

## COMPANY PROFILE



**TEIJIN ENGINEERING LIMITED**

# ENGINEERING

A vision for the future,  
and the strength to build it.



## CORPORATE PHILOSOPHY

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At Teijin Engineering, this is what we promise.

- Continue providing original engineering solutions for the challenges facing society.
- Seek to earn our customers' trust through the solutions we provide.
- Work to build a company that each and every employee can be proud of.

## Providing engineering solutions for a new era with new expectations

Ever since its founding in 1978, Teijin Engineering has cultivated a foundation of engineering experience and expertise at the production centers of the Teijin Group, and we utilize this first-hand understanding of plant operations to provide customers with comprehensive engineering solutions, encompassing everything from conceptual design to basic design, detailed design, machinery fabrication and maintenance in such business fields as the Environment and Energy, Automation and Labor Saving, and Plant, Construction and Maintenance. Further, it is the diversity of needs from a diversity of customers which has fed our growth and development over these many years.

Amidst a drastically changing business environment for our customers, we continually seek engineering solutions that will provide them with value and, as a result, facilitate our ongoing evolution and adaptation as "problem-solving specialists."

Our corporate identity can be succinctly described as "providing original engineering solutions to society's challenges," as is evident by our active involvement in a wide array of issues, such as energy and plant efficiency, global environmental clean-up and population decline and aging. We keep the customer's perspective front and center in our engineering, promptly accommodating their requests and offering a diverse range of options in order to ensure that we exceed their expectations. Our desire is to contribute to the future of society as we, ourselves, continue to grow.

We are truly grateful for the unwavering support of our stakeholders and eagerly look forward to their continued feedback and encouragement.

President  
Hideharu Shimura



## BEHAVIOR GUIDELINE

We will:

- Act in good faith by considering our customers' feelings as we would our own.
- Focus on two-way communication in order to share satisfaction and inspirations.
- Capitalize on our comprehensive strength as professionals to continually exceed expectations.
- Learn, think and take up challenges to create our own solutions.
- Maintain a high standard of ethics and act with integrity.



