



TECHNOLOGY TRANSFER

COMMERCIALIZATION & PARTNERSHIP



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ABOUT Y-12



MISSIONS

The Y-12 National Security Complex has three primary national security missions that protect our country and our allies around the world. Maintaining the U.S. nuclear stockpile, reducing global threats, and fueling the U.S. Nuclear Navy are key activities at this historic site.

Maintain the safety, security, and effectiveness of the U.S. nuclear weapons stockpile

Production, surveillance, dismantlement, and storage are four distinct facets of this mission. Production includes the manufacture of new components, which often are combined with recycled components into subassemblies. This process, referred to as refurbishment, extends the lifetimes of systems in the active weapons stockpile and ensures their effectiveness. Another aspect of this mission is surveillance testing, which determines how weapons in the active stockpile are aging. Dismantlement involves separating components of retired weapons and recovering nuclear materials. Storage occurs throughout all of these processes.

Reduce the global threat posed by nuclear proliferation and terrorism

Y-12 works with NNSA and other federal agencies to secure vulnerable nuclear materials domestically and internationally. Activities encompass detection, removal, and security of nuclear material, and ultimately making weapons material available for peaceful uses, such as fueling research reactors and producing medical isotopes. Through NNSA's Material Management and Minimization Program, Y-12 safely secures materials and transports them to Y-12 for storage or disposition. Additionally, Y-12 works globally to ensure materials are appropriately protected through training of those charged with its protection.

Provide feedstock to fuel the U.S. Nuclear Navy

Y-12 provides highly enriched uranium (or feedstock) used in the fabrication of fuel for reactors in the Navy's nuclear-powered aircraft carriers and submarines under an agreement with NNSA's Naval Reactors Office.

The Y-12 National Security Complex in Oak Ridge, Tennessee, is one of six production facilities in the National Nuclear Security Administration's (NNSA's) Nuclear Security Enterprise. Y-12's unique emphasis is the processing and storage of uranium and the development of technologies associated with those activities. Decades of precision machining experience make Y-12 a production facility with capabilities unequaled nationwide.

Consolidated Nuclear Security, LLC (CNS), manages and operates the facility under a contract with the U.S. Department of Energy/NNSA.





HISTORY

Constructed as part of the World War II Manhattan Project, Y-12 provided the enriched uranium for Little Boy, the atomic bomb dropped on Hiroshima, Japan, to help the United States and its allies end a war that had taken 63 million lives worldwide. Afterward, Y-12 provided lithium separation and key components for the thermonuclear weapons that helped end the Cold War. Y-12's expertise in machining, handling, and protecting radiological materials has made the Oak Ridge site central to the nation's nuclear security.

KEY CAPABILITIES

Y-12 has developed state-of-the-art capabilities in three core areas: nuclear technology and materials, security and consequence management, and manufacturing and technical services.

Y-12 lends its specialized expertise to other federal agencies, such as the U.S. Departments of Defense and Homeland Security, state and local governments, and private-sector companies.

Projects at Y-12 include providing protective equipment to soldiers in combat, training National Guard units for radiological emergencies, and creating machining platforms that improve production and efficiency. Applying our capabilities to these endeavors while meeting core NNSA commitments ensures maximum benefit to our ultimate customer, the U.S. citizen.

APPLIED EXPERTISE

Products and processes that Y-12 develops for use in a high-consequence production setting strengthen the science, technology, and engineering competencies at the foundation of NNSA's missions. Y-12 actively seeks partnerships to commercialize these technologies, which not only help solve a variety of global security challenges, but also have applications for allies, other government agencies, and the private sector.

To review technologies available for licensing, visit <http://www.y12.doe.gov/technologies>

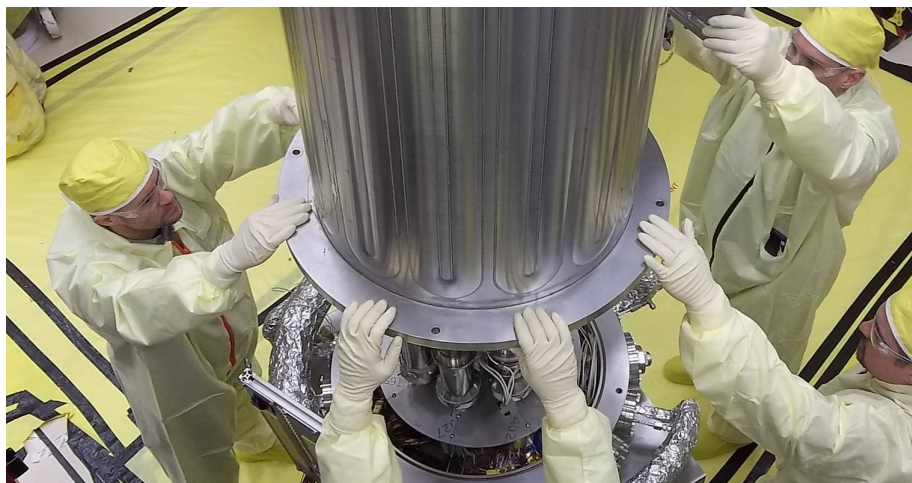
FACILITY SIZE

Y-12 spans 811 acres, with 2.5 miles between its eastern and western boundaries. Housed within its borders are manufacturing, production, laboratory, support, and research and development areas.

WORKFORCE

The strength of Y-12 lies in the dedication and patriotic commitment of its employees. More than 8,000 Tennesseans work at Y-12, including federal and contractor staff.

Partnership Opportunities



NASA is partnering with Y-12 and others on a reliable, efficient, kilowatt-size fission power system for future space missions. The prototype system is fueled with highly enriched uranium alloy components produced at Y-12. (Photo courtesy of NASA)

Y-12 researchers develop technologies to more effectively deliver the mission — now and in the future.

Partnerships strengthen research and development (R&D) capabilities to drive rapid advancement of technologies beneficial to the Department of Energy (DOE) and the Nuclear Security Enterprise.

Expertise

Y-12 is a hotbed for the advancement of science and technology. While meeting the country's evolving nuclear security needs, Y-12 has acquired a wealth of experience and capabilities in:

- Science-based product evaluation
- Materials science
- Precision manufacturing
- Applied manufacturing technology
- Nuclear nonproliferation
- Data-driven operations management
- Enterprise software solutions
- Energetic materials
- Handling of nuclear materials

Plant Directed Research and Development Program

Y-12 funds technical efforts through the Plant Directed Research and Development (PDRD) program, a legislatively enabled program allowing Consolidated Nuclear Security (CNS) to directly invest in the development and application of innovative or high-risk material, manufacturing, and production support technologies that address both unique and

broad challenges. PDRD projects improve efficiency in production and business systems and ensure the safety and effectiveness of the nation's nuclear stockpile.

The PDRD program encourages partnering with other sites in the Nuclear Security Enterprise, universities, government agencies, and the private sector. Forming partnerships with universities and industries is key to applied technology development and commercialization efforts. Partnerships lead to better solutions, increased savings, and faster implementation of technologies for both parties.

Partnerships Program

The Partnerships Program strategically aligns CNS mission-directed research with academic, governmental, and industry partners to strengthen R&D capabilities and accelerate technology development. These partnerships ensure innovative technologies and solutions mature and provide maximum value to the partner, CNS, DOE, and the National Nuclear Security Administration. CNS establishes partnerships with universities, businesses, federal agencies, and national laboratories using the following contractual agreements.

- **Cooperative Research and Development Agreement (CRADA)** — CRADAs allow for collaborative R&D on problems of mutual interest. Under a CRADA, CNS and the partner may share scope responsibilities and cost (in-kind funds) or the partner may pay CNS for CNS expertise and

execution (funds-in). The partner may negotiate exclusive commercial rights (or share in the rights if mutually developed) to license intellectual property covered under the CRADA.

- **Strategic Partnership Project (SPP)** — SPPs allow CNS to conduct paid work for partners, such as solving problems, making prototypes, conducting product evaluations, or developing and implementing solutions.
- **University Partnership** — University partnerships allow university faculty and students to collaborate with CNS researchers, enhancing CNS's ability to solve complex problems.
- **Joint Assignment Agreement (JAA)** — JAAs allow for the formal exchange of personnel, helping both organizations to accomplish long-term technology, business, and research goals.
- **License Agreement** — The commercial rights to CNS-developed technologies may be licensed to private sector partners for sale, use, and/or other benefit to the licensee.
- **Bailment Agreement** — A bailment agreement is a formal technology transfer mechanism that allows for the temporary transfer of government property to support collaborative R&D opportunities.
- **Memorandum of Understanding (MOU)** — An MOU is a nonbinding agreement between CNS and the partner that summarizes areas of mutual interest and potential cooperative efforts.

Contact

If you would like more information, please contact the
Office of Technology Commercialization and Partnerships:
OTCP@y12nsc.doe.gov
<http://www.y12.doe.gov/technologies>

CNS Cooperative Research and Development Agreements



National Nuclear Security Administration (NNSA) production sites have unique skills, capabilities, and technologies that, in many cases, provide solutions to complex challenges faced by private industry. Collaborating with Consolidated Nuclear Security (CNS) on these challenges can be accomplished through a Cooperative Research and Development Agreement (CRADA).

Background

CRADAs make government facilities, intellectual property, and expertise available for collaborative interactions to further the development of scientific and technological knowledge into useful, marketable products. CNS benefits from the insight and collaborations with the industry partner or university, and the partner benefits from the technology, expertise, equipment, or resources at CNS. The intent of Congress in establishing CRADAs was to promote national technological competitiveness and the rapid transfer of innovation to the marketplace.

CNS seeks CRADA partners to further research and development (R&D) efforts in the following areas:

- Material Development and Enhancement
- Manufacturing Processes Development
- Security Technologies and Processes
- Safety Technologies and Processes
- Explosives Technologies
- Special Nuclear Material
- Emergency Response
- Information Technologies
- Engineering Design and Development Technologies

Advantages

- Leverage R&D resources to facilitate the development and commercialization of common research goals
- Gain access to unique knowledge, technologies, and equipment
- Accelerate development of a solution
- Negotiate exclusive commercial rights (or share in the rights if mutually developed) to license intellectual property covered under the CRADA
- Ensure protection of knowledge and data generated throughout the project

Funding

In-Kind: Under this type of CRADA, no money is exchanged. CNS and the partner may share scope responsibilities and cost, with each partner funding its own efforts.

Funds-In: Under this type of CRADA, the partner may pay CNS for CNS expertise and execution.

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Licensing Y-12 Technology



Inventions are available for licensing for commercialization by U.S. and foreign companies and organizations. Licensing allows the entity to reproduce, manufacture, sell, or use Consolidated Nuclear Security (CNS)-developed or -owned intellectual property. CNS licenses its intellectual property on terms similar to universities and other research organizations that receive federal funding.

License Application

CNS requires companies interested in licensing inventions to complete a licensing application form. The purpose of the form is to obtain information about your company, technology interest, intended technology use and market segment for commercialization of the technology. In addition, a business plan is requested to accompany the application. CNS reviews this information and makes a determination regarding the company's ability to carry out the commercialization plan for the technology.

and breadth of the grant of rights. Payments are usually required bi-annually along with an associated royalty report.

U.S. Government-retained License

Because federal funds are used to develop technology at Y-12, the U.S. Government retains a worldwide, non-exclusive, nontransferable, irrevocable, paid-up license to practice or have practiced any licensed intellectual property for or on behalf of the U.S. Government.

Grant of Rights

The grant of rights is made regarding exclusivity and field of use. A non-exclusive grant of rights means that the technology can be licensed to multiple companies. An exclusive grant of rights means that CNS will not license the technology commercially in the field of use to another company during the time that the license is active. Fields of use are determined based on CNS's licensing strategy for the technology and the company's intended technology use and/or market segments identified for commercialization.

U.S. Preference

Licenses are preferentially licensed to U.S. companies to maintain jobs and product growth within the U.S. Licenses can be made to non-U.S. companies as well, as long as the licensed products are substantially manufactured in the U.S. or an adequate U.S. alternate benefit statement is provided to U.S. Department of Energy (DOE) and approval of that is obtained.

Royalties and Payments

Licenses usually require an up-front, non-refundable payment, running royalty payments based on sales or other applicable criteria and a minimum annual royalty. Fees typically vary depending on the invention valuation, number of inventions licensed

Technical Assistance

The licensee is solely responsible for the commercialization of the licensed inventions. Under specific circumstances, CNS may agree to provide technical assistance to the licensee on a full-cost-recovery basis if the work is beneficial to CNS's mission objectives.

Limited Warranty & Indemnification

Any license of CNS technology will contain a disclaimer of warranties and require indemnification of CNS and the U.S. Government.

Non-Assignability

The license may extend to subsidiaries of the licensee or other parties, if provided for in the license, but will be non-assignable unless approved by CNS, except to the successor of that part of the licensee's business to which the invention pertains.

Sublicensing

A CNS license may include the right to grant sublicenses under the license, subject to approval by CNS. Each sublicense shall contain substantially the same key license provisions, including the rights retained by the Government, and a copy of such sublicense must be furnished to CNS.

DOE March-In Rights

Under the law, DOE has certain march-in rights to intellectual property developed with federal funding. This right helps ensure the technology is made available to the public.

Export Control

The license will contain a provision recognizing that the release of goods or technical data may require an export license from the U.S. Government. Failure of the licensee to obtain an export license when required may result in criminal or civil liability under U.S. law.



Partnering Opportunities

CNS has many technologies available for licensing, and a portfolio of these technologies is posted on our website. Individuals in our Office of Technology Commercialization and Partnerships are ready to assist potential licensees in creating the business partnership needed to successfully commercialize an available technology.

Contact

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Xpress Terms Licensing (XTL)



Xpress Terms Licensing (XTL) is a distinctive innovation in patent licensing. In early 2011, the U.S. Department of Energy (DOE) challenged laboratories to enhance technology deployment, new job creation and economic development by offering licensing agreements to startups. CNS responded with XTL, a licensing mechanism available only to startup companies.

Startup companies wishing to apply for XTL licensing first complete two steps of the standard licensing process:

- Identify a licensable technology that fits the company's business model and future commercialization abilities.
- Complete and submit the CNS licensing application form, including a business plan that contains financial and market forecasts for the technology.

After the form has been submitted and CNS's commercialization due diligence has been met, the business and legal terms outlined below are available.

