



KAJIMA

NEWS & NOTES

Autumn 1999

SEIBU

THE WORLD'S FIRST DOME-RETROFITTING OF AN EXISTING STADIUM

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Ring-Shaped Temporary Scaffolding

While large roofs over open spaces are normally erected using a temporary supporting system that employs numerous pillars, such pillars could not be used at the Seibu Dome because the spectator stands under the roof could not bear the pillars' weight. Thus, the metal roof was constructed gradually in circular sections that extended progressively toward the center of the stadium.



The World's First Dome-Retrofitting of an Existing Stadium

The construction of the Seibu Dome was completed in March 1999. The Seibu Dome was created by retrofitting the existing stadium of the Seibu Lions professional baseball team with a domed roof—the first such project in the world.

The Seibu Dome is the fifth domed stadium in Japan. However, it is a totally new type of domed stadium that provides an atmosphere midway between that of outdoor and indoor facilities.

Situated in an appealing natural setting of low hills in Tokorozawa, Saitama Prefecture, the Seibu Dome

has a simple design that is as inconspicuous as possible and coexists in harmony with its surroundings.

Environment-Friendly Dome

Rather than being a conventional lid-like roof, the Seibu Dome's roof resembles a parasol fixed above the preexisting stadium. The huge roof is held up by 24 v-shaped pillars, and a space left between the stadium's roof and walls allows for an abundance of fresh air—as well as spring cherry blossoms—to enter. A balance between the atmospheres of outdoor and indoor facilities, the stadium's bright atmosphere is similar to the comfortable ambiance to be found in the shade of trees. Those inside of the dome can see the surrounding trees and other natural scenery and enjoy changes in the view brought by seasonal transitions.

The Seibu Dome is also distinguished from other domed stadiums in that it makes considerable use of its natural setting energy. Not equipped with an air-conditioning system, the facility is open to natural ventilation from all directions, thereby helping

reduce its energy consumption. Moreover, 40% of the roof and ceiling are made from a Teflon®-based substance that allows the stadium to be brightly illuminated with natural light. This reduces the need for lighting equipment and significantly lowers the stadium's running costs.

The Optimal Combination of Metal and Membrane

The metal roof above the spectator stands is designed to provide superior heat insulation and prevent the secondary transmission of heat from the sun warming the stadium. Moreover, the strong metal roof created during the first stage of the retrofitting project serves as a frame supporting the central roof section. Thus, the roof is composed of an ideal mix of materials.

Overcoming Diverse Challenges

The time available for retrofitting the existing stadium included only the baseball leagues' off-season periods over two years—a total of eight months. This required the work to be carried out quickly. Many other difficulties stemmed from the

Elevations



Installation of the Membrane Roof

The 2000-ton preassembled membrane roof section was hoisted approximately 37 meters to its final position using 100 jacks. The 30-hour process was performed over a three-day period.

restrictions that apply to the retrofitting of an existing stadium although not to new construction projects. To overcome such challenges, Kajima devised a number of new technologies and construction methods.

The first stage of construction began in July 1997, during the baseball season, with the start of pile driving work around edge of the stadium. After the season ended, Kajima initiated the erection of the metal roof section's steel frame—weighing 8,000 tons—which was covered with stainless steel roofing panels.

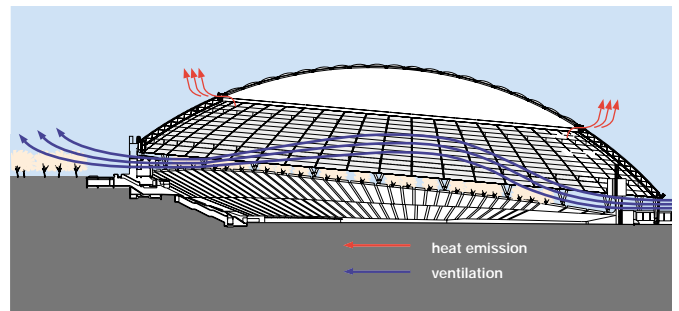
Moreover, there was no space for the installation of cranes around the stadium's circumference, so Kajima developed and installed special equipment for efficiently and safely placing up to five (0.5 meter-by-20-meter) 140-kilogram metal roofing panels at a time around half the stadium's circumference before installing them.

During the second stage of construction, which began in November 1998, the 145 meter-diameter membrane roof section was assembled on the ground, raised, and joined

to the metal roof installed during the first construction stage. The most important part of this work was to quickly assemble the huge, 17,000 square meter membrane roof portion. This process would have required four months to perform using conventional methods; however Kajima reduced the time period required to 45 days through the use of a newly developed automatic spreader device. The subsequent complicated process of lifting the membrane roof is shown in the photos and caption on the left of this page.

Future Dome-Retrofitting Business

In addition to stadium technologies, Kajima's roof-retrofitting technologies for creating energy-efficient buildings characterized by low initial and operating costs can be applied to many types of structures. The technologies allow for existing facilities to be roofed quickly and inexpensively with minimal disruption to the facility's operations. Among the potentially unlimited range of applications are pedestrian plazas in front of train stations, schoolyards, playing fields, and parking lots. Having established its capabilities for retrofitting stadium roofs, Kajima intends to use its related expertise to create diverse types of structures that enclose large spaces.



Seibu Dome

Location:	Tokorozawa, Saitama Prefecture
Design Supervision:	Yoshiro Ikehara
Design and Construction:	Kajima Corporation
Total Floor Area:	42,541.70 square meters
Structure:	Steel structure and steel-frame membrane structure, three floors above the ground and one below

Kajima around the World



From the U.S.A.

