materials of interest, transport them easily between laboratories, and perform high resolution analysis of their microstructure. We are excited to leverage this equipment to expand our capabilities and bring added value to our customers and partners.

This is just a small sample of CNL's recent work. For more information on all of the exciting projects taking place at CNL, please email commercial@cnl.ca for a copy of our annual report!

Canadian Nuclear Laboratories | Laboratoires Nucléaires Canadiens

NUCLEAR SOLUTIONS From Burns & McDonnell

Burns & McDonnell is focused on providing services to the nation's operating fleet of nuclear utilities. More than 80 percent of our engineers have spent much of their careers working full-time in the nuclear fleet and have lived the nuclear culture.

"When it comes to understanding the safety and operational culture of our nuclear fleet, we understand, we've lived it," says Glenn Neises, Chief Nuclear Officer for Burns & McDonnell. "There is no substitute for direct experience."

Burns & McDonnell has experienced engineers and project managers deployed in offices throughout the U.S. "We are local and committed to the success of our clients wherever they are because we are familiar with their needs," Neises says.

As a 100 percent employee-owned firm, Burns & McDonnell is committed to the success of each and every project because "you are our client, both personally and professionally," Neises adds. "Ownership means we care about making sure every project is executed to perfection. Our clients notice this attention to detail.

"Burns & McDonnell has more than 6,000 employee-owners working in engineering and construction services across 11 divisions. We bring a broad experience base to the nuclear industry, which results in innovative solutions for the most complex problems."

Burns & McDonnell has revenue of more than $2 billion annually, half of which comes from construction projects. "We can do any size project from the smallest study to the largest design-build project," Neises says.

For more information, visit:

BURNS McDONNELL

www.burnsmcd.com/nuclear

USA UTILITIES SERVICE ALLIANCE
Supplier Partner

STARS ALLIANCE
Engineering Service Provider

RSCC
World Class Nuclear Cable

Committed To The Nuclear Industry

For over forty years, RSCC has supported the Nuclear Industry by providing a broad range of nuclear qualified cables to the industry. Our commitment to quality, innovation and range of products is unmatched.

Quality

RSCC's quality assurance program starts with incoming raw materials and continues through the complete manufacture of our products. We can provide full traceability of the raw materials, in process testing and final electrical test. Our Quality Assurance Program for Nuclear Products is in accordance with 10 CFR Appendix B and NQA-1 2014.

We are also ISO 9001-2008 certified.

Service

RSCC maintains the largest inventory of both low voltage and medium voltage single and multi-conductor products. Our entire inventory is fully documented and ready for immediate shipment.

Everyone working in the RSCC Nuclear Segment are experts in their fields. This allows us to provide the highest level of service in the areas of Sales, Engineering, Quality and Production.

Innovation

Our in-house R&D lab is continually examining and evaluating new materials to identify new opportunities for products. Our broad line of insulating and jacketing materials and engineering expertise allow us to provide virtually unlimited product options.

Qualified

All of our qualified cables meet or exceed all pertinent nuclear industry standards, including IEEE-383 and IEEE-323. Whether it's flame resistance postulated design base event (LOCA), thermal life projections, or other critical evaluations, our in house qualification test facilities continually perform simulated accident and accelerated long-term prototype tests to ensure product dependability.

Marmon Engineered Wire & Cable
A Berkshire Hathaway Company
www.rsccnuclearcable.com

RSCC
World Class Nuclear Cable

RSCC FIBER OPTIC CABLE

- Fiber optic cables are qualified in accordance with IEEE-1682 and IEEE-323
- Cable configurations utilize both single mode and multi mode fibers
- Cable designs include low smoke zero halogen and PVDF configurations
- Cable designs utilize rad hardened fibers qualified and fit for use in wide variety of applications such as:
  - Wireless access
  - Security
  - High Band Width Applications
- Fiber optic cables are immune to and do not emit EMI and RFI

RSCC
Lighting Up The Future

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BROKK®

Q: So how can you perform challenging, heavy duty, D&D work in Hazardous environments at nuclear sites in complete safety?

A: Well if you are familiar with BROKK remotely operated machines, you will know that over the past 40 years more than 8,000 BROKK machines have been deployed worldwide in the most hazardous of environments. Furthermore, you may also be aware that there have been no injuries incurred by operators using BROKK equipment deployed on some of the most challenging projects at nuclear sites worldwide.

We can all appreciate the significant negative impact to a project if there is an injury, a near miss, exposure to radiation or exposure to hazardous materials for any individuals engaged on the project. This negative impact may go beyond the project, to the overall site, even to the industry itself. The use of BROKK remotely operated equipment keeps the operators at a safe distance from the hazardous workface avoiding the possibility of injury or exposure.

BROKK Features and Benefits

An important advantage of BROKK equipment is high productivity, so safer does not mean slower. Very powerful tools are rapidly deployed by the BROKK machines to complete work effectively and to help bring projects in ahead of time and under budget.

BROKK offers hundreds of standard and custom designed tools and attachments for our machines to ensure that the best tools for the job are always available.

With these multiple attachment choices, compact size, ease of maneuverability and an intuitive control system, BROKK is now established as the nuclear industry standard for safe, powerful, reliable, rugged, high performance, remotely operated equipment. Our unmatched 40 years of deployment experience and the lessons learned from this have been incorporated into our latest generation of equipment. Many upgrades and improvements have been made to continually improve the performance of our equipment based on direct feedback and our extensive operational experience.

Innovative BROKK features such as our "NQH" auto-tool change interface avoids any operator radiation exposure on projects requiring multiple tools and a variety of functions to be performed by a single machine. Vision systems, additional radiation hardening and auto recovery systems are also available as integrated machine options where required.

BROKK Technical and Customer Support

BROKK has a dedicated internal Special Engineering Group to assist our customers in defining the best overall solution to meet the project goals. We continue to provide ongoing technical support for all of our customers after equipment delivery, through the duration of the project. We stock a full range of spare parts which are typically shipped out the same day as they are requested. We also provide on-site technical support and certified operator training at the customer's site(s) as needed.

BROKK Custom Design and Special Applications

The BROKK Special Engineering Group can also develop custom designed machines and custom designed attachments where needed for special projects. We have a proven track record of successfully working with our customers to develop and deploy application specific solutions.

For more information Contact Tony Marlow
Tel: (505) 699 8923, email: tony@brokkinc.com
www.brokk.com/us

Extraordinary power and reliability for extraordinary jobs.

Some projects require a special solution. Brokk offers a unique and well proven combination of equipment, design, engineering and technical support for the most challenging projects at nuclear facilities.

Brokk is the industry leader for safe, rugged, reliable, heavy-duty, remotely operated equipment and with 8 available base machine options, there is a Brokk machine size available to suit each application without compromise.

Brokk machines are available with many standard options including vision systems, radiation hardening, auto tool change, auto recovery capabilities and more. They can also be customized and fitted with additional special options as needed for specific customer projects

Brokk also offers hundreds of standard and custom designed tools and attachments for our machines. With our standard quick change attachment interface or our optional fully remote tool change interface, a single Brokk machine can perform multiple tasks in hazardous environments with the operator always working in complete safety.

Now add to that over 40 years of Brokk deployment experience, our in-house engineering and technical support staff, on-site training and after sales support and you can see that Brokk provides comprehensive support to our customers who are working on very challenging projects.

For more information Contact Tony Marlow Tel: (505) 699 8923, email: tony@brokkinc.com

BROKK®

Original Demolition Power™

Brokk Inc. | 1144 Village Way, Monroe WA | Tel.: 360 794 1277 | info@brokkinc.com | www.brokk.com/us

Extend "Breaker-to-Breaker" Runs with a Reliable Tube Plugging Solution

Your success is determined by consistently providing energy to your customers, and providing that energy depends on safe and event-free operations. Unreliable condenser tube plugging solutions such as elastomer or friction fit plugs can degrade and/or eject over time, leading to cooling water in-leakage (and other issues) that can cause equipment failure. Don't let an unreliable tube plugging method cut your next "breaker-to-breaker" run short!

The Pop-A-Plug® Tube Plugging System from Curtiss-Wright EST Group offers a perfect solution to plants looking for an engineered solution to seal leaking and degraded heat exchanger and condenser tubes. Since 1981, Pop-A-Plug Tube Plugs have been performing reliably under severe operating conditions, providing the lowest life-cycle cost as compared to alternative plugging methods. Pop-A-Plug Tube Plugs are rated for service up to 7,000 PsiG (483 BarG) and 1100° F (593° C); Pop-A-Plug Tube Plugs conform to ASME PCC-2-2015 (Article 3.12) recommended mechanical tube plugging repair methods and meet all guidelines in the EPRI Condenser In-Leakage Report.

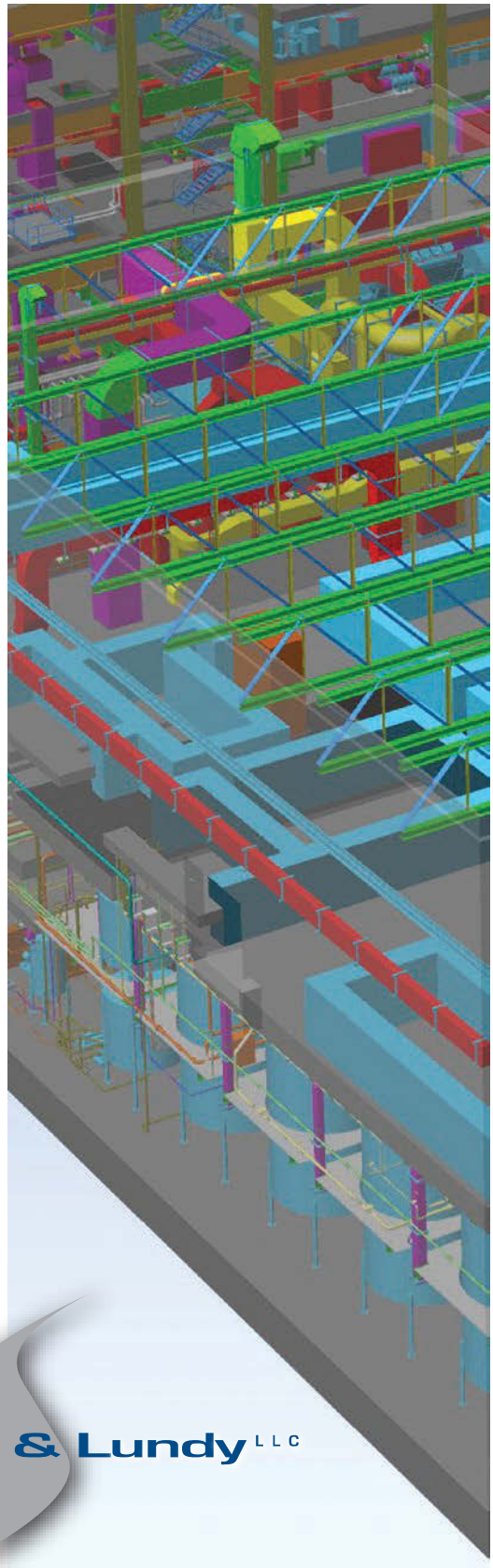
Simple and quick installation coupled with reliable performance over the life of a heat exchanger are imperative design goals for any tube plugging system. Pop-A-Plug Tube Plugs achieve these objectives by: 1) creating a simple metal-to-metal seal providing long term reliability versus expandable rubber plugs; 2) fast installation - eliminating welding, pre-heat & PWHT; 3) eliminating tube end and tube joint damage caused by hammer-in tapers and seal welded plugs; and 4) provide a helium leak tight seal to $1x10^{-10}$ cc/sec.

Pop-A-Plug Tube Plugs can easily handle pressure upsets occurring during nuclear power plant LOOP or SBO events. Pop-A-Plug Tube Plugs can be supplied under ISO-9001:2015, 10 CFR 50 Appx B, or ASME Section III Quality programs. Documentation packages include: Certificate of Conformance, Certified Mill Test Reports (CMTR), Independent Test Results of Raw Stock, and Production Lot Pressure Test Reports. Curtiss-Wright EST Group maintains a large inventory, with 24/7 emergency manufacturing capabilities. Ask about our Heat Exchanger Assessment Tool (HEAT) and Outage Job Box Programs.

Learn why nuclear power plants around the world rely on Pop-A-Plugs as their tube plugging solution! For more information, visit cw-estgroup.com/pap.

Contact us at est-info@curtisswright.com or +1 215.721.1100 to speak with one of EST Group's Product Experts today!

Helping Clients Secure the Future of Nuclear Power



Nuclear power has been a core business of Sargent & Lundy since 1954, with proven capabilities in engineering design, analysis, compliance, project management, and more. Our leading-edge services address today's emerging issues with cost-effective solutions.

Clients confidently rely on our technical depth and industry-wide experience for the critical input to make long-range strategic and corporate decisions. Owners enlist our support as their engineer-of-choice and rely on our expertise for specialized problem solving.

We are trusted throughout the industry, currently supporting more than 100 nuclear units across North America and nuclear clients worldwide.

Our solutions encompass all vital areas of nuclear power, including:

- **Post-Fukushima safety enhancements**
- **Open-phase solutions**
- **Cyber security**
- **Digital control system upgrades**
- **Implementing NFPA 805 solutions**
- **New plant projects from inception through operation**

That's in addition to our extensive support for the many on-going initiatives and O&M programs that effectively address nuclear plant requirements for continued safe, reliable, and economical operation.

To discuss your needs, contact Tom Behringer, Senior VP, at 312-269-6893

Sargent & Lundy LLC

55 East Monroe Street • Chicago, IL 60603-5780 USA • 312-269-2000

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- Error-Free® Equipment Troubleshooting
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- Error-Free® Human Performance Inspector
- Error-Free® Human Performance Instant Root Cause Analysis
- Error-Free® Internal and/or Vendor QA/QC
- Error-Free® Job Observations
- Error-Free® Leadership
- Error-Free® LOP Management
- Error-Free® Management Capability
- Error-Free® Managers
- Error-Free® Mechanical Equipment Failure Mode & Root Cause Analysis
- Error-Free® Operation & Maintenance
- Error-Free® Pre-Job Briefing
- Error-Free® Procedure Design
- Error-Free® Procedure Use
- Error-Free® Project Management
- Error-Free® Psychologically-based O&P Root Cause Analysis
- Error-Free® Reviewers
- Error-Free® Safety Management for Safety Professionals
- Error-Free® Self and Situation Analysis
- Error-Free® Supervisory Leadership
- Error-Free® System Commission Testing
- Error-Free® Workers

Re-defining the quality standard for individuals and organizations.

