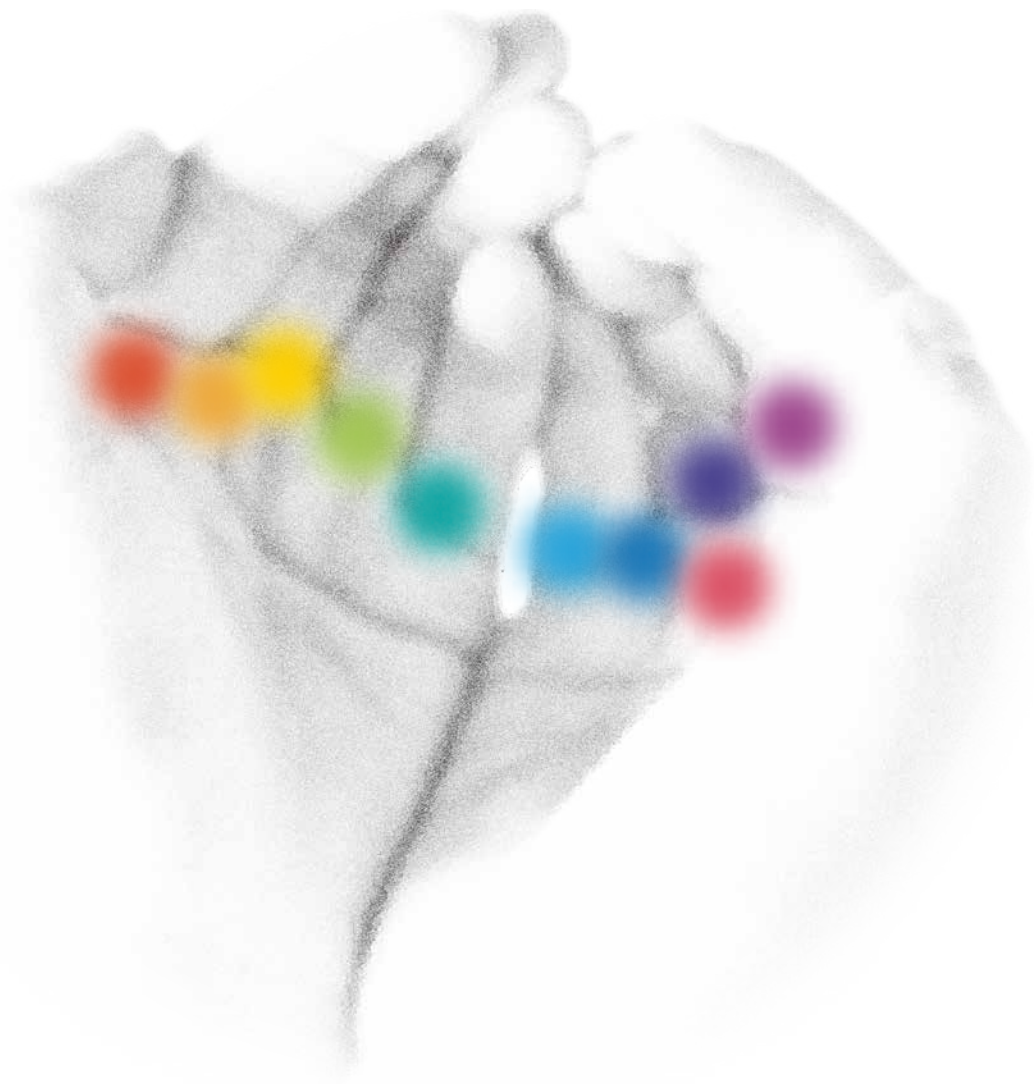


# Nuclear Energy Buyers Guide in Japan 2016-17

# Nuclear Power

— Energy choice for a sustainable world



Japan has a long history of involving in NPP construction for more than half a century while continuing to advance its sophisticated, well-developed nuclear technology. Especially, Japan takes pride in manufacturing the highest quality equipment under the richly layered supply chains and executing the “On Time, On Budget” project management.

Using our accumulated nuclear experiences and capabilities, we are ready to take a leading role toward a greener future.

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# Nuclear Vendors

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# Hitachi, Ltd.

<http://www.hitachi.com>

<b>Address</b>	1-18-13, Sotokanda, Chiyoda-ku, Tokyo, 101-8608, Japan
<b>Contact Person</b>	Please send us the inquiry from the following website. <a href="http://www.hitachi.com/contact/index.html">http://www.hitachi.com/contact/index.html</a>
<b>Phone</b>	+81-3-3258-1111

### Our Major Business Operations

**We contribute to society by developing our excellent technologies and products.**

The Power Systems Company delivers powerful synergy generated through collaboration within the Hitachi Group. Maintaining strong strategic partnerships with GE, Mitsubishi Heavy Industries, Ltd. and Mitsubishi Electric Corporation in the power generation field, we deliver world-class, cutting-edge power generation systems to solve problems faced by society.

#### Transmission & Distribution

The introduction of natural energy, enhancement/expansion of power supply infrastructure to respond to growing electricity demand, and renovation of old facilities are in progress all across the world. The Power Systems Company provides high value-added solutions worldwide that enhance power grids and make them more reliable by utilizing power distribution system integration that combines the equipment with IT.



#### Nuclear power

The Power Systems Company promotes business operations with GE by establishing the One Team framework, and addresses research and development to enhance technologies and economy of light water reactors such as advanced boiling light water reactors. We are responding to global needs with consistent responsibility, from the planning and design of nuclear systems to the manufacture of major equipment, construction of power generation stations, and maintenance of operating plants.



#### New energy

Power Business unit offers wind turbine and photovoltaic power generations facilities focused on domestic towards to the low carbon society implementations. Domestic largest single unit, 5MW wind turbine power generation facilities begin its commercial operations this year and will contribute to Japan's energy mix policy.



#### Power solution business operations

Hitachi, Ltd., Mitsubishi Electric Corporation and Mitsubishi Heavy Industries, Ltd. jointly established an operational company and established a coherent business structure in the field of hydroelectric and thermal power generation, establishing a supply system for cutting-edge technologies and products. The joint company also focuses on providing services such as predictive diagnosis of plants and other advanced monitoring systems.



#### Nuclear fusion equipment and accelerators for discovery science and others

We support society extensively through our long history of providing nuclear fusion equipment and accelerators for discovery science, medical equipment\* such as a particle beam therapy system developed based on accelerator technology, and our electric motor business for industry in general and vehicle/wind power.

\*The Power Systems Company manufactures the equipment and the Health Care Company sells it.



# HITACHI Hitachi-GE Nuclear Energy, Ltd.

<http://www.hitachi-hgne.co.jp/en/index.html>

<b>Address</b>	3-1-1, Saiwai-cho, Hitachi-shi, Ibaraki-ken, 317-0073, Japan
<b>Contact Person</b>	Please send us the inquiry from the following website. <a href="http://www.hitachi.com/contact/index.html">http://www.hitachi.com/contact/index.html</a>
<b>Phone</b>	+81-294-22-1000

## Profile

### Building the Future of Energy Through Reliable Manufacturing

From the standpoints of energy security and the prevention of global warming, nuclear power generation is important and will soon embark on a new era. Hitachi-GE Nuclear Energy, Ltd., was established in 2007 by Hitachi, Ltd., and the General Electric Co. of the U.S. as a means of participation in the nuclear energy business. Hitachi-GE Nuclear Energy, Ltd., having inherited the technologies and the experiences of both companies, each with a half-century of experience in the nuclear energy business, is working for progress in that field while promoting highly reliable manufacturing practices. Furthermore, through synergistic collaboration with the supporting companies in the U.S. and Canada, we offer global services of consistently high quality, ranging from research and development to design, manufacturing and construction, as well as the maintenance of advanced boiling water reactors, fast reactors, nuclear fuel cycle facilities, etc. Hitachi Group's overall strength, is used to support the reliable, sustainable supply of energy, as part of an effort to build a richer, more comfortable future for people and the planet.

## Business Outline

### We support nuclear power generation, creating healthy avenues for the future of the world.

Hitachi-GE Nuclear Energy, Ltd., as it pursues the construction of nuclear power generation facilities with a higher level of both reliability and safety, conducts operations in their entirety through a consistent organizational structure. This structure encompasses the planning and design of nuclear systems, the manufacture of main equipment, the construction of power generation plants, and the repair/maintenance of operating plants. Moreover, we actively support the use of cutting-edge technologies by promoting the implementation of advanced boiling water reactors (ABWR), robotics, and the construction and development of new materials and radioactive-waste disposal systems.



## Network

### We contribute to the future of nuclear power, working together with the companies of the Hitachi Group.

Hitachi-GE Nuclear Energy, Ltd., together with Hitachi Group companies, offers products and services that excel in terms of reliability, safety and cost-effectiveness. This is achieved through a consistent organizational structure encompassing the nuclear fuel, the nuclear fuel cycle and, of course, the power generation plant. Additionally, we are mobilizing our collective efforts and resources toward R&D, pursuing continuous improvement in the technological sophistication and economic efficiency of light water reactors—which currently predominate in nuclear power generation—while aiming to the future when fast reactors will be put into practical use.





# Mitsubishi Electric Corporation

<http://www.mitsubishielectric.com>

<b>Address</b>	Tokyo Building, 2-7-3, Marunouchi, Chiyoda-ku, Tokyo, 100-8310, Japan
<b>Contact Person</b>	Please send any inquiries to the following website = <a href="http://www.mitsubishielectric.com/products/energy/index.html">http://www.mitsubishielectric.com/products/energy/index.html</a>
<b>Phone</b>	+81-3-3218-2111

## Corporate Information

The Mitsubishi Electric Group operates on the corporate principle of contributing to creating a vibrant and affluent society by enhancing its technologies, services, and creative powers, as a leader in the manufacture and sales of electric and electronic equipment used in Energy and Electric Systems, Industrial Automation, Information and Communication Systems, Electronic Devices, and Home Appliances.

## Main Activities

### Energy and Electric Systems

- Generator Load Break Switch
- Reactor Cooling Pump Motor
- Main Control Board
- Control / Protection
- Gas Insulated Substation
- Nuclear Instrumentation / Radiation Monitoring
- MV / LV Switchgears
- Emergency Diesel Generator
- Main Transformer
- Turbine Generator

## Products

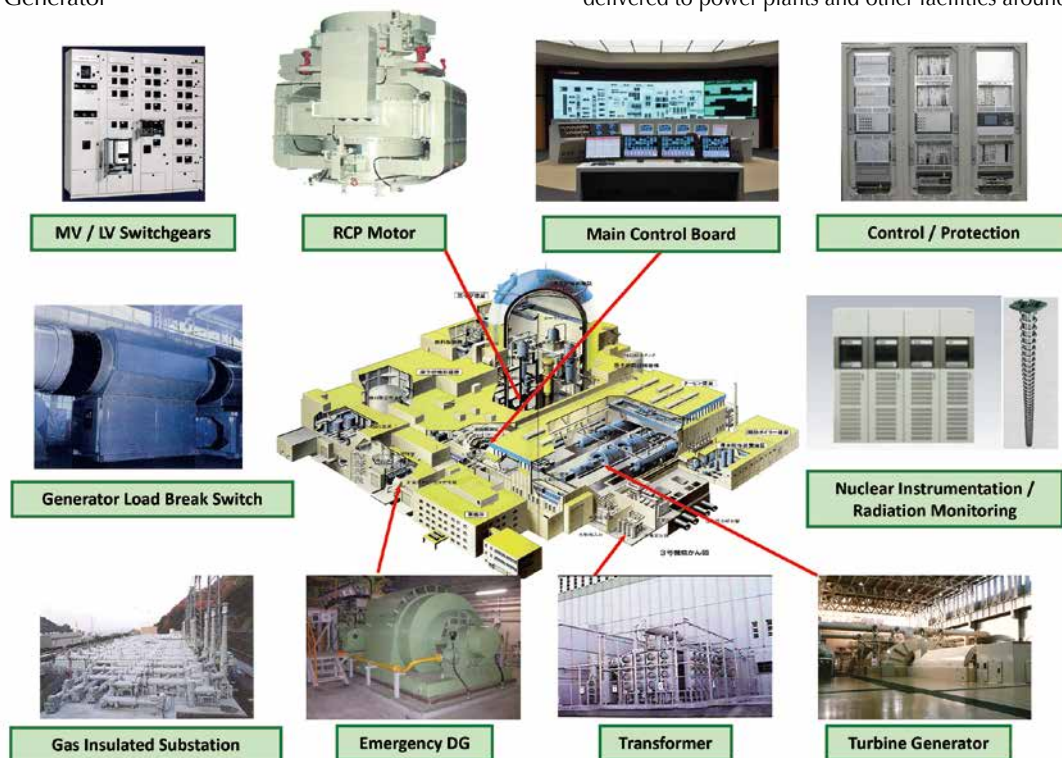
### Power Plant Instrumentation Control Systems

Advancement in digital instrumentation and control continue at an amazing pace in Mitsubishi Electric. Our information processing, power electronics and electrical systems control strengths are integrated into cutting-edge instrumentation control systems for power plant generation systems. From state-of-the-art nuclear power plants to the refurbishment and retrofitting of older hydroelectric and geothermal plants, Mitsubishi Electric instrumentation control systems are being applied around the world as a cost-effective and ecological means of improving operations. Mitsubishi Electric instrumentation control systems are being applied around the world as a cost-effective and ecological means of improving operations.

### Turbine Generators

Adopting original technologies developed throughout the company in areas such as semiconductors, power electronics and machinery automation, Mitsubishi Electric manufactures turbine generators that operate with minimal loss and higher efficiency.

Boasting a reputation for outstanding performance, reliability, safety and lowering the environmental burden related to energy production, an increasing number of our generators are being delivered to power plants and other facilities around the world.







# Mitsubishi Heavy Industries, Ltd.

<http://www.mhi-global.com/index.html>

<b>Address</b>	2-16-5, Konan, Minato-ku, Tokyo, 108-8215, JAPAN		
<b>Contact Person</b>	Please send any inquiries to the following website: <a href="http://www.mhi-global.com/inquiry/inquiry_nuclear.html">http://www.mhi-global.com/inquiry/inquiry_nuclear.html</a>		
<b>Phone</b>	+81-3-6716-3111	<b>Fax</b>	+81-3-6716-5800

## Corporate Information

### — Integrated, Comprehensive Technology to Meet Society's Needs, from Developing New Technologies to Design, Production, Service —

All four of Mitsubishi Heavy Industries, Ltd. (MHI)'s operating business domains, our research and development centers throughout Japan, and our manufacturing facilities mesh together to develop the next generation of technologies from design and manufacturing to the provision of services. Moreover, all of our technologies and expertise built within each of our fields are forged into an organic whole, into a global deployment of manufacturing writ large, to create new value.

## Nuclear Power Generation

As a leading manufacturer of nuclear power plants, MHI is active across the entire nuclear power industry by way of supplying pressurized water reactor (PWR) nuclear power plants, developing fast breeder reactors (FBR) and engaging in nuclear fuel cycle related business.

MHI has supported the successful operation of all of 24 PWR nuclear power plants in Japan with a total output of more than 20,000 MWe since 1970. MHI is continuously contributing to a stable electricity supply with our extensive experience and practical accomplishments.

## Sophisticated Production Capabilities Contribute to a Low-Carbon Society

Based on the customers' excellent trust in our abundant experience and capability with high technologies, MHI has been the No.1 Supplier, among other Japanese suppliers in the field, of major heavy components for the overseas market such as the United States, Europe, and other overseas countries.

In response to the increasing global demand for nuclear power plants, along with the momentum to control emission of greenhouse gas, MHI is aggressively promoting export business of PWR nuclear power plants and the major components required to contribute to the realization of a low-carbon society.

## Nuclear Power Plants

- PWR (Pressurized Water Reactor)
- ATMEA1 (Mid-sized PWR jointly developed with AREVA)
- U.S. / EU-APWR (The U.S. / EU large sized Advanced PWR)
- Next-Generation PWR

## Advanced Reactors

- Fast Breeder Reactor (FBR)
- Nuclear Fusion Reactor
- High Temperature Gas-cooled Reactor
- Integrated Modular Water Reactor (IMR)

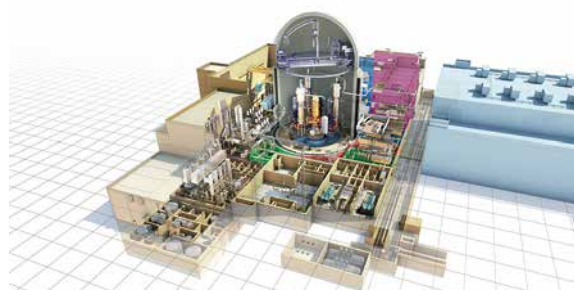
## Nuclear Fuel Cycle, etc.

- Fuel Fabrication
- Spent Fuel Reprocessing Facility
- Spent Fuel Transportation/Storage Cask
- Spent Fuel Interim Storage Facility
- MOX Fuel Fabrication Facility
- Various Disaster Support Robot, etc.

## Post-Operational Services

- Statutory Periodical Inspection
- Replacement
- Repair
- Degradation Prevention and Mitigation
- Long-Term Maintenance Planning
- Operational Support, etc.

The ATMEA company is a joint venture between AREVA and MHI, two of the world's leading nuclear suppliers.



ATMEA1 (The mid-sized Generation III<sup>+</sup> PWR)



## Toshiba Corporation

[http:// www.toshiba.co.jp/nuclearenergy/english](http://www.toshiba.co.jp/nuclearenergy/english)

<b>Address</b>	72-34, Horikawa-cho, Saiwai-ku, Kawasaki, 212-8585, Japan
<b>Phone</b>	+81-44-331-0552
<b>Fax</b>	+81-44-548-9500

### Corporate Information

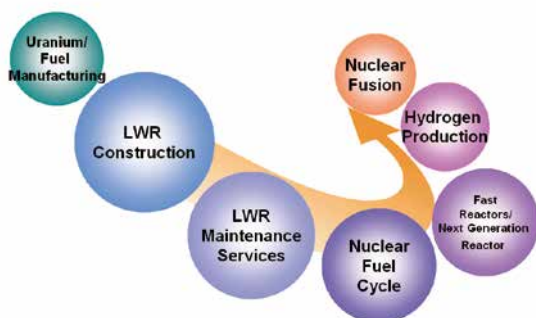
Toshiba, with group company Westinghouse Electric Company, leads the global nuclear industry with capabilities in both Boiling Water Reactor (BWR) and Pressurized Water Reactor (PWR). Our comprehensive research and investment support advances in nuclear power safety and efficiency.

### Products and Services

Abundant experience in plant construction and ceaseless efforts in technology development assure that we deliver nuclear power plants and services offering high levels of safety, reliability and economic efficiency.

With Westinghouse, we provide fuel, services, plant design, construction and equipment for both pressurized water reactor power plants and boiling water reactor power plants.

We also offer new solution in the field of energy, the environment and healthcare by drawing on advanced technologies derived from R&D in nuclear fusion, accelerator and superconducting magnets.



Nuclear energy business domain



ABWR Advanced Boiling Water Reactor (Kashiwazaki-Kariwa Nuclear Power Station unit No.6 and No.7: TEPCO)



AP1000™ Next Generation Pressurized Water Reactor (Sanmen Nuclear Power Station unit No.1: SNPC)

### Main Products

- LWR Construction
  - Advanced Boiling Water Reactor (ABWR)
  - Boiling Water Reactor (BWR)
  - Next generation pressurized water reactor (AP1000™)
  - Pressurized water reactor (PWR)
- Steam turbine and auxiliary equipment
- Digital instrumentation, control and electrical systems
- Service and maintenance for operating plant
  - Laser Peening System for SCC mitigation
  - Laser Welding System
- Decommissioning
- Fast Reactors (FR)
- Nuclear fuel
- Reprocessing facilities
- New Technology Application
  - Fusion Reactor Equipment
  - Accelerator
  - Superconducting applications



High Performance Turbine



Portable Laser Peening Equipment



ITER TF Coil (International Thermonuclear Experimental Reactor)





**M**anufacturing

## Entry Companies

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Power and productivity  
for a better world™



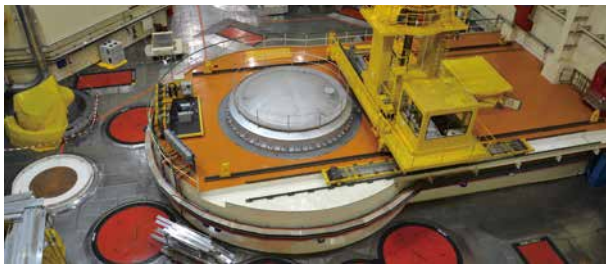
<http://new.abb.com/enterprise-software>

<b>Address</b>	ThinkPark Tower 22F, 2-1-1, Osaki, Shinagawa-ku, Tokyo, 141-6022, Japan		
<b>Contact Person</b>	Mr. Taku Niioka	<b>E-mail</b>	jpabb.communications@jp.abb.com
<b>Phone</b>	+81-3-4523-6200	<b>Fax</b>	+81-3-4523-6290

## Corporate Information

ABB provides industry-leading software and deep domain expertise to help the world's most asset-intensive industries, including nuclear generation, solve their biggest challenges, from plant level, to regional network scale, to global fleet-wide operations.

Our enterprise software portfolio offers an unparalleled range of solutions for asset performance management, operations and workforce management, network control, and energy portfolio management to help customers reach new levels of efficiency, reliability, safety and sustainability. We are constantly researching and incorporating the latest technology innovations in areas such as mobility, analytics and cloud computing.



## Nuclear Industry Solutions

As the independently-ranked #1 solution provider for asset and workforce intense industries, ABB's software solutions are proven to accelerate uptime, yield and profit, while reducing risk and boosting safety and compliance. We offer unmatched capabilities to integrate information technologies (IT) and operational technologies (OT) to provide complete solutions to our customers' business problems. ABB's nuclear solutions provide for best practices and align with the Core and Business Operational Processes within the NEI Standard Nuclear Performance Model (SNPM) across the entire asset lifecycle, establishing a very competitive nuclear fleet environment and optimizing electricity production at greatly reduced costs.

ABB offers a comprehensive nuclear solution for enterprise asset and operations management, as described below.

ABB's Asset Suite is designed to enable, integrate and automate Enterprise Asset Management (EAM) processes in complex environments to facilitate operational excellence. With comprehensive functionality for Asset & Work Management, Materials & Procurement, Safety & Compliance,

and Mobility, Asset Suite is used in hundreds of fossil generation plants and at over 50% of all nuclear fleets globally.

