



OKAZAKI
MANUFACTURING COMPANY
UK LIMITED

Temperature is our Business

World leading manufacturer of

temperature sensors and heaters





We are Okazaki Manufacturing Company (OMC)

Temperature is our business

We design and manufacture market-leading temperature measurement products and heating systems.

In choosing us as your temperature partner, you will have access to an unrivalled range of the most highly accurate and advanced temperate-related products, designed to operate in some of the harshest environments.

Our temperature measurement assemblies cover the full range of process applications and temperatures from -200°C to +2,160°C.

Cutting Edge Technology

Since 1954, we have been at the forefront of our field - pushing the boundaries and actively pursuing new technologies to take our product development and the industry to new levels. Our history of innovation spans decades - from 1963 when we developed our metal sheathed MgO insulated resistance thermometer, RESIOPAK, which has since been replicated by manufacturers from around the world, right through to the present day and our most recent development of the smallest thermocouple at a diameter thinner than that of a human hair for which we now hold a world record.

Quality Assurance

We are fully committed to quality management and the quality of our products and service is backed by numerous certifications and standards, including ISO 9001, ISO 14001 and JCSS 0079.

Bespoke Solutions

We appreciate that one size does not fit all and despite a large range of products, we are happy to develop customised products and solutions to solve specific issues or market needs.

Global Footprint, Local Specialists

With manufacturing sites in Japan, USA and Taiwan and offices around the globe, our world-wide footprint is coupled with local representatives who provide specialist instrumentation advice, guidance and technical support.

A Trusted Supplier

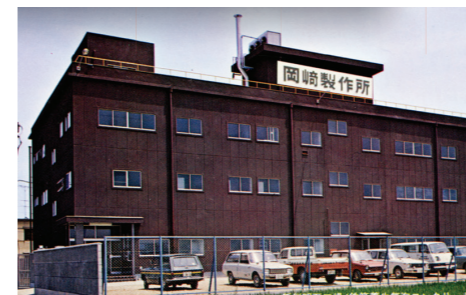
We are proud of our heritage and history and have been a trusted supplier to customers throughout the world for over 50 years.

History

- 1954** Okazaki Trading Company Ltd established to import thermocouple and resistance wires
- 1959** Thermocouple production started
- 1960** Concluded an Far-Eastern General Agency Agreement with ARi Industries Inc. in the USA and started importing and selling AEROPAK sheathed thermocouples, pressure detectors, pitot tubes etc.
- 1963** Resiopak metal sheathed ceramic insulated resistance thermometer launched
- 1966** New factory opened at Akashi, company name changed to Okazaki Manufacturing Company
- 1972** New factory opened at Usui
- 1973** Completed construction of the Okazaki Building in Kobe
- 1977** Established in 1977, the Kobe-Iwaoka factory is one of Japan's largest manufacturing plants of its kind. The site is OMC's production base for electric heaters and MI cables for both instrumentation and power applications. The primary objective for the factory is continuing the development of new products and the improvement of product quality.
- 1980** Acquired ARi Industries Inc, USA
- 1987** Okazaki Manufacturing Company established in Taiwan
- 1990** Succeeded in developing temperature sensors for space and received official authorisation for them as common parts for space development in association with Mitsubishi Heavy Industries Ltd. from the National Space Development Agency of Japan
- 1993** ISO9001 awarded
- 1998** JCSS0079 awarded as a certified company to carry out calibration in compliance with national standards
- 1999** ISO14001 awarded for Environmental Management Systems of Akashi factory, Space and Nuclear Department, and the Iwaoka Factory
- 2002** Aerospace Division of MMF. Set up in 2002, this factory is equipped with the latest, state-of-the-art production and inspection facilities, including clean rooms for the manufacture and assembly of highly advanced sensors and other products for the aerospace industry. The plant is also home to OMC's maintenance division and development division.
- 2004** UK office opened for European business
- 2008** New factory opened at Kyushu including the installation of the latest production equipment to meet the global demand for MI Cable
- 2012** New MMF opened
- 2012** Our Temperature Sensors for satellites was registered in the EPPL by ESA
- 2015** Kyushu plant expanded to increase our MI Cable production capability
- 2017** Construction of our new facility in Kobe Iwaoka was completed to meet the growing demand for MI Cables and Electric Heaters



Original Okazaki Office (1954)



Akashi Factory (1966)



ARi Industries (1980)



OMC (Taiwan) 1987



MMF (2012)



Innovation

Innovation is at the heart of our operation and crucial to our success. We lead where others follow.

Through continuous development in product design and investment into the latest, cutting edge technologies, we will maintain our market leading position and continue to provide our customers with the next generation of temperature sensors and heaters.

Some of the innovations which we are most proud of include:

Tube Skin Thermocouples

Our unique range of tube skin thermocouples for process heaters offer higher accuracy and reliability than competing thermocouples.

