



## Business Guide

# Meeting Every Challenge, Past and Future.

Since its founding in 1966, Irie Koken (IKC) has been growing steadily, while primarily engaged in the manufacture of metal bellows and related application products. These include, for example, welded bellows that expand and contract in a variety of angles while keeping the atmosphere out of the vacuum. At IKC we have at our disposal proprietary design technologies, as well as ultraprecision welding technologies and unwavering confidence that "although appearances may be copied, it would not be possible to reproduce the performance of our products".

IKC has been exhibiting strengths primarily in niche fields in which other companies have not been involved. In order to respond to the needs of our customers in such fields it has been necessary to bring together existing technologies and develop new innovative technologies, which involve a process of repeated trial and error. This is also true for our vacuum valves, which are one of our principal products at the present time. Development for these valves began at a stage when no



Norihiro Irie, President

businesses were willing to respond to these needs and the founder of our company decided to take on the challenge as he felt that “this could be interesting”.

IKC considers itself a “research and development type enterprise aiming for a global reach”. The company has been proactively participating in numerous national projects, such as the large-scale synchrotron orbital radiation facility SPring-8, or the break-even plasma test device JT-60, while providing special metal bellows and various devices, which are certainly indicative of the company’s identity.

It has been nearly half a century since the company was founded and we are setting ourselves a grandiose policy of becoming “an enterprise that continues to exist for a century and then for centuries”. In order for a business to continue for centuries it is necessary to supply what is needed by the world at all times. The world’s needs change rapidly over time, thus we need to continue taking on the challenges of technological innova-

tions and management reforms, while addressing the needs of our customers in a serious manner.

We implemented Theory Of Constraints (TOC) into the production lines of the Nakayama Works. Consequently the production capability tripled over a short period and subsequently we were the first Japanese small and medium-sized business in Japan to be awarded by the AGI Goldratt-Institute of the United States as a “case example of noteworthy successful implementation in a country outside the United States”.

The basis that led to such success is nothing more than each and every employee’s passion for craftsmanship. Employees who appreciate the joy of craftsmanship make full use of their techniques and skills to bring forth reliable products, which in turn gain great trust from our customers. IKC promises to faithfully execute the “Corporate Philosophy” and “Three Targets”, while ensuring to fulfill the mission of bringing forth products required by society.

## Corporate Philosophy

We aim to realize an “enterprise that continues to exist for a century” by capturing the hearts of our customers and ensuring that our products are used for a long time, providing our customers perfect products, with as much service as possible.

## Three Targets

- Bring out superior individualities
- Compete with reliability and technology
- Share the joy of creating

## NATIONAL PROJECTS

IKC supplies various devices for numerous scientific experimental facilities promoted by the national government of Japan. Precious research results obtained through such efforts are fed back into a diverse range of products.



**High-speed railway** (started deliveries in 1972)  
Conservators are devices mounted on Shinkansen trains which facilitate safe running by enabling adjustments to volumetric changes in silicon oil of the traction transformers.



**Lunar orbiter satellite KAGUYA (SELENE)** (launched in 2007)  
Our attenuators are mounted on Okina and Ouna, Rstar and Vstar sub-satellites of SELENE, to control the swinging motions.



Source: RIKEN

**SPring-8** (started deliveries in 1992)  
We have supplied aluminum bellows for SPring-8, as well as welded bellows for the vacuum sealing undulators used at XFEL (nicknamed SACLA).



Source: High Energy Accelerator Research Organization

**KEKB** (started deliveries in 1995)  
Products, such as SR monitors for taking the measurements of beam profiles using synchrotron orbital radiation, have been delivered.



Source: JAEA/KEK J-PARC Center

**J-PARC** (started deliveries in 2004)  
Titanium formed bellows, with a high degree of difficulty, as well as beam profile monitors, have been delivered.

## Innovating cutting-edge technologies in a broad array of fields to further improve the quality of life.

Contributing to a society with more abundance.

IKC continues with untiring research and development, as well as technological innovations, starting from the manufacture of bellows and expansion/contraction joints, in order to achieve original technological abilities that are exhibited also in the field of vacuums. From semiconductors and liquid crystals to space applications, highly reliable products of IKC are adopted in a diverse range of fields.