GET IN TOUCH

Contact us to discuss how our customized Error-Free® organization-specific training can benefit your company.

Chong Chiu, Ph.D.
MIT
ANS Fellow and Award Winner
Founder, PII and Error-Free Inc.

(760) 722-0202 | info@errorfree.com | http://errorfree.com

For Engineering Excellence, Integrity & Quality, look no further than DP Engineering

DP Engineering Ltd. Co. (DPE) is a leading provider of engineering and consulting services to the power industry in the United States. DPE was established to provide value-added engineering services and continues to grow rapidly by contributing to the continued success of our clients. Our primary goal is to establish long term relationships with our clients while ensuring their short and long term goals are met in a safe, timely, and cost-effective manner. Our core engineering competencies include project studies, design modifications (including implementation support), technical reports, engineering analysis as well as development of specifications and calculations.

DPE provides engineering services in support of design engineering. We also provide services to Programs and Systems Engineering and other departments where engineering support may be required, such as Procurement, Maintenance Engineering, Project Management, and Special Projects.

DPE maintains a 10CFR50 Appendix B Quality Assurance Program. Our QA Program has been approved for use by multiple nuclear utilities, and is available for review at the NUPIC website. DPE provides continuing training as well as just-in-time training specific to the project and/or task. Many of our on-site staff maintain qualifications specific to the client within the clients' accredited training program. DPE also maintains an internal qualification program for its technical staff.

In addition to the main office in Fort Worth, Texas, DPE maintains personnel in other areas. To effectively support the Waterford 3, River Bend, and Grand Gulf stations, DPE has an office in Baton Rouge, Louisiana. For our clients in the gulf coast region, the Baton Rouge office has been a huge success in supporting their needs. To support the ongoing success of the Arkansas Nuclear One units, DPE maintains a staff of approximately 20 professionals on-site working both on managed tasks (modifications, engineering studies, calculations) and in staff augmentation positions in support of ongoing engineering efforts.

There are approximately 120 employees currently working for DPE in our Fort Worth, Baton Rouge, and Arkansas locations. Temporary staff and associate consultants are also available on an "as needed" basis. This approach allows DPE to maintain a staff size and discipline mix that is responsive to our clients' needs while maintaining flexibility and a range of technical experience to address specific project or consulting requirements.

For more information, please contact:

David McKibbin,
Business Development Manager
davemckibbin@
dpengineering.com
Direct Dial: 817-710-8407
Cell: 817-917-5547

Website:
www.dpengineering.com

Address:
6100 Western Pl. Ste. 500
Fort Worth, TX 76107

DP ENGINEERING
ESTABLISHED 1995

Nusource Designs Replacement Heat Exchanger Tube Bundles for Emergency Diesel Generators with Improved Materials

Earlier this year, NuSource LLC was awarded a significant project to deliver custom hardware for a nuclear power plant located in the southeastern United States.

The project included the design and manufacturing of safety related, ASME Code Section III replacement heat exchanger tube bundles to be installed on the Emergency Diesel Generators at the site.

Emergency Diesel Generators (EDG's) are one of the most critical pieces of equipment at nuclear power plants, acting as the redundant electrical power source for emergency cooling and shut-down equipment. Given their importance to plant safety and increased regulatory scrutiny post-Fukushima, EDG maintenance reliability is a top priority at all plants.

The scope of the job demonstrates NuSource's capability to deliver specialty replacement hardware with an improved design which will solve an ongoing material degradation problem that has challenged the plant over the past several years.

With the improved design, NuSource will utilize alternate materials that will be more corrosion resistant, will provide a longer life of the equipment, and will exhibit improved thermal performance of the units.

The NuSource Quality Assurance Program meets the highest standards of the nuclear industry, including 10 CFR 50 Appendix B and the ASME Boiler and Pressure Vessel Code "N" Stamp. For more information, visit www.nusourcellc.com

Typical Applications

EDG
- Lube Oil Coolers
- Jacket Water Coolers
- Intercooler Heat Exchanger

Balance of Plant
- Steam Turbine Oil Cooler
- Gland Seal Condenser
- CCW / TBCCW

Skid Mounted Pump Coolers
- Charging Pump Oil Coolers
- Safety Injection Pump Oil Cooler
- Aux Feed Pump Oil Cooler

Typical Services

Engineering
- Certified Design Specifications
- ASME Code Design Reports
- Safety Related Thermal Performance Calculations
- Safety Related Tube Plugging Margin Calculations

Installation
- On Site Engineering Support during installation

NuSource

NAC INTERNATIONAL

NAC celebrates 50 years of providing solutions to the nuclear industry

In August 2018, NAC completes a half-century of designing, licensing, and deploying technologies and providing expert consulting and information services for the nuclear industry. Our proven process for obtaining regulatory approvals covers methods and equipment for storing, transporting, packaging, and/or managing spent nuclear fuel, high level, GTCC, other solids, and liquid wastes.

Ideal cask solutions for your most challenging storage & transportation needs

NAC INTERNATIONAL

CELEBRATING 50 years of Service to the nuclear industry

www.nacintl.com

Custom-tailored solutions

When your project requires storage and/or transportation of challenging nuclear materials, NAC offers proven systems and trained personnel to lower risk and ensure success.

Innovation to meet challenges

Throughout our history, NAC has created new designs and adapted older ones to meet industry needs:

- Two out of every three casks loaded with spent fuel at shutdown U.S. NPPs is an NAC design.
- The CoC for our workhorse NAC-LWT transport cask has been amended 68 times for specific contents, for over 400 shipments.
- Our newest cask, OPTIMUS™, is a versatile Type B package for 55 to 110-gal. drums with fissile material contents, and can be configured to transport HLW, transuranic, and other wastes.
- To meet NPP spent fuel storage and transport needs, NAC developed MAGNASTOR®, the first licensed and first loaded ultra-high capacity multi-purpose spent fuel dry storage technology. 124 MAGNASTOR systems have been loaded to date, at both operating and decommissioning NPPs.

Building on our legacy

NAC's 50-year history of facilitating management, transport, storage, and tracking of nuclear materials has been performed worldwide. With the vital role that nuclear power plays in meeting increasing global clean energy needs, safe management of nuclear materials is more vital than ever. NAC will continue to develop and license technologies, partnering with our clients to support a sustainable nuclear energy future.

For more information:

Doug Jacobs, Vice President
djacobs@nacintl.com, 678-328-1257

THE NUCLEAR INDUSTRY'S RIGGING AND TRANSPORTATION EXPERTS

The unique nature of the nuclear power industry demands vendors with the skills and experience that can consistently perform at extremely high levels. Barnhart's Nuclear Services Group has proven its rigging and transportation expertise in nineteen years of working with the nation's leading nuclear energy producers, contractors, and engineers.

LIFE EXTENSIONS, UPGRADES, AND MAJOR MAINTENANCE REQUIRE THE HANDLING OF CRITICAL COMPONENTS WITHIN OPERATING PLANTS. To perform this work during planned outages, a thorough knowledge of major construction techniques, advanced structural engineering, and ALARA is required. It is also crucial that the company has practical working knowledge of the demanding requirements of nuclear protocol, such as NuReg 0612. Barnhart exceeds that criteria and has developed unique tools and methods to perform the movement of major equipment such as:

- RPV Closure Heads
- Moisture Separator Reheaters
- Pressurizers
- Feedwater Heaters
- Condensers
- Transformers
- Steam Dryers
- ISFSI Installations

RIGGING SUPERVISION, LIFT PLANNING, HEAVY RIGGING, AND CRANE SERVICES are provided through their team of professional supervisors, engineers, and project managers. Barnhart ensures the safety, quality, and timely completion of plant outages. Often they are called upon to participate in the "Readiness Planning" of various operating plants. These plans serve to limit downtime during emergency outages by coordinating the engineering, rigging plans, and transportation schedules. In some cases, heavy rigging in nuclear power facilities presents the challenge and opportunity for development of custom designed rigging tools. Barnhart's ISO9001 certified engineering and fabrication capabilities provide solutions, from concept through completion, to handle major components safely and on schedule.

EXPERIENCED AND CERTIFIED FOR HAZMAT SERVICE, Barnhart also brings a working knowledge to the transportation of contaminated components to burial or processing. Barnhart's Heavy Lift Terminal in Memphis serves as a transfer point and waste processing facility of Energy Solutions. Barnhart provides transportation of such components by barge, rail, or road. Barnhart rounds out their experience by providing warehousing services to support the Pooled Inventory Management (PIM) program administered by Southern Company. The PIM program is a mechanism for nuclear plant owners to jointly procure and store critical plant spare equipment. Permanent PIM management resides at the Barnhart facility coordinating the maintenance and handling of the inventory by Barnhart personnel. To learn more about Barnhart's work experience in the nuclear industry, visit **www.barnhartcrane.com**.

BARNHART NUCLEAR SERVICES
2163 Airways Blvd., Memphis, TN 38114
800.587.3249 • nuclear@barnhartcrane.com

Service... Innovation... Value... Integrity.

Founded in 1979, WMG Inc. is headquartered in Peekskill, New York. WMG provides the nuclear industry with professional nuclear engineering and waste management services. Beginning with our industry-standard RADMAN™ software program for radioactive shipments, WMG has continued to provide innovative solutions to the industry's most complex challenges. WMG is recognized throughout the nuclear industry as a leader in software, engineering, project and waste management innovations and accomplishments. WMG's proven expertise has been demonstrated in such areas as Major Component disposition, D&D Project Management and support services, Irradiated Hardware and Spent Fuel Pool Services, as well as spent filter storage systems and Torus desludging services.

WMG continues its legacy of developing innovative solutions, including two new software programs; FME Guardian™ and FuelCAL™. FME Guardian™ allows our customers to electronically log and track items entering and exiting FME Level 1 zones as well as manage FME workers and zones. Our newest software application; FuelCAL™, provides for efficient fuel selection for dry cask storage loading campaigns. The software has the ability to import fuel assembly parameters, non-fuel hardware and spent fuel pool location information. The graphic interface will allow the user to interactively obtain fuel assembly information and manage transfers for fuel assembly and/or non-fuel hardware.

WMG has performed projects at every nuclear power facility in the United States as well as in Canada and Europe. To date, WMG has successfully completed over 2,500 projects related to the management and control of radioactive materials.

Whatever your challenge, WMG is ready to help you find a sound and cost effective solution.

When you don't know who to call...

16 Bank Street
Peekskill, New York 10566
www.wmginc.com

Phone: (914) 736-7100
Fax: (914) 736-7170
Email: wmg@wmginc.com

40 Years of Radwaste Management Innovation Built on a Foundation of Trust

Since 1979, WMG Inc., a small, family owned business, has led the nuclear industry in innovative waste management solutions. From developing the only NRC approved waste characterization/ classification software program, to working with the DOT on the first ever Special Permit to transport Large Components, WMG has found new and innovative ways to solve the industry's most challenging waste management issues.

Today, that tradition continues with new products and services aimed at helping our customers reduce costs, manage their radwaste in a safe and ALARA manner, and receive the highest return on their investment. Our success is based on 5 tenets: **Service, Innovation, Value, Integrity, but most of all Trust.** So call us today to discuss your waste management challenges and we'll work with you to find the right solution.

- Waste Characterization
- Decommissioning Services
- Engineering Services
- Filter Management
- Specialty Packaging
- Custom Steel Liners
- Torus Desludging
- Training Services
- Fuel Pool Cleanup Services
- Software Solutions

Service…Innovation…Value…Integrity…but most of all TRUST

www.wmginc.com | 914.736.7100

Delivering Powerful Solutions for the Next Generation

Bechtel's commercial nuclear power business is a global leader in the licensing, design, procurement, and construction of nuclear power plants. From a new build to plant completion and recovery, or existing facilities modifications to advance reactor technology development, Bechtel has the breadth of knowledge to lead a wide range of nuclear projects. Bechtel has been an integral partner to the nuclear power industry since its inception, and remains at the forefront by providing a range of services and technical expertise that no other contractor can match.

With more than 60 years in the nuclear power industry performing nuclear security, production, laboratory, cleanup, and naval nuclear propulsion work, Bechtel is an industry-leading organization with capabilities across the lifecycle of facilities and sites for commercial and government customers. We provide customers the expertise and capabilities of over 5,100 professionals, including 150 internationally recognized technical specialists, 100 nuclear specialists, 11 Bechtel Distinguished Engineers and Scientists, and 9 Bechtel Fellows who are nationally or internationally known in their respective fields of seismology, civil/ structural design, water use, meteorology, hydrology, soil structure interaction, metallurgy, and hydraulics. With this much know-how, Bechtel has the ability to deliver first-of-a-kind solutions for any nuclear technology.

To date, Bechtel has been a major architect/engineer participant on more than 150 nuclear power plants worldwide and has provided the following services around the world:

- construction of 42 plants
- architect/engineer services for 71 plants
- 34 steam generator replacements
- 11 reactor head replacements
- 7 extended power uprates
- first major underground pipe replacement in the nuclear industry

Bechtel is leading the way in constructing tomorrow's nuclear power solutions. Currently, Bechtel is supporting a number of new generation activities, such as front-end engineering and design (FEED) development for Horizon Wylfa Newydd; construction completion for Vogtle 3&4; licensing services for the Clinch River SMR; and project management and consulting services at Olkiluoto 3, Hinkley Point C, Shin Kori 3&4, Shin Hanul 1&2, and Barakah 1–4. Additionally, we have been selected to perform innovation research for small modular nuclear plant projects by the U.S. Department of Energy.

With Bechtel's vast experience in delivering nuclear solutions, we play a critical role in helping customers deliver current and future nuclear projects, and will continue to lead future generations on the journey to providing clean, reliable energy.