Due to its unique 8mm diameter sheath made from Hastelloy-X, the 'Fan Tip' tube skin thermocouple can be bent and coiled to enable movement in both the horizontal and vertical axes. The 40mm end tip can be easily welded to any type of process heater tube on both sides, which significantly reduces the chances of the thermocouple breaking off whilst in service and means the user gets a more accurate

temperature measurement on the surface of the tube.

Construction and tip profile accuracy is now between +4 and +6°C of the true tube temperature.

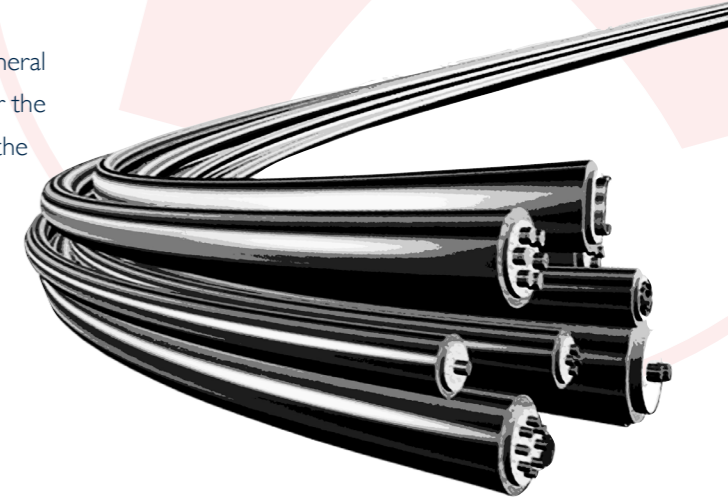


AEROPAK®

Mineral Insulated (MI) Cables

We were among the first pioneering companies to manufacture mineral insulated cable to improve product performance and reliability. Over the decades, we've refined and improved that technology, as it remains the heart of our products to this day. We specialise in:

- Thermocouple Cables
- Resistance Cables
- Insulation material available include both MgO and SiO₂ (other isolation materials available upon request)
- RF Coaxial Cables
- Multiconductor Transmission Cables for power, control and instrumentation
- Bespoke designs to suit your application
- Welded and hermetically sealed connections



The Vortexwell Thermowell

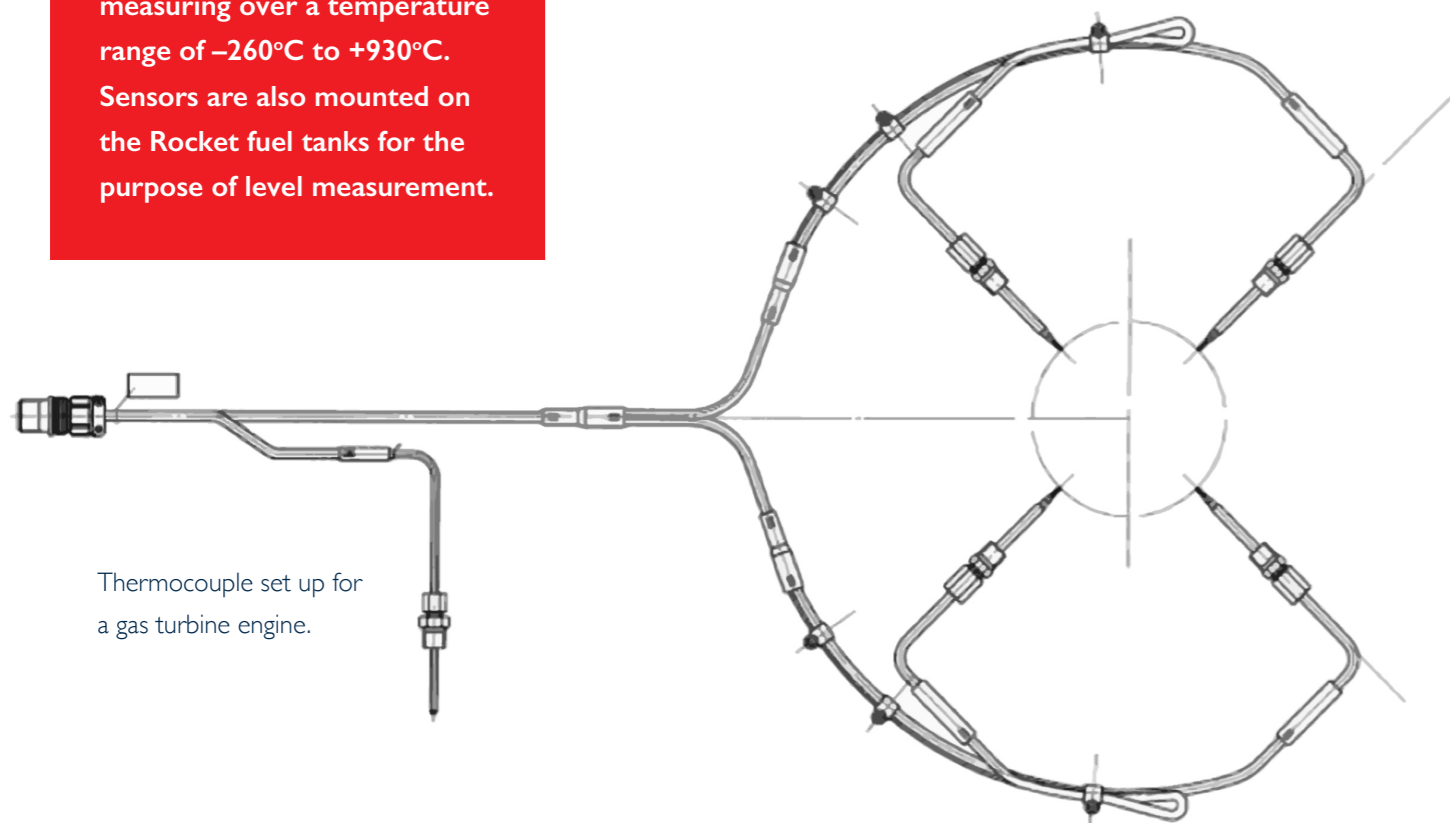
After extensive R&D and independent evaluation, we have developed a unique design of thermowell, the VortexWell®, which doesn't require a velocity collar and is cost effective for the end user in terms of purchase, installation and maintenance costs.