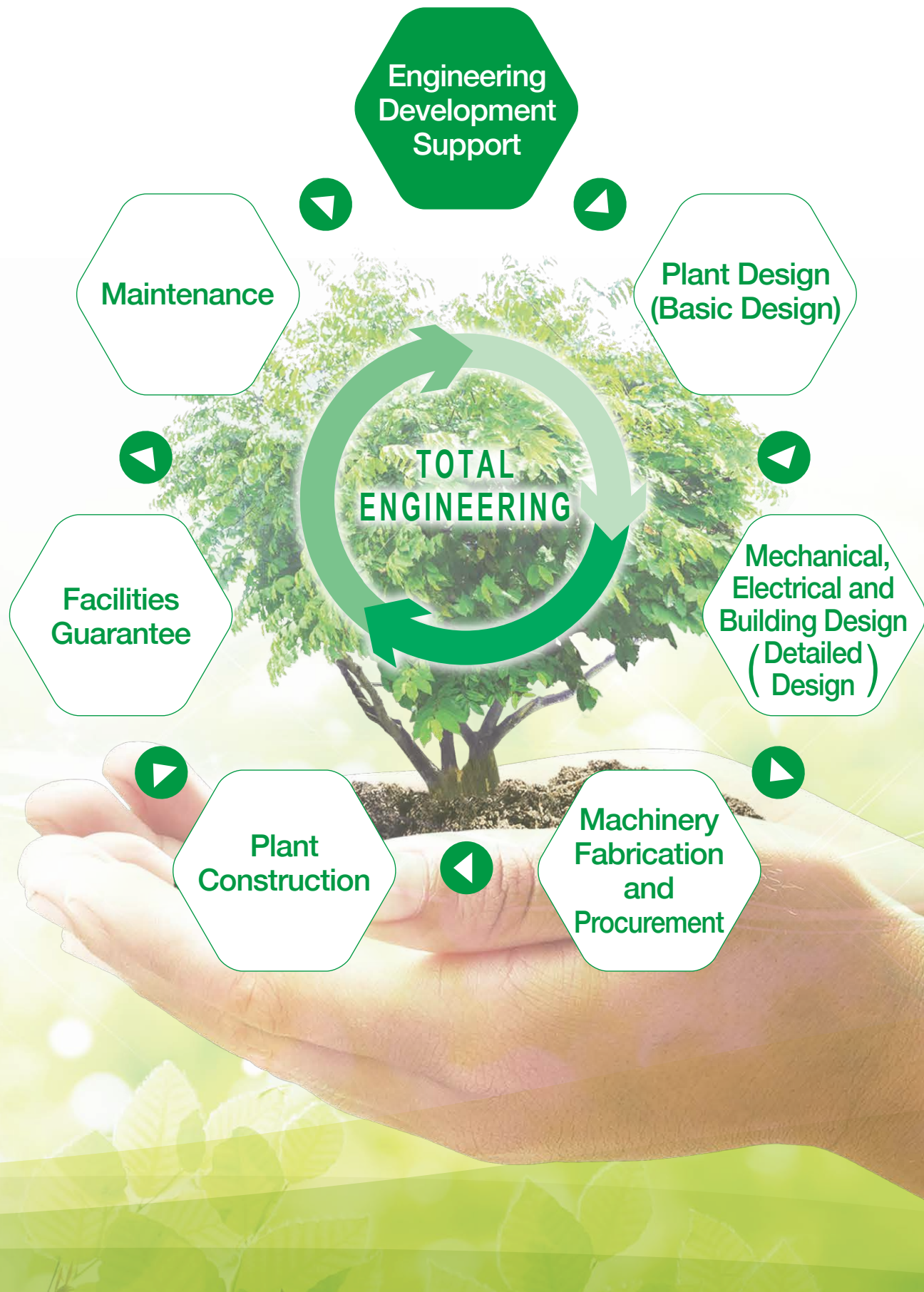
## BUSINESS FIELDS

Teijin Engineering develops and implements effective engineering solutions for a variety of issues facing society, such as global environmental pollution, energy supply stability and aging-related workforce population decline.



## SERVICES

Teijin Engineering helps customers tackle engineering challenges in specialized fields by offering a comprehensive range of "total engineering" services, which includes everything from facilities development support to maintenance.





# PLANTS, CONSTRUCTION AND MAINTENANCE

## Pressure Vessels

Teijin Engineering designs, manufactures and installs heat exchangers, towers, vessels and tanks used by petroleum refineries, petrochemical plants and other similar facilities. In addition, Teijin Engineering is the only company in Japan capable of analyzing and manufacturing DTS, an indispensable technology when it comes to tube vibration prevention for heat exchangers.

### FEATURES

#### ① Heat Exchangers

Teijin Engineering offers heat exchangers which are optimized according to operating requirements and the results of chemical engineering calculations and analysis.



#### ② DTS

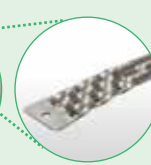
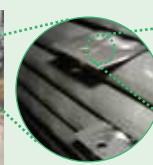
Teijin Engineering provides vibration prevention technology (DTS) which has been optimized according to the results of tube vibration analysis.



#### DTS (Dimpled Tube Support Technology)

By inserting DTS (STS\*) dimpled and corrugated metal strips in between tubes, vibrations are suppressed and the tube bundle is strengthened.

- Can be easily installed in existing bundles.
- Capable of eliminating tube vibration noise.
- Increases the natural frequency of the tubes to lessen vibration.
- Able to be used in U-bend sections as well.



Tube bundle with DTS   DTS when inserted   DTS appearance

\*STS (Saddled Tube Support Technology)...effective with soft metal finned tubes.

