2016 Hydrogen-Related Businesses in the Kansai Region

Ministry of Economy, Trade and Industry, Kansai Bureau (METI-Kansai)

Introduction

This brochure highlights the potential of Kansai as a region with many businesses working in the field of hydrogen and presents in detail some of the hydrogen-related technology that is available here.

The Basic Energy Plan, which was approved by Cabinet in April 2014, extolled the virtues of measures to accelerate efforts to work toward the realization of a “hydrogen society,” and in June of the same year, the Strategic Roadmap for Hydrogen and Fuel Cells was formulated (revised in March 2016) to promote various efforts.

There are ongoing industrial, regulatory, and scientific efforts to spread and popularize fuel cells and the use of hydrogen (centering around stationary fuel cells, fuel cell vehicles, hydrogen stations, etc.), and although the advent of a “hydrogen society” is widely anticipated, many technical, economic, regulatory, and infrastructure obstacles still remain.

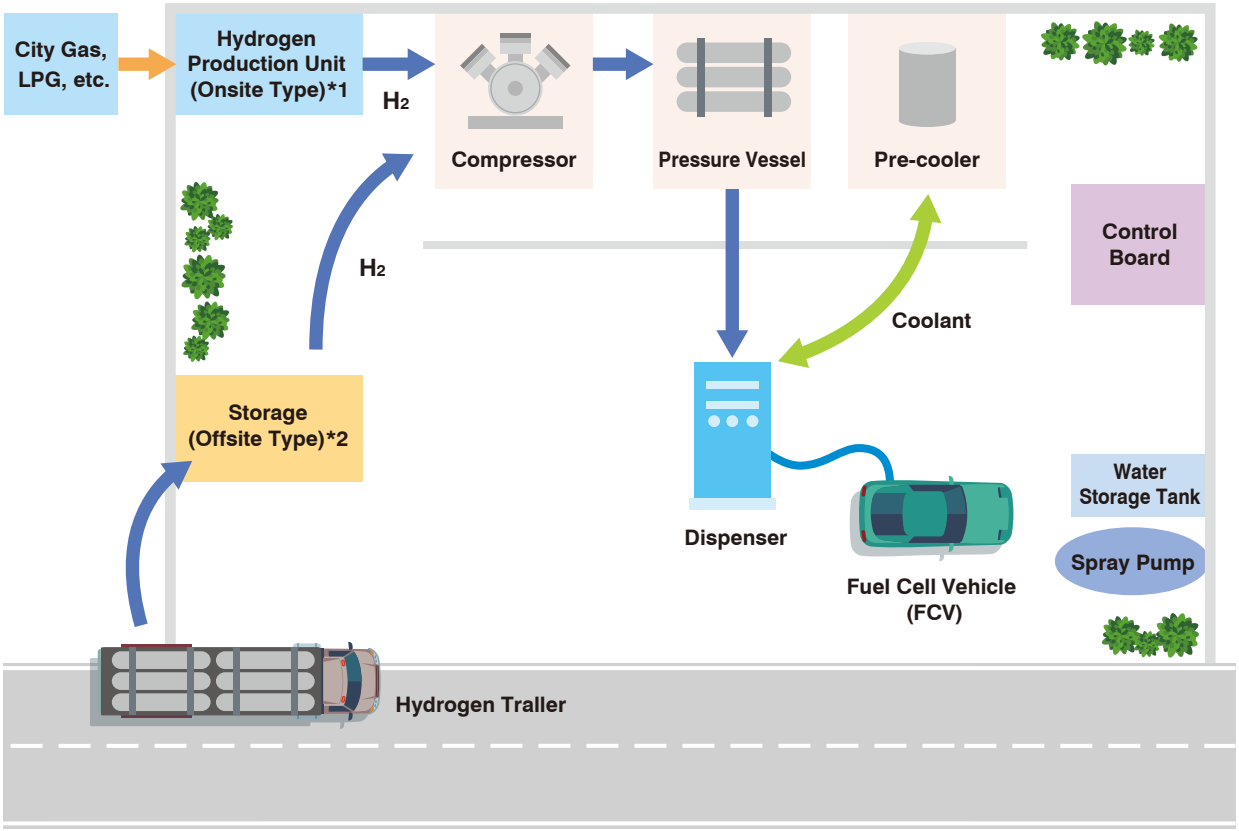
However, hydrogen technology has a wide range of applications, and if the current problems can be solved through the further development and popularization of industrial technology, then this could greatly contribute to drastically improved energy efficiency and security, and reduced environmental impact.

As there are many businesses in the Kansai region that are engaged in activities related to hydrogen, this brochure has been compiled as an initial attempt to introduce their industrial high technology for hydrogen and fuel cells.

It is hoped that this corporate information regarding businesses engaged in the field of hydrogen in the Kansai region will lead to the further popularization of hydrogen and fuel cells.

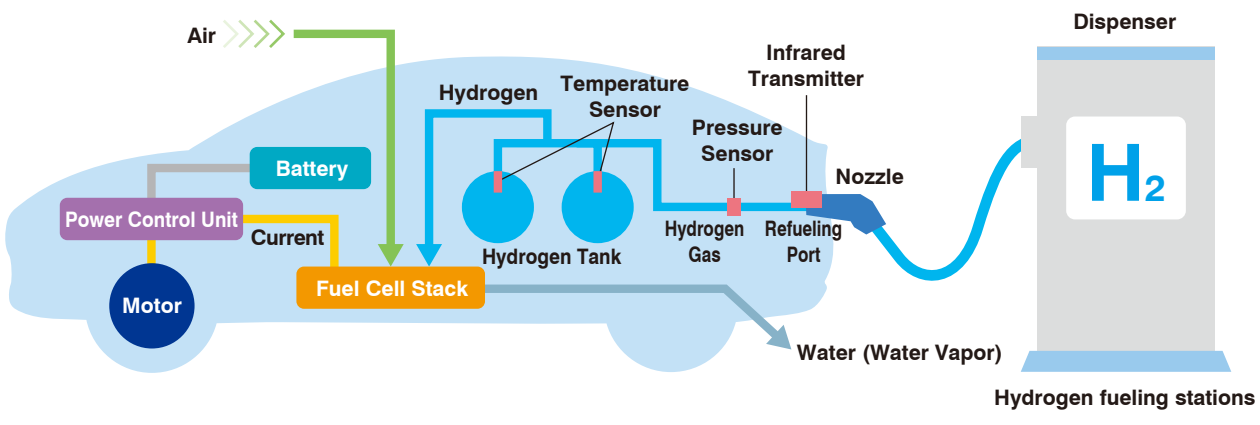
System Overview

Hydrogen fueling stations



*1 Onsite Type: Hydrogen gas is produced in thehydrogen fueling stations from City Gas or LPG, etc.
*2 Offsite Type: Hydrogen gas is produced in the hydrogen production plant outside and is transported to thehydrogen fueling stations.

Fuel Cell Vehicle(FCV)



List of Companies

The companies featured in this brochure are responsible for the accuracy of the information shown on their respective pages.

hydrogen fueling stations indicates technology and products, etc., used in hydrogen stations.

Intelligent Energy Ltd.

Partnering with the World's Largest Companies World-Class Fuel Cell Solutions from the United Kingdom

Contact Person Masataka Yamakawa
TEL +81-6-6147-2122 Email masataka.yamakawa@intelligent-energy.com

Our Advantages/Characteristics

Development of High Power Density Compact Proton Exchange Membrane Fuel Cells

A compact form factor, high power density, and fast startup time are characteristic of our proton exchange membrane (PEM) fuel cells. These characteristics enable us to collaborate with some of the world's major corporations in various areas, such as two-wheeled vehicles, drones, and chargers for mobile devices. Our headquarters in the UK has world-class product development and testing facilities where we can develop fuel cells to suit a wide range of products.

Our Unique Technology/Service

Developing Flexible Fuel Cells for a Wide Range of Uses

We have a development track record that spans many specialized fields, such as two-wheeled vehicles, London taxis, chargers for portable tools, drones, and emergency power supplies. We have offices in not only the UK, but also in India, the US and Japan, and have collaborated with major companies throughout the world. This experience gives us the flexibility to be able to develop fuel cells to suit the many different situations in which electricity is needed as we work towards the realization of a hydrogen society.

Track Record

In 2011 we jointly developed a fuel cell scooter with Suzuki Motor Corporation, which became the first two- or four-wheeled vehicle in the world to achieve European Whole Vehicle Type Approval.
In 2012 we provided the fuel cell systems for five London taxis that were used at the time of the London Olympic Games.
In 2015 we developed a fuel cell mobile battery charger (the "Upp") in the UK for the iPhone.
In 2016 we succeeded in equipping a drone with a fuel cell.

Future Plans

We will continue to develop fuel cells for various fields in cooperation with businesses that need fuel cell systems. We would like to continue to work closely with Suzuki Motor Corporation while introducing our technology into other fields in Japan.

Corporate Profile

Representative: Masataka Yamakawa
Address: 16F Umeda Square Bldg., 1-12-17 Umeda, Kita-ku, Osaka City, Japan 530-0001
URL: http://www.intelligent-energy.com
TEL: +81-6-6147-2122
Founded: 2011
Capital: 1 million yen
Number of Employees: 5
(As of January 2017)

Business Activities

Research/development and manufacture of PEM fuel cells, and related consultation.

A-Tec Co., Ltd.

Contributing to the Expansion of Industries as a Manufacturer of Cryogenic Machinery

Contact Production Divi. Contact Person Yoshiharu Matsuoka
TEL +81-78-941-8822 Email y.matsuoka@a-teckk.co.jp

Mobile hydrogen station.

Iwatani Group

Our Advantages/Characteristics

Offering Assorted Equipment for Hydrogen Stations

We work with companies in Japan and overseas to manufacture ultra-high pressure equipment, such as mobile hydrogen stations, simple hydrogen stations and the liquid hydrogen storage tanks, compressor units, and accumulators that comprise stationary hydrogen stations.

Our Unique Technology/Service

Working Toward the World of Cryogenic Temperature and Ultra-High Pressures

We have recently been using our original special expertise (the manufacture of cryogenic storage tanks, tanker trucks, and pumps for liquefied gases) as a foundation to make the ultra-high pressure hydrogen station equipment that is essential for the spread of FCVs. We welcome the challenge of exploring the field of cryogenic temperature, ultra-high pressure technology.


Liquid hydrogen pump.

Track Record

Our equipment is being adopted for use in many of the hydrogen stations that have been established by oil and gas companies and local governments, beginning with the Iwatani Hydrogen Station established by Iwatani Corporation.

hydrogen fueling stations

Future Plans

Although hydrogen stations are still fairly new, we are already working on introducing hydrogen booster pumps that can be used in the soon to be introduced fuel cell buses and large hydrogen stations. This technology is being adopted by automobile manufacturers in their production facilities and it is also supporting the spread of fuel cell vehicles.

Corporate Profile

Representative: Masami Makise
Address: 20-1 Minami-Futami, Futami-cho, Akashi City, Hyogo, Japan 674-0093
URL: http://www.a-teckk.co.jp
TEL: +81-78-941-8822
Founded: 1986
Capital: 40 million yen
Number of Employees: 70

(As of April 2016)

Business Activities

- Manufacture of cryogenic storage tanks and tanker trucks for liquefied gases.
- Manufacture of gas equipment for space and defense purposes.
- Design and construction of LNG satellite plants.
- Manufacture of hydrogen station equipment.

SR Engineering Co., Ltd.

Combining High Quality with Next-Generation Cutting-Edge Technology!

Website http://www.sr-engineering.co.jp

Please visit our website for more information.

