



Innovative solutions coupled with expertise in pumping technology

Torishima is firmly committed to contributing to society in total harmony with environmental demands.

Torishima is a leading pump manufacturer, founded in 1919 in Osaka, Japan. Our primary objective is to contribute to society as a quality provider of pumping equipment and services. We continue to strive to be the market leader in our field, our on-going investment in research and development highlights our commitment to provide the best technology for our customers. Our mission is always to listen to our customers, understand their needs and meet their expectations. We offer our products in the following four domains: High-Tech Pumps, Projects, Renewable Energy & Environment, Service Solutions. Torishima is also fully committed to maintaining harmony in the environment.

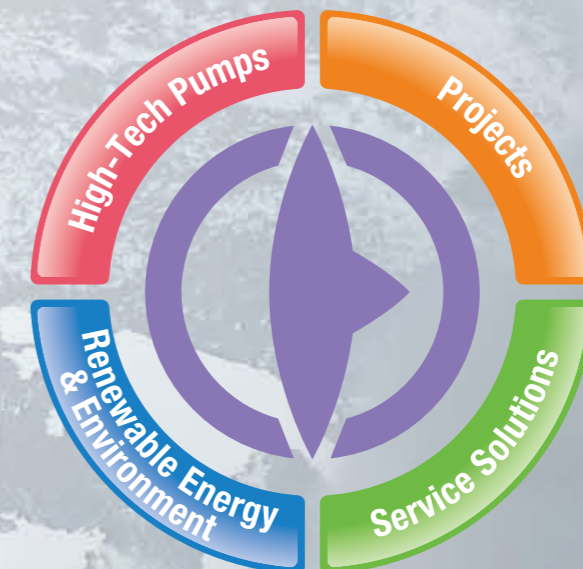


High-Tech Pumps

Manufacture and supply of high-efficiency, high-value-added pumps

Renewable Energy & Environment

- Wind power generation
- Mini- & Micro-hydro generation



Projects

Supply EPC(engineering, procurement, construction) for turnkey pumping stations

Service Solutions

- Operation & Maintenance
- Pump overhaul repair
- Spare parts supply
- Pump inspection & testing
- REDU (Re Engineering & Design Up)



Power Plant Projects, Torishima provides a full range of pumps in this industry.

The demand for energy continues to increase globally with particularly high growth rates in the Indian subcontinent and many parts of Asia. As a result, the number of new and refurbished power plants will increase to meet this demand. Torishima is well placed to provide a full range of pumps designed for the applications needed within the various types of power plants. We are able to supply boiler feed pumps, circulating water pumps, condensate pumps and boiler circulating pumps as well as a range of auxiliary duties. Torishima pumps have been installed globally in this market.

①	②	⑤			⑨
③	④	⑥	⑦	⑧	

- ① Barrel type boiler feed pump, Rabigh 2 combined cycle power plant, Saudi Arabia, 4×700MW
- ② Barrel type boiler feed pump, Cirebon coal fired power plant, Indonesia, 1×660MW
- ③ Barrel type boiler feed pump, Mong Duong 2 coal-fired power plant, Vietnam, 2×620MW
- ④ Ring section type boiler feed pump, Isle of grain power station, U.K., 1×1,320MW
- ⑤ Barrel type boiler feed pump, Mojave Solar Power Plant, U.S.A., 2×240MW
- ⑥ Condensate pump, Samalkot combined cycle power plant, India, 3×800MW
- ⑦ Hotwell pump, Polaris geothermal power plant, Nicaragua, 1×36MW
- ⑧ Circulating water pump, Pacifico coal fired power plant, Mexico, 1×700MW
- ⑨ Boiler circulating pump, Mahanadi thermal power plant, India, 6×600MW

Seawater Desalination



As a specialist in pumps for seawater desalination, Torishima plays a significant role in solving the global water shortage problem.

Only 0.01% of the world's water is useable fresh water. There is no doubt that water demand is increasing with the growth of population and industry, particularly in emerging countries. Consequently, the necessity of seawater desalination plants is rapidly increasing. Torishima has a wide range of experience and has been supplying engineered pumping equipment in this field for 50 years. Our pumps are installed throughout the world and are designed for almost all methods of seawater desalination including MSF, RO and MED.

In addition, we can offer Energy Recovery Devices (ERDs) through our partnership with FEDCO*, a world leading American manufacturer of ERDs for the RO desalination market.

※Fluid Equipment Development Company, LLC.