Our generation-specific functionality, advanced architectural foundation, and extensive implementation experience make Asset Suite the ideal catalyst to enable clients to gain performance improvements with best practices for:

- Workflows that are adaptable to a client's specific business processes and are easy for the workforce to learn and use
- Maintenance procedures to improve equipment reliability and performance while at the same time reducing operating costs
- Planning and prioritization of work and resources to support plant outages, including rotating resources across the enterprise
- Simplified assignment and management of engineering work requirements
- Institutionalized work history data and operational practices to address aging workforce issues
- Accelerated deployment of systems to support new plant construction and operations

### Customer benefits have included:

- Up to 25%-35% savings in maintenance costs
- Up to 20% improvement in asset utilization
- Up to a 20%-30% reduction in material costs

ABB's electronic Shift Operations Management System (eSOMS) ensures the safe, efficient, and reliable operation and maintenance of facility assets. eSOMS aids in automating and integrating the major processes of plant operations management, facilitating data sharing and reducing the amount of data entry required. With eSOMS, companies have easier access to information and recordkeeping, consistent & compliant processes, enhanced efficiency, productivity and safety, and overall reduced time and costs of operations activities.

### Customer benefits have included:

- 45-minute reduction in critical path outage
- 5-day reduction in first outage
- US\$3-5M in savings in replacement power costs
- 10% reduction in duration of every outage (2-3 days)
- 33% reduction in personnel time required to conduct plant rounds
- 25% reduction in the number of personnel working on tagging related activities
- 68% reduction in the number of tags hung in the plant after first outage; 75% reduction by 2nd and 3rd outage

<b>Address</b>	5-6-3, Sotokanda, Chiyoda-ku, Tokyo, 101-0021, Japan		
<b>Contact Person</b>	Mr. Akira Hara	<b>E-mail</b>	ahara@adfutech.com
<b>Phone</b>	+81-3-6803-0177	<b>Fax</b>	+81-3-3839-0177

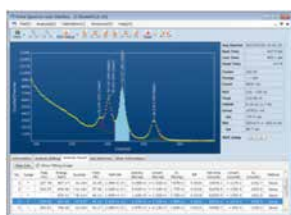
## Corporate Information

AdFuTec was established in 2004. Despite its small size, almost all staff of the company have over 25 years of business experience in the nuclear related market in Japan. AdFuTec is well-known among our valued customers for our professionalism.

## Main Products

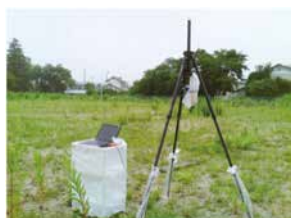
### Prime Spectrum User Interface

MCA emulation, data acquisition and analysis software for Gamma Spectroscopy.



- Features:
- Simple and easy operation
  - Data acquisition and hardware control
  - Gamma-ray spectrum analysis from "Middle" resolution detectors
  - Peak viewer
  - Analysis report
  - Support for multiple file formats
  - Multiple language support

### Prime In-Situ System



- Features:
- "Middle" resolution Gamma Spectroscopy System
  - Suitable for soil contamination screening
  - Suitable for environmental measurement
  - Analysis method: ICRU Rep.53
  - Lightweight, compact and easy to carry
  - Quick installation and easy setup
  - Battery operation
  - USB connection to MCA

### AFT-DDS

#### Portable Radiation Depth Distribution Spectrometer

This device provides an optimum solution for soil contamination having depth distribution.

- Features:
- Built in 20 each CsI (TI) scintillators and HV modules
  - Scintillations: 10mm x 10mm x10mm (placed with 20mm intervals)
  - 512 Channel conversion gain/spectrum memory
  - Waterproof and dustproof
  - Dimensions: 125mm x 71mm x 200mm
  - Rod: 30  $\phi$  mm x 430mm
  - Weight: < 3.0kg



### AFT-NDA2

#### Food Screening System with Non-Destructive Sample Assay

- Features:
- Sample preparation not needed
  - MDA < 10Bq/kg @ 1kg sample/10min measurement
  - Sample weight range: 300g – 2,000g
  - Built in 5" x 5" NaI (TI) scintillator, HV. MCA
  - Sample room size: 315mm x 315mm x 180mm
  - Energy range: 50 – 3,000keV
  - 1,024ch spectrum
  - Size: 466mm x 466mm x 790mm
  - Weight: 430kg
  - Easy operation with analysis software



# TECHNOL CHIYODA TECHNOL CORPORATION

<http://www.c-technol.co.jp/>

<b>Address</b>	1-7-12, Yushima, Bunkyo-ku, Tokyo, 113-8681, Japan		
<b>Contact Person</b>	Mr. Tatsuya Kobayashi	<b>E-mail</b>	ctc-w@c-technol.co.jp
<b>Phone</b>	+81-3-3816-5267	<b>Fax</b>	+81-3-5803-1940

### Corporate Information

Established in 1958, Chiyoda Technol Corporation (CTC) has been providing its services and goods related to radiation protection through 27 sales branches throughout Japan.

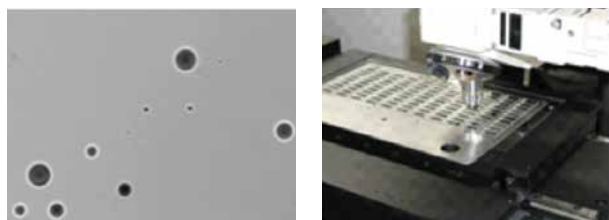
### Personal Dosimetry Services with RPL Glass Dosimetry

CTC is the primary personal monitoring services company in Japan that had started with film badge services in 1956. Since 2000, we have succeeded in the replacement of film dosimeters by glass dosimeters, covering about 60% of market share in Japan including all kinds of radiation field workers in hospitals, schools, research institutes and nuclear power stations (approx. 3,700,000 measurements/year) in Japan. Glass dosimeters called "Glass Badge" is "the State of the Art" whole body personal dosimeter. Its quality has been recognized in Europe (IRSN adopted more than 200,000 Glass Badges in France).



Photo © IRSN / Grégoire Maisonneuve

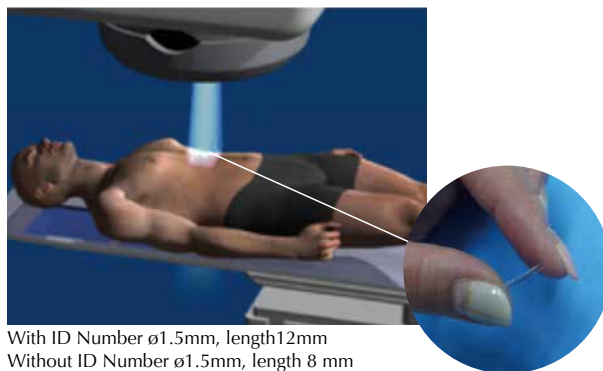
We also supply the highest quality and a wide range of solid state detector for **neutron monitoring**, which is used at majority of the nuclear power plants in Japan (400,000 Neutrons detectors every year)



PADC with very few back ground

### In-vivo RPL Dosimetry System

Our **small dosimetry** system called Dose Ace is particularly suitable for verification of dose delivered during radiotherapy and diagnostic imaging use.



With ID Number ø1.5mm, length 12mm  
Without ID Number ø1.5mm, length 8 mm



### RPL Environmental Monitoring System

High liability and precision are the undeniable asset of Radio-Photo luminescence (RPL) technology in environmental monitoring such as Gamma ray around nuclear plants, Synchrotron facilities and X-ray for hospitals.



### Calibration Services

As the only one private accredited laboratory with International Laboratory Accreditation Cooperation (ILAC/MRA) in Japan, the Oarai laboratory possesses measurement standards and reference standards traceable to international and national measurement standards.

\* We can provide our dosimetry systems upon your inquiry.





# Dainichi Machine and Engineering Co., Ltd.

<http://www.dainichikikai.co.jp>

<b>Address</b>	1-11-15, Kitasaiwai, Nishi-ku, Yokohama, Kanagawa, 220-0004, Japan		
<b>Contact Person</b>	Mr. Hirohisa Ueda	<b>E-mail</b>	ueda@dainichikikai.co.jp
<b>Phone</b>	+81-45-311-6803	<b>Fax</b>	+81-45-314-6049

## Corporate Information

Dainichi made use of its rich experience in designing and producing nuclear power plant apparatus and has played a big role in correspondence since the Fukushima Daiichi accident. As we celebrated the 50th anniversary of foundation in 2015, we are expanding our business in new fields such as hydrogen energy, in addition to the design production analysis in the field of nuclear power industry which we have cultivated for many years.

## Main Activities

Dainichi was established by two experts in the field of industrial equipment design in 1965. These two founders started their business from scratch by taking orders and making designs for the handling apparatus in the nuclear reactor, successfully resulting in putting automatic apparatus-related machines to use for in-service inspection work at power stations.

Dainichi develops various products such as sub-merged remote processing equipment, handling device of the electric discharge device and remote abrasion device. Based on our knowledge and experience at the nuclear power facilities over the years, we can offer products in accordance with customer needs now and in the future.

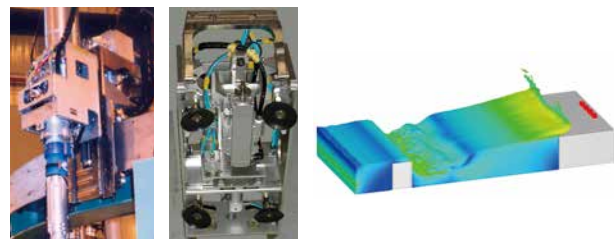
## Consulting Service

We believe that manufacturing is the base for every product, but engineering and analysis are also important. The necessary construction menu is often decided after the structural analysis under severe conditions and flow dynamics. We understand how the structure and instrumentation in a real nuclear power plant work. We therefore are confident that the needs of our customers can be met perfectly. In addition, we have seen successful results based on our recommendations to our customers, such as the use of light weight materials resulted from analysis and omitting unnecessary steps during production process. The analysis tools to be used mainly are NX™/NASTRAN, LS-DYNA®, FLOW-3D®, FloEFD™, and STAR-CCM+®.

Most products supplied from foreign countries are designed and made based on foreign standards such as American Society of Mechanical Engineers (ASME). We perform various types of analysis to match these products with the Japanese standards when they are introduced into Japan. Foreign products, before being imported to Japan, require authorization in accordance with national law and standards. We can offer sound advice on Japanese standards, laws and ordinances to our foreign customers in order to find a quick solution.

## Next Generation Technology

As Dainichi successfully provided the consecutive hydrogen production examination facilities to Japan Atomic Energy Agency (JAEA) in 2014, we are focusing on the hydrogen energy development now.



From JAEA photo

# DAINIPPON PLASTICS CO., LTD.

<http://www.daipla.co.jp>

Chapter 2

DAINIPPON PLASTICS CO., LTD.

<b>Address</b>	Shinagawa Inter City A-30F, 2-15-1, Kounan, Minato-ku, Tokyo, 108-6030, Japan		
<b>Phone</b>	+81-3-5463-8501	<b>Fax</b>	+81-3-5463-1120

## Corporate Information

At Dainippon Plastics Co.,Ltd., we have been pursuing the creation of "new forms" as a plastics manufacturer to realize the potentials of chemistry and social prosperity since our founding in 1956. To achieve this, we have sought to create valuable products in diverse fields with high levels of motivation and sincerity.

By utilizing the connections of the Daipla Group we have established over the years, we have access to flexible information links and have the capability to develop multiple types of products types of from one idea and to feed back market information to the development site in real time. Through these initiatives, we are taking steps to create a system that responds flexibly to market needs.

## Main Activities

Daipla is a leading company and a pioneer in the development of large plastic pipes for gravity and pressure pipes in Japan. Today, plastic pipe systems enjoy the greatest demand and the fastest growth rate worldwide. We provide these pipe system for industrial applications such as intake/outfall, chemicals, drainage, sewerage, water treatment and hydraulic transportation.

## Gravity Pipes ID $\phi$ 300~ $\phi$ 3000mm

Gravity pipe system is designed for high pipe stiffness to withstand external load. The gravity pipes are produced with a structured (profiled) wall.

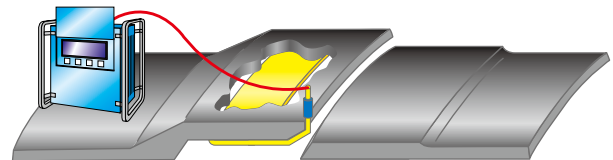


Diameter of 3m



Flexibility pipe

## Pressure Pipes



- Easy fusion joining
- Realization of an integrated pipeline
- Fusion joining even in narrow spaces
- Realization of weight saving
- Good workability
- No cracking even in cold areas

Pressure pipe system is designed for high internal pressure. The pressure pipes are produced with a homogeneous solid wall. They are either made out of fully high density polyethylene or out of a compound (based on high density polyethylene and glass fibers.)

The advantage of this pipe system is the perfection, the end finish of the pipes. Every pipe can be produced directly with an integrated socket and spigot or every other end design which is available.



Generation facilities



Seawater intake pipe



# Fuji Electric Co., Ltd.

<http://www.fujielectric.com/products/nuclear>

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## Corporate Information

### Corporate Mission

We, Fuji Electric, pledge as responsible corporate citizen in a global society to strengthen our trust with communities, customers and partners.

Our mission is to:

- Contribute to prosperity
- Encourage creativity
- Seek harmony with the environment

## Main Activities

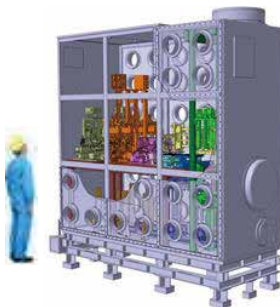
Beginning with the construction of Japan's first commercial nuclear power station (the Tokai Power Station, a gas-cooled reactor) in 1965, Fuji Electric has made significant contributions to the establishment of the nuclear fuel cycle and the expansion of nuclear power as a clean form of energy that does not produce carbon dioxide by utilizing three core technologies: remote handling, waste treatment, and high-temperature gas-cooled reactors.

## Core Technologies and Main Products

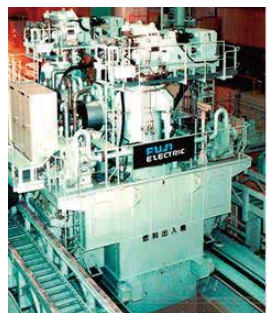
Fuji Electric is a unique company in the nuclear business field. Our principal experience is as follows:

### 1. Remote Handling Technologies

- MOX Fuel Pellets Manufacturing facility
- Fuel Transfer Systems

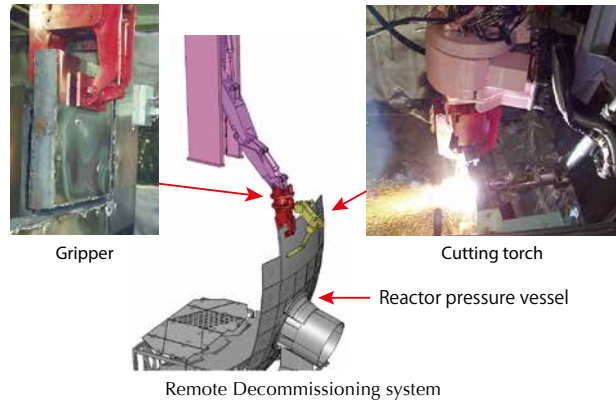


Fuel Pellets inspection equipment



Ex-vessel fuel transfer system

- Remote dismantling system



### 2. Radwaste Treatment Technologies

- Fuji Resin Reducer (Spent resin volume reduction equipment)
- SIAL (Geopolymer for radioactive waste treatment)



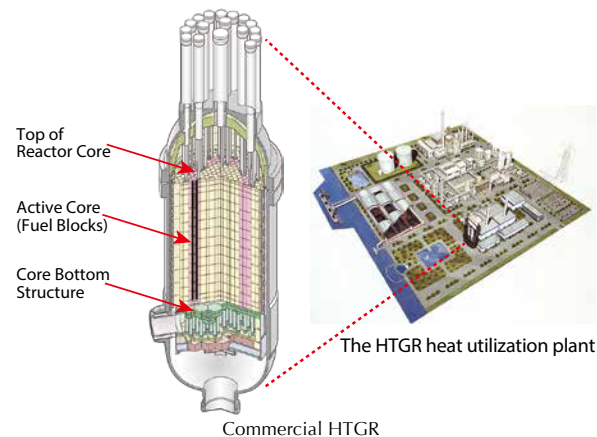
Fuji Resin Reducer



SIAL On-site mixing machine (by courtesy of Amec Foster Wheeler)

### 3. HTGR Technologies

- Commercial HTGR with passive safety feature





<http://www-ng.fujikin.co.jp/>

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### Introduction

Nuclear power plants and thermal power plants are two main pillars supporting energy supply in Japan. The valve equipments used for these plants require higher safety and reliability in compliance with the guidelines and laws including Electricity Enterprises Law.

Fujikin has so far delivered many types of instrumentation valves to nuclear power plants of PWR (pressurized-water reactor)

and BWR (boiling-water-reactor) types throughout the country. Based on these experiences, our valves products have been also adopted by nuclear fuel reprocessing plants.

Fujikin has many clients also in the field of thermal power plant, not only in Japan but also worldwide, receiving high acclaims for its quality and reliability.

Fujikin promises to provide security, safety and reassurance through our products.

Grand-sealed instrumentation valves



Two valve manifolds



Metal diaphragm-sealed instrumentation valves



Excess flow check valves



IA header valves



Fail-proof devices



Tubes connectors for nuclear application



Mini control valves



Bellows-sealed valves



Pin-type snubbers



After-sales service



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## Corporate Information

The Hirata Valve Industry Co., Ltd. (HVI) is a specialty valve maker for energy since 1937.

Recently we piled up many track records and became a trustworthy leader in the valve making industry, by manufacturing products for nuclear power plants and LNG plants, in which social responsibility is highly required.

Our company creed is to serve our society by manufacturing advanced, user-friendly and user-considerate valves from the user point of view.

Under our company creed, we strive to offer reliable products of high quality and high performance within customer's budget. Furthermore, we undertake research and development of new products based on current needs, such as environmental preservation and energy saving resources, and contribute to the development of the energy industry.

## Main Activities

We produce our valves based on customer's need and demand. Our wide range of basic product lineup is as follows:

- **Valve Type**  
globe valve, needle valve,  
gate valve, lift check valve,  
swing check valve, tilting check valve,  
ball valve, butterfly valve,  
tank bottom valve, Y-type strainer,  
safety valve and others
- **Operation Type**  
manual, air, electric and solenoid operation
- **Pressure Class**  
150LB-2500LB,  
JIS10K-63K,  
PN10-PN100
- **End Connection**  
flange,  
socket welding (SW),  
butt welding (BW)
- **Nominal Size**  
6A-1500A,  
1/8B-60B (Differ according to the valve type)

## Material

carbon or low alloy steel(forgings, castings),  
austenitic steel(forgings, castings)

## Field

LNG terminal,  
thermal power station,  
nuclear power station,  
process industry plant(oxygen, nitrogen, oil, chemistry  
and food, etc.),  
space rocket liquid hydrogen device,  
and others

## Development Information

After the 3.11 Fukushima nuclear accident, we have been carrying out manufacture and delivery of valves to be used for decontamination equipment for radioactive water in the nuclear power plant, as well as valves for filter vent equipment required in case of a severe nuclear power plant accident.

Our isolation valve of filter vent equipment is especially worth noting. We succeed in developing new rubber-free butterfly valves of the metal sheet with 200°C+ heat resistance and radiation proof features.

The butterfly valves of a metal sheet are shown in Fig.-1 and Fig.-2.

Fig.-1 is class 150-400A(16B) motor drive butterfly valve and Fig.-2 is class 300-400A(16B) air operation butterfly valve.



Fig.-1



Fig.-2



# Hitachi, Ltd.

<http://www.hitachi.com/>

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<b>Phone</b>	+81-3-6284-3673	<b>Fax</b>	+81-3-6284-3656

## Corporate Information

It was in 1954 when we first released our radiation measuring instruments.

Since then, we have been providing quality products for various fields including nuclear power plants (NPPs), medicine, biochemistry, and pharmacology. These have played crucial roles in radiation (safety) management, research, and examination around the world.

As the pioneer in the field of radiation measurement, we have contributed greatly to the peaceful use of atomic energy and the development of isotope technology. We will continue to assist the progress of medicine and energy for the new age.

## Main Activities

We have the expertise from development and manufacturing to sales and inspections for various types of radiation measuring instruments including the products below.

- 1. Survey Meters** are hand-held measuring devices for radiation dose rate and radioactive surface contamination. Optimal types can be selected from a large lineup according to various purposes of use.
- 2. Electronic Pocket Dosimeters** measure radiation exposure of individuals. Our large lineup provides product types fit for each purpose of use.
- 3. Monitors for NPP** measure environmental radiation and samples related to power plants to enable safer management. Our portable area monitors are one of the major products for measuring Gamma dose rate.
- 4. Monitors for hospitals, research institutions and other facilities** support precise radiation control. Radiation central console can collect measurement values throughout the facility, ensuring radiation safety.
- 5. Liquid Scintillation Systems** measure radioactivity in environmental samples as well as every type of low energetic Beta research. This is used in various applications including pharmacokinetic studies.

## Products

### Survey Meters



### Electronic Pocket Dosimeters



### Liquid Scintillation Systems



### Portable Area Monitors



# Hitachi Zosen Corporation

Hitachi Zosen

<http://www.hitachizosen.co.jp/english/index.html>

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## Corporate Information

Environmental protection, plants, precision machinery, disaster prevention – in each of these fields, the Hitachi Zosen Group, founded in 1881, is providing safer and more comfortable today, and working to create a more affluent tomorrow. Its business domain includes the manufacturing of industrial machinery and process equipment, engineering of state-of-the-art environmental plants, creation of information technology-related business, offering of relevant proposal, and provision of services in a range of fields.

## Main Activities

Hitachi Zosen has over 30 years of experience in nuclear field. Especially for transport/storage cask, we have been providing the service of development, design and manufacturing as a pioneer in Japan.

In 2013, we acquired “NAC International Inc.”, a leading nuclear fuel cycle management company focused on engineering and transportation of cask and canisters in U.S., giving us the capability to provide “one-stop” integrated solution service in the global market.

In addition, we have a manufacturing system of components for nuclear power plants including heat exchanger.