50 MPa hydrogen gas automatic valve.

Our Advantages/Characteristics

Developing Automatic Valves for High-Pressure Hydrogen Gas with Unique Patented Technology

Hydrogen stations, which are essential for the spread of FCVs, need to be maintained. Our automatic valves are used as the main valves for the composite cylinders on the trailers that transport high-pressure hydrogen gas to hydrogen stations, and are a key product for ensuring the safe and reliable accumulation and release of hydrogen gas.
Our automatic valves are pilot-operated shut-off valves, and are equipped with fusible safety valves that are designed to function under high temperatures, such as during a fire. All of our valves are unique patented products that use our fluid control technology and mechanics technology.

- **Patented Technology**
  · JP-Patent No.5679392: Safety Valve · JP-Patent No.6059391: Automatic Valve

Our Unique Technology/Service

Contributing to Automation with Fluid Control Technology and Mechanics Technology

We have the development know-how to make original products thanks to our long experience with advanced pneumatic/hydraulic (oil and water) technology, mechatronic combination technology and electromagnet/permanent electromagnet technology.

- Fluid Control Technology Example: HU-Type Hi-Lock Unit

(The pneumatic-driven hydraulic pump unit that is the foundation of our quick die change system)
We use the outstanding manufacturing and quality framework that supports this product development combined with the productive and technical capability for high-precision processing at our factory to develop automatic valves for hydrogen gas.

HU-Type Hi-Lock unit.

Track Record

We are testing ways of mass-producing the main valves for the composite cylinders used in trailers transporting high-pressure gas.

Future Plans

Currently, our automatic valves for hydrogen conform to the 50 MPa specification noted under the container regulations of the High-Pressure Gas Safety Act. In the future we plan to add products that comply with the 99 MPa specification. We are also planning to increase development of products in line with the general regulations of the High-Pressure Gas Safety Act.

Corporate Profile

Representative: Masahiko Hashimoto
Address: 3-2-60 Takatsuka-dai, Nishi-ku, Kobe City, Hyogo, Japan 651-2271
URL: http://www.sr-engineering.co.jp
TEL: +81-78-991-4400
Founded: October 1972
Capital: 48 million yen
Number of Employees: 71

(As of October 2016)

Business Activities

- Activities relating to press machines.
  Hydraulic clamps, die cushion systems, etc.
- Activities relating to injection molds and die-casting machines.
  Hydraulic clamps, permanent electromagnetic clamps, etc.
- Activities relating to new products.
  Electromagnetic header valves for roll coolant, high-pressure gas boosters, auto couplers, auto connectors, etc.

Osaka Gas Engineering Co., Ltd.

Inspiring Technology – OGE Has the Answers

Contact Process & Environment Business Division
Contact Person Konishi/Tokuda TEL +81-6-6220-1218 Email y-konishi@oge.co.jp

Our Advantages/Characteristics

Compact High-Purity Hydrogen Generators Using City Gas

The HYSERVE series of compact hydrogen generators are the latest units developed by Osaka Gas Group for use in hydrogen stations. Available in three sizes according to production capacity (30 Nm^3/hour, 100 Nm^3/hour, 300 Nm^3/hour), these units boast the reliability of conventional plant-size units in a compact package consisting of a reactor/heat exchanger and hydrogen-purification unit, which dramatically reduces installation costs and a lower overall cost.

Our Unique Technology/Service

Catalyst and Control Technologies Developed Over the Years for City Gas Production

Using our proprietary high-performance catalysts, hydrogen is efficiently generated from city gas or LPG. Operation can be started or stopped at the touch of a button and production can be carried out using automatic load adjustment. Should trouble occur, the unit shuts down automatically and safety. All units come standard with a reformer hot stand-by mode, which significantly shortens the start-up time compared with cold stopping condition.

Track Record

Since the launch of the HYSERVE series in 2004, 22 units have been installed in hydrogen stations and for use in other industrial applications.

Future Plans

We are working to further improve the HYSERVE series while reducing the cost, and plan to increase sales to hydrogen stations and for use in other industrial applications.

Corporate Profile

Representative: Takeshi Yamawaki
Address: 2-4-9 Bingo-machi, Chuo-ku, Osaka City, Japan 541-0051
URL: http://www.oge.co.jp
TEL: +81-6-6220-1211
Founded: 1978
Capital: 100 million yen
Number of Employees: 121

(As of April 2016)

Business Activities

- Liquefied natural gas (LNG) plant technology
- Maintenance technology
- Gas supply technology
- Overseas projects
- Environmental technology
- Energy technology

Kaji Technology Corporation

Offering High Quality Hydrogen Compressors from Design to Assembly

Contact Sales Division, Tokyo Sales Dept. No. 1 Section Contact Person Minami TEL +81-3-3232-2651 Email h-minami@kajitech.com
Contact Sales Division, Osaka Sales Dept. Contact Person Yasuda TEL +81-72-361-9500 Email t-yasuda@kajitech.com

Our Advantages/Characteristics

Various Product Lines from a Manufacturer Specializing in Compressors

We are a specialist manufacturer of compressors with a history that goes back over a hundred years. Making the most of our experience and the know-how gained through making compressors for various gases and pressures from design to manufacture, we can design compressors not only for use in hydrogen stations, but also for use over a wide range, from low to high pressures and from small to large capacities.

Our Unique Technology/Service

15 Years Spent on Developing Hydrogen Embrittlement Countermeasures

We began developing compressors for FCVs in 2001, and since coming out with an ultra-high pressure 110 MPa hydrogen compressor in 2005, we have been using the know-how accumulated over many years to develop high-value compressors for clients with features such as hydrogen embrittlement countermeasures, extended working life, gas reduction countermeasures, which have been received to high acclaim.

Track Record

We have provided a total of 16 compressors for hydrogen stations in Tokyo, Aichi, Osaka, and Fukuoka. We are also offering compressors for a wide range of uses, such as for refilling fuel cell forklifts and for use in generating hydrogen from renewable energy sources.

hydrogen fueling stations

Future Plans

We are contributing to the advent of the coming hydrogen society by designing and developing compressors and other peripheral equipment, which are necessary for the production of the currently popular next-generation clean energy sources, such as renewable energy and by-product hydrogen, with units ranging from low to high pressure and from small to large capacity in line with the requirements of clients.

Corporate Profile

Representative: Takashi Nakazawa
Address: 6 Bodai, Mihara-ku, Sakai City, Osaka, Japan 587-0064
URL: http://www.kajitech.com
Reception: +81-72-361-0881
Founded: 1934
Capital: 1,440 million yen (Listed on the Second Section of the Tokyo Stock Exchange)
Number of Employees: 200
(As of January 2017)

Business Activities

- Design, manufacture, and sale of air compressors.
- Design, manufacture, and sale of specialized compressors for various gases.
- Design, manufacture, and sale of peripheral equipment for compressors.

Kawasaki Heavy Industries, Ltd.

Powering your potential

Contact Corporate Technology Division, Hydrogen Energy Supply Chain Development Center
Contact Person Seiichi Sugawa **TEL** +81-78-921-1615 **Email** sugawa_seiichi@khi.co.jp

JAXA

Our Advantages/Characteristics

Kawasaki Hydrogen Road

It is important to set up a stable and sustainable supply chain to make clean energy – hydrogen – a reality. Our unique perspective and experience as one of the few manufacturers in the world with the key technologies and products to be able to seamlessly cover every aspect of the supply chain, from hydrogen liquefaction systems, liquid hydrogen storage tanks and liquid hydrogen containers, to hydrogen gas turbines, etc., means that we are well suited to do so. High efficiency and high thermal insulation are characteristics of our technology, and related products include liquid hydrogen storage tanks, LNG carriers and LNG tanks, all of which utilize cryogenic technology.


Image provided by:HySTRA

Our Unique Technology/Service

Handling Hydrogen in a Stable, Safe and Cost-Effective Manner

We are the number one manufacturer in Japan with technology for large-scale liquid hydrogen installations. We have the development/design technologies and high-precision manufacturing/processing technologies that are essential for utilizing hydrogen energy, such as technology for dealing with extremely low temperatures, large-scale construction, high-speed rotating bodies, and clean combustion. Furthermore, our technology and know-how regarding safety assessment and management of hydrogen ensures that our hydrogen-related products are outstanding. One of our achievements is the liquid hydrogen storage tank (the biggest in Japan with a capacity of 540m^3) that has been operating efficiently with a low rate of evaporation at JAXA's Tanegashima Space Center for more than 25 years.

Track Record

In addition to the above-mentioned spherical tank at Tanegashima Space Center, we have also been supplying horizontal liquid hydrogen tanks for industrial use, in addition to commercializing and supplying liquid hydrogen containers and high-pressure hydrogen trailers. Another project we are working on is the development of a gas turbine that can burn variable ratio hydrogen/natural gas mixtures.

hydrogen fueling stations

Future Plans

In order to support the hydrogen energy supply chain of the future, we will develop and commercialize the world's first liquid hydrogen carriers and other hydrogen-related equipment. With this in mind, we formed a technological research association in February of this year to engage in various activities with the aim of bringing online a proof-of-concept pilot plant by 2020.

企業情報

Representative: Yoshinori Kanehana, President
Tokyo Head Office Address: 1-14-5 Kaigan Minato-ku, Tokyo, Japan 105-8315
TEL: +81-3-3435-2111
Kobe Head Office Address: 1-1-3 Higashi Kawasaki-cho, Chuo-ku, Kobe City, Japan 650-8680
TEL: +81-78-371-9530
URL: http://www.khi.co.jp
Founded: 1896
Capital: 104.484 billion yen (As of March 31, 2016)
Number of Employees: 34,605 (consolidated) (As of March 31, 2016)

事業内容

- Aerospace business
- Shipbuilding business
- Rolling stock
- Energy-related business (gas turbines, etc.)
- Environment-related facilities
- Industrial machinery, industrial robots
- Steel structures
- Motorcycles

Kobe Steel, Ltd.

A Leader in the Field of Ultra High-Pressure Equipment - Helping to Build a Hydrogen Society

Contact Machinery Business, Rotary Machine Dept. Contact Person Takashi Ishiyama
TEL +81-3-5739-6770 Email ishiyama.takashi@kobelco.com

Our Advantages/Characteristics

Kobe Steel's Ultra High-Pressure Hydrogen Equipment is Used throughout the World

Kobe Steel, which has a metal materials division that handles not only steel but also aluminum and titanium, as well as a machinery division, is well known as a supplier of 100 MPa- and 200 MPa-class ultra-high pressure equipment. We have a solid track record of developing and supplying various types of hydrogen-related equipment, and together with our group companies, including Kobelco Eco-Solutions Co., Ltd. and Shinko EN&M, we are actively working toward the realization of a hydrogen society.

Our Unique Technology/Service

From Hydrogen Station Equipment to Total Hydrogen Station Solutions

In response to customer needs, Kobe Steel has developed and brought to market various types of specialized hydrogen-related equipment, including non-multipurpose high-pressure hydrogen compressors/heat exchangers for industrial use, equipment for testing machinery in high-pressure hydrogen environments, high-pressure hydrogen compressors for hydrogen stations (HyAC), diffusion-bonded compact heat exchangers (DCHE), and the HyAC mini all-in-one compact hydrogen station package.

Track Record

We have a dedicated hydrogen station comprehensive test center and our equipment is used in many of the hydrogen stations located throughout Japan. We are also in the process of exporting to the US.

hydrogen fueling stations

Future Plans

In addition to developing and supplying equipment for hydrogen stations in Japan, we are endeavoring to optimize such equipment and reduce costs using our in-house hydrogen station comprehensive test center. We are also collaborating with other companies in the Group to utilize hydrogen from water using renewable energy as we work toward the realization of a hydrogen society and the reduction of CO_2 emissions.

