

## Feature- I : Welding and Joining Technology

# Kobe Steel Research and Development in Welding Materials, Robotic Welding system and Welding & Joining Process



Fig.1 Small-sized robot and robot carrier

Welding and joining technology using heat sources such as arc and laser is indispensable for building steel structures such as ships, steel frames, construction machinery, bridges and automobiles, and is needed as well in the field of energy. Kobe steel develops and sells carbon steel, low alloy steel, high alloy steel welding materials, and welding systems and processes mainly for use in arc welding. In this issue, we introduce the latest welding and joining technology with "welding solution" in mind.

Fig.1 shows a robotic system for block-sequence welding in the assembly of ships. The robot, which enters narrow spaces, is designed for downsizing, including the lower arm that houses the motor and cables. The robot carrier for moving within blocks has a device for automatic positioning after reaching its destination. We offer various welding solutions for shipbuilding automation, including robot teaching software, combined with dedicated flux-cored wires.

## Feature- II : Machinery - Industrial Machinery and Compressor Technology

# Technology and Application Development of Industrial Machinery and Compressors



Fig.2 New tire uniformity machine, LIBROTA®

Kobe Steel has made continuous efforts in developing technologies and applications to satisfy user's needs in the field of industrial machinery, such as tire and rubber machines, plastic processing machines, rolling mills, isostatic presses and vacuum coating equipment, as well as compressors including screw, centrifugal and reciprocating types. This issue introduces our latest products and technologies in the field of industrial machinery and compressors, along with examples of new applications.

Fig.2 shows a tire uniformity machine for inspecting the quality of tires for passenger cars, trucks and buses. In 2013, Kobe Steel commercialized a new tire uniformity machine, "LIBROTA®," which has more accurate repeatability and shorter cycle time of measurement. Since then, more than 70 machines have been sold particularly in Chinese and Southeast Asian markets. Provided with a variety of options, the machine satisfies various needs from the global market in Europe, United States, etc.



Fig.3 Horizontal cold isostatic pressing equipment for food, "FOOD FRESHER"

Fig.3 shows horizontal cold isostatic pressing equipment for food, "FOOD FRESHER." Applying the technology of cold isostatic pressing (CIP) equipment, which has been cultivated over many years, Kobe Steel has developed equipment that combines various features such as low height, ease of operation, light weight and compactness required for food applications. In 2015, the first commercial equipment, capable of 400MPa processing pressure, was delivered for the application of opening and removing oyster shells, which was followed by the completion of "FOOD FRESHER", having a higher capability of 600MPa processing pressure.

### <Cover photos>

[Feature- I (right half)] Kobe Steel has the technology for arc-welding robot systems, which has been proven in the field of building steel frames and construction machinery, and the technology of flux-cored wires, the advantages of which have been demonstrated in the field of shipbuilding. The company combined these technologies to develop a new system for automatically welding vertical and horizontal fillets in shipbuilding blocks and has begun selling the new system. Kobe Steel develops both robot systems and welding materials, the company's strength enabling it to propose welding solutions. There is an increasing need for "welding automation" in the fields of building steel frames, construction machinery, shipbuilding, and energy. The technology for visualizing and distinguishing molten pool is expected to become important in automating the arc welding of thick plates.

[Feature- II (left half)] The photos show some of the representative Kobe Steel products: a tire uniformity machine (upper left), cold isostatic pressing equipment for high pressure food processing (upper right), large continuous mixer/pelletizer system (lower right), and large integrally-gear centrifugal compressor (lower left). These machines play important roles in producing various daily commodities.

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