Business Terms

- Grant — A sole commercial field-of-use grant of the proprietary rights of the licensable technology is included.
- Sublicensing — In most cases, sublicensing is allowed. Depending on the technology, restrictions may apply.
- Royalty sharing — An initial \$1,000 fee is distributed directly to the inventor(s) of the technology in compliance with CNS's royalty-sharing procedure.
- Patent reimbursement — Licensee pays CNS the cost of patent expenses incurred prior to the



license's effective date within 30 days of its first anniversary. Licensee reimburses CNS the cost of patent expenses incurred following the effective date within 30 days of the following anniversary.

- Minimum and running royalties — Running royalties in the amount of 3% are due to CNS. Minimum royalties are deferred for 3 years, after which a \$10,000 minimum per year is due.
- Sublicensing consideration — Ten percent of sublicensing revenues and 20% of sublicensing royalty revenues are due to CNS.
- Equity — CNS takes no equity in the company.
- Liquidation payout — Upon the occurrence of a liquidation event such as but not limited to a merger, sale or initial public offering, 0.75% of the company's fair-market value or actual bona fide sales price is due to CNS.

Legal Terms

The legal terms of the XTL licensing agreement are consistent with requirements outlined by DOE and are present in all CNS licensing agreements. These requirements include but are not limited to the following areas:

- Indemnification of CNS and DOE
- Primary manufacturing in the United States

- 
- 
- Royalty-free government rights to use the technology
 - Commercialization requirements
 - Export control requirements
 - Termination and early termination articles
 - Limitations on sponsored research

Awards

- Tennessee Valley Technology Council Navigator award
- Federal Laboratory Consortium Southeast Region Excellence in Technology Transfer award

Contact

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Section Definitions



ADVANCED MATERIALS

We have developed a series of advanced materials that have enhanced properties yielding improved strength, elasticity, wear, corrosion, fatigue, thermal, and other desirable characteristics.

CHEMICAL

Our focus to improve safety and reduce health risks associated with our mission has led to the discovery of certain chemicals and solvents that have multiple commercial benefits.

DETECTOR/SENSOR/IMAGING

Our global nuclear nonproliferation efforts and unique imaging needs have led to the development of an array of detectors, sensors, and imaging technologies that can be converted to commercial applications ranging from natural resource extraction, energy production, and medical imaging and diagnostics.

MATERIALS PROCESSING AND MACHING

Our ability to serve as a leader and resource for precision manufacturing has created several innovative manufacturing-related technologies.

SAFETY & SECURITY

We develop, demonstrate, and deploy unique security solutions and technologies that mitigate security risks. Many of these technologies translate into solutions that can address many challenges faced by the private sector on a daily basis.

SOFTWARE

We have developed and hold the copyrights to multiple software codes in support of mission-related activities. These unique and innovative products cover a host of applications including, but not limited to, knowledge preservation, predictive modeling, electronic records management and tracking, decision making tools, emergency communication and management, and many others.

TOOLING AND INSTRUMENTATION

We have developed a variety of tooling and lab instrumentation technologies that provide a number of benefits not found in other industry products. This tooling and instrumentation is truly unique and offers performance unlike any other found in their respective markets.



Applications of Sol-Gel Materials in Additive Manufacturing



Using sol-gel materials provides atomically homogenous mixed-metal objects, in various chemical forms (oxides, alloys, intermetallics), feeds or bed materials in additive manufacturing (AM). This application avoids compositional variations produced by other preparative methods and otherwise difficult to achieve homogenous mixtures via mechanical milling. In addition, this solves the problem of segregation during solidification of an alloy which occurs due to most solutes being less soluble in the solid than in liquid form.

Applications of sol-gel materials in AM offers research opportunities as the application is currently conceptual in nature.

Features & Benefits

- Provides atomically homogeneous mixed-metal feeds or bed materials for AM
- Achieves homogeneity in product on deposition, not by post-treatment
- Purely chemical, low temperature to achieve uniform alloys
- Feeds can be used for oxides, alloys, and intermetallics
- Sol-gel route is not an extension of mechanical mixing or doping of metals into polymer carriers

Inventor

Vincent E. Lamberti, Roland D. Seals, and Patrick K. Moehlen

Technology Readiness Level (1–9)



Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

Applications & Industries

- Direct-write Sensors
- Temperature/Strain Sensors
- Condition Monitoring
- Bio-material Traces
- Printing of Miniature Scaffolds that Mimick Native Tissues

Patents

- U.S. Patent No. 11,027,254

If you would like more information, please contact the Office of Technology Commercialization and Partnerships: OTCP@y12nsc.doe.gov
<http://www.y12.doe.gov/technologies>

Hardface Coating Systems



Hardface Coating Systems provides a family of coatings or surface materials on substrate metal alloy systems for wear and corrosion applications. A titanium boron coating is applied as a liquid to the surface of another metallic object. As the liquid cools, it bonds to the surface and undergoes a chemical reaction that provides superior wear and thermal stress properties. The metallic coating combines the performance of heat treatment and alloys, bonded to the surface of the substrate.

Features & Benefits

- Creates a hard, high wear, and corrosion-resistant surface
- Can be used on a variety of metal substrates
- Does not drastically affect mechanical heat treatments
- No heat treatment needed
- Directly bonds to the surface of the substrate
- Can be applied on finished components or fabricated on sheet materials

Applications & Industries

- Rotor blades
- Turbine blades
- Arc-heaters
- Cutting tools
- Power generating surfaces
- Military hardware
- Sports equipment
- Castings

- Bearing surfaces

- Tooling

Patents

- U.S. Patent Nos. 9,108,276 and 9,982,332

Inventor

Roland D. Seals

Technology Readiness Level (1–9)

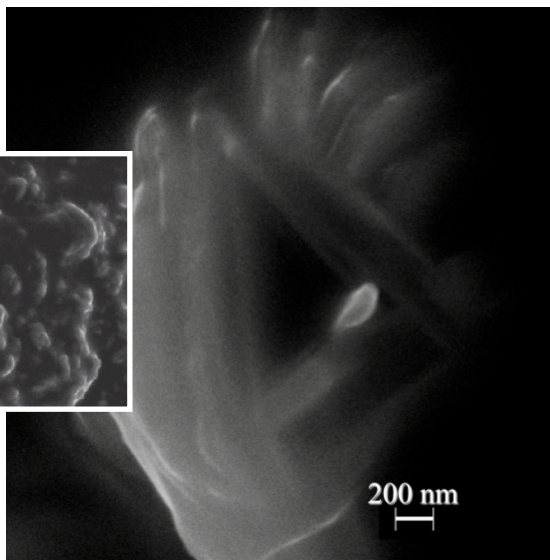
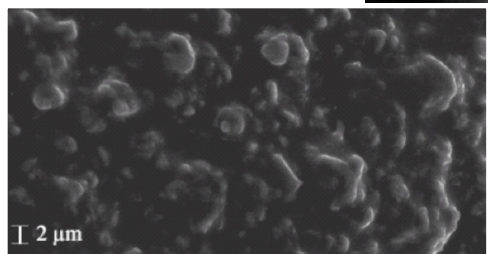
Concept has been demonstrated in a laboratory environment.



Partnering Opportunities

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HexBilt™ is an enhanced family of super-strong metallic or ceramic composites. Carbon nanostructures or nanotubes are incorporated into multi-component material arrangements to make improvements in strength and performance. The nanotubes may be integrated into the bulk and/or matrix materials or used as a coating for "normal" materials. HexBilt has the potential to enable future concepts while improving current technology.

Features & Benefits

- Improved material properties and applications
- Metal alloys: iron-based materials, first-row metal alloys, second-row metal alloys, third-row metal alloys and refractory metal alloys
- Nanostructures: carbon-, boron- and silicon-based materials and may be any combination of particles, nanotubes, single-walled nanotubes, multi-walled nanotubes, bundles of nanotubes, nanoropes, nanofibers and nanohorns
- Nanostructure incorporation can take many forms and can be accomplished in several arrangements
- Materials with increased strength — the upper bounds of which have not been determined
- Improved elasticity, wear, electrical, erosion, fatigue and thermal characteristics
- Improved strength-to-weight ratios

Applications & Industries

- Stronger steel construction beams
- High-stiffness power transmission cables — with high conductance and low electrical loss

- Transportation applications: lightweight components, crash-protection barriers and high-performance coating for multiple surfaces

Patents

- U.S. Patent Nos. 9,192,993 and 8,231,703

Inventors

Roland Seals, Edward Ripley and Jonathan Morrell

Technology Readiness Level (1–9)

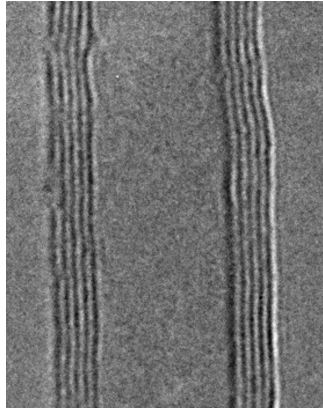
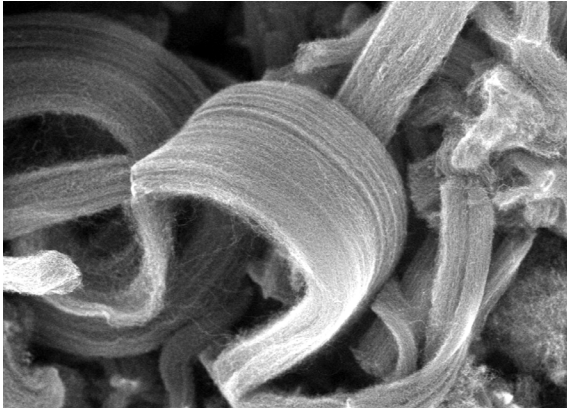


Basic technological components are integrated to establish that the pieces will work together.

Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

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Microscopic view of 2008 R&D 100 Award-winning Nano-Wool, a reinforcing material that can be used in many markets to achieve optimum strength-to-weight ratios in a variety of mediums.

Pro-Ox Nano is a unique material attachment process that delivers quantum improvements in the strength-to-weight ratios of materials. The method, which minimizes nanomaterial production issues, produces high-purity carbon nanotubes quickly and at a significantly lower cost than competitive methods. Use of the Pro-Ox Nano suite of patents has produced Nano-Wool—a high-strength, lightweight material that can be used to reinforce metals or to produce new polymers that conduct electricity.

Features & Benefits

- Produces high volume
- Yields high purity and consistency
- Creates families of new materials with enhanced properties and uses
- Requires fewer production steps
- Lessens production cost and saves time and energy

Applications & Industries

- Ships
- Automobiles
- Textile incorporation
- Material/alloy manufacturing
- Sports equipment
- Cutting tools
- Aircraft

Patents & Awards

- U.S. Patent Nos. 8,974,719; 8,945,691; 8,337,840; 8,318,250 and 9,878,307
- R&D 100 Award for resulting Nano-Wool
- Technology Ventures Corporation Featured Technology

Inventors

Roland D. Seals and Oak Ridge National Laboratory

Technology Readiness Level (1–9)



Model or prototype has been demonstrated in a relevant environment.

Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

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▲ Microscopic view of needles in TiBor Skin composite structure.

TiBor Skin™ is a two-part technology that enables creation and fabrication of toughened and corrosion- and wear-resistant composite structures. First, it provides a family of coatings or surface materials for application on metals plus methods of applying these materials. Second, it provides methods of interjoining the applied coatings with their substrates to form composite structures, the surfaces of which wear and corrode at rates much lower than those currently experienced in the industry.

Features & Benefits

- Coatings are applied to substrates as a sheet, tape, slurry or paste.
- Coatings react with substrates to form composite structures rather than mechanical bonds; heating may be applied in the presence of an oxidation preventative until the reinforcing material interjoins with the substrate.
- Integral — does not distort substrate geometry, reduce surface smoothness or allow for delamination
- Versatile — may be applied either to raw materials prior to manufacturing or to parts after manufacturing
- Nonrestrictive — does not interfere with welding process
- Thorough — replaces need for other coating techniques such as plasma spraying, sputtering and plating
- Broad — can also be used to aid in bonding of dissimilar metals

- Food processor blades
- Chain saw chains
- Cutting tools
- Lawnmower blades
- Saw blades
- Drill bits
- Bearings, pistons and similar wear parts

Patents & Awards

- U.S. Patent Nos. 8,691,343 and 9,682,531
- Technology Ventures Corporation Featured Technology

Inventors

Roland D. Seals, Edward B. Ripley and Russell L. Hallman Jr.

Applications & Industries

- Aircraft propeller blades
- Compressor turbine blades

Technology Readiness Level (1–9)



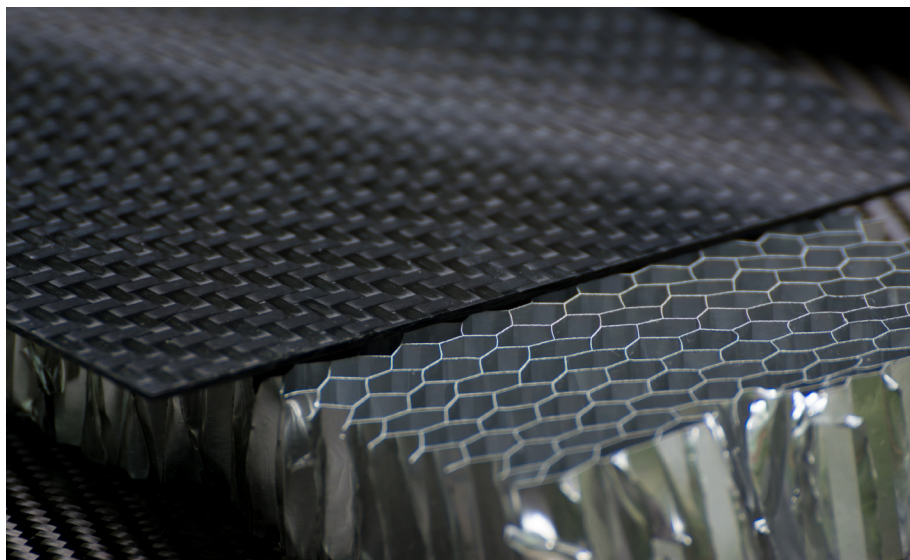
Basic technological components are integrated to establish that the pieces all work together.

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Toughened and Corrosion- and Wear- Resistant Composite Structures and Fabrication Methods



Toughened and corrosion- and wear-resistant composite structures and fabrication methods provides a single-embodiment method of making a durable, reactive thermal coating for metal systems. The method paints a formulated and heat-caused reaction surface with the metal.