Corporate Profile

Representative: Hiroya Kawasaki
Head Office Address: 2-2-4 Wakinohama Kaigan-dori, Chuo-ku, Kobe City, Hyogo, Japan 651-8585
URL: http://www.kobelco.co.jp
TEL: +81-78-261-5111
Founded: 1905
Capital: Approximately 250.9 billion yen
Number of Employees: Approximately 11,000 (individuals)
(As of March 2016)

Business Activities

- Steel (steel plate, wire, titanium, iron powder, etc.)
- Welding (welding materials, welding systems)
- Aluminum/Copper (sheet, forged products, pipes, etc.)
- Machinery (including engineering and construction machinery)
- Power (power supply)

SAMTECH Co., Ltd.

Providing Design, Production and Quality Assessment of High-Pressure Cylinders with Advanced Safety Features

Contact High-Pressure Cylinder Dept. Contact Person Senta Tojo
TEL +81-72-977-8801 Email vessel@samtech.co.jp

Composite cascade cylinders for hydrogen stations.

Our Advantages/Characteristics

Hydrogen Station Market Share of over 80%

SAMTECH high-pressure cylinders are equipped with a leak-before-break (LBB) function for increased safety, are one fifth the weight of conventional steel cylinders, and are used in more than 80% of hydrogen stations throughout Japan. Cylinders are made of an aluminum alloy that is resistant to hydrogen embrittlement to ensure the highest quality. We receive inquiries from a diverse range of fields, not just limited to hydrogen stations, so we are well able to suggest the most suitable type of high-pressure cylinder to suit your particular needs.

A cylinder for use in a hydrogen vehicle.

Our Unique Technology/Service

Choose SAMTECH for Safe and Reliable High-Pressure Cylinders

Even if a cylinder is damaged from the outside, the LBB function means that gas will be leaked gradually without the cylinder bursting. All cylinders are tested for airtightness before shipping, to ensure the highest quality. Design, production and quality assessment are all carried out in-house, making it possible for us to suggest the most suitable type of high-pressure cylinder to suit the needs of customers.

Track Record

More than 80% of all hydrogen stations in Japan (91 as of June 2016) use SAMTECH Hiprea composite cascade cylinders. SAMTECH's composite cylinders are also used in Japan's first 45 MPa hydrogen transporter.

hydrogen fueling stations

Future Plans

In order to further reduce the weight and cost of composite cylinders, we have commenced development of a cylinder using 7000 series aluminum alloy.
We are working together with our partners to commercialize such products by 2020.

Corporate Profile

Representative: Yoshiki Sakaguchi
Address: 1000-18 Enmyo-cho, Kashiwara City, Osaka, Japan 582-0027
URL: http://www.samtech.co.jp
TEL: +81-72-977-8801
Founded: 1949
Capital: 95 million yen
Number of Employees: 350

(As of January 2016)

Business Activities

- Forged parts for automobiles
- High-pressure gas cylinders
- Production and sale of ultra-thin liners

Kobelco Eco-Solutions Co., Ltd.

Providing Hydrogen Supplies for Every Purpose from R&D to the Production Line

Contact Hydrogen Business Promotion department Contact Person Tatsuo Suda
TEL +81-3-5739-5814 Email t.suda@kobelco-eco.co.jp

Our Advantages/Characteristics

A Successful Track Record with 150 Polymer Electrolyte Membrane Hydrogen Generators Sold

Our on-site hydrogen generators can produce high-purity hydrogen on demand. We have sold 150 units in Japan and overseas for not only industrial uses, but also for research and development and testing, etc. Our unit does not use any chemicals, and gas yield is adjusted automatically to instantly supply from 0% to 100% capacity on demand.

Our Unique Technology/Service

We Have Many Years of Experience and a Proven Track Record

We are No.1 in terms of market share in Japan for full-scale industrial polymer electrolyte membrane hydrogen generators. With a proven track record in hydrogen generation and utilization, we are well able to meet the hydrogen supply needs of our clients.

Track Record

hydrogen fueling stations

We have a track record in supplying hydrogen that spans various fields, including hydrogen generation for hydrogen stations and renewable energy sources, various industrial uses (semiconductor manufacturing, power plant electric generator cooling, metal product manufacturing, and industrial gas purification, etc.), and research and development.

Future Plans

We would like to see the high-purity hydrogen, simple operation, and great safety features of our products put to good use to make hydrogen for use as an energy source. We would also like to see these features used to solve hydrogen supply problems so that hydrogen can come to be used in every aspect of industry.

Corporate Profile

Representative: Tsuyoshi Kasuya, President
Head Office Address: 1-4-78, Wakinohama-cho, Chuo-ku, Kobe City, Hyogo, Japan 651-0072
URL: http://www.kobelco-eco.co.jp
Reception: +81-78-232-8018
Founded: 1954
Capital: 60.02 billion yen
Number of Employees: 1,147
(As of November 2016)

Business Activities

- Activities related to water treatment.
- Activities related to waste treatment.
- Activities related to machinery for food and chemicals.

CHIYODA SEIKI CO.,LTD.

Comprehensive Manufacturer of Industrial Gas Equipment for Welding/Cutting, Food, Medical, Semiconductor Use

Contact Overseas Division Contact Person Yoshihiro Taniguchi
TEL +81-78-681-8844 Email victory@chiyoda-seiki.co.jp

Large pressure regulator.

Our Advantages/Characteristics

A Proven Track Record in Hydrogen-Compatible Tools, Equipment, and Engineering

Hydrogen Mixed-Gas Cutting/Welding Tools: Hand cutting torches, hand welding torches, dry type flashback arrestors for H2.
Pressure Regulators for Hydrogen: H2 cylinder regulators, H2 pipeline regulators, H2 manifold regulators.
Vacuum-Insulated Pipe for Cryogenic Liquefied Hydrogen

Our Unique Technology/Service

From Design to Delivery and After-Sales Service

We have a wide range of hydrogen gas pressure regulators for welding tools, cutting tools, safety devices, analysis, semiconductors, and industries that use hydrogen gas as a fuel, as well as a proven track record for installing liquid and gas supply equipment and piping. We also produce vacuum-insulated pipe for cryogenic liquefied hydrogen.

Vacuum-insulated pipe.

Track Record

hydrogen fueling stations

We installed the equipment and plumbing required for the hydrogen station at Kansai International Airport.
We also have a proven track record in installing equipment for supplying/receiving hydrogen at metal and glass factories, as well as large-capacity hydrogen pressure regulators.

Future Plans

We plan to expand into the production and installation of hydrogen-related equipment for hydrogen stations and hydrogen plants, as well as continuing to expand our hydrogen-related product lineup.

Corporate Profile

Representative: Yoshihiro Taniguchi
Head Office Address: 7-9-21 Higashi-Shiriike-cho, Nagata-ku, Kobe City, Hyogo, Japan 653-0022
URL: http://www.chiyoda-seiki.co.jp
TEL: +81-78-681-8844
Founded: August 1948
Capital: 71.28 million yen
Number of Employees: 190

(As of January 2017)

Business Activities

- Manufacture and sale of various kinds of high-pressure gas control equipment.
- Design and construction of gas control systems.
- Manufacture and sale of gas cutting/welding equipment.

Nippon Seisen Co., Ltd.

Developing an Organic Hydride Dehydrogenation Reactor Employing an Electrically Heated Monolithic Aluminum Catalyst

Joint Research: Alumi-Surface Technologies Co., Ltd.

Contact Customer Service Dept. Contact Person Tsuneo Akiura
TEL +81-72-840-1265 Email t_akiura@n-seisen.co.jp

Our Advantages/Characteristics

Compact Large-Capacity Dehydrogenation Reactor Optimum for Daily Start and Stop (DSS) Operation

The maintenance of hydrogen stations is proceeding in anticipation of the spread of FCVs, and in the midst of that, the use of organic hydrides (methylcyclohexane (MCH)) as a medium for hydrogen storage and transportation is proceeding as a matter of state policy. We are working on developing a dehydrogenation reactor that makes use of the dehydrogenation reaction of this organic hydride (MCH). As part of this we are assessing the major benefits of this reactor, which are (1) miniaturization, (2) rapid heating, and (3) high efficiency.

Our Unique Technology/Service

Working Toward Making the “Only One” for the Coming Hydrogen Society

Introducing aluminum-clad wires and heating elements clad using our cladding technology. The aluminum is given an alumite treatment and a catalyst support, then a catalyst support that enables the wire itself to generate heat by direct electrification is formed, and this becomes the heat source. By using an electrically-heated monolithic aluminum catalyst wire, we can manage with endothermic energy required for the dehydrogenation of organic hydrides in an optimum and highly efficient manner.

Track Record

At present, we are establishing technology for mass producing aluminum monolith catalysts, verifying electrical safety and reliability, and conducting demonstration experiments with a dehydrogenation reactor with a hydrogen generation capacity of 10 Nm^3/h, with a view to seeing them used in dehydrogenation reactors for hydrogen stations (hydrogen generation capacity of 300 Nm^3/h).

Future Plans

While establishing technology for mass producing aluminum monolith catalysts, verifying electrical safety and reliability, and conducting demonstration experiments using a dehydrogenation reactor with a hydrogen generation capacity of 10 Nm^3/h, we are searching for plant manufacturer with whom we can work to develop this technology into devices for commercial sale.
In addition to using organic hydride dehydrogenation (MCH) in hydrogen stations, we would like to explore the potential application of the technology to catalytic reactors, which require an endothermic reaction (although there are limitations in terms of temperature). We are also working toward partial commercialization of HYBREM (a stainless steel spring wire resistant to hydrogen embrittlement) and hydrogen separation membrane modules.

Corporate Profile

Representative: Motoshi Shinkai, President/CEO
Address: 4-1-1 Koraibashi, Chuo-ku, Osaka, Japan 541-0043
URL: http://www.n-seisen.co.jp/
TEL: +81-6-6222-5431
Founded: 1951
Capital: 5 billion yen
Number of Employees: 535
(As of March 2016)

Business Activities

- Processing and sale of stainless steel wire and deformed wire.
- Processing and sale of other metal wire and deformed wire.
- Manufacture and sale of welding rods.
- Manufacture, processing and sale of metallic fibers.

Hitachi Zosen Corporation

Technology for People, the Earth, and the Future

Contact Industrial Equipment Sales Dept., Industrial Equipment Business Unit, Machinery Business Headquarters
Contact Person Kenji Wada TEL +81-3-6404-0827 Email wada_k@hitachizosen.co.jp

Our Advantages/Characteristics

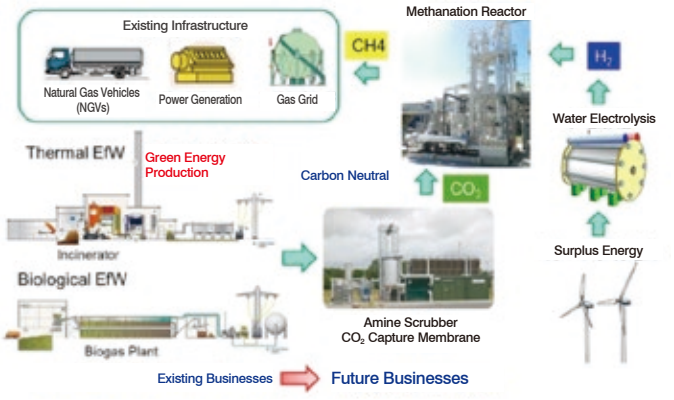
"HYDROSPRING" – A Safer and More User-Friendly On-Site Hydrogen Generation System

HYDROSPRING is an on-site hydrogen generation system that produces a supply of high-purity hydrogen gas by electrolyzing water. Our HYDROSPRING allows for a high-efficiency, low-cost machine that contributes toward a hydrogen society. We have a broad range of units with capacities ranging from small (1 Nm^3/h) to large (over 100 Nm^3/h). We can also design units to custom specifications as needed, such as remote monitoring systems.

