

## COMPANY PROFILE



# 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.

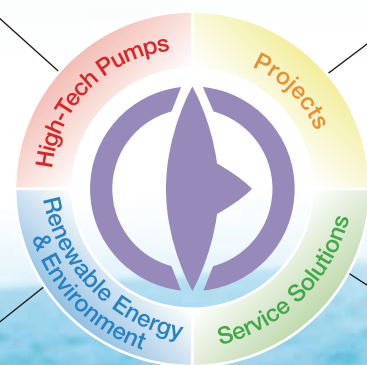
## Business and Products

### ■ High-Tech Pumps

- **Pump**  
High-value-added pump available for various needs. Power generation plant, Desalination plant, Petro-chemical plant, etc.

### ■ Renewable Energy & Environment

- Wind power generation
- Mini & Micro hydro generation
- Bio gas & mass co-generation
- Resource recycle



### ■ Projects

- **Supply EPC for turnkey pumping stations**  
Engineering, Procurement and Construction (EPC) in areas including water transmission, wastewater, irrigation and drainage equipment.

### ■ Service Solutions

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



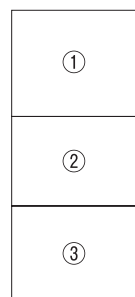
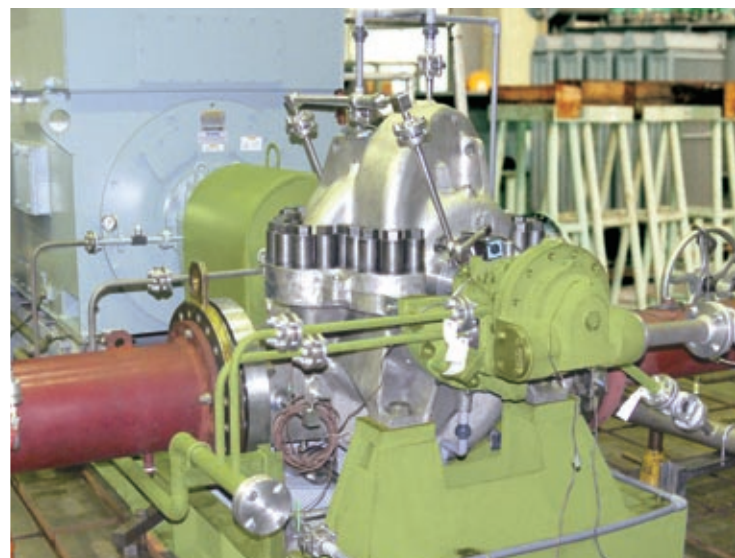
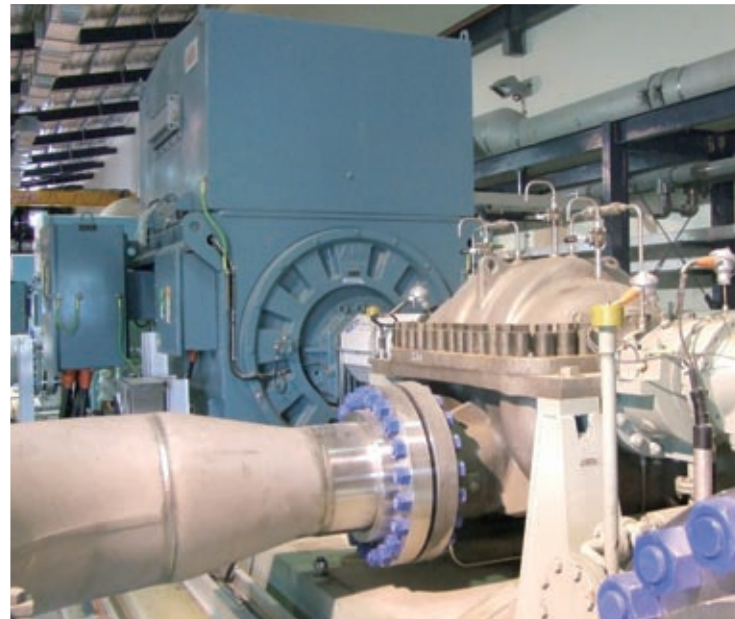
# As a specialist in pumps for seawater desalination, Torishima plays a significant role for solving global water shortage.