- #### ③ Compatible with a wide range of laws and regulations, including the Industrial Safety and Health Act and the High Pressure Gas Safety Act

##### [Japanese Standards]

- Industrial Safety and Health Act (Boilers, Class-1 Pressure Vessels, Class-2 Pressure Vessels, Small-size Boilers, Small-size Pressure Vessels)
- High Pressure Gas Safety Act (Designated Equipment Inspection Regulations, Refrigeration Safety Regulations)
- Electricity Business Act   ■ Gas Business Act

- #### ④ Able to manufacture a diverse array of chemical engineering equipment in specialized materials

##### [Materials Handled]

- |   |   |
|---|---|
| ■ Stainless steel (austenitic, ferritic, martensitic, duplex) | ■ Titanium alloy (such as TTH340W)  |
| ■ Low alloy steel (such as SCM V3)                            | ■ Various clad steel (SB410 + C6161P, SCM V3 + SUS405, SB410 + TP340, etc.) |
| ■ Copper alloy (C1220, C4430, C6872, C7150, etc.)             | ■ Other (HIC-resistant SB410, SN-5, SUS444, etc.)                           |
| ■ Nickel alloy (NCF600, NCF825, hastelloy, carpenter, etc.)   |   |

- #### ⑤ Can accommodate projects with tight deadlines which require maintenance technology specific to heat exchangers

Teijin Engineering can handle the unexpected on-site and plant issues which arise, such as re-tubing, measuring sheet surface warpage for existing equipment and facer work.

## PRODUCTS

### [Heat Exchangers]

- Shell and tube heat exchangers
- LNG/ammonia vaporizers
- Feed water heaters
- Double tube-type heat exchangers
- Hairpin-type heat exchangers



Fixed tubesheet heat exchanger



Kettle-type heat exchanger



Fixed tubesheet heat exchanger (titanium tube)



Tower



Vessel (maritime transport)



Tube bundle

### [Towers, Vessels and Reactors]

- Distillation towers
- Reaction towers
- Absorption towers
- Agitated vessels
- Accumulators
- Cone roof tanks

## CAPACITY / EQUIPMENT

### [Production Capacity]

- Maximum weight: 60 ton
- Maximum inner diameter: 5.5 m
- Maximum plate thickness: 60 mm
- Maximum length: 25 m (overland transport), 50 m (separated)



Heavy-duty band saw



NC gas cutting machine

# PLANTS, CONSTRUCTION AND MAINTENANCE

## Plants, Construction and Maintenance

Teijin Engineering draws on wealth of diverse experience in chemical plant-centered construction and installation to meet the various needs of customers as well as the challenges of new fields.

### FEATURES

- ① Provides engineering services which comprehensively integrate everything from design and installation to on-stream maintenance and regular repairs
- ② Provides thorough safety management, process control and construction and work management
- ③ Able to ensure compliance with the High Pressure Gas Safety Act, Industrial Safety and Health Act (Class-1 Pressure Vessels), the Fire Services Act and other equipment installation and peripheral facilities work regulations
- ④ Able to overhaul specialized apparatus and even provide tailored repairs of chemical engineering equipment
- ⑤ Able to handle construction, maintenance and emergency repairs anywhere in Japan

### SERVICES

#### ① Range of Installation

- Petroleum, petrochemical, etc., process piping
- Powder and chip transport piping
- Electrical generation high-pressure steam piping
- Polymer piping (duplex pipe)
- Gas piping (liquefied, high-pressure)

#### ② Scope of Periodic Overhaul Maintenance

- Overhauling of stationary equipment (towers, vessels, heat exchangers, etc.)
- Disassembly and repair of rotating equipment (pumps, blowers, pressurizers, centrifuges, stirrers, transmission and reduction gears)
- Disassembly and repair of specialized equipment (disassembly and repair/testing of boilers, diesel generators, safety valves and various other valves)

#### ③ Materials Handled

- Steel pipe for general pressure applications
- Steel pipe for high temperature applications
- Steel pipe for low temperature applications
- Steel piping for alloyed steel
- Nickel and titanium pipe

