



Company
Profile

IKEUCHI



“The Fog Engineers”
H. IKEUCHI & Co., LTD.

Fog from the “Fog Engineers”, contributor to the world's manufacturing success

As Japan's top manufacturer of industrial spray nozzles, IKEUCHI has supplied innovative, high-precision products to the world for over 60 years.

The fog produced by our spray nozzles is widely used in many industries for a broad range of manufacturing processes.

One thing that we have learned from operating in the vast amount of industries that we have been privileged to support, is that “bringing new things and new services into the world is a true contribution to society.” As a company, we have recognized and incorporated this as we grew.

We are grateful for this opportunity, and as the “Fog Engineers”, our company will continue with product development that only our company can accomplish and a complete dedication to fog and contribute to supporting a vibrant society.



OUR MANAGEMENT PHILOSOPHY

“Contributing to
society
with fog”

Paper & Pulp, Printing



Our nozzles for canvas washing, edge-trimming, controlling moisture content of paper and cardboard, air for sheet separation and transport. Also used to remove particles from post-washing waste water, and support environmental protection.

Humidification	Moisture control
Trimming	Cleaning

Electronics



Our products play an important role in semiconductor wafer washing, PCB precision washing, and humidity control for clean rooms as a static charge countermeasure.

Cleaning	Developing
Etching	Stripping
Humidification	

Pollution Control



Our nozzles are used for flue gas cooling as a dioxin countermeasure. Also used as desulphurization and denitrification devices to reduce NOx and SOX in flue gas.

Gas cooling	Cooling
Dust suppression	Heat reduction
Odor reduction	

Automotive Manufacturing



Our nozzles are used in a wide variety of manufacturing processes relating to engine power trains, car bodies, painting and coating, bumpers, outfitting, and car electronics, amongst others.

Cooling	Humidification
Cleaning	Drying

Steelmaking



We developed a pneumatic nozzle for the steelmaking industry in 1983 and began supplying them for use in spray cooling of continuous casting. Our spray nozzles are also used in processes including descaling, washing, surface treatment, and dust suppression.

Cooling	Descaling
Cleaning	Surface treatment
Dust suppression	Gas cooling

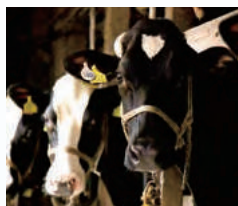
Food Products



Processes that were done by hand can be automated, with better precision and uniformity, which yields cost-savings and economization. Our spray nozzles help to create all sorts of appealing and safe food products.

Cleaning	Flavoring
Oil coating	Moisture control
Disinfection	

Agriculture, Livestock



We developed innovative cultivation methods based on high-quality fine fog solutions. Nozzles are also used in cooling of cattle barns, disinfection, etc.

Cleaning	Outdoor cooling
Spraying	Disinfection

Environment, Entertainment



Our nozzles are used for environmental cooling and the treatment of industrial waste water. "Special effect" sprays are successfully used in theme parks and other fog and light displays.

Outdoor cooling	Odor reduction
Fog and light displays	
Waste water filtration	

Medicine, Welfare



Solutions produced by IKEUCHI include humidification of hospitals and care facilities, indoor disinfection, medical product packing, and many more. Our nozzles are furthermore used in mist saunas and toilet cleaning.

Cleaning	Disinfection
Outdoor cooling	Humidification

Energy



Our nozzles are commonly used in fire prevention. We developed spray units to work with gas turbines to keep the inlet air and air fin condensers cool for higher efficiency in hot weather.

Cooling	Dust suppression
Cleaning	Fire prevention

Fog solutions for new business fields across the globe

As a part of Japan's history of strong industrial development, IKEUCHI's fog solutions have contributed to increases in productivity and product quality for manufacturers.

IKEUCHI is using fog in unique approaches to contribute to solving problems from energy savings in industry and society, to environmental issues including air pollution and global warming.

One example of such an approach is the use of fog to cool exhaust gases as measure to increase the efficiency in removing dioxin and other toxins. Using the evaporation energy of fog in cooling systems to help relieve the urban heat island effect is another one. Fogging is an energy-saving humidification technique to reduce static charge that builds up in dry conditions, thus helping prevent product defects in production. It is also used in novel cultivation technique that makes it possible to produce crops in dry, desert regions.

IKEUCHI's business divisions were created with this specialist approach to meet the diverse needs of not only our Japanese customers, but those of our customers worldwide.

Fog Engineers handling all aspects of spray nozzles



Nozzle Division

The core of our company is the nozzle division, providing and supporting our entire range of nozzle products. Matching spray nozzles to specific applications and goals of our customers. We provide individualized support to our customers to ensure their needs are met.