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③	④	⑧	⑨	

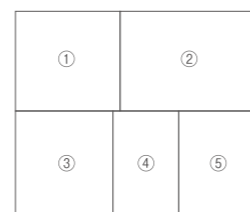
- ① High pressure seawater feed pump, Tuas II (RO), Singapore, 318,500m³/d
- ② High pressure seawater feed pump, Victorian desalination (RO), Australia, 444,000m³/d
- ③ High pressure seawater feed pump, Hamma water desalination (RO), Algeria, 200,000m³/d
- ④ High pressure seawater feed pump, Theie Nungua desalination (RO), Ghana 60,000m³/d
- ⑤ Brine recirculation pump, Shuaiba south (MSF), Kuwait, 231,846m³/d
- ⑥ Brine recirculation pump, Jebel Ali M (MSF), U.A.E., 636,440m³/d
- ⑦ Seawater intake pump, Zawia desalination (MED), Libya, 80,000m³/d
- ⑧ High pressure seawater feed pump, Copiapo (RO), Chile, 38,880m³/d
- ⑨ Energy recovery device (FEDCO Turbocharger), Jeddah III (RO), Saudi Arabia, 240,000m³/d

Petrochemical, Oil and Gas(LNG) Industry



With the expansion of the Oil and Gas market, Torishima has developed highly reliable pumps that meet stringent requirements.

In the oil and gas industry, the processing plants are operated under arduous conditions with high temperatures and high pressures. Accordingly, the pumping systems are required to be highly engineered for safety, reliability and emission control. Torishima has a long history and proven capability in manufacturing engineered pumps which can meet such difficult requirements. We have been supplying innovative pumping solutions for the Oil & Gas industry including for production, refining and related petrochemical industries.



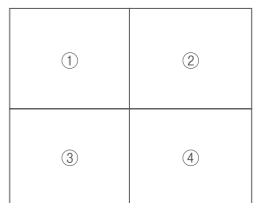
- ① Cooling water pump for petrochemical plant
- ② Boiler feed pump for fertilizer plant
- ③ Boiler feed pump for petrochemical plant
- ④ Seawater pump for LNG facility
- ⑤ Process pump for chemical plant

General Industry



Torishima Pumps designed for general industrial applications

Torishima is committed to designing and installing a wide variety of centrifugal pumps suited to a number of industrial applications. We have a large number of single stage and multistage pumps installed in different industries such as iron & steel, machinery, pulp & paper, textile, automobile, electronics and various others. We can also offer pumps designed specifically for building services and air-conditioning processes.



- ① Cooling water pump for medical facility
- ② Cooling water pump for district heating and cooling facility
- ③ Cooling water pump for non-ferrous factory
- ④ Boiler feed pump for incineration plant

High-efficiency standard pumps: The Eco-Pumps

While pumps undeniably play an essential role in modern society, they consume an enormous amount of energy. However, little attention has been paid to energy efficiency in general, particularly with standard pumps. Torishima, as an established pump manufacturer, has developed higher efficiency standard pumps - "The Eco-Pumps" - by drawing on our highly technical knowledge and long experience in manufacturing large-sized high-efficiency pumps.

Besides just offering the Eco-Pumps, we have been promoting "Go Green with Pumps" initiatives to raise awareness of the fact that energy consumption can be reduced in pumping operations. These activities won the "Energy Conservation Grand Prize" sponsored by Japan's Ministry of Economy, Trade and Industry (METI) in 2015.



Water transmission, Sewage, Oil & Gas



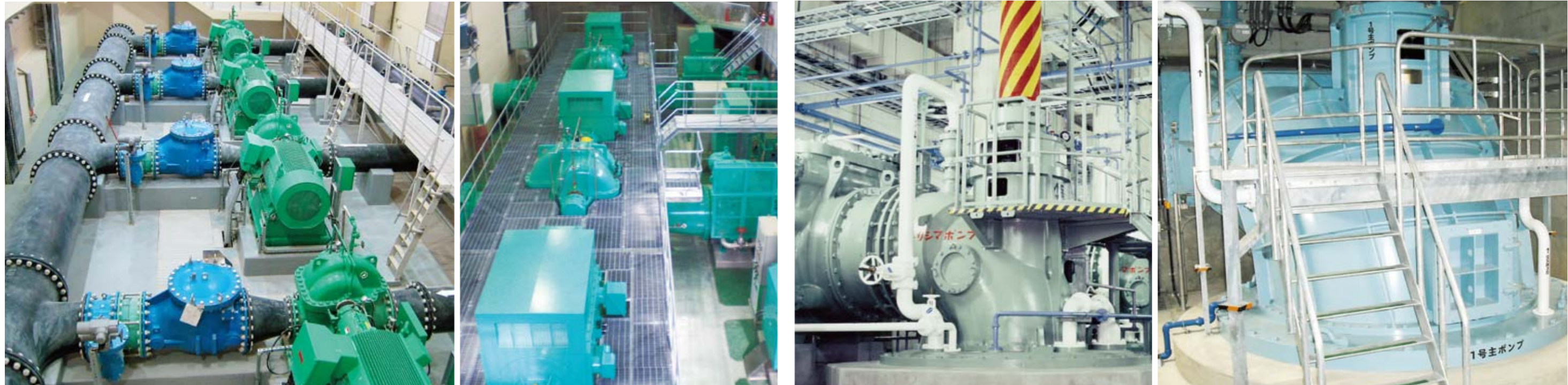
Not just a pump supplier, but Torishima has experience as an EPC contractor for turnkey pumping stations.