Our Unique Technology/Service

The Only Company in the World to Provide Hydrogen or Methane (PtG) Production from Renewable Energy

Power-to-Gas (PtG) is a term for technology that takes electricity from renewable energy technologies, such as offshore wind power, wood biomass power, biogas power, and waste-to-energy power, and uses this electricity to make hydrogen or methane, and its practical implementation is being investigated in many places around the world. We are able to offer technology for establishing a consistent energy supply chain that provides for the storage, transportation, and utilization of renewable energy.



Track Record

hydrogen fueling stations

Our units are being used at research institutions such as Saga University, Nagoya University, the University of Tsukuba, the National Institute of Advanced Industrial Science and Technology, and Kyushu University Ito Campus Hydrogen Station as hydrogen conversion equipment powered by renewable energy, or as hydrogen supplies for hydrogen-cooled generators or for weather balloons for the Japan Meteorological Agency.

Future Plans

Renewable energy sources suffer from uneven supply and demand, and often generate surplus electricity. The extensive adoption of renewable energy has been planned to drastically reduce CO_2, but how to use large amounts of surplus electricity is a problem. Hitachi Zosen will manufacture gas using this surplus energy and plan to initiate projects to contribute greatly to CO_2 reduction.

Corporate Profile

Representative: Takashi Tanisho
Head Office Address: 1-7-89 Nanko-Kita, Suminoe-ku, Osaka, Japan 559-8559
URL: http://www.hitachizosen.co.jp
[Tel.] +81-6-6569-0001 [Fax] +81-6-6569-0002
Founded: 1881
Capital: 45,442,365,005 yen (As of March 2016)
Number of Employees: 9,990
(As of September 2016)

Business Activities

- Environmental equipment/factory equipment.
- Precision machinery/industrial machinery.
- Electricity generators/internal combustion engines.
- Pressure vessels/structural steelwork/construction machinery.

Yamato H2Energy Japan Inc.

Offering Economical Systems Ranging from Fuel Cells to Hydrogen Stations

Contact Technical Dept. Contact Person Murakami/Onodera/Hirase
TEL +81-6-7656-1825 Email welcome@yh2ej.com

Fuel cell-powered electricity generator
(4 units × 2.5 kW = 10kW)

Our Advantages/Characteristics

Compact and Economical Hydrogen Station

Yamato H2Energy Japan has revolutionized the idea of a package-type hydrogen station. Because we can handle every aspect of fuel cells, including design, manufacture, application, and maintenance, we have managed to achieve amazingly low costs through miniaturization. This enables you to enter the business with affordable hydrogen stations before having to consider full-scale stations for passenger vehicles. We have received inquiries from fuel cell vehicle dealers, road services companies, fuel cell forklift users, and gasoline stand owners. Out products:
(1) Dramatically reduce the entry price for setting up a hydrogen station.
(2) Can be used for a range of applications when used as a mobile hydrogen station, such as road services, etc.

Hydrogen filling machine (dispenser).

Our Unique Technology/Service

Mobile Dispensers for Road Services

Our small lightweight hydrogen filling machines can be used by road services and fuel cell vehicle dealers. They can also be used as small-scale hydrogen stations (mobile stations are also possible) and small-scale forklift-refilling machines. Fuel cells have a track record as economical and environmentally friendly emergency power supplies.

Track Record

We have a track record of making small-scale hydrogen stations and dispensers. Our fuel cells have a track record as mobile and emergency power generators, and we receive many enquiries about them.

hydrogen fueling stations

Future Plans

Our small-scale 35 MPa hydrogen stations can be used for refilling forklifts and for fuel cell vehicle dealerships. Our portable fuel cells, which weight as little as 7 kg, are in great demand. We offer economical fuel cells that range in power from 30 W to 10 kW.

Corporate Profile

Representative: Ikuo Hirase
Address: 4-2-26 Nishi-Nakajima, Yodogawa-ku, Osaka City, Japan 532-0011
URL: http://www.yh2ej.co.jp
TEL: +81-6-7656-1825
Founded: 2014
Capital: 6 million yen
Number of Employees: 10

(As of March 2017)

Business Activities

- Small-scale hydrogen stations.
- Hydrogen refilling machines for fuel cell forklifts and other fuel cell vehicles.
- Hydrogen supply equipment.
- Fuel cells (various kinds ranging from 30 W to 10 kW).
- Portable fuel cell electricity generators, emergency fuel cell power supplies, and more.

Ryuki Kogyo Co., Ltd.

We Do Everything Ourselves, In-House

Contact Sales/Technology Contact Person Miki Yoshiyuki/Mitsuru Nakamura
TEL +81-6-6335-4088 Email info@ryukikogyo.co.jp

Our Advantages/Characteristics

Our Mobile Processing Equipment Means We Can Work On-Site

Cone and thread fittings are approved for use in hydrogen installations. We have a mobile cone and threading machine as well as a mobile ultra-high pressure compressor, which means we can handle delicate on-site plumbing and durability/airtight testing that is difficult for other companies. We can also handle everything from detailed design through to fabrication, applications, arrange testing, and do on-site installation.

Our Unique Technology/Service

Diverse Types of Welding

We can provide automatic welding, manual welding or a combination of the two. As welding can reduce the number of fittings required for installations, we can therefore also help clients to reduce costs.
Furthermore, we have developed our own proprietary fittings, which are a combination of thread and weld (patented) so that we can use the most appropriate type to provide a high degree of reliability to clients.

Track Record

Past projects have included the following:

- Osaka Morinomiya Hydrogen Station
- Osaka Hirakata Hydrogen Station
- Kyushu Regional Testing Facility, etc.
- Osaka Ibaraki Hydrogen Station
- Aichi Testing Facility

hydrogen fueling stations

Future Plans

As progress is made on developing hydrogen-related infrastructure, we plan to incorporate new methods of installation as the need arises.

Corporate Profile

Representative: Yoshihiro Yamamoto, President
Head Office Address: 1-17-23 Harada-Naka, Toyonaka City, Osaka, Japan 561-0807
[Tel.] +81-6-6335-4088 [Fax] +81-6-6335-4089
Founded: December 10, 2002
Capital: 10 million yen
Number of Employees: 14
(As of December 2016)

Business Activities

- Various types of unit.
- Various types of boiler.
- Design and installation.
- Pressure vessels.
- High-pressure gas facilities.

FIS Inc.

Hydrogen Detectors for a Safe Hydrogen Society

Contact Research and Marketing Contact Person Kiyonori Ono
TEL +81-72-780-1800 Email info@fisinc.co.jp

Our Advantages/Characteristics

Installed in the World's First Mass-Produced Hydrogen Fuel-Cell Vehicle

Installed in fuel-cell vehicles (FCVs) and other mobile and stationary fuel-cells that use hydrogen as a fuel, our detectors quickly detect and notify you in the unlikely event of a hydrogen leak.
Fast startup time (less than one second), quick response (less than two seconds), high hydrogen selectivity, long life (about 10 years), environmental resistance, and compact form factor, enable these detectors suitable for a wide range of applications.
Our products have been installed in the world's first mass-produced hydrogen FCV.

Our Unique Technology/Service

From upstream to down stream

Drawing on our extensive gas sensor material development and housing design know-how, we produce everything from sensors and sensor modules through to the completed product, enabling us to provide customers with the products that they require.
We offer not only hydrogen detector itself, but also IoT solutions such as wireless sensor network systems.

Track Record

Installed in the world's first mass-produced hydrogen FCV, as well as in the ENE-FARM household fuel-cell.

Future Plans

While striving for a compact form factor and low power consumption, while improving solutions such as wireless networks, we aim to have our sensors adopted for use in a wide range of fields, such as hydrogen stations and back-up power supplies that run on hydrogen.

Corporate Profile

Representative: Takao Hashimoto
Head Office Address: 3-36-3 Kitazono, Itami City, Hyogo, Japan 664-0891
URL: http://www.fisinc.co.jp
TEL: +81-72-780-1800
Founded: 1992
Capital: 320.2 million yen
Number of Employees: 81
(As of December 2016)

Business Activities

Development, designing, manufacturing, sales & marketing and maintenance of gas sensor and its applied products.

Okazaki Manufacturing Company

Measuring Temperatures in Extreme Environments

Contact Kobe Sales Office Contact Person Shuichiro Tsuri
TEL +81-78-251-8200 Email s_tsuri@okazaki-mfg.com

Pressure-resistant explosion-proof sheathed thermocouple for measuring high-pressure hydrogen temperatures.

Our Advantages/Characteristics

Proven Track Record in Hydrogen Stations

- Our ultrahigh-pressure hydrogen thermocouples can be used in 100 MPa environments and are compatible with various explosion-proof standards.
- We can supply platinum-cobalt resistance thermometers that can precisely measure temperatures in the ultralow 1.5 K (-271.5°C) range.
- We can also provide Pt 1000 Ω resistance thermometers for civilian use that utilize sensor technology for measuring the temperature in space.

Our Unique Technology/Service

World's Top Specialist Manufacturer of Temperature Sensors and Heaters

As a specialist manufacturer of industrial temperature sensors and heaters, we have been contributing to the progress of industries and societies both within Japan and overseas by furthering temperature measuring technology in a diverse range of fields, from consumer products, such as automobiles, food, chemicals and textiles, to steel, power and rockets.

Temperature sensors for measuring ultralow temperatures.

Track Record

hydrogen fueling stations

Our pressure-resistant explosion-proof sheathed thermocouple for measuring high-pressure hydrogen temperatures is used to safely maintain piping and tanks in hydrogen stations. In addition to hydrogen-related applications, we can provide a diverse range of products to meet the requirements of customers, ranging from ultralow to ultrahigh temperature, as well as anti-explosion and space applications with short delivery times, from our main manufacturing base in Japan.

Future Plans

We are aiming to obtain hazardous area certification status on our temperature sensors for use in liquid hydrogen plants.
As a member of the Kobe Hydrogen Cluster Study Group (part of Kobe City Machinery and Metal Industry Association), we will continue to expand applications for hydrogen-related industries.

Corporate Profile

Representative: Kazuo Okazaki, Chairman/CEO
Head Office Address: 3-1-3 Goko-dori, Chuo-ku, Kobe City, Hyogo, Japan 651-0087
URL: http://www.okazaki-mfg.com
TEL: +81-78-251-8200
Founded: January 26, 1954
Capital: 86.5 million yen
Number of Employees: 273

(As of March 2016)

Business Activities

- Manufacturing and sale of temperature sensors.
- Manufacturing and sale of industrial electric heaters.
- Manufacturing and sale of mineral-insulated (MI) cable for measuring/control/heating.

GTR Tec Corporation

Half a Century of Experience in Gas Permeation Analysis Pioneering the Field of Gas Permeation Testers

Contact Sales Promotion Dept. Contact Person Nobuo Akatsuka
TEL +81-774-25-7131 Email akatsuka@gtr-tec.com

Gas permeation tester for solid polymer electrolyte membrane

Our Advantages/Characteristics

Our Gas Permeation Testers for Polymer Electrolyte Membranes are Essential for Electrolyte Membrane Research and Quality Control

Advantages and Characteristics

- Gas (H_2, O_2, etc.) and H_2O permeation can be measured with a single unit.
- Only unit capable of measuring permeation rates in dry and wet (single/double sides) conditions.
- Both the equal pressure technique (Flow method) and gas chromatography (JIS/ISO) can be used.
- Membranes can be pressure tested from both sides.
- Automatic and semi-automatic units that can automatically set measuring conditions (temperature/humidity) are available.
- Our units have a reputation for good design gained through long years of experience.
- We offer contract measuring services.

Our Unique Technology/Service

First Company to Use Gas Chromatography to Measure Gas Permeation

Our gas permeation testers can measure the permeation of various types of gases, liquids, or steam with a single unit that uses gas chromatography.
Measuring the permeation of mixtures of steam and various types of gas is possible.
Measuring the permeation of liquids such as petrol, etc. is also possible.