COMPANY MOTTO

"Taking the path
less traveled"

World's first humidification experts



Humidification Division

Provides humidification systems that use non-wetting "Dry Fog" to help prevent troubles caused by static charge in printing plants, paper mills, electronics plants and many more.

Providing fog solutions to help both society and industry



Environment Division

Supplying cooling systems that use the cooling effects of evaporation to counteract "urban heat islands". Systems that can provide cooling in the summer and humidification in the winter.

Meeting a wide range of needs worldwide



Overseas Division

The international business division works with businesses to develop, support and meet the challenges of the global market. Providing on-site solutions for all aspects of production, pollution control, environmental protection and more.

Experts in industrial cooling



Cooling Division

From large scale systems for electric power plants, to metal mold cooling units, we work with our customers to create a cooling system using one of our specialized fog nozzles to meet their specific needs.

Research and development of new agriculture using fog



Agro Division

Engages in research and development that yields new kinds of agriculture by using fog; including environment control systems to yield the ideal conditions for cultivation, to cultivation methods that do not require a cultivation medium to be used.

History of IKEUCHI

COMPANY MOTTO

Taking the path less traveled

IKEUCHI was founded as a trading company in 1954. In 1961, by developing a ceramic spray nozzle with guaranteed precision, IKEUCHI started on its path as a manufacturer and seller of spray nozzles.



World's first ceramic nozzle

Our founder, a man with strong determination, started exporting Japanese products. These included those products related to producing rayon for the textile industry, which was prominent back then. One of those products was a ceramic spinneret which was highly resistant to wear and chemicals. This spinneret gradually became obsolete as nylon took over for rayon after World War II.

Our founder wanted to preserve the technology of the ceramic spinneret. Therefore, in 1961, he established a small factory in his hometown Kure city, Hiroshima prefecture, to succeed in manufacturing the first ceramic spray nozzle in the world. This ceramic spray nozzle was quickly accepted by leading agrochemical spray equipment manufacturers who had been looking for a solution to the problem of wear in standard nozzles. This opened business in a wide range of industries.



The first ceramic tip developed by IKEUCHI

World's first precision guarantee

With the CERJET® nozzle IKEUCHI introduced a "precision guarantee". Only nozzles that were within a uniform standard of "Spray Capacity Tolerance" and "Spray Angle Tolerance" would be shipped. This has not been seen in the spray nozzle industry, neither at that time nor now.

Since then, this precision guarantee has been and is a proof of the reliability of our product quality. We continue to earn high praise from our customers.

Our unique fog classification

The word "fog" encompasses a wide range of characteristics. IKEUCHI therefore started very early to use its own classification system which is based on droplet size. By standardizing it they paved the way for an "industry standard".

Using this system makes it easier to explain to customers what type of fog best suits their changing needs and to provide the optimal spray nozzle and/or system.

The hardships of developing the world's first ceramic nozzle



One of original CERJET®

Many difficulties arose during the development of the world's first ceramic nozzle.

The most challenging of these is that the ceramic material contracts in the firing process. In the design stage, the condition of the fog spray pattern and spread, the spray flow rate, the ultimate size of nozzle, etc. are all dependent on extreme precision in dimensions. However, during firing, the ceramic material shrinks, which then makes it difficult to guarantee product quality. Further, due to variation in the original material, such as differing moisture content, presence or lack of air bubbles, and so on; following the same firing conditions can still lead to differences in the final product, and variation in product quality.

Through careful research of each factor, from material composition to firing temperatures, as well as trial-and-error tests, IKEUCHI overcame those issues and the result was the world's first ceramic nozzles CERJET® with precision guarantee.

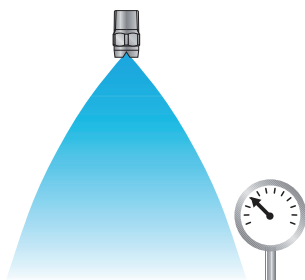
IKEUCHI's Fog

Guarantee of Precision Nozzle Performance

IKEUCHI sets a strict acceptance criteria for spray performance and only the nozzles that pass the inspection will be shipped. This precision guarantee allows our customers to use our spray nozzles with complete confidence, even in case very accurate spray is required.

Guarantee of our hydraulic spray nozzle performance

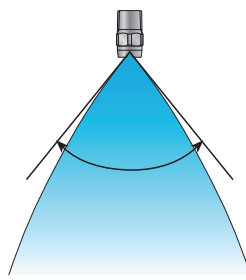
Spray Capacity Tolerance



$\pm 5\%$

Guaranteed to within $\pm 5\%$ of the rated spray capacity under the standard pressure*.