The pump is at the heart of any water / wastewater transfer scheme. Torishima is not only a pump supplier but we have a long history of design of pumping stations. We are committed to providing a turnkey service to our customers where we can design, engineer, procure, construct and commission all the equipment within a pumping station. We have expertise in water distribution, wastewater and power plant cooling systems.

①-1	①-2	③-1	③-2
①-3	②	③-3	④

- ① Shuweihat potable water transmission project, U.A.E.
 - ①-1 Mirfa long distance, 140km, transfer pumping station
 - ①-2 Surge vessels
 - ①-3 Mussafah water supply pumping station
- ② Harbour Area Treatment Scheme (HATS), Hong Kong
Stonecutter island main sewage pumping station
- ③ Shuaiba oil refinery plant, Kuwait
 - ③-1 Cooling water pumping station
 - ③-2 Installation of cooling water pump
 - ③-3 Installation of a 10.5 MVA power generator
- ④ Old salwa water supply pumping station, Qatar

Irrigation, Drainage, Balance of Power Plant



①	②	④	⑤
③-1	③-2		

- ① TSE2 irrigation pumping station, Qatar
- ② Irrigation water supply pumping station, Japan
- ③ Ca Mau project, Balance of power plant, Vietnam
 - ③-1 Main cooling water pumping station
 - ③-2 Make up water pump
- ④ Stormwater drainage pumping station, Japan
- ⑤ River drainage pumping station, Japan

Torishima Innovation

Newly Developed Technologies for Flood Control

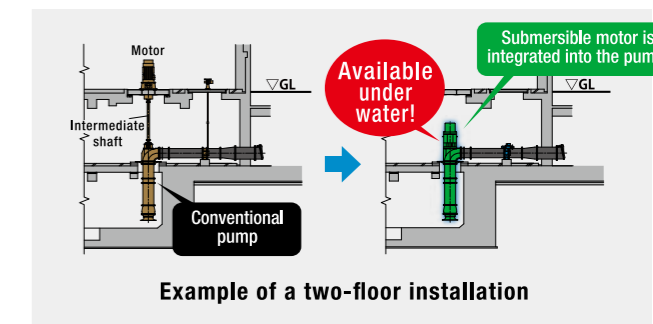
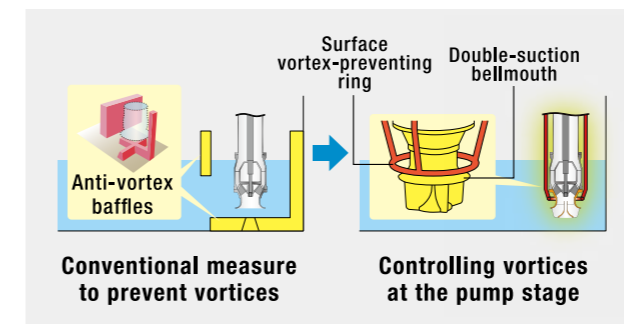
Pump with Vortex-Prevention Technology

Torishima developed a pump with a double-suction bellmouth and vortex-preventing ring. This new technology removes the need to install anti-vortex baffles conventionally used to avoid generating harmful vortices in pumping operations, reducing civil engineering costs, increasing safety, and shortening the construction time schedule.



Pump with Submersible Motor

Normally motors are installed above ground level to avoid submergence. In the case of two- or three-floor installation, an intermediate shaft between a motor and a pump is needed. A pump with a submersible motor enables its operation without a problem in case of flooding in a pump room, and is also earthquake resistant.