VortexWell® incorporates an innovative helical strake design, very similar to the helical strakes seen on columns and cooling towers. By using the latest CFD software to visualise the flow behaviour, we were able to accurately compare a standard tapered thermowell and its new VortexWell®. In the tests, the standard tapered thermowell showed classic shedding behaviour as expected, whereas the VortexWell® demonstrated no signs of regular flow behaviour. The VortexWell® helical strake design disturbed the flow sufficiently to interrupt the regular formation of vortices. Whilst a small vortex was observed in the wake of the VortexWell® this was a localised stagnation point and didn't shed.



Aerospace

OMC is proud to manufacture and supply sensors used in the H-IIA & H-IIB Japanese Space Rocket, which are capable of measuring over a temperature range of -260°C to $+930^{\circ}\text{C}$. Sensors are also mounted on the Rocket fuel tanks for the purpose of level measurement.



Thermocouple set up for a gas turbine engine.



OMC produces components used in many different applications within the aerospace industry.

We appreciate that temperature sensors manufactured for the aerospace industry require reliable and precise temperature measurement.

Our temperature sensors can be found on:

- Commercial aircraft & helicopters
- Aircraft & helicopters
- Domestic rockets & satellites
- Gas turbine engines



We provide sensors and heaters that meet highly detailed specifications and are strong enough to withstand severe environments.

Usage examples:

- Our complex thermocouple multi-bundles are used for the measurement of outlet gas temperature in helicopter rotor turbo shaft engines as well as gas turbine engines measuring temperatures between -50°C to $+1100^{\circ}\text{C}$
- Our MI cable (HOSKINS 2300®) is capable of operating at temperatures of up to 1260°C . Using it to measure turbine blade path temperature in a jet engine allows the engine to run hotter and quieter, thereby improving environmental performance and noise pollution
- Our liquid level detection sensors are used for measuring extremely low temperature fuel tanks of domestic rockets
- Our cryogenic sensors are installed to measure extremely low temperatures inside fuel tanks of rockets ranging from the liquid oxygen point (-183°C) to liquid helium point (-269°C)
- All our Mineral insulated cables can be supplied with twisted pair conductors if required to remove electric background noise.



Petro-Chemical

Over the past 50 years, OMC has developed an unrivalled breadth of temperature measurement and heater assemblies for the petrochemical as well as oil & gas industries.

Temperature Assemblies for use in Potentially Hazardous Atmospheres



Thermowells



Whether it's an onshore petrochemical plant or offshore gas platform, our products ensure the safe and efficient operation of these production units at all times.