## Products

- Transport/Storage Cask and Canister
- Components for Nuclear Power Plant
  - Vessel & Tank
  - Heat Exchanger
  - Piping Module



Transport Cask



Storage Cask



Canister (Basket)

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<b>Contact Person</b>	Mr. Kazuhide Tomita	<b>E-mail</b>	kazuhide_tomita@ihico.jp
<b>Phone</b>	+81-45-759-2293	<b>Fax</b>	+81-45-759-2891

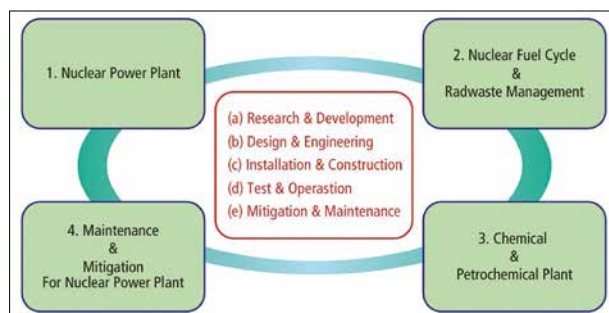
### Corporate Information

IHI is a leading company in providing significant components for nuclear power plants since 1955, such as reactor pressure vessels, primary containment vessels, and piping systems. We have delivered and installed 24 RPVs for both Boiling Water Reactor (BWR) and Advanced Boiling Water Reactor (ABWR) types. IHI is also involved in the development and construction of nuclear recycling system and involved in maintenance & mitigation field. Furthermore, we are expanding our technology to component supplies for Pressurized Water Reactors (PWR) for world market, such as Steam Generator, Reactor Vessel and Containment Vessel.

We seek to solve energy related problems of the 21st century, through offering nuclear power-related key components made by our unique technology focusing on "Monozukuri" technology.

### Main Activities

Main activities of IHI nuclear business are shown in the figure below. In each business, IHI performs "research & development", "design & engineering", "installation & construction", "test & operation" and "mitigation & maintenance", supplying total solutions in each field.



### Products & Services

#### 1. Nuclear Power Plant Type of Reactor

##### Types of Reactor

- Boiling Water Reactors (BWR)
- Advanced Boiling Water Reactors (ABWR)
- Pressurized Water Reactors (PWR)

##### Significant Components and Services

- (1) Reactor Pressure Vessel (ABWR, BWR)  
Reactor Vessel (PWR)

- (2) Reinforced Concrete Containment Vessel (ABWR)  
Containment Vessel (BWR, PWR)
- (3) Piping & structure module
- (4) Steam Generator (PWR) and other heat exchangers
- (5) Engineering and design
- (6) Installation of above components



Reactor Vessel (PWR)



Containment Vessel (PWR)



Steam Generator (PWR)

#### 2. Nuclear Fuel Cycle & Radwaste Management

- (1) Waste receptacle and storage facility
- (2) Radioactive waste verification facility

#### 3. Chemical & Petrochemical Plant

- (1) Ethylene-Oxide Reactor
- (2) Salt bath type (Acrylic Acid, Methyl Methacrylate, etc.)

#### 4. Maintenance & Mitigation for Nuclear Power Plant

- (1) Inspection technologies
- (2) Robot technologies
- (3) SCC (Stress Corrosion Cracking) preventive technologies
- (4) Laser weld technologies

#### 5. Decontamination & Decommissioning of Nuclear Facilities

- (1) Decontamination technologies
- (2) Segmentation technologies
- (3) Remote handling
- (4) Waste management

### Qualifications Possessed

- Authorization for the manufacture of boilers & Class 1 pressure vessel
- Authorization to use U, U2, S, N, NA & NPT stamps of the American Society of Mechanical Engineers (ASME)
- Level 1 of evaluation of welding shop performance of Japan Power Engineering and Inspection Corporation (JAPEIC)
- Authorization for the manufacture of nuclear power, thermal power and chemical process equipment and devices in compliance with ISO 9001
- Authorization for the Environmental Management System in compliance with ISO 14001





<http://www.konecranes.com>

<b>Address</b>	5300 S. Emmer Drive, New Berlin, WI 53151, USA		
<b>Contact</b>	Mr. Troy Fowler (troy.fowler@konecranes.com)		
<b>Phone</b>	+1 (360) 581-6990	<b>Japan office</b>	+81 (3) 5436-6446

### Corporate Information

Konecranes Nuclear Equipment & Service (KNES) is a 100% American subsidiary of Konecranes PlcOy, a Finland-based leading world supplier of industrial cranes and lifting equipment with over \$2 billion USD in annual sales (NASDAQ Helsinki: KCR1V). KNES provides cranes, lifting equipment, site services, outage support, modernizations of existing equipment and related engineering services for nuclear installations around the world and is one of the industry's premier leaders in nuclear material handling. With our products in over 60% of nuclear facilities worldwide, our breadth of product and service offerings sets the global standard for nuclear material lifting. KNES started from the nuclear division of legacy crane supplier P&H. Our history in supplying nuclear-grade cranes and equipment, including hoisting equipment on many fuel bridges and refueling platforms around the world, extends back over 50 years. In Japan, KNES works in collaboration with Konecranes Japan, Inc., which has in-country resources for supplying and servicing your equipment.

### Main Business Areas

KNES designs, builds, sells and upgrades nuclear lifting equipment including cranes, fuel handling systems and spent fuel transporters around the world. We also provide many engineering and operational support services. KNES boasts over 40 in-house engineers specializing in seismic and structural analysis, regulatory compliance and nuclear safety-systems. We also have a global network of service technicians that provide outage support, crane inspections and certifications.

#### Nuclear cranes and lifting systems

- Reactor & turbine building, cask handling & spent fuel cranes
- Manipulators, electric hoists and monorails

#### Crane modernizations

- Trolley & hoist upgrades to single failure proof (SFP)
- Control upgrades, radio control conversions
- Capacity upgrades, system automations

#### Engineering Services

- Seismic & structural analysis, safety and regulatory compliance, procedure & DCP writing

#### Inspections

- Robotic rail and rope surveys

#### Spent Fuel Transporters

- Vertical cask transporters



# OKANO VALVE MFG. CO. LTD.

<http://www.okano-valve.co.jp/en/index.html>

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<b>Contact Person</b>	International Sales Section Sales Dept. Sales Headquarters	<b>E-mail</b>	okano-kaiei@themis.ocn.ne.jp
<b>Phone</b>	+81-93-372-9244	<b>Fax</b>	+81-93-382-1200

## Corporate Information

Established in 1926, OKANO VALVE MFG. CO. LTD. has been on the front line in development and design of some of the world's most important valves. With the expansion of thermal and nuclear power plants in and outside of Japan, these valves help provide the base for our current technology. OKANO manufactures most types of valves used for thermal and nuclear power plants, as well as other fields of industry. Covering ultralow to ultrahigh temperatures as well as vacuum area to high pressure, these valves total more than one million.

## Main Activities

### 1. Design

- Designing of valves for thermal and nuclear power plants in accordance with applicable codes, standards and regulations such as ASME, ANSI, JSME, JIS and JEAC

### 2. Manufacturing (Valves and Materials)

- Line valves, pressure relief valves and safety valves
- Steel casting materials conforming to the codes and standards, such as ASME and JIS
- Performing Nondestructive examination for casting materials and valve parts

### 3. Material Supply

- Supplying steel and non steel materials

### 4. Maintenance

- Providing maintenances for valves delivered to the customers for safe and high operation

### 5. Quality Assurance Program

- Establishing, maintaining and implementing the Quality Assurance programs



Head Office



MSIV

## Products & Technologies

### Material Organization

Having our steel casting shop, we manufacture quality casting material including valve parts for manufacturing proved by many data accumulated.



### Technologies

OKANO is the world's first valve manufacturer to produce valves with seat surfaces overlaid with stellite alloy. This technology has been adopted worldwide as the standard in valve manufacturing.



### Main Steam Safety Relief Valves

OKANO's design and development of the Main Steam Safety Relief Valve (MS-SRV) is one of the most important valves to assure safety of BWR and ABWR nuclear power plants. Proving our technology is capable of responding to future development, the MS-SRV has been adopted by all BWR nuclear plants throughout Japan.

In addition, having obtained the ASME NV Certificate, the MS-SRV manufactured by OKANO is ready to be adopted worldwide.



**Valves for overseas nuclear power plants**  
Aiming to increase orders for Nuclear Power Plants overseas

# TVE TOA VALVE ENGINEERING INC.

<http://www.toavalve.co.jp/english/>

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<b>Phone</b>	+81-6-6416-8865	<b>Fax</b>	+81-6-6416-1207

## Corporate Information

### “Safety”, “Security” and “Confidence”

Toa Valve Engineering Inc. has supplied the valves for all nuclear power plants (PWR, BWR, ABWR, FBR) in Japan from the Japan's first commercial nuclear power plant-Tsuruga Unit No.1 in 1967. Moreover, our valves are used as the main valves for the primary and secondary system of all PWRs (Pressurized Water Reactor) in Japan. TVE has also provided the critical maintenance services for safety and reliable operation in reply to the various customer's needs. Our valves are also used at nuclear plants in USA, Mexico and China.

TVE has provided consistently manufacturing, sales, maintenance of industrial valves and safety valves as one of the leading valve suppliers, along with changes in the main market, such as for ships until about 1945 and for power plant during the years of high economic growth.

### “Opening”, “Closing” and “Relieving”

We have prided ourselves on contribution for the stable electric supply through the safety and reliable operation of power plants, providing the products which fulfill those functions reliably under all circumstances and maintenance. We put our continuous effort into contribution of the development of economy and society while respecting the each culture and custom of country/region as well as complying with the international rules and the local laws to cooperate with international society.

It is our belief that our considerable experience and high quality acquired through half a century of valve design and manufacturing for nuclear will respond to the needs of a new era.

## Main Activities

### Manufacturing and maintenance of cast & forged steel and stainless steel valves, etc.

- Nuclear Power Generation,
- Conventional Thermal Power Generation,
- Petroleum, Petrochemicals, General Chemicals, and various vessels

covering the ranges from ultra high-temperature to ultra low-temperature and from ultra super critical pressure to low pressure.

### Valve Types:

Gate valves, globe valves, check valves, safety valves, relief valves, needle valves and various other special valves

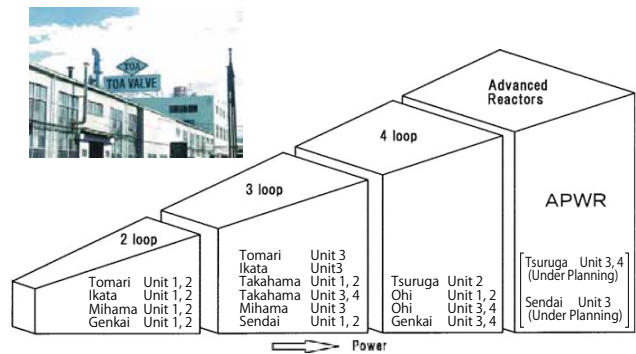
### Manufacturing and supply of various maintenance equipment;

- Computer aided diagnosis equipment for motor operated valve: “TACS (TVE Actuator Characterizing System)”, etc.

## Products

### Supply results for PWR in Japan

Since the first reactor unit was constructed, TOA valves have been delivered to evolving Japanese nuclear power plants.



### Main products for PWR nuclear power plants

- Pressurizer Safety Valve (Inlet Flange Size:150A)**
- Main Steam Safety Valve (Inlet Flange Size:150A)**
- Electric Motor Operated Wedge Gate Valve (Size:50A and more)**
- Fuel transfer channel gate valve (Size:500A-850A)**
- Check Valve (Size:80A and more)**
- Moisture Separator Reheater Relief Valve (Inlet Flange Size:400A-600A)**



# Yokogawa Electric Corporation

YOKOGAWA

<http://www.yokogawa.com/>

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<b>Phone</b>	+81-422-52-5637	<b>Fax</b>	+81-422-52-6672

## Corporate Information

Founded in 1915, Yokogawa Electric Corporation has over 100 years' experience in the measurement, control, and information businesses, and provides leading-edge products and services to industry. The high added value created with its excellent technologies contributes not only to the development of industry, but also to the realization of an affluent society. The company remains committed to the achievement of a healthy and profitable operation.

## Main Activities

Yokogawa is a leading control company and a pioneer in the development of distributed control systems for the monitoring and control of process in a broad range of production facilities. Its comprehensive solutions range from sensors (such as pressure transmitters, flowmeters and analyzers) to control systems, software that improves productivity, and services that optimize plant lifecycle costs. These solutions currently play vital supporting roles for our customers in the electric power industry (including nuclear), oil, chemical, natural gas, iron and steel, pharmaceuticals, food, and other industries.

Based on Yokogawa's vision for realizing the ideal plant, we are developing products and solutions that ensure safety, make maximum use of plant assets, enhance production, and optimize operations over the entire plant lifecycle.

## Main Services

### Production Control Systems

We provide our customers with a range of systems that support the safe and efficient operation of their plants. These include highly reliable production control systems for the control and monitoring of plant operations, safety instrumented systems that are fully integrated with plant production control systems to achieve the highest levels of safety, and network-based control systems that are both highly reliable and versatile.

In addition, Yokogawa is unique in the sense that it can offer completely diverse and modular analogue systems that employ magnetic elements to process the functional logic, making it inherent failsafe and extremely fast and reliable.



**CENTUM VP**  
Integrated Production Control System



**Prosafe-SLS**  
Safety Instrumented System  
(Solid-state Logic Solver)



**ProSafe-RS**  
Safety Instrumented System



**STARDOM**  
Network-based Control System

### Field Instruments, Analytical Instruments, and Recorders

We offer a full lineup of field instruments for use on production lines. These include transmitters and flowmeters that measure fluid pressure, temperature, and flow rate. We also offer analytical instruments such as pH analyzers and process gas chromatographs for measuring the concentrations of gas and liquid constituents as well as paperless recorders that store measurement data in electronic form.



**DPharp EJX**  
Differential Pressure/Pressure Transmitter



**DXAdvanced**  
Data Acquisition and Display Station



**FLXA21**  
2-Wire Liquid Analyzer



**ADMAG AXF**  
Magnetic Flowmeter



**GC1000 Mark II**  
Process Gas Chromatograph

### Solutions for Manufacturers

We provide total solutions that address the entire range of company activities. These include information management solutions that enhance the visibility of manufacturing operations as well as manufacturing execution and enterprise resource planning (ERP) solutions. By bringing together the production and management domains, we make it possible for companies to manage their operations in real time, thereby maximizing efficiency and enhancing corporate value.



# **S**teel, Metal & Materials

## Entry Companies

<b>01</b> Chouetsu-glass Kaken Co., Ltd.	<b>30</b>
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# Chouetsu-glass Kaken Co., Ltd.

<http://www.chouetsuglass.com/>

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## Corporate Information

Chouetsu-glass Kaken Co., Ltd. was established in 2013 to maximize the technological potential of Kazari-ichi Co., Ltd., which had been developing technologies on silk glass since its foundation in 1971. Silk glass, a new material developed by President Yoko Iwamiya in 1987, has superior character of coating on fibrillose materials such as paper and cloth.

At Chouetsu-glass Kaken, silk glass has been applied to coat tungsten powder thickly on cloth in order to make a tungsten-based sheltering cloth from radioactivity.

Silk glass mainly consists of multifunctional siloxane network polymer and is applied to coat paper decorations for celebration, wood based interior/exterior and other Japanese traditional products. It was used at the Imperial Households and many historic shrines, and also used in an experiment of flying a paper-airplane in space by JAXA.

In March 2011, President Iwamiya noticed that many children were threatened by the fear of radiation exposure. She then decided to establish a new company named Chouetsu-glass Kaken, in order to provide safe and easy wearable shielding goods using silk glass for children. Chouetsu-glass Kaken has developed her silk glass technology to extend to coat metal tungsten powder on cloth to give higher radiation shielding while keeping the flexibility of cloth.

## Main Activities

There are two types for tungsten coated cloth. Both cloth have flexibility with radiation shielding.

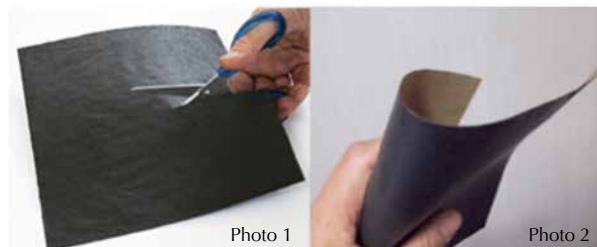
### Flexible tungsten powder coated sheet

It consists of the coating layer of tungsten powder of several micro meters in diameter surrounded by binding silk glass and backing cloth, and has the following features:

1. Radiation shield for  $\gamma$ -ray and X-ray
  - 1/2 shielding thickness for  $\gamma$ -ray from Cs137 is **30mm** including backing cloth. The weight for 1/2 shielding thickness per 1 cm<sup>2</sup> is 7.3g (Pb: 9.8g, concrete 13.3g).
  - 1/10 shielding thickness for 80keV X-ray is **1.7mm**, and **2.3mm** for 100 keV X-ray, which includes also backing cloth.

2. Flexible, bendable and easy to cut and sew

Since the silk glass which encloses tungsten powder and cohere with backing cloth is soft, the coated sheet almost keeps the flexibility of the backing cloth (Photo1 & 2). It can be used with multilayer wrapping.



3. Non-toxic and washable

Different from lead, tungsten is non-toxic, and covered with silk glass which has water repellency and satisfies the safety standard for food vessel.

### Winkle finished flexible tungsten coated sheet

Leveraging with the flexibility of the sheet, a new type of radiation shielding sheet has been developed. Radiation exposure in the environment comes from all surrounding directions, differently from the exposure from a point source.

The wrinkled finishing, which is based on Chirimen, Japanese traditional technology, makes a convexo-concave structure on the surface which gives longer path for beams from multi direction (Photo 3).



## Products

- Flexible tungsten powder coated sheet: 0.34mm thickness from 20cm X 20cm
  - Winkle finished flexible tungsten coated sheet
  - Radiation shield cloths
- Trial production with order (Photo 4)



## Patents

JP 3456956, US 7332196, 2013-202174 (AP), 2014-228874 (AP)



# JSW The Japan Steel Works, Ltd.

<http://www.jsw.co.jp>

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## Corporate Information

Founded in 1907, The Japan Steel Work, Ltd. ("JSW") has been providing various kinds of high quality steel and machinery products to the major global sectors like fossil and nuclear power, steel mill and petrochemical industries. Under the reputation as "General Supplier of Steel Products and Machineries", JSW is highly valued by its clients. Especially in the field of fossil and nuclear power generating equipment market, JSW keeps supplying large scale steel products manufactured with its advanced technologies which have been developed and accumulated through the efforts in its history over 100 years. JSW, as the leading manufacturer of high quality steel forgings on earth, will maintain to support what the nuclear supply chain demands, and continue to contribute to the nuclear industry with its reliable high quality steel products.

## Main Activities

The Japan Steel Works, Ltd., as its name suggests, began as a domestic producer of steel products in Muroran City, Japan. Utilizing a number of extra-large production facilities, notably represented by two units of 14,000-ton forging presses, and with the world's largest ingot of 670 ton commercially available, its broad range of products including large castings, forgings, clad steel plates, and pressure vessels are manufactured. Muroran Plant completed the major capacity expansion programs a few years ago, and has constantly been contributing to the various needs of nuclear development.

Located in Hokkaido, northern major island of Japan, facing a good natural bay called Muroran Bay, Muroran Plant has Melting, Forging, Foundry, Heat Treatment, Machining and Weld Fabrication Shops in a large complex so they can control the products' quality, cost and delivery in the same place easily and effectively.



JSW's Muroran Plant



14,000-ton Press

JSW Muroran Plant is diligently upgrading its capabilities to supply high quality steel products under the most sophisticated quality control system certified by ASME, RCC-M, ISO, TUV, JIS and other multi-national authorities.

## Products

### NSSS Forgings



RPV Bottom Petal



RPV Monoblock Shell Flange



Monoblock RV Head



SG Conical Shell



Primary Loop Piping

### Nuclear Steam Turbine & Electric Generator



Monoblock LP Rotor



Integral MSV Casing



Generator Rotor



Steam Turbine Casing

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**Corporate Information**

The Kobe Steel Group, a global enterprise built around Kobe Steel, Ltd., is engaged in a wide range of fields, with its major businesses in materials (iron and steel, welding, aluminum and copper products), industrial and construction machinery, as well as engineering in the field of natural resources and environmental solutions.

While various energy sources have been reconsidered as countermeasures for global warming, nuclear energy plays a significant role in today's energy supply with ever higher levels of reliability and safety. The Kobe Steel Group is committed to strengthen *monozukuri* and will pursue its unique "Only One" products in this nuclear industry as well.

**Main Activities**

**1. Plants and Equipment**

Interim Storage Facility, Cask Maintenance Facility, Rad Waste Treatment/Handling/Storage/Disposal Facilities

**2. Transport & Storage of Spent Fuel and Waste**

Storage Casks, Transport Casks, Canisters

**3. Chemicals**

Boric Acid (H3BO3), Potassium Fluoroboride(KBF4)

**4. Materials for Pressure Vessels**

Forged Materials, Titanium Alloys, Steel Plates, Welding Materials

**5. Materials for Nuclear Reactors and Nuclear Facilities**

Fuel Channels, Zircaloy Fuel Cladding Tubes, Stainless Steel Fuel Cladding Tubes, Special Alloys

**6. Decommissioning Services**

High-Concentration Radioactive Waste Processing, Metal Recycle



**Products**

**Forged Materials**

As a world-leader of steel castings and forgings, Kobe Steel has been supplying reliable and high-quality products worldwide, earning high degree of trust from our customers.

We are capable to supply various material and shaped forgings for the most-advanced nuclear power plants, based on our advanced technology, using world's largest 130MN Forging press and maximum size of 420t ingot, located at Takasago Works.



**Transport/Storage Casks & Canisters**

Kobe Steel has manufactured and delivered over 250 casks for transport/storage of spent fuel and radioactive wastes generated in nuclear power plants and reprocessing facilities worldwide.



**BWR Fuel Channels**

Kobe Steel, as one of the few companies worldwide engaged in the production of zircaloy products, has accomplished mass-production of Fuel Channels for BWR fuel assemblies as the first Japanese supplier in the early 1970's. We have delivered over 50,000 Fuel Channels worldwide.

**Boron 10**

Kobe Steel has established a mass-production technology for highly enriched boron (more than 96%) for the first time in Japan by joint development with Stella Chemifa Corporation and has delivered enriched boric acid for primary coolant of reactors worldwide.