The useable fresh water in the world amounts to 0.01% of the world's water.

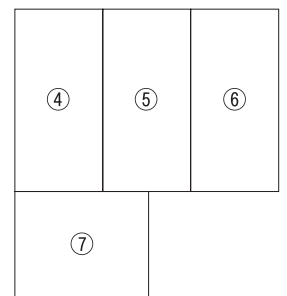
There is no doubt that water demand is increasing with the growth of population and industry, especially in emerging countries. Consequently, the necessity of seawater desalination plants is rapidly increasing.

Torishima has a wide range of experience in supplying engineered pumping equipment continuously in this field for 40 years. Our pumps are installed throughout the world, particularly in locations with a shortage of potable water such as the Middle East, North Africa, South East Asia and Australia.

Our products are designed for almost all methods of desalination including MSF, RO and MED.



- ① High pressure seawater feed pump  
Gold coast desalination (RO) Australia, 125,000m<sup>3</sup>/d
- ② High pressure seawater feed pump  
Victorian desalination (RO) Australia, 411,000m<sup>3</sup>/d
- ③ High pressure seawater feed pump  
Hamma water desalination (RO) Algeria, 200,000m<sup>3</sup>/d

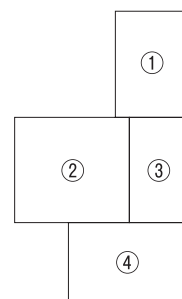


- ④ Brine recirculation pump  
Shuaiba south (MSF) Kuwait, 231,846m<sup>3</sup>/d
- ⑤ Brine recirculation pump  
Jebel Ali M (MSF) U.A.E., 640,000m<sup>3</sup>/d
- ⑥ Seawater intake pump  
Zawia desalination (MED) Libya, 100,000m<sup>3</sup>/d
- ⑦ High pressure seawater feed pump  
Jeddah I phase I (RO) Saudi Arabia, 56,800m<sup>3</sup>/d

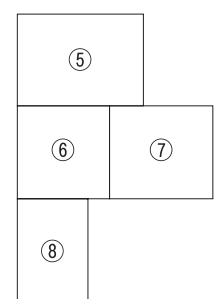
# Power Plant Projects, Torishima provides a full range of pumps in this industry.

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 plant. We are able to supply boiler feed pumps, main circulating water pumps, condensate extraction pumps and boiler circulating pumps as well as a range of auxiliary duties. Torishima pumps have been installed globally in this market.



- ① Boiler circulating pump  
Mahanadi thermal power plant, India, 6x600MW
- ② Boiler circulating pump  
Tomato atsuma power station, Japan, 1x600MW
- ③ Condensate pump  
Lama power station, Hong Kong, 1x350MW
- ④ Barrel type boiler feed pump  
Cirebon coal fired power plant, Indonesia, 1x660MW



- ⑤ Ring section type boiler feed pump  
Isle of grain power station, UK, 1x1320MW
- ⑥ Circulating water pump  
Pacifico coal fired power plant, Mexico, 1x700MW
- ⑦ Ring section type boiler feed pump  
Staythorpe C combined cycle power plant, UK, 1x1500MW
- ⑧ Hotwell pump  
Polaris geothermal power plant, Nicaragua

# 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 iron & steel plants, machinery manufacturers, pulp & paper plants, chemical and petrochemical plants etc. We also have a large number of pumps designed specifically for building services and air-conditioning processes.