Features & Benefits

- Allows putting a durable coating on softer metals
- Provides ductility and strength
- Provides very high corrosion resistance

Applications & Industries

- Pulping industry
- Construction equipment – grader blades and loader buckets
- Lawn and garden tool industry

Patents

- U.S. Patent No. 10,828,865

Inventor

Roland Seals, Edward Ripley, and Russell Hallman

Technology Readiness Level (1–9)



The system and method has been tested and can be demonstrated.

Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

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<http://www.y12.doe.gov/technologies>

Methods and Systems for Metal Chloride Production



Methods and Systems for Metal Chloride Production produces uranium chloride for the Y-12 National Security Complex. The process provides the capability to produce uranium chloride in a molten salt, which allows for rapid production rates without contaminating the end product.

Features & Benefits

- Eliminates Multi-Step Synthesis Process
- Increased Metal Production
- Provides a Safer Process

Applications & Industries

- Power Generation for Commercial Use
- Fuel Material for Reactors

Patents

- U.S. Patent No. 10,704,152

Inventor

Justin Holland and John Freiderich

Technology Readiness Level (1–9)



Concept has been demonstrated in a laboratory environment.

Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

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Removing road dirt and brake particulate from alloy wheels is one of many uses of cleaning cloths employing SIMW_yPES technology. ➡



For more than two decades, Y-12 has been developing microwave metal and ceramic processing technologies related to melting, casting, heat treating, sintering, and bonding. Recent developments include vast improvements in ceramic systems that provide ways to heat materials not readily amenable to microwave processing.

With one basic system, it is possible to melt, cast and heat-treat. Because some metals cast with microwaves do not produce an alpha case, resulting parts can be used with minimal postprocessing. Microwave-assisted chemical synthesis also is possible and is routinely used to process difficult or sensitive chemical compounds.

Features & Benefits

- Employs discrete amounts of highly effective tackifier, ensuring that little or no residue is transferred to cleaned surfaces
- Safe — employs a food-grade tackifier
- Conducive to environmental/occupational health — eliminates contaminants associated with particulate-induced diseases and ailments
- Effective — cleans on a nanoscale level
- Easy — involves wiping/rubbing rather than chemical burning or aggressive mechanical action associated with other methods of ultra cleaning
- Self-sufficient — requires no additional cleaning agent
- Versatile — contains active ingredient that can be employed to produce a variety of mediums (cloths, detector swabs, wipers, polishers, filters, tack mats, sponges, dry mops, etc.) for a variety of uses
- Economical — costs as little as a few cents per square foot of medium to employ

Applications & Industries

- U.S. Departments of Energy and Defense facilities
- Manufacturing facilities (aerospace, automotive, pharmaceutical, microelectronics)
- Clean rooms (maintenance requiring particle absorption/retention)
- Painting and assembly operations (air-purifying respirators, surface preparation/cleaning)
- Home cleaning
- Restoration

Patents

- U.S. Patent No. 8,337,626
- R&D 100 Award

Inventor

Ronald F. Simandl and Scott M. Hollenbeck

Technology Readiness Level (1–9)



Actual application of the technology in its final form.

Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

**If you would like more information, please contact the
Office of Technology Commercialization and Partnerships:**

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<http://www.y12.doe.gov/technologies>

Amorphous Wire Pressure Sensor



Closed containers may gain or lose pressure due to a variety of reasons, and opening these containers may be dangerous. The Amorphous Wire Pressure Sensor is a passive, wireless sensor for determining internal pressure of a sealed container without the need for penetrations. The sensor can be embedded inside a container and its data read through the wall by an external detector.

Features & Benefits

- Wireless, inductive signal can be detected through variety of materials
- Does not require batteries
- Small size
- Passive, wireless communication
- Eliminates the need for penetrations of containers that may be under high pressure
- Extended life span with no batteries to replace

Applications & Industries

- Sealed waste containers
- Process vessels
- Composite gas cylinders
- Measuring tire pressure

Patents

- U.S. Patent Nos. 9,146,168 and 9,915,575

Inventors

David K. Mee, Edward B. Ripley, Zachary C. Nienstedt, Alex W. Nienstedt, and Layton N. Howell Jr.

Technology Readiness Level (1–9)



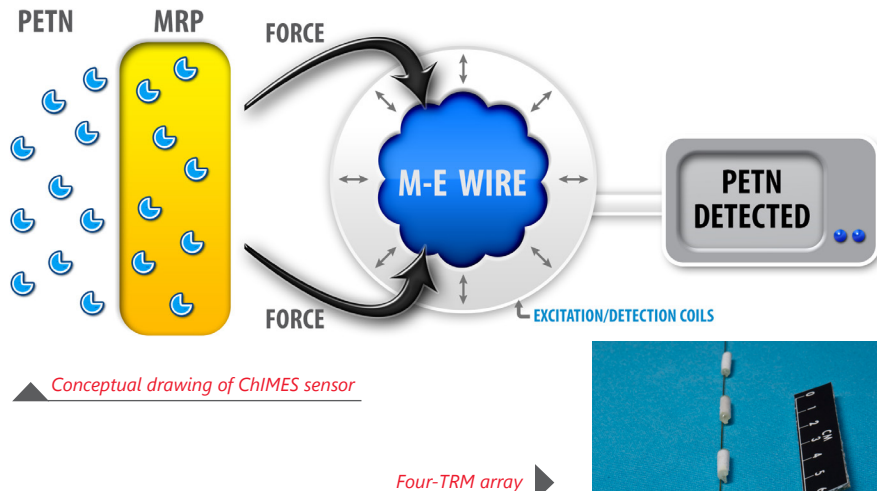
Model/prototype has been tested in relevant environment.

Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

If you would like more information, please contact the Office of Technology Commercialization and Partnerships:
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ChIMES: A New Broadly Applicable Chemical Sensor



Conceptual drawing of ChIMES sensor

In collaboration with the University of Tennessee, Y-12 has developed a new low-cost sensor technology, known as ChIMES (Chemical Identification by Magneto-Elastic Sensing), that uses target response material (TRMs) as actuators in magneto-elastic sensors. TRMs can come from many classes of chemical and biochemical compounds, with many degrees of selectivity. TRMs with strong affinities for specific targets can be used individually, while TRMs with distributed selectivity can be formed into arrays with an artificial neural network or other artificial-intelligence-based tool used for analysis and interpretation. The magneto-elastic components are amorphous ferromagnetic alloys with high permeability and very low coercivity. When a TRM encounters a target, it imposes forces that change the magnetic properties of the alloy in ways that can be detected with an excitation-detection coil set.

Features & Benefits

- Can detect anything for which TRMs can be identified or developed.
- Capable of untethered communication through a nonmetallic or thin metallic barrier.
- Miniaturizable and energy-efficient enough for powering with on-board batteries.
- Sensor's shape, size, and appearance can be tailored to a specific need.
- Suitable for both overt and covert applications.
- With modular TRMs, can detect multiple and variable targets simultaneously.
- Much less expensive than techniques like gas chromatography.

Applications & Industries

- Explosives or taggants.
- Chemical and biological warfare agents and precursors or by-products of CBRNe manufacture.
- Exhaled gas constituents for health diagnostics and drug detection.
- Toxic industrial chemicals and materials

- Volatile organic compounds and other air- and water-borne pollutants.
- Food freshness and safety.

Patents & Awards

- U.S. Patent Nos. 8,871,523, 9,255,920 and 9,411,069
- R&D 100 Award

Inventors

Y-12: Vincent Lambert, Neville Howell, and David Mee
University of Tennessee: M.J. Sepaniak

Technology Readiness Level (1–9)



Component and/or breadboard validation in relevant environment.

Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

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Obtaining a usable X-ray image means that the technician must align the X-ray beam, collimator, and target properly, which often means taking several test radiographs, resulting in lost time and a waste of materials. The Leha'ir system uses a focused, visible light to indicate the spread of an X-ray beam. The light assists in aligning the X-ray generator with the target to achieve the required radiographic coverage. An indication system and electrical lockouts are used on the X-ray generator to protect the light from the harmful X-rays and ensure that the light beam is retracted prior to exposing the film.

Features

- Simple and safe visual alignment method
- Hinged or sliding framed that is mounted to the face of the X-ray generator
- High-intensity LED light, which illuminates the area of the projected radiation beam
- An interlock switch prevents the X-ray generator from operating while the operator is aligning

Benefits

- Aids technician in radiographic setup to ensure coverage with significantly reduced rework
- Reduces technician time
- Reduces film and chemical usage for film radiography
- Reduces unnecessary exposure to digital panels for digital radiography

Applications & Industries

- X-ray radiography
- Dental offices
- Isotope radiography
- Medical offices
- Laboratories

Patents

- U.S. Patent No. 10,325,691

Inventors

Nathaniel F. Henry

Technology Readiness Level (1–9)

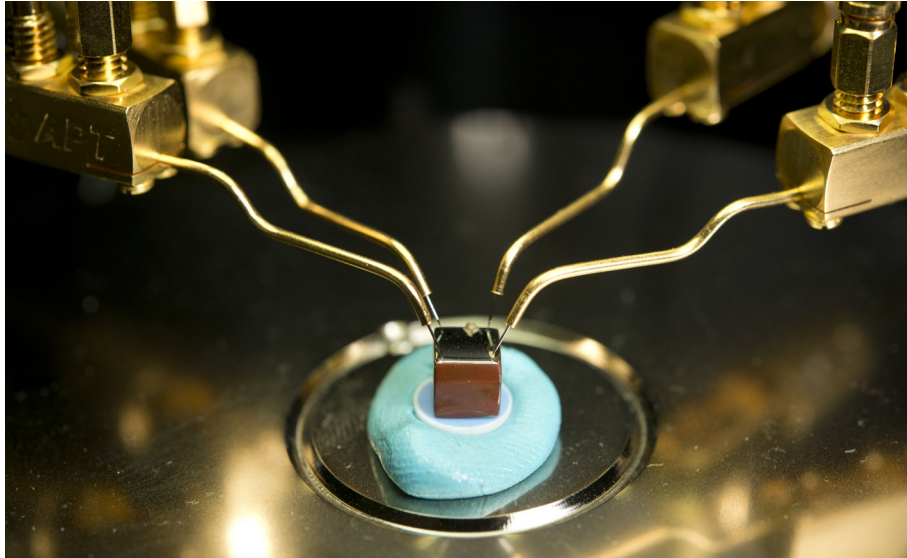


Concept tested in relevant environment.

Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

If you would like more information, please contact the Office of Technology Commercialization and Partnerships: OTCP@y12nsc.doe.gov
<http://www.y12.doe.gov/technologies>

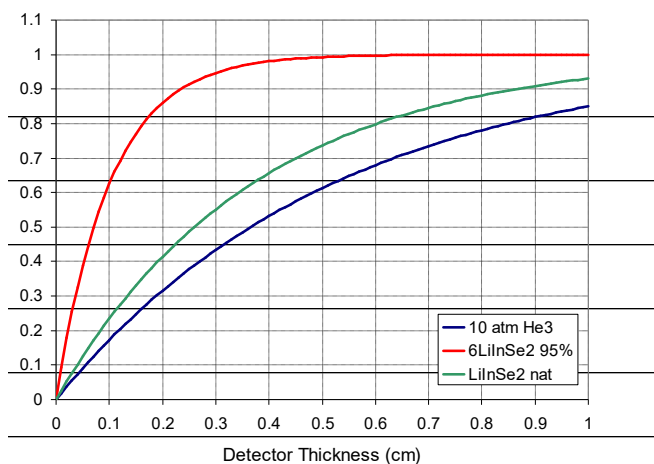


The Li-containing compound semiconductor thermal neutron detector is based on the ${}^6\text{LiInSe}_2$ single crystal. A novel ${}^6\text{Li}$ chemical purification method and proprietary two-step synthetic process that starts from elementary materials (Li, In and Se) yield large radiation detection quality crystals of ${}^6\text{LiInSe}_2$. The harvested crystal also must exhibit the appropriate electrical bandgap, high bulk resistivity and current stability. These ${}^6\text{Li}$ -containing chalcopyrite-type semiconductor crystals efficiently detect thermal neutrons at room temperature by either direct semiconductor conversion of ${}^6\text{Li}(n,\alpha)$ charged particles or detection of scintillation photons via a coupled solid state photodetector.

Features

${}^6\text{LiInSe}_2$ crystal properties:

- Band gap: 2.8 eV
- Bulk resistivity: $>10^{12} \Omega\cdot\text{cm}$
- Optical transmission: 60%
- High thermal neutron efficiency

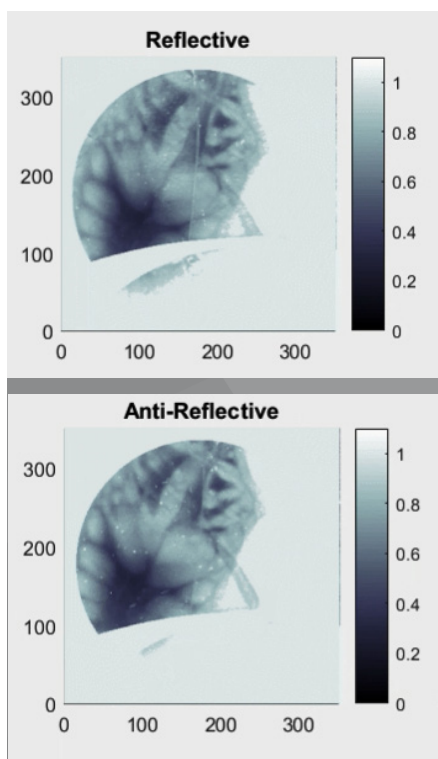


Benefits

- Compact, low cost, low energy
- All solid state detection
- Versatile design for a wide range of applications (hand-held, high resolution, bulk counter, imaging)
- High intrinsic gamma/neutron discrimination

Applications & Industries

- Neutron science facilities or neutron detection and imaging entities will be interested in increased spatial resolution and detection efficiency possible.
- Industrial firms in the oil industry and transportation providers would be interested in the detection and security benefits.
- Government agencies with research or operational interest in nuclear nonproliferation, radiation detection and homeland security.
- Non-linear optics.
- Medical imaging.



Patents & Awards

- U.S. Patent Nos. 7,687,780; 9,334,581; 9,429,662; 9,632,190; 9,638,809; 9,638,813; 9,499,406; 9,658,350; 9,612,345; 10,054,697 B1; 10,114,131 and 11,014,854
- R&D 100 Award

Inventors

Y-12: Ashley Stowe
Oak Ridge National Laboratory: Zane Bell
Fisk University: Arnold Burger

Technology Readiness Level (1–9)



$^6\text{LiInSe}_2$ crystals of sufficient size and bulk electrical properties are readily made in the laboratory, and detection of ionizing radiation has been successful with rudimentary detector archetypes.

Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

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NMP Computed Radiography Plate



Computed radiography plates are used in medical imaging and nondestructive testing of welds, fabricated pipes, and aging infrastructure where sampling is expensive or not possible. The layer that binds the phosphorous material to the substrate has its own luminescence and negatively impacts the signal to noise ratio of the image. This technology improves image clarity in high-energy radiographic images by applying a phosphorous material directly to the Tantalum plate without the use of a polymer binding agent, thereby reducing imaging interference.

Features & Benefits

- Provides improved resolution in high-energy radiographic images
- Allows for the removal of plastic polymer by utilizing a phosphorous material
- Reduced amount of radiation needed to perform radiography
- Superior high-energy radiographic image clarity
- Reduces interference and internal scattering and allows for increased resolution
- Higher levels of repeatability

Applications & Industries

- Medical imaging
- Weld inspection
- Machine component inspection
- Fatigue life analysis
- Nondestructive testing of welds, fabricated pipes, and aging infrastructure where sampling is expensive or not possible

Patents

- U.S. Patent No. 9,110,175

Inventors

Nathaniel F. Henry and Alex K. Moses

Technology Readiness Level (1–9)



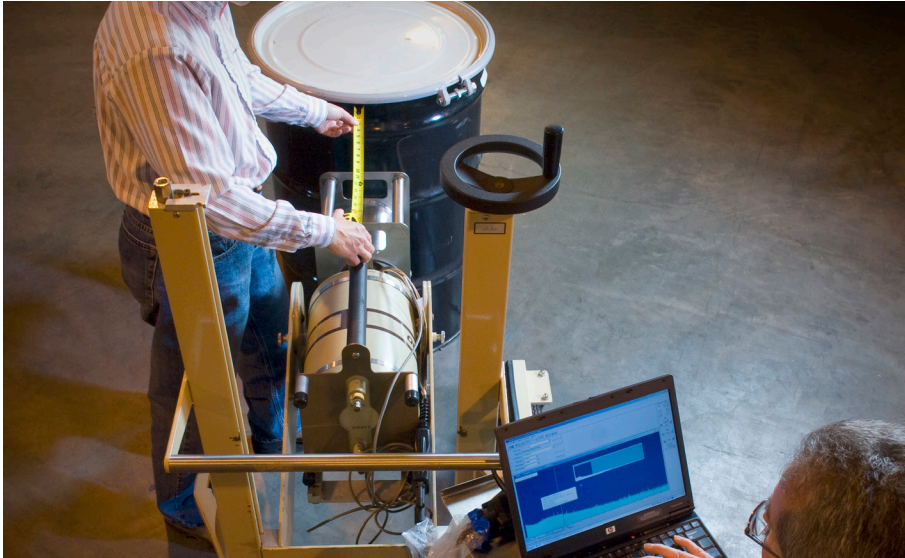
Model or prototype has been demonstrated in a relevant environment.

Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

If you would like more information, please contact the Office of Technology Commercialization and Partnerships:
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Passive In Situ Gas and Chemical Sensor



In many sealed systems, the spontaneous generation of chemicals and gases can adversely affect the contents of a sealed system. The container or system is closed, and sampling is impossible. A passive method for detecting the presence of specific chemicals in the system is critical and addresses a key question: How do you ascertain the integrity of the contents in a sealed container without opening it? This invention allows a sealed system to be monitored for the infiltration or generation of gasses or other chemical species specific to the enclosed materials.

Features & Benefits

- Can be used as a passive or active detector
- Not only allows a specific gas or chemical to be identified, but also determines its concentration, mass, temperature, and time history.
- Provides quantitative analysis for determining longevity of the system

Benefits

- Can be custom tailored to react to a single chemical or broad spectrum of chemicals
- Passive monitoring
- Cost-effective

Applications & Industries

- Specialized storage and warehousing
- Laboratory testing services
- Scientific research and development

Patents

- U.S. Patent No. 8,114,677

Inventors

Jonathan Morrell and Edward Ripley

Technology Readiness Level (1–9)



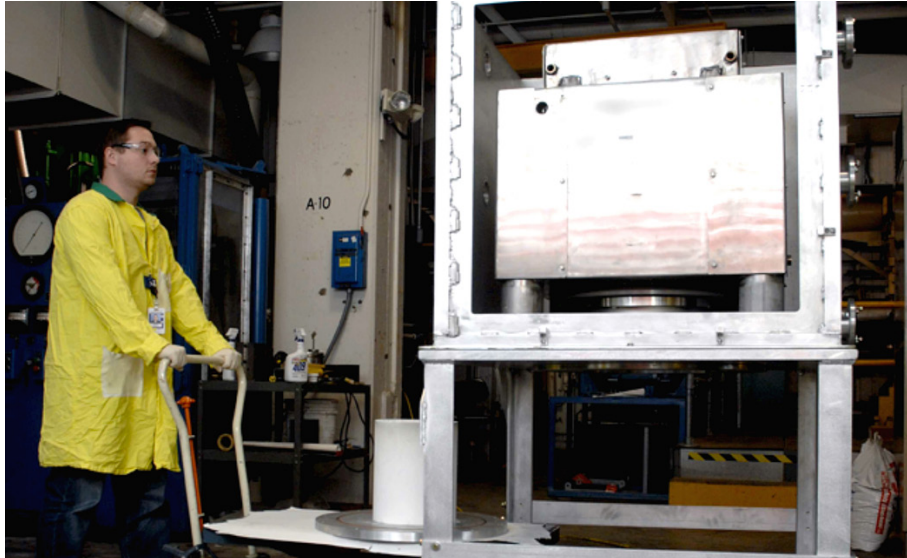
Applications are speculative at this time, however, key principles have been observed, and next steps include integrating into a functional prototype.

Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

If you would like more information, please contact the Office of Technology Commercialization and Partnerships:
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Infrared Debonding



Infrared (IR) Debonding is a dry, nondestructive method of using heat to separate components joined by adhesives. It is safer and better for the environment than debonding techniques currently in use. The method has many permutations, lending itself in separating a myriad of different materials bonded by a wide variety of substances. The technology involves the use of a portable IR apparatus within which debonding is accomplished.

Features & Benefits

- Eliminates most mechanical processing
- Applies directional heat, without the use of a susceptor
- Can be easily repositioned and located
- Designed to be operated with minimum physical effort
- Materials or components are not damaged or abraded, allowing for preservation or reuse
- IR heating is instantaneous and rapid, shortening schedules
- Uses less energy than conventional methods, minimizing costs
- Debonded items can be easily removed from the apparatus, allowing quicker processing
- Physical activity required is minimized, eliminating many hazards to workers

- Manufacturing quality control
- Recycling

Patents & Awards

- U.S. Patent No. 7,896,053
- Technology Ventures Corporation Featured Technology

Inventors

Ronald F. Simandl, Steven W. Russell, Jerrid S. Holt and John D. Brown

Technology Readiness Level (1–9)



Actual application of the technology in its final form.

Applications & Industries

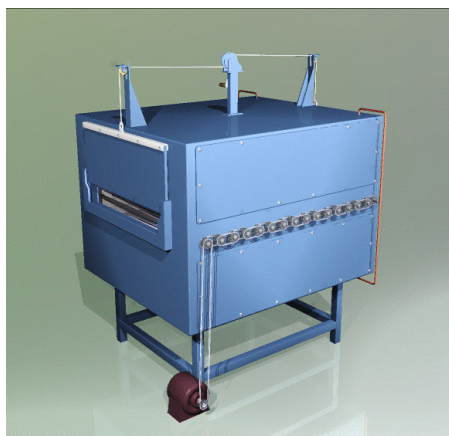
- Dismantlement and salvage operations
- Repair operations involving defective components
- Component recovery

Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

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Infrared HotWave™ Radiant/ Convective Heat Treatment Furnace



The Infrared HotWave™ Radiant/Convective Heat Treatment Furnace is a new, efficient, cost-effective, high volume, small footprint furnace that provides heat treatment of metals, metal alloys, and other materials. The heat treatment furnace is based on infrared heating that uses radiant energy and convective heating jointly. This high-powered infrared heating technology can be used for today's advanced heat treatments, annealing, outgassing, alloying, thermal dehydration, distillation, melting, recovery, purification, and casting operations.

Features & Benefits

- Uses energy-efficient infrared heating process
- Features quick, controllable, directional heating to very high temperatures
- Flexible heating with multiple set points
- Features a small, adaptable footprint
- Capable of melting a variety of materials at one time
- Cost-effective alternative to traditional industrial furnaces
- Infrared heating is inherently clean and operator friendly
- Reduces the time and energy requirements of traditional industrial furnaces
- Adaptable configuration

Applications & Industries

- Coatings
- Glass
- Plastics
- Rubber
- Metals
- Textile

Patents

- U.S. Patent No. 8,865,058

Inventor

Roland Seals

Technology Readiness Level (1–9)



Actual application of the technology in its final form.

Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

If you would like more information, please contact the Office of Technology Commercialization and Partnerships:
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Low Temperature Lithium Production



Lithium is a valuable metal used in heat transfer applications and the rapidly growing rechargeable battery industry. Conventional methodologies require electrolysis at extremely high temperatures to extract lithium from a molten salt. At CNS, a low temperature electrolysis method has been developed utilizing a non-aqueous electrolyte composition. This method can yield lithium with purity above 95% by weight, resulting in improved efficiency and performance.

Features & Benefits

- Lithium production under 100 degrees Celsius
- Operates with current density range from 0.1mA/cm² to 0.83mA/cm²
- Process yields material purity between 95 and 99%
- Production is safer and more energy efficient than high temperature electrolysis
- Methodology allows for deposition of internal zwitterions or internal salt

Applications & Industries

- Electronics manufacturing industry
- Electric vehicle manufacturers
- Liquid fluoride nuclear reactors
- Energy storage
- Steel and aluminum alloys

Patents

- U.S. Patent No. 10,718,057

Inventor

John Freiderich

Technology Readiness Level (1–9)

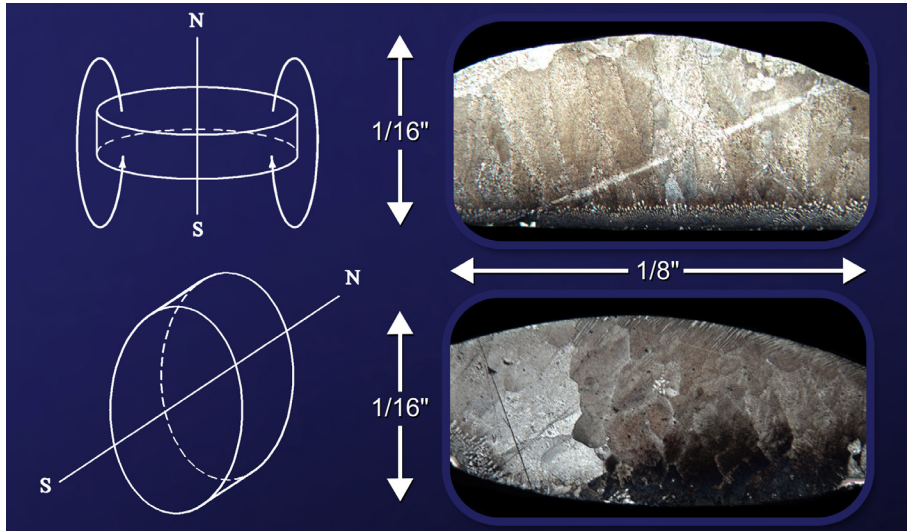


The system has been built and tested, and it can be demonstrated.

Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

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▲ Structural reorientation as a function of magnetic orientation of tin-silver solder.

Magnofex is a processing method for nonferrous metal deposition which uses magnetic fields to manipulate the microstructure of the deposited metal. Strategic orientation of magnets controls grain structure in a manner that enhances the strength and mechanical properties of the metals involved. Lead-free solders, which are nonferrous metals, can greatly benefit from the presence of magnetic fields during soldering. Consisting primarily of tin, lead-free solders often exhibit a paramagnetic-to-diamagnetic shift as they solidify in the presence of a magnetic field. Strategic orientation of magnets during soldering processes controls the solder's grain orientation, improving the performance and reliability of the lead-free components and reducing the propensity to form "tin whiskers."

Features & Benefits

- Simple — employs magnetic influence
- Inexpensive — requires minimal equipment
- Flexible — adapts easily to current manufacturing processes and is transportable
- Versatile — works with new products as well as rework and repair
- Broad — spans across all lead-free solders
- Unique — employs none of traditional solutions for mitigating tin whisker growth (e.g., conformal coating techniques, solder/alloy alteration)

Benefits

- Reduces mechanical failure — increases ability of electronics to withstand shock and vibration, increases wettability, decreases board delamination
- Improves manufacturability — reduces tin whisker formation/pad cratering, aids in solder reballing, enables retrofitting existing solder stations to current manufacturing techniques
- Addresses issues regarding lead-free solutions for manufacturing and plating applications

Applications & Industries

- Electronic components
- Aircraft propeller blades
- Compressor turbine blades
- Welding
- Brazing
- Food processor blades
- Cutting tools

Patents & Awards

- U.S. Patent 9,181,611
- Technology Ventures Corporation Featured Technology

Inventors

Edward B. Ripley and Russell L. Hallman Jr.

Technology Readiness Level (1–9)



Component and/or breadboard validation in a relevant environment.

Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

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Methods for Electropolishing and Aluminum Coating



Methods for Electropolishing and Aluminum Coating creates a protective barrier on substrates that are difficult to plate which protects against air and moisture corrosion. Coating reactive metals can be cumbersome due to the current complexity of equipment. These methods utilize electropolishing with an impassible molten salt bath which has a thickness above what is currently used to strip debris from reactive metals allowing a clean, clear surface for plating.