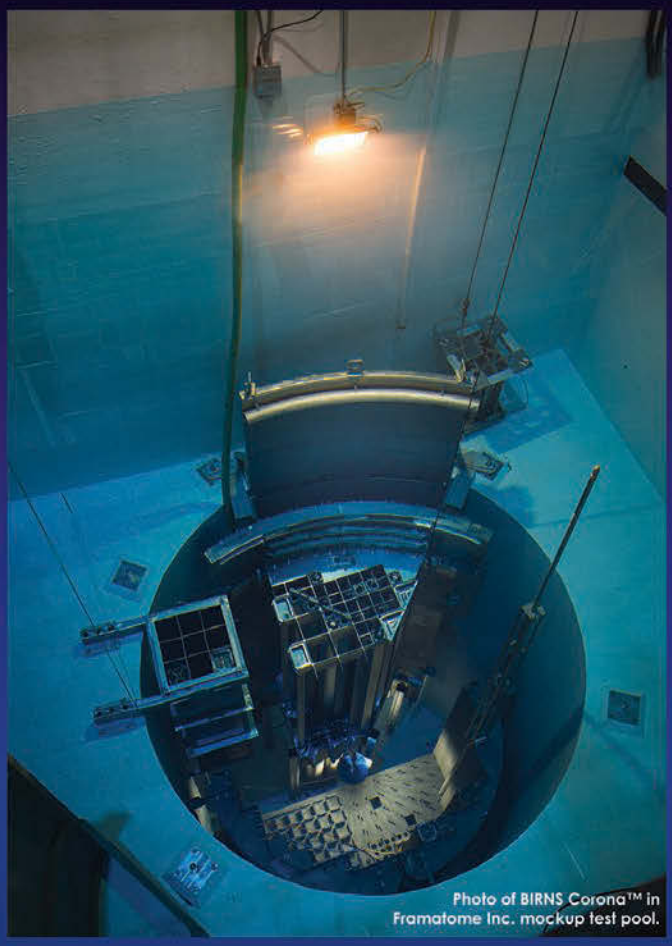


Photo of BIRNS Corona™ in Framatome Inc. mockup test pool.

Nuclear Lighting That Stands the Test of Time

BIRNS, Inc. has proudly been serving the nuclear power industry with high performance lighting solutions since 1977. Since then, the company has contributed to the advancement of industry technology for fuel and reactor pool lights, drop lights, seismically qualified emergency lights and high bay lights.

Our Quality Management System is ISO 9001:2015 certified, and complies with the requirements of NRC 10CFR50 App. B. Our products are custom engineered, precision manufactured in the U.S.A. and are stringently tested to exceed the requirements of our nuclear customers worldwide.

We're proud that our lights have been trusted to provide long term use and brilliant output for the past four decades, and we look forward to an equally bright future.

BIRNS®

www.birns.com

BIRNS' Quality Management System is ISO 9001:2015 Certified; NRC 10CFR50, App. B Compliant

ThermoFisher SCIENTIFIC

The Best Imager for Many Applications…..
The Only Imager for Some!

Thermo Scientific – CIDTEC is a supplier of radiation hardened, machine vision, and scientific cameras based on the proprietary Charge Injection Device (CID) technology for use in the most demanding imaging applications.

The **MegaRAD** series of cameras are capable of operating in high dose radiation environments such as nuclear reactors, fuel inspection, hot cell monitoring, remediation, surveillance, and X-ray imaging applications. Most importantly, this capability can now be provided in either Monochrome or Color version cameras, with remote head cable lengths up to 150-meters.

The **SpectraCAM** scientific camera series offers unparalleled dynamic range, exceeding 26-bits in some applications and is available in purged as well as hermetically sealed systems. These cameras exhibit low noise, excellent UV sensitivity, non-destructive readout, and user programmable windowing capabilities. CIDTEC's RACID Exposure software makes the SpectraCAM easy to use and provides the user with the required data in a wide variety of formats at the touch of a button.

CIDTEC's intensified cameras are available in RS-170, Progressive Scan, and CCIR formats for extremely low light level imaging, UV sensitivity, or for gating high-speed events.

All of the CID based cameras offer the unmatched anti-blooming, wide dynamic range, and UV sensitivity performance that has become synonymous with CID technology.

Charge Injection Device

The Charge Injection Device (CID) is a solid state imaging sensor with capabilities well beyond the limitations of today's consumer Charge Coupled Devices (CCDs). Like a CCD, the CID uses pixels to capture images, converting light into an electronic charge which is directly displayed on a monitor or captured digitally on computer. The superior resistance to radiation is a significant advantage for radiation tolerant imaging within facets of the nuclear power industry, medical, dental, and space based applications, and the inherent anti-blooming performance of the CID ensures accurate image detail even under extreme lighting conditions.
The CID is uniquely positioned to serve the growing imaging market and the challenges for higher levels of accuracy in the radiation tolerant inspection market, as well as machine vision, scientific imaging. Thermo Scientific - CIDTEC is the leading manufacturer of CMOS imagers using the CID pixel architecture, and supply imaging solutions to OEM's as well as end-users throughout the world.

Applications

Thermo Scientific CID based video cameras and sensors provide solutions for the most demanding applications including:

- Radiation Hardened
- Spectroscopy
- UV Imaging
- Measurment
- Laser Profiling
- Medical Diagnostics
- Interferometry
- Aerospace
- Semiconductor Inspection
- Synchrotron Beam Profiling

thermoscientific

Got radiation?
See what you've been missing

Imaging in radiation environments just got easier

With superior capabilities for operating in radiation environments, the MegaRAD cameras provide excellent image quality well beyond dose limitations of conventional cameras, and are well suited for radiation hardened imaging applications

MegaRAD3 produce color or monochrome video up to 3 x 10^6 rads total dose

MegaRAD1 produce monochrome video up to 1 x 10^6 rads total dose

KiloRAD PTZ radiation resistant camera with Pan/Tilt/Zoom

In the United States:
For customer service, call 1-800-888-8761
To fax an order, use 1-315-451-9421
Email: sales.cidtec@thermofisher.com

International:
For customer service, call [01) 315-451-9410
To fax an order, use [01) 315-451-9410
Email: sales.cidtec@thermofisher.com

Find out more at **thermofisher.com/cidtec**

ThermoFisher SCIENTIFIC

Veolia Nuclear Solutions, a world-class player in nuclear facility clean-up and treatment of radioactive waste

Veolia Nuclear Solutions includes the most comprehensive range of technologies and services for facility restoration, decommissioning of plants, and the treatment of radioactive waste, all nurtured by our nuclear experts and backed by thousands of Veolia staff worldwide. Nuclear Solutions is present on the most complex sites of the nuclear industry, all over the world.

Responding to the crisis at Fukushima Daiichi, Japan

We were among the first responders to assist TEPCO in the Fukushima tsunami recovery. We have deployed a mobile technology platform to remove radioisotopes from water streams held in hundreds of storage tanks on the site. At the reactors themselves, our Remote Access technologies are used to inspect and repair reactor containment systems.

Veolia Nuclear Solutions' remote access activity is the undisputed leader of advanced engineering, Remote/Robotic technologies and Decommissioning/Remediation solutions for a variety of high-hazard end markets where quality and timely delivery are paramount.

Dexter®, our remote manipulator system

Dexter® is a touch-sensitive remote manipulator system specifically designed to replicate human arms. The human operator performs tasks with the master manipulator, which the slave replicates exactly, in real time, in the remote location. The slave can be positioned up to 8km from the master because there's no mechanical connection between the two – just cables for power and data. Our remote access solutions have been used on some of the most publicized, mission-critical projects worldwide.

Whiteshell, a challenging case

Our experts will provide Canadian Nuclear Laboratories an integrated solution under the agreement, designing, fabricating and commissioning a system to remediate a range of intermediate, and low-level waste from in-ground concrete standpipes and bunkers at the Whiteshell site. The system deployed at Whiteshell will be using proven technologies to retrieve and sort the waste.

In addition to our remote access solutions, we also deploy or vitrifications capabilities on many sites.

Geomelt®, our vitrification technologies to stabilize waste

GeoMelt® technologies are a group of vitrification processes that are configured to meet a wide range of radioactive and hazardous waste treatment and remediation needs. GeoMelt® vitrification destroys organic wastes and immobilizes radionuclides and heavy metals in an ultra-stable glass. Our GeoMelt® technologies are among the most advanced and we work with the biggest names in the industry.

Recently, EDF and VEOLIA concluded a partnership agreement on nuclear plant decommissioning and radioactive waste processing

EDF and Veolia entered a partnership agreement to co-develop remote control solutions fordismantling gas-cooled reactors and for vitrifying radioactive waste, in France and worldwide. Veolia will thus provide EDF with its experience in remote handling technologies with a view to designing and delivering innovative solutions to access the cores of gas-cooled reactors and to cut up and extract components under optimum safety and security conditions. In parallel, EDF and Veolia will work to develop an industrial solution for the vitrification of low- and intermediate-level waste using VEOLIA's GeoMelt® technology.

Contact: Veolia Nuclear Solutions, Technology Business Lines, David Kelly, Business Development Manager : david.kelly@veolia.com / +1 (720) 699-2446

Commercial Grade Dedication

In-House and In Control.

Quality is key in the nuclear industry, and quality starts before any fabrication ever does. It begins during the procurement of materials. Commercial Grade Dedication (CGD) is a method used in accordance with NQA-1 standards to accept materials that are determined to be safety related.

When safety related materials are required, there are two options available: 1) materials can be procured in accordance with NQA-1 requirements, or 2) materials can be accepted through CGD. While both options are viable, utilizing a vendor capable of performing CGD offers a variety of benefits: cost, time, and quality.

Cost. Performing CGD in-house offers some cost savings to the buyer. The vendor is capable of procuring commercial materials and then dedicating them in-house, offering a less expensive option than having to initially procure dedicated materials.

Time. Dedicating materials can be time consuming, especially if procured from a third party vendor. Long lead items often cause the most delays in a project schedule. Using a vendor that has the capability of performing CGD in-house can alleviate scheduling concerns as both material availability and fabrication can be performed in-house.

Quality. It begins and ends with quality, especially so when it comes to safety related items. Which is why the ability to perform CGD in-house is likely the greatest benefit to a potential customer. NQA-1 requires complete traceability of materials, from procurement to delivery. Performing CGD in-house allows greater quality and traceability control, which provides a greater level of confidence to the buyer.

To see how quality and CGD can benefit your next nuclear project, contact Premier Technology, Inc.

208.785.2274 | www.ptius.com
commercialnuclear@ptius.net

SSM INDUSTRIES, INC.
POWER DIVISION
Formerly Schneider Sheet Metal

Over 40 Continuous Years as a Nuclear Safety Related Fabricator & Installer

SSM Industries, Inc. (formerly Schneider Sheet Metal) is the largest Safety Related HVAC designer / fabricator / supplier / installer in the United States. SSM entered the nuclear industry over forty (40) years ago as the metal fabrication division of Schneider Power.

Based in Pittsburgh, the Power Division of SSM Industries Inc. provides design, qualification, fabrication, and installation support to utilities in today's nuclear market for both safety related and non-safety related HVAC ductwork, dampers (tornado, bubbletight, balancing, manual, fire/smoke), fans, VFD's, louvers, skid units, etc. We have supplied equipment to virtually every Commercial Nuclear plant in the United States, as well as Nuclear Plants worldwide.

Starting in the 1970's, SSM has performed complete HVAC duct fabrication and installation at 7 nuclear new builds, and this continues at Vogtle 3 & 4. SSM is performing the complete HVAC fabrication and installation of duct, dampers, and standalone fans.

Together with Westinghouse we designed the AP1000 Containment Building HVAC Duct and Supports system and VCS containment fans.

The industries we serve include Commercial Nuclear Power Plants, DOE EM Facilities, and critical mission research facilities and laboratories.

We can supply new equipment, replacement parts, spare parts – if it's related to HVAC and air movement we can support your needs.

SSM maintains a complete 10CFR50/NQA-1 (including all Supplements) Quality Assurance Program. SSM is listed in the NUPIC data base as a pre-qualified vendor to supply Safety Related HVAC equipment and services, including the commercial dedication of components fabricated by others, to all commercial nuclear plants.

Give us the opportunity to be a part of your next project and we'll help you stay on budget and on time.

SSM INDUSTRIES, INC.
3401 Grand Avenue
Pittsburgh, PA 15255
Phone: (412)-777-5101
www.ssmi.biz

Over 40 Years of Nuclear HVAC Experience

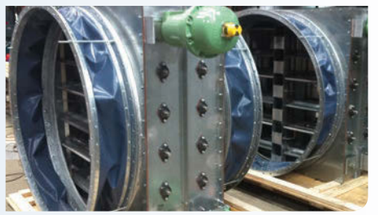
SSM Industries has over 40 years experience designing, qualifying, fabricating and installing complete HVAC ductwork systems and equipment in DOE facilities and Nuclear Power Plants around the world.

Let us work with you on all of your HVAC needs. From custom retrofits to new plant build, we are the HVAC solution that you have been looking for.