Permeation tester for high temperature gases.

Track Record

We have been involved in measuring the gas permeation of membranes since the initial development of fuel cells that uses electrolyte membranes. Our units are used by universities, public research institutions, chemical companies, automobile-related industries, etc., and are valued as essential units in their respective fields.

Future Plans

We are developing a unit to measure the gas permeation of gases such as hydrogen through thin metal plates at high temperature.

Corporate Profile

Representative: Hirotsugu Tsujii
Head Office Address: 159-2 Mekawa, Makishima-cho, Uji City, Kyoto, Japan 611-0041
URL: http：//www.gtr-tec.com
Founded: 2001
Capital: 10 million yen
Number of Employees: 10

(As of January 2017)

Business Activities

- Contract measurement of gas/steam/liquid permeation.
- Manufacture and sale of gas/steam/liquid permeation testers.

New Cosmos Electric Co., Ltd.

We Maintain Your Hydrogen Stations

Contact Industry Sales Division
TEL +81-6-6308-2111 Email info-mail@new-cosmos.co.jp

Our Advantages/Characteristics

Contributing to Every Stage of Safety Maintenance from Hydrogen Production, Storage,Transportation Through Use.

We make hydrogen detection and alarm systems for hydrogen stations, hydrogen leak detectors, and hydrogen fire detectors that comply with explosion Proof requirements to make hydrogen stations safer.

Our Unique Technology/Service

All Levels of Detection from Low to High Hydrogen Concentrations for Any Place or Purpose

Our unique hydrogen sensors, highly-sensitive hot wire/ semiconductor type gas sensors with high selectivity for hydrogen, power-saving catalytic combustion-type gas sensors, and our durable thermal conductivity sensors, can handle any required level of hydrogen detection from near 0% to 100%.

Explosion-proof detector
for hydrogen stations.

Track Record

Our hydrogen alarm systems are is used in over 80% of hydrogen stations in Japan.
Our portable gas detectors are being used for daily maintenance.

hydrogen fueling stations

Future Plans

We are working with JAXA to develop extremely sensitive hydrogen detectors that can be used in a vacuum. We will continue to develop more products that contribute to the safe use of hydrogen on earth and in space.

Corporate Profile

President: Tesshi Shigemori
Head Office Address: 2-5-4 Mitsuyanaka, Yodogawa-ku, Osaka City, Japan 532-0036
URL: https://www.new-cosmos.co.jp
TEL: +81-6-6308-3112
Founded: May 1934
Capital: 1.46 billion yen
Number of Employees: 427

(As of April 2016)

Business Activities

Research, development, manufacture and sales of household gas detectors, mobile gas detectors, portable gas detectors, alarms, fire alarms, odor sensors and more.

Nanogray Inc.

We provide non-contacting and non-intrusive measurement solutions.

Contact Sales Dept.
Contact Person Miyashita
TEL +81-72-726-4000
Email info@nanogray.co.jp

Our Advantages/Characteristics

The Only Measurement Solution for Hydrogen Production

- (Gamma Level Gauge / Density Meter) High pressure/ high temperature processes are popular for hydrogen production. Gamma Level gauge TH1000/3000 and density meter PM-1000 can measure with non-touching to High pressure/ high temperature processes and with no moving parts, they provide reliable long-term measurements.

Applicable to Special Production Processes

- (X-ray Weight Gauge) Our gauge can be precise on-line measuring coating-weight of catalysts on MEA/ CCM.

Our Unique Technology/Service

Radiation-Based Measuring Devices that Require No License or Controlled Area

- (Gamma Level Gauge / Density Meter) Our products are certificated by NSR as "The approved devices with certification labels", so they can be used without any license and controlled area.
- (X-ray Weight Gauge) A supersensitive detector and low power X-ray tube provide high radiation safety and high level accuracy at the same time.

Track Record

Gamma density-meter: a National Institute, hydrogen production pilot plant (thermochemical cycle) (2013～)
Gamma level gauge: hydrogen production plant (biomass process) (2011～)
X-ray weight gauge for CCM(MEA):Fuel-Cell Maker, CCM production line (2011～)

Future Plans

Expand product lineup (Gamma Level gauge / Density meter).
Expand application to other processes.

Corporate Profile

Representative: Hiraku Miyashita
Head Office Address : 1-11-16 Senba-Higashi, Minoh City
Osaka, Japan 562-0035
URL : http://www.nanogray.co.jp
TEL : +81-72-726-4000
Founded : 2006
Capital : 10 million yen
Number of Employees: 4
(As of November 2016)

Business Activities

Manufacture and sale of radiation-based measuring devices as follows

- Gamma-ray level gauge and density meter
- X-ray / beta-ray weight / thickness gauge
- Thermoluminescence measuring devices

Murakami Giken Co., Ltd.

Security Sensors for a Hydrogen Society

Contact Sales/Technology Dept. Contact Person Masayuki Genta
TEL +81-725-45-0321 Email murakami@murakamigiken.co.jp

Our Advantages/Characteristics

We Have a Proven Track Record in Hydrogen Stations (Explosion-Proof Flame Sensors)

Explosion-proof flame sensors allow rapid detection of hydrogen flames that are almost invisible to the naked eye. Our sensors detect the ultraviolet radiation emitted by flames, but a unique method of signal analysis allows them to be extremely sensitive yet not easily affected by sunlight and other light sources. (We have a patent for our ultraviolet hydrogen flame sensors.)

Our Unique Technology/Service

Novel Hydrogen Detector (Optical Hydrogen Detection Switch)

Our optical hydrogen detection switch (alloy thin film) detects hydrogen by reacting to hydrogen gas and changing color (patented). The sensor element is not electrified, so it is extremely safe from the perspective of disaster prevention. The detector can also detect hydrogen gas in oxygen-free environments and in moving air (patented).

Track Record

Our explosion-proof flame sensors are being widely adopted and used as safety equipment for monitoring for hydrogen and other fires around dispensers, accumulators, and compressors in hydrogen stations. They have also been patented as security sensors for hydrogen storage area, parking lots for fuel cell vehicles (FCVs), piping for hydrogen, and vessels carrying hydrogen or FCVs.

hydrogen fueling stations

Future Plans

Not content with dealing with only security sensors for hydrogen stations, we are rapidly expanding into safety equipment for hydrogen generation, transportation and storage. We are also developing security sensors that can be used at sea in anticipation of hydrogen being used at sea and not only on land.

Corporate Profile

Representative: Isao Murakami
Head Office Address: 3-9-55 Ikegami-cho, Izumi City, Osaka, Japan 594-0083
URL: http://www.murakamigiken.co.jp
TEL: +81-725-45-0321
Founded: 1979
Capital: 10 million yen
Number of Employees: 20
(As of November 2016)

Business Activities

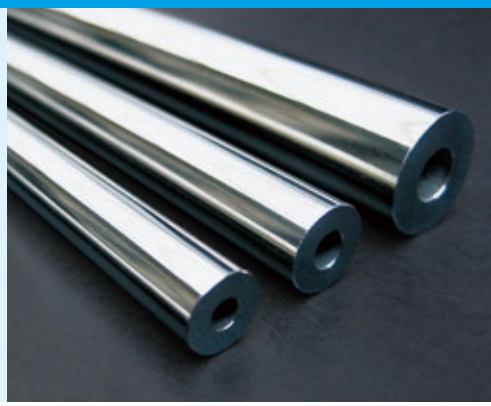
- Activities relating to rangefinders, such as laser distance sensors.
- Security devices, such as flame sensors.
- Factory automation.
- Murakami IoT (Information of Trouble)

Development, manufacture and sale of related sensors and electronic equipment.

Nippon Steel & Sumitomo Metal Corporation

New Stainless Steel for High-pressure Hydrogen Environments

Contact Chemical & Shipbuilding Tubular Products Marketing Dept. Specialty Tubular Products Marketing Div. Pipe & Tube Unit
Contact Person Soju Koguchi TEL +81-3-6867-5788 Email koguchi.s3g.sohju@jp.nssmc.com



HYDREXEL™

Our Advantages/Characteristics

HYDREXEL™ - New Stainless Steel for High-pressure Hydrogen Environments

HYDREXEL™ is an austenitic stainless steel with three distinctive features: (1) excellent resistance to hydrogen gas embrittlement, (2) high strength, and (3) excellent weldability. This steel can help to reduce construction cost of hydrogen stations and improve maintainability and safety. As welds in HYDREXEL™ have the same level of high strength and resistance to hydrogen gas embrittlement as the base metal, it is the only material that can greatly reduce the need for the mechanical joints that are normally used in hydrogen stations by replacing them with welds.

Our Unique Technology/Service

Becoming the Best Steelmaker with World-Leading Capabilities

At Nippon Steel & Sumitomo Metal Corporation we have five businesses:steelmaking, engineering, chemistry, new materials, and system solutions. We will pursue world-leading technologies and manufacturing capabilities, and contribute to society by providing excellent products and services. We offer products and services that contribute to the development of a hydrogen society, centered mostly around HYDREXEL™ stainless steel for highpressure hydrogen.

HYDREXEL™

Track Record

HYDREXEL™ has already been adopted for commercial hydrogen stations constructed by Iwatani Corporation, Tokyo Gas Co., Ltd., and other companies in Japan for use in piping, couplings/valves, and machinery (compressors, pre-coolers, and gauges).

hydrogen fueling stations

Future Plans

We offer products and services centered around HYDREXEL™ stainless steel for use with high-pressure hydrogen that contribute to the development of a hydrogen society.

Corporate Profile

Representative: Takao Shindo, President
Head Office Address: 2-6-1 Marunouchi, Chiyoda-ku, Tokyo, Japan 100-8071
URL: http://www.nssmc.com/index.html
TEL: +81-3-6867-4111
Founded: October 1, 2012
Capital: 419,524 million yen
Number of Employees: 84,837
(As of March 2016)

Business Activities

- Steelmaking
- Engineering
- Chemistry
- New Materials
- System Solutions

Takaishi Industry Co., Ltd.

Seal Hydrogen with O-Rings Developed Using Our Unique Compounding Technology

Contact Marketing Dept. Contact Person Haruhisa Saito
TEL +81-72-632-3365 Email saito@takaishi-ind.co.jp

Our Advantages/Characteristics

Already in Use at Hydrogen Stations!

We are a manufacturer of rubber seals with an integrated production line that handles compounding, kneading, shaping, finishing, and inspection in our own factory. We have applied our technology and equipment to develop O-rings for use in compressors and breakaway devices for hydrogen stations. These O-rings, which use a unique compound developed in-house, are presently being used in hydrogen stations all over Japan.

Our Unique Technology/Service

Unique Material Developed Using Compounding Technologies Refined over Many Years

The compound employed in the O-rings that are being used in hydrogen stations has been perfected over the course of many years. Sealing hydrogen using rubber was a huge challenge, but after trying over 60 different compounds we finally arrived at the optimal solution. We are open to discussing trial manufacture and mass production of O-rings that use our EPDM and FKM.

Track Record

hydrogen fueling stations

At present, our EPDM O-rings are being used as a seal material for breakaway devices and our FKM O-rings are being used in hydrogen compressors at hydrogen stations throughout Japan.

Future Plans

To improve product quality even more, we are continuing to gather testing data at the Hydrogen Energy Test and Research Center (HyTReC) by cycle testing using a jig in a hydrogen atmosphere, etc. In the future, we plan to expand throughout Japan and overseas, as well as exhibit our products/technology at exhibitions overseas and visit prospective clients overseas.

Corporate Profile

Representative: Hideyuki Takaishi
Head Office Address: 3-18 Arujihara-cho, Ibaraki City, Osaka, Japan 567-0897
URL: http://takaishi-ind.co.jp/english/
TEL: +81-72-632-3365
Founded: 1948
Number of Employees: 85
(As of November 2016)

Business Activities

- Mass production of rubber seals for all kinds of liquids.
- Trial manufacture of rubber seals using our own dies.
- Performance assessment tests for chemicals for rubber compounds.