#### ④ Regulations Accommodated

- High Pressure Gas Safety Act
- Industrial Safety and Health Act (Boilers, Class-1 Pressure Vessels)
- Fire Services Act

#### ⑤ Total Cost Reduction

- On-site installation
- Piping work
- Maintenance

#### ⑥ Track Record

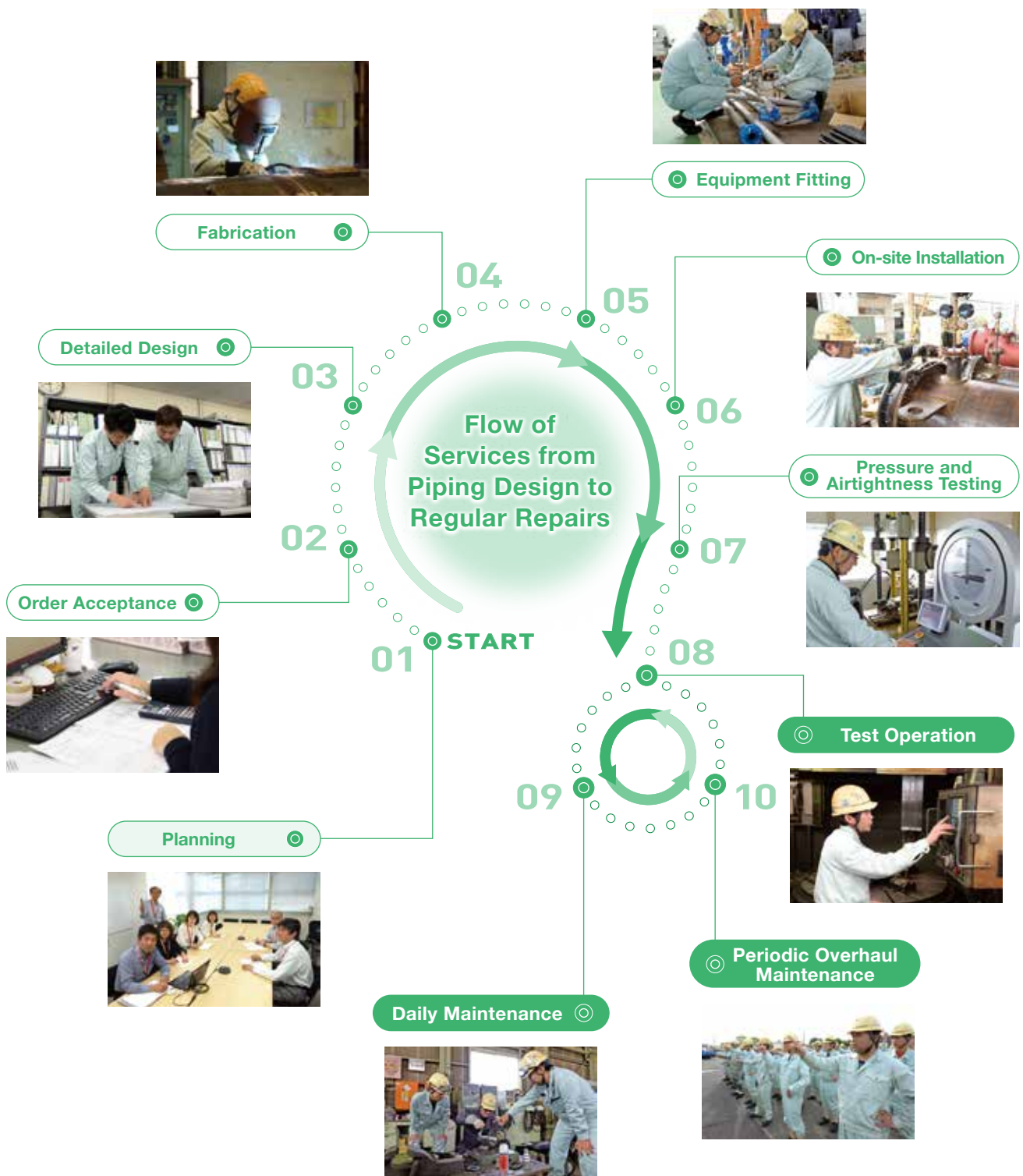
- Provided services are backed up by a proven track record of results which has been cultivated as a member of the Teijin Group.