- |   |   |   |
|---|---|---|
| ① | ② |   |
| ③ | ④ | ⑤ |
- ① Water supply pumps in machinery plant
  - ② Process pumps in beer brewery plant
  - ③ Process pumps in food industry
  - ④ Cooling water pumps for blast furnace in iron and steel works
  - ⑤ Boiler feed pumps in district heating and cooling system

## Significant reduction of operational cost and CO<sub>2</sub> emissions with 'Torishima Eco-Pump'.

Approximately 90% of the life-cycle cost of a pump is power consumption. For this reason, we pursued improvements in pump efficiency and developed high-efficiency pumps incorporating proprietary technologies.

The adoption of our ultra-high-efficiency motor (IEC IE3), offering enhanced efficiency through reduced copper electrical resistance, etc., enables a 10-30% reduction in power consumption compared to earlier products.



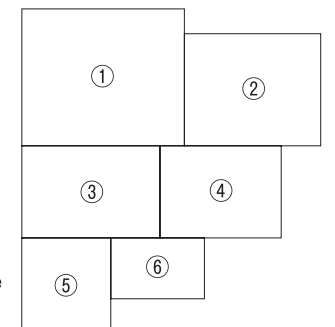
**"Eco-Pump"**  
A product of R&D realizing lower life-cycle costs and reduced CO<sub>2</sub> emissions.

# Mechanical seals supplied for all types of rotating equipment.

Torishima has been manufacturing mechanical seals for many years and for many applications which 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 seal technology as we know the importance of seal performance to the reliability of the pump.

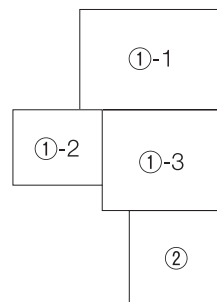


- ① Mechanical seals for turbine and process pumps
- ② Cartridge type mechanical seal
- ③ Set mechanical seal in standard pumps
- ④ Bellows type mechanical seals
- ⑤ Polishing the surface of mechanical seal with lapping machine
- ⑥ Automatic assembling unit of mechanical seals

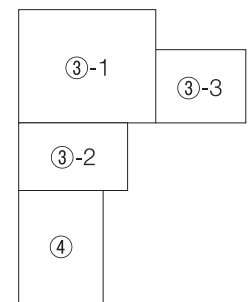


# Not just a pump supplier, but Torishima has experience as an EPC contractor for turnkey pump stations.

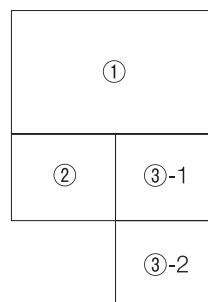
The pump is at the heart of any water / wastewater transfer scheme. Torishima is not only a pump supplier but we have a long history of design of pumping stations. We are committed to providing a turnkey service to our customers where we can design, engineer, procure, construct and commission all the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



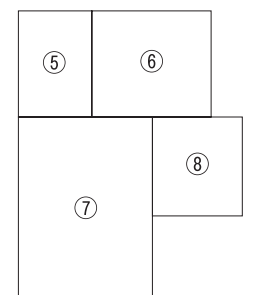
- ① Shuwei hat potable water transmission project, U.A.E.
  - ①-1 Mirfa long distance, 140km, transfer pumping station
  - ①-2 Surge vessels
  - ①-3 Mussafah water supply pumping station
- ② Strategic sewage disposal scheme (SSDS), Hong Kong



- ③ Shuaiba oil refinery plant, Kuwait
  - ③-1 Cooling water pumping station
  - ③-2 Installation of a 10.5 MVA power generator
  - ③-3 Installation of cooling water pump
- ④ Old salwa water supply pumping station, Qatar



- 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 Ca Mau power station



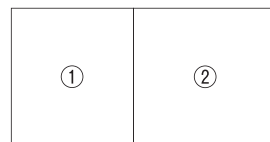
- ⑤ River drainage pumping station, Japan
- ⑥ River drainage pumping station, Japan
- ⑦ Stormwater drainage pumping station, Japan
- ⑧ River drainage pumping station, Japan

# World-class service solutions to maximize the life span and efficiency of plant.

As a premier engineered equipment supplier, Torishima is committed to provide 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.