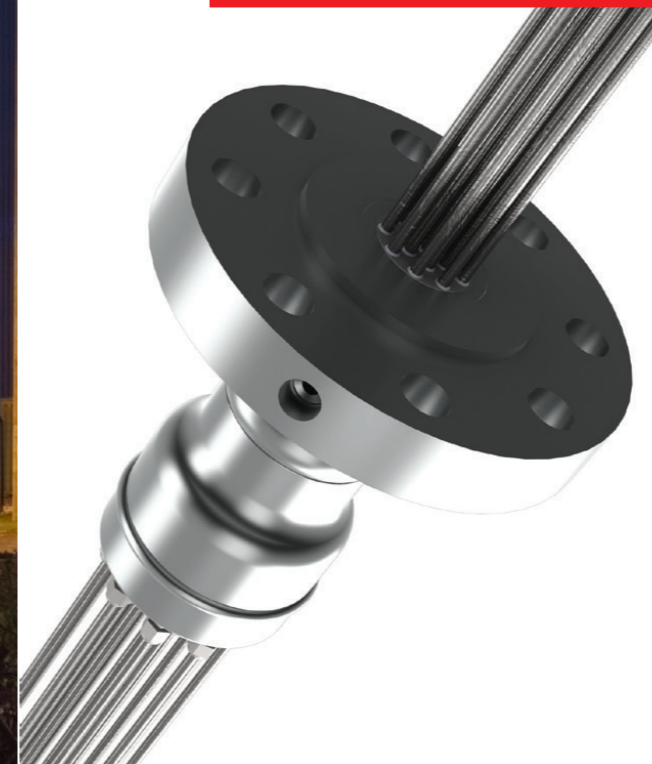
Our products are fully licensed for use in potentially hazardous and flammable atmospheres and can operate within zones 0, 1 & 2 certified to global and country-specific standards including European ATEX, USA NEC, Canadian CSA, Global IECEx, EAC, GOST K, GOST R, NEPSI, KOSHA and JIS.

Here are some examples of products that OMC has supplied on recent contracts for the Oil & Gas sector.

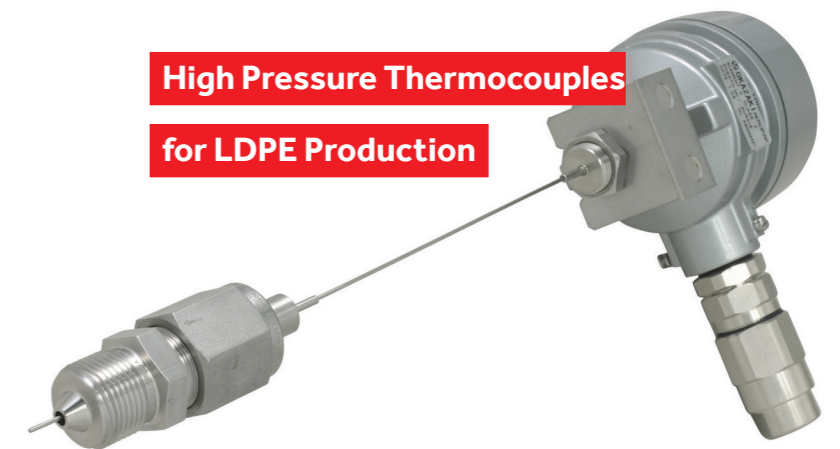
Usage examples:

- Our FAN TIP tube skin thermocouples are used for fired heater TMT measurement
- Our VortexWell thermowell design is used for high velocity applications
- Our multipoint temperature assemblies are used for all types of process applications including crude oil storage tanks, hydrocarbon cracking units, chemical reactors and desulphurisation catalyst bed reactors
- Our type SH13 sheath heater is suitable for heating liquid inside a tank and liquid of a shell and tube type heat exchanger
- Our high pressure thermocouples are used for production of LDPE
- Okazaki Temperature Sensors now SIL 3 rated to IEC 61508

Multipoint Temperature Assemblies



High Pressure Thermocouples for LDPE Production



Power Generation

OMC manufactures products for all types of power generation facilities, including thermal, hydroelectric and nuclear power plants.