HVAC SYSTEM COMPONENTS

Access Doors
Actuators: Electric & Pneumatic
Air Handling Units
Charcoal Adsorber Units
Dampers:
Backdraft
Balancing
Bubble-Tight
Control: Manual, Electric & Pneumatic
Diverter
Fire & Smoke
Guillotine
HELB
Isolation

HVAC SYSTEM COMPONENTS

Tornado
Variable Frequency Drives
Ductwork & Supports
Fans: Axial & Centrifugal
Filters & Filtration Units (incl. HEPA)
Flexible Connections
Grilles, Registers & Diffusers
Housings
Heat Exchangers
Cooling Coils
Louvers
Plenums
Sleeves

SPECIALTY FABRICATIONS

Angle Rings
Cable Trays & Covers
Control Cabinets
Doors: Access, Heavy-Duty & Blast
Equipment Bases
Filter Boxes
Fire Barriers
U. L.-Rated, 3 Hour
Glove Boxes
Sealed Enclosures
Seismic Supports
Cooling Coils
Heating Coils
Heat Exchangers
Tanks

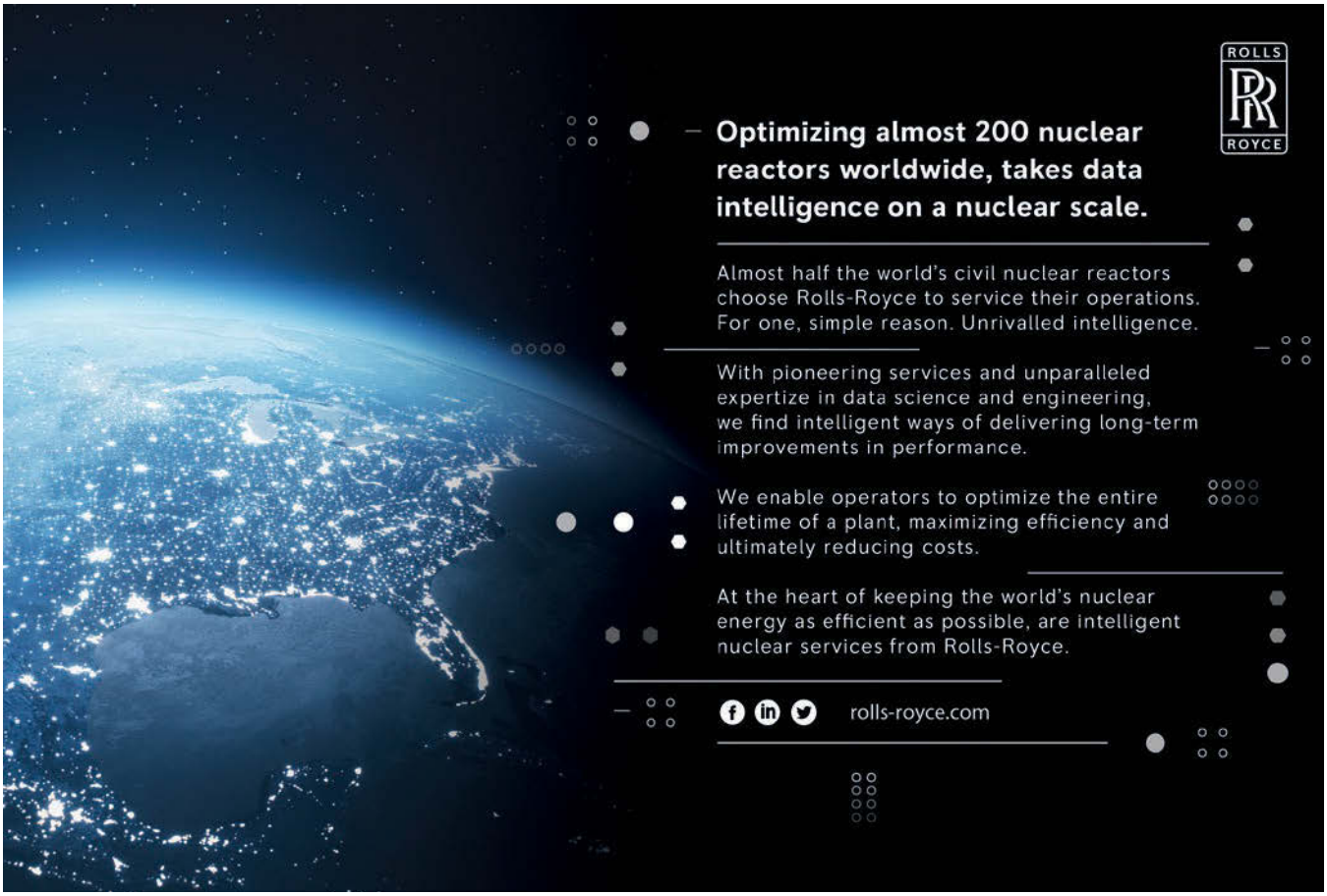
QUALITY CERTIFICATIONS

NQA-1
ASME AG-1
10CFR50
Appendix B
ASME
AWS

SSM INDUSTRIES, INC.

For more information contact the SSM Power Division at (412) 777-5101 or visit us at www.ssmi.biz to learn how our experience can benefit your next project.

(412) 777-5101 • ssmi.biz



HELPING CUSTOMERS GENERATE MORE POWER FOR LONGER

We help our customers find new ways to generate more power for longer, creating a lasting competitive edge with which they can face the world's low carbon electricity demands of the future.

Our intelligent approach is to invite them to collaborate with us to develop long-term relationships so we can use their data to create intelligence that can generate lifetime savings, making the operation of their nuclear power stations more efficient, simpler and easier.

Our expertize spans data analytics and world-leading instrumentation and control systems, to engineering design and site support services like robotic inspections. This equips power station operators with the essential tools they need to face the current cost and reliability challenges, as well as positioning them as strongly as possible for the future.

Turning data analysis into operational intelligence creates value

We break through barriers to greater operational reliability and efficiency by collaborating with customers to analyze, diagnose and optimize their operations, using cutting edge predictive data techniques.

By combining our unique data resources with our world-class engineering design and services, the insights we create bring lifetime savings and bring existing nuclear power stations into a new, intelligent age.

Predicting maintenance, managing obsolescence

From maintenance optimization to obsolescence management, our tried and tested technology brings new clarity and insights to how operational availability and efficiency can be improved; new ways to optimize asset management; and innovation to manage the complex and dispersed supply chain to secure best value for our customers.

And this is just the start. Our vision for bringing our intelligent approach to our customers will transform how clearly they see new savings and efficiencies in their operations.

Almost half the world's reactors rely on our systems

Rolls-Royce has a 50-year heritage in supplying critical safety control and instrumentation systems, back up power generation, and more recently heat exchangers and waste treatment systems. We're also one of the only end-to-end in-house suppliers in the world for back-up diesel generators, using the full scope of the Rolls-Royce Group to design systems, manufacture and supply equipment with full I&C integration. Among the many systems projects we're currently supplying OEM long-term I&C support solutions to all 58 EDF reactors in France; performing Safety I&C modernization for 20 French 1300MW reactors; delivering rod control, neutron instrumentation and pressure transmitters to all CPR1000 reactors in China; as well as heat exchangers to Hinkley Point C in the UK.

Value from integrated services for a lifetime partnership

Focusing on efficiency and cost reduction across the lifetime of nuclear power stations, we provide integrated through-life engineering design and site support services that span the latest capabilities in physical, systems and cyber security strategy, to plant process computer systems; remote inspections and non-destructive testing; component design, small component manufacture; supply chain integration and commercial grade dedication.

rolls-royce.com

MIRION TECHNOLOGIES

Mirion Technologies provides products and services for a wide range of radiation safety, measurement and scientific purposes.

Mirion solutions are employed in advanced space, technology and research applications as well as to secure critical facilities, protect people from radiation exposure and limit the spread of contamination.

Our organization is comprised of over 1700 talented professionals, passionate about delivering world class products, services, and solutions to our customers.

From our operating facilities across North America, Europe, and Asia, Mirion Technologies offers products and services in **6 key areas**:

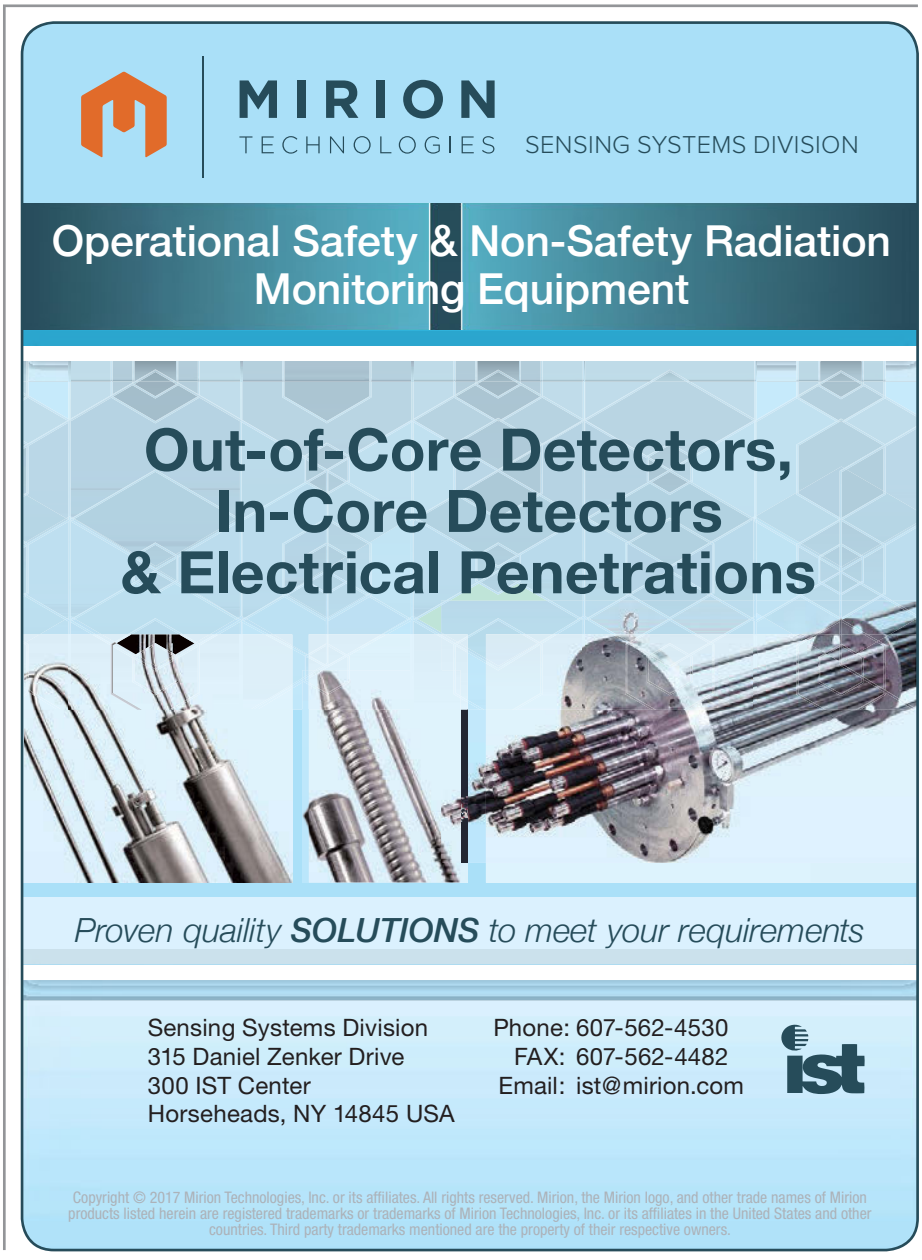
- Health Physics
- Radiation Monitoring Systems
- Spectroscopy
- Characterization
- Dosimetry Services
- Sensing Systems

Sensing Systems Division

The Sensing Systems Division, maker of IST and IST-Conax range of products, offers a range of operational safety and non-safety radiation monitoring equipment, including in-core and out-of-core detectors and electrical penetrations. This equipment is used by power generation establishments to ensure the safe and efficient operation of their facilities. In addition, Mirion manufactures the associated electronics, temperature sensors, thermocouples, special purpose valves, connectors, cable/ connector assemblies and electrical conductor seal assemblies.

The entire Mirion team is dedicated to providing a new standard of solutions for our customers in nuclear facilities, military and civil defense agencies, hospitals, universities, commercial, state and national laboratories, and other specialized industries.

For more information about our wide range of products and services visit: **www.mirion.com.**



Radiation Safety. **Amplified.** **www.mirion.com**

A NEW DAY OF ENERGY | IS ON THE HORIZON

It began with a simple idea: *If more people, across the globe, had access to power, we could make the world better.* But first, we realized we need to make the power better. Now, we are changing the power that changes the world.

NuScale Power is creating a new kind of nuclear power plant, one that is smarter, cleaner, and safer to improve the quality of life for all humankind. Our innovative concept features a small modular reactor (SMR) that is a scalable version of a pressurized light water reactor. It's called the NuScale Power Module™ (NPM) and is capable of generating 60 MW of electricity. Each NPM operates independently within a multi-module configuration. Up to 12 modules are monitored and operated from a single control room within a plant.

Our NPM is premised on well-established nuclear technology principles with a focus on integration of components, simplification or elimination of systems, and use of passive safety features.

Its flexible design can support desalination, integrate with renewables resources, provide highly reliable power to mission critical facilities, or serve as clean baseload power.

The scalable nature of our reactor allows it to fit different energy needs. And its different sizing options allows the reactor to be assembled in a wide range of locations, from the most populated urban areas to remote destinations.

We have centered our reactor's design and business model around four key elements, which have led us to producing superior energy. First, we looked to make our energy smarter. Every aspect of our design was carefully analyzed; all redundancies removed to focus on creating more reliable, efficient energy. Next, we concentrated on generating cleaner energy. To change the world, we have to preserve it. We have reduced our carbon footprint to zero, helping to secure a future for all humankind. After that, we put all our efforts into safety—an element we hold to the highest standards. And finally, we did all that we could to ensure that more people had access to our power by making it cost competitive.

SMARTER

Smarter energy means focusing on simplicity. With this in mind, the NuScale Power Module™ (NPM) is comprised of the reactor vessel and containment vessel in a single cylindrical module. The NPM has no reactor coolant pumps, no external steam generator vessels, and no large-bore reactor coolant piping. NuScale Power is building SMR technology with unique safety characteristics, a small footprint, and flexible, scalable installation. This isn't just a small version of a big reactor.

CLEANER

The need for carbon-free power has never been greater. Changing regulator requirements, challenging economic environment, and uncertain long-term fossil fuel pricing means a diverse energy mix is essential to meeting that need. The NPM's innovative, efficient design has produced a power source that is 100% carbon-free clean energy. It's as clean as wind or solar, cleaner than any fossil fuel.

SAFER

Safety comes first, second to none. NuScale's Triple Crown for Nuclear Plant Safety™ has achieved a paradigm shift in the level of safety of a nuclear power plant. As we set new standards for rigorously proven safety, we ensure our protocols will help reduce the need for future maintenance, lowering repair costs. Should it become necessary, the NuScale Power Module shuts itself down and self-cools for an indefinite period of time, with no operator action required, no additional water and no AC or DC power. This is a world-first in nuclear design. NuScale is the only developer to achieve this groundbreaking capability.

COST COMPETITIVE

The economics of this advanced nuclear technology offer long-term financial certainty over the plant's life. The NPM is far less complex than other designs. Off-site fabrication and assembly reduce cost. Components are delivered to the site in a ready-to-install form. All of this results in construction occurring in a shorter, more predicable period of time.

NuScale's SMR technology is a revolutionary solution to one of the biggest technical challenges for the current fleet of nuclear energy facilities. Its innovative and comprehensive safety features provide a stable, long-term solution to our energy needs. It can make smarter, cleaner, safer and cost competitive energy accessible for people everywhere.