Spray Angle Tolerance



$\pm 5^\circ$

Guaranteed to within $\pm 5^\circ$ of the rated spray angle under the standard pressure*. Spray angle is the angle of spray measured near the nozzle, unless otherwise specified.

Spray Angle Tolerance for Solid Stream Jet



Within 3°

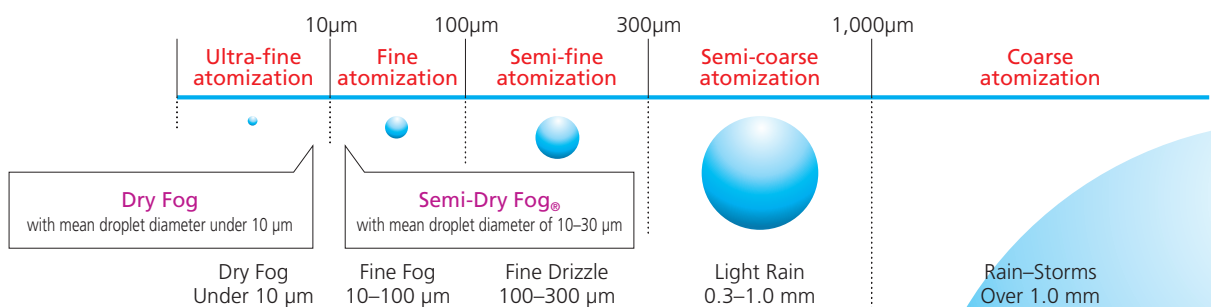
Solid stream jet nozzles are guaranteed for the axis of spray direction within 3 degrees from the nozzle body centerline under the standard pressure*.

*A standard pressure is defined as the design pressure based on the common liquid pressure during normal use for each hydraulic spray nozzle series.

Fog Classification System

IKEUCHI has classified spray droplet sizes and with that is able to offer fog as industrial material. We continue to develop new products, while maintaining a high awareness of the environment; recognizing the importance of water and air as being essential for life.

Classification of Spray Droplet Size



Note: There are many opinions on the classification of spray droplet sizes but IKEUCHI, "The Fog Engineers", have classified them as above.

IKEUCHI's Strengths

Exploring a wide range of industries by fully utilizing a variety of fogs;
Continued R&D fueled by knowledge obtained

We set ourselves apart from other spray nozzle manufacturers by continuously developing new values of "fog", our core technology, and extending our specialty nozzles into areas where we see a demand from our customers. We continue to improve our technical capabilities, research and develop leading edge technologies based on decades of experience and know-how and marketing research across a variety of industries.

Exploring new fields and industries and improving our technical capabilities; constantly repeating this cycle not only improves the precision of our existing products but also challenges us to develop new, unique fog solutions. This enables us to support the growth of industries not only in Japan, but all over the world.



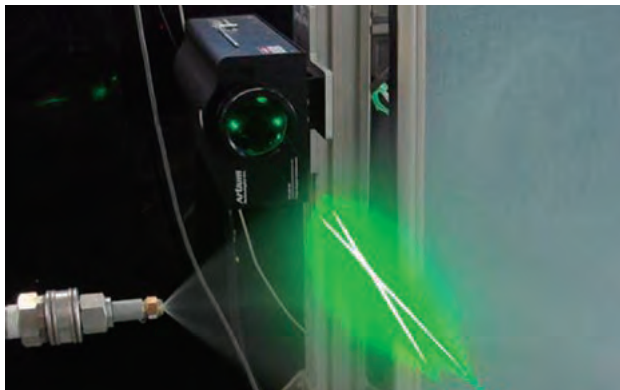
Quality Management

IKEUCHI produces reliable and safe products that have been supporting manufacturing industries across the globe

Spray nozzles are becoming increasingly important elements of the foundation for manufacturing. All of our facilities in Japan have obtained ISO 9001: 2008 Certification, the international standard for quality management systems (QMS). This certification offers reliability through our precision guarantee, in order to provide customers with more satisfactory products. With our own QMS established in accordance with ISO standards, we strive to further enhance customer satisfaction by continuously improving product reliability and safety.

Fog quality

We are actively introducing advanced inspection equipment such as laser measurement tools to gauge spray droplet size. Our inspection equipment performs detailed analyses of measurements such as spray capacities, spray angles, and spray distributions. We strive to maintain our perfect quality management system, the only “precision guarantee” in this industry.



Measurement of spray droplet diameter



Measurement of spray droplet diameter



Measurement of spray impact

Product management

We utilize bar-codes and handheld terminals to reduce human errors and, combined with automated warehouses and rotary racks, ensure reliable storage and error-free inventory management. Individual lots can be accurately managed and traced.