**High-Concentration Radioactive Waste Processing**

Kobe Steel together with Studsvik AB (Studsvik) has been proposing the patented and proven technology (fluidized bed steam reforming) commonly called THOR (Thermal Organic Reduction) to Japanese market. The THOR process can treat various waste forms including ion exchange resins and other organic wastes.

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## Corporate Information

Mitsubishi Materials Corporation (MMC) and its Group Companies, since established in 1871, have supplied cement and copper materials to build social infrastructure and provided processed metal products, electronics products, technologies and services that are indispensable for industrial activity and everyday life.

The MMC Group has also taken the leadership in advancing the environmental and recycling business for zero-waste society. We have engaged in nuclear energy development to establish the domestic nuclear fuel cycle as well as our involvement in reproductive energy such as geothermal and hydro energy.

## Main Activities

Having started our nuclear fuel cycle R&D in 1954 with domestic nuclear energy program, we have accumulated over 60 years experiences and achievements.

### (1) Research and Development

Research, development and demonstration of nuclear fuel cycle (conversion, fuel manufacturing, reprocessing, waste management and disposal) have been carried out at our facilities using radio-isotopes and nuclear materials.



Solvent extraction experiment



Metal recycling demonstration

### (2) Engineering and Service

Process and plant engineering, and licensing and operational supports are our main activities. Uranium conversion plant, reprocessing plant, waste treatment plant, low-level radio-active waste disposal business support, and also Fukushima Project are our successful achievements.

## Technologies

- Process development using precipitation, solvent extraction, fluidizing bed, rotating furnace, molten metal
- Safety assessment and related data acquisition for waste disposal
- Safety designing of nuclear facilities
- Process simulation, accident simulation

# ACT Nikkeikin Aluminium Core Technology Co., Ltd.

<http://www2.nikkeikin.co.jp/act>

Chapter 3

Nikkeikin Aluminium Core Technology Co., Ltd.

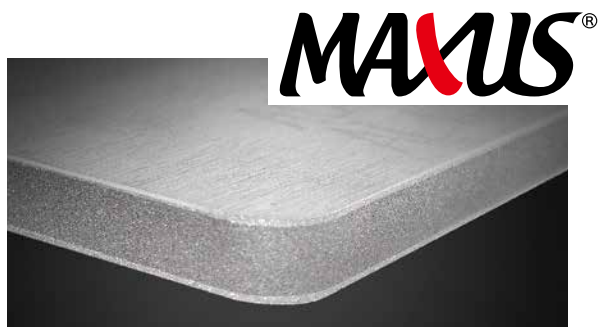
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## Corporate Information

Nikkeikin Aluminium Core Technology (ACT) Co., Ltd. was established in October 2002 and is a 100% owned subsidiary of Nippon Light Metal (NLM) Holdings Company, Ltd. Nikkeikin ACT specializes in manufacturing aluminum extrusion and aluminum processed products and is ISO 9001 and ISO 14001 certified.

Nikkeikin ACT has a diverse and global employee base comprising 140 members, and has created and provided high quality products that have been used by the nuclear industry, construction industry, transport industry and many more.

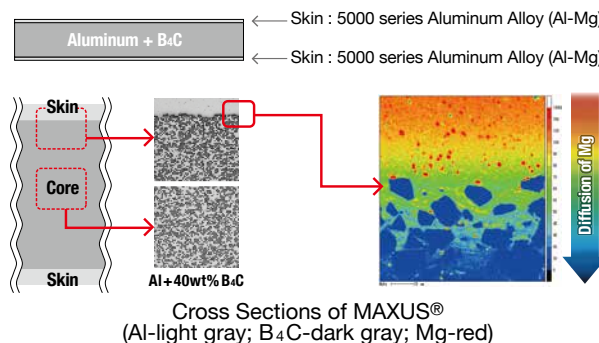
## Products Information



Nikkeikin ACT's main product for the spent nuclear fuel industry is MAXUS®. MAXUS® is a high-density neutron absorber material used in spent nuclear fuel dry storage and/or transportation casks as well as in the racks of spent nuclear fuel pools.

MAXUS® consists of a sandwich structure with highly corrosion resistant aluminum cladding and boron carbide powder (B<sub>4</sub>C) uniformly distributed within a high-purity aluminum matrix. By adjusting both the amount of B<sub>4</sub>C included in the matrix and the thickness of the plate, MAXUS® can be customized at a diverse range of 10B areal densities that can cover storage for low burn-up to high burn-up fuel designs.

The advanced manufacturing process of MAXUS® also allows for strong bonding between the clad and the core through the diffusion of magnesium from the skin's aluminum alloy. With MAXUS®, Nikkeikin ACT has realized an unprecedented high performance material that meets customers' expectations.



Nikkeikin ACT has also produced an effective radiation shielding material called MAXUS-w®. MAXUS-w® has a similar sandwich structure and is composed of the same corrosion resistant aluminum cladding as MAXUS®, but with tungsten powder uniformly distributed within a high-purity aluminum matrix instead. MAXUS-w® has been found to reduce gamma radiation by up to 74%.

Nikkeikin ACT is also able to manufacture special aluminum boron carbide extrusion products as a neutron absorbing structural material. This neutron absorbing structural material has high thermal durability, guaranteeing no significant degradation during service life.

## Products Technical Information

### MAXUS®

<b>Maximum Length</b>	5,000 mm (197")
<b>Maximum Width</b>	500 mm (20")
<b>Maximum Thickness</b>	2 - 10 mm (0.075" - 0.395")
<b>Clad Material</b>	5000 series Aluminum
<b>Matrix Material</b>	1070 Aluminum
<b>B<sub>4</sub>C content in matrix</b>	20 - 40% in mass
<b>Density</b>	2.6 g/cm <sup>3</sup>
<b>Thermal Conductivity</b>	110 - 160 W/m*K
<b>Specific Density</b>	Close to 100%

### MAXUS-w®

Aluminum and 50 vol% W  
(Data for lead in parentheses for comparison)

<b>Density</b>	9.2 g/cm <sup>3</sup>	(11.4)
<b>Tensile Strength</b>	195 MPa	(18)
<b>0.2% Yield Strength</b>	167 MPa	(-)
<b>Strain</b>	2.3 %	(52)
<b>Thermal Conductivity</b>	166 W/m*K	(160)





**C**onstruction

## Entry Companies

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# HAZAMA ANDO CORPORATION

<http://www.ad-hzm.co.jp>

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## Corporate Information

Hazama Ando Corporation (Ad-hzm) General Contractors, Architects & Engineers marks more than 110 years of growth as one of Japan's leading companies. Ad-hzm's role in the construction of large-scale civil and public works helps to improve the total infrastructure of many countries. The company also has been engaged in designing and construction of nuclear power plants since 1960's.

Tsukuba technical research institute of Ad-hzm established in 1992 continuously produces new architects and engineering technologies. The outputs contribute to the progress and safety of nuclear industries.

## Main Activities

### 1. Construction Works

#### (1) Nuclear power plants (NPPs)

Ad-hzm has been engaged in the construction works constantly since 1966 in 18 NPP sites. Main works are of reactor, turbine and rad-waste building, circulating water intake or discharge culvert and other concrete structures.

#### (2) Other plant/facility/laboratory of nuclear fuel, RI or accelerator concerned

Construction and engineering of nuclear fuel cycle plant, radioactive waste treatment facility, and hospital or laboratory with radiation shielding system is the important activity of us.

### 2. Diagnosis and Design Works

(1) Health monitoring and diagnosis of aging or damaged facility (e.g. Assessing cracks on concrete structures by digital photo image; [www.ad-hzm.co.jp/trr/hazama/2009/pdf\\_file/04.pdf](http://www.ad-hzm.co.jp/trr/hazama/2009/pdf_file/04.pdf), in Japanese)

(2) Earthquake - resistant design of building, circulating water intake or discharge culvert, concrete structure, foundation, slope etc.

### 3. Research and Development

#### (1) Consignment study

Ad-hzm has contracted R&Ds from Japanese public organizations (JAEA, RWMC, JNES, NUMO etc.) and also from private companies (Electric Company, Plant maker, JNFL, TEPSCO etc.). In the field of radioactive waste disposal the total number of consignments FY1991-2015 is about 300, the sum is over 3 billion yen.

#### (2) Independent study

Ad-hzm has been continuing the own R&D. Results are published in "Technical Research Report of Ad-hzm Corporation".

<http://www.ad-hzm.co.jp/trr/2014/start.html>

## Technologies

### 1. Large Scale Test for Earthquake-resistant Technology

High-performance shaking table can accommodate specimens up to a weight of 784kN and Maximum acceleration is X:1G Y:3G Z:1G (with 343kN specimen). The facility can carry out vibration tests on any type of structure, controlling both horizontal axes and vertical axes simultaneously.



Shaking Test of NPP Concrete Wall

### 2. Radiation Shielding Technology

Ad-hzm researches radiation protection systems for facilities such as hospitals, and is developing new materials and rational systems.



Neutron Irradiation Measurement  
[<sup>252</sup>Cf, shielding concrete]

### 3. R&D for Radioactive Waste Disposal [LLW, TRU, HLW etc.]

Ad-hzm is contributing to the safety disposal of radioactive waste. Concerning design and construction of artificial barrier and bentonite buffer material, laboratory experiments, monitoring and total consultants are available.



Compaction Machine  
for LLW Bentonite Barrier



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**Corporate Information**

Headquartered in Yokohama, Japan, JGC is a leading, internationally recognized contractor with total engineering, procurement and construction (EPC) capabilities. Over the course of its more than 80-year history, JGC has executed in excess of 20,000 projects of all sizes in over 70 countries. The majority of these have been on a lump-sum turnkey basis, for a wide range of industries, including petroleum refining, gas processing, LNG, GTL, petrochemicals, power, pharmaceuticals, nuclear waste disposal, and non-ferrous metals.

**Main Activities**

**Meeting All Needs**

JGC possesses a wide range of original process technologies and constituent technologies, the result of well-directed research and development. This R&D conducted, combined with JGC's flexible systemization, has significantly extended the company's business horizons. JGC has accumulated extensive experience in the meshing of industry with society over the last 30 years. Plants and facilities completed by the company in Japan and overseas bear the hallmark of JGC's advanced technologies and high reliability. In the non-hydrocarbon field, these include pharmaceutical and food processing plants, research laboratories, medical and welfare facilities, commercial facilities, various industrial plants, and facilities for environmental conservation. These facilities, supported by our variety of services, meet client needs in a wide array of business fields.

**Technologies**

JGC brings superior engineering capabilities and experience in the field of nuclear energy, where stringent safety standards and effective use of latest technologies are of paramount importance. JGC has a history of nuclear power plant design spanning more than 40 years, focusing on the treatment and disposal of low-level radioactive waste and the reprocessing of spent fuel. Moreover, recently, JGC has been drawing on its advanced project management capabilities and extensive experience with overseas projects to actively participate in nuclear power plant construction project overseas, as demand for nuclear power is increasing in developed as well as emerging countries.



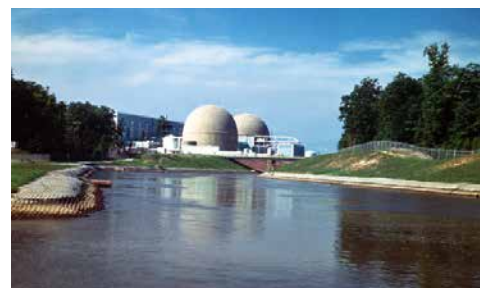
Petroleum Facility



Natural Gas Facility



Nuclear Fuel Reprocessing Plant for JAEA



RW Facility for Virginia Power USA

# Kajima Corporation

<http://www.kajima.co.jp/english/welcome.html>

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<b>Phone</b>	+81-3-5544-1251	<b>Fax</b>	+81-3-5544-1748

## Corporate Information

Established: 1840  
 Incorporated: 1930  
 Paid-in Capital: Over ¥81,400 million  
 Number of Employees: 7,546 (As of March 31, 2015)  
 President Representative Director: Mr. Yoshikazu Oshimi

## Main Activities

Kajima Corporation is one of the leading contractors in the construction industry in Japan, providing a full range of services in Japan and countries around the globe. For any categories and types of buildings and civil structures, skilled professionals in the areas of architectural and civil engineering design, building and civil construction, and real estate development are ready to serve our clients. Engineers and specialists highly versed in mechanical, electrical, and information technologies as well as chemistry, agriculture, and oceanography are also on hand to provide comprehensive services and solutions when requested.

- Construction
- Real Estate Development
- Environmental Engineering
- Research and Development
- Architecture
- Engineering
- Global Support

## Main Services in Nuclear Industry

Kajima's engineering and construction technology of nuclear facilities are moving ahead in tandem with the development of nuclear power in Japan.

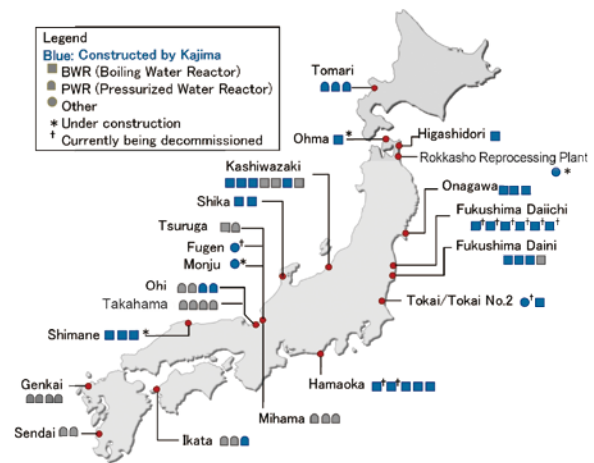
For a safe and secure energy cycle, we integrate planning, design, engineering and construction of the nuclear power plant structures. Our ongoing technological development will support the life cycle management of nuclear power facilities.

### Construction

Kajima has been constructing nuclear power plants since the 1950s. Using those experiences and innovative ideas, Kajima has developed the technologies to build high-quality structures safely in a very short term "Large-Scale Modular Construction Method", "All-Weather Construction Method", and so on.

### Seismic Design and Analysis

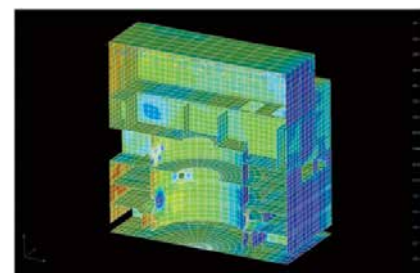
The seismic design and analysis is one of the most priority technologies in a land of earthquakes, Japan. In order to evaluate the seismic effects induced into the structural element and to assess the structural integrity of the building accurately, Kajima applies a dynamic response analysis technique with 3D finite element model of entire building.



Nuclear Power Facility Construction Track Record (as of March 2016)



Shimane Nuclear Power Plant Unit 3 construction (as of February 2010)



Seismic analysis using 3D finite element model of reactor building



# Nishimatsu Construction Co., Ltd.

<http://www.nishimatsu.co.jp/>

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## Corporate Information

Founded in 1937, Nishimatsu Construction Co., Ltd. has earned recognition worldwide as one of Japan's leading general contractors. The Company is renowned for taking on new challenges and for its trend-setting development and introduction of sophisticated technologies in the fields of civil engineering and building construction.

Headquartered in Tokyo, Nishimatsu has a network of 5 regional headquarters and 8 branches around Japan, as well as overseas offices in 13 countries and territories. The Company is well-known for its expertise in planning, design and construction in a wide variety of fields such as marine and harbor projects, airport projects, highways, dams, tunnels, railways, high-rise buildings and power plants.

Nishimatsu has an impressive record of contributions to social and economic development in Asia. In addition to a continuing presence in several Asian countries, it is currently involved in or has completed large-scale projects in Europe and Africa.

Providing high-quality, timely and environmentally-friendly services at all stages of its various projects, Nishimatsu continues working to meet the demands of its clients and advance the frontiers of construction technology.

## Major Business Activities

Nishimatsu's major activities relating to nuclear power are as follows:

### 1. Construction of the nuclear power stations

Nishimatsu has rich construction experiences as a contractor for Tomari Nuclear Power Station of the Hokkaido Electric Power Co., Inc., Onagawa Nuclear Power Station of the Tohoku Electric Power Co., Inc. and Kashiwazaki-Kariwa Nuclear Power Station of The Tokyo Electric Power Co., Inc.

The Company currently participates in the projects of Ohma Nuclear Power Station of the Electric Power Development Co., Ltd., Higashidori Nuclear Power Station of the Tokyo Electric Power Co., Inc. and Tsuruga Nuclear Power Station of the Japan Atomic Power Company.

### 2. Membership for the various nuclear related associations

Nishimatsu actively affiliates not only with the Japan Atomic Industrial Forum, Inc., which is promoting the development of the nuclear power, but also the various associations and committees relating to the nuclear field. It also continuously makes efforts to collect information and absorb knowledge in the nuclear field through research and investigation by dispatching a number of its staff to various auxiliary organizations across the country.

## Technologies

Not only does Nishimatsu cover business across Japan, it also has a strong presence worldwide.

Since about 50 years ago, by establishing representative/branch offices in South East Asian countries, it has been engaging the various construction projects related to the infrastructure development overseas.

In particular, it has extensive experiences in construction of the dams, subways, airports and power plants in Hong Kong, and subways and high-rise building in Singapore.

As for energy related-projects, it constructed the thermal power stations at Lamma Island in Hong Kong (known as Lamma Power Station) and in Thailand (known as Map Ta Phut Coal Fired Power Station), and the hydraulic power station in Laos (known as Nam Thuen 2 Hydropower Station).



Business base outside of Japan



# OBAYASHI CORPORATION

<http://www.obayashi.co.jp/english/>

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## Corporate Information

Obayashi Corporation, with its history of more than 120 years, is one of Japan's largest general contractors. Centered around Obayashi Corporation, the Obayashi Group comprises 84 subsidiaries and 28 affiliated companies with a total of approximately 13,000 employees and combined annual net sales of approximately ¥1,700 billion.

Obayashi also has an established record outside Japan, dating back to 1962 when it became the first Japanese general contractor to take on an overseas construction project. Since then, Obayashi has continued its business activities in the United States, playing a role in many high-profile large-scale projects, from the Central Artery/Tunnel Project in Boston to the Colorado River Bridge at Hoover Dam. In addition to the United States, Obayashi has been involved in a number of projects around the world, from the main stadium for the 2000 Sydney Olympics to The Dubai Metro Urban Rail System.

## Main Activities

Our main scope of business is as follows:

1. Contracting for construction work
  2. Regional, urban, marine environmental development and management, and other construction related business
  3. Engineering and management, including research and surveys, planning, design and supervision related to the two preceding items
- In the field of nuclear energy, Obayashi provides engineering, construction and technical services for facilities such as nuclear power plants, reprocessing facilities, spent fuel interim storage facilities, geological disposal facilities, and decontamination of contaminated areas due to the accident of Fukushima Daiichi nuclear power station.

## Major Accomplishments

Since the completion of Japan's first pressurized water reactor (PWR) in 1970, Obayashi has undertaken many nuclear facility construction projects as outlined below.

- Mihama nuclear power station Units -1,2, Ohi nuclear power station Units -1,2, 3 and 4 (The Kansai Electric Power Co., Inc.)
- Genkai nuclear power station Units -1,2,3 and 4 (Kyushu Electric Power Co., Inc.)
- Tsuruga nuclear power station Unit -2 (The Japan Atomic Power Company)
- Proto type FBR Monju (Japan Atomic Energy Agency)
- Rokkasho Reprocessing Plant (Japan Nuclear Fuel Limited)
- Mizunami and Horonobe Underground Research Laboratory (Japan Atomic Energy Agency)

## Major Technologies

### 1. Advanced Construction

Obayashi has an extensive modularization methodology developed through experience with construction of nuclear facilities; this is coupled to a highly advanced computer-integrated system that incorporates information and construction management functions. Making full use of this advanced methodology, we are able to realize improvements in productivity and quality, with a corresponding reduction in costs, as required in the construction of large-scale nuclear facilities.

### 2. Pre-stressed Concrete Containment Vessels (PCCV)

Obayashi recognized the potential of PCCV at a very early stage, starting research in the 1960's and constructing the first PCCV in Japan. At present, we are continuing to improve our technology in order to maintain our global position as the leading expert in PCCV.

### 3. Waste Disposal Technology

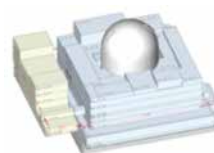
Obayashi has a long history of global involvement in radioactive waste disposal projects. We participated in the WIPP construction project in USA, in 1982 and are now involved in a variety of waste disposal research projects worldwide, for example in the Grimsel and the Mont Terri rock laboratories in Switzerland. We provide a "one - stop" service for all aspects of geological disposal, including site investigation, design, construction and safety assessment.

### 4. Technology for Decontamination and Interim Storage Business

Obayashi is engaged in the decontamination waste interim storage business in the radioactively contaminated areas due to the accident of Fukushima Daiichi nuclear power station. We are doing research and development of decontamination technology with companies in Japan and overseas.



### 5. "Visualization" of Construction Information Using 3D Models



We utilize building information modeling (BIM) in the building construction field and construction information modeling (CIM) in the civil engineering field to construct computer

-based models of buildings or infrastructure, as a visualization technique. The models integrate 3D form information as well as information on material and component specifications and attributes such as costs and finishing. Use of 3D models assists information sharing and mutual understanding between people involved in projects, and enables them to form a consensus quickly.

<b>Address</b>	2-2-2, Matsuzaki-cho, Abeno-ku, Osaka, 545-8555, Japan		
<b>Contact Person</b>	Mr. Kazuyoshi Ohkuma	<b>E-mail</b>	kazuyoshi.ohkuma@okumuragumi.jp
<b>Phone</b>	+81-6-6621-1101	<b>Fax</b>	+81-6-6623-7692

## Corporate Information

OKUMURA CORPORATION is a general contractor to undertake various projects ranging from social infrastructure to various types of private facilities.

Our expertise covers the entire project from start to finish; throughout all the stage of conceptual approach, project planning, design, construction, operation, maintenance, and management.

## Main Activities

The main activities of the Company are described at each of five stages as follows:

### 1. Conceptual approach and general planning

We engage in the project from the conceptual approach and general planning stage, providing proposals to meet the specific requirements of the customer.

### 2. Project planning

We undertake project planning to enable effective use of land and maximize asset values. Through functions such as capital procurement and financial services, we help realize a wide range of undertakings, including land readjustment projects, urban redevelopment projects, and private finance initiative (PFI) projects.