### Semiconductors

We supply reliable high-vacuum components used in silicon semiconductors where manufacturing by microfabrication continues to progress. We also deliver compound semiconductors through a unified framework that extends from design to the manufacture of components created from GaAs, GaN, SiC and sapphire substrates. These components become core devices for items such as high-intensity LEDs and EVs.

#### Supported Products

Metal Bellows, Gate Valves, Chambers, Linear/Rotary Feedthroughs

### Flat Panel Displays

We supply high-vacuum gate valves, rectangular bellows and various metal bellows for large-screen LCD TVs, organic EL displays, touch panels and other high-definition displays. IKC has a major share of large valve manufacture in Japan, which are key components in large-screen LCD products.

#### Supported Products

Metal Bellows, Gate Valves



### Photovoltaic Solar Cells

Contributions are made to the manufacture of highly efficient solar cells, ranging from silicon crystals to compound crystals, as well as thin film solar cells of CIS or CIGS, etc. The FFT series gate valves, intended for film depositing equipment for flexible substrates that support the roll-to-roll process, have been put into commercial production.

#### Supported Products

Metal Bellows, Gate Valves and Angle Valves

## Medical Devices

The manufacturing of medical devices, including MRIs and freeze dryers, often involve the use of superconducting and refrigeration technologies. Metal bellows, which are produced in a clean environment and feature pressure-tightness and airtightness, are able to exhibit true values even under specialized conditions, such as low temperatures and high pressures.

Supported Products  
Metal Bellows



Source: National Institute of Radiological Sciences



Source: JAEA/KEK J-PARC Center

## Accelerators and Nuclear Fusion

Products are supplied through participation in major national projects, such as motion drives for beam monitoring of the electron-positron collider (KEK), large-scale synchrotron radiation facilities, as well as the nuclear fusion Satellite Tokamak Project (JAEA). Contributions are made to the progress of science with sophisticated vacuum technologies.

Supported Products  
Metal Bellows, Beam Diagnostic Devices and Chamber

## Railways

The company boasts an overwhelming market share for conservators that absorb volumetric changes in silicon oils used in alternating current transformers of high-speed railroad rolling stock, such as Shinkansen, as well as weight measuring instruments related to brake controls for container bogies. (IKC considers the expansion of railway business to be important.)

Supported Products  
Conservators, Load Sensing Valves, I-type Flexible Pipes and Metal Bellows



## Aerospace

The technologies of IKC expand even to the aerospace field, with the manufacture of bellows for rockets and launch support facilities. Vacuum technologies nurtured over many years are used in applications, such as nutation dampers that inhibit the spinning of artificial satellites.

Supported Products  
Metal Bellows and Metal Pipe Fitting

# BELLOWS

Bellows manufacturing technologies at IKC bring high quality and added value to bellows for ultra-high vacuum applications, as well as equipment for railway rolling stock.



■ Welded Bellows



■ Formed Bellows



■ Welded Bellows With RF Contacts



■ Titanium Formed Bellows  
(pump ports with RF shield bellows on both ends)

The basic technologies of IKC are derived from the manufacture of metal bellows. The emphasis is placed particularly on the vacuum field, where high performance and reliability are required, with high evaluations received for precision bellows.

"Elasticity", "air-tightness" and "durability" are characteristics combined to deliver not only expansion/contraction joints for piping, but also for applications in a wide range of fields including semiconductors and liquid crystals, as well as particle accelerators, nuclear fusion reactors, nuclear power plants, railways, medical applications, construction and others.

Demand for various equipment that dictates safe and secure operations, while completely shutting out external air, are diverse, yet IKC has established a flexible production framework that caters to every customer's needs.



■ Specialized Shape Welded Bellows



■ Large Rectangular Welded Bellows



■ Large Welded Bellows



■ Large Titanium Formed Bellows  
(Big-BPM)

# Gate Valves

A stable sealing performance is made possible with proprietary technologies as represented by the differential pressure cancellation structure. Flexible responses are possible for customized designs also.