Automated warehouse in our Kure factory



Bar-code management prevents shipping mistakes



Rotary rack

Spray Nozzle Business & 4 Specialty Divisions



Nozzle
Division



Humidification Division



Environment Division



Agro Division



Cooling Division





Nozzle Division

Fog engineers handle all aspects of spray nozzles and provide continuous support to meet customer needs

The Nozzle Division is the core of our company. Rather than just sell nozzles, we focus on proposal-based sales that are directed to meet customer needs.

Not only do we provide spray nozzles that meet a specific purpose, but we also provide proposals that include installation layouts and advice on how to effectively make use of our products.

In recent years, we have been focusing on developing specialized spray units for specific production processes.



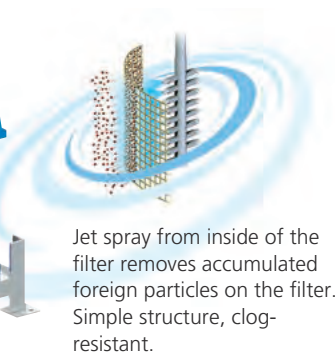
We can propose the most suitable spray nozzle for your needs with over 42,000 types of our products to choose from.



Auto Reverse Self-cleaning Filter

ARS Filter

Powerful jet cleaning that uses spray nozzles to remove accumulated particles on the filter screen without fail. A wide range of models is available in various filtration capacity types, filter screen mesh types and sizes. Suitable for filtration of both recycled and industrial water. In addition, its effective filter cleaning also helps save water.



Jet spray from inside of the filter removes accumulated foreign particles on the filter. Simple structure, clog-resistant.

Pump unit for deodorizing and disinfection

Pump unit equipped with a large-capacity tank, allowing both timer-based automatic operation and manual operation. It is mainly used in food factories for odor reduction, disinfection, and insect control purposes.





Humidification Division

The world's most advanced humidification system helps reduce problems caused by static charge

IKEUCHI's Dry Fog humidification system with internationally patented spray nozzles helps to prevent product defects or work environment problems caused by low humidity or static charges.

Dry Fog humidification can be used as a non-wetting solution where wetting is not allowed. It can maintain optimal humidity levels for large areas or provide spot humidification for small areas, specific process, or machine.

The running-costs of our system are only one-fifth of a typical steam humidification system, resulting in dramatic energy savings.

Our Dry Fog humidification system was commended for its performance and results and received an "Achievement Award" from the Institute of Electrostatics in Japan.



Received "Achievement Award" from Institute of Electrostatics



Industrial humidification system AirAKI®

Example of AirAKI® in practice



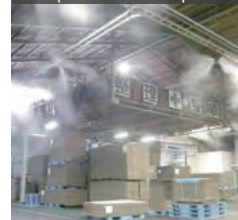
Offset printing factory

Example of AirAKI® in practice



IC mounting process

Example of AirAKI® in practice



Cardboard factory

Example of AirAKI® in practice



Plastic molding factory



The running cost is 1/50 of a comparable steam humidification system

High-pressure hydraulic humidification system AirULM®

This industrial high-pressure hydraulic humidification system does not require compressed air. It is recommended for use in large open areas such as factories, with a minimum ceiling height of about 3.5 meters. Driven by a high-pressure pump, it provides fog humidification that does not wet the equipment, manufactured products, or other items in the site. The running costs of our system are an astounding 1/50th in comparison to a general steam humidification system.



Immediate use with an air supply

AKIMist® "E" Portable Dry Fog Humidifier Set AE-T set

An easy-to-move unit for spot humidification, no installation work required. You can use it immediately in any place with an air supply. Dry Fog can be used for spot humidification near the products or machinery without the risk of wetting. The spray volume per nozzle is 2.4 l/hr and up to four nozzles can be mounted per humidifier.





Environment Division

Providing a wide range of fog solutions useful for both industries and society

The Environmental Division uses non-wetting "Semi-Dry Fog®" for energy efficient cooling of large-scale factories or urban buildings. It is also used to help increase the humidity in schools and hospitals. In 2006 we developed an outdoor cooling system, the "LYOHM System®". This system helps reduce temperatures with evaporative cooling of fog. This is becoming popular to help fight the heat island phenomenon and can be seen everywhere in urban areas in Japan.

In recent years we have developed and promoted systems that improve the operating efficiency of outdoor units and solar panels during the summer months. We have also worked on humidification systems to help prevent infectious diseases, such as influenza, caused by dryness during the winter months.