## BASIC FLOW OF SERVICES

Teijin Engineering combines responsiveness, thorough safety management and the ability to rapidly mobilize in order to allow it to take prompt action on customer needs.

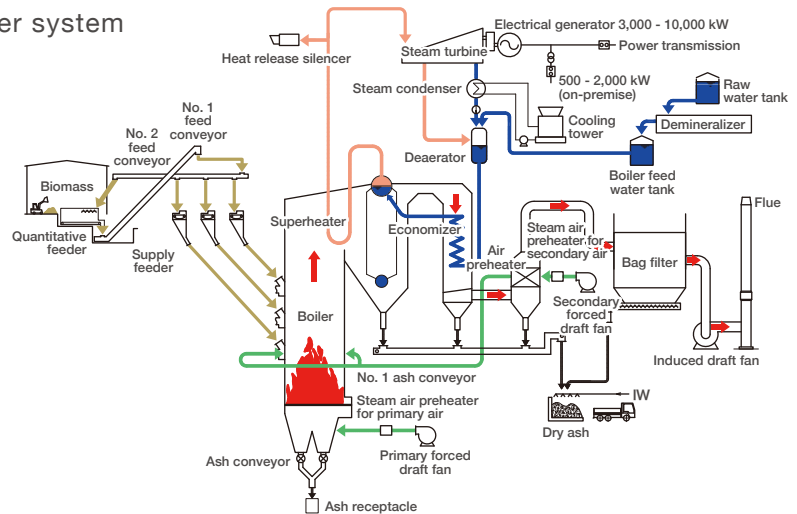


## Biomass(Coal)Boiler (Capacity:2-100ton/h,Power:Less than 20MW)

We can design and supply Biomass (Coal) Boiler for Private power plant. And can provide some kind of solution based on the high technology and experience in Japan.

### FEATURES

- 1 Biomass(Wood chip,PKS, etc.) Boiler system
- 2 Coal Boiler system
- 3 Oil or Gas Boiler system

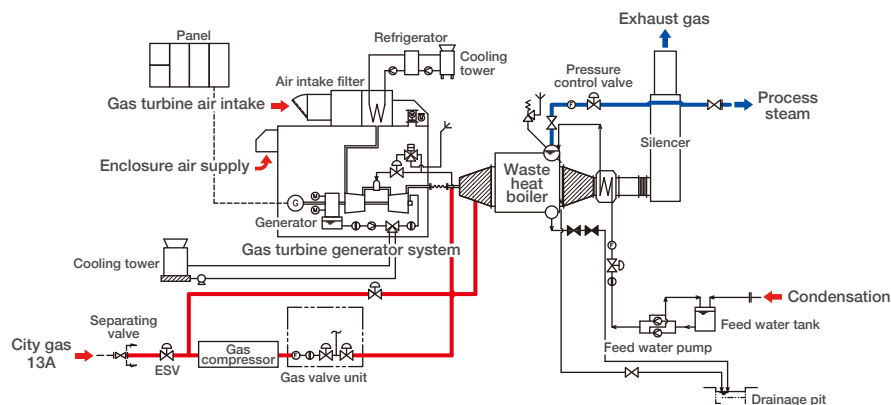


## Co-Generation System

We can design some kind of Co-Generation System according to customer request and electrical system situation.

### FEATURES

- 1 Gas turbine or gas engine Co-Generation System to decrease factory cost.
- 2 Capacity is 2-20MW.