Hualalai Resort Wins FIABCI Prize

The Hualalai Resort in Hawaii, developed by Kajima, has won the annual FIABCI (International Real Estate Federation) prize in the leisure facility category. Generally known by its French acronym—FIABCI—the federation annually awards prizes to the world's most outstanding develop-

ment projects. Besides an 18-hole championship golf course that hosts a senior PGA tournament, the Hualalai Resort encompasses a Four Seasons Hotel, residential units, and other facilities. Since its development in 1996, it has been described as the top U.S. luxury resort by a leading leisure magazine and is highly regarded by residential owners, resort guests, and those in the resort industry.



From England

The Millennium Conservation Center

The facilities of the 170-year-old London Zoo in central London's famous Regent's Park have been augmented by the addition of the Millennium Conservation Center—one of the first Millennium Commission-supported projects* to be completed in the United Kingdom. The facility was designed and constructed

during the period from November 1997 through March 1999 by Kajima U.K. Engineering Ltd. (KUKU), a subsidiary of Kajima Europe U.K. Holding Ltd. On June 3, 1999, Queen Elizabeth II, who is a patron of the Zoological Society of London, officially opened the building and the "Web of Life" exhibition within.

KUKU was awarded the contract for the ¥4.4 million project due to the close ties between London Zoo and Kajima Urban Development, LLC (KUD), which is a subsidiary of Los Angeles-based Kajima International, Inc. (KII). These ties were fostered in course of cooperative efforts by KUKU, KUD, and the London Zoo to obtain Millennium Commission funding for a large aquarium (this project was given honorable mention in the funding competition).

The Millennium Conservation Center was designed by a local architect, who used a layout and materials that highlight the theme of conserving biodiversity and the natural environment. This theme appeals strongly to visitors to the zoo and harmonizes well with the zoo's objectives.

*The Millennium Commission has used funds raised by the U.K.'s National Lottery to encourage and fund projects that will be lasting monuments to the achievements and aspirations of the people of the United Kingdom.



From Taiwan

Taiwan Cement Corporation's New Head Office Building

On June 7, 1999, a ceremony was held to celebrate the completion of Taiwan Cement Corporation's new head office building in Taipei, and those attending the ceremony included Kajima's Advisor to the Board Akira Miyazaki and Managing Director Fujio

Yoshida. In addition to housing Taiwan Cement's head office, the intelligent building features a multipurpose hall with a world-class theater, audio equipment, and many other facilities on 15 floors above the ground and 5 below. The fundamental elements of the building were constructed by a joint venture between Chung-Lu (Sino-Kajima) Construction Co., Ltd., and a local company, Ta Yu Wei Construction Co., Ltd. Chung-Lu Construction was also responsible for building the multipurpose hall portion.

The ceremony included a classic lion dance accompanied by firecrackers and a tape-cutting ritual. A speech by Taiwan Cement Chairman Koo Chen-fu was followed by short messages from Taiwan's Premier Vincent Siew, President Morin Kaku of KMG Architects & Engineers, and Akira Miyazaki. Participants then attended a Beijing Opera performance in the multipurpose hall. In addition to being a prominent figure in Taiwan business circles, Koo Chen-fu is also a skilled performer in the Beijing Opera.



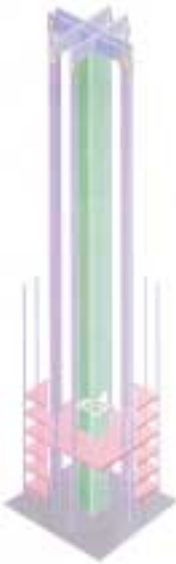
From Malaysia

Facility of Kenwood Corp's Malaysian Subsidiary Inaugurated

Held on May 18, 1999, the opening ceremony for the factory of Kenwood Electronics Technologies (M) Sdn. Bhd. was attended by numerous distinguished guests, including the

Malaysian Minister of International Trade and Industry Y.B. Dato' Seri Rafidah Aziz. While the factory's construction was actually completed in early 1996, the event was held to commemorate the official opening of the factory in conjunction with the launch of Kenwood's R&D Division. The three-story assembly plant with a floor area of approximately 33,240 square

meters was completed in 8 months on a design-and-build basis by Kajima's Malaysia-based subsidiary, Kajima Malaysia Sdn. Bhd. The facility is located in the state of Johor, which is at the southern tip of the Malay peninsula and close to a causeway bridge to Singapore.



From Japan

Free-Plan Skyscraper Technology Wins Award

Kajima's free-plan technology for superreinforced concrete-frame skyscrapers has won a construction prize bestowed by the Nikkei BP Technology Awards of Nikkei Business Publications Inc. These awards are in honor of outstanding technologies in principal business fields that have a large influence on industry and society. By using flat-slab and core-wall technologies to concentrate beams and pillars in certain parts of the structure, free-plan technology leaves most interior space free of both horizontal and vertical obstructions. As a result, the system allows for flexible floor layouts and facilitates large-scale renovations.

From Japan

Kajima Begins Marketing Ichimei Tasuke Air Bag Vests



Comprising companies that cooperate with Kajima, the Kajima Business Cooperation Association has developed a personal air bag device that works like an automobile air bag to help prevent workers from incurring injuries due to falls. The association recently began marketing this device under the name *Ichimei Tasuke*. If a construction worker should fall more than 80 centimeters, a sensor in the back of the product senses the fall and inflates a personal air bag similar in shape to a life jacket in 0.2 second. *Ichimei Tasuke* is designed to protect such particularly vulnerable parts of the body as the head, neck, and spine from the shock of impact. The marketing of *Ichimei Tasuke* is being handled by Taiko Trading Co., Ltd., a Kajima subsidiary, and plans call for marketing the product overseas beginning in fiscal 2001 or later.



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