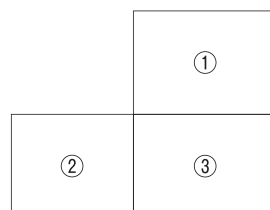


- ① Installation of seawater intake pumps.
- ② Test and commissioning of transmission pumps



## 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.



- ① Inspection of pumping plants
- ② Onsite overhaul service
- ③ On the job training for local engineers



## What's REDU?

Torishima has the ability to combine field service engineering and product design technology. This results in our engineers being able to provide advice on improved design and the upgrade of in-situ pumping equipment and other rotating equipment.

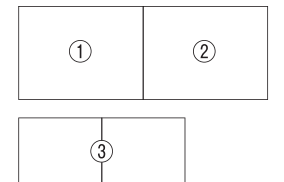
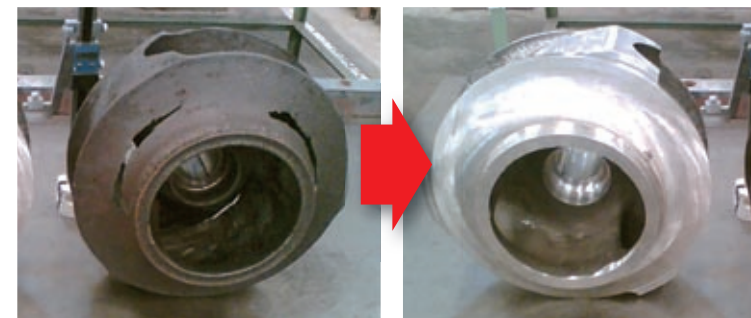


\*REDU is a registration of trademark of TORISHIMA



Before

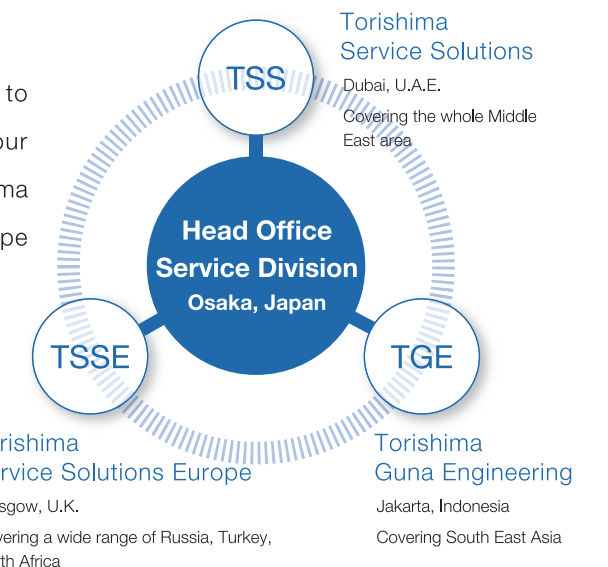
After



- ① Scanning of casing with FaroArm for upgrade
- ② Machining of high pressure split casing for upgrade
- ③ Upgrade of impeller

## Global Service Network Expansion

Torishima continues to develop its global network of service operations to deal with customer's needs all around the world. We currently focus our service business in four locations; Service Headquarters in Japan, Torishima Service Solutions (TSS) in the U.A.E., Torishima Service Solutions Europe (TSSE) in the UK and Torishima Guna Engineering (TGE) in Indonesia.