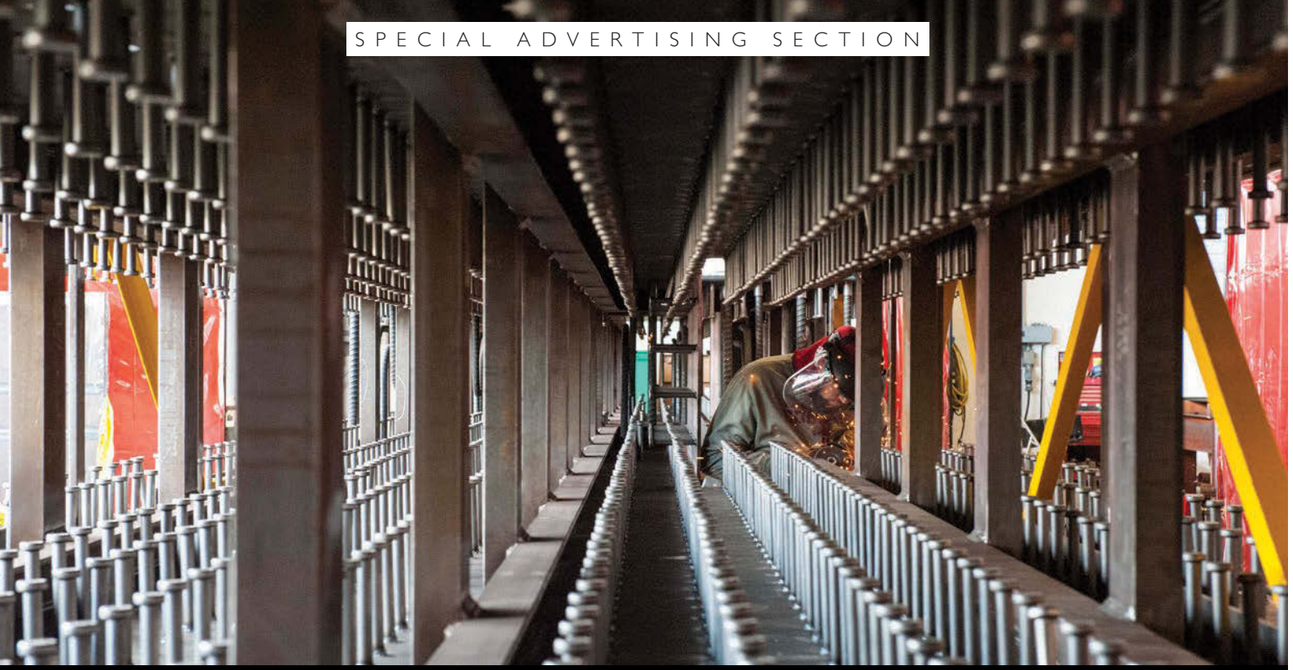
NuScale is truly the answer to changing the power that changes the world.

NUSCALE™
Power for all humankind

A NEW DAY OF ENERGY | IS ON THE HORIZON

NuScale is a pioneering force, advancing the energy industry. We're challenging what's possible in the field by developing a new nuclear power technology. Through innovative design and best practices, we're producing smarter, cleaner and safer energy to power all humankind. Together, we can usher in a new era of energy. nuscalepower.com

NUSCALE™
Power for all humankind



UNSURPASSED COMPLEX FABRICATION

Located in Oregon, Vigor offers customers across America innovation in complex fabrication and systems integration. Technology combined with a highly skilled workforce and expert project managers have enabled Vigor teams to fabricate a diverse project portfolio. For more than two decades, we have been the primary integrated fabrication supplier for the nation's Ground Based Mid-Course Defense (GMD) program. We build bridges, critical components for the aerospace industry, sophisticated gates for hydroelectric power, pressure vessels, shield doors, gloveboxes, reactor modules and more.

Vigor manufactures to the highest quality standards in all industries we serve. Trust us for reliable performance and exceptional quality on your next project.

N, NA, NS, NPT, U, U2

VIGOR

Clackamas, OR USA
Vancouver, WA USA
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sales@Vigor.net
Vigor.net

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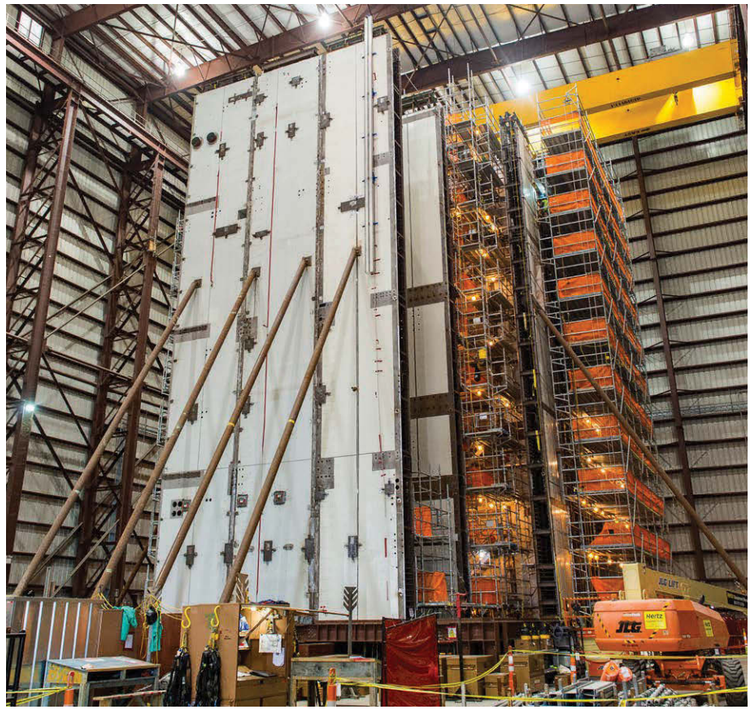

INNOVATION, FABRICATION, SYSTEMS INTEGRATION

Vigor Works (formerly Oregon Iron Works) provides expert metals fabrication and systems integration for the nuclear supply chain. With more than 3 million manhours of production logged under nuclear quality programs, we consistently deliver the oversight and detailed documentation the world's most critical customers demand.

- 320,000 SF Fabrication, Machining & Integration
- 150 Certified ASME Welders, 10 ga. To 12 inch
- Stainless, Inconel, Carbon, Nickel, Titanium, Hastelloy
- 160 Ton Shop Lift Capacity
- CNC Machining, 10 lbs to 100+ tons
- Mechanical Assembly, Integration, Controls
- EPRI Compliant Commercial Grade Dedication

N, NA, NS, NPT, U, U2

VIGOR

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Vigor.net

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system|one

exceptional talent. specialized solutions.

NUCLEAR STAFFING AND SERVICES EXPERTISE

System One delivers workforce solutions and integrated services for nuclear power utilities, the Departments of Defense and Energy, OEMs, EPCs and other energy utility providers. For more than 35 years, System One has achieved consistent year over year growth and market share increase in our energy and engineering businesses. We continue to expand our presence within the commercial nuclear power sector delivering custom workforce programs, including emerging NDE technologies.

System One Delivers for its Nuclear Power Partners

Workforce Solutions
From traditional staffing to managed staffing programs (MSP), recruitment process outsourcing (RPO) and vendor management system (VMS) staffing, we are experts in delivering top energy and engineering talent within the electric power industry. System One's dedicated and highly tenured "nuke squad" delivers specialized resources and programs to address the unique workforce challenges in the nuclear industry, specifically:

- **Contract and direct hire staffing** across all nuclear plant specialty areas.
- **Customized workforce solutions** leveraging our MSP and RPO solutions.
- **VMS staffing** using our proprietary technology platform to deliver talent.

Our customized workforce programs are ideal for plant design, construction, decommissioning, outage support and other major programs to ensure you have the talent needed for success.

Integrated Services
In addition to our workforce solutions, System One has expertise in supporting the entire nuclear plant lifecycle with the following integrated services:

- **Advanced NDE and Testing** delivered through a full set of QC and NDE services supporting the commercial nuclear fleet. Extensive history of providing phased array UT and computer aided RT, MT, PT and VT services in support of client nuclear inspection programs. We have an exclusive partnership with Evisive, LLC. to employ EvisiveScan's™ volumetric microwave inspection technology for dielectric materials such as REJs, HDPE and fiberglass, saving critical outage time, improving maintenance programs and reducing costs from unnecessary equipment replacement.
- **Technical Training** to provide NDE and pipeline inspection instruction to thoroughly prepare individuals for working in energy, power, industrial and technical facilities.
- **Transmission & Distribution Services** providing management resources for construction and capital projects including: smart meter installation, smart grid integration services, project scheduling and project controls.

Let System One take the guesswork out of your project resource needs. Visit our website, **systemone.com** to learn more.

Valcor: Designer and Manufacturer of High Quality Flow Control Devices

Valcor Engineering Corporation designs and manufactures valves for nuclear, aircraft, space, industrial, and scientific applications. Since 1951, Valcor's involvement with supplying components for difficult applications with high-pressure, flow, temperature, and vibration under extreme environmental/seismic conditions has been continually expanding. Today, Valcor manufactures over 100,000 solenoid valves and other fluid system components per year!

Valcor Engineering originally started out in the aircraft and space industries. Applications include both commercial aircraft and space components to major programs. We have also supplied hydraulic, fuel and pneumatic solenoid valves, APU shut-off valves, pressure and flow regulators, and pressure vessels for military programs including naval nuclear, fixed wing, rotary and unmanned aircraft.

In 1970, Valcor expanded and began designing and manufacturing high quality flow control components to the nuclear industry, with most activity centering on solenoid operated valves and regulators. Within Valcor, the Nuclear Group is structured as one of three integral corporate business units, which allows us to focus very clearly to develop, design and produce products for the nuclear industry worldwide, and be extremely responsive to individual customer needs. Our business is split approximately 50/50 between the domestic and international markets.

Most of our products are either ASME "N" stamped process valves for various fluids (including hydraulic fluid applications), or Class 1E air pilot valves for pneumatic actuators. There are also many special designs within our installed base of well over 15,000 "N" stamped units. Our products range in application from reactor coolant pressure boundary isolation to cryogenic, liquid sodium and marine (nuclear navy) services. These products generally are less than 4" NPS, and are used extensively in both domestic and international nuclear programs.

We have also signed license agreements and other supply arrangements with well-known former suppliers to the nuclear marketplace to manufacture and supply their unique nuclear product lines:

a. Hoke Inc. (Cresskill, NJ) for the supply of instrument isolation valves and manifolds

b. Circle Seal Controls (Corona, CA) for the supply of inline check valves and solenoid valves.

c. Fox Valve (E. Hanover, NJ) for the supply of cavitating venturis and eductors

d. CU Services (Elk Grove Village, IL) for the supply of plug resistant orifices and let down orifices

These relationships have greatly expanded our supply capability beyond our traditional ASME Section solenoid valves.

In 2017, Valcor underwent a highly successful ASME re-certification audit for our "N", "NPT" and "NS" certification/stamps. We are excited that this renewal now extends to welded piping systems, subassemblies, and component supports, and pressure vessels. This, in turn, opens significant new markets to us for the supply of complete systems, such as skid-mounted process packages requiring an extensive degree of installed instrumentation components.

For more information on our products and services, please visit www.valcor.com, call us at (973) 467-8400 or email us at nuclear@valcor.com.

PETERSEN INCORPORATED "A Winning Combination."

1527 N 2000 W, Ogden, UT 84404 • (801) 732-2000 – Phone • (801) 732-2098 – Fax • www.peterseninc.com

Petersen Inc. has been the industry leader in custom steel manufacturing for the nuclear industry for decades. How? By creating solutions to difficult problems and helping our customers meet their high demand project timelines and producing high quality products efficiently and in-budget.

HISTORY

Petersen Inc. of Ogden, Utah opened its doors in 1961 and has been manufacturing products for a variety of industries worldwide since that time. For over 50 years Petersen Inc. has been the company to go to when custom fabrication, design, engineering, and field installation are required for difficult projects. We have become the industry leader in the field of fabrication and precision machined components.

Petersen Inc. has been chosen as a partner in high-profile projects such as the Department of Energy's Hanford Waste Treatment Plant, Savannah River MOX facility, WIPP, Zion, West Valley, Kewaunee, APS, ORNL, LANL, LLNL, INL, and others.

The Petersen Inc. fabricated Melters will be the heart of the Hanford Waste Treatment Plant which will be the world's largest chemical radioactive waste treatment plant. Up to 53-million gallons of radioactive waste is anticipated to be processed through the melters.

Petersen Inc.'s participation in the Department of Energy's MOX Services project at the Savannah River Site is constructing storage components, gloveboxes, and other associated equipment for the facility which converts weapon grade plutonium into fuel for electricity generating power plants.

The Petersen Inc. involvement with Energy Solutions, NAC International, West Valley, Kewaunee, GEH and APS is in providing dry fuel storage casks and transportation equipment, as well as custom equipment to support the dry fuel storage requirements.

Petersen Inc. is a major supplier of containers for many industries including Nuclear, Oil & Gas, Aerospace and is proud to be a part of the clean-up of waste generator sites around the country, helping to make it a cleaner and safer environment for future generations. Petersen Inc. fabricates RLC's, SWB's, and TDOP's for Nuclear Waste Partnership LLC, (NWP) at the Department of Energy's WIPP site which allows us to provide storage containers of various sizes and specifications to anyone who purchases them through NWP.

CERTIFICATIONS

- ASME NQA-1
- ISO9001:2008
- NRC Subpart H of 10CFR71
- ASME {U} {U2} {S} {R}
- AS9100:2009 Rev C
- AISC

CGD In-house Test Lab

- Commercial grade dedication of material for nuclear applications
- Spectrographic chemical analysis of low alloy steels, stainless steels, nickel base alloys (includes nitrogen and oxygen determination)
- Rockwell hardness
- Certified penetrant, magnetic particle and visual examination
- Weld procedure testing
- Weld wire certification including welding of test coupons in accordance with filler material specifications

Dry Fuel Storage Cask • IP Containers • Standard Waste Box • Standard Large Box • Glovebox
Process Equipment • Melters • Material Handling Equipment

Sandvik's in-house capabilities make it a leader in quality advanced materials for nuclear applications

For more than 50 years, Sandvik has delivered products to nuclear plants worldwide. In doing so, the developer and manufacturer of advanced stainless steels and special alloys has built extensive experience in the materials field for nuclear power applications. The company can today classify itself as a major player in the nuclear steam generator market having delivered more than 300000 tubes, exceeding 60 million meters in combined length, to more than 100 reactor units worldwide.