Nisshin Kasei Co., Ltd.

Proposing a Low-Cost Hydrogen Supply Process Using Silicon Nanoparticles

Contact Electronic Materials Sales Development Dept. Contact Person Higo
TEL +81-6-6203-1891 Email higo@nisshinkasei.co.jp

Our Advantages/Characteristics

Low-Cost Process to Supply High-Purity Hydrogen for FC Operation

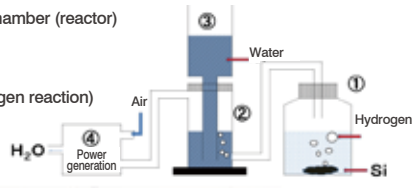
Using the industrial waste that is generated from the production of silicon wafers, we succeeded in developing inexpensive silicon nanoparticles by special processing. The high-purity hydrogen supply process that we propose uses these silicon nanoparticles to produce ultra-pure hydrogen simply and cheaply at any time or place. These silicon nanoparticles have a high surface activity and can easily react with water (oxidation), producing 1,300 cc of high-purity hydrogen from 1 g of silicon nanoparticles.

Our Unique Technology/Service

Low-Cost System to Produce Hydrogen Simply Anywhere

Hydrogen gas is a dangerous material which transportation, storage and use are regulated under the Fire Service Act, etc. Our hydrogen supply system is not subject to such restrictions. It is possible to safely transport and store this system, so you can easily produce hydrogen gas anywhere depending on your necessity. (You still need to comply with the relevant laws when you use the hydrogen gas.) As the silicon nanoparticles have high formability, it is possible to process them into many different shapes. (Nanoparticles themselves are subject to the Fire Service Act.)

(1) Hydrogen generation chamber (reactor)
(2) Hydrogen tank
(3) Water supply tank
(4) Fuel cell (hydrogen-oxygen reaction)



Track Record

Although we have no examples of adoption yet, our system can be used as an emergency hydrogen supply system. In emergency, we can provide silicon nanoparticles in the form of tablets or cartridges for hydrogen stations or FCVs.

Future Plans

We are looking for companies who can join us in building emergency fuel-cell systems that use or apply our proprietary system and also building auxiliary systems that use or proprietary system as emergency hydrogen-supply system for hydrogen stations and FCVs.

Corporate Profile

Representative: Tadasu Uemura
Head Office Address: 1-7-10, Dosho-machi, Chuo-ku, Osaka City, Japan 541-0045
URL: http://www.nisshinkasei.co.jp
TEL: +81-6-6203-1891
Founded: 1958
Capital: 75 million yen
Number of Employees: 50
(As of November 2016)

Business Activities

- Comprehensive trading company for special chemical products.
- Design and sales of appearance checking device for tablets.
- Development and sales of the novel film coating agent POVACOAT®.
- Design and sales of the firing binder EC Vehicle®

ASCO Japan Co., Ltd.

Specialist in Solenoid Valves – Provide New Value with Fluid Control

Contact Marketing Section Contact Person Sato
TEL +81-798-67-7255 Email asco.ascojp@Emerson.com

Our Advantages/Characteristics

Top Share in Hydrogen Stations

The hydrogen explosion-proof solenoid valves that are used in hydrogen stations are mostly found in relation to high-pressure hydrogen compressors and hydrogen tanks. We are the first company in Japan to provide hydrogen explosion-proof systems by combining enhanced levels of explosion-proof safety and resin-encapsulation. Compared with conventional solenoid valves in flameproof enclosures, our units have approximately 85% less volume. As no barrier is required, astonishing savings in terms of cost and space have been achieved.

Our Unique Technology/Service

ASCO Japan is the market leader for Explosion-Proof Solenoid Valves

ASCO Japan has gained the trust of many companies in the infrastructure industry as a pioneer in the field of solenoid valves, combining world-class technology with Japanese development capabilities. Our products are used in many diverse fields, including nuclear power plants and petrochemical plants, as well as in medical fields, all of which require outstanding levels of quality.

Track Record

hydrogen fueling stations

Our hydrogen explosion-proof solenoid valves are used mainly for high-pressure hydrogen compressors, hydrogen tanks and dispensers.
We have a track record of selling into more than 60% of hydrogen stations, mainly to major companies that lead hydrogen-related businesses in Japan, regardless of their size.

Future Plans

Solid oxide fuel cell (SOFC) + micro gas turbine (MGT) hybrid systems for power generation.
Liquid hydrogen plants.
Thermal power generation using hydrogen as fuel.

Corporate Profile

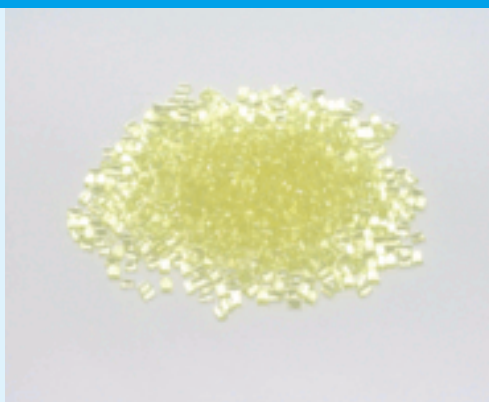
Representative: Michio Sunami
Head Office Address: 1-20 Takahata-cho, Nishinomiya City, Hyogo, Japan 663-8202
URL: http://www.ascojp.co.jp
TEL: +81-798-65-6361
Founded: 1970
Capital: 50 million yen
Number of Employees: 90
(As of November 2016)

Business Activities

- Manufacture of solenoid valves.
- Sale of solenoid valves and related equipment.
- Development of solenoid valves.

The Nippon Synthetic Chemical Industry Co., Ltd.

Producing Hydrogen Resistance Using Butenediol-Vinyl Alcohol Copolymers



Contact Core Technology Lab., Central Research Laboratory

Contact Person Masato Aoyama **TEL** +81-72-643-2381 **Email** aoyama.masato@mh.nichigo.co.jp

Our Advantages/Characteristics

A Polyvinyl Alcohol Resin Displaying Hydrogen Resistance

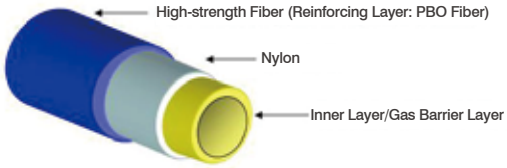
We are applying our technology about designing resins, molding, and controlling gas barrier properties that has been refined through our ethylene/vinyl alcohol copolymer resin(Soarnol™) and our butenediol/vinyl alcohol copolymer (Nichigo G-polymer™) to products relating to hydrogen.

Our Unique Technology/Service

Nichigo G-Polymer™ – An Extrusion-Moldable Resin

Nichigo G-polymer™ is an extrusion-moldable resin. By controlling the crystallinity of the molded product we have achieved hydrogen resistance (no change in appearance even after exposure to hydrogen at 70 MPa) with low hydrogen solubility. We can also improve its low temperature characteristics with polymer alloying technology.

Structure of Prototype Multi-layered Resin Hose



Track Record

We carry out research and development with the assistance of the Research and Development of Technology for Hydrogen Utilization program of the New Energy and Industrial Technology Development Organization (NEDO). We are currently developing an 87.5 MPa resin for hoses and are also trial manufacturing a tube that has excellent characteristics even in low temperatures and does not change in appearance in hydrogen exposure tests.

Future Plans

In the future we plan to further develop the material design and evaluation technology we developed in conjunction with NEDO and release products.
We will also investigate whether our technologies can be used for high-pressure hydrogen containers other than hoses.

Corporate Profile

Representative: Katsumi Kimura, President
Head Office Address: 2-4 Komatsubara-cho, Kita-ku, Osaka, Japan
URL: http://www.nichigo.co.jp/
TEL: +81-6-7711-5400
Founded: 1927
Capital: 17.9 billion yen
Number of Employees: 1,755 (consolidated)
(As of November 1, 2016)

Business Activities

- Polyvinyl alcohol, vinyl acetate.
- Life chemical (sodium acetate).
- Functional films (optical films, etc.).
- Ethylene-vinyl alcohol copolymers.

Fujikin Incorporated

Aiming to Be the Top Runner in the Field of Hydrogen Gas Control

Contact Customer Service/Marketing Dept. Contact Person Yasushi Hashimoto
TEL +81-6-6372-7141 Email y-hashimoto@fujikin.co.jp

Our Advantages/Characteristics

99.9 MPa Compliant, Used in Hydrogen Stations Throughout Japan

1. Ultra-high pressure (99.9 MPa) hydrogen gas compliant.
2. Comprehensive lineup, including control valves, shut-off valves, manual valves, check valves, filters, and fittings, etc.
3. All parts that need to come into contact with hydrogen use SUS316 (reduction ratio ≥75%, Ni equivalent ≥28.5) in compliance with the specification described in the exemplified standard of Article 7-3 of the Security Regulation for General High-Pressure Gas.
4. Compact design.
5. Control valves include an advanced smart positioner. (Auto setup, diagnostic and communication functions)

Our Unique Technology/Service

Using Technology We Developed for Rockets in the Field of Hydrogen Energy

1. Since we produced the first valves for rockets in 1976, we have accumulated a wealth of technological know-how regarding how to control hydrogen gas under harsh conditions, such as ultra-high pressure (50 MPa) and ultra-low temperature (-253°C).
2. Using the technology we developed for rocket valves, we have been active in the field of hydrogen energy right from the initial stages of the hydrogen station, and, among other things, developed precision flow control technology for ultra-high pressure hydrogen gas (99.9 MPa).

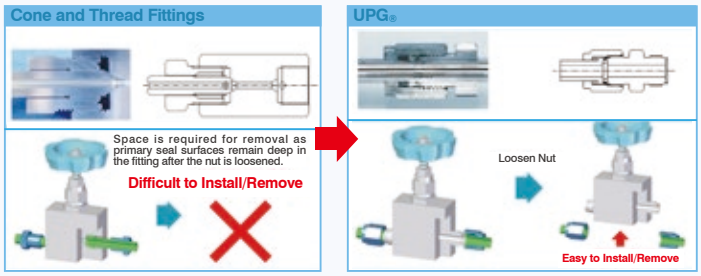
Track Record

At present, our valves are used in approximately 80% of domestic hydrogen stations.
They have also been used for many years in the testing and inspection facilities of clients such as the Hydrogen Energy Test and Research Center (HyTReC), various automakers and onboard equipment manufacturers.

hydrogen fueling stations

Future Plans

High Tensile Welding Pipe and Metal Gasket Fittings
At present, the most commonly used fittings in hydrogen stations are cone and thread types, but there are issues in terms of operation and maintenance. By using our UPG® metal gasket fittings and HRX19® high-tensile materials, it is possible to use smaller gauge pipe with thinner walls. By using them in combination with welded fittings, it is possible to make facilities more compact and improve maintainability.
* HRX19® is a registered trademark of Nippon Steel & Sumitomo Metal Corporation.



Corporate Profile

Representative: Shinya Nojima, President & COO
Corporate Headquarters Address: Kita Hankyu Bldg., 1-4-8 Shibata, Kita-ku, Osaka, Japan 530-0012
URL: http://www.fujikin.co.jp
TEL: +81-6-6372-7141
Founded: 1954
Capital: 5.4 billion yen (Group total)
Number of Employees: 2,800 (Group total)
(As of March 2016)

Business Activities

- Valves for use in processes associated with rockets, semiconductors, energy, petrochemical, pharmaceuticals/food, etc. (valves, fittings, units, modules).
- Medical-related equipment, life sciences (sturgeon breeding, etc.)