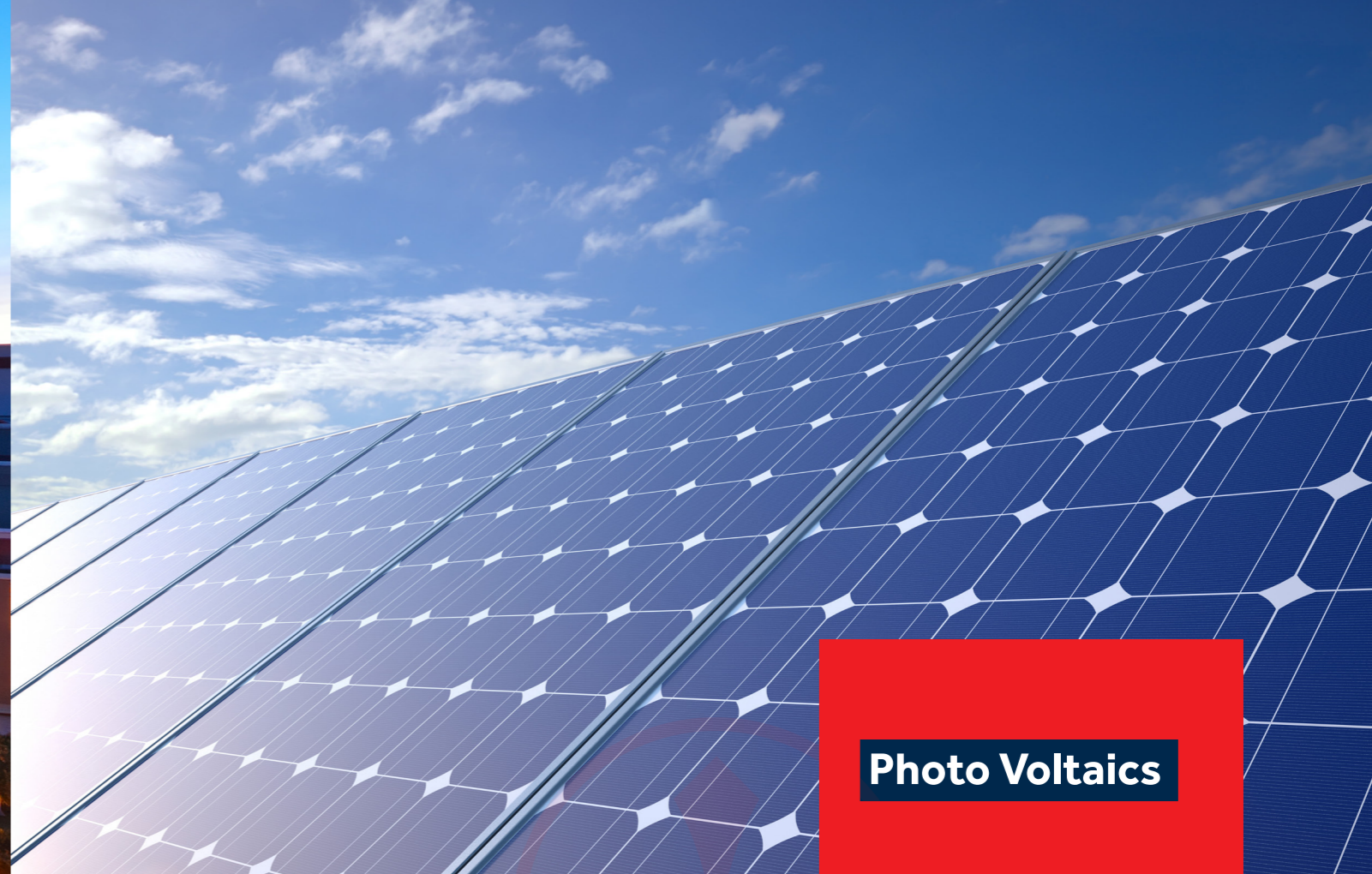
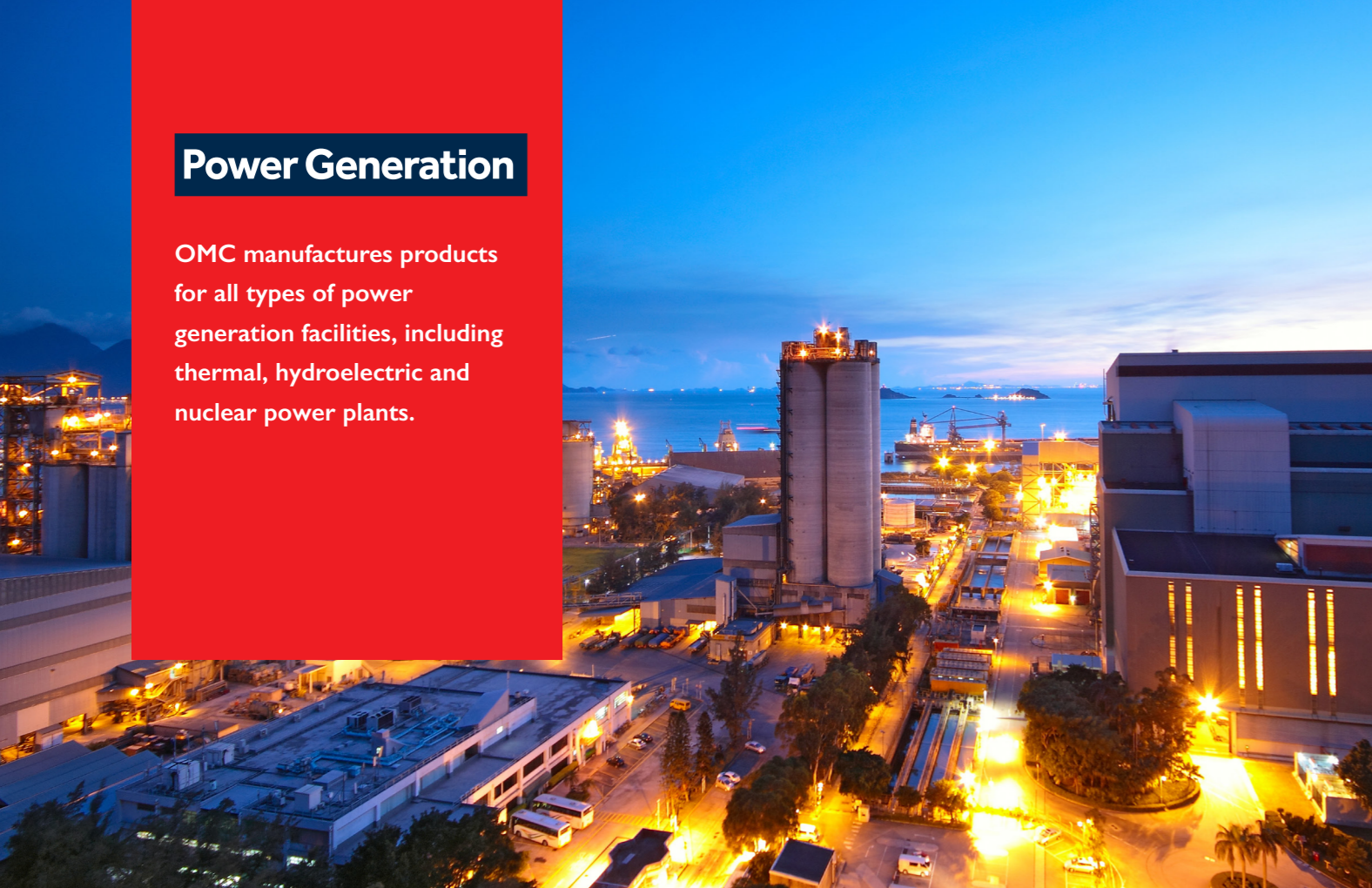