Features & Benefits

- Creates Protective Coating from Air & Moisture on Reactive Metals
- Safe Handling & Long-Term Storage of Reactive Metals
- Ability to Coat Metals in Complex Applications
- Higher Viscosity, Impassible Molten Salt Bath Stripping Debris & Creating Clear Surface for Plating

Applications & Industries

- Protecting Reactive Metals Handling & Long-Term Storage
- Nuclear Power Reactors
- National Defense
- Medical Tracers
- Isotope Production in Neutronics Applications

Patents

- U.S. Patent Application No. 17/379,395
- U.S. Patent No. 11,142,841

Inventor

John Freiderich and Tasha Boyd

Technology Readiness Level (1–9)



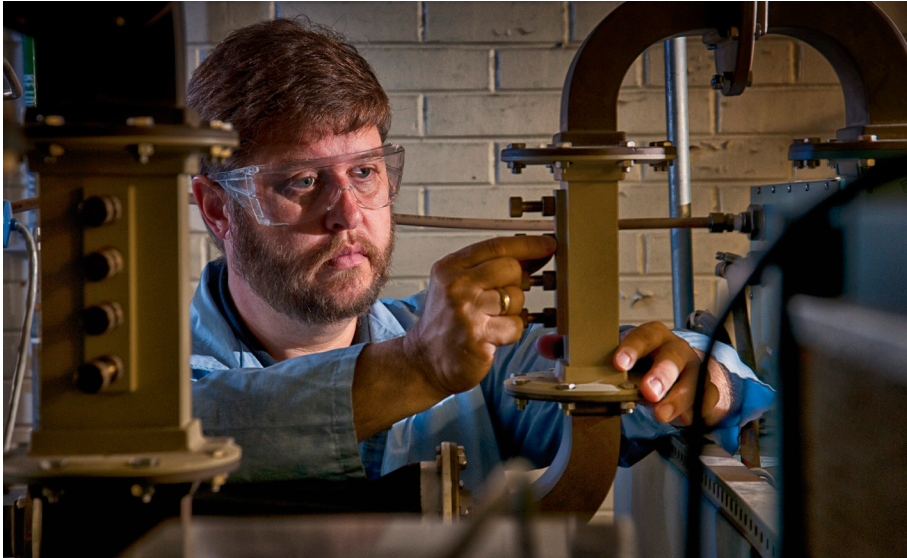
The process is effective, but still has some complexities to work through.

Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

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Microwave and Process Technologies



For more than two decades, Y-12 has been developing microwave metal and ceramic processing technologies related to melting, casting, heat treating, sintering, and bonding. Recent developments include vast improvements in ceramic systems that provide ways to heat materials not readily amenable to microwave processing.

With one basic system, it is possible to melt, cast and heat-treat. Because some metals cast with microwaves do not produce an alpha case, resulting parts can be used with minimal postprocessing. Microwave-assisted chemical synthesis also is possible and is routinely used to process difficult or sensitive chemical compounds.

Features & Benefits

- Safe — Heating is limited to specified area, increasing worker safety
- Clean — Heating creates no solid residues
- Versatile — Methods can heat disparate materials simultaneously, creating products having qualities superior to those of individual components
- Economical — Higher throughput and improved energy efficiency result in reduced manufacturing costs

Applications & Industries

- Casting — produces high-quality metal with few inclusions and contamination
- Annealing and heat-treating — has results comparable to those of other heat-treating methods
- Sintering, bonding and assembly — joins adjacent porous components having different strengths, electrical-/heat-transfer properties or coefficients of thermal expansion
- Fluidized bed — occurs in microwave-heated bed, resulting in quick, uniform heating and exceptional thermal conductivity

- Microwave assisted chemistry (MAC) — allows the manufacture of chemicals, cross-linking of polymers and catalysis of reactions (some of which are possible only by MAC)
- Plasma creation/containment — controls location of created plasma so that it remains in proper zone for nanotechnology and other materialsprocessing applications

Patents

- U.S. Patent Nos. 7,161,126; 7,358,469; 7,601,294; 7,603,963; 7,621,672; 7,622,189; 7,767,943; 7,857,193; 7,909,907; 7,939,787; 8,061,580; 8,701,970; 8,183,507; 8,716,637 and 10,079,135
- U.S. Patent Application 15/351,710

Inventor

Edward R. Ripley, Alan F. Moore, M. Stan Morrow and Donald E. Schechter

Technology Readiness Level (1–9)



Actual prototype demonstration in an operational environment.

Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

**If you would like more information, please contact the
Office of Technology Commercialization and Partnerships:**

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Microwave Sintering, Bonding and Assembly of Metal and Ceramic Parts



Replica of Civil War-era USS Monitor propeller illustrating phases of sintering and bonding:

Hub and four propeller blades were printed from powdered metal and sintered. Hub and top-left/bottom-right blades were assembled and then infiltrated/bonded with nickel bronze. Bottom-right propeller was hand-finished and polished. Two remaining sintered blades were positioned for subpart comparison.

Microwave Sintering, Bonding and Assembly is a manufacturing technology that creates complex metal and cermet composite components using minimal equipment. Employing either powder-printing or powder-pressing processes, parts are made and sintered to approximately 60% density. These parts are assembled, and the resulting assembly is infiltrated with molten metal to bond the parts and create a solid metal/cermet or cermet/cermet composite component.

Features & Benefits

- Versatile — Subparts can have different physical/chemical/material properties.
- Flexible — Designer can incorporate in subparts, blind voids, complex bends/tubes/traces.
- Simple — Manufacturer needs only a few small pieces of equipment, computer design files and a selection of raw materials.
- Decreased manufacturing time and expense —Cutting, grinding and wear surfaces can be incorporated into components.
- Minimal post-process machining — Complex component is ready for use once assembled.
- Nearly limitless possible combinations of mechanical and thermal properties — Components can be designed to meet specific strength and temperature requirements.
- Decreased need to warehouse critical components — Assemblies can be created quickly and as needed.
- Reduced costs — Prototyping and field verification of design concepts are accomplished with minimal investment.

Applications & Industries

- Armor and ballistic protection systems
- Fins and nosecones for supersonic projectiles (leading edges)
- Propulsors
- Multi-material part manufacturing
- Prototyping
- Engine blocks

Patents & Awards

- U.S. Patent Nos. 7,857,193; 8,061,580; and 8,701,970

Developer

Edward R. Ripley

Technology Readiness Level (1–9)



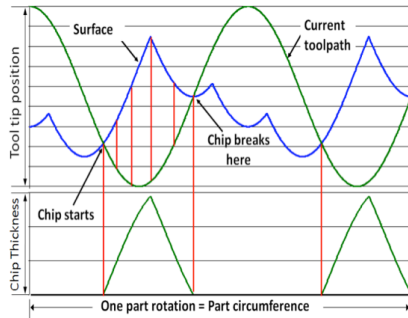
Analytical and experimental critical function and/or characteristic proof of concept.

Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

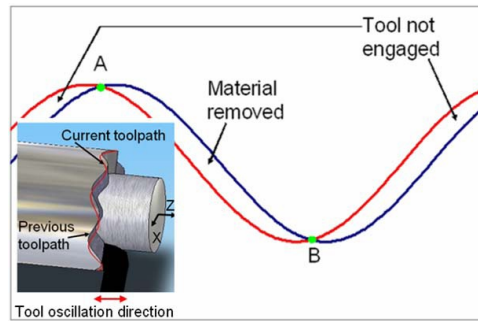
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Modulated Tool Path (MTP) Chatter Suppression System



Exaggerated Representation of MTP Chip Breaking Process

Interaction between the cutting tool and the workpiece cut-face profile that eliminates chatter.



The Modulated Tool Path (MTP) chatter suppression system builds on the general dynamic machine characterization and control capabilities associated with the MTP chip breaking system development. Chatter is caused by the vibration of the machine tool as it encounters previous cutting passes. Through the phase shift of the cutter motion associated with the MTP process, the mechanism that is the basis for the chatter is eliminated.

Features

- Computer modeling and simulation techniques
- No need to reduce feeds or speeds
- Automatic chip breaking

Benefits

- Increased production by eliminating the need to reduce feeds or speeds
- Improved quality of the machined surface
- Eliminated down time
- Simplified and less costly chip-processing/recycling
- Decreased product delivery delays
- Reduced cutting tool temperatures
- Reduced part flaws
- Improved workplace safety
- Reduced machine repairs

Applications & Industries

- Turning and boring operations involving a variety of materials

- Most machining operations

Patents & Awards

- U.S. Patent Nos. 8,610,393 and 8,240,234
- R&D 100 Award

Inventors

William Barkman, Ed Babelay and University of North Carolina at Charlotte

Technology Readiness Level (1–9)



Active research and development initiated.

Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

If you would like more information, please contact the Office of Technology Commercialization and Partnerships: OTCP@y12nsc.doe.gov
<http://www.y12.doe.gov/technologies>

Modulated Tool-Path (MTP) Chip-Breaking System



The Modulated Tool-Path (MTP) chip-breaking system is a cost-saving solution for machining operations that create continuous chips. These chips can damage the workpiece or machine tool, pose hazards to the machine operator, complicate cleanup of the work space and cause operation delays. The MTP chip-breaking system creates a significantly safer operating environment and can reduce cleanup, repair and replacement costs.

Features & Benefits

- Computer modeling and simulation techniques
- Selectable chip lengths
- Automatic chip breaking motion
- No special cutting tool required
- Works with all materials, part shapes and machine configurations
- Compatible with light depths of cut
- Eliminated down time caused by chip bird nests
- Simplified and less costly chip-processing/recycling
- Reduced machine repairs
- Decreased product delivery delays
- Improved workplace safety
- Reduced cutting tool temperatures

Applications & Industries

- Turning and boring operations involving ductile materials including metals and plastics
- Most machining operations

Patents & Awards

- U.S. Patent Nos. 8,432,119; 8,240,234 and 8,610,393
- R&D 100 Award
- Technology Ventures Corporation Featured Technology

Inventors

William Barkman, Ed Babelay and University of North Carolina at Charlotte

Technology Readiness Level (1–9)



Technology has been proven to work in its final form and under expected conditions.

Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

If you would like more information, please contact the Office of Technology Commercialization and Partnerships:
OTCP@y12nsc.doe.gov
<http://www.y12.doe.gov/technologies>

Shaped Cutting Tool



The shaped cutting tool reduces the amount of time and money needed to create a metal spherical shape by minimizing multiple passes, which are typically required during traditional cutting methods. The tool forms a finished part from a rotating work piece and includes a first cutting edge extending from a first end of the cutting tool, a second cutting edge extending from a second end of the cutting tool, and a shaping edge disposed between the first cutting edge and the second cutting edge.

Features & Benefits

- Creates Protective Coating from Air & Moisture
- Creates a perfect metal spherical or oval shape
- Increased precision on gas samples
- Allows for more precise cutting method
- Minimizes machining steps
- Reduced cutting time
- Reduced cutting costs

Applications & Industries

- Analyzing gas samples
- Analyzing high-purity and highly reactive metals

Patents

- U.S. Patent No. 10,596,633

Inventor

Edward Ripley

Technology Readiness Level (1–9)



Model or prototype has been demonstrated in a relevant environment.

Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

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Apparatus for the Characterization of Respirable Aerosols



Apparatus and method for the characterization of respirable aerosols is a laboratory-scale apparatus that produces experimental conditions for a large-scale test method, which determines the amount of aerosols under catastrophic conditions. The apparatus includes a burn chamber configured to selectively contain a sample that is heated to generate an aerosole, a heating assembly disposed within the burn chamber adjacent to the sample, and a sampling segment coupled to the burn chamber and configured to collect aerosol so that it may be analyzed.

Features & Benefits

- Size of the apparatus is less than 6 feet tall
- Easily accessible
- Very affordable – saves billions of dollars on testing facility costs

Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

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Applications & Industries

- Nuclear regulatory licensing in Research and Development

Patents

- U.S. Patent No. 9,354,218

Inventor

Douglas K. Clark, Bradley W. Hodges, Jesse D. Bush and Jofu Mishima

Technology Readiness Level (1–9)



Using quality assurance plan for fundamental science and data.

Access Rate Control System (ARCS)



The Access Rate Control System (ARCS) is a fully mechanical, ready-to-install kit that controls the speed of a person's entry through full-height turnstiles. The faster the entry speed, the more resistance is generated by ARCS on the rotor to slow the operator. At a preset normal entry speed, the operator can pass through with minimal rotor force, and ARCS freewheels on exit. All internal components are furnished in a weather-protected steel housing. This low-cost kit can be installed quickly on new or existing turnstiles, cost-effectively providing a new layer of security.

Features & Benefits

- Fully mechanical, ready-to-install kit
- Automatic response to rotation speed
- Weather-protected stainless steel housing
- Customizable design that works with various turnstile models
- Permanently lubricated, sealed gearing
- No tension adjustments or sensitivity alignments in the field
- Controlled entry speeds, exit speeds unaffected
- Quick installation, low maintenance
- Cost-effective security
- No external power/control circuitry needed

Applications & Industries

- Law enforcement
- Military
- Penitentiaries
- Stadiums
- Event centers
- Farms/agriculture
- Border crossings
- Airports
- Perimeter security

Patents & Awards

- U.S. Patent No. 8,136,297
- Government Use Award

Inventor

Lee Bzorgi

Technology Readiness Level (1–9)



Actual application of the technology in its final form.

Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

If you would like more information, please contact the Office of Technology Commercialization and Partnerships: OTCP@y12nsc.doe.gov
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Blast-Resistant Vehicle Seat



The Blast-Resistant Vehicle Seat offers new applications of fluidized bed technologies and is ideal for use in military vehicles, such as the Mine-Resistant Ambush Protected (MRAP). The seat consists of a rigid bed affixed to the vehicle with sand-filled polymer channels on top of the seat frame. When the seat is occupied, gas is directed into the channels to fluidize the sand, conforming perfectly to the shape of the occupant.

The Blast-Resistant Vehicle Seat couples the occupant to the vehicle, conforms to the passenger, is easily configurable to a wide variety of occupants and body types, and can help in environments where thermal management is a consideration. The seat can be custom fit for any vehicle.

Features & Benefits

- Conforms to occupant's body with no pressure points and is ergonomically sound
- Allows the occupant to control heating and cooling—especially advantageous in harsh environments
- Controls stiffness of seat by absorbing some of the force/impact during an accident
- Protects the occupant from impact trauma from improvised explosive devices
- Fits all body sizes and forms a comfortable, solid seat bed
- Protects the body, shoulders, neck and back in a blast
- Can be reconfigured any time the occupant needs to change position

Applications & Industries

- Homeland security
- Military
- Law enforcement
- General automotive
- Racing
- Aircraft

Patents

- U.S. Patent No. 8,371,647

Inventor

Edward B. Ripley

Technology Readiness Level (1–9)



Analytical and experimental critical function and/or characteristic proof of concept.

Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

If you would like more information, please contact the Office of Technology Commercialization and Partnerships: OTCP@y12nsc.doe.gov
<http://www.y12.doe.gov/technologies>



For government agencies, law enforcement departments and private security organizations that need ballistic protection for their facilities/structures, tools, vehicles and/or canine support teams, Code 4 Armor™ is a multi-impact, customizable, monolithic armor technology.

Unlike competitive products, Code 4 Armor™ uses cermet metallic technology, a composite material composed of ceramic and metal, which provides multiple-hit survivability. Code 4 Armor™ affords superior protection while reducing product weight and production costs.

Features & Benefits

- Provides stopping power equal to steel armor
- Weighs half as much as steel armor
- Will not separate like glued, layered construction
- Does not fragment catastrophically
- Sustains multiple impacts
- Can be mass-produced on an assembly line
- Can be custom-fit and functionally graded for specific applications
- Decreases final product weight
- Better meets protection needs in a combat zone
- Lowers cost by eliminating handwork and reducing material waste
- Improves safety by eliminating weak points caused by glued construction
- Increases comfort

Applications & Industries

- Embassies, hotel lobbies, teller booths, checkpoints
- Structures and barriers

- Exterior surfaces of air and land vehicles and fuel tanks
- Sniper shields
- Police/military canines
- Perimeter security

Patents & Awards

- U.S. Patent Nos. 7,857,193; 8,061,580; and 8,701,970
- Technology Ventures Corporation Featured Technology

Inventor

Edward B. Ripley

Technology Readiness Level (1–9)



Analytical and experimental critical function and/or characteristic proof of concept (prototype for marine propulsion application).



Partnering Opportunities

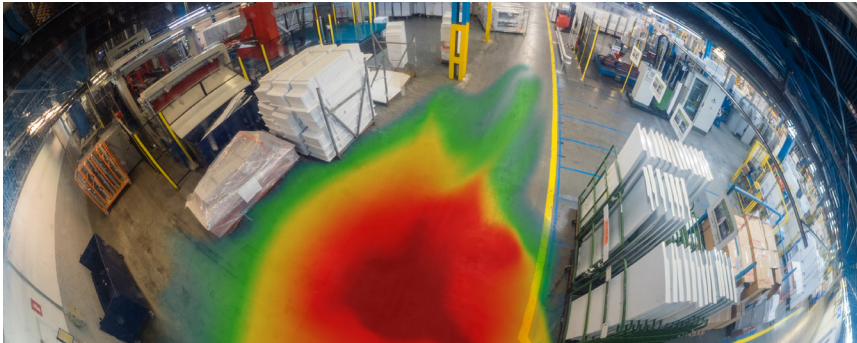
CNS is seeking an industry partner to fully commercialize this technology.

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Detector Array



Monitoring radioactive materials is a significant problem in many fields. The Detector Array determines location of radiation emitters in an area by the temporal evolution of the count rate signal from a radiation sensor read-out by supporting electronics systems during each full revolution of a specifically shaped motorized rotating shielding member. It is mounted to the ceiling or wall to monitor the activity of radioactive materials throughout the room. The device continually measures the spatial radiation field fingerprint and either compares it to the stored trusted template or sends it encrypted to a central decision-making location. Upon statistically significant deviation from the template spatial fingerprint, either an alarm gets tripped or the device stops sending cryptographically signed "still OK" messages, depending on security system architecture.



Features & Benefits

- Monitors materials through direct detection of gamma and neutron emission
- Creates a 3D radiation map or "fingerprint" of the room/area
- Adapts radiation "fingerprint" to movements made by a trusted authority
- Signals alarm when movement occurs without trusted authority present
- Detects gamma and neutron emissions in real time
- Can be incorporated into existing security system
- Eliminates the need for monitoring personnel
- Real-time detection of material movement or material incident

Applications & Industries

- Any industry requiring radioactive materials that must be stored and/or monitored, including government agencies handling specialized nuclear material, nuclear power industry, and medical nuclear imaging/radiopharmaceutical industry

- Any industry concerned with nuclear terrorism, nuclear nonproliferation, or general transportation of nuclear material, including Department of Homeland Security, Customs and Border Protection and International Atomic Energy Agency
- Universities and medical centers with test reactors and/or source materials

Patents

- U.S. Patent Nos. 9,881,708 and 9,978,469

Inventors

Ashley Stowe, Matjaz Vencelj, Toni Petrovic, Andrej Kosicek and Jonathan Morrell

Technology Readiness Level (1–9)



Basic technological components are integrated to establish that the pieces will work together.

Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

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Irradiator Security Gate



Panoramic irradiators are commonly used to disinfect and sterilize products, such as medical supplies, pharmaceutical raw materials, cosmetic raw materials, food, food containers, and medical supplies. These irradiators typically use Cobalt 60 as a source of radiation—a material that could potentially be used to build a “dirty bomb.” As a result, the Nuclear Regulatory Commission (NRC) requires installation of a security system for each irradiator; however, current electronic security systems have a short life-span due to the fact that the radiation source must be stored in a pool of water. Irradiator Security Gate is a mechanical security sensor that uses pneumatic or hydraulic piping. The remotely located electronic pressure sensor detects any tampering that can result in change of internal pressure.

Features & Benefits

- Reliable, mechanical security features can be located under water
- Meets NRC regulations
- Adaptable to fit almost any environment where security and durability are a concern, especially in extreme conditions, such as high radiation areas.
- Electronic components are located remotely from the security system, providing greater reliability and a longer life cycle
- Cost-effective and durable
- Can operate in high radiation environments

Applications & Industries

- Security gate for high radiation areas where electronics will be damaged
- Security for large diameter underwater or above water drain lines without stopping the flow
- Security for large diameter intake lines without affecting the flow

Patents

- U.S. Patent No. 8,850,868

Inventor

Lee Bzorgi

Technology Readiness Level (1–9)



The system has been built and tested, and it can be demonstrated.

Partnering Opportunities

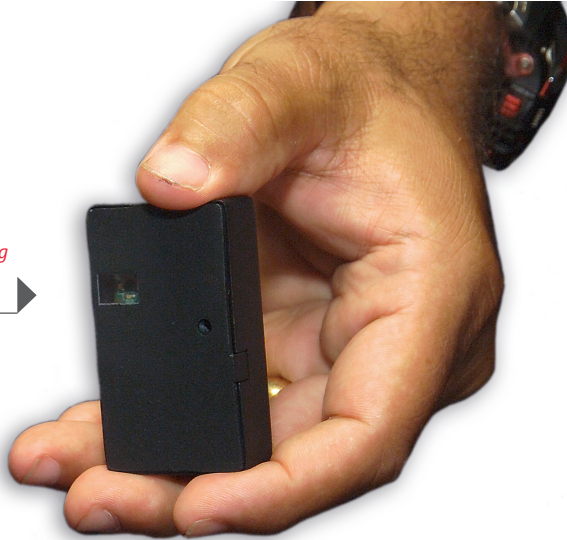
CNS is seeking an industry partner to fully commercialize this technology.

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<http://www.y12.doe.gov/technologies>

Personal Annunciation Device (PAD)



Not even the size of a pager, the PAD may be the smallest self-arming multiple-use accident notification device.



The Personal Annunciation Device (PAD) is a wireless emergency alert technology that can be easily adapted for multiple-hazard or high-consequence events where traditional notification means are not adequate and rapid alert and accountability are required. The PAD uses radio frequency identification (RFID) technology. It not only provides the user an emergency alert and an approximate location of the hazard but also notifies command-and-control personnel of the user's location. The RFID feature uses a "bread-crumb approach," acting as a tracker as the individual moves from area to area. The device can receive either an automatic signal from a network of detectors or a coded message from a sender.

Features & Benefits

- Lightweight, small and self-activated
- Integrates radio-frequency receiver with RFID technology
- Provides concurrent alarms of vibration, light and sound and displays location of emergency
- Reliable — performs over a frequency range that can penetrate areas where pager or cell phone messages would not be received
- Immediate — provides alarm within 5 seconds of emergency
- Automated — requires little human interface
- Versatile — can be easily adapted for multiple-hazard or high-consequence events where rapid alert and accountability are required
- Efficient — has extended battery life because of self-activation feature

Applications & Industries

- Coal mines and high-hazard industrial facilities
- Chemical companies
- Large convention and game venues
- Universities

- Elementary, middle and high schools
- Remote snow-ski and beach resort complexes
- Hospitals

Patents & Awards

- U.S. Patent No. 7,876,213
- R&D 100 Award
- Technology Ventures Corporation Featured Technology

Inventors

Peter Angelo, James Younkin and Paul DeMint

Technology Readiness Level (1–9)



Technology has been proven to work in its final form and under expected conditions.

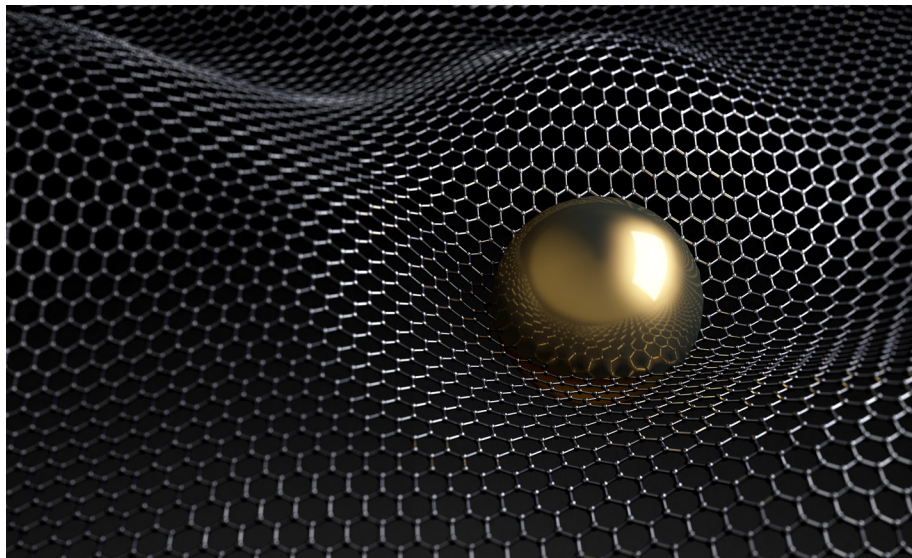


Partnering Opportunities

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Thermal Protection Barrier for Delayed Access



A thermal protection barrier including a base layer having a plurality of baffles with perforated walls and a high melting temperature granular media disposed within the plurality of baffles. When the base layer is breached by a thermal threat (i.e., explosive device, thermite torch, etc.), the granular media is capable of flowing through the perforated walls of the plurality of baffles to provide a controlled flow of granular media to an area proximate the breach for thwarting thermal threats.

Features & Benefits

- Access delay for secured facilities
- Breach protection in a secured area
- Thermal shockwave breaks up through granular media
- Takes heat and air away from thermite torches
- Temperature barrier for sensitive materials
- Introduces noble gas suppressing fire
- Reduced intruder access

Applications & Industries

- Bunkers, Explosive Barriers
- Military
- Security Doors, Vault Doors
- Nuclear Security
- Banking

Patents

- U.S. Patent No. 10,655,939

Inventor

Edward B. Ripley, Jacob Miller, Michael J. Renner, Walter Duerksen, and Jonathan Morrell

Technology Readiness Level (1–9)



Built and demonstrated for Y-12 National Security Complex use to protect buried systems.

Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

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<http://www.y12.doe.gov/technologies>

Electronic Derivative Classifier/ Reviewing Official (eDC/RO)



New Submission ☆

✱ Please allow appropriate white space for placement of the classification stamp. Otherwise the classification stamp will overwrite the existing text in that location.

✱ It is the Submitter's responsibility to retain a copy of the uploaded document in its original format. The returned document format will be PDF.

✱ It is your responsibility to ensure the original and any copies of this document are properly marked.

Drag and Drop files or Click to upload
A separate Submission will be created for each file

Files

Filename	Title
Document_for_Review.docx	<input type="text" value="Document_for_Review"/> ✕
Photo_for_Review.jpg	<input type="text" value="Photo_for_Review"/> ✕

Note to Reviewer

Reviewers

Name	
John Doe	✕
Jane Doe	✕
Bob Smith	✕

Add Reviewers (5 max) 🔍

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Last Used Reviewers

☒ Add All

☒ Jesse Johnson

☒ David Smith

☐ Larry Jones

☐ Jack Wilson

☐ Robert Williams

☒ Carl Brown

eDC/RO is a web-based system that provides a secure way to accomplish required classification reviews across multiple DOE sites. The system streamlines the document review process by automating document handling. This paperless processing system provides a mechanism by which document authors upload documents for technical review in a secure, contained environment and notify the appropriate reviewers to open the submission for review. The system also maintains usage statistics and activity metrics to facilitate monitoring, report generation, and accountability.

Features & Benefits

- Designed to store and track documents in ways that make Incidence of Security Concern cleanup quick and complete
- Submitters can track the progress of the review steps and/or cancel their request for a review
- Keeps track of the user's previously requested reviewers
- Provides the availability status of reviewers before submitting
- Reviewers have a set of tools to place classification markings, including their digital signature, onto the document immediately
- Consistent document markings
- Automates document handling
- Facilitates electronic signatures and document storage
- Reduces or eliminates wasteful printing
- Built in need-to-know controls prevent unauthorized access to documents
- Easy access to list of documents pending review
- Reviewers can opt-out of review if inadequately trained

Applications & Industries

- Government agencies that handle classified information
- Companies regularly handling Personally Identifiable Information
- HIPAA Compliance
- Protection of Proprietary Product and Service Information

Copyright

Consolidated Nuclear Security, LLC has copyright protection for this technology.

Inventors

Joshua Harris, Greg McDuffie, Kenneth Light, John Barton and Casey Guinan

Technology Readiness Level (1–9)



This system is currently in use at Y-12.



Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

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Electronic Information Release Office System (eIROS)



eIROS delivers a streamlined, web-based process to clear information for public release. This paperless processing system allows document authors to upload documents for technical review and notify the appropriate reviewers to open the submission for review. It can be integrated with multiple systems for an entirely electronic review and release process, ensuring documents are properly cleared through Classification, Export Control, Operational Security, Public Relations, Legal, Technology Transfer, and any other organization that may need to see them before they are released. The system also maintains usage statistics and activity metrics to facilitate monitoring and report generation.