LYOHM System®
Semi-Dry Fog®
cooling system



COOLSAVE-D
Fog cooling for air
conditioner outdoor units



CoolBIM® for barn
cooling
Livestock or barns do
not become wet



COOLJetter® ULM
Automatic control of
optimal humidity



Low-energy, large space cooling system **COOLJetter® Dome**

Fog + Fan cooling unit

COOLJetter® series

Low-energy cooling system producing "Semi-Dry Fog®" reduces temperatures by 3–5°C with evaporative cooling. Semi-Dry Fog of droplets is so small that it does not cause wetting when touched. There are several models suited for various uses and environments, ranging from small to large spray capacity type. COOLJetter® can be used in a wide range of sites including sports grounds, gymnasiums, working spaces in large factories, and rest stations to create a comfortable cool spot.

One ULM covers approx. 150 m²

Large-space humidification unit ULM®

A large-volume spray humidifier that uses our atomization technology. ULM® sprays 4.7 liters per hour, which enables quick humidification to an optimal humidity level for a large space up to 150 m². Because the fog is so fine, people and floors do not become wet. There is no installation work required and ULM is easy to use for everyone. Moreover, ULM® is very economical, as its electricity cost is only JPY19 (16 cents)* per day. It is suitable in places where many people gather, such as a dining hall, reception areas, etc.

*For 12 hours of operation per day, calculated at JPY22/kWh





Cooling Division

Industrial cooling specialists creating optimal fog cooling systems to meet customer needs

Traditionally, natural cooling, air cooling, sprinkling water, and water cooling have been used as general industrial cooling methods. However, we have developed a unique fog cooling system that overturns such conventional cooling techniques, which is now applied in various industries. We create a fog cooling system that meets our customer's needs, ranging from large-scale fog cooling systems for steelworks and power plants to smaller products for cooling dies and molds. We work together with our customers to ensure an optimal level of service, from proposals to after-sales assistance.



Semi-Dry Fog® inlet air cooling system

Reducing the gas turbine inlet air temperature with evaporative cooling results in an increase in power output along with improved fuel economy.



Nozzle installation in the cooling tower



Kiln cooling system

Efficiently controls cooling processes from slow cooling to rapid cooling.



Air fin cooler assist cooling system

Uses the evaporation cooling of fog with fan air blow to recover reduced cooling capacity during summer.



Die-cast products & Castings cooling system

Quick and even cooling is possible without wetting products.



Applying release agents, cooling dies

Helps to reduce the amount of release agents/lubricants and extend the lifespan of dies and molds.

No extra drainage

Gas cooling system

This system cools down exhaust gas with fog spray to help remove dioxins and noxious gases. Computational fluid dynamics are used to optimize both the tower shape (gas flow) and the nozzles. Optimal nozzles are designed based on simulations of sprayed water droplet trajectories, temperature change, and laser measurement, which only nozzle manufacturers can perform. We can provide a total fog cooling system including towers, nozzles, and control unit.

Gas cooling tower



Exploring the creating of a new type of agriculture using fog atomization technology

We have developed an energy-saving system that cools and humidifies greenhouses without wetting the crop or inside of the greenhouses, utilizing the evaporative cooling effect of Semi-Dry Fog®, which is much finer fog than that of conventional spray cooling equipment. This system makes it possible to cultivate crops following the customer's schedule, even the crops that are difficult to grow year-round.

Furthermore, IKEUCHI is working on a project that stimulates photosynthesis, increases yields, and improves quality by optimally controlling the vapor pressure deficit for the growth of crops.

In addition, we are conducting R&D on a new cultivation method that atomizes liquid fertilizers, which can be sprayed directly onto the roots of crops for better absorption. This groundbreaking cultivation method needs no medium like hydroponics or substrates such as soil, rock wool, or other conventional cultivation methods. Since only a minimum amount of water is required to make liquid fertilizers, it is even possible to cultivate crops in deserts.



Greenhouse cooling and humidification system **CoolBIM®**



We grow various types of crops in our own experimental farms all year round.



We harvest summer strawberries in August.



Cooling and pest control system

Fog of chemical solution disinfects and kills bugs and bacteria even on the underside of leaves.



Delicious vegetables grown using fog

The Agro Division researches and develops agricultural technologies that place top priority on profitability.

For agricultural customers to be able to adopt our products with confidence, we sell tomatoes, lettuces, strawberries, and other crops harvested from our own greenhouses through retail outlets to demonstrate the effectiveness of our systems.



Global Sales Network

To meet our contribution to society by means of fog, we have advanced and specialized our fog engineering in response to current issues and requests from partnering industries. Today the field of fog utilization is not limited to Japan, but is spreading across borders into other countries and markets.

In order to effectively respond to global needs we are establishing subsidiary offices and accelerating the movement towards our own global network.