Yamashin Steel Co., Inc.

Small Batch, Quick Turnaround Sales and Secondary Processing of Stainless Steel for High-Pressure Hydrogen

Contact Sales Dept. Contact Person Yusuke Ueno
TEL +81-6-6763-1395 Email y-ueno@yamco.co.jp

Our Advantages/Characteristics

Extensive Raw Materials Inventory and Secondary Processing Capability

We were the first to stock materials approved for use in high-pressure hydrogen environments (SUS316/SUS316L Ni equivalent) in accordance with the Security Regulation for General High-Pressure Gas in 2013 and provide them to customers.
We use Aichi Steel Corporation's AUS316L-H2 as raw material, and we coordinate with them with regard to manufacturing, delivery and quality control in order to meet the demands of our clients.

Our Unique Technology/Service

Drawing (Secondary) Process for High Tensile Near-Net Shapes

Our company carries out secondary processing (drawing) of these materials to achieve a higher tensile steel and provides materials in the dimensions and shapes required by our clients, resulting in an overall reduction in total cost.

Track Record

We supply materials for compressors, valves and dispensers etc., to manufacturers of parts and equipment that are involved with hydrogen stations, and our drawn high tensile materials have also been adopted for use in fuel cell vehicles (FCVs).

hydrogen fueling stations

Future Plans

In the future, in addition to maintaining an extensive inventory, by investigating secondary processing to enable us to provide new sizes and shapes of materials, we will offer clients the kind of materials that they need in terms of mechanical properties, etc., with the overall aim of contributing to the realization of a hydrogen society.

Corporate Profile

Representative: Eiji Yamauchi
Head Office Address: 1-19-5, Uemachi, Chuo-ku, Osaka,Japan 540-0005
URL: http://www.yamco-yamashin.com
TEL: +81-6-6763-1395
Founded: 1939
Capital: 90 million yen
Number of Employees: 60
(As of November 2016)

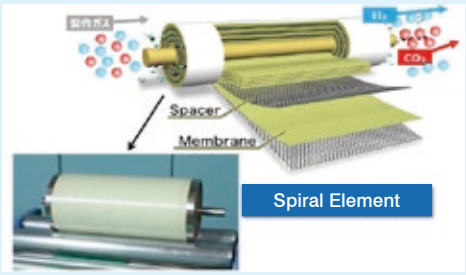
Business Activities

- Secondary processing of stainless/high alloyed steels and titanium.
- Sale and secondary processing of stainless steel for use with high-pressure hydrogen.
- Milling.

Renaissance Energy Research Corporation

Leading the Hydrogen Society with Cutting-Edge Membrane Separation and Advanced Catalyst Technologies

Contact Kyoto Development Center Contact Person Kunihiro Nakato
TEL +81-75-634-9817 Email nakato@r-energy.com



A typical CO_2 membrane separation module.

Our Advantages/Characteristics

Optimizing Hydrogen Manufacturing Efficiency while Reducing Size and Costs

CO_2 separation technology plays an important role not only in the hydrogen manufacturing process, but also in global warming countermeasure technology. However, as existing CO_2 separation technology, which uses adsorbents or absorbing solutions, requires large and expensive facilities and consumes a lot of energy, it is, in fact, an obstacle when it comes to improving the economic efficiency of hydrogen stations and large-scale hydrogen plants. On the other hand, the CO_2 membrane separation technology developed by our company is fundamentally a high energy-efficient process, and as size and cost can be dramatically reduced, our developed technology greatly improves the economy of the hydrogen manufacturing process.

Our Unique Technology/Service

World's First Separation Membrane With High-Speed CO_2 Permeability and High Hydrogen Selectivity

From the beginning, our company have researched and developed with Matsuyama laboratory of Kobe University and together we succeeded in improving characteristics of CO_2 permeability and hydrogen selectivity of facilitated transport membranes dramatically – something that was previously thought to be difficult to achieve – and developing a epoch-making CO_2 separation membrane. In the process of researches, we have established advanced separation membrane preparation and evaluation technologies and a system that can promote efficient R&D of CO_2 separation membran. We are now developing applications of CO_2 separation membrane not only for hydrogen stations but also for various other fields, such as large-scale hydrogen plants and space developement.

Track Record

On the industrialization of the CO_2 separation membranes for large–scale hydrogen plants, the world's first commercial CO_2 membrane separation equipment with our CO_2 separation membranes will start to operate in 2017 at a chemical company in Japan.

Future Plans

If our CO_2 separation membranes are put into practical use, it will be possible to achieve high efficiency, compactness, and cost reduction of hydrogen stations where major problems remain at present.
In the future ,we will take advantage of the features of the CO_2 membrane separation method and also work on catalyst development and commercialization to optimize the total system of the hydrogen station.

Corporate Profile

Representative: Osamu Okada, President
Head Office Address: ACT Kyoto 102, 105 Jibu-cho, Fushimi-ku, Kyoto, Japan 612-8374
URL: http://www.r-energy.com
[Tel. and Fax] +81-75-634-9817
Founded: 2004
Capital: 290.25 million yen
Number of Employees: 30

(As of May 2014)

Business Activities

1.Development, etc., of various types of gas permeable membranes, such as CO_2 selective permeable membranes, and applications that utilize such membranes.
2.Sale and licensing of catalyst/process technology, as well as chemical process/plant design/engineering, based on hydrogen manufacturing technology using the hydrocarbon steam-reformation process, mainly in energy and hydrogen fields, including fuel cells, and contracted research and technical consulting, etc., in related fields.
3.Development of computational chemistry software for catalysts/materials, and simulation software for chemical fields.

Iwatani Corporation

Creating the Hydrogen Business Value Chain

Contact Hydrogen Gas Dept. Contact Person Osaka Staff
TEL +81-6-7637-3458

Our Advantages/Characteristics

Liquid Hydrogen is Ideal for Bulk Transportation and Storage

Our company has been involved in the manufacture, transportation, storage and use of hydrogen in an ongoing manner since hydrogen caught our attention more than 70 years ago. It is difficult to transport or store large quantities of hydrogen gas due to its low energy density per volume. Iwatani therefore focused on liquid hydrogen which has high transport and storage efficiency and promote to create supplying system of liquid hydrogen.

Our Unique Technology/Service

Building a Supplying System as Japan's Only Supplier of Liquid Hydrogen

Iwatani is the only liquid hydrogen supplier in Japan and possess three plants (Osaka, Chiba and Yamaguchi prefecture) which obtain liquid hydrogen production and supplying system. The total annual production capacity will reach approximately 100 million Nm^3 in FY2017.
Iwatani also obtain distribution network, which covers Honshu, Shikoku, and Kyushu and are working to strengthen a stable supply system to meet the expanding demand of hydrogen.

Track Record

Iwatani supply liquid hydrogen to over 90 companies throughout Japan. Taking advantage of its features, Iwatani install liquid hydrogen storage type hydrogen stations which enables space saving, bulk storage.

hydrogen fueling stations

Future Plans

Iwatani plan to produce liquid hydrogen from renewable energy sources and import large volume of CO_2-free liquid hydrogen from overseas in specialized tankers in the future. We aim to create a supply chain for not only FCVs, but also large-scale hydrogen power generation facilities.

Corporate Profile

Representative: Masao Nomura
Head Office Address: 3-6-4 Hommachi, Chuo-ku, Osaka, Japan 541-0053
URL: http://www.iwatani.co.jp
TEL: +81-6-7637-3131
Founded: May 5, 1930
Capital: 20,096 million yen
Number of Employees: 1,466
(As of May 2016)

Business Activities

- Sale of various types of high-pressure gas and production/supply facilities, etc.
- Sale of LPG and combustion appliances, etc.
- Sale of industrial machinery, metal products, synthetic resin, etc.
- Sale of food, agricultural/livestock products and related processed products, etc.

Shinko Engineering and Maintenance Co., Ltd.

Thinking of a Hydrogen Station? Leave It to Us!

Contact Plant Division, Sales Dept. Contact Person Seijiro Kazumoto
TEL +81-78-881-3357 Email kazumoto.seijiro@kobelco.com

Our Advantages/Characteristics

Largest Market Share for Hydrogen Station Construction and Maintenance in Japan

At Shinko EN&M, we combine our proprietary hydrogen filling simulation technology and control system technology with Kobe Steel's high-pressure hydrogen compressors and pre-coolers and Kobelco Eco-Solutions's electrolytic hydrogen generators, to make us the top company in Japan for the construction and maintenance of hydrogen stations.

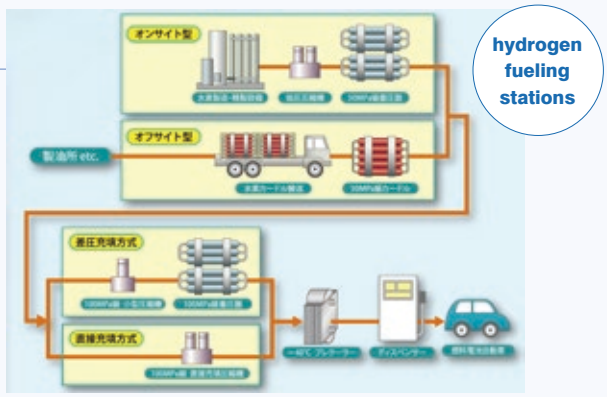
Our Unique Technology/Service

Hydrogen Station Planning, Design, Construction and Maintenance

Shinko EN&M has a long history in supplying plants associated with high-pressure gas and natural gas station solutions, etc., and is constantly working to enhance our hydrogen station planning, design, construction and maintenance capabilities using our proprietary hydrogen filling simulation technology and control system technology.

Track Record

We have planned, designed, constructed, and maintained hydrogen stations in 10 off-site and one on-site type stations. We are also working with Kobe Steel and Kobelco Eco-Solutions to develop hydrogen stations that use electricity derived from renewable energy to make hydrogen.



Future Plans

On the basis of our experience in this field, we are working to optimize hydrogen station planning, design, construction and maintenance, as well as carry out standardization and reduce costs.
We are working with Kobe Steel and Kobelco Eco-Solutions to develop hydrogen-related technology and products, such as hydrogen stations that use hydrogen produced using renewable energy, and will continue to contribute to a hydrogen society in which CO_2 emissions can be reduced.

Corporate Profile

Representative: Takahiko Sato
Head Office Address: 4-5-22 Iwayakita-machi, Nada-ku, Kobe City, Japan 657-0846
URL: http://www.shinkoen-m.jp
TEL: 078-803-2901
Founded: November 2014
Capital: 150 million yen
Number of Employees: 1,400
(As of November 2016)

Business Activities

- Design, construction and maintenance of steel plants.
- Design, construction and maintenance of chemical plants.
- Production of pressure containers, towers, tanks, heat exchangers, etc.

Air Liquide Japan, Ltd.

Pioneering Global Hydrogen Mobility

Contact Advanced Business and Technologies Dept. Contact Person Tanimizu/Kubota
TEL Tokyo Office: +81-3-6414-6509, Amagasaki Office: +81-6-6429-2148 Email webmaster-aljp@airliquide.com

Our Advantages/Characteristics

Forty Years in the Hydrogen Market

As the world leader in industrial and medical gases, Air Liquide Group is working toward improving air quality for better environment and health. To delivering “Customer experiences”, Air Liquide has been offering innovative solutions for over 100 years. In Japan, we started our business in 1907.
Air Liquide encourages the supply of low carbon electrical energy and supports the development of renewable energy. And we have developed clean transportation solutions around biomethane and hydrogen energy for 40 years. We have extensive knowledge and experience covering the production, storage, transportation, and utilization of Hydrogen.