Photo Voltaics

The photo-voltaic industry has advanced at a spectacular rate in recent years and OMC has remained at the forefront of these technological developments ensuring our products and processes are enhanced accordingly.

Process and product temperature are very important physical indicators within the solar manufacturing process.

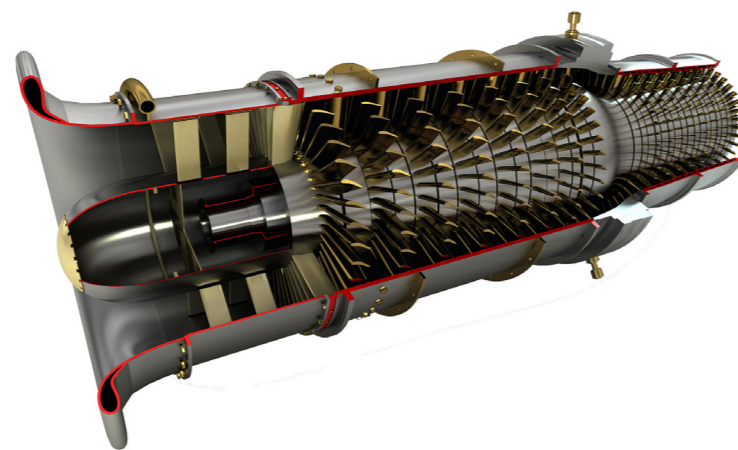
Through years of experience and our state-of-the-art facilities, we have developed intelligent solutions for the numerous thermal processes of photo-voltaic manufacturing that guarantee accuracy and precision.

Our range of compact, multiple applications have been manufactured with extraordinary care to ensure that each sensor is of the highest degree of quality and durability.

As temperature measurement is one of the most common parameters used for monitoring and controlling power plant operations, the accuracy and reliability of our products means that we are the chosen supplier for energy plants around the world.

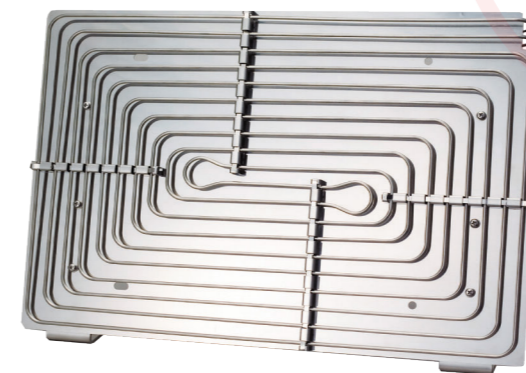
Maximum safety is required in these environments and our products are manufactured and tested to withstand the harshest of environments. We have thermocouples and RTDs that are strong enough to endure the severe radiation of nuclear power plants.

As well as contributing to the safety of power plants worldwide, our products also optimise operational efficiency by allowing plants to operate at higher temperatures.