### 3. Design

We submit design proposals incorporating the optimum solutions for a variety of conditions, including location, profitability, environmental preservation, and disaster prevention. We are also active providers of PM(project management) and CM(construction management) services.

### 4. Construction

Once construction work starts, we make full use of our extensive experience and technology to ensure the highest level of safety while at the same time minimizing adverse impact on the local community and the natural environment.

### 5. Operation, maintenance, and management

Services we provide to sports venues and public facilities include operation, maintenance management, and study of renovation options.

## Major Works

We introduce some of major works in various construction fields; nuclear power station, inclined water pressure conduits of hydropower station, underground tunnel in urban areas and through mountains, high rise RC building and passenger terminal building of airport.



Kashiwazaki-Kariwa nuclear power station



Kannagawa hydropower station

## Advanced Technologies

We engaged in research and development to pursue advanced technologies in building, civil and environment engineering; seismic isolation and vibration control system for prevention of earthquake disaster, estimation and control technique of noise and vibration (prediction of franking transmission) at RC condominium, numerical method for deformation and failure by excavating small covering soil layers, borehole fluorescence method for visualizing of cracks in rock masses, purification of oil-polluted soil using bio-augumentation technique, and so on.



Seismic isolation building and table system

# Penta-Ocean Construction Co., Ltd.

<http://www.penta-ocean.co.jp>

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<b>Phone</b>	+81-3-3817-7579	<b>Fax</b>	+81-3-3817-7787

## Corporate Information

**Established:** April 1896

**Paid-In Capital:** 30,450 million Yen

**Employees:** 2,441 (as of March 31, 2015)

**President, Chief Executive Officer**

**and Representative Director:** Takuzo Shimizu

**Corporate Policy:**

- Affiliating with Society
- Creating a Nature-Rich Environment
- Cherishing a Pioneering Spirit

- Genkai Nuclear Power Station (Kyushu Electric Power Co, Inc.)
- Shimane Nuclear Power Station (Chugoku Electric Power Co, Inc.)
- Shika Nuclear Power Station (Hokuriku Electric Power Co, Inc.)
- Ikata Nuclear Power Station (Shikoku Electric Power Co, Inc.)



Kashiwazaki-Kariwa Nuclear Power Station



Shimane nuclear power station

## Main Activities

Our main activities of business are as follows:

### 1. Construction

- Project contracting
- Design supervision
- Construction (Civil engineering and architectural projects)

### 2. Design

- Basic design execution

### 3. Business Plan

- Detailed business plan
- Project cost investigation
- Basic planning
- Land use planning
- Spatial construction planning

### 4. Reserch and Analysis

- Site investigation

### 5. Business Operations

- Business consulting operations
- Long-term maintenance planning
- Renewal

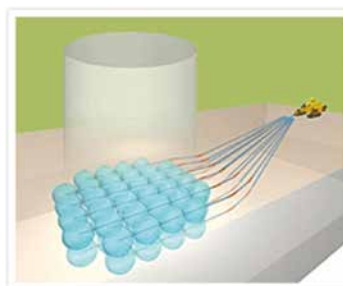
## Major Works

Penta-ocean, having the global technology and know-how about marine engineering works, has dealt with a lot of exclusive harbor construction of the nuclear power plants over the years. The main constructions are as follows:

- Fukushima Nuclear Power Station (Tokyo Electric Power Co, Inc.)
- Kashiwzaki-Kariwa Nuclear Power Station (Tokyo Electric Power Co, Inc.)
- Onagawa Nuclear Power Station (Tohoku Electric Power Co, Inc.)
- Tomari Nuclear Power Station (Hokkaido Electric Power Co, Inc.)

## Technologies

Penta-Ocean Construction has developed a number of advanced technologies in construction and maintenance of infrastructures, including nuclear power plants. Among all, permeation grouting method (PGM) is a unique soil improvement method providing the opportunity of soil improvement with minimum deformations on the surface ground. This method increases the strength of the ground and reduces the likelihood of liquefaction during an earthquake. Controlled curved drilling is the newly developed technic by Penta-Ocean for application of this method to the ground under existing structures. A schematic illustration of this technic is shown in the figure below. The ground under several existing infrastructures has already been improved by this technic, including the grounds under the runway of the Fukuoka and Tokyo International Airports. Prevention of liquefaction in nuclear power plant sites is critical for their safety during and after an earthquake. Controlled curved drilling application of PGM can be a wise choice for improvement of the ground under nuclear power plants.



Schematic illustration of controlled curved drilling for application of PGM



# SATO KOGYO CO., LTD.

<http://www.satokogyo.co.jp>

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<b>Contact Person</b>	Public Relations Manager	<b>E-mail</b>	skip@satokogyo.co.jp
<b>Phone</b>	+81-3-3661-0502	<b>Fax</b>	+81-3-3661-5473

## Corporate Information

Sato Kogyo traces its roots to one of the oldest turnkey contractors in Japan. Established in 1862 and headquartered in Tokyo, Japan, Sato Kogyo has accomplished numerous types of building and civil engineering projects of varying scales, natures and complexity not only in Japan but also in other parts of the world. At the same time, Sato Kogyo is committed to creating a unique identity by combining a signature mix of innovative construction techniques with advanced quality control. In keeping with its vision of being a leader in the construction industry increasingly marked by keen competition, Sato Kogyo has focused its efforts on its brand value – “Total Project Excellence” to enhance customer satisfaction, to build safe, secure and comfortable spaces and to develop high quality social infrastructure.

## Main Activities

### 1. Civil Engineering

Civil engineering involves technologies in various disciplines. While experts from each discipline are concentrating on developing the technology in their own field, our role is to harness the strength of all these technologies for application in the design and construction of civil engineering works to serve the society in a wide range of infrastructure projects related to energy, roads and rails, dams, sanitation, landfill and marine.

### 2. Building

Buildings are required to be not only physically durable but also flexible in layout to accommodate the changing needs and expectation of different era. Our objective is to provide quality living space with due consideration for environment. We have the technology and expertise to create various types of buildings in the educational, cultural, entertainment, residential, medical, commercial, research and industrial fields.

### 3. Environmental Business

“Power from Nature”, “Recycle like Nature”, and “Wisdom of Nature” are our philosophies when dealing with environmental issues. We, Sato Kogyo, have been conscientiously adopted these philosophies in our development and application of environmental technology to provide a safe and comfortable environment for all.

### 4. Overseas Business

Sato Kogyo has been actively establishing its presence in South East Asia, particularly in Singapore, Malaysia and Thailand since the 1970s. Over the years, Sato Kogyo has successfully completed numerous projects, some of which are high profile landmark projects in those countries. Our approach has always been to understand and respect the philosophy and the culture of the host countries while introducing innovative engineering solutions. Sato Kogyo is well poised to be engaged in many exciting up-coming projects as a trusted, reliable contractor in those dynamic economies and is spreading its wings beyond the regions.

### 5. Quality, Environmental, Health, Safety Management

Sato Kogyo is ISO certified for its rigorous implementation of Integrated ISO Management System. The achievement on continuous certifications of the system is a reflection of Sato Kogyo’s commitment and dedication in achieving “Total Project Excellence” in such areas as quality, environment, health, safety and timely performances for every project we do.

## Technologies

The constant participation in various projects has not only provided Sato Kogyo with vital opportunities to innovate further and to develop more efficient and sophisticated construction techniques, it also propels Sato Kogyo into greater scale and heights in the quest for construction excellence. This is achieved by passionate collaborations with Sato Kogyo Research Institute and with its domestic and international joint venture partners.



Intake Pond Structure (Design & Construction)

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**Corporate Information**

Shimizu's more than 200 year history began in 1804 when our founder Kisuke Shimizu launched a carpentry business in Edo (now Tokyo), Japan.

Shimizu provides state-of-the-art technologies from the design and engineering phase through to the construction and maintenance phase for all building and construction projects.

**Consolidated Financial Highlights**

Net Sales: 1,567,843 million JPY  
(13,032,783 thousands USD)  
(120.30 JPY=USD)

Employees: 15,587  
(Year ended March 31, 2015)

**Smart Vision 2010**

Smart Vision 2010 is Shimizu Group's long term vision to become a Smart Solutions Company. With the construction business positioned at its core, Shimizu aims to turn the three priority fields of our long - term vision – Global business, Sustainability business, and Building stock management – into profitable businesses. Our goal is to advance the sustainability of society and construction while creating value that surpasses customer expectations.

**Nuclear Projects Division**

In the nuclear field, Shimizu constructed the first nuclear power plant in Japan and has been responsible for the building/civil design and construction of various types of nuclear power plants. Shimizu has also participated in overseas nuclear related projects.

**Main Activities**

The goal of Shimizu's nuclear activities is to develop and provide leading technology for security and seismic safety to realize a sustainable energy supply. From seismic analysis to decommissioning, our technology contributes to a cleaner and safer global environment.

Shimizu has broad ranging technology development, design, construction and maintenance capabilities that provide our customers with timely and high quality solutions.

**1. Ground Motion and Soil Evaluation**

Ground motion evaluation, liquefaction and soil improvement assessment. Generation of site specific input earthquake motion.

**2. Technology Development**

Seismic isolation system for nuclear power plants: 2D and 3D seismic isolations.

Containment vessel: Reinforced concrete containment vessels and steel plate reinforced concrete containment vessels including next generation reactors.

**3. Design and Planning**

Structural design: Dynamic soil-structure interaction response analyses, nonlinear containment vessel analyses, aircraft impact assessment for nuclear facilities and support for nuclear regulatory licensing.

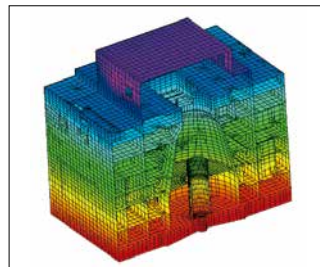
**4. Construction and Maintenance Management**

Construction technologies: Utilization of BIM (3D-CAD), large block and modular construction methods.

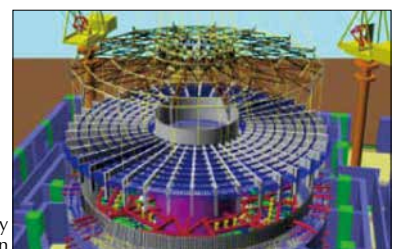
**5. Decommissioning and Recycling**

Nuclear plant decommissioning: Decommissioning of experimental reactors, contamination area assessment, decontaminated concrete demolition system, radioactive waste processing technology and technology development applied to the Fukushima incident including debris removal from the damaged containment vessel (first of its kind).

**Shimizu is open to cooperation with overseas design/engineering/construction firms for nuclear related projects.**



3D FEM Stress Analysis



3D CAD Study of Modular Construction





# Taisei Corporation

<http://www.taisei.co.jp/english/index.html>

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<b>Phone</b>	+81-3-5381-5316	<b>Fax</b>	+81-3-5326-0188

## Corporate Information

Since its establishment in 1873, Taisei Corporation has undertaken many notable projects in Japan and overseas. Our corporate roots coincided with Japan's development as a modern nation and we have continuously met the demands of a changing era and people's aspirations for the future through sound construction operations.

In the second century of modern urban construction, there is a strong need to preserve historic scenery, protect the environment and create attractive public and private spaces. Taisei Corporation is responding with even more advanced technologies through research and development. With a capital position among the strongest in the industry, we are redoubling efforts to produce world-class, leading-edge technologies. Operations extend internationally, including the construction of environmental and infrastructure projects in developing nations.

## Main Activities

1. Planning, surveying, designing, supervising, engineering, implementing, managing, and consulting concerning building construction, civil engineering, installation of machinery, tools, and equipment, and other general construction works.
2. Business relating to surveying, planning, designing, supervising, engineering, managing, and consulting for regional development, urban development, ocean development, energy provision, and environmental improvement.
3. Planning, designing, supervising, constructing, holding, leasing, transferring, maintaining and operating roads, railways, harbors, airports, river facilities, water and sewer facilities, government buildings, waste disposal and treatment facilities, parking lots, and other communal facilities.
4. Diagnosis and assessment of buildings, structures and civil engineering works, and operations relating to security and safety.

## Technologies

Taisei Corporation has participated in designing and constructing nuclear power plants and various nuclear facilities including

facilities for nuclear fuel cycle and nuclear waste. Based on our outstanding technologies, expertise and experience, we develop new designs and construction technologies for nuclear power plants construction plannings.

### 1. Technology to shorten work periods

Taisei Corporation has constructed a number of nuclear power plants by employing the Pre-installed Steel Frames (PISF) construction technique and successfully shortened construction times. This advanced method significantly expands the possibilities of construction.



### 2. Technology to secure indoor work space

It is possible to enclose the structure and secure indoor work space at an early stage of construction by installing PCF (Precast Concrete Form) exterior wall boards to the frame. Use of PCF exterior wall panel can reduce the volume of temporary materials and significantly shorten work processes because exterior scaffolding and formwork assembling are not necessary.

### 3. Technology to allow winter time construction

It is possible to secure a favorable work-space, without pillars inside, by using air-inflated membrane technology on top of the dome as a measure against snow, wind and freezing when framework construction of the top dome of a nuclear power plant is conducted during the winter.



### 4. Robotic technology

The use of robotic technology can maintain stable work efficiency and quality of exterior wall painting of nuclear power plants as mechanization of painting ensures uniform paint pressure and work performance.





[http://www.takenaka.co.jp/takenaka\\_e/](http://www.takenaka.co.jp/takenaka_e/)

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### Corporate Profile

With yearly sales of \$10 billion, 22 overseas offices, the largest construction R&D laboratory in the world and over 1,000 architects in our design department, Takenaka offers comprehensive services worldwide across the entire spectrum of space creation from site location and planning to design and construction as well as postcompletion services such as building maintenance.

We became the first construction company to win the Deming Prize in 1979 and again the first in the industry to win the Nippon Quality Control Medal in 1992, both in recognition of our efforts in Total Quality Management.

At Takenaka, we strive to consistently improve the quality of our works to ensure building owners that orders placed with us will be fulfilled with the utmost confidence, security, satisfaction and pride throughout the contract period and beyond.

### Main Activities

Takenaka has been carrying out construction works for various kinds of nuclear power plants such as BWR and PWR in Japan since the early 1960s.

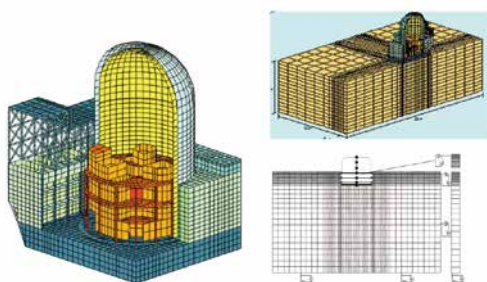
#### (1) Seismic Analysis

In Japan since September 2013, all nuclear power plants have suspended their operation to evaluate safety, then, Electric Power companies have to obtain the approval for restarting operation from Nuclear Regulation Authority.

Takenaka is implementing the structural analysis for mainly earthquake and tsunami to ensure safety measurement during reviewing design for the nuclear power plants constructed by Takenaka in the past.

3D FEM model of reactor building with PWR is shown as left-side below.

Evaluation for soil-structure interaction by 3D FEM model is shown as below and also with analysis by 2D FEM model.



#### (2) TEPCO Fukushima Daiichi Works

We have completed new structure frame over Unit 4 Reactor for the purpose of removing spent fuel rods left in the storage pool at Unit 4 Reactor.

The condition of radiation dose around Unit 4 is not so severe as Unit 1, 2 and 3. The people wearing the protection mask have been able to work carefully in a short period of time at Unit 4 Reactor building. On the contrary, the remote machines only have been used instead of people at Unit 1, 2 and 3 Reactor buildings.

#### The construction process was as follows;

Firstly, we cleaned up around Unit 4 as preparation work. Secondly, we removed broken pieces over the operating floor which is located 30 meters high above the ground.

Finally, we constructed new structure frame which has set on the south of Unit 4 Reactor building and has been overhung 30 meters without interfering existing things. Fuel Handling machine and 100 ton overhead crane were installed on the new structural frame.


Fuel Handling machine is picking up the spent fuel rods and inserting those into Cask in the storage pool at 30 meters high. Then Cask contained by spent fuel rods is taken out from the pool and lifted down to the ground.

The design for this structure has been resulted in large and heavy size structural members. For example, concrete foundations are 4 meters thickness and columns and girders are steel square tube with section of 3 meters. Those columns and girders were effective in shielding steel workers against radiation exposure, because that steel workers were staying and tightening bolt sets in steel square tube with section of 3 meters.

This construction works has been completed successfully by Takenaka Joint Venture in March 2014, then the removal of spent fuel rods from Unit 4 Reactor building has been completed in December 2014.







# Nuclear Fuel

## Entry Companies

<b>01</b> Mitsubishi Nuclear Fuel Co., Ltd.	<b>52</b>
<b>02</b> Nippon Nuclear Fuel Development Co., Ltd.	<b>53</b>
<b>03</b> Nuclear Fuel Industries, Ltd.	<b>54</b>



## Mitsubishi Nuclear Fuel Co., Ltd.

<http://www.mnf.co.jp/en/>

<b>Address</b>	622-1, Funai-shikawa, Tokai-mura, Naka-gun, Ibaraki, 319-1197, Japan		
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<b>Phone</b>	+81-29-287-8108	<b>Fax</b>	+81-29-287-8054

### Chapter 5

Mitsubishi Nuclear Fuel Co., Ltd.

#### Corporate Information

Since its establishment in 1971, MNF has supplied over 20,000 high performance PWR fuel assemblies for use in all the PWR reactors in Japan. With the strong technical advantages that the Mitsubishi Group has developed over many years, MNF is committed to supplying reliable products meeting diverse customers' needs. As a global supplier of PWR fuel, MNF is also active with its proven technology in the world market.

#### Main Activities

- Design, development, manufacturing, and sales of Mitsubishi PWR fuel
- In-core components supply, core design and related services, MOX fuel supply to Japanese customers, uranium reversion service

#### Worldwide Advanced Mitsubishi PWR Fuel

For improvement of fuel reliability, MNF has been striving for design improvements based on customers' requests, operating experience, and application of precautionary measure design to foreign fuel trouble. Customers can benefit from our experience and vigorous efforts for improvement.

MNF has also been trying to achieve more enhanced fuel economy. The MNF advanced fuel design allows plant operators to realize more economical and flexible operations such as High Burn-up, Power Uprate, and Longer Cycle operation with advanced cladding (M-MDA) and new technologies. Keeping the safety of nuclear fuel as first priority, MNF will continue to supply high quality and high performance products in order to meet customers' needs as well as to contribute to stable energy supply.

#### ZDP fuel of Mitsubishi Zero Defect Performance

##### Isotropic Top Nozzle

Wear reduction of control rod tip,  
Reliable removable mechanism

##### I-Type Grid Spacer

Scratchless rod loading,  
Grid-to-rod fretting resistance,  
High thermal-hydraulic performance,  
High seismic adequacy

##### Pellet for Flexible Core Operation

High density (up to 97%T.D.),  
High content of Gd (up to 10wt%)

##### Robust Thimble Tube

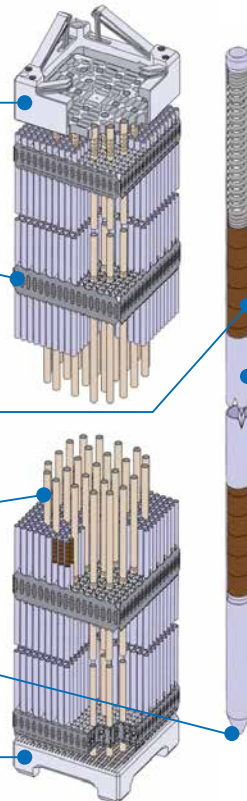
Countermeasure  
against Incomplete Rod Insertion

##### Tapered End Plug of Fuel Rod

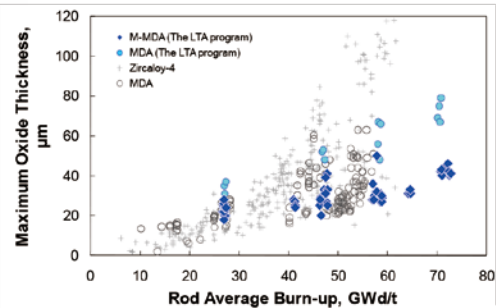
Grid-to-rod fretting resistance

##### Bottom Nozzle with Built-in Filter

High capability of debris trapping



#### MDA™ & M-MDA™ Corrosion-resistant Cladding



Alloy	Chemical component [wt%]					
	Sn	Nb	Fe	Cr	O	Zr
Zircaloy-4	1.2-1.7	-	0.2	0.1	-	Balance
MDA	0.8	0.5	0.2	0.1	-	Balance
M-MDA™	0.5	0.5	0.3	0.4	-	Balance

The reliability of MDA (Mitsubishi Developed Alloy) is well proven being used for over 10 years in Japanese PWR plants as the Mitsubishi standard cladding for 55GWd/t fuel assembly.

M-MDA (Modified MDA) is a new cladding alloy based on MDA. M-MDA, which has demonstrated the excellence reaching rod burn-ups up to 70GWd/t in a PWR reactor, is ready for commercial use.

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<b>E-mail</b>	mail@nfd.jp		
<b>Phone</b>	+81-29-266-2131	<b>Fax</b>	+81-29-266-3273

## Corporate Information

Nippon Nuclear Fuel Development Co., Ltd. (NFD) was established in 1972 as a joint venture between Hitachi, Ltd. and Toshiba Corporation for the purpose of researching and developing nuclear fuels. Changing with the times, we are now also conducting research on reactor structural materials for the purpose of plant long term operation.

- Paid-in capital: 1.8 billion yen
- Stockholders: Hitachi, Ltd. 50% Toshiba Corporation 50%

## Business Outline

1. Research and development for nuclear fuels
2. Development of inspection and test technologies for spent nuclear fuels
3. Research for post-irradiation material characteristics
4. Analysis of radioactive nuclides promoting decommissioning
5. Transportation business using radioactive material transportation casks

## Research

### 1. Research on safety improvement of nuclear power plants

In order to improve safety of nuclear power plants, NFD carries out research on individual processes and overall behavior to contribute to maintenance of severe accident analysis codes, and to develop technologies necessary for behavior analysis of accident-tolerant fuels. In addition, NFD does research to improve fuel safety and performance during normal operation.

In order to contribute to restarting and extending the operation lifetime of plants, NFD does research and development on characteristic changes of metals and electric cables by radiation and their mechanisms. The data necessary to make regulations and standards have been obtained.