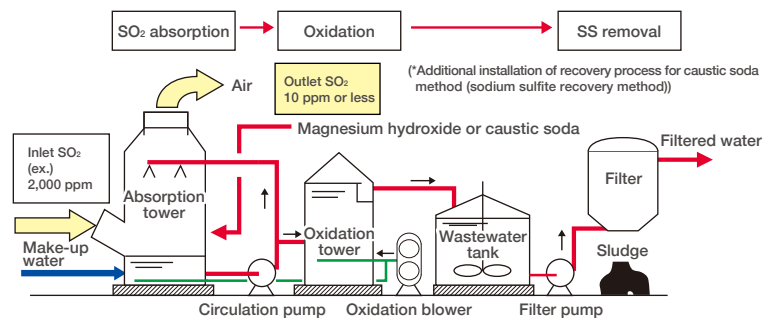


# Wet-type Flue Gas Desulfurization System

This system uses an absorbent (magnesium hydroxide and caustic soda) to absorb sulfur dioxide ( $\text{SO}_2$ ) from the flue gas and trap it inside the system where it is removed as a suspended solid (SS) and then either discharged or recovered as effluent.

## FEATURES

- ① Able to provide stable, long-term operation with a  $\text{SO}_x$  removal efficiency of 99.5% or better.
- ② Operational management is incredibly easy (system and processes are extremely simple).

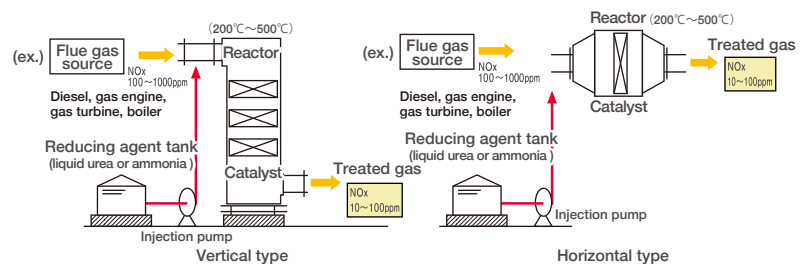


# Flue Gas De- $\text{NO}_x$ system(SCR)

In order to remove nitrogen oxide ( $\text{NO}_x$ ) from flue gas, aqueous ammonia and liquid urea are sprayed into the gas to catalyze the decomposition of  $\text{NO}_x$  into harmless nitrogen and water.

## FEATURES

- ① Able to provide stable, long-term operation with an extremely high  $\text{NO}_x$  removal efficiency (90% or better).
- ② Operational management is incredibly easy (system and processes are extremely simple).





# ENVIRONMENT AND ENERGY

## Composite Cylinder (ULTRESSA®)

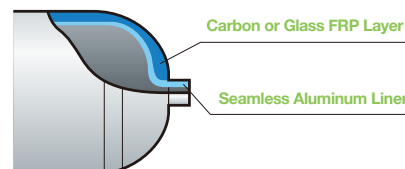
This FRP pressure cylinder is made from carbon and glass fibers.

It is put to use in a wide variety of settings owing to its lightweight body (50-70% lighter than steel cylinders), high corrosion resistance, ability to resist high-pressure gas filling and proven track record of safety.

### FEATURES

The inner cylinder (liner) is made of seamless gas tight aluminum alloy which is wrapped in high-strength fibers such as carbon or glass fiber in a multi-layered structure impregnated with epoxy resin to create an ultra-lightweight pressure cylinder. Owing to this structure, in the unlikely event of excessive pressure causing cylinder failure, the liner will begin leaking gas instead of rupturing (i.e., a "leak before break" structure).

- ① **Lightweight** ..... Approximately one-third the weight of steel containers (owing to carbon fiber)
- ② **Safe** ..... High-strength fiber and leak before break structure
- ③ **Corrosion-resistant** ... Made from materials which do not corrode (composite section)
- ④ **Larger sizes** ..... Cylinder size up to 300 Liter
- ⑤ **Higher pressures** ..... Service pressure up to 70 MPa, 100 MPa (successful trial production)
- ⑥ **Proven track record** ... More than 400,000 units sold in Japan since 1987



### USES

#### [General Applications]

- Self contained Breathing Apparatus (used by firefighters)
- Medical applications (For Home oxygen therapy etc.)