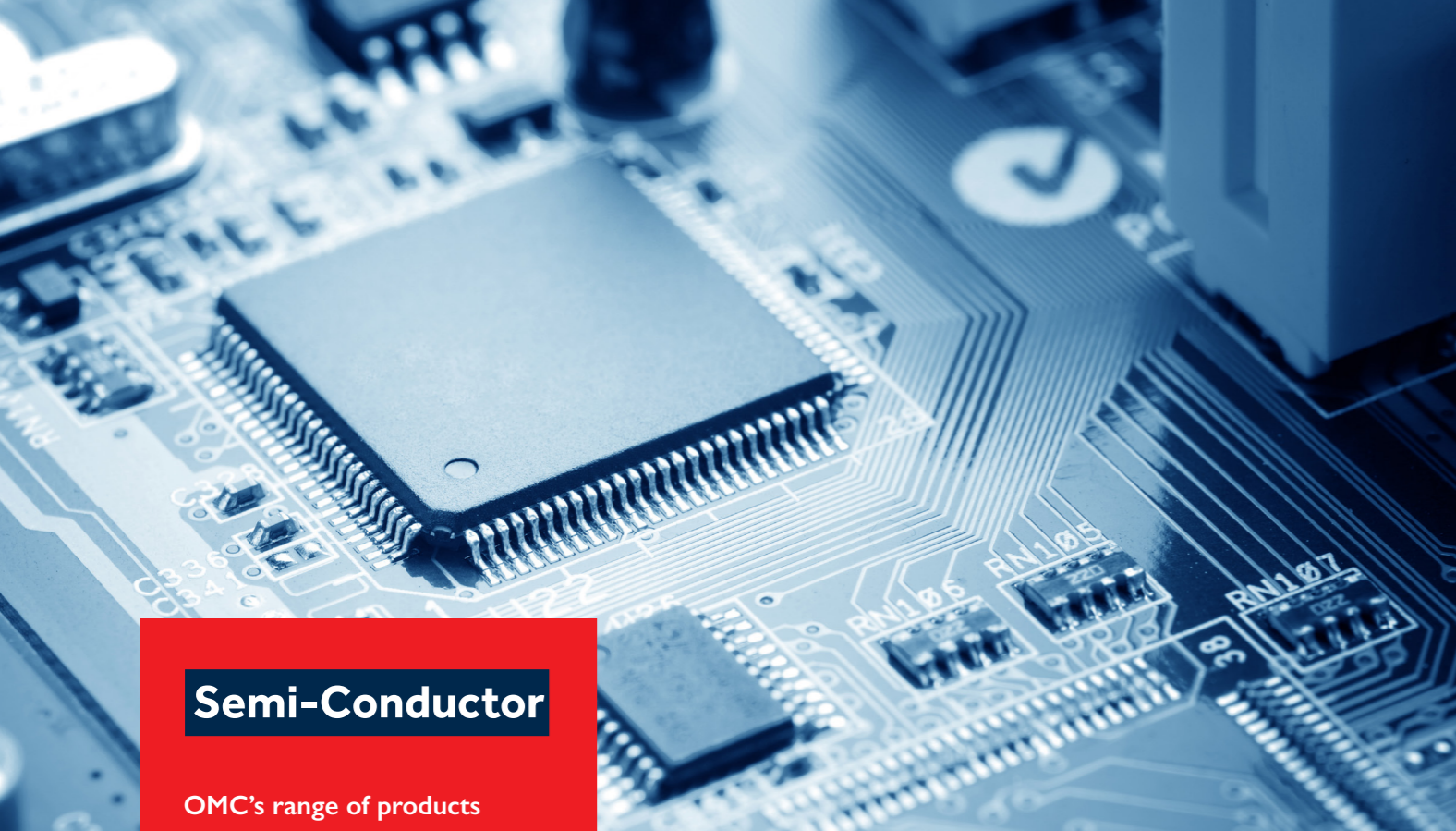
HOSKINS 2300®

Our HOSKINS 2300® cabling allows gas turbines to run hotter; improving efficiency and reducing noise.



AEROHEAT®

is the brand name of our long-life electric heaters, the development of which was based around our superior MI cables. By arranging multiple panel heaters, precise temperature control can be achieved even with large glass substrates such as photo-voltaics.



Automotive

OMC manufactures a range of high quality cabling and temperature sensors for the automotive industry.

Semi-Conductor

OMC's range of products for the semi-conductor manufacturing process are small, fast and accurate.

Based on our vast experience in monitoring temperatures in high technology applications, we can offer a variety of sensors ranging from temperature profiling of diffusion ovens, to sensors that control the temperature in clean rooms.

We offer ultra high temperature thermocouples to measure temperatures over 2000°C and we can provide a wide range of sheath materials, elements and insulating materials. Our special plate heaters for semiconductors provide superior performance and uniform surface temperature under vacuum conditions in CVD, sputtering and ion plating devices used in semi-conductor equipment. Our advanced heater and measurement technologies enable us to provide a heater with a surface temperature up to 850°C and uniformity within 1%.

Our Mineral Insulated cables and sensors are used to measure exhaust gas temperatures and also contribute towards the temperature management of catalytic converters.

With a demand for performance, safety, efficiency and clean emissions within the automotive industry, our temperature control products are designed to contribute to the safe and reliable production of automotives in an environmentally friendly manner.