■ Circular Gate Valve MARINA  
(gate size: 320A)



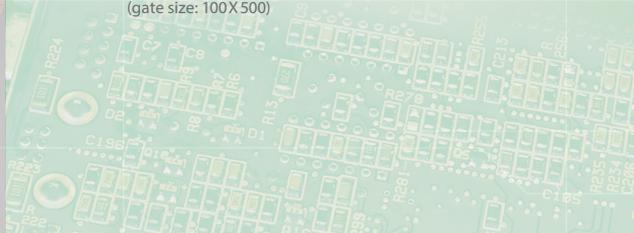
■ FFT Valve  
Flexible Substrates Step-to-Roll



■ Compact KOSLARZE II  
Semiconductors  
(gate size: 50X336)



■ KOSLARZE RI  
Next-generation Semiconductors and Organic EL  
(gate size: 100X500)



Vacuum valves are used to compartmentalize and adjust the pressures of individual vacuum chambers in the manufacture of displays and semiconductor substrates. By eliminating friction to maintain a particle-free environment, IKC succeeded in the development of KOSLARZE I, the first of its kind to be developed in Japan. We then created a series of frictionless valve products with higher performance, releasing KOSLARZE II. Technologies resulting from advances in semiconductor manufacturing and vacuum equipment have been further refined for application in the supersizing of glass substrates in flat panel display manufacturing equipment. The GARIVA supersized gate valve incorporates a differential pressure cancellation structure to realize the commercial production of products with an gate size of 3,000 mm or more, for the first time in the world.

In addition, we have also developed high value-added valves for flexible substrates of the next generation in order to continue supplying products that always satisfy our customers.



■ KOSLARZE II  
Solar Cells and FPDs (gate size: 50 X 1320)

■ GARIVA  
Largesized Gate Valve  
FPD Vertical Conveyor (gate size: 300 X 1800)

■ GARIVA  
Supersized Gate Valve  
Large-scale FPD (gate size: 150 X 3000)

# Vacuum Equipment

Technologies refined through participation in national projects are resulting in products with superior applications in the ultra-high vacuum field.



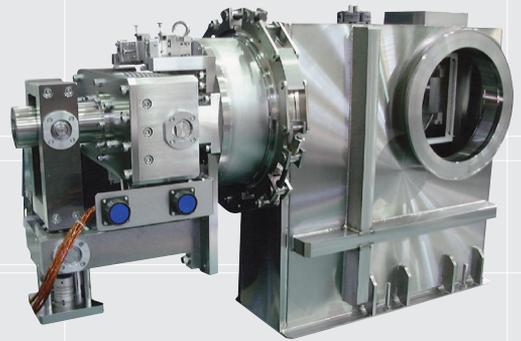
■ High-vacuum Angle Valves



■ Flexible Tubes



■ Linear/Rotary Feedthroughs



■ Proton Beam Profile Monitor (variable drive type)

Vacuum technologies nurtured through participation in numerous national projects, such as J-PARC or JT-60SA and the manufacture of specialized bellows for the connection of beam profile monitors and beam ducts, are utilized in the design and fabrication of vacuum chambers for various vacuum equipment, feedthroughs for long strokes, as well as vacuum units for various equipment.

Raising the level of such technologies forms the foundation of IKC. We believe that our promotion of green innovations in vacuum technologies that support the manufacture of devices, for which higher integrations and higher definitions are occurring, such as with VLSI or organic EL, contributes greatly to the realization of a sustainable society.



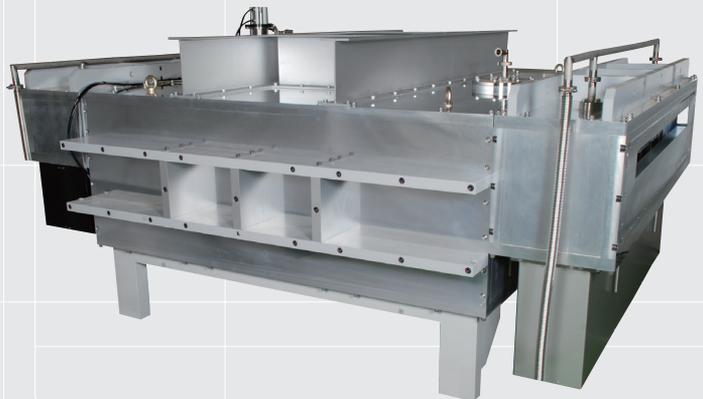
■ Clamp Couplings



■ Pipe Fittings



■ Vacuum Chamber



■ Large Assembled Chamber (size: 2000 X 2000)  
With Flat Seal Valve (gate size 100 X 1500)

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