### 2. Research on decommissioning of Fukushima Daiichi Nuclear Power Plant Units 1-4

Since the nuclear accident at the Fukushima Daiichi Nuclear Power Plant, NFD is performing tests to confirm validity and safety of various measures to deal with the accident, and it is contributing to the establishment of measures against future accidents. In addition, research on decommissioning of Fukushima Daiichi Nuclear Power Plant Units 1-4 is being actively performed to allow restoration and revival of Fukushima Prefecture areas around the plant site.

## Technologies

### 1. Research and development on nuclear materials

Tests, evaluations and analyses of nuclear materials and radioactive metals, such as uranium oxide, zircaloy cladding and low alloy steel, are performed using the most advanced test and analytical equipment and testing technologies developed by NFD. Data for evaluating reliability and safety of nuclear power plant have been obtained.

### 2. Development of post-irradiation examination technology

Since irradiated nuclear fuels and metals used in nuclear power plants are highly radioactive, NFD develops test and analytical equipment for remote operation use inside nuclear facilities shielded by thick concrete and steel. It also develops evaluation technology for analytical data taking into account radiation effects. Post-irradiation test data must have high accuracy and reliability, since they are used for safety evaluations of nuclear power plants.

### 3. Analysis of radioactive nuclides to support decommissioning

Wide varieties of wastes occur in the process of nuclear power plant decommissioning, and especially at the Fukushima Daiichi Nuclear Plant. Non-typical wastes will occur. Appropriate and realistic evaluation by the nuclide analysis is required in order to rationally promote the decommissioning. NFD has planned the stepwise increase of the number of analyzing species to make a substantial contribution to the plant decommissioning.

### 4. Transportation of irradiated fuels and materials

NFD has the technology and know-how to perform safety analyses, evaluations and license acquisition for transportation of irradiated fuels and materials. NFD owns multiple transportation casks for fuels and irradiated material transportation.





## Nuclear Fuel Industries, Ltd.

<http://www.nfi.co.jp/>

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Chapter 5

Nuclear Fuel Industries, Ltd.

### Corporate Information

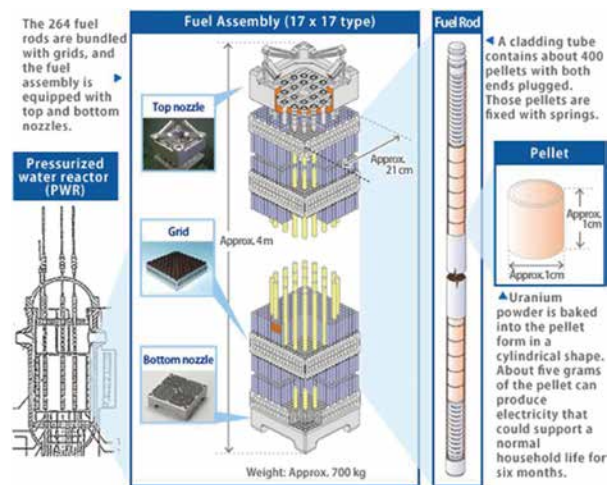
Established: July 1972  
 Capital: JPY 1 billion  
 Shareholders: Westinghouse Electric Company 52%  
 Sumitomo Electric Industries, Ltd. 24%  
 The Furukawa Electric Co., Ltd. 24%  
 Facilities: Kumatori Works (Osaka)  
 Tokai Works (Ibaraki)  
 Subsidiary: Toho Engineering Co., Ltd. (85%)  
 Affiliate: Nuclear Engineering, Ltd. (44%)  
 Kansai Electric beam Co., Ltd. (0.7%)

### Main Activities

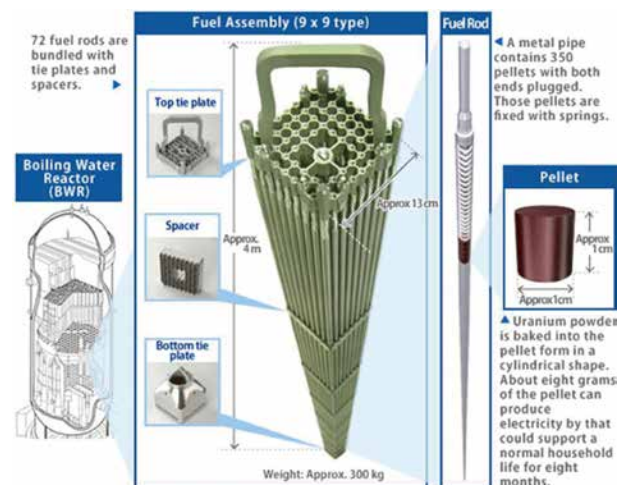
- R&D, design, manufacturing and sales of nuclear fuel for light water reactors (PWR/BWR)
- Core management services for light water reactors (PWR/BWR)
- R&D, design, manufacturing and sales of nuclear fuel for HTGR and other research reactors.
- Engineering services related to nuclear power plant applications
- Engineering for domestic MOX fuel fabrication plant
- Electron beam irradiation services (sterilization/material modification)

**NFI is a sole company in Japan that manufactures nuclear fuel for both PWR and BWR.**

**NFI is also a sole company in Japan that manufactures nuclear fuel for HTGR.**



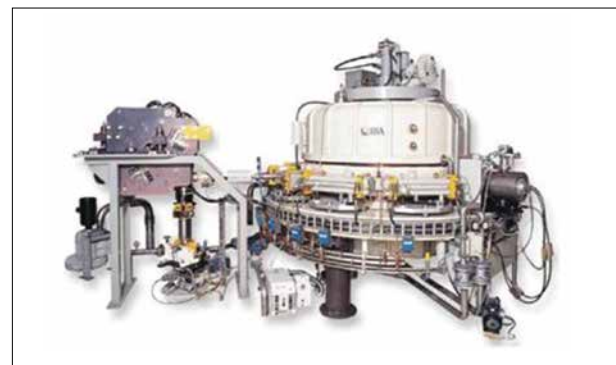
PWR fuel



BWR fuel




HTGR fuel



Electron beam irradiation services







**T**ransportation

## Entry Companies

<b>01</b> Kamigumi Co., Ltd. (Heavy Cargo & Energy Transportation HQ)	<b>58</b>
<b>02</b> Nuclear Fuel Transport Co., Ltd.	<b>59</b>



**Kamigumi Co., Ltd.** (Heavy Cargo & Energy Transportation HQ)

<http://www.kamigumi.co.jp/>

<b>Address</b>	7th floor, 4-1-11, Hamabe-dori, Chuo-ku, Kobe, 651-0083, Japan		
<b>Contact Person</b>	Mr. Hajime Wada	<b>E-mail</b>	juryou_energy@kamigumi.co.jp
<b>Phone</b>	+81-78-271-5141	<b>Fax</b>	+81-78-271-5216

## Corporate Information

Kamigumi provides the most competitive, integrated logistics services in international intermodal transport, port transportation, installation and heavy cargo transportation, plant transportation, warehousing, customs, navy and air freight, shipping agents and freight transport vehicles to our clients of all types incidental to their business and leisure facilities.

## Main Activities

As a pioneer of the nuclear fuel transportation, we have been deeply involved in whole operation of nuclear fuel cycle in Japan.

1. Transportation of nuclear raw materials and nuclear fuel
2. Transportation of spent fuel and cask handling
3. Transportation of heavy cargo equipment and installation



Transportation of pressurized fluidized bed boiler (3,820 tons) for a thermal power plant

## Main Services

We have accumulated tremendous experiences in the transportation of heavy industrial equipment such as transformers, exhaust heat collecting boilers, waste nuclear casks, Japanese bullet trains, and so on. We understand that our customers need not only the transportation of heavy cargo by big-scale specialized vehicles (high-performance unit carriers, etc.) all developed originally by ourselves, but also the installation of large-scale facilities and the periodic inspection of gas turbines. Hence, we pride ourselves on providing services conformed to the ISO 9001 standard and making contributions to a wide range of industries, always with safety as our theme.

### Example of Plant Transportation



Transportation of the vessel



Speed Carrier (140tons)

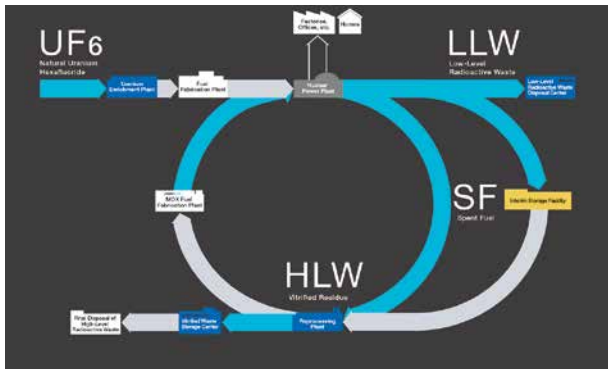
# Nuclear Fuel Transport Co., Ltd.

<http://www.nft.co.jp/english/index.html>

<b>Address</b>	1-1-3, Shiba-daimon, Minato-ku, Tokyo, 105-0012, Japan		
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<b>Phone</b>	+81-3-3438-7329	<b>Fax</b>	+81-3-3438-3240

## Corporate Information

Nuclear Fuel Transport Co., Ltd. (“NFT”) is a company specializing in the transport of spent nuclear fuels and other related materials – all of which constitute an integral part of the nuclear fuel cycle in Japan. Handling radioactive materials from nuclear power plants nationwide, NFT is ensuring safe and reliable transport, while consolidating a relationship of trust with stakeholders. In addition, NFT is striving to make maximum contributions to the stable operations of the nuclear fuel cycle business in Japan. Furthermore, we have established a perfect safety record of transport since our foundation in 1971.



\*Blue arrows show our current transport scope.

## Main Activities

### 1. Transport

NFT plays an important role in the nuclear fuel cycle process through its transportation business with our equipment such as dedicated vessels, SF casks and cranes.

We conduct:

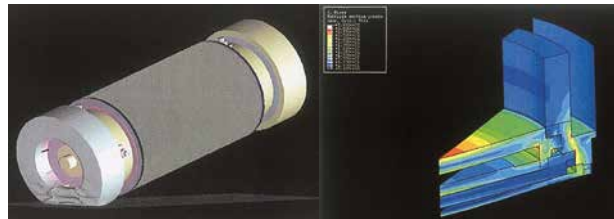
- Marine and land transport of spent fuels and low-level radioactive wastes
- Land transport of vitrified residue and natural uranium hexafluoride



### 2. Engineering

In order to secure safe transport of spent fuels, packages have to meet national criteria in design, manufacturing and operational processes. NFT conducts thorough quality control based on the requirements of ISO 9001 standards. Cooperating with its group company, OCL CORPORATION, NFT engages in package design, licensing, manufacturing and maintenance as well as upholding high performance standards by leveraging its extensive experience and know-how. NFT is especially experienced in the areas of:

- Acquisition of design and packaging certification
- Package designs and safety analysis
- Manufacturing control and packaging certification
- Performance maintenance and renewal of packaging certification



## Safety Measures for Marine Transport

Our dedicated transport vessels have enhanced structure and various safety measures to be in conformity with domestic regulation which is stricter than INF code.

- (1) Securing of safe navigation
  - Various navigation radars
  - Automatic anti-collision system
- (2) Safety structure
  - Double-hulled structure
  - Enhanced stability against collision or grounding
- (3) Fire prevention
  - Fixed cargo space cooling arrangements
  - Fire-extinguishing equipment in case of emergencies





# Chemical & Water Treatment

## Entry Companies

<b>01</b> Kurion®, Inc.	<b>62</b>
<b>02</b> Organo Corporation	<b>63</b>
<b>03</b> Tomiyama Pure Chemical Industries, Ltd.	<b>64</b>

## KURION Kurion<sup>®</sup>, Inc.

— FOR A CLEANER FUTURE —

<http://www.kurion.com>

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### Corporate Information

Kurion<sup>®</sup> was founded in 2008 to solve the most challenging technical problems in nuclear waste and to realize nuclear power's clean energy promise. We have invested millions of dollars to create new technologies that lower the total lifetime cost of waste disposal and put the best environmental solutions within reach. Over the past several years, we have attracted some of the most respected leaders in the industry to help us meet this historic challenge.

Kurion<sup>®</sup>'s name joins "curie" and "ion" and symbolizes the collaboration between people and technology. This philosophy is reflected in how we operate:

**We partner with industry leaders to deploy our technologies around the world.**

**Kurion<sup>®</sup>: 3 Continents, at 10 Locations and Growing**



**Kurion<sup>®</sup>: Cutting edge thinking, inventiveness and innovations to help our customers be more effective in accomplishing their work**

Kurion<sup>®</sup>'s history as an innovative solutions provider offers more than just concepts...

**"Kurion<sup>®</sup> Honored as IHS CERAWEEK 2015 Energy Innovation Pioneer and wins BritWeek and UK Trade & Investment Business Innovation Awards for Technology"**

### Main Activities

At Kurion<sup>®</sup> our motto, "For a Cleaner Future" is more than just a "tag-line", this is our mission, our specialty and our passion. We have internationally recognized technologies, supported by engineering and environmental capabilities, demonstrated by real-world experience.

Kurion<sup>®</sup>, an innovator in nuclear and hazardous waste management is known for our relentless focus on creating technology resolutions that access, separate and stabilize nuclear and hazardous waste around the world.

We specialize in remote systems, state-of-the-art ion-specific media, and vitrification technologies providing turn-key solutions and "customer-centric" improvements to existing systems.

**This is how we make a difference – for our communities and the environment to "Create a Cleaner Future".**



### ACCESS

#### Robotic Systems and Services

*Eliminating human risk during the remediation of hazardous waste...*

### SEPARATION

#### Radioactive Isotope Removal Technologies

*Eliminating the threat, a key step in Kurion's comprehensive approach to waste management...*



### STABILIZATION

#### Vitrification Technologies

*Kurion vitrification technologies are cost effective and process a variety of waste simultaneously*

**Durability for Millennia...**





# ORGANO CORPORATION

<http://www.organo.co.jp/english>

<b>Address</b>	1-2-8, Shinsuna, Koto-ku, Tokyo, 136-8631, Japan		
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<b>Phone</b>	+81-3-5635-5131	<b>Fax</b>	+81-3-3699-7160

## Corporate Information

ORGANO creates value through the use of water with "Heart and Technology". In response to needs of its customers, ORGANO has been researching and developing new technologies and solutions for all water treatment industries: power utilities, supply and sewage water, IT manufacturing plants, pharmaceutical and general industries since 1946.

### Power Plant Business

The pioneer spirit is a part of ORGANO's culture for the water treatment business field at nuclear power utilities. Many challenges to meet strict water quality requirements from BWR's (Boiling Water Reactor) and PWR's (Pressurized Water Reactor) water chemistries, ORGANO has been developing new technologies and brushing them up step by step. The sophisticated engineering and technologies provide high-performance with the world's best water quality.

- CD, RWCU, FPC and WW (radioactive liquid waste) installation at Japan's first commercial Nuclear Power Plant in 1970
- First CF installation at BWR in Japan, 1974
- First CD installation at PWR in Japan, 1977
- Hollow Fiber Filter (as CF) installation at BWR in Japan, 1986
- First Hollow Fiber Filter (as CF) installation at PWR in Japan, 1997
- First Hollow Fiber Filter (as CF) installation at BWR in the USA, 2007

## Main Activities

- Engineering
- Purchase
- Construction
- Commissioning
- Maintenance service



## Products Lineup

### Condensate Filter: CF (BWR, PWR)

- Hollow Fiber Filter
  - High iron removal efficiency
- Pleated Filter

### Condensate Demineralizer: CD (BWR, PWR)

- High Flow Velocity (Option)
- Anion Resin Underlay (Option)

### Reactor Water Cleanup: RWCU (BWR)

- Filter / Demineralizer with powdered resin
  - High area flow rate, 2% of Feed Water, design with IFD\* at ABWR\*\*

### Fuel Pool Cleanup: FPC (BWR)

- Filter / Demineralizer with powdered resin
  - High area flow rate, design with IFD\* at ABWR\*\*

\* Integrated Flow Distributor

\*\*Advanced Boiling Water Reactor

### Waste Water Treatment: WW (BWR, PWR)

### Makeup Water: MUW (BWR, PWR)

- RO Seawater Desalination
- MPU<sup>TM</sup> – RO + EDI
- STRATA-G<sup>TM</sup> – Save regen (time and consumption)



## **TOMYPURE** Tomiyama Pure Chemical Industries, Ltd.

<http://www.tomypure.co.jp/>

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<b>Phone</b>	+81-3-3242-5142	<b>Fax</b>	+81-3-3242-3166

### Corporate Information

We, at Tomiyama Pure Chemical Industries, supply high-purity chemical products that we pursue together with our customers with all our originality and technical capability. We supply excellent quality products manufactured to suit the conditions of customer uses with high reliability to obtain full customer satisfactions.

We can also assist our customers in developing and improving products with a quick-wheeling development system.

We are ready to undertake joint research and development projects with customers as well.



### Technologies

#### **High-purity chemicals for the nuclear power industries allowing people to live in safety.**

We supply boric acid for nuclear power applications.

Thus, boric acid is used for cooling water in a nuclear reactor for safety operations, and also used for the materials to emergency-stop as one of the multiple safety systems, in case that a nuclear radiation trouble occurs and the normal safety systems can not be conducted during nuclear reactor operations. Therefore, boric acid and borates are playing important indispensable roles for the peaceful utilization of nuclear power.



#### **High-purity chemicals for the nuclear power industries**

- Boric acid and Borates
- For reprocessing chemicals







# **E**mergency Management

## Entry Companies

<b>01</b> Nohmi Bosai Ltd.	<b>68</b>
<b>02</b> Teikoku Sen-i Co., Ltd.	<b>69</b>
<b>03</b> Tokyo Bosai Setsubi Co., Ltd.	<b>70</b>

## **NOHMI** NOHMI BOSAI LTD.

<http://www.nohmi.co.jp/english>

<b>Address</b>	4-7-3, Kudan-Minami, Chiyoda-ku, Tokyo, 102-8277, Japan		
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<b>Phone</b>	+81-3-3265-0329	<b>Fax</b>	+81-3-3265-5348

### Corporate Information

#### A pioneer in the fire protection industry in Japan

Nohmi Bosai Ltd., established in 1916, listed on the Tokyo Stock Exchange First Section, is an international company who is responsible for the development, marketing, installation and maintenance of a wide variety of state-of-the-art fire protection systems. Nohmi has branch offices all over Japan besides two factories, three Research and Development laboratories in Japan. Nohmi occupies more than 40% of market share in gaseous fire suppression systems and 30% of fire alarm systems in Japan. Being an international company, Nohmi has a world-wide distributor channel and subsidiaries in China, Taiwan and India.



### Main Activities

Nohmi continues to strive to give customers an assurance of "safety" by providing optimum fire protection systems and a wide variety of services. To this end, the company, as a pioneer in the fire protection industry, is always aggressively challenging new fields of fire technologies, which include the following:

- Manufacturing and engineering intelligent fire protection systems that can be flexibly adapted for the diversified urban spaces and industrial facilities
- Survey of properties to be protected, analysis of the fire risks, and proposals for optimum fire protection systems
- Consistent responsibility setup for all works ranging from basic research, development, manufacturing, engineering installation and to maintenance

### Main Products

Nohmi manufactures a wide range of fire alarm system and fire suppression system products such as follows:

#### Analog Addressable Integlex Multicrest Fire Alarm Systems

The Integlex Multicrest systems are analog addressable fire alarm systems. With the features of Nohmi's state-of-the-art technologies, the Integlex Multicrest can be flexibly adapted to meet the diverse requirements of today's buildings.

#### MIDEX III Foam Fire Extinguishing Unit

MIDEX III is a packaged type foam fire extinguishing unit, which was developed to suppress industrial fires, especially fires of machine tools and combustible oils.

#### NN100 Nitrogen Gas Fire Suppression System

NN100 is a 99.99% nitrogen gas fire suppression system. NN100 has no adverse affect not only to natural environment but also to human beings. NN100 has been recognized by the below organizations.

- Underwriters Laboratories Inc. (UL)
- National Fire Protection Association (NFPA)
- US Environment Protection Agency (US EPA)
- Fire Protection Equipment Safety Center of Japan (FESC)
- International Standard Organization (ISO)





# TEIKOKU SEN-I CO., LTD.

<http://www.teisen.co.jp>

<b>Address</b>	Yanagiya-Bldg., 2-1-10, Nihonbashi, Chuo-Ku, Tokyo, 103-0027, Japan		
<b>Contact Person</b>	Mr. Yuichi Suzuki	<b>E-mail</b>	yuichi.suzuki@teisen.co.jp
<b>Phone</b>	+81-3-3281-3031	<b>Fax</b>	+81-3-3274-6397

## Our Main Business

### Disaster Prevention and Preparedness Business

Concerning disaster prevention operations in our country, special concern is on the rise in the area of disaster prevention and crisis management. That includes preparedness for terrorism and specific disasters, in addition to large-scale natural disasters such as earthquakes, floods, tsunami and also large-scale industrial disasters such as fires at petrochemical complexes and factories. The government as well as public bodies have also reinforced measures and policies to prevent disasters. The role of disaster prevention activities "protecting safe and secure life of the people" and "protecting properties" has become more and more important. In order to respond to such demand of our times, our group is striving to establish comprehensive and highly specialized business for disaster and crisis management. We will enhance our traditional activities involving firefighting, rescue and emergency care. At the same time, we will focus on intensifying, enhancing and expanding comprehensive and highly specialized disaster and crisis management business that can respond to upgraded equipment, hazardous material handling, crisis management, etc.,

to protect against increasingly complex and large-scale disaster and social risks.

### Large Volume Water Supply System

The Long Distance Large Volume Water Supply System vehicles (Hydrosub System vehicles) can supply water at up to 30,000L/min. over long distances for fire extinguishing in the event of disasters, oil tank fires or forest fires and can also be used for emergency cooling of nuclear power plants. The Long Distance Large Volume Water Supply System vehicle and Hose Carrier further meet the following terrorism and severe accident measures in the current nuclear regulations set by Japan's Nuclear Regulation Authority (NRA).

▼Cases corresponding to prevention of nuclear disasters:

- Response to intentional aircraft crashes
- Suppression of radioactive material dispersal
- Prevention of Containment Vessel failure & large release
- Prevention of core damage (Postulate multiple failures)

**Over 80 sets of these products have been supplied to nuclear power plants in Japan.**

## Chapter 8

TEIKOKU SEN-I CO., LTD.