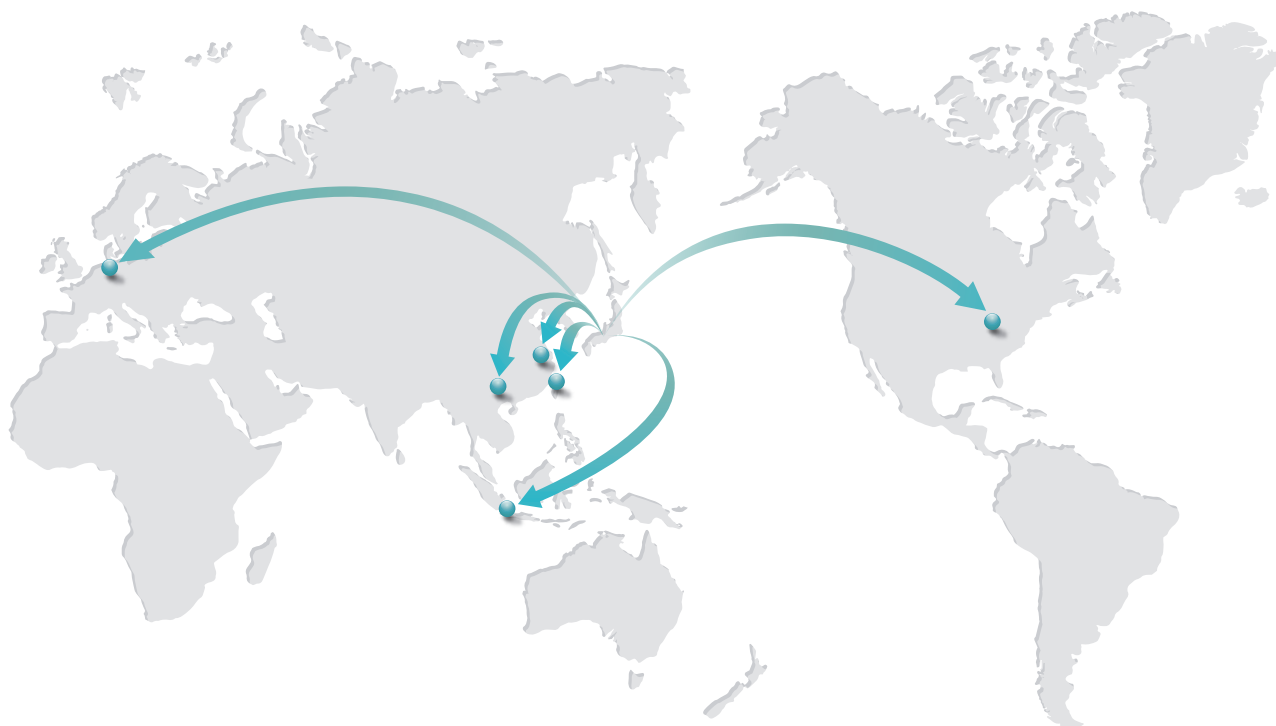
Main overseas business activities

In Europe:

We provide engineering for a wide variety of production processes, ranging from automotive and agriculture to steelmaking, heavy industries, environmental conservation, and electronic devices supporting the Internet of Things (IoT).

In the US:

We provide engineering support for manufacturing processes, ranging from key industries such as power generation, steelmaking, and car manufacturing, to advanced technologies for the semiconductor manufacturing, data centers, and aerospace manufacturing.



In the Middle East:

We are engaged in the installation of cooling systems that use non-wetting fog to improve heat-extreme working environments, as well as fog cultivation systems that enable crops to grow with less water than with conventional systems.

In Asia:

We are engaged in current, cutting-edge technological innovations required to sustain a continuously growing industrial production, various production processes, and quality, as well as to maintain and improve the working environment, atmosphere, and water quality.

We can support customers in their local language as well as Japanese, so that Japanese employees working abroad in international offices can contact us there without reservation.

We also have distributors and agents in Korea, South-East Asia, and other specific countries.

Please feel free to contact them or us.