Sandvik offers a wide and expanding portfolio of products including seamless steam generator tubing and nuclear fuel tubes for both pressurized and boiling water reactors. Its services must satisfy ever growing needs for life extension programs, success building and new product and relationship development. Sandvik understands that meeting these customer requirements will prove vital in consolidating nuclear as a growing source of global energy.

Due to its trusted reputation as a fully integrated supplier of tube, strip and wire in advanced stainless steels and special alloys, Sandvik is increasingly approached by end users directly rather than through distributors. The company's guarantee of quality assurance is therefore key and certified to a number of quality management system standards such as ASME NCA 3800, ISO 9001, RCCM and ISO/TS 16949.

Simon Sun, Sales Director Nuclear, China, Sandvik Materials Technology, explains: "When we talk about quality assurance, everything is based on the normal standard ISO 9001 system and different international standards depending on where the products are going, the market and the design. Sandvik also has its own quality program called the Nuclear Driver's License, completely our own add-on system where we audit and certify different mills to produce and handle nuclear products.

"For example, we have set up a dedicated state-of-the-art mill for the manufacture of nickel alloy steam generator tubes in Sandviken, Sweden. This was opened in 2012, right in the middle of Fukushima which was not exactly the best timing, but it doesn't matter because we now have a new and fully efficient mill that is world class with improved capabilities. We will remain one of the top suppliers, the capabilities and performance that we have in this mill will ensure that."

Streamlined in-house capabilities

In 2014, Sandvik streamlined its organisation by forming a dedicated Business Unit that is devoted to its offerings for the nuclear industry. The company's in-house capabilities are crucial to the Business Unit's operations.

Mikael Blazquez, Director of Business Unit Nuclear, Sandvik Materials Technology, said, "Normally, you have to go outside of your own company to find alliances, or you have to buy external resources to complete the package. With the broad Sandvik portfolio, more products can be provided to the customer within the Business Unit Nuclear umbrella. We can have more valuable discussions with the customer about their needs, desired products and service packages.

"Sandvik's services also meet increasing technical requirements and this is where we invest our 50-plus years of nuclear experience. Being a fully integrated company that meets all customer demands in-house, Sandvik has gained the trust of both fabricators and suppliers. They regard us as being a supplier of the utmost quality products which meet the highest safety standards."

Sandvik maintains strict control over the entire manufacturing process, from steel melt and heat treatment to the finished product. Customers can therefore feel confident in being able to achieve trouble free operations with high quality products, and fully-manage the entire purchase process through a single supplier whether for steam generator tubing, zirconium fuel tubes, heat exchangers and more – supplied either as straight or u-bent.

Nuclear fuel tubes

Sandvik's program of zirconium alloy nuclear fuel cladding tubes covers all fuel designs and most technical specifications. The integrated manufacturing of these starts with alloying and melting zirconium sponge and concludes with the finished tubes. Sandvik controls and optimizes a range of critical process parameters to safeguard the high quality and material property demands.

For customers, the result is safe and trouble free performance during reactor peak activity levels. It is possible to achieve longer life times for the nuclear fuel elements of which the cladding tubes are the most critical component. Sandvik manufactures nuclear fuel tubes to the pressurized water reactor (PWR)/VVER, BWR, CANDU (HWR), AGR and LMFBR nuclear fuel types.

Steam generator tubes

Nuclear steam generator tubes by Sandvik meet the most stringent Eddy Current multifrequency inspection demands and a signal-to-noise ratio of 15:1 or better. The tubes are manufactured in a mill specially dedicated for the production of long U-bent steam generator tubes, with state-of-the-art non destructive examination (NDE) equipment.

The Sandvik program includes steam generator tubes in two alloys, Sanicro 30™ and Sanicro 69™, in size range OD 10-25.4 mm (0.394-1 in.). Sanicro 30 is a low-carbon version of Alloy 800 austenitic nickel-iron-chromium alloy. It is used for steam generator tubing and other heat exchangers at temperatures of up to about 550 °C (1020 °F), where good resistance to stress corrosion cracking (SCC) and intergranular corrosion are required.

Sanicro 69 is an austenitic nickel-chromium-iron alloy used primarily in the 'thermally treated' condition for steam generators. The grade has good structure stability and good weldability with extremely high resistance against SCC in primary side PWR water conditions, and improved pitting corrosion resistance in chloride containing solutions compared with Alloy 600.

For more information:
materials.sandvik

Sanicro 69 and Sanicro 30 are trademarks owned by Sandvik AB through Sandvik Intellectual Property AB.

LANXESS Lewatit© IX Resins for the Power Industry

The Liquid Purification Technologies business unit of LANXESS has a wealth of experience in the nuclear power plant sector in Europe, Asia and North America. Nuclear power plants throughout Western and Eastern Europe, China and North America have chosen Lewatit© ion exchange resins to meet their demanding specifications and water purification challenges. Ion exchange resins help at numerous points to ensure the efficient, safe and reliable operation of these power plants over many years. These include applications in primary and secondary cooling, blowdown, fuel pool, stator cooling, and condensate polishing. Lewatit© resins are also used in the rad waste servicing industry.

LANXESS' most recent brochure, "Ion Exchange Resins for the Power Industry." highlights the Emsland nuclear power plant in Germany, a 1400 Mw PWR plant. LANXESS supplied Lewatit© MonoPlus S 200 KR and Lewatit© MonoPlus M 800 KR, both processed to nuclear specifications and used in mixed bed applications within the plant. Lewatit© resins have shown extended run lengths, greater physical stability, and higher operational efficiencies in these applications.

Nuclear Plants Using Lewatit©

Below are nuclear power suppliers and plants that have used Lewatit© resins:

- Électricité de France S.A (EDF)
- China
- Germany
- Korea Hydro Nuclear (KHNP)
- Mexico
- Russia
- Slovakia
- Spain
- United States □

"Ion Exchange Resins for the Power Industry"

Visit our web site to learn more and download the brochure "Ion Exchange Resins for the Power Industry" at **http://lpt.lanxess.com/en/products-lpt/product-groups/ion-exchange-resins/**

Keep Your Power Transformers Powering On With Transformer Clinic™

Did you know that the average age for power transformers in the United States is over 40 years, with 70% being over 25 years old?

Aging infrastructure, lack of spare transformers, and irregular maintenance create an environment where unplanned outages, underperformance, and unreliability in power transformers can result in lengthy inspection/repair processes and revenue stagnation.

Sound familiar? Meet MISTRAS Group Inc.'s (NYSE: MG) Transformer Clinic™.

Transformer Clinic™ maximizes transformer availability and reliability by using a combination of in-service diagnostic testing and long-term 24/7 condition monitoring to determine and keep track of what's troubling your transformer.

Transformer Clinic™ represents an industry benchmark for determining the fitness and health status of your power transformers. Backed by MISTRAS' decades of substation reliability and transformer monitoring experience, Transformer Clinic™ offers four phases of in-service diagnostic testing and monitoring: **Sample**, **Screen**, **Observe**, and **Monitor**.

After an initial test **Sample** is taken and analyzed as a first indicator, the results may necessitate further investigation into areas of concern, calling for an on-site **Screen** spot inspection.

Utilizing industry-leading acoustic emission (AE) technologies, Transformer Clinic™ specialists screen transformers for instantaneous fault detection. Technicians are able to locate a variety of issues, including loose connections, arcing, partial discharge, blocked radiators, and more.

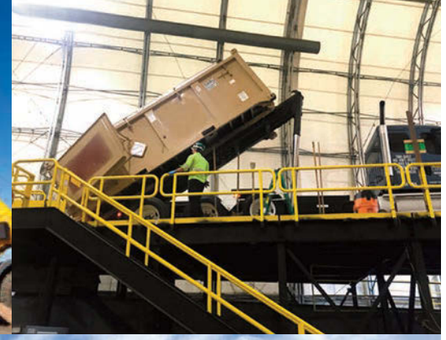
If symptoms are sporadic, Transformer Clinic™ specialists may recommend a 24-hour **Observation**. This results in a comprehensive condition ranking summary, providing a clear overview of the transformer's condition and outlining a recommended course of action if a problem is found.

Long-term **Monitoring** is prudent both for transformer operators whose assets require continued maintenance, and for those who simply want an extra layer of peace of mind. MISTRAS' proprietary AE sensors continuously detect and monitor abnormalities, organizing the data through a web-based application to generate real-time health and condition-based summaries to maximize your transformer's in-market availability.

MISTRAS' Transformer Clinic™ solutions provide myriad benefits, including determining transformer conditions in real time, reduction/avoidance of Environmental Protection Agency fines due to environmental contamination, unplanned outage prevention, and asset life extension. Safety is paramount in the nuclear industry, so early detection of faults is essential to avoid catastrophic failures, which maximizes the safety of personnel.

As transformers in nuclear plants continue to age, the need for close inspection and monitoring grows along with them. With Transformer Clinic's™ help, operators can enable their power transformers to Keep Powering On™.

For more information, visit www.transformer.clinic or call 1-609-716-4000.



Count on SECUR to orchestrate asset-based logistics, packaging, technical services and waste management to simply and safely handle your most challenging jobs. Find out how we can harmonize with your team when you visit us at www.securllc.com or call 888.484.4031.

LOGISTICS | PACKAGING | TECHNICAL SERVICES | WASTE MANAGEMENT

SECUR
Well orchestrated.

We are SECUR

An independent, asset-based, transportation, packaging, technical services and waste management firm

With more than 35 years of experience, **SECUR** offers the nuclear and radioactive waste industry innovative, turnkey waste management solutions.

SECUR manages a private fleet of more than 600 intermodal containers, all latest generation and water-tight tested.

We also maintain strategic partnerships with US manufacturers of proprietary and custom-made metal and flexible packaging that give our customer the most favorable pricing.

Our private railcars maximize capacity with configurations you can't get from the railroads.

SECUR's waste management experts orchestrate innovative solutions that keep your projects on schedule and on budget.

We have saved the nuclear decommissioning industry millions of dollars.

All services are performed in strict accordance with ASME NQA-1-2008 and DOT 49 CFR quality assurance requirements.

Our robust safety program integrates safe practices into every task and empowers all employees with stop-work authority.

Looking for an innovative partner to help orchestrate your next waste management project?

Call us at **888-484-4031** or visit us at **www.securllc.com**.

SECUR's innovation in action:

*Our **Waste Management Simulation Model** accepts input and validates resource requirements for every stage of the project from demolition to packaging, shipping and disposal.*

*SECUR's **Transportation Plan** ensures compliance with DOT Hazardous Material regulations, 49 CFR, NRC regulations, and applicable DOE orders.*

*SECUR is the exclusive North American distributor of the **ATOM container line**, the most popular choice on decommissioning sites in Europe.*

Your Manufacturing Solution

We build our business around the needs of our customers

Who we are...

Pennatronics is a customer-focused Contract Manufacturing Service provider specializing in Printed Circuit Board Assembly (PCBA) and Electro-Mechanical Box Build Assembly for Original Equipment Manufacturers (OEM's). We encompass a 10CFR50 Appendix B compliant nuclear safety program as well as ISO 9001/13485 accreditation that is ready to meet your contract manufacturing requirements.

Our Capabilities

Our 70,000 square-foot manufacturing facility is state-of-the-art in every respect and operates 7 days/week to meet all of our customers needs. Every project is driven by efficient, rapid-response methodology, stringent quality control and highly skilled personnel. We deliver exceptional service, board assembly, testing, and electro-mechanical box build assembly at competitive pricing.

Exceeding Expectations

Meeting standards is a given. Exceeding them is our mandate. On-time delivery that is considered world class and defect free product that meets regulatory requirements.

The Right Partner

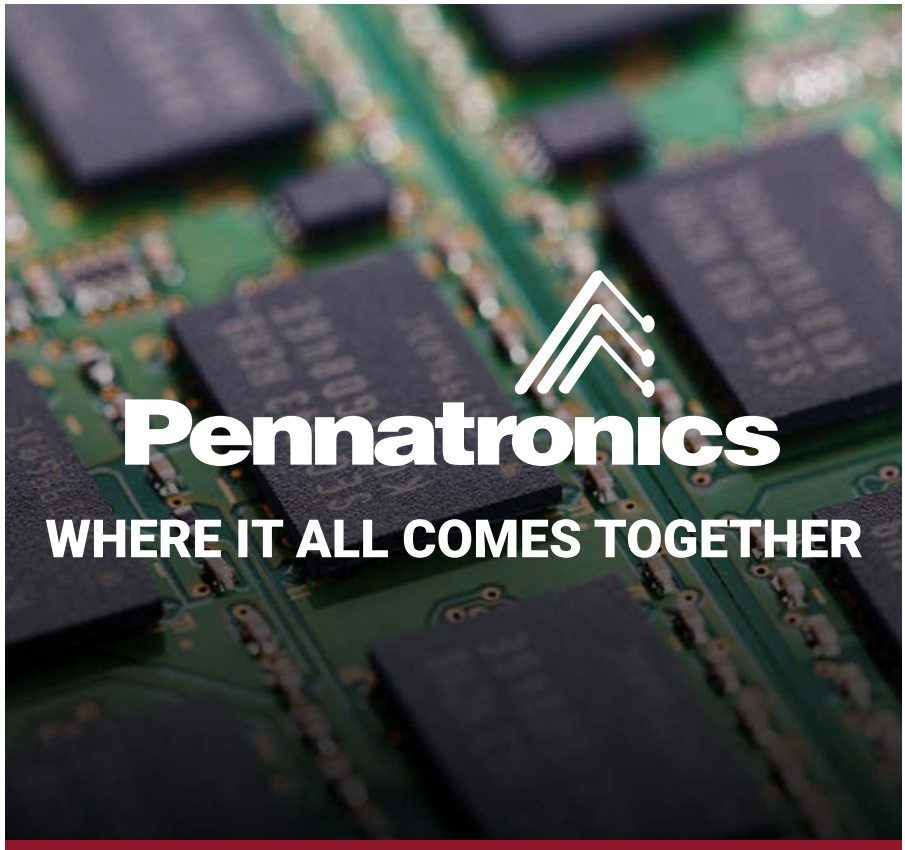
Although there are many CM's in the US, the pool shrinks considerably when looking for a supplier that has a fully compliant Appendix B program. We are not a transactional supplier but rather a partner with the Engineering resources providing vital feedback on manufacturability.