## Tokyo Bosai Setsubi Co., Ltd.

[http://www.tokyo-bosai-setsubi.co.jp/tbs/index\\_eng.html](http://www.tokyo-bosai-setsubi.co.jp/tbs/index_eng.html)

<b>Address</b>	1-8-1, Kita-shinjuku, Shinjuku-ku, Tokyo, 169-0074, Japan		
<b>E-mail</b>	info@tokyo-bosai-setsubi.co.jp		
<b>Phone</b>	+81-3-3363-9761	<b>Fax</b>	+81-3-3363-9765

### Corporate Information

In 1955, Tokyo Bosai Setsubi Co., Ltd. (TBS) opened for business with a foundation philosophy of maintenance of fire protection systems installed on US military bases in Japan. In 1965, Japan's first commercial nuclear power plant was built in Tsuruga, Fukui Prefecture. TBS was selected by General Electric (GE) of the United States and successfully designed, supplied, installed and commissioned the fire protection systems, which put us in the position of having established Japan's first fire protection and technical consulting business for nuclear power plants. Since then, TBS has delivered fire protection systems and security systems to 19 nuclear power plants in Japan and 7 overseas.

### Mission

TBS aims to create ultimate fire extinguishing systems capable of extinguishing a fire in a few seconds. In addition, TBS proposes antiterrorism measures to prevent vandalisms based on tests and verifications.

TBS' mission is to eliminate danger of fire and to provide safety. It keeps TBS develop various fire extinguishing systems such as follows:

- Local application foam-based fire extinguishing systems for auxiliaries, and various cable trays equipped with power supply cables for the nuclear reactor coolant pumps, which are one of the most important machineries in nuclear power plants.
- Gas-based fire extinguishing systems against electrical cabinet fires inside metal-clad switchgear cabinets and control cabinets.
- Ultra high-speed foam-based fire extinguishing systems for semiconductor plants.

TBS has provided fire protection systems and security systems based on persistent efforts, extensive experience and deep insight for more than 50 years in co-operation with clients.

### Main Activities

#### Consultation for fire protection systems and security systems

TBS's Nuclear Power Plant Group focuses on the provision of fire protection systems for nuclear power plants. TBS develops and builds the best fire protection/security systems for clients, complying with regulations and laws. TBS designs, procures and sets up complete systems, based on the full engineering experience.

#### Maintenance and inspection of nuclear power plants

Not only design and installation, but maintenance on the systems is provided by TBS's engineers who are well-versed in the system itself.

#### Research and development on fire extinguishing products and systems for special needs, which can be also set up to nuclear power plants.

##### - Compact Foam /Water Monitor™

Powerful but compact water monitor capable of 400~5,000ℓ/min (various flow types available).

##### - Intelligent AFEX™

Standalone automatic fire extinguishing robot, absolutely suitable for unattended environments during evening hours or 24hrs.

##### - Mini AFEX™

Automatic small scale fire extinguishing system for an electrical fire inside an enclosures/panel.



TBS's Saku test facility in Nagano Prefecture



Fire extinguishing demonstration of Intelligent AFEX™







**S**ervices

## Entry Companies

<b>01</b> Association for Nuclear Technology in Medicine	<b>74</b>
<b>02</b> Computer Simulation & Analysis Japan	<b>75</b>
<b>03</b> Japan Environment Research Co., Ltd.	<b>76</b>
<b>04</b> The Japan Power Engineering and Inspection Corporation	<b>77</b>
<b>05</b> Kanden Plant Corporation	<b>78</b>
<b>06</b> Nuclear Engineering, Ltd.	<b>79</b>
<b>07</b> Nuclear Engineering and Services Company - 1	<b>80</b>
Nuclear Engineering and Services Company - 2	<b>81</b>
<b>08</b> Sojitz Corporation	<b>82</b>



# Association for Nuclear Technology in Medicine

<http://www.antm.or.jp>

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<b>Phone</b>	+81-3-5645-2230	<b>Fax</b>	+81-3-3660-0200

## Corporate Information

The Association for Nuclear Technology in Medicine (ANTM) is a public interest incorporated foundation established in March 1996. The prospectus of ANTM aims to promote research related to nuclear technology in medicine, such as medical treatment and diagnosis technologies using various kinds of radiation, in addition to advanced particle radiation therapy. We carry out various activities such as holding lectures and seminars, publishing public relations magazines and brochures, developing human resources, promoting facilities planning, distributing technical information, providing calibration service for radiotherapy instruments, and others. Thus, we have played an important role as a nonprofit/public interest organization, which differentiates us from both national and local governments and the private sector.

## Main Activities

### (1) Particle beam cancer therapy

Japanese particle beam radiation cancer therapy has been driving the world's advanced medical technology as a promising technology. ANTM supports facility improvement promotion, human resources development projects and facility operation in each part of the process from facility construction planning to management.

Especially, we have implemented human resources development of experts, and fulfilled the crucial role as core institution.

### (2) Boron Neutron Capture Therapy (BNCT)

ANTM supports R&D and technical development toward practical use of BNCT as the only public interest foundation in Japan. Not only do we share information about BNCT, but we also address issues and collaborate with experts among domestic and overseas and research organizations.

### (3) Accuracy improvement of radiation and quality control

ANTM carries out calibration services for therapy level dosimeters to assure the accuracy and the treatment quality as a third-party organization. As the only accredited organization in Japan, we have been playing a critical role in this field. Our calibration testing service accepts orders from almost all the domestic hospitals and

institutions as a secondary standard dosimetry laboratory. In addition, we conduct output dose audit service for radiotherapy equipment as a third-party. The output dose audit service is growing gradually.

## Projects for foreign countries

### (1) International Training Course on Carbon-ion Radiotherapy

We hold International Training Courses on Carbon-ion Radiotherapy (ITCCIR), aiming to develop necessary human resources for medical doctors, medical physicists, and radiological technologists once a year in Japan. The contents of the training course consist of basic lectures by experts using textbooks as well as visits to heavy ion radiotherapy centers.

### (2) Support for overseas patients desiring a consultation services on heavy ion radiotherapy, and facility construction planning.

We provide consultation and support service for overseas patients on heavy ion radiotherapy in cooperation with partner organizations, "Particle Radiotherapy Clinic", and others. In addition to that, we provide consultation services for overseas organizations regarding construction of radiotherapy facilities and supply of medical equipments.

## Donations

Nuclear technology is an indispensable technology which has been making great contributions to human health and welfare. We ask for your understanding of our objectives and activities, and look forward to your heartwarming support and donations.





# Computer Simulation & Analysis Japan

<http://www.csaj.co.jp/>

<b>Address</b>	1-3-9, Shibadaimon, Minato-ku, Tokyo, 105-0012, Japan		
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<b>Phone</b>	+81-3-5776-1838	<b>Fax</b>	+81-3-5776-1859

## Corporate Information

Computer Simulation and Analysis Japan (CSAJ) was founded in 1999 by a group of nuclear safety analysts with the idea of providing the industry and projects with an independent and neutral view on nuclear safety as an independent company. CSAJ is a consulting company located in Tokyo, Japan. The staff of CSAJ consist of nuclear and software engineers that specialize in providing services to the nuclear industry. CSAJ has provided technical and consulting services to nuclear electric utilities, national research laboratories, private research organizations and government agencies. This experience base allows CSAJ to provide support in nearly every aspect of the nuclear industry.

## Main Service

### Thermal Hydraulic Analysis

Thermal hydraulic analysis is one of the most important analyses for nuclear power plant safety. CSAJ staff has profound knowledge, skills and experience about thermal hydraulic analysis and has been successfully doing it for over 20 years. For example,

- We have analyzed numerous commercial and test reactors.
- We have developed many computer programs for thermal-hydraulic analysis.
- We have made improvement to analysis codes by adding new models.

We have experience and are skillful in using the major thermal hydraulic analysis codes such as RELAP, TRAC, RETRAN and COBRA.

### Probabilistic Risk Analysis

#### • Quantitative Solutions - PRA

Probabilistic Risk Analysis (PRA) is one of the solution techniques to estimate reliability by using statistics. PRA can provide valuable information to design, operate, and maintain complicated systems.

#### • Cost Effectiveness

Accident sequence analysis, that is one of the tasks in PRA, can provide occurrence frequencies of several

accident sequences. By comparing relative magnitude of them, it helps to make a decision on how the safety-related equipment works. This analysis also helps to reduce accident frequencies. PRA can show the effectiveness to a change, and the cost associated with the change. We can make relationship between the effectiveness and the cost of a change. This helps to run your business better.

#### • Application of PRA

CSAJ has a lot of experience to use this methodology for the nuclear plants and the nuclear fuel plants. We are also experienced in seismic PRA analysis of nuclear plants. Our track record provides confidence in helping you. We have a lot of knowledge in nuclear plants and skills of the PRA methodology.

#### • Software Services

CSAJ offers following software services.

- 1) Supporting Sales of Software
- 2) Developing Software
- 3) Software Maintenance
- 4) Technical Research Services

## Support of Business Expansion in Japan

CSAJ provides the various services to support the business development in Japan.

We support you to

- Introduce, market, and consult your premier products to government organization and industries in Japan.
- Coordinate meetings with your clients in Japan.
- Negotiate for establishing partnership.

We have experiences to tie up with the following companies.

- Zachry Nuclear Engineering, Inc., CSA -Analysis Division
- Micro-Simulation Technology
- ABS Group of Companies, Inc.

# Japan Environment Research Co., Ltd.

<http://www.jer.co.jp/> (Japanese only)

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<b>Phone</b>	+81-3-5322-2271	<b>Fax</b>	+81-3-5322-2272

## Corporate Information

Japan Environment Research Co., Ltd. (JER) was founded in 1973. We have a license of the public working environment measurement authority (radioactive material). We provide measurement and analysis services of the radioactives based on ISO9001 (JQA-QM9735). We also provide safety services and manufacture specialty equipment for all customers working in the radiological workplace.

## Main Activities

- General environmental study and workplace environmental study
- Management of radioactive materials handling facilities Radiation safety control services
- Manufacture and sales of radiation protection equipment
- Maintenance and management of radioactives handling facilities
- Environmental management of waste treatment facilities and radioactive materials handling facilities
- Civil engineering work such as dismantling and carrying out of pollution control facilities
- Dispatch of workers
- All tasks associated with each of the above business activities

## Leading Products



### ALARA™ Ventilator

Durable and transportable ventilator for radiation environment.



### ALARA™ Survey

One-hand GM survey meter equipped with judgment function for contamination.



### RadiBorg™

#### (Real time wearable radiation monitoring system)

RadiBorg™ is the system which enables workers who are working under highly radiation circumstance to reduce radiation dose by their own judgment by means of indicating dose rate of working area and integrated radiation dose from wearable sensors in their view.



Example of indication in worker's view

### ACF filter for radioactive iodine

A filter made from activated carbon fiber (ACF) to adsorb organic or inorganic radioactive iodine. Ventilating system equipped with ACF filter.



## Unique Service

### CN leakage test

High sensitive leakage test to find extremely small leaks in heat exchanger tubes and condensers tubes.





# The Japan Power Engineering and Inspection Corporation

[http://www.japeic.or.jp/english/e\\_index.htm](http://www.japeic.or.jp/english/e_index.htm)

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## Corporate Information

The Japan Power Engineering and Inspection Corporation (JAPEIC) was established in 1970, with contributions from the government, utility companies and manufacturers, as a highly specialized organization which provides inspection services to ensure safety of power plants in Japan. Our competence exists in our ability and experiences to evaluate and certify the safety of welding of boilers, pipes and peripherals which have to endure high temperature and high pressure in power plants.

For more than 40 years, JAPEIC has been engaged in inspection and research activities. Activities of JAPEIC are carried out by well-experienced inspectors and competent staff in Tokyo Head Office, Osaka Regional Office, two branch offices of Hiroshima and Fukuoka, and Yokohama Nondestructive Evaluation (NDE) Center.



NDE Center

## Main Activities

### Safety Management Reviews

JAPEIC is a registered safety management reviewer of thermal power plants in accordance with the Electric Utility Law of Japan. We provide major electric power companies and IPP with high quality review services which are required by the law to ensure safe operation of power plants. The reviews are submitted to the government for approval. We have the biggest share in this business in Japan.

### Welding Inspection and Engineering Services

We also provide engineering support services, especially welding inspection services, to thermal and nuclear power plants, including plant components which are imported from overseas to Japan. The components and materials of power

plants have to abide by the strict regulations stipulated by the Electric Utility Law or the Nuclear Regulation Law. We have long and abundant experiences in support of welding inspection of thermal and nuclear power plant operators in Japan. Our highly trained inspectors include CWI and AI holders, and are ready to provide necessary engineering services to power plant operators and manufactures inside and outside Japan.



Inspection of welding

### Research and Development

The NDE center conducts research and development on welding and nondestructive inspection, which include ultrasonic testing technologies, electromagnetic nondestructive testing technologies, welding engineering to improve reliability, etc. You can see the detail of our R&D activities in the technical review in JAPEIC's HP.

The center also provides training courses in nondestructive inspection and welding technologies based on accumulated knowledge and expertise.



Training of inspection

# Kanden Plant Corporation

<http://www.kanden-plant.co.jp>

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## Corporate Information

Our company was founded as an affiliate company of The Kansai Electric Power Co., Inc. (KEPCO) in October 1953, with the company name changing from Kanden Kogyo Kabushiki Kaisha to Kanden Plant Corporation in October 2004. Throughout these years, our company has been active as an enterprise specializing in installing and maintaining facilities for fossil fuel and nuclear power plants.

As a member of the KEPCO Group, our company supports the basis of a safe and stable supply of electricity. Simultaneously, based on sophisticated technologies cultivated in handling power facilities, our company is positively extending businesses into the fields of industrial plants such as on-premises power generation facilities and chemical plants.

Through the continued provision of safe and high-quality services to our customers, our company aims at being an enterprise that produces increased customer satisfaction. On the other hand, our company will help, company-wide, the industry and society develop by means of the company's approach to realizing a low-carbon society, a demand of the age, and of contributing to the stable supply of energy.

## Main Activities

### Fossil/nuclear power generation facilities

Our company responds to the needs of our customers through plant technology that comprehensively supports construction and equipment installation work.

Based on an accumulation of rich experience and technology, our company supports nuclear power generation with excellent safety management.

\*Construction/modification, scheduled inspection, and facility repair

### On-premises power generation facilities

Making the most of our know-how of sophisticated technology and quality/safety management cultivated in handling fossil fuel/nuclear power generation, our company responds to a wide variety of customer needs.

\*Construction/installation and maintenance

### Gas supply facilities

Our company makes the most of its accumulation of rich

experience and technology cultivated through the construction and maintenance of LNG-fired power generation facilities for many years.

\*Construction/installation and maintenance

### Various plant facilities

Through sophisticated quality/safety management, our company responds to the needs of constructing, installing, and maintaining plant facilities in a variety of fields such as facilities used in environment-related businesses.

\*Construction/installation and maintenance

### Chemical cleaning of boilers

Our company offers technology of chemically cleaning boilers that is effective under various facility conditions to prevent efficiency degradation and piping rupture accidents.

## Presentation of Technology

### Design/execution/maintenance

Our company is capable of offering systems compatible with our customers' facilities, such as instrumentation facility systems, connected with the design, execution, and maintenance of satellite facilities and plant piping.

### Condenser tube cleaning unit (Raku-chin gun)

The brush cleaning of tubes of a condenser at a power plant is replaced by continuous water and air purge cleaning.

This unit enables cleaning operations to be performed with "raku-chin" ("easy to use") without being exposed to reactive forces, with reduced work time and water consumption.



Raku-chin gun



Raku-chin gun in action



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## Corporate Information

NEL utilizes the best technologies developed by others at home and abroad, as well as through our own research and development efforts. Our objective is to maintain and further improve our world-class engineering and technological capabilities. As an ISO 9001 certified company, we are committed to enhancing customer satisfaction by making continual improvement to our quality management system. We are also committed to rigorous compliance activities, through which we meet the goals of our corporate policy and build a corporate culture that earns trust from all concerned.

NEL is determined to continue providing top quality advanced engineering services in which man and technology have been integrated.

## Main Activities

### 1. Safe and Reliable Operation of Nuclear Power Plants

- Reload Core Design, Core Physics Testing
- Development of PSA Models

### 2. Monitoring Plant Operation and Developing Human Resources

- Designing, Manufacturing and Installation of Plant Simulator, Support for Operator Training
- Development of Operating Parameter Monitoring System and Support of Data Analysis
- System Development for Plant Administrative Activities

### 3. Providing NDT Services

- Development of Advanced ECT Inspection Technology for SG Tubes
- Visual Inspection of SG Secondary Side

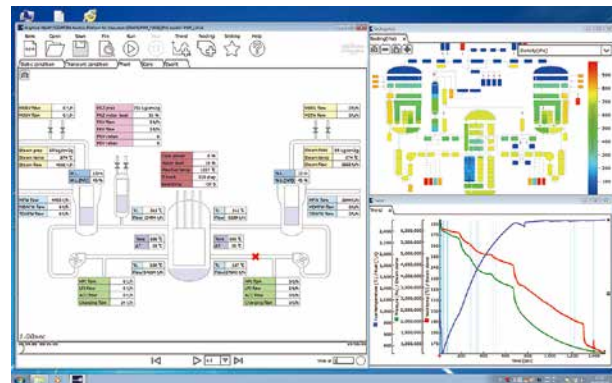
### 4. Providing Plant Maintenance Related to Engineering Services

- Advancement of Maintenance Program
- Support of Japanese PWR utilities on PLM
- Preventive Maintenance of SS Components by Tough Joint Resin Coating Technique
- Support for Development and Revision of Private -Sector Codes

### 5. To Secure Future Energy Needs

- Engineering Services Related to Decommissioning and Building New Plant Facilities

## Technologies

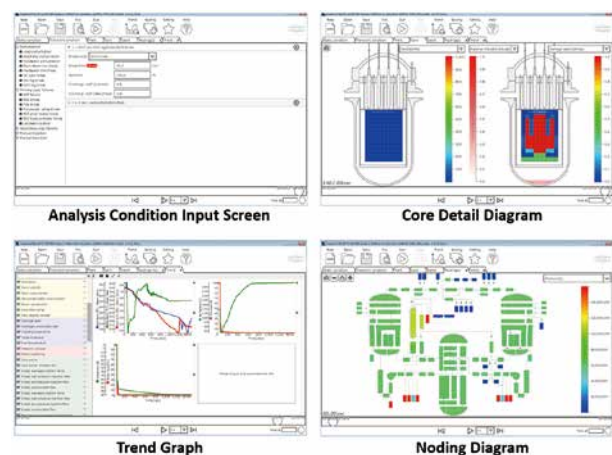


### GRAPE: Graphical RELAP5-based Analysis Platform for Education/Engineering

GRAPE is an innovative platform for a nuclear plant simulation for education and engineering where reliable plant models for RELAP/SCDAPSIM code are available. With an intuitive and easy-to-use GUI, students can perform simulations using an engineering-grade system analysis code without deep knowledge of the calculation code itself.

Visualization capability of GRAPE makes it possible to show the calculation results from various angles with quite simple manners. Even novice users can obtain in-depth understanding of nuclear power plants in a short time.

GRAPE provides additional values for education and engineering with its flexibility and extensibility such as multiple language support, sensitivity analysis support with the built-in macro language, and incorporation of user-defined plant models.





# Nuclear Engineering and Services Company - 1

<http://www.gnesc.co.jp/>

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## Corporate Information

Nuclear Engineering and Services Company (GNESC) was established in 2015 as a wholly-owned subsidiary of JAPC<sup>\*1</sup> and has extensive and proven expertise in maintenance of nuclear power stations, radiation control, operation of nuclear power stations and auxiliary facilities, development and maintenance of IT application software, etc.

\*1: The Japan Atomic Power Company (JAPC) is an electric power company which owns and operates two nuclear power stations in Japan and has a leading role as a pioneer in nuclear power through various projects.

## Nuclear Engineering

GNESC has been working together with JAPC to challenge new business fields as a pioneer of nuclear power company.

### Our technical fields are as follows:

- Core management analysis:  
We have specialists for calculating the reactor core characteristics and planning the core designs for both BWR and PWR.
- Development of PRA model for Nuclear Power Plant:  
PRA (Probabilistic Risk Assessment) is today mandatory in the countries with nuclear power plants. We can provide a PRA model and results for your nuclear power plants.
- Radiation analysis:  
We have specialists for calculating radioactivity inventory evaluation using ORIGEN, GIP and SCALE systems.
- Development of nuclear power plant simulator:  
Our full-scope classroom simulator has both BWR and PWR models for operator team training, and it provides real-time simulation of accurate condition of the reactor core, balance of plant and instrumental reaction with user operation.

The classroom simulator is ideal for education for engineers of electric companies, nuclear administration staff of government agencies and students in nuclear engineering.

## Information Service

GNESC provides various IT solutions to nuclear-related organizations as well as JAPC.

### Our services include the following:

- Development of the customized OA systems that specializes in nuclear power business
- Computer and telecommunication infrastructures' design, installation, operation and maintenance including network security and protection
- Document management including development and operation of the management system and digitization of the documents
- Consulting on the development of business continuity plan
- Education of computer literacy
- Sales and lease of computers, network equipments and software



Classroom simulator of nuclear power plant



<http://www.gnesc.co.jp/>

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## Feather Suit and Tyluck Suit

PVA (Polyvinyl Acetate) Suit, ordinarily used in wet working conditions including in nuclear power stations, is superior to other products for its water-proof capability. It is, however, not suitable for long-hours of work under hot and humid conditions because of its low moisture permeability. Feather Suit and Tyluck Suit (Coverall Protective Suit) are both developed to resolve these problems with cooperation among the Japan Atomic Power Company (JAPC), Genden Business Services Company (GBSC<sup>\*1</sup>) and an apparel company to provide better workability and more comfortable wearing for professionals. It contributes to improve work efficiency and also comfortability of workers, especially under high temperature environment. A total more than 250,000pcs of Feather Suit and Tyluck Suit are used at Tokai II Nuclear Power Station in Ibaraki prefecture and other Japanese nuclear facilities.

\*1: GBSC was merged to Nuclear Engineering and Services Company (GNESC) in 2015. GNESC is inheriting the sale of Feather Suit and Tyluck Suit.

## Basic Specifications

Feather Suit



Tyluck Suit



- Type: Coverall with attached hood
- Weight: 180g
- Cloth materials: Nylon66

water-repellency (grade)	5·5·5 <sup>*1</sup>	JIS L 1092 (3 specimens)
water-proof (mm)	1,177 1,302 <sup>*2</sup>	JIS L 1092: A method
moisture permeability (g/m <sup>2</sup> ·24h)	10,032 9,816 <sup>*3</sup>	JIS L 1099: A-1 method

\*1 : 5·5·5 is the highest grade of water-repellency.