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Hanoi factory

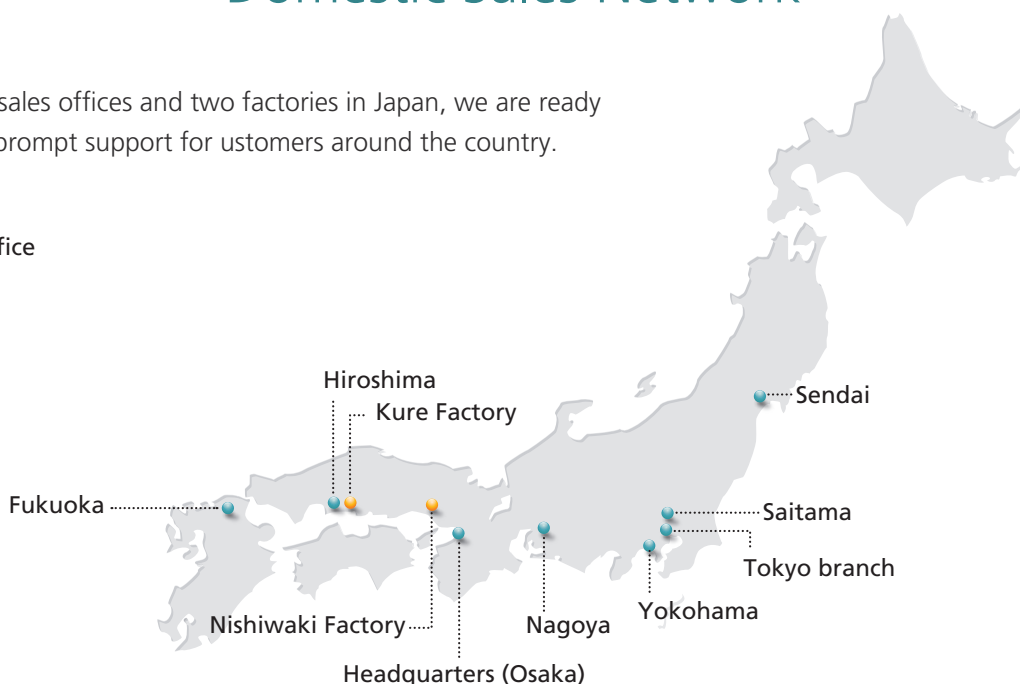
IKEUCHI VIETNAM CO., LTD.

K-1, Thang Long Industrial Park,
Dong Anh District, Hanoi, Vietnam

Domestic Sales Network

With eight sales offices and two factories in Japan, we are ready to provide prompt support for customers around the country.

● = Sales office



Development History and Historical Background

Main product history

1961



Developed the world's first ceramic tip nozzle **CERJET®**

1964



Developed high pressure cleaning and descaling nozzles **DSP series**

1973

Developed and began production of metal spray nozzles

1975

Developed full cone spray nozzles with uniform distribution and minimal clogging

1979



Invention of ultra-fine fog nozzles **AKIJet®** patented worldwide

1983



Developed spray nozzles for steelmaking industry to optimize the cooling process for continuous casting machines

1984

Developed plastic nozzles for electronics industry

1980



Invention of the innovative Dry Fog humidifier **AKIMist®** using **AKIJet®**

1985



Developed **CERTIIM®**, injection-molded version of **CERJET®**

1990



Founded world's first specialized "humidification" division with industrial humidification system **AirAKI®**

Developed self-cleaning nozzle **MOMoJet®**

1991

Developed pneumatic nozzle header with **BIMV** nozzles for steel surface treatment

1997



Received Achievement Award from The Institute of Electrostatics Japan for development of anti-static system

1998



Developed gas cooling nozzles **GSIM** for incineration plants

1954
Established as a trading company

1961
Opened first plant in Kure city, Hiroshima, Japan

1979
Opened second plant in Nishiwaki city, Hyogo, Japan

1983
Opened third plant in Kure city, Hiroshima, Japan

1987
Established subsidiary company **Ikeuchi Taiwan Co., Ltd.** in Taipei, Taiwan R.O.C.

1960

1960s

Industries such as steel, ship-building, and petrochemical industries advance, thus contributing to the period of **Japan's high economic growth**.

1970s

The oil crisis causes the industrial structure to **transform from resource-intensive industries to energy saving industries**. In the steel industry, the recovery of by-product gas intensifies, and the casting method is changed to continuous casting.

1970s

The act concerning the rational use of energy (known as the "**Energy Conservation Act**") is enacted and enforced.

1980s

The risk of **global warming** begins to gain general public recognition.

1980s

The development of IC technologies and the growth of high-technology industries make a remarkable progress. Organizational education and practice for countermeasures against static electricity begin in the semiconductor sector.

1990

1990s

The United Nations Conference on Environment and Development (UNCED), also known as the Earth Summit, opens up the discussion about worldwide **measures against global warming**.

1990s

The **Energy Conservation Act** is amended. Basic policy is formulated, and the obligation of regular reporting on designated energy management factories and other articles are added.