Greater than the sum of our Parts

When you partner with Pennatronics, you get much more than just assembled components. Our highly experienced management team and skilled workforce bring decades of electronics manufacturing expertise and problem-solving abilities to meet your biggest challenges. A state-of-the-art manufacturing facility, the best equipment available, and extremely efficient manufacturing processes help us deliver unmatched value.

For more information, please contact:

Dave Spehar
VP of Operations
(724) 938-1800



Board Assembly. Testing. Box Build. Repair.

All delivered with close attention to detail and exceptional service — and priced competitively.

That's what you get from Pennatronics, your premier EMS supplier.

Our efficient, rapid-response methodology, stringent quality control, and highly-skilled, trained personnel enable us to deliver astonishing results. We become an extension of your manufacturing capabilities.

- PCB assembly (prototype to high-volume)
- Electro-Mechanical / Box Build Assembly
- Design for Manufacturing (DFM)
- Supply chain management
- Component review & analysis
- Complex builds and quick turns
- Experience in vintage designs & re-designs
- **ISO9001:2008 Certified**
- **ISO13485:2003 Certified**
- **10CFR50 Appendix B Compliant**

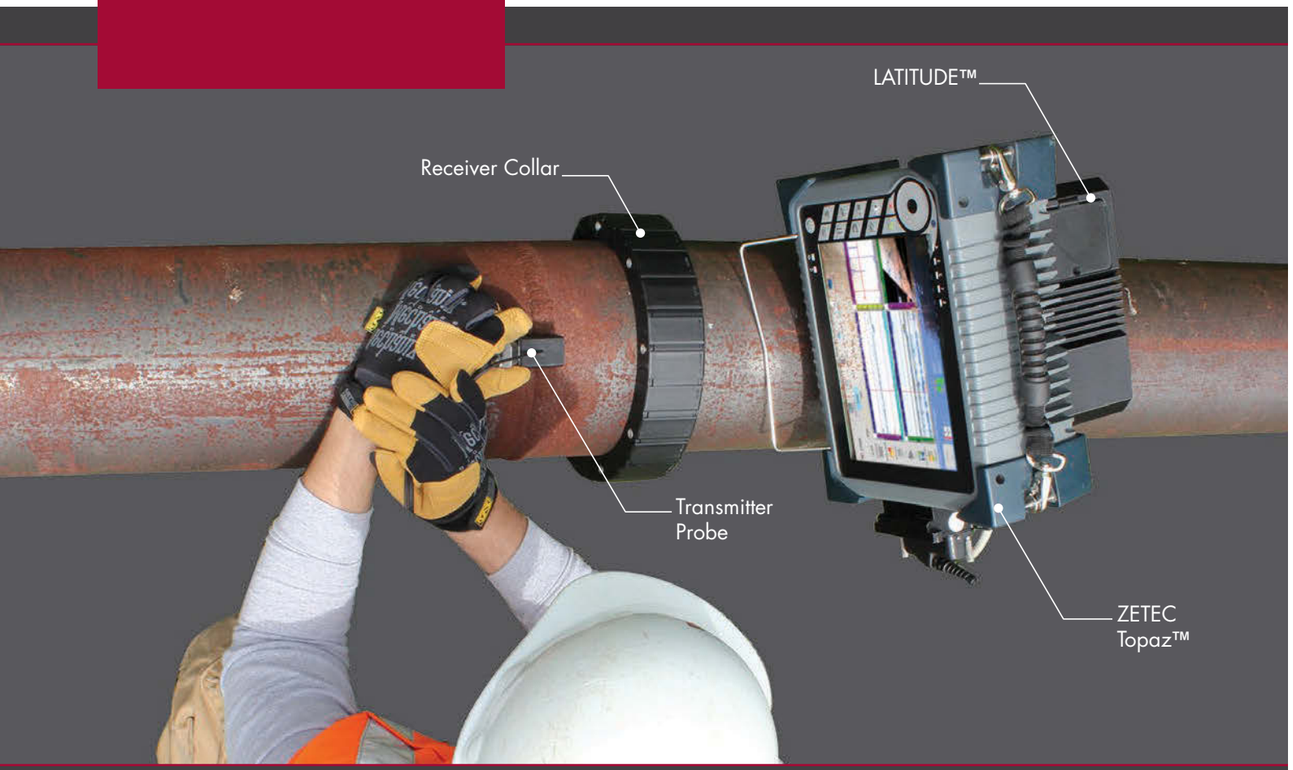
Call us today to see how Pennatronics makes it all come together.
Phone: 724-938-1800 Email: info@pennatronics.com Web: www.pennatronics.com

Pennatronics

Structural Integrity Associates, Inc.

LATITUDE™

manual scans | automated results



LESS EQUIPMENT
LATITUDE is compact, portable, and battery powered

SMALLER CREW
LATITUDE is designed to be set up and operated by a single person

FASTER SETUP
LATITUDE adds minimal set-up time to that required for a traditional manual examination

BETTER QUALITY
Guarantees coverage and puts the probe back into a human hand, helping to optimize coupling and indication response

Structural Integrity Associates is excited to announce the introduction of LATITUDE a revolutionary non-mechanized position encoding system for use with non-destructive examination equipment.

Why is LATITUDE revolutionary and how will it help you and your facility?

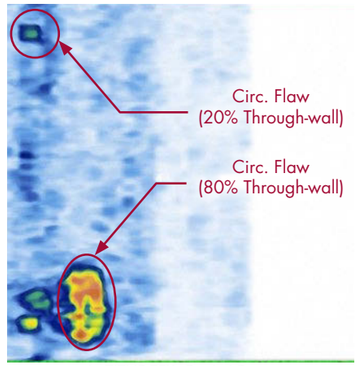
LATITUDE is an innovative alternative to cumbersome and complicated automated inspection equipment for a variety of applications.

1-877-4SI-POWER ***www.structint.com/nuclear-news***

A FIRST-OF-A-KIND NDE INNOVATION

Structural Integrity Associates, Inc. is pleased to announce the availability of a new Ultrasonic Testing (UT) service to the power generation industry. This new service offering is based on LATITUDE™, a revolutionary non-mechanized position and orientation encoding system designed for use with UT non-destructive examination (NDE) equipment, enabling our operators to collect high-quality encoded data while utilizing a manual examination process. In addition, LATITUDE requires less equipment, fewer people, shorter setup time and runs on battery power. SI provides LATITUDE UT services for the following power generation applications:

DISSIMILAR METAL WELDS
LATITUDE is the basis of a new procedure for the examination of dissimilar metal welds in nuclear power plants. The procedure, SI-UT-217, was qualified by the Electric Power Research Institute (EPRI) in accordance with the rigorous demands of the ASME Code Section XI, Appendix VIII and the Performance Demonstration Initiative (PDI) requirements.

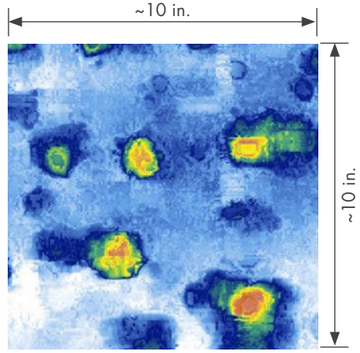


LATITUDE™ DMW Data

ASME CODE EXAMINATIONS
LATITUDE UT techniques meet the specific requirements specified the ASME Code, including Section III and XI, B31.1, and B31.3.

GENERIC WELD EXAMINATIONS
LATITUDE presents a new opportunity to encode manual examinations of weldments where the use of automated or other mechanical encoding methods are impractical or cost prohibitive. It has been used for the examination of girth and seam welds and can be deployed with phased-array UT (PAUT), time-of-flight-diffraction (TOFD), and a range of other NDE technologies.

FLAW CHARACTERIZATION
Structural Integrity can quickly deploy LATITUDE to confirm and characterize the size of a flaw. The encoded data can then be used by Structural Integrity to support engineering disposition of the flaw.



LATITUDE™ Corrosion Mapping collected in less than 2 minutes of scanning

CORROSION MAPPING
LATITUDE, when coupled with the use of a PAUT corrosion mapping probe, enables the encoding of high-resolution thickness data while manually manipulating the inspection probe, resulting in a composite thickness map that requires little to no post-processing for analysis.

www.structint.com/nuclear-news
877-4SI-POWER

HOW IT WORKS

LATITUDE uses air-born ultrasound to achieve its position tracking capabilities and does so by tracking the position of a small transmitting probe relative to a set, or array, of stationary receiver sensors. The LATITUDE transmitting probe can be attached to a variety of NDE probes and the absolute position of the NDE probe can be tracked multi-dimensionally, relative to the receiver array. Currently, the LATITUDE system can track x (axial) position, y (circumferential) position, probe rotation (skew), and can compensate for pipe (or component) curvature.

The LATITUDE system consists of three primary components: ❶ the electronic control unit, ❷ the receiver array, and ❸ the transmitter probe attachment. In Phased Array Ultrasonic Testing (PAUT), the electronic control is integrated with the Zetec TOPAZ™ PAUT instrument and control of the LATITUDE system is done through the customized TOPAZ user interface. The LATITUDE enclosure is sealed, fanless, and can run for up to 10 hours off two hot-swappable batteries, eliminating the need for a 120V power supply.

Installing and calibrating the LATITUDE system adds minimal set-up time to that required for a traditional manual examination. LATITUDE has been extensively tested in the laboratory and in a power plant environment and has been demonstrated to be resilient in the presence of acoustic and electromagnetic noise.

Delivering the Nuclear Promise: Finding the savings

As ENERCON supports utilities implementing activities associated with Delivering the Nuclear Promise (DNP), opportunities for additional cost-savings through the efficiency bulletins initiatives are occurring. One of the greatest returns on investment has been found when implementing Value Based Maintenance (VBM).

Through VBM, ENERCON has helped clients identify the potential for millions of dollars in annual savings by finding the optimal balance between cost and reliability.

ENERCON Subject Matter Experts (SME) have partnered with utilities to uncover additional savings by evaluating a larger set of components. Using predictive modeling, ENERCON analyzes component failure rates and then applies cost information to the different scenarios, assisting utilities to develop Balanced Maintenance Strategies (BMS). BMS also allows utilities to more efficiently apply resources to focus on the most critical components - an overall safety and reliability improvement.

ENERCON is also heavily involved in another key initiative, implementation of 10CFR50.69. Our SMEs help realize savings resulting from alternative treatment of systems and components considered to be of low significance to safe and reliable plant operation.

ENERCON has demonstrated industry expertise in support of writing industry guidance on these alternative treatment programs, and providing key industry support such as developing the required license amendment requests, performing Probabilistic Risk Assessments (PRA), and System Categorization.

There are numerous opportunities to realize substantial savings by implementing regulatory strategies in pursuit of DNP. ENERCON has one of the deepest benches of SMEs in the industry to help utilities with all such initiatives including NFPA 805, Tech-Spec Surveillance Programs, Tech-Spec Completion Times, PRA Evaluations, and more, all resulting in cost savings including outage time savings, and elimination of forced outages.

Efficient application of resources decreases costs & improves reliability and safety.

info@enercom.com | www.enercon.com

ENERCON

ENERCON

Supporting DNP
We are more than you know

ENERCON has Engineer of Choice contracts at over 80% of the US nuclear fleet performing engineering projects for over 35 years...we have become so much more.

We have subject matter experts for all key issues facing the commercial fleet today, with *integrated services* to help you Deliver the Nuclear Promise. ENERCON personnel have performed a diverse range of projects for utilities in pursuit of the Nuclear Promise, resulting in well over $20 million dollars in cost savings.

Reach out today and see how our expanded services reduce your total cost of power generation.

If it is important to nuclear, it is important to ENERCON.

Risk-Informed Services

- Value-Based Maintenance Programs
- Probabilistic Risk Assessments
- Full and Focused-Scope Peer Reviews
- Facts & Observations Closeout by Independent Assessment
- Risk-Informed Tech Spec Implementation 5b, Surveillance Frequency Control Program 4b, Risk-Informed Completion Times
- Risk-Informed Categorization and Alternative Treament per 50.69
- Risk-Informed Tornado Missile Protection using Tornado Missile Risk Evaluator
- NFPA-805 Implementation
- Licensing and License Amendment Support
- Configuration Risk Management 50.65 (a)(4)
- Risk-Informed GSI-191 Resolution

Excellence–Every project. Every day.

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Improving Material Properties Through Electropolishing

An Introduction to Electropolishing

Electropolishing is an electrochemical process by which surface material is removed by anodic dissolution. What may be envisioned as "reverse plating", electropolishing actually removes surface material, beginning with the high points within the microscopic surface texture. By removing these points, the electropolishing process will improve the surface finish, and enhance the near surface chemistry of the material.

Improving Corrosion Resistance & Reducing Product Adhesion

Electropolishing delivers a smoother, more reflective surface that reduces product adhesion and improves surface cleanability. Perhaps more importantly, electropolishing preferentially dissolves free iron, inclusions, and embedded particles from the surface of the work-piece. This process improves the near surface chemistry of the material, and promotes the formation of an improved corrosion resistant oxide layer. Please see the full description of each of electropolishing's benefits.

The Basics of Electropolishing

Electropolishing is accomplished by creating an electrochemical cell in which the material to be polished is the anode. A cathode is formed to mirror the geometry of the work-surface and the two are submerged in a electrolyte bath. When a DC current is applied, the electrical charge forces metal ions to be dissolved from the materials surface.

The key to the electropolishing process is the difference in current density across the surface. Within the microscopic surface profile, the current density is greater at the high points and lesser at the low points. The rate of the electropolishing reaction is directly proportional to the current density. The increased current density at the raised points forces the metal to dissolve faster at these points and thus tends to level the surface material.

Electropolishing Services

Harrison Electropolishing, L.P. specializes in electropolishing, precision mechanical polishing, passivation, oxygen cleaning, and chemical cleaning of high purity and corrosion resistant processing equipment.

Our services can be provided at our Houston facility or at your jobsite, anywhere in the world. We offer full technical evaluation, quotations, sales, and consulting services with quality assurance and test certifications.

Harrison Electropolishing L.P.

800-914-0615

Leading the nuclear industry from day one

Through our broad legacy of nuclear contractors, AECOM traces its history back to the very forefront of the nuclear industry. In 1947, we began work at the Brookhaven Graphite Research Reactor — the first peace-time nuclear reactor built exclusively for research. We were also one of the Manhattan Project's original six industrial partners. As the industry evolved, we continued to build upon our nuclear expertise, creating our continuous 60-year record of providing management, engineering, construction and modification solutions to virtually every commercial nuclear power plant currently operating in the U.S. and many that have since been retired.