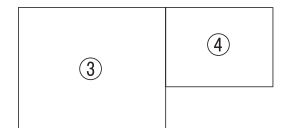




# Minimize the environmental impact of our activities by utilizing natural resources.

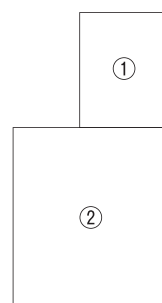
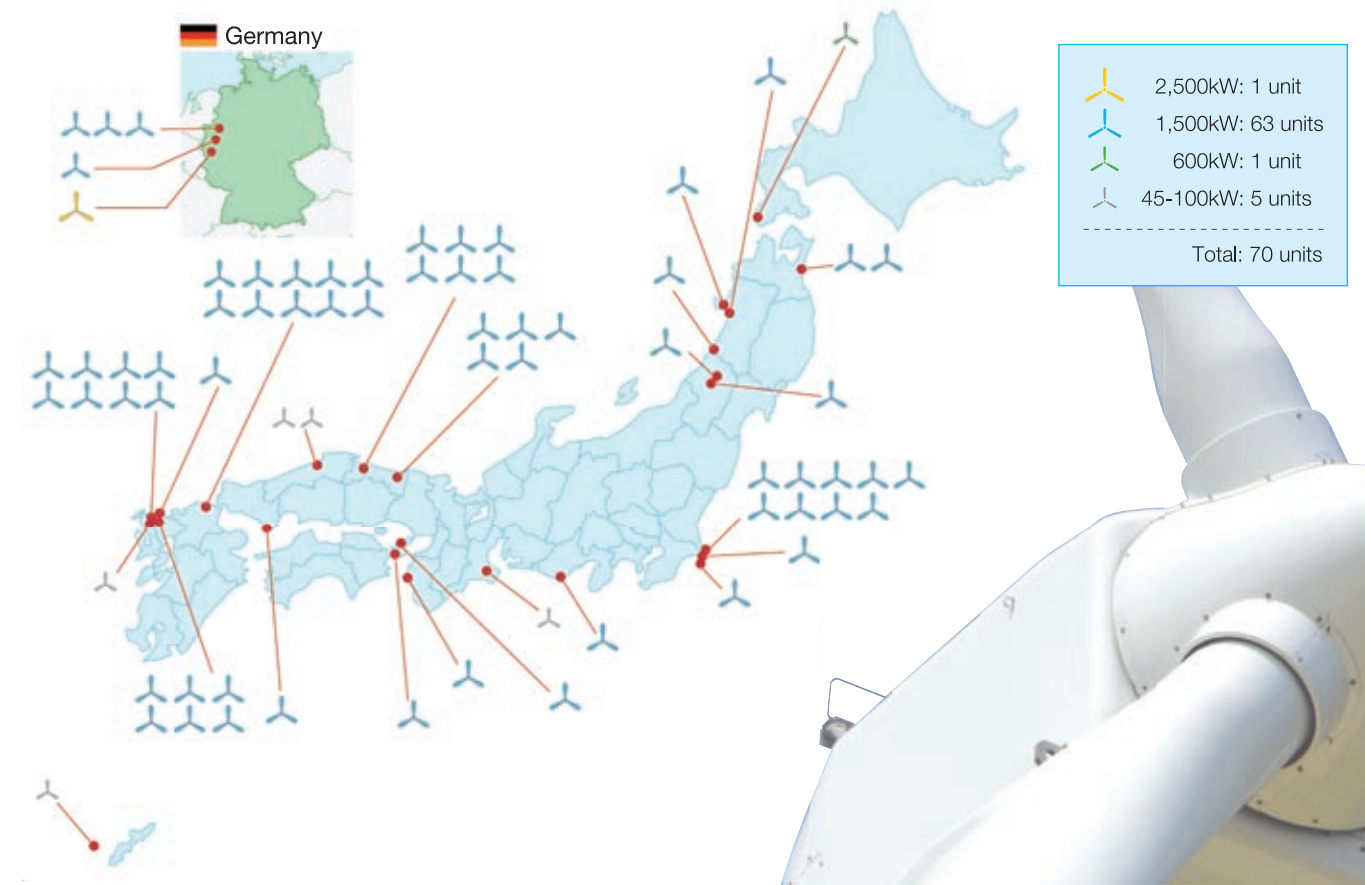
Torishima promotes the use of renewable, clean energy resources aimed at reducing CO<sub>2</sub> emissions through wind power generation and mini and micro hydro generation systems.