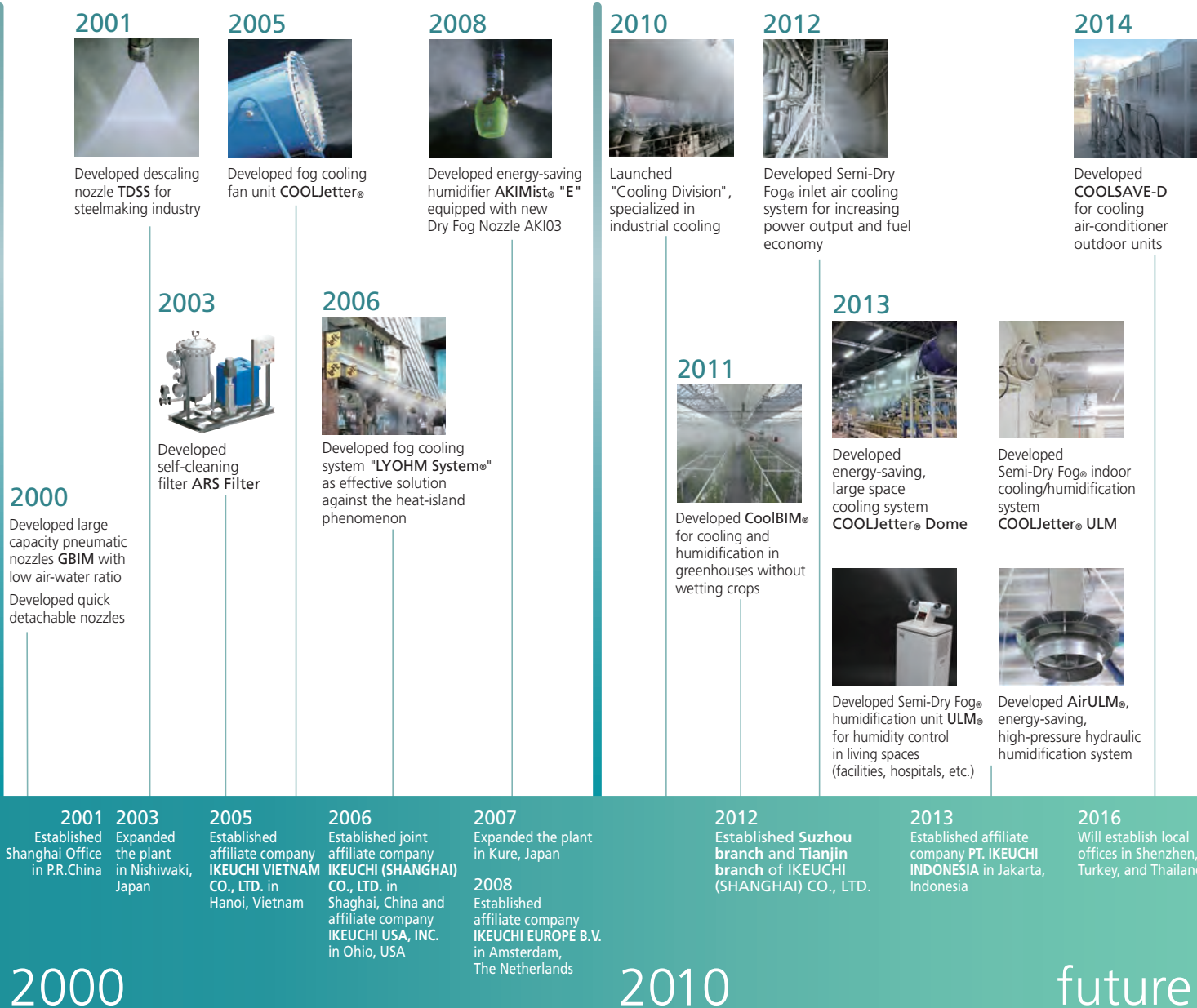
1990s

The Ministry of Health and Welfare creates guidelines for the prevention of dioxins generated by waste treatment and distributes them to local governments.

1990s

The **Law concerning Special Measures against Dioxins** that stipulates environmental standards, measures, and other articles is established.

Historical background



2000

2010

future

2000s

The **Energy Conservation Act** is amended. The obligation of energy management equivalent to that of large-scale factories is added to large-scale office buildings or similar buildings.

2000s

The Outline of the **Policy Framework to Reduce Urban Heat Island Effects** is formulated. Assistance to energy-saving investment is enforced.

2000s

The **Kyoto Protocol** is adopted.

2000s

The **paint industry** calls for attention to prevent occupational **accidents caused by static charge**.

2010s

After the Great East Japan Earthquake, the **balance of power supply and demand** become an object of public concern. To secure stable power supply, the power industry focuses on an intake air cooling system that prevents the output of gas turbines from declining during summer.

2010s

The Outline of the **Policy Framework to Reduce Urban Heat Island Effects** is amended. The promotion of adaptation measures to reduce impacts on human health is added.

Note: There may be different views or opinions about historical background. Here we picked up only general examples based on our research.

Corporate information

Date established: November 8, 1954

Paid-up capital: 90 million yen

Representative: Shingo Murakami, President & COO

Business description: Production and sale of spray nozzles, humidifiers, related equipment
and systems using spray nozzles for industrial use

Number of employees: 500 (including subsidiaries)



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