Features & Benefits

- Designed to store and track documents to clearly define chain of custody
- Submitters can track the progress of the review steps and/or cancel their request for a review
- Keeps track of the user's previously requested reviewers
- Archives submissions, review comments, and approvals
- Ensures all releases are approved by all necessary stakeholders
- Automates document handling
- Facilitates electronic signatures and document storage
- Reduces or eliminates wasteful printing
- Easy access to list of documents pending review
- Reviewers can opt-out of review if inadequately trained

- Government agencies that must review documents for public release
- Organization public messaging and branding
- Protection of Proprietary Product and Service Information

Copyright

Consolidated Nuclear Security, LLC has copyright protection for this technology.

Inventors

Casey Guinan, Josh Harris and Sara Webb

Technology Readiness Level (1–9)



This system is currently in use at Y-12.

Applications & Industries

- Legal departments that must review company-wide public releases and documents
- Companies that must protect proprietary documentation in large volumes



Partnering Opportunities

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Electronic Medical Business Operations System (EMBOS)



The Electronic Medical Business Operations System (EMBOS) is a support system that addresses the unique health information and operational needs of many government and nongovernment organizations.

EMBOS was originally designed by occupational and mental health professionals and developed using the strictest federal cyber security and software quality assurance guidelines.

Features & Benefits

- Easy-to-use interface supports real-world work flow
- Online questionnaires allow pre-appointment updates to medical and maintenance histories
- Voice recognition technology
- Online scheduling and autoscheduling for recurring exams and maintenance
- Automated appointment notifications and single-click registration
- Automated interfaces to lab devices and digital imaging
- Easy navigation to electronic record summaries with drill-down capability
- Psychological evaluation support with results imported from standard psychological testing tools
- Real-time entry of notes in easy-to-use forms
- Minimizes staff learning curves
- Minimizes time spent scheduling and appointment delays
- Eliminates or minimizes transcription time and errors

- Ensures information security
- Puts vital information at the operator's fingertips for a more effective, efficient and complete exam

Applications & Industries

- Occupational health clinics
- Medical offices
- Dental offices

Copyright

Consolidated Nuclear Security, LLC has copyright protection for this technology.

Developers

David Caldwell, Dan Cannon, Jessica Metcalf, Matt Morrell, Melissa North, Brian Ray, Terry Richardson, Steve Underwood and Patsy Shelton

Technology Readiness Level (1–9)



Actual application of the technology in its final form.



Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

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Emergency Management Information System (EMInS)



EMInS is web-based software that provides real-time information, data, graphics, maps, and video capabilities necessary to efficiently manage an emergency. This technology provides a structured means of recording emergency information and sharing it among emergency response cadre members as well as responding agencies. Individual access is provided through a web interface, and large group viewing is available through selective projection via standard video inputs.

Features & Benefits

- Support for multiple independent event sites
- Easy to use, customizable web interface
- End user content management, including the ability to link and display from any folder/directory on your network as well as other URLs
- Emergency responder management can be internal to the application or imported from a spreadsheet, database, or emergency paging system
- Document collaboration and management tool
- Data can be displayed, queried, used in models, or used by a geographic information system.
- Full integration of site systems with a video system, meteorological data collection system, geographic information system, and cadre paging system
- Connectivity among emergency operations centers both internal to the site as well as external federal, state, and municipal authorities

Copyright

Consolidated Nuclear Security, LLC has copyright protection for this technology.

Developers

Tim Hickerson, Scott Gebbie and Robert Gee

Technology Readiness Level (1–9)



This system is currently in use at Y-12.

Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

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Applications & Industries

- Fully integrated emergency response management

Facility Management Enterprise System (FMES)



Logged in as Terrance Hatfield

PROD - FC591PROD | Production Facilities | [Unclassified] Contact FMES IT Support | Request Access | Logout | Exit

Facility Management Enterprise System
Production Facilities

Facility: 9201-SN09 | Set Default Facility

Electronic Status Boards > Scrolling Status Board

SM Office

Stop

NON-LCO System Status

Group	SubGroup	System/Subsystem/Component	Mode/Status	Date/Time	Comments
9201-SN	(Area)	Building 9201-SN/SI	OPERABLE	04/12/2012 15:44	Facility Status
9201-SN	(Area)	Fire Sprinkler System 92010SN-FPS-AJ-004	OPERATION	08/13/2013 14:26	
9201-SN	(Area)	Fire Sprinkler System 92010SN-FPS-DPS-005	OPERATION	08/30/2011 13:02	
9201-SN	(Area)	Fire Sprinkler System 92010SN-FPS-WPS-001	OPERATION	08/30/2011 13:02	
9201-SN	(Area)	Fire Sprinkler System 92010SN-FPS-WPS-002	OPERATION	08/30/2011 13:02	
9201-SN	(Area)	Fire Sprinkler System 92010SN-FPS-WPS-003	OPERATION	08/04/2012 15:55	Small leak Rm-201, OK per FPE (8-31-11)
9201-SN	(Area)	Fire Sprinkler System 92010SN-FPS-WPS-004	OPERATION	05/07/2013 10:32	Unusual noise reported 3/28/13. PM on 4/18/13
9201-SN	2nd Fl.	CHUCK VAC PUMP J-5008-1 (WEST UNIT)	OUT OF SERVICE	05/07/2013 10:32	
9201-SN	2nd Fl.	CHUCK VAC PUMP J-5008-2 (EAST UNIT)	ONLINE	07/17/2013 12:40	PM on 4/18/13
9201-SN	2nd Fl.	RADCON SAMPLING PUMP J5001-1 (WEST UNIT)	ONLINE	05/16/2013 14:33	PM on 5/16/13
9201-SN	2nd Fl.	RADCON SAMPLING PUMP J5001-2 (EAST UNIT)	STANDBY	05/16/2013 14:33	PM on 5/16/13
9201-SN	Dock-266	ELEVATOR # -12	ONLINE	08/03/2013 15:33	60 Month PM on 5/28/13.
9201-SN	Mezz.	Supply Fan AJ-5772 ... Rm-103	ONLINE	08/07/2013 09:34	PM on 8/6/13
9201-SN	Roof	Exhaust Fan AJ-5090 Stack-87	ONLINE	08/07/2013 09:42	PM on 5/5/13
9201-SN	Roof	Exhaust Fan AJ-5200 (Plating)	ONLINE	08/07/2013 09:42	PM on 5/5/13
9201-SN	Roof	Exhaust Fan AJ-5210 (Plating)	ONLINE	08/07/2013 09:42	PM on 5/5/13
9201-SN	Roof	Fan Coil AH-10280 ... (R-60 Room)	ONLINE	08/26/2013 13:21	PM on 8/7/13 Sheave needs replaced.
9201-SN	Roof	Supply Fan AH-10280 ... (R-60 Room)	ONLINE	08/26/2013 13:21	PM on 8/7/13 Sheave needs replaced.
9201-SN	Roof	Supply Fan AJ-5700 ... (F-8ay)	ONLINE	08/07/2013 09:27	PM on 8/6/13
9201-SN	Roof	Supply Fan AJ-5708 ... (D-)	ONLINE	08/08/2013 04:45	PM on 8/7/13

The Facility Management Enterprise System (FMES) provides a variety of tools to manage operations information across facilities and organizations incorporating interfaces to corporate systems as needed for data accessibility and real-time status updates and notifications.

Features & Benefits

- Variety of status boards track and report the health of production, utility, and facility support systems
- Provides review, update, and approval capabilities for monthly reporting
- Provides flexible search and editing capabilities with the ability to upload supporting documents to be stored and associated with index records
- Keeps track of on-duty personnel and equipment assignments
- Allows multiple organizations to view and update status reports interactively with access to a complete searchable history of all records
- Replaces paper-based tools and records with electronic management of key facility operating documents
- Data are retained as historical records
- Operation activities can be planned and scheduled up to 2 months in advance
- Status boards can scroll continuous real-time system and equipment status, outages, announcements, and area update information

Applications & Industries

- Manufacturing and industrial companies
- Government agencies

Copyright

Consolidated Nuclear Security, LLC has copyright protection for this technology.

Developers

Rusty Crisp, Terrance Hatfield and Rick Lewis

Edit Outage Tag Index

Created By: MPK on 04/06/13 at 06:23 PM Last Updated By: 9LR on 04/08/13 at 06:38 AM

Facility: 9212

Tag Number: 31004558 ☒ Tag Placed? Tag Placed By: 00037669 Verify Badge/UID
Bratcher, Thomas W

Tag Type: ☐ Planned Outage ☒ Impaired ☐ DMC

Service Not. No.: 31004558 SAP Tag Placed Date: 04/06/2013

Comp Measure Performed By: None Failure Type: EST Disable Device

Comp Measures: No comp measure Failure Description: Two activations of WFS with nothing abnormal

Tag Status: ☒ Active ☐ Closed Issuing FPE Badge/UID: 1JG Verify Badge/UID
Gump, Jack A

System: Y-F-9212-FPS-WPS-003
Current Status: Deficient
Report Status: In Service

Component: Y-F-9212-FPS-WPS-003-WFS001
Current Status: Impaired
Report Status: Impaired

Failing Part: FD-Water Flow Switch
Manufacturer: Pending
Model: Pending

COMMENTS
Add Comment
MPK at 4/6/2013 6:23:26 PM
FPE Gump advised no comp measures necessary. Pressure switch & W/MG confirmed to be in working order according to last conducted surveillance and six additional flow switches on system.

Links
Add New Link
No Link data found.

Technology Readiness Level (1–9)



Actual application of the technology in its final form.

Partnering Opportunities

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Knowledge Preservation Management



What began as a requirement to capture the knowledge of retiring nuclear facility workers has grown into a capability with broad applications for improving manufacturing operations in industry.

For more than two decades, Y-12 has been developing microwave metal and ceramic processing technologies related to melting, casting, heat treating, sintering, and bonding. Recent developments include vast improvements in ceramic systems that provide ways to heat materials not readily amenable to microwave processing.

With one basic system, it is possible to melt, cast and heat-treat. Because some metals cast with microwaves do not produce an alpha case, resulting parts can be used with minimal postprocessing. Microwave-assisted chemical synthesis also is possible and is routinely used to process difficult or sensitive chemical compounds.

Features & Benefits

- Captures and manages video, animation, process maps, work instructions, and any other associated information digitally
- Allows for information configuration control and long-term archival of knowledge base
- Can be access controlled to ensure appropriate need to know
- Assimilates and manages critical information and makes it available on demand to those with the appropriate need to know
- Easy to use, efficient transcript-based, jump-to-frame video data mining and retrieval
- Flexible with content configuration control and long-term archival of a company's knowledge base

Applications & Industries

- Manufacturing and industrial companies
- Government agencies
- Research and development firms

Copyright

Consolidated Nuclear Security, LLC has copyright protection for this technology.

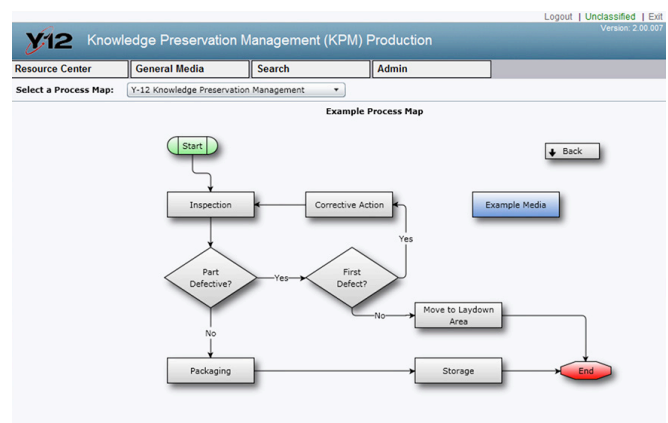
Inventor

Scott A. Gebbie, David S. Henderson and Rick A. Lewis

Technology Readiness Level (1–9)



Actual application of the technology in its final form.

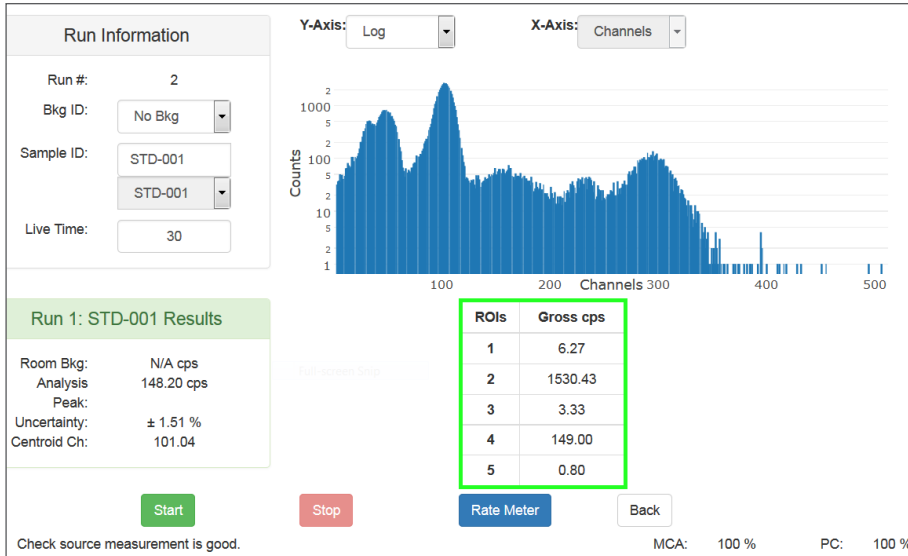


Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

**If you would like more information, please contact the
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OTCP@y12nsc.doe.gov
<http://www.y12.doe.gov/technologies>

Multi-Channel Analyzer Application (MCAA)



The Multi-Channel Analyzer Application is a Windows-based software program that allows a user to operate a multi-channel analyzer set to collect gamma spectra. These measurements are critical for quantifying residual radioactive material or completing radiation surveys of a working space. The software creates a connection between a tablet/personal computer and a multi-channel analyzer, allows configuration of measurement settings, automates critical quality control checks, and saves the acquired spectrum in a variety of file formats for later analysis.

Features & Benefits

- Full-energy spectrum display in real time with programmable regions of interest
- Compatible with multiple detectors from low to high resolution
- Saves output in Snapshot, HMS4, and HMS3 formats for analysis
- Full touchscreen functionality with Windows 7 and 10 compatibility
- Detector HV and gain settings controllable through user interface
- User interface designed around HMS4 for familiarity
- More robust/enabled automated gain stabilization
- System application is independent of system hardware; developed libraries for the multi-channel analyzer and connection types
- Interchangeable between analysis stations, which reduces equipment
- Compatible with latest versions of Windows
- Reminders for verifying calibration improves quality assurance

Applications & Industries

- Radioisotope detection
- Deactivation and dismantlement (weapons or power facilities)
- Nuclear non-proliferation application (e.g., U.S. Customs and Border Protection, International Atomic Energy Agency)

Copyright

Consolidated Nuclear Security, LLC has copyright protection for this technology.