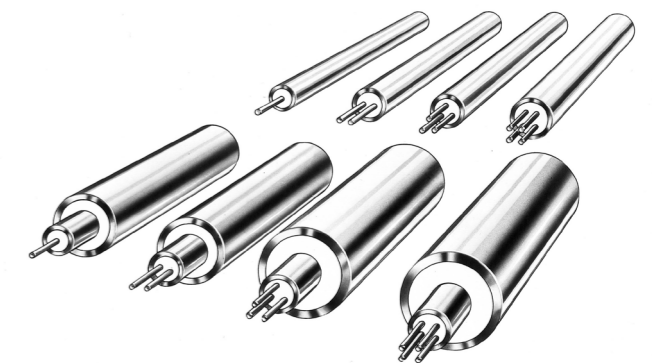
By continually developing our products, we strive to manufacture temperature sensors that improve passenger comfort, engine efficiency and performance.

These cables and sensors have been used in automotive applications for decades with a proven robust quality record in the field.

AEROHEAT®

HOSKINS 2300®

With Aeroheat® shaped into a plate it can be used as a plate heater, essential in semi-conductor production. These plates heat up quickly and provide superior surface temperature uniformity.



OMC's dedicated production and testing facilities allow us to maintain our high standards and best practice in the manufacturing of temperature sensors and heaters.



Main Manufacturing Facility

Established in 2012, the 13,120m² Main Manufacturing Facility in Kobe is responsible for the design and manufacture of temperature sensors, including thermocouples, resistance thermometers and thermowells for use in general industry, nuclear energy, environment and electronics industries. It also has a JCSS thermometer calibration laboratory which offers products on a custom basis.

ARi Industries INC.

Set up in 1952, ARi Industries joined the OMC Group in 1980. Our US arm was one of the first companies to use mineral insulated technology to improve products' performance and reliability. That same technology has been improved and refined over the years and is the heart of a wide variety of products that ARi manufactures today.

Fukuoka Factory

Established in 1972, the 3,360m² Fukuoka factory is a manufacturer and supplier of mass-production temperature sensors, compensating and other various types of lead wires, seat heaters and mat heaters for stockbreeding of animals.

Kobe-Iwaoka Factory

Established in 1977, the Kobe-Iwaoka factory is one of Japan's largest manufacturing plants of its kind. The site is OMC's production base for electric heaters and MI cables for both instrumentation and power applications. The primary objective for the factory is continuing the development of new products and the improvement of product quality.

Aerospace Division of MMF

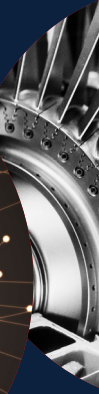
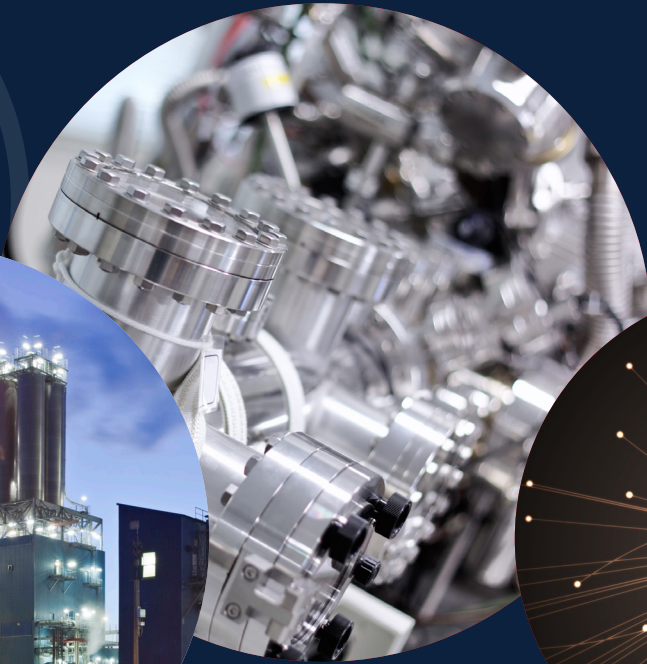
Set up in 2002, this factory is equipped with the latest, state-of-the-art production and inspection facilities, including clean rooms for the manufacture and assembly of highly advanced sensors and other products for the aerospace industry. The plant is also home to OMC's maintenance division and development division.

Kyusyu Factory

Purpose-built for MI cable production in 2008, the Kyusyu factory boasts the world's largest production scale for this particular product. With the most sophisticated equipment, this factory produces high-quality MI cables for our own domestic and international facilities, as well as overseas sensor makers.

OMC (Taiwan) Factory

OMC (Taiwan) is one of the world's leading manufacturers of thermocouple and conductor MI cables. Built in 1987, the 6,226m² factory supplies finished products to OMC's international group of companies and other customers around the globe.



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