World-class service solutions to maximize the life span and efficiency of plants

As a premier engineered equipment supplier, Torishima is committed to providing the highest quality aftermarket service. Our innovative solutions can enhance performance and increase the life span of pumps, other equipment and plants. This allows operators to maximize efficiency, reduce maintenance costs and conserve energy.

Installation & Field Test

Torishima provides field engineering service both domestically and internationally, to supervise pump installation work and equipment commissioning, ensuring the pumping equipment can meet customer expectations.



Installation of seawater intake pumps



Test and commissioning of transmission pumps

Maintenance, Overhaul, Operator Training

Torishima can provide experienced engineers who can advise on pumping equipment and plant maintenance. We can give advice on long term & short term maintenance requirements, spares inventory and overhaul requirements. We are also able to provide a range of training solutions for the plant operators.



Inspection of pumping equipment



Onsite overhaul service



3D scanning of casing

What's REDU?

The REDU (Re Engineering and Design Up) service provides a review of pump specifications, regardless of the original supplier, and lengthening the useful lives of pumps. This service also includes the restoration and improvement of obsolete and worn parts as well as the replacement of parts. Using the latest technology, we can increase the efficiency and reliability of existing pumps.



Examples of REDU

1 Upgrade of hydraulic parts

Before

Existing pump
Pump performance had decreased due to vibration caused by cavitation and crack in casing.

Plant utilization decreased

After

Upgraded hydraulic parts
Pump performance has increased by REDU!

Contribution to stable plant utilization

Only hydraulic parts upgraded

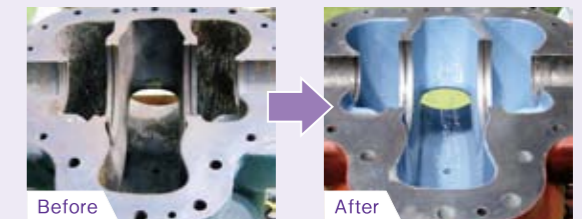
2 3D measurement of impellers



3 Upgrade of impellers

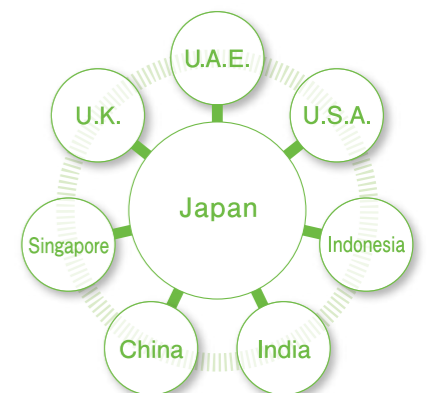


4 Coating



Expanding our service center network to support all of our customers around the world

To provide our best-in-class services around the world and respond to local customers more quickly, Torishima has established service bases in major regions, including in the U.A.E., the U.K., the U.S.A., Indonesia, Singapore, China and India.





Mechanical seals supplied for all types of rotating equipment

Torishima has been manufacturing mechanical seals for many years and for many applications, and these seals are installed in a variety of rotating equipment. Our mechanical seals are installed in pumps throughout our product range from low-pressure single-stage pumps to high-pressure high-temperature boiler feed pump applications. We offer a range of seals from split seals to fully assembled cartridge type seals. We continue to develop our sealing technology as we understand the importance of seal performance to the reliability of the pumps.



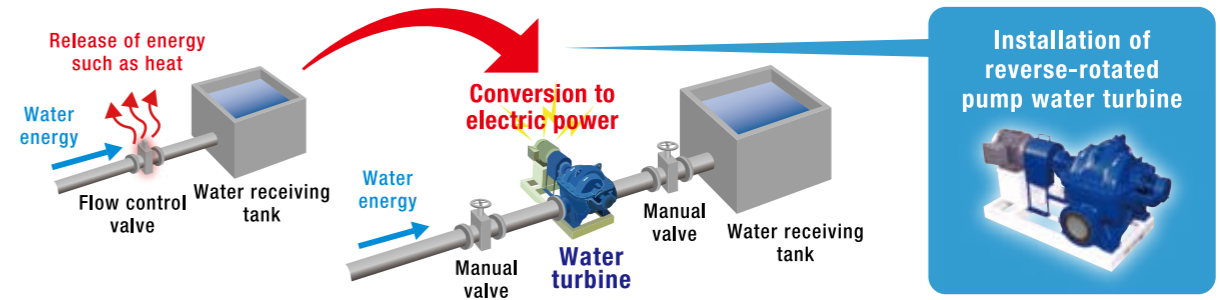
- ① Mechanical seals for turbine and process pumps
- ② Bellows type mechanical seals
- ③ Automatic assembling unit of mechanical seals
- ④ Cartridge type mechanical seal for boiler feed pump

Today, the issues of preserving the Earth's environment and reducing energy consumption are becoming increasingly serious. As a responsible global corporation, Torishima provides products and services that contribute to reducing the burden on the environment.