Developers

David Davis, Nick Loden, Cynthia Gunn and Cory Hudson

Technology Readiness Level (1–9)



The system has been built and tested, and it can be demonstrated.



Partnering Opportunities

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Other Software



Software Development Capabilities

The nature of our mission requires us to operate independently of third-party ancillary services. This means we must operate on our own medical facilities, firehouses, communications departments, and routine plant maintenance services, among others. As a result, Consolidated Nuclear Security, LLC (CNS) has developed software to meet these needs. Here are some of the programs created to perform these tasks that can be applied to outside industries.

CNS has copyright protection for these technologies.

Highly Efficient Reliable Operations (HERO)

Features

- Web-based system that provides visibility of product life-cycle activities business decisions
- Features automated task tracking, results filtering, configurable display options, and color coding with data integration and visualization tools
- Improved metrics display, including overdue tasks and on-time starts/completions

Applications & Industries

- Production planning and operations monitoring in manufacturing
- Large service repair facilities

Developers

Kent Nix, Brian Knight, Tim Schwartz and Shaun Hancock

Electronic Logistics Management System (ELMS)

Features

- Provides insight into container inventory at Nuclear Security Enterprise (NSE) sites
- Provides history of container inventory

- Displays production manufacturing deliverables
- Provides a view of the NSE PCD schedule
- Consolidates information from multiple manufacturing systems

Applications & Industries

- Easily transferable to other NSE sites
- Government agencies, such as the Defense Department, requiring effective inventory management of nuclear material

Developers

Kent Nix, Brian Knight, Tim Schwartz, Vince Howard, Terry Holeman, Karon Overlin, Bryan Miller, Peggy Dyer, Jack Lewis, Jonathan Bolz, Jim Plemmons and Jim McClanahan

Readiness Certification Assurance Process Tracking System (RCAPTS)

Features

- Manages work flows automatically and notifies users when an action is required
- Accepts electronic storage of evidence documents and links to external systems



- Eliminates the need for client interaction
- Runs on any JavaScript-enabled internet browser or device connected to a network on which PHP is installed

Applications & Industries

- Engineering firms responsible for construction and/or startup activities
- Software companies (e.g., supplement to existing software)
- Operating firms that start new complex processes in a regulated environment (e.g., nuclear utilities, refinery operations)

Developer

Garrett Cook

Electronic Record Maintenance System (ERMS)

Features

- Easy-to-use interface that supports real-world work flow
- Online questionnaires that facilitate reappointment updates to medical and maintenance histories
- Voice recognition technology

- Online scheduling and autoscheduling for recurring exams and maintenance
- Automated appointment notifications and single-click registration
- Automated interfaces to lab devices and digital imaging

Applications & Industries

- Fleet vehicle maintenance
- Veterinary clinics
- Patient or equipment history/validation

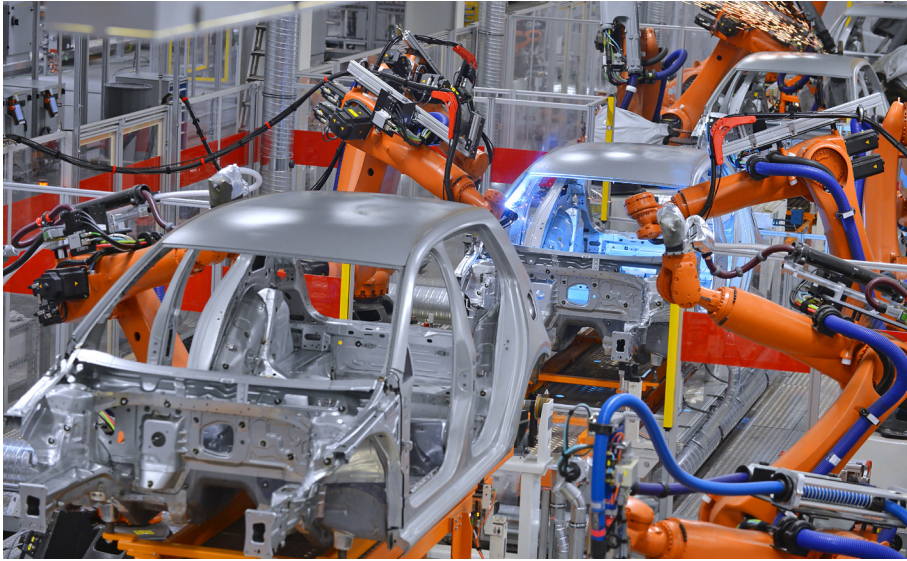
Developers

David Caldwell, Dan Cannon, Jessica Metcalf, Matt Morrell, Melissa North, Brian Ray, Terry Richardson, Steve Underwood and Patsy Shelton

Contact

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Combined Transducer-Actuator System for Automatic Part Alignment



A prevalent challenge in manufacturing precision parts is the alignment of a part on a holding fixture. The Transducer-Actuator system combines component measurement and part realignment functions into a single unit that is capable of measuring the alignment or misalignment of machine elements and work pieces as well as automatically moving a part to the desired orientation. Automating the centering operation can reduce manual set-up activities and produce more accurate and repeatable positioning. The result is significant cost savings and improved part accuracy.

Features & Benefits

- Automatic measuring and aligning of parts in either open or closed machining environments
- Can function in a vertical or horizontal orientation
- Enables automatic work piece alignment operations
- Reduces operator errors
- Increases personnel safety in activities involving hazardous materials

Applications & Industries

- Machine shops
- Automotive parts and manufacturing
- Aircraft parts and manufacturing
- Screw, nut, and bolt manufacturing

Patents

- U.S. Patent No. 9,389,058

Inventors

William Barkman, Thomas A. Dow, Kenneth P. Garrard and Zachary Marston

Technology Readiness Level (1–9)



Prototype built and tested in laboratory environment.

Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

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The Extrans permeation measurement system is a customizable system for testing the behavior and uniformity of polymers and other materials. The system can be used to determine permeation rates using variable temperatures, total pressures, differential pressures and mechanical deformations as well as adjustable concentration levels for gases and liquids. Extrans supports permeation testing from liquid-to-gas or from gas-to-gas phases.

Features & Benefits

- User-selected temperature and pressure ranges
- Balanced differential pressure manifold incorporating a back-pressure control valve and regulator
- Adaptable for materials of varying composition, thickness, configuration and permeability
- Programmable for repetitive or complex tasks
- Compact design
- Versatile — able to handle varying degrees of pressure and temperature
- Precise — accurately measures permeation rates
- Portable — can be used for field testing
- Effective — can induce stress in materials to determine the effect on permeation rates

Applications & Industries

- Container analysis and design for storage of food, munitions and moisture-reactive materials
- Materials analysis of conformal coatings for electrical circuit components used in marine, aerospace, defense and other critical applications

- Corrosion studies
- Coating, film and paint evaluation

Patents

- U.S. Patent Nos. 7,325,439; 8,171,775; and 8,479,563

Inventors

Russell L. Hallman Jr. and Michael J. Renner

Technology Readiness Level (1–9)



Technology has been proven to work in its final form and under expected conditions.

Partnering Opportunities

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Intrinsically Safe Moisture Blending System



In response to the needs of areas where intrinsically safe equipment is utilized, this newly developed moisture blending system can predictably blend precise amounts of moisture with a dry gas without the use of electricity. The system works by allowing the user to select the desired range of moisture, detecting the moisture content of the room by comparing the built-in water bath temperature to a reference chart that correlates it to the moisture content, and then generating moisture in various ranges through the use of multiple permeation tubes.

Features & Benefits

- Uses no electricity
- Allows the user to select a range of moisture
- Allows the user to determine the precise amount of moisture generated
- Can be used in any field location
- Compact, low cost, low energy
- All solid state detection
- Versatile design for a wide range of applications (hand-held, high resolution, bulk counter, imaging)
- High intrinsic gamma/neutron discrimination

Applications & Industries

- Field-calibration in explosion areas
- Moisture source for kinetic studies
- Blending condensable liquids and gasses
- Drug delivery system for medications, similar to asthma inhalers

- Hydroponics

- Humidity control of Humidity control of homes, offices, or hospital operating rooms

Patents

- U.S. Patent No. 8,262,280 B1

Inventors

Russell Hallman Jr. and Paul Vanatta

Technology Readiness Level (1–9)



A prototype has been built, but the device has not yet been deployed in an operational environment.

Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

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Omni Jaw 5™



The Omni Jaw 5™ is a high-powered hydraulic tool that generates up to 5 tons of force on the cutting jaw. An electric trigger placed ergonomically on the handle actuates the device. The longer the momentary trigger is held open, the higher the force generated. This design allows the tool to use the minimum amount of power required to achieve the desired result. After the trigger is released, the system automatically resets and the cutting jaw returns to the open position. When used as a bolt cutter, the Omni Jaw 5—which was originally designed for the U.S. Department of Energy as a portable asbestos cyanide-dipped bolt cutter—cuts and traps the bolt head to eliminate environmental and safety hazards.

Features & Benefits

- 4140 steel alloy machined body and cutting jaw
- S7 high-impact tool with steel machined cutting blades
- Stainless steel jaw guards and handle frame
- ¼" Lexan transparent shield
- Ultra alloy steel bolts
- Strong — generates up to 5 tons of force
- Ergonomic electric trigger — improves ease of use
- Safe — traps trimmings to eliminate environmental and safety hazards
- Portable — weighs 18 pounds, including section of hydraulic hose and fittings
- Fast — shears bolts in seconds
- Versatile — with an interchangeable jaw, can be used as a bolt cutter, punch or shear
- Precise — leaves surface undamaged

Applications & Industries

- Asbestos removal

- Equipment dismantlement
- Building demolition
- Ship deconstruction
- Construction

Patents & Awards

- U.S. Patent Nos. 7,673,392 and 7,971,359
- Technology Ventures Corporation Featured Technology

Inventor

Lee Bzorgi

Technology Readiness Level (1–9)



Technology has been proven to work in its final form and under expected conditions.

Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

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Reactor Cell Assembly for Use in Spectroscopy and Microscopy Applications



The Reactor Cell Assembly allows environmental monitoring of air-sensitive, solid-gas, and thermal decomposition reactions. The aluminum chamber has one or more viewports, a heated sample stage, and gas inlet ports. Each face of the cube has an opening in which various configurations allow a researcher to conduct various spectroscopic or microscopy applications. Gas-solid reactions, component compatibility, and outgassing studies can be conducted in a controlled environment.

Features & Benefits

- Solid block aluminum construction
- Openings for eyepiece, light source, specimen, and/or inlet and outlet gas or vacuum attachments
- Windows may be constructed from quartz, sapphire, or zinc selenide
- Reaction chamber contains a heater as well as gas inlet ports
- Compact
- Modular construction
- Variable temperature (hot and cold)
- Vacuum and pressurized operation
- Superior resolution
- Can be used in a wide range of optical and laser spectroscopy applications, as well as optical microscopy applications
- Highly configurable
- Aluminum design prevents outgassing of hydrogen and protects air-sensitive material from the outside environment

Applications & Industries

- In situ vibrational analysis of reactions (thermal decomposition, corrosive environments, compatibility)
- Study of hydrogen outgassing
- Simultaneous microscopy or vibrational spectroscopy and gas analysis

Patents

- U.S. Patent No. 9,097,633

Inventors

Quirinus Grindstaff, Ashley Clinton Stowe, Norm Smyrl, Louis Powell and Sam McLane

Technology Readiness Level (1–9)

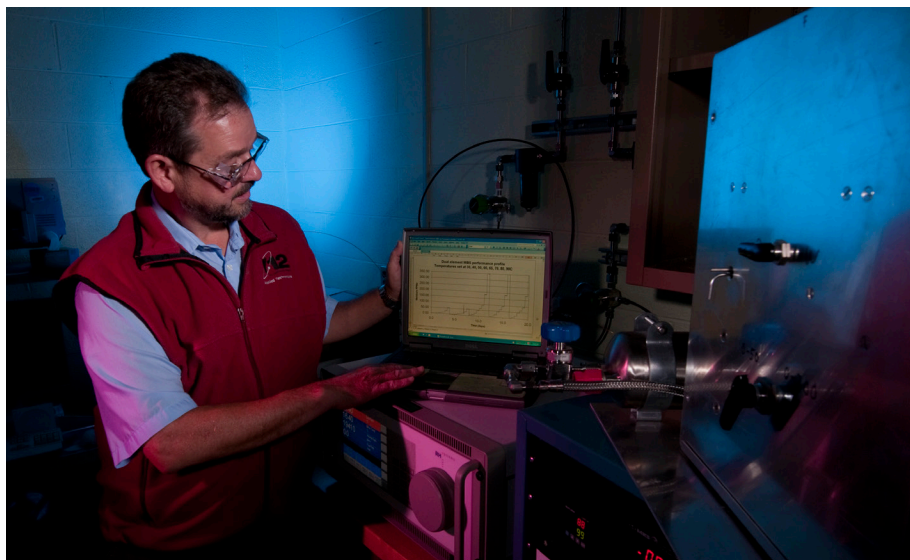


The spectroscopic reaction chamber has been fabricated by Accurate Machining and Design in Oak Ridge and requires little validation beyond initial use and testing.

Partnering Opportunities

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Tropexx is a high-resolution blending system that works with gases, vapors and volatile (readily vaporizable) liquids in addition to moisture. A high-precision laboratory tool for blending gases and vapors for application in corrosion and material-evaluation studies, Tropexx can also be used to check instrument calibration. It can substantiate the accuracy of instrument readings within parts per million.

Features & Benefits

- User-selected blending range
- Back-pressure control valve and regulator
- Compact design
- Programmable for repetitive or complex application
- Versatile — able to handle varying degrees of pressure
- Steady — allows consistent flow rates of output
- Precise — supplies uniform moisture into dry gas
- Portable — can be used for field testing
- Cost effective — reduces the cost of calibration and redundant instruments

Applications & Industries

- In-field calibration of moisture monitors
- Process gas-blending system
- Blending of volatile liquids or gases
- Controlled environment manufacturing

Patents

- U.S. Patent No. 7,494,114

Inventor

Russell L. Hallman Jr.

Technology Readiness Level (1–9)



Actual application of the technology in its final form.

Partnering Opportunities

CNS is seeking an industry partner to fully commercialize this technology.

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