We provide 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.



- ③ Checking bolt tightness for pitch bearing of wind turbine blade
- ④ Micro hydro power generator

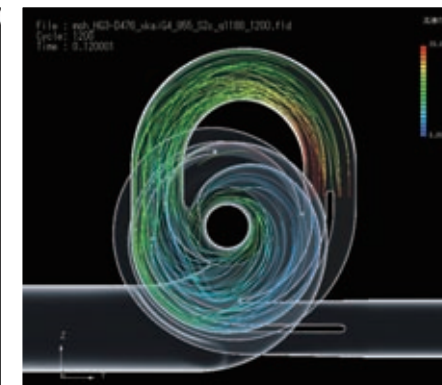
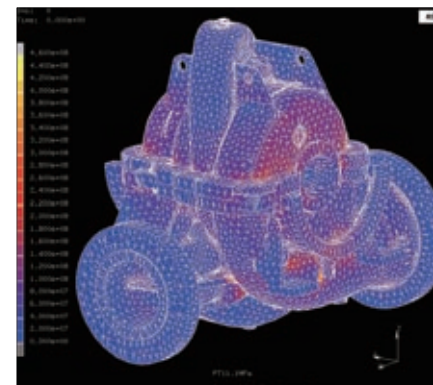
○ Torishima wind turbines references (as of march 2010)



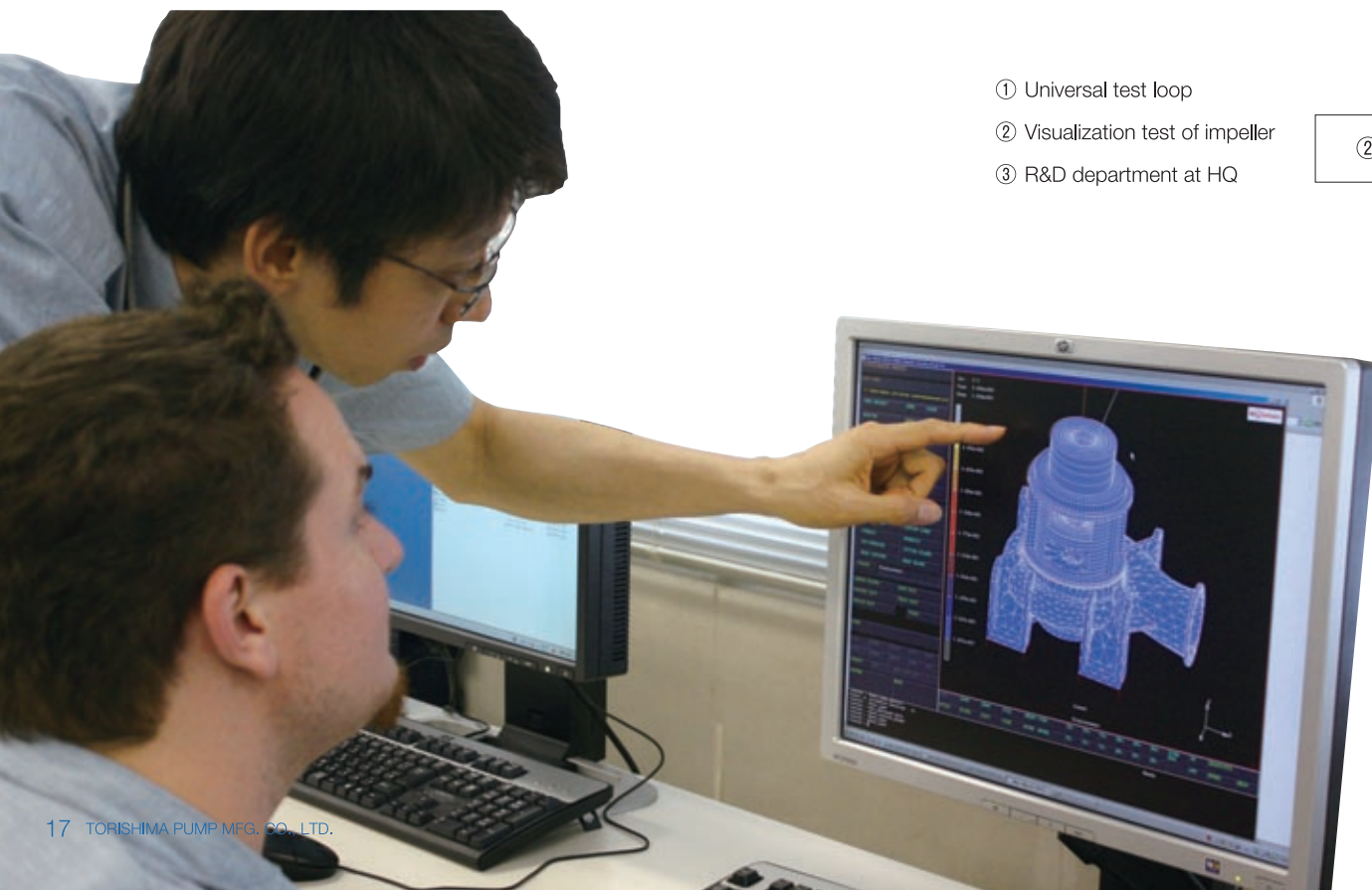
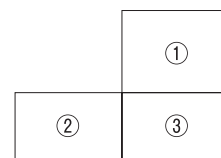
- ① 100kW wind turbine
- ② 1,500kW wind turbine