Our legacy companies were engineer- and/or constructor-of-record for 49 nuclear power plants, including the first nuclear units in Spain, Italy, Brazil, Mexico and Taiwan. Consumers still depend on much of this nuclear baseload today. After the great build-out of the 1970s and 80s, our employees have helped to maintain the reliability of the operating fleet by accomplishing thousands of technical services tasks and life-extension modifications through a solid engineering services organization that has supported our customers as alliance partners, engineers-of-choice and consultants.

We provide complete resources for feasibility studies, costing, technical evaluation, environmental assessments, permitting and licensing, conceptual and detailed design, procurement, construction, operating services, maintenance, modifications and decommissioning.

Having a global focus, supported by 87,000 employees serving clients in more than 150 countries, we offer our clients a wide range of technical and engineering services including owner's engineer for nuclear new build, license renewal, alternate source terms assessments, control room habitability projects and independent spent fuel storage options for today's dry cask storage technologies.

To help vital operating assets meet today's challenges we've:

– Created a culture of safe work execution, with one site achieving 10 million man-hours without a lost time accident over a 10-year period

– Helped to reduce outage durations to less than 30 days, and at some plants, less than 20 days

– Increased power output through power uprate programs

– Mitigated component obsolescence through digital upgrades and component replacement programs

– Enhanced human performance through empowerment, training and continuous learning

– Improved plant performance through our integrated project design and installation teams

– Continued to deliver, with joint venture partner SGT, world-class performance steam generator replacement projects and a project execution model for large nuclear plant capital projects

The no. 1 ranked* global engineering design firm, AECOM is a leading construction contractor. We combine specialties in architecture, building engineering, construction services, economics, energy, environment, government, mining, oil & gas, consulting, program management, transportation and water.

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We Build More than Just Ships. We Build Solutions.
HII Nuclear and Environmental Group Renames Business Units

Huntington Ingalls Industries (HII) is well-known as America's largest military shipbuilding company, but there is a lot more to the company than building nuclear and conventionally-powered ships for the United States Navy and Coast Guard. To demonstrate a firm commitment to non-shipbuilding services, HII formed the Technical Solutions division, home of the Nuclear & Environmental Group (N&EG).

Comprised of HII Nuclear (formerly, Stoller Newport News Nuclear (SN3)) and HII Mechanical (formerly, Newport News Industrial (NNI)) N&EG is focused on improving our nation's security. We do this by supporting the national security mission of the Department of Energy (DOE), fabricating nuclear quality components for the only new nuclear units being constructed in the country and Boiler Water Circulating Pump repairs and rebuilds for the fossil industry, as well as valve repairs and testing for the Department of Defense and commercial markets.

Changing our legal business unit names to HII Nuclear and HII Mechanical has allowed us to harmonize our branding strategy with our corporation's legacy of successfully managing simultaneous complex nuclear projects based in shipbuilding. That knowledge is applied to the DOE and commercial nuclear markets through N&EG. We apply our disciplined nuclear operations culture, forged through decades of excellence, in the most complex projects ever undertaken in the global marketplace.

As a company, we believe that we contribute to our national security by executing with distinction every single day. We believe in being a good partner and in building relationships based on mutual trust and respect, founded in integrity. Finally, we believe in the value of open communication and the undeniable value of an ethical, diverse, inclusive and safe work environment.

Our full range of services include:

- Nuclear Management and Operations
- Site and Facility Restoration
- Environmental Services
- High Complexity Program Management
- Nuclear and Non-Nuclear Fabrication and Equipment Repair
- Nuclear and Non-Nuclear Modular Construction

N&EG consistently achieves project performance success at all levels. We offer innovative strategies resulting in safe, high-quality, on time, on budget delivery to our customers.

- VPP Star status and excellent safety performance
- 300+ nuclear projects safely delivered
- Over 2,000 projects performed for DOE

N&EG has a reputation for delivering results that go beyond expectations, creating a solid foundation of trust and reliability with our customers and partners.

To learn more about the Nuclear & Environmental Group, HII Nuclear and HII Mechanical, visit: http://tsd.huntingtoningalls.com

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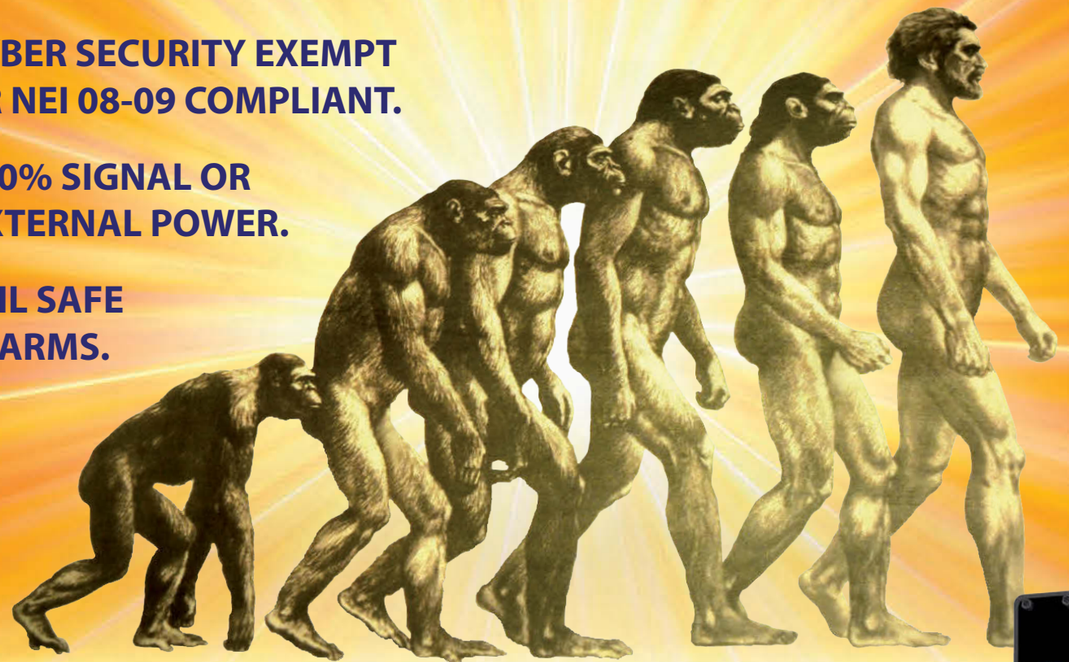
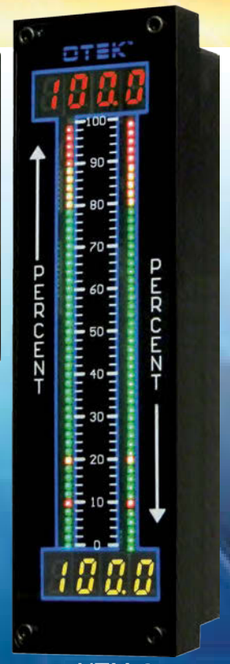
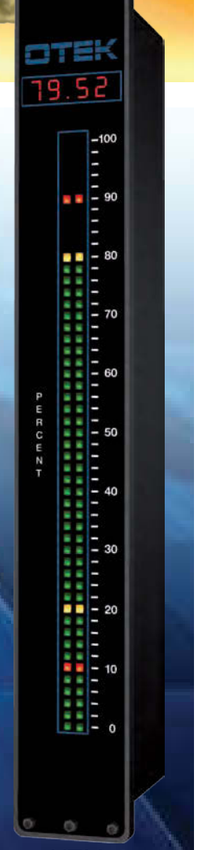


Photo Credit: Hannes Grobe (talk) -own work, Schulhistorische Sammlung Bremerhaven

SSAM-N



NTM-9



NTM-4

100% form, fit and function replacement for old analog and digital meters.

Otek's new quality program complies with 10CFR50 APP. B, ASME-NQA1.

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- Cyber Security Features, Suitable for Use as a CDA Under NEI 08-09
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Introducing The New SSAM Series

SSAM-N

The **SSAM (Solid State Analog Meter)** Series features a bright 4½ digit LED display and a 101 segment bargraph to promote easy HMI readings and consistent interpretations by operators. The SSAM has no critical digital assets (CDA), therefore, it does not need to comply with NEI 08-09 (Cyber Security requirement). The **SSAM** is ideal for replacing existing obsolete analog and digital instruments; it is designed as a 100% Form Fit and Function (F.F.F.) replacement.

Reduce/Eliminate I&C Obsolescence

Analog and Digital Instruments from the 1960s and 70s are no longer available from their OEM's. The OTEK **SSAM** is 100% FFF compatible with many popular models and "Obsolescence Hardened" with multi-sourced and standard components.

NO External Power Required

OTEK's Patented "Loop-Powered" design means your **SSAM** Instruments can be powered directly from the signal (mA DC/AC, VDC/AC). There is no need to design in a new power supply. The **SSAM** uses the same 2-wire connection as the analog instrument it's replacing.

Improve Safety

Solid State Design means no mechanical parts to wear out, no stuck needles and no subjective interpretation. "Loss of Signal" indication and other alarm functions support Fail-Safe operation.

Increase Data Precision & Accuracy

Analog Instruments are 2% precision at best. The **SSAM** provides up to 0.5% precision throughout its operating range, with minimal drift over time.

Reduce Maintenance Cost

Analog instruments must be frequently tested and recalibrated. Solid-state **SSAM** design means less testing, calibration and maintenance costs with a MTBF of over 25 years.

Need H.V. relay output for annunciator or alarm? SSAM offers "Fail Safe" & Hi/Lo relay out, all with signal or external power!

Otek maintains a 10CFR50 Appendix B Quality Assurance Program

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As a result of the unfortunate events of Fukushima, we have worked with a number of utilities to develop thin-profile coatings which can be installed over existing seals, vastly improving their resistance to flood. These coatings are easily removable, radiation resistant, fire tested and compatible with Hypalon™ and Firewall III cable. Additionally, as the exclusive worldwide distributor of 3M products to the nuclear industry, we have qualified 1-3 hour electrical raceway fire barrier systems that fully comply with the latest USNRC requirements. These systems have been qualified to the more rigid seismic and LOCA conditions resulting from the Fukushima incident.

Most recently, our NQA-1 Quality Assurance program has passed the rigorous audit process of the DOE and has continued to meet the requirements of NUPIC every year since its inception.

Our Target Zero safety program is one of the best in the industry. Our EMR is one of the lowest in the country. As part of Performance Contracting Group (PCG), we offer the resources and financial stability of "one of the Top 10 Specialty Contracting Firms in the USA," as ranked by *ENR Magazine*.

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- Stay on time and within budget
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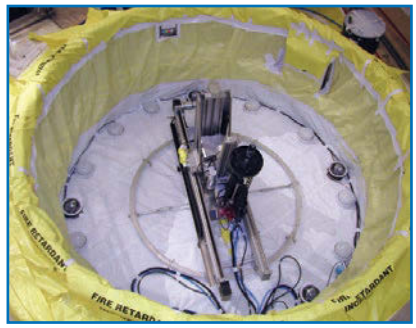

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F&J combines advances in hardware and software technologies to simplify the data collection process for the benefit of its customers.

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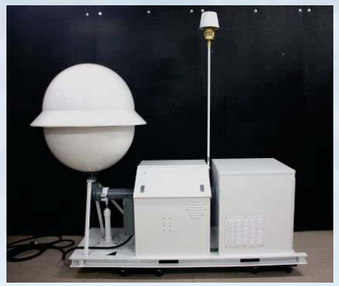

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WIPP Space Faces TRU Waste Disposal Limits: THE VOLUME REDUCING SOLUTION

By Steve Chunglo, Central Reseach Laboratories

Transuranic (TRU) waste packaging for removal from a glovebox has for many years involved the use of bags as the primary containment. In many cases, many hydrogenous layers of bags, yards of tape, and multiple filters are added to the waste stream in order to get the TRU waste into the final 55 gallon drum package to be shipped and buried at the Waste Isolation Pilot Plant (WIPP).

The WIPP is currently limited to a total finite disposed volume of Contact Handled (CH) and Remote Handled (RH) TRU waste. As of early 2014 over half of the allotted WIPP volume had been filled with mainly CH-TRU waste. Based on current bag operation packaging methods used, the Department of Energy's (DOE) remaining CH and RH waste will not fit in the remaining limited WIPP space.
Bag operations, can be performed safely by good operators following tedious repetitive processes and many Administrative Safety Controls. Since the bag is the only confinement layer between the contamination and the operator, contamination incidents can occur. Bag-out operations require close proximity to the waste to perform the process. With some waste streams, this close to waste proximity increases operator radiation dose.

Central Research Laboratories (CRL), based in Red Wing Minnesota, who for many decades has developed proven engineered material transfer solutions based around their Rapid Transfer Port (RTP) technology, has worked with DOE sites to develop a TRU Waste Management Solution. The solution is a single filtered large Polyethylene (PE) or Stainless Steel (SST) Rapid Transfer Port container in a standard Department of Transportation (DOT) 7A, Type A drum, which allows for loading of TRU waste directly from the operational glovebox without the use of bags, sleeves or tapes to provide leak tight containment. All operator interventions to connect and disconnect a drum to and from the glovebox are achieved in an upright ergonomic position by one (1) operator in less than three (3) minutes. Minimal As Low As Reasonably Achievable (ALARA) levels are achieved during connect and disconnect of the drum, due to the engineered safety controls of the RTP.

The CRL RTP solution allows glovebox or re-packaged TRU waste to be safely transferred to the final 55 Gallon drum container without additional bags or tape. The high diffusion coefficient filter on the CRL RTP 55G container and elimination of added hydrogenous packaging, improves the Decay Heat Limit (DHL) per drum for most TRU waste types compared with bagged drums, and in most cases allows more TRU waste to be loaded per drum. Inorganic TRU waste materials can be packaged directly into the CRL RTP SST drum container to the maximum DHL and Fissile Gram Equivalent (FGE) allowable for a drum.

TRAMPAC approved TRU waste packaging of CH and RH TRU waste can be accomplished in a safer, cost effective manner without adding any additional packaging materials to the waste stream, thus increasing the chance of placing all DOE's legacy and to be generated TRU waste in the remaining WIPP space.