Reuse of wastewater energy

Drawing on its strengths as a pump manufacturer, Torishima provides its clean and highly efficient reverse-rotated pump water turbines.

In water supply systems, which are an integral part of the lifelines sustaining human life and activities, it is a fact that a considerable amount of energy in water is wasted in the processes of controlling water flows to meet needs in differing seasons and times of the day. With this realization, Torishima developed its reverse-rotated pump water turbine systems, which use this energy, that was formerly wasted, for generating electric power.



Product Features

- ① Zero impact on water quality
- ② Low-cost products
- ③ Easy maintenance
- ④ High efficiency



Tuen Mun Water Treatment Works
Hong Kong
Capacity 76.4m³/min
Effective Head 19m
Maximum power output 211.2kW

Mukangu Water Treatment Plant2
Kenya
Capacity 15.96m³/min
Effective Head 30m
Maximum power output 50kW

Efficient use of wind energy

Torishima provides total engineering solutions for wind power generation systems as well as wind assessment and location surveys including business plans, design, installation, and maintenance advice.

We offer comprehensive customer support for our installed wind power facilities as well as those built by other companies.



100kW wind turbine

1500kW wind turbine

Factory

Integrated and optimized manufacturing process

The main manufacturing site of Torishima is located in Headquarters, Osaka, Japan. Our manufacturing facility is designed to provide the full range of activities required to produce our high efficiency pumping equipment. This includes foundry, machining, assembly and testing prior to equipment dispatch. The site extends to 63,182m² and also includes a painting facility. Communication is continual between design and manufacturing teams to ensure our machine tool settings and programs are in synch with our design requirements. In addition, there is another manufacturing site, 57,495m², in Torishima Kyusyu, Japan, which has the latest production technologies, including computer integrated manufacturing (CIM). Both of sites are committed to preserving the environment.



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Foundry Shop

Torishima is one of the few pump manufacturers to maintain a large foundry within our own factory. This enables us to stay in control of casting quality and lead times, leading to additional customer confidence in our performance.

Capability

- ▶ Maximum weights : 20ton
- ▶ Maximum flask size : 4,000mm × 4,000mm

Material

- ▶ Cast iron, Nodular graphite cast iron, Austenitic cast iron, High-chrome cast iron.



Pouring into small, middle-size mould



Melting by electric furnace

Machining and Welding

Torishima Pumps are known for high reliability and quality, they are manufactured using state-of-the-art machining and welding centers integrated to 3D CAD/CAM design equipment. Torishima continues to invest in new manufacturing equipment and strives to improve product in terms of efficiency and cost.



Double housing vertical machining center



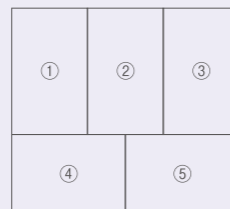
Numerical controlled horizontal boring machine



Submerged welding machine

Large Pump Shop

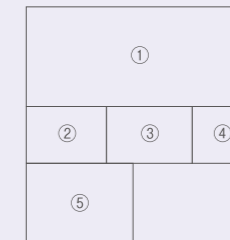
Torishima has introduced cutting-edge and high-precision processing machinery for large-sized pumps, integrating production processes from machining and assembly to performance tests. This enables us to meet customers' needs more smoothly with shorter delivery times.



- ① 2,100mm, Cooling water pump
- ② 1,950mm, Cooling water pump
- ③ 1,200mm Brine recirculation pump
- ④ 2,000mm, Stormwater drainage pump
- ⑤ 2,700mm, Water circulation pump

High Pressure Pump Shop

Torishima has modernized the assembly line for high pressure pumps to meet increasing market demands, improving the production efficiency for barrel type- and ring section type- high pressure pumps for power plants. High pressure pumps used in RO seawater desalination plants are also manufactured here.