# Torishima's strategy is to invest in Research & Development.

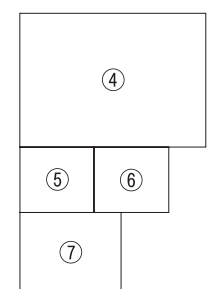
As the size of desalination, water distribution, wastewater and power plants increase, manufacturers must be able to provide optimum products to meet these new demands. Torishima is fully committed not only to providing innovative designs for future applications but the continual improvement of existing designs to maximize efficiency and increase the reliability of our equipment, as well as improving our costs. Torishima has 7 test loops where we can analyze and improve our pump performance. We have also invested heavily in computational fluid dynamics (CFD) software to enable quick analysis of pump and plant performance.



- ① Universal test loop
- ② Visualization test of impeller
- ③ R&D department at HQ



- ④ Scanning a shape of impeller by 3D coordinate measurement machine
- ⑤ FEM (Finite Element Method) analysis
- ⑥ CFD (Computational Fluid Dynamics) analysis
- ⑦ Hydraulic pressure test



# A manufacturing plant suitable for 21<sup>st</sup> Century

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 63,182m<sup>2</sup> 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, 57,495m<sup>2</sup>, in Torishima Kyusyu, Japan, which has the latest production technologies, including computer integrated manufacturing (CIM) .

Both of sites are committed to preserving the environment.



Foundry



Machining



Assembly



Testing



Painting

- >> Foundry Shop ————— 20
- >> Large Pump Shop ————— 21
- >> High Pressure Pump Shop ——— 22
- >> Boiler Circulating Pump Shop — 23

## Foundry Shop

Torishima is one of the few pump manufacturers to maintain a large foundry within our factory. By doing this, we stay in control of casting quality & lead times, this results in 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.