\*2 & \*3: Spec. apply to Tyluck Suit.

## Features

- Due to water-repellency, water-proof and water vapor permeability, Feather Suit and Tyluck Suit provide efficiency of work in wet working conditions.
- Re-useable<sup>\*4</sup> upon cleaning<sup>\*5</sup> or removing contamination.
- Incinerable for disposal including zippers (made of PET or ROM etc.).
- Light weight, compact to fold and easy for transportation {100pcs will be contained in a carton (app.H500\*W400\*L500)}.
- Based upon operational planning of re-use, more than half of the originally required storage space could be freed up.

\*4: At present, the basic criteria for re-use are less than 40Bq before cleaning and less than 1Bq after cleaning at nuclear power stations.

\*5: Performing laundry tests (JIS L0217 103 method) confirmed that water-repellency remains after more than 5 times of washing.



# Sojitz Corporation

<http://www.sojitz.com/en/>

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## Corporate Information

Sojitz Corporation was formed out the union of Nichimen Corporation and Nissho Iwai Corporation, both companies that boast incredibly long histories. For more than 120 years, our business has helped support the development of countless countries and regions. Today, the Sojitz Group consists of approximately 440 subsidiaries and affiliates located in Japan and throughout the world, and it is developing its wide-ranging general trading company operations in roughly 50 countries and regions across the globe.

As a general trading company, the Sojitz Group is engaged in a wide range of businesses globally, including buying, selling, importing, and exporting goods, manufacturing and selling products, providing services, and planning and coordinating projects, in Japan and overseas. The Group also invests in various sectors and conducts financing activities. The broad range of sectors in which Sojitz operates includes those related to automobiles, plants, energy, mineral resources, chemicals, foodstuff resources, agricultural and forestry resources, consumer goods, and industrial parks.



## Main Activities

Sojitz has served as the sole distributing agent in Japan for France's Areva NC, the world's top integrated nuclear fuel company since the 1970s. This allows us to provide a full range of services in the nuclear fuel cycle to Japanese electric power companies. Other operations include the sale of equipment, fuels and materials related to nuclear power plants through a subsidiary.

### e-Energy Corporation

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We will continue to expand the scope of our business in nuclear energy and related industries in Japan and overseas.

## Products

- Nuclear equipment
- Nuclear fuel, transportation and material
- Equipment for the Fukushima nuclear accident recovery and other projects
- Equipment for general industries
- Offshore trade, etc.





## Entry Companies

<b>01</b> Amec Foster Wheeler Asia KK	<b>86</b>
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# Amec Foster Wheeler Asia KK

<http://www.amecfw.com>



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## Corporate profile

Amec Foster Wheeler designs, delivers and maintains strategic and complex assets in the nuclear, oil and gas, mining, power generation, pharma, environment and infrastructure markets, employing over 40,000 people in more than 55 countries. With more than 3,000 nuclear specialists around the world, we're able to support our customers with local expertise. We have been involved with Japan's nuclear industry since the 1960s, when we helped build Tokai. We also participated in the fast breeder programme at Joyo and Monju and now we are supporting the remediation efforts for Fukushima.

## Main Activities

### New build

Amec Foster Wheeler's experience and capability in nuclear new build is world class. We have played a key role in the design and build of every civil nuclear power station in the UK, where we are now supporting new build vendors Hitachi-GE and Toshiba/Westinghouse. We were involved in 19 out of 20 new build projects in the US and we are the owner's engineer on Poland's nuclear new build programme. We understand the challenge facing the industry and we are committed to supporting owners and operators.

### Reactor operational support

Many of our senior staff have worked for nuclear operators so we combine broad technical capability with an understanding of the issues facing utilities. We devise innovative solutions to increase asset uptime and availability over the entire lifecycle. We are one of the

largest suppliers of engineering and technical services to the current UK reactor fleet. In North America, Amec Foster Wheeler has provided design and engineering support for Bruce Power and Ontario Power Generation in Canada and for US utilities. We also support operators in France, Romania, Slovakia and South Africa.

Extending the operation of any complex nuclear asset beyond its original design life takes a deep understanding of nuclear engineering and power plant systems. We have developed innovative approaches to life extension and improved operability and can provide technical and engineering capability in management of ageing and obsolescence which allows us to define cost-effective solutions.

### Decommissioning and clean up

For more than 40 years, Amec Foster Wheeler has been working on the world's most complex nuclear decommissioning site at Sellafield in the UK and we have been working at Chernobyl for more than 20 years. In Japan, we have joined our Japanese partners in the efforts to restore Fukushima Prefecture, where our work includes strategic waste management, geopolymer encapsulation, robotic solutions and off-site clean up.

We offer innovative solutions and deploy proprietary technologies for scanning, characterisation and minimisation of waste through to processing, transportation and safe final disposal.

Our services span the full lifecycle of any decommissioning project, from design and concept through to hands-on clean up, including environmental consultancy, analysis and remediation of contaminated land.



Amec Foster Wheeler's ScanSort system at work in Japan





# Dia Consultants Co., Ltd.

<http://www.diaconsult.co.jp/english/index.html>

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## Corporate Information

Dia Consultants Co.,Ltd is a consulting company in the field of geology, ground, groundwater and natural disaster and participates in construction of almost all nuclear power facilities in Japan. Dia was incorporated in 1963, as a geological survey company for natural resources and construction. For more than 50 years, Dia has offered professional services with highly experienced and trained engineers. Dia's services include, but not limited to, survey, analysis and evaluation in the field of geology, ground, groundwater and natural resources, as well as investigation and evaluation in the field of earthquake and natural disaster at nuclear power plants.

## Main Activities

Dia performs survey, analysis and evaluation at nuclear power plants and nuclear power facilities in both Japan and foreign countries.

- Geological survey and geological structural investigation, ground test and groundwater test, analysis and evaluation from these results
- Volcanic survey, analysis and evaluation
- Ground motion analysis and evaluation
- Groundwater survey, analysis and evaluation
- Tsunami sediments investigation and prospective analysis
- Paleoseismic study of capable fault
- Safety examination about the above items
- Proposal, planning, advice and guidance for survey and analysis



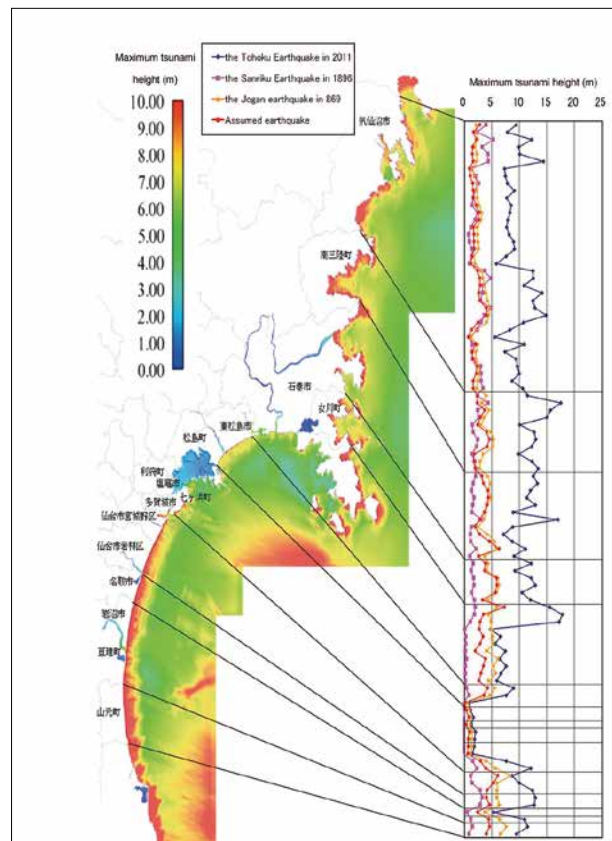
TEPCO's Kashiwazaki-Kariwa Nuclear Power Station

## Main performance records

- Almost all nuclear power plants in Japan, such as Tokyo Electric Power Company, Inc.
- Nuclear power plants in Vietnam and Turkey
- Nuclear power facilities, such as Japan Nuclear Fuel Ltd. and Recyclable-Fuel Storage Company
- Japan Atomic Energy Agency, Nuclear Waste Management Organization of Japan, Nuclear Regulation Authority, etc.

## Services that Dia can Offer

Dia contributes to earthquake-resistant evaluation and prior investigations to prevent accidents caused by natural disasters, such as earthquake, tsunami and volcano at nuclear power facilities. At Dia, its highly experienced engineers in the above fields provide top-notch technical improvement guidance and comprehensive study to its valued clients.



Result of Tsunami Simulation



# The Japan Atomic Power Company

<http://www.japc.co.jp/english/index.html>

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## Corporate Information

The Japan Atomic Power Company (JAPC) was established in November 1957 as a power company solely engaged in nuclear energy in Japan.

Since then, JAPC has continued to play a leading role in the electric power industry as a pioneer in nuclear power generation through various projects, including the construction, operation and decommissioning of the first commercial nuclear power plant (GCR) in Japan and the construction and operation of BWR and PWR.

We operate our nuclear power stations in accordance with our "Safety First" policy and the understanding of the Japanese people, including the residents of the areas where our power stations are located.



## Business Objectives

- We conduct the following operations to develop civilian nuclear power generation business:
  - To construct and operate nuclear power plants and to supply electricity generated thereby; and
  - To engage in other businesses relating to the preceding
- We conduct surveys, designing, construction supervision, construction operation and other relevant engineering assistance relating to nuclear power plants.

## Services of JAPC

JAPC has much experience of planning and construction of the first commercial nuclear power plant in Japan, and of more than 40-year operation, maintenance and decommissioning. In addition, JAPC has provided consulting services such as Feasibility Study of nuclear power project for foreign countries that plan to introduce nuclear power generation. Based on these experiences, JAPC is able to provide satisfiable consulting services and support from the viewpoint of power utilities.

- Project Management
  - Overall planning from design to operation
- Feasibility Study
  - Gathering design data, geological survey, environmental impact assessment, radiation dose evaluation, reactor type evaluation and economical evaluation
- Construction Management
  - Management of construction schedule, procurement, construction, design and commissioning
- Operating Support
  - Operating support of plant operation and maintenance
- Human Resource Development
  - Training of personnel for management of nuclear power plants



**We contribute to energy security and work on realizing a low-carbon society.**

**We have continued to play a leading role in addressing new challenges regarding nuclear power generation.**

# JANUS JAPAN NUS Co., Ltd.

<http://www.janus.co.jp/eng/tabid/92/Default.aspx>

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## Corporate Information

Established in 1971, Japan NUS Co., Ltd. (JANUS) offers technically advanced consulting services that aim to balance energy supply and economic growth with environmental conservation. JANUS has been the choice of hundreds of customers for more than 45 years because of our wealth of knowledge and experience, and our high-quality and sincere services. We specialize in technical consulting in the field of energy and environment.

## Main Activities

We address the problems of energy and resources. In particular, we have been providing **technical consulting services related to nuclear power generation** since our foundation.

We have various safety analysis technologies in **reliability risk assessment, radioactive materials environmental diffusion, exposure evaluation, radioactive waste management**, etc.

We have deep insights in the regulations in overseas nuclear power generation programs including areas of nuclear power plant licensing, operation and maintenance, plant aging management, nuclear fuel cycle, decommissioning, and health effects of radiation.

We have the most thorough experience and insights for these topics in Japan.

Recently, we are expanding our business to support the overseas development of nuclear power plants by domestic clients.

## Consulting Services

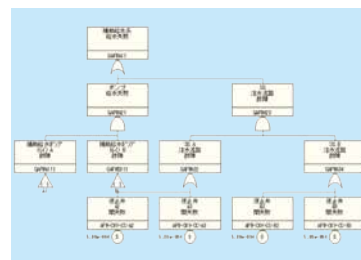
### 1. Radiation Protection & Exposure Evaluation:

We develop codes that are applicable to various fields from plume modeling to 3D modeling, and carry out analysis work of atmospheric advection and diffusion, environmental impact assessment, etc.



AREDES (Atmospheric Release Emergency Dose Estimation System) Model

**2. Reliability & Risk Assessment:** We support Probabilistic Risk Assessments (PRA) and risk-based management of facilities, including nuclear power plants.



PRA Fault Tree Model

**3. Radiation Effects on Human Health and Environment:** We conduct and support surveys in Japan and overseas on research trends related to radiation effects and regulatory trends related to radiation protection.

**4. Information Services & Consulting:** We provide timely information primarily from the U.S. and Europe in various fields such as nuclear regulation, safety issues, operating experience, maintenance, aging management, etc. through collaboration with overseas business partners.

**5. Fuel Cycle and Waste Management:** We carry out survey on the latest trends in Japan and overseas, and safety analysis, etc. in order to support the operation of nuclear fuel cycle facilities, decommissioning of nuclear facilities, and the disposal of radioactive waste.

**6. Environmental Impact Assessments:** We offer broad support for environmental impact assessment procedures in Japan and overseas, namely by helping with surveys, projections, assessments, the creation of assessment statements from impact statements, stakeholder meetings, etc.

# pesco PESCO Co., Ltd.

<http://www.pesco.co.jp>

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## Corporate Information

Established in 1988 in Tokyo, PESCO started its activities with prime objective of expanding the PNC\* developed nuclear technologies to the domestic industrial communities as well as supporting the PNC activities. Our nuclear technology ranges from the front-end through the nuclear fuel cycle, to the back-end. Human resources that support those activities are excellent engineers who have rich experiences in the individual areas for a number of years.

Since then, PESCO had grown steeply in business sales basis due to the growing businesses in overseas, fuel cycle and public relations. In 1998, activities for advance reactors were enforced in the Tsuruga region, home of the FBR Monju. In 2002, the activities were further enforced to support the Japan Nuclear Fuel Cycle Limited, in Rokkasho, in the areas of fuel cycles.

Currently, more than 100 engineers and administration specialists are working for PESCO across Japan, especially, focusing on remedial programs for Fukushima, and for the development of the future nuclear energy.

\*PNC was the government nuclear research & development institute that was later reorganized to JNC in 1998 and further reorganized and merged to JAEA in October 2005. JAEA is the sole research institute in Japan dedicated to comprehensive research and development (R&D) in the field of nuclear energy.

## Main Activities

Our current activities range so wide as follows:

### 1. SUPPORT TO FUKUSHIMA

- (1) Measurement of internal exposures to the general public of Fukushima
- (2) Training of workers engaged to decontamination of the environmental radioactivity

### 2. NUCLEAR TECHNOLOGY

- (1) Investigation research and evaluation of nuclear fuel cycle technology and advanced nuclear reactors
- (2) Design for process and facilities
- (3) Consultation of running and operating of nuclear facilities including hot facilities
- (4) Analysis and evaluation of scientific database

### 3. PUBLIC RELATIONS

- (1) Management and operation of science museum
- (2) Support for communications between experts and the general public on nuclear development and safety issues to establish mutual understanding
- (3) Research and consulting on social environment

### 4. EDUCATION & TRAINING

- (1) Personnel education and training
- (2) Preparation of materials for training and education
- (3) Support to seminars for safety and nuclear disaster management

### 5. INTERNATIONAL COOPERATION AND SUPPORT

- (1) Research and development on MOX fuel assemblies for thermal and fast reactor in Russia (2004-2008)
- (2) Physical protection system support in Kazakhstan (2008)
- (3) Collection, analysis and evaluation of overseas nuclear information
- (4) Translation of overseas reports on nuclear technology

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### Corporate Information

Shearman & Sterling is one of the world's leading international law firms with a network of 20 offices, and a history of serving our clients for over 140 years.

With approximately 850 lawyers, we act on the largest and most complex nuclear development and financing projects around the world, particularly focusing on groundbreaking and first-of-a-kind transactions in major regions of the world.



### Comprehensive Nuclear Expertise

We have a full-scope global nuclear energy practice, Combining with Shearman & Sterling's world-leading project development and finance group with experience under English and New York law, we focus on procurement, construction and financing for nuclear new build, as well as related nuclear-industry specific advice on international nuclear law, nuclear liability and nuclear trade issues. Our work covers:

- development, construction and operations of nuclear power plants
- nuclear finance
- nuclear arbitration and litigation
- nuclear liability
- nuclear export controls
- international nuclear law
- licensing and facility regulation
- nuclear fuel cycle transactions
- public policy

### Dedicated Nuclear Team

We have a dedicated group of nuclear lawyers with experience in all possible nuclear-related activities and transactions. Our global team is located in Asia, Europe, the Middle East and the U.S. Our nuclear lawyers include engineers with technical understanding of nuclear technologies.

Our lawyers have worked on the most recent nuclear new build projects in established and emerging nuclear markets and on the largest international arbitration in the nuclear sector. Our lawyers have an unrivalled understanding of nuclear project risks (legal, financial and technical) and have advised on every type of nuclear-related contract and transaction.

### Nuclear Industry Understanding

We are part of the nuclear industry and our lawyers have a special appreciation for the opportunities and challenges involved in doing business in this industry. In particular, we assist our clients in managing their nuclear export businesses and transactions in foreign countries.

Our clients include electric utilities, governments, export credit agencies, commercial banks, nuclear reactor power plant vendors and equipment suppliers, investment/commercial/advisory banks, universities, trading companies, universities and other major companies involved in the nuclear energy sector. Our clients have priority access to, a team which brings lessons learned from previous first-of-a-kind nuclear and conventional power projects, as well as practical and tested deal-making solutions to challenges which may arise in developing international nuclear power projects and associated transactions.

### Shearman & Sterling Global Presence



\*Abdulaziz Alassaf & Partners in association with Shearman & Sterling LLP

# 3R Corporation

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## Corporate Information

3R Corporation was founded in 2001 as a technical consultant specializing in energy, resources, and the environment. It is located in Sendai, the largest city in the Tohoku region of Japan. The company name 3R originates from three Rs: reduce, reuse, and recycle. We are particularly interested in reducing waste and consumption of energy and resources, as well as reusing and recycling waste and other materials. Many of our activities are related to the nuclear industry.

## Main Activities

**Our main activities include:**

- Technical survey and consultation conducted by collecting and analyzing scientific and technical information on nuclear power, new energies such as hydrogen power, renewable energies such as solar and wind power, and environmental issues
- Technical survey and consultation on the treatment and disposal of radioactive material
- Technical survey and consultation on the recovery and reuse of mining and industrial products/byproducts containing rare metal and other valuable materials
- R&D and consultation on technologies for the separation, purification, and measurement of radioactive and chemical materials as well as technologies for environmental analysis and improvement
- Sale of nuclear equipment and provision of technical guidance and information for such sale

## Translation Services

Through our subsidiary company Transwords Co. Ltd., we offer technical translation services in various industrial fields including energy, resources, and the environment. We are particularly experienced in nuclear energy (from uranium mining to final disposal of radioactive waste), renewable and alternative energies (including solar, wind, geothermal, biomass, and hydrogen power), geological exploration, and technologies for reducing waste and other environmental loads.

Our translation work is done by rigorously selected translators specializing in the above fields, and final quality is carefully checked by adept translators having a Ph.D. in either Science or Engineering.

Our translators are well experienced, for example, in English-to-Japanese translation of Radwaste Solutions published by the American Nuclear Society, English-to-Japanese translation of Nucleonics Week published by McGraw-Hill, Japanese-to-English translation of JAERI News published by Japan Atomic Energy Research Institute, and Japanese-to-English translation of the Denki Shimbun newspaper.

We mostly deal with the language pair of English and Japanese and also handle such languages as French, German, Russian, and Chinese. Our rates depend on the language pair and the level of complexity of the subject. Please contact us for a free cost estimate on your project. All information received will be treated with strict confidentiality.

**Contact information for our translation services:**

### Transwords Company Limited

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## Center for Safe and Disaster-Resistant Society

<http://www.okayama-uc.ac.jp/user/csdrs/>

Okayama University Center for Safe and Disaster-Resistant Society

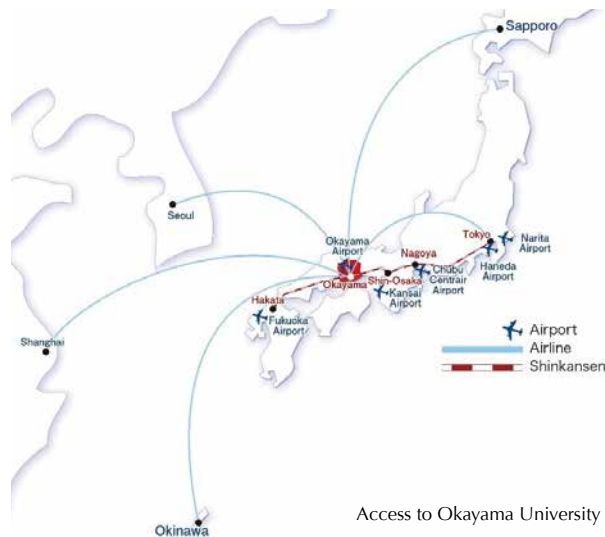
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### Information

"Okayama University, Center for Safe and Disaster-Resistant Society" was established in January 2014, in which relevant areas of research and education are organized under cooperation with IAEA, JAEA, the Japan Nuclear Education Network (JNEN; associated with Okayama University, Tokyo Institute of Technology, Osaka University, Kanazawa University, Fukui University, Ibaraki University, Nagoya University and JAEA), and others.

Key topics covered are radiation measurement, protection and human health; safety design for disaster-resistant nuclear facilities; radwaste management; safety culture for nuclear use, security management and public communication.

We provide not only a regular graduate program including Master and Doctoral courses, but also intensive courses which are available for national and international post-graduates and management/technical staff working in relevant industries.



Tsushima Campus



Ningyo-toge Environmental Technology Center, JAEA









# Japan Atomic Industrial Forum, Inc.

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## Corporate Information

The Japan Atomic Industrial Forum, Inc. (JAIF) was incorporated on March 1, 1956, as a comprehensive nonprofit organization for nuclear energy. Its objective has been to promote peaceful uses of nuclear energy and technology to support sound development of the national economy and well-being.

JAIF became the first NGO that was awarded “consultative status” by the International Atomic Energy Agency (IAEA) in 1960.

JAIF is unique in having a broad membership comprising about 440 member organizations, ranging from nuclear-related businesses, including utility companies, vendors, and R&D institutes, to organizations such as local governments.

**Public Understanding**

**Human Resources Development**

**Objectivity**

**International Cooperation**

**Diversity**

**Internationality**

**Members Interaction**

**Information Sharing**

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