Self contained breathing apparatus used by firefighters



ULTRESSA®

#### [Automotive Applications]

- NGV (Natural gas vehicle fuel tank)
- FCV (fuel cell vehicle hydrogen tank)



Example of use with compressed natural gas vehicle

### MODELS

Internal Volume		Model	Glass FRP Cylinder		Carbon FRP Cylinder				
			ALT611	ALT667	ALT602J	ALT639J	ALT603J	ALT604H	ALT841J
Volume	liter		8.4	4.7	8.6	4.7	6.8	9.1	6.8
Service Pressure	MPa (kgf/cm <sup>2</sup> )		14.7 (150)	29.4 (300)	14.7 (150)	29.4 (300)	29.4 (300)	29.4 (300)	30 (306)
Gas	liter		1,260	1,270	1,290	1,270	1,830	2,460	1,870
Weight (Nominal)	kg		4.0	4.2	2.9	3.0	4.1	5.4	3.6
Outer Diameter (Nominal)	mm		172	142	173	139	173	182	160
Length (Nominal)	mm		508	482	496	485	457	539	521
Filling Gases			Air, oxygen, nitrogen, argon, carbon dioxide, helium or mixtures of these		Air, oxygen, nitrogen, argon, hydrogen, helium or mixtures of these				Air, oxygen, nitrogen, argon, hydrogen, helium
Service Life			15 years						

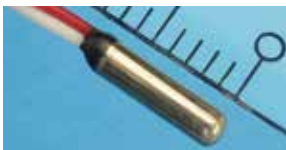
# FACTORY AUTOMATION

## Sensors

Teijin Engineering offers a variety of temperature sensors that incorporate a platinum resistance thermometer.

### FEATURES

- ① **High-response compact temperature sensors (sheath type)**  
Compact temperature sensors that incorporate a small stainless steel sheath with dimensions of 2 x 7 mm.
- ② **High-response compact temperature sensors (resin-coated type)**  
Compact temperature sensors that incorporate highly heat-conductive resin for enhanced responsiveness.
- ③ **Chemical-resistant temperature sensors (PFA resin molded type)**  
Resin-molded sensors with excellent chemical resistance due to their high-density perfluoroalkoxy (PFA) resin molding.
- ④ **Bad-environment-compatible temperature sensors (FEP resin molded type)**  
Resin-molded sensors that absorb vibration and have excellent dust resistance and waterproof performance due to their fluorinated ethylene propylene (FEP) resin molding.



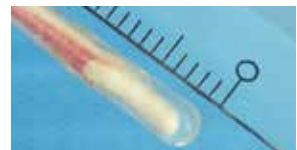
Sheath Type



Resin-Coated Type



PFA Resin Molded Type



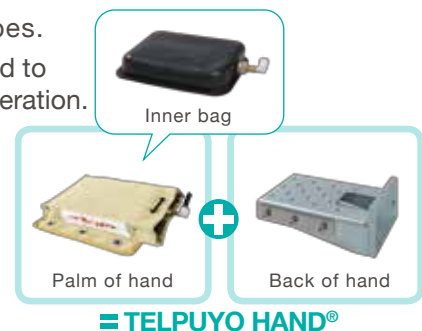
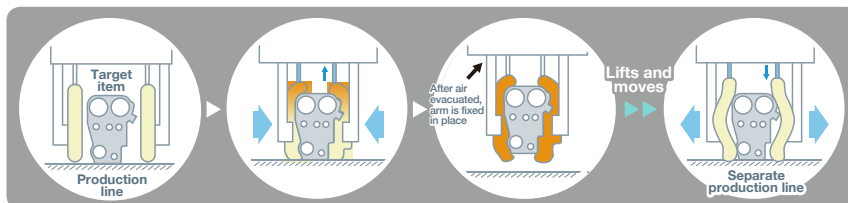
FEP Resin Molded Type

## TELPUYO HAND®

This robotic fixture can gently grab and set in place products of differing sizes and shapes.