- ① Assembly line of boiler feed pump
- ② Assembly of RO high-pressure seawater feed pump
- ③ Dynamic balance test of rotor
- ④ Assembly of transfer pump for potable water plant
- ⑤ Performance test of boiler feed pump

Boiler Circulating Pump Shop

Boiler Circulating Pumps are operated under difficult conditions with very high temperature (350°C) and high pressure (30MPa). The main issue at such temperatures is the inability to implement conventional mechanical sealing technology. This results in the unit being termed 'glandless', with sealing between the motor and pump achieved by a water barrier. Torishima makes the complete pump and motor assembly in the Osaka factory, we also have the ability to carry out hot tests within our testing set up.

Torishima is one of the few companies who can manufacture the boiler circulating pumps even in the world.



①	②
	③
	④

- ① Boiler circulating pump for 6×660MW thermal power plant
- ② Preparing for hydraulic pressure test of boiler circulating pump
- ③ Assembly of wet motor for boiler circulating pump
- ④ Performance test of boiler circulating pump

Quality Assurance

Torishima mission – quality cannot be compromised.

The reputation of Torishima is built on Japanese quality. From design to manufacture and testing, our quality procedures and continual testing ensures the product meets the high quality standards set by our company. Torishima has all the relevant quality assurance certification such as ISO 9001, ISO 14001 etc. We have continual internal audits to ensure our company maintains a level of high quality. We insist on equally stringent quality requirements on our sub-suppliers and in particular our material suppliers. Torishima will not tolerate substandard equipment at any time.



①		
②	③	④

- ① High pressure test of boiler circulating pump
- ② Performance test of boiler feed pump, string test of booster pump
- ③ Performance test of large-size vertical pump
- ④ Inside inspection with ultrasonic test, NDE*

*NDE - Non Destruction Examination

The Torishima R&D team pursues the path to be the world's best.

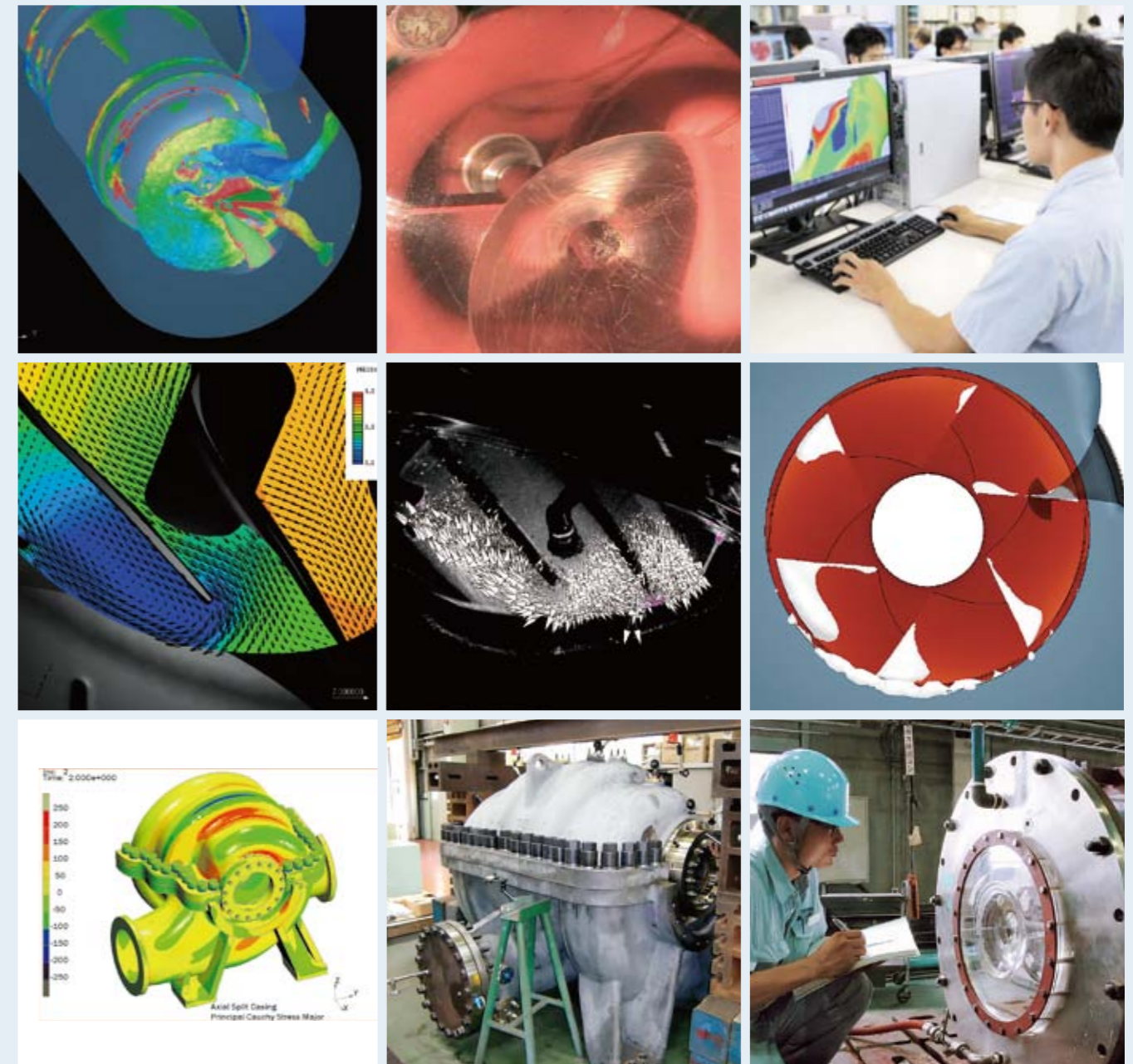
With the growth of economical and industrial development, market needs have been becoming more sophisticated and diversified. Especially in recent years, "High-efficiency" and "High-speed" are keys to meeting customers' needs in pumping technology.