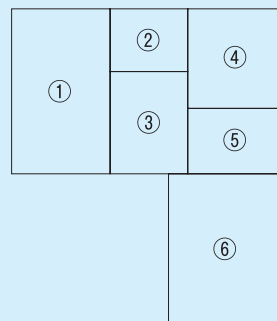


- ① Pouring into small, middle-size mould
- ② Melting by electric furnace
- ③ Tensile test of material
- ④ Pouring into large-size mould
- ⑤ Finishing

①	②
③	④
	⑤

## Large Pump Shop

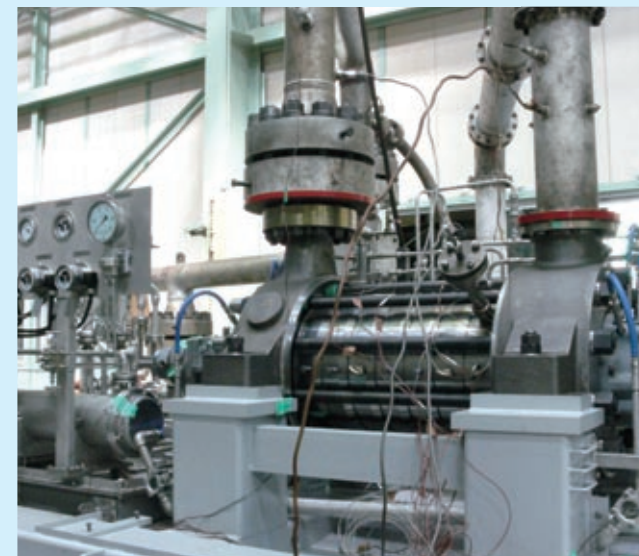
The scale of waterworks projects, sewage systems and power plants are continuing to increase. Therefore Torishima has designed their manufacturing plant to cope with large pumping equipment. We continue to invest in machine tools and testing facilities suited for such huge pumps.



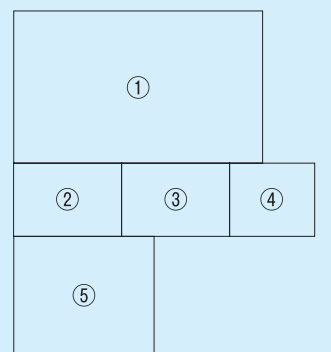
- ① Assembly of 1,100mm dia, brine recirculation pump
- ② NC machining for fabrication of large size pumps
- ③ 1,950mm dia, main cooling water pump
- ④ NC machining for fabrication of large size pumps
- ⑤ 2,000mm dia, stormwater drainage pump
- ⑥ 800×500mm water transmission pump

## High Pressure Pump Shop

The demand for power and desalinated water is growing at a fast pace. To cope with the increased number of high pressure pumps, Torishima has invested heavily on modern machine tools and improved testing facilities to meet the demands of this market.



- ① Assembly 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 seal 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.



①	②	① Boiler circulating pump for 6×660MW thermal power plant
	③	② Preparing for hydraulic pressure test of boiler circulating pump
	④	③ Assembly of wet motor for boiler circulating pump
	⑤	④ Assembly of boiler circulating pump
	⑤	⑤ Wet motor for boiler circulating pump



## Quality Assurance

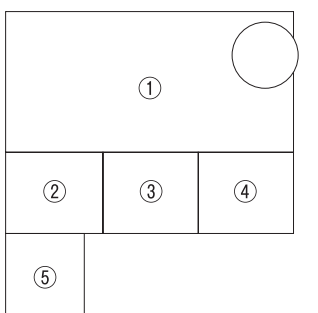
### Torishima mission – quality cannot be compromised.

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 Inside inspection with ultrasonic test, NDE\*
- ② Surface inspection with liquid penetration test, NDE\*
- ③ Performance test of high-pressure pump
- ④ High-temperature and high-pressure test of boiler circulating pump
- ⑤ Performance test of large-size vertical pump

\* NDE - Non Destruction Examination



# Global Network



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● Sales ● Engineering ● Service ● Manufacturing



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