### FEATURES

- ① Flexibly adaptable to different product sizes and complex shapes.
- ② Once adapted to a particular shape, the internal pressure is decreased to make the gripping section rigidly fixed to that shape for continued operation.



TELPUYO HAND®

For pointed materials...

#### [Technora® aramid fibers]

Utilizes high-strength and high-elasticity para-aramid fibers possessing tensile strength eight times that of steel. These high-performance fibers are highly resistant to damage, even when used to grab metallic burrs and other pointed objects.



For easily damaged or breakable materials...

#### [Cordley® Artificial leather]

This high-performance material is similar in structure to natural leather, is easy to care for, is lightweight and offers good durability.



# FACTORY AUTOMATION

## Automation Equipment

No matter the industrial field, Teijin Engineering provides tailored automation options which include everything from stand-alone process equipment to entire production lines.

### FEATURES

Automation makes use of primary machinery on the existing line (human labor is replaced with machinery and robotics).



## Gantry Loader System

Incorporating parts produced by Swiss company GÜDEL, the Gantry Loader conveyor system provides high-speed, high-precision, high load resistance, low noise operation and worldwide support.

### FEATURES

- 1 Transportable from lightweight to heavy.
- 2 Available for many variations.
- 3 Simple and low noise with precision rack rail.





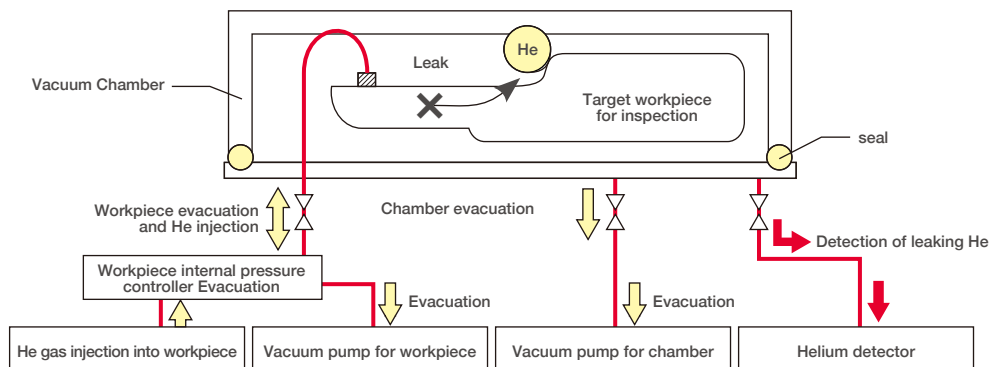
# Leakage Inspection System

## (Helium Gas type)

This system measures the leakage of a given product by injecting it with helium gas and then measuring the amount which leaks out.

### FEATURES

- ① **High-precision and high reproducibility** ... Approximately 1,000 times higher resolution than the submergence method or air differential pressure method.
- ② **Short inspection time** ..... Thanks to the rapid diffusion velocity, inspection time is reduced by roughly 75% compared with the air differential pressure method.
- ③ **Low running costs** ..... Helium gas can be recovered and re-used.



### USES

#### [High-pressure gas injection-based pressure-resistance leakage inspection system]

Conventional air pressure resistance inspection using submergence inspection can be performed as a dry inspection which detects leaks using gas injected at 38.0 (MPa).

#### [Minute pressure gas injection-based leakage detection system]

Gasoline and kerosene tank-related leak detection can be performed with minute gas injection pressure control.

#### [Modular press-type leakage detection system]

Products with a layered structure can be sealed with a press clamp and then subjected to leak detection.

#### [Leakage detection system for special sealing elements]

This system can be used to apply a seal and perform leak detection on large-diameter and individually-shaped products such as aluminum worked products and resin-molded products.



Fuel injection pipe



Aluminum die-cast case



Aluminum Welded parts



High-pressure electromagnetic switch tank



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<https://www.teijin-eng.co.jp/>

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