Our Unique Technology/Service

Hydrogen Stations tailored for you

Air Liquide advanced Business & Technologies (aB&T) operates more than a dozen subsidiary companies in 12 countries on 3 continents, and employs almost 1,300 people. We work close together with global team to develop cutting-edge technologies and accumulate know-how in designing, constructing, and operating hydrogen stations. Air Liquide supports you at every stage of your project from design to operation, including integration, manufacturing, start-up, training and maintenance.

Track Record

We are pioneering innovative H_2 mobility projects worldwide. As of November 2016, Air Liquide has built approximately 80 hydrogen stations. In Japan, six hydrogen stations are delivered in Kobe, Nagoya and Kyushu areas.

hydrogen fueling stations

Future Plans

The Kobe Shichinomiya Hydrogen Station by Air Liquide starts operating in March 2017. The station’s footprint is the smallest ever built in Japan, as one of the solutions for the metropolitan area which tend to have a space restriction. We continue to work for increasing hydrogen mobility in Kobe City and the regions.

Corporate Profile

Representative: Shiro Yahara , Representative President/CEO
Head Office Address: Granpark Tower, 3-4-1 Shibaura, Minato-ku, Tokyo, Japan 108-8509
TEL: +81-3-6414-6700
Amagasaki Office: 4-3-23 Minami-Tsukaguchi-cho, Amagasaki City, Hyogo, Japan 661-8558
TEL: +81-6-6429-3321
URL: https://www.airliquide.com/jp/japan
Founded: 1930 (Established: 1907)
Capital: 21.79756 billion yen
Number of Employees: 2,000 (Group total)
(As of January 2017)

Business Activities

- Production and sale of industrial and medical gases.
- Manufacture and sale of equipment related to industrial and medical gases.
- Services relating to industrial and medical gases.
- Plant engineering activities.

Hydro Edge Co., Ltd.

Japan's First Liquid Hydrogen Manufacturing Plant Contributes to the Early Realization of a Hydrogen Society

Contact Technical Dept. Contact Person Yoshinori Yasui
TEL +81-72-244-7221 Email giten@iig.iwatani.co.jp

Our Advantages/Characteristics

One of the Few Liquid Hydrogen Manufacturing Plants in Japan

Our plant is one of the few producers of liquid hydrogen in Japan. As liquid hydrogen is more pure than high-pressure hydrogen gas and takes up only a twelfth of the space, its applications in industry are increasing. This plant will play a major role in further spreading and expanding the use of liquid hydrogen in the emerging hydrogen society.

Our Unique Technology/Service

Highly Efficient Liquid Hydrogen Manufacturing Process Utilizing the Cold Energy of Liquefied Natural Gas (LNG)

Our proprietary process for producing liquid hydrogen begins with the separation and production of nitrogen, oxygen and argon for industrial use from the air using the cold energy of LNG, after which we use the cold energy of the resulting liquid nitrogen to liquefy the hydrogen obtained through steam reforming the natural gas, which is the raw material. Even in Japan, our plant in the only one where a combination of two processes is used to liquefy hydrogen.

Track Record

We supply liquid hydrogen to a wide range of customers, including the space and electronics industries.
We also supply liquid hydrogen to Iwatani hydrogen stations throughout the county.

hydrogen fueling stations

Future Plans

With the emergence of the hydrogen society, the demand for hydrogen is expected to further increase, especially as fuel cell vehicles (FCVs) become more popular and the number of hydrogen stations increases. As a company we are dedicated to providing a safe and steady supply of liquid hydrogen for the emerging hydrogen society using our state-of-the-art production.

Corporate Profile

Representative: Yojiro Taira
Head Office Address: 3-1-23, Chikko Shinmachi, Nishi-ku Sakai City, Osaka, Japan 592-8331
URL: http://hydroedge.co.jp
TEL: +81-72-244-7221
Founded: 2004
Capital: 490 million yen
Number of Employees: 27
(As of November 2016)

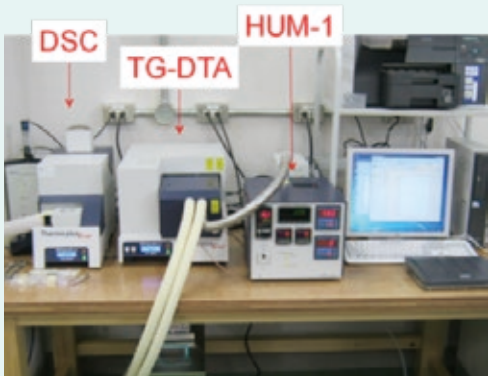
Business Activities

- Manufacture and sale of liquid and compressed hydrogen.
- Manufacture and sale of liquid nitrogen, liquid oxygen and liquid argon.
- Manufacture of liquid carbon dioxide.

KRI, Inc.

Your Innovation Partner

Contact Analysis Research Center
Contact Person Hideki Inaka
TEL +81-6-6466-4555
Email marc@kri-inc.jp



Our Advantages/Characteristics

Providing Comprehensive Support for the Realization of the Hydrogen Society through Technology Development, Analysis/Evaluation and Simulation

As an affiliated company of Osaka Gas, we have been involved in the evaluation of environment/energy-related catalysts, process development and engineering, design/analysis/evaluation/troubleshooting involved in the development of anticorrosion technology and other equipment. Surveys and simulations are also one of our specialties and our experts provide comprehensive support to clients regarding the challenges involved in the realization of a hydrogen society.

Our Unique Technology/Service

Our Material/Process/Analysis Specialists Find Solutions to Your Problems

Using the experience and technologies accumulated over many years in the energy/environment field, we can handle everything from surveys regarding hydrogen applications/technology and research and development regarding hydrogen-related technology (fuel cells, hydrogen generation, hydrogen separation, etc.), to process design/feasibility studies for hydrogen-related facilities. We can also run system simulations and analyze hydrogen-induced degradation for materials such as metals, resins and rubber.

Track Record

Surveys and Feasibility Studies: Fuel cells, hydrogen sources/generators, hydrogen applications and related market surveys, hydrogen station feasibility studies, etc.
Research and Development: Fuel cell development/evaluation, hydrogen generator process development, hydrogen separation membrane process development, organic hydride process development, hydrogen storage material development, etc.
Simulations: BEMS and process simulations, etc.
Analysis: Fuel cells, hydrogen-induced material degradation analysis/evaluation (metals/resins/rubber, etc.).

Future Plans

We will conduct surveys, research/development, testing/evaluation and feasibility studies regarding fuel cells/hydrogen as requested by clients. As we have differential thermal analyzers that can supply various types of gas, including hydrogen, water vapor, ammonia (see photo above), we can study the reaction behavior of hydrogen in different environments.
We can also carry out degradation analysis for fuel cell and hydrogen facility maintenance.

Corporate Profile

Representative: Hiroshi Sumitomo
Head Office Address: Kyoto Research Park, 134 Chudoji Minami-machi, Shimogyo-ku, Kyoto-City, Japan 600-8813
URL: http://www.kri-inc.jp
TEL: +81-75-322-6830
Founded: 1987
Capital: 300 million yen
Number of Employees: 150

(As of July 2016)

Business Activities

- Contracted research and development mainly in material and energy/environment fields.
- Analysis and testing/evaluation.
- Surveys and business support regarding all of the above-mentioned activities.

Nishiyama-Seisakusho Co., Ltd.

Custom Made Testing Equipment

Contact Sales Dept.
Contact Person Hiroyuki Nakagawa
TEL +81-6-6203-0571
Email h.nakagawa@nishiyama-osaka.co.jp

Our Advantages/Characteristics

Customizing Fuel Cell Evaluation Equipment

We have been making fuel cell evaluation equipment in conjunction with research institutions and universities for more than 20 years, and now also make equipment as requested by related companies. The equipment we supply combines the high levels of performance we have developed over the years with added-value safety and automation features provided by other enterprises. Why not experience the flexibility (short delivery times and our ability to incorporate changes), creativity and the highly personalized level of service that only a small company can provide.

Our Unique Technology/Service

After We've Made What You Want We Look After You

The equipment we supply is customizable. Although we do our best to provide you with equipment you will be satisfied with the first time, in some cases it can be difficult. When you start to use your new equipment, you may find that you want it to be easier or more convenient to use, or you may want to provide enhanced levels of safety to comply with new company rules (or rules that were maybe unclear). You can be sure that we're there to help you all the way.

Track Record

Our diverse range of clients includes gas companies, automobile-related companies and ceramic manufacturers. We are also turning our attention to not only fuel cells, but also testing equipment for high pressure/high temperature hydrogen environments.

Future Plans

We mainly make testing devices, many of which use hydrogen, and in the future we plan to develop and manufacture new types of equipment suited to the needs of the evolving needs of society.

Corporate Profile

Representative: Yukio Ishida
Head Office Address: 2-1-15 Awaji-machi, Chuo-ku, Osaka, Japan 541-0047
URL: http://www.nishiyama-osaka.co.jp
TEL: +81-6-6203-0571
Founded: March 25, 1941
Capital: 10 million yen
Number of Employees: 42
(As of January 31, 2017)

Business Activities

- Manufacture and sale of laboratory equipment.
- Manufacture and sale of medical-related equipment.
- Manufacture and sale of custom-made testing equipment.

Nippon Steel & Sumikin Technology Co., Ltd.

Providing Solutions for Everything to Do with Materials

Contact Kansai Branch Contact Person Yasushi Matsuda
TEL +81-6-7688-5170 Email matsuda-yasushi@nsst.jp

Our Advantages/Characteristics

Proven Track Record Among Hydrogen-Related Enterprises Throughout Japan

We support the enhanced safety of the equipment used by our customers using a variety of the latest testing and analysis techniques, coupled with the wealth of knowledge and experience that we have accumulated through our years in the steel industry and our active approach to problem solving that is second to none. This is especially evident when it comes to hydrogen embrittlement, which is one of the main issues with materials such as steel, and the know-how that we have accumulated over the years is proving useful to many enterprises.

Our Unique Technology/Service

Pioneer in Material Evaluation for High-Pressure Hydrogen Gas Environments

With the increasing emergence of the hydrogen society, due to the fact that the materials and equipment used in the steadily increasing number of hydrogen stations, etc., will be exposed to harsh high-pressure hydrogen environments of tens of megapascals (MPa), there is a need for evaluation tests that can be carried out in such environments. In response, our company was among the first in the private sector to introduce testing facilities where harsh high-pressure hydrogen environment evaluation is possible.

Track Record

We have been involved in the establishment of criteria for the selection of materials to be used in facilities associated with high-pressure hydrogen and the actual evaluation tests involved in assessing such equipment and parts.
Our experience enables us to offer advice regarding a wide range of evaluation tests involving different condition settings and jig designs. Our achievements are detailed in Reports No. 45, 70, 92 on our website under “NSST tsushin.”

Future Plans

Up until now, endurance tests and investigations of the operational characteristics of pipes, valves and tanks were only able to be evaluated using inert gas. Now, however, with the introduction of testing facilities that are capable of using hydrogen, it will be possible to carry out such evaluations in a high-pressure hydrogen environment at levels of up to 100 MPa.

Corporate Profile

Representative: Shokichi Iwata
Head Office Address: 6F North Wing Yuraku-cho Denki Bldg., 1-7-1, Yuraku-cho, Chiyoda-ku, Tokyo, Japan 100-0006
URL: http://www.nsst.nssmc.com
TEL: +81-3-6870-6970
Founded: April 2013
Capital: 100 million yen
Number of Employees: 3,600

(As of April 2016)

Business Activities

- Quality assurance, research and development assistance for the steel industry, etc.
- Investigation, analysis, evaluation, research and development of materials and products.
- Environment-related analysis and measurement.

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This brochure was prepared as part of the 2016 Core Regional Business Creation and Support Initiative
(Initiative to Create a Hydrogen Supply System to Accelerate the Realization of a Hydrogen Society) of METI-Kansai.

2016
Hydrogen-Related Businesses in the Kansai Region

Published March 2017

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