Torishima takes advantage of state-of-the-art analysis technology with parallel computing system that allows us to conduct computer simulations and a series of experiments repeatedly. This produces high-efficiency, reliable and environmentally-friendly pumps at a competitive price. We are unwaveringly devoted to R&D activities to provide the world's best products for years to come.



R&D test loop

Research and Development



①-a	①-b	②
③-a	③-b	⑤-a
④-a	④-b	⑤-b

- ① Verification of vortex in a barrel
a. CFD analysis b. Visualization test
- ② Structural analysis with FEM
- ③ Flow verification of entrance to a mixed-flow diffuser
a. CFD analysis b. PIV (particle image velocimetry) result
- ④ Verification structure of casing for seawater desalination high pressure pump
a. FEM analysis b. Hydraulic pressure test
- ⑤ Verification of cavitation in an impeller
a. CFD analysis b. Visualization test

Torishima Global Network

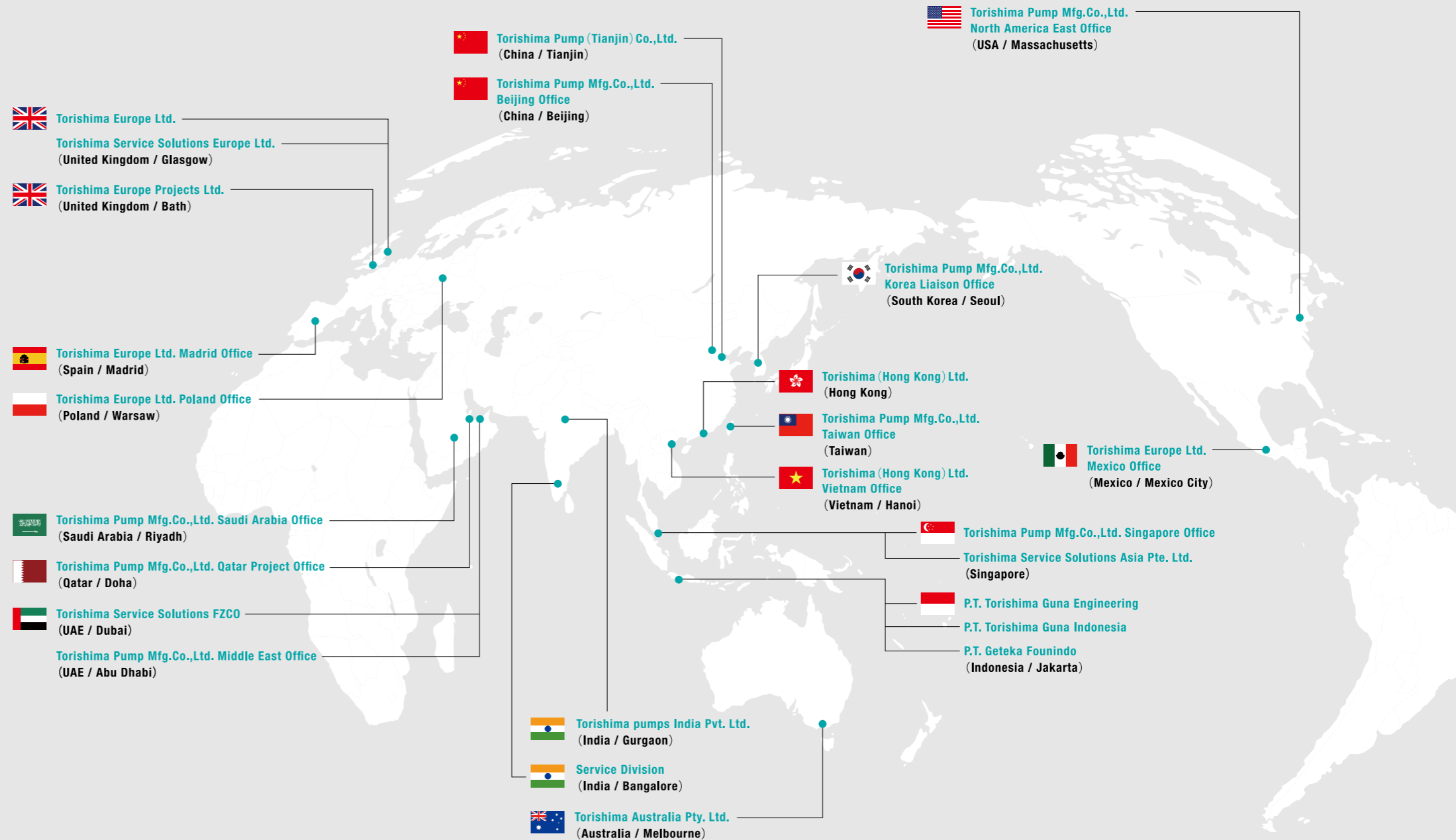
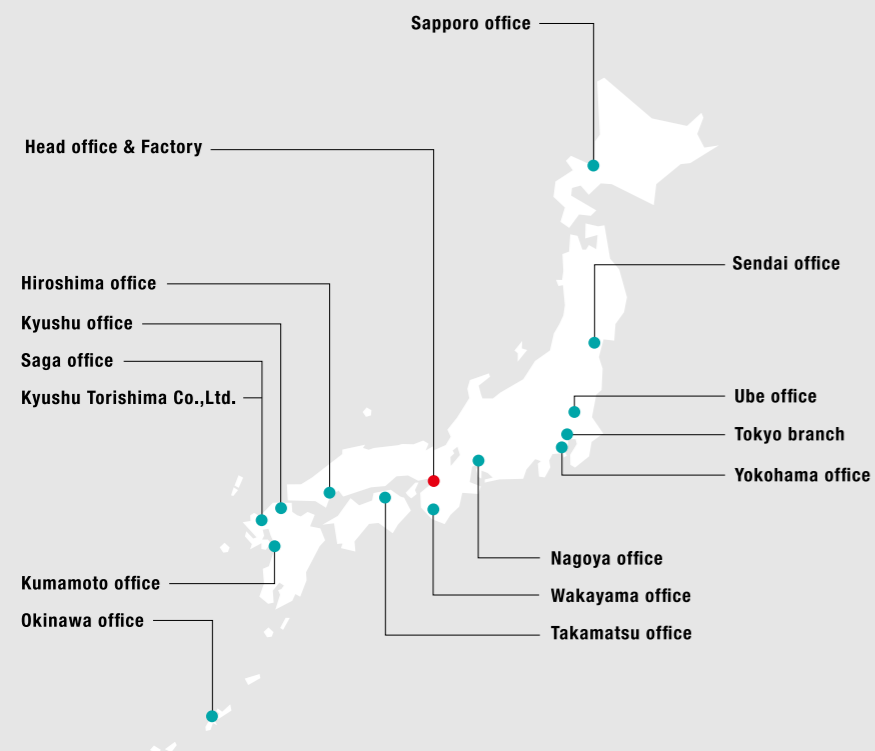
Since the launch of the first overseas office in Singapore in 1979, Torishima has been continuously expanding our global network throughout Asia, the Middle East, Europe, North America and Oceania. In addition, having established manufacturing / service facilities in China, the U.A.E., the U.K., and Indonesia, we can provide prompt and appropriate response to local customers in each region.

Corporate Data (As of 31 March 2015)

Company name Torishima Pump Mfg. Co., Ltd.
Head office 1-1-8, Miyata-cho, Takatsuki-city, Osaka 569-8660, Japan
Foundation August 1, 1919
President & CEO Kotaro Harada
Paid in capitals JPY1,592,775,030
Employees 1,516 (Consolidated)
 807 (Non-consolidated)
Listed on The Tokyo Stock Exchange



Domestic Network



Manufacturing / Service facilities

