

■ Topics

# Esplanade- *Theatres on the Bay*

In October 2002, Penta-Ocean completed work on *Esplanade-Theatres on the Bay*, a world class performing arts and urban center on the banks of the Singapore River. The six-hectare complex is located across the river from the Merlion, Singapore's most famous landmark and houses a concert hall, theaters and studios, an outdoor performing arts plaza, restaurants, shopping malls, and parking. Penta-Ocean played a central role in the construction phase of the project, supervising a consortium of companies from Asian and western countries. An opening ceremony was held to commemorate the opening of the Center, which was attended by 2,000 dignitaries and 5,000 guests.





### ↪ Lyric Theatre

The Lyric Theatre has seating for 2,000 and is equipped with a wide stage that can accommodate full-scale ballet and opera performances. The state-of-the-art stage system has more than 100 functions for hoisting, illumination and screening, and offers more than a thousand variations in stage settings.

### ↪ Concert Hall

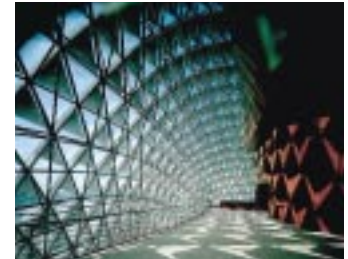
The centerpiece of the concert hall is an enormous pipe organ, located behind the stage with large side panels of glass fiber reinforced gypsum covered with Thai silk. This humidity resistant material has exceptional acoustical properties and has been used to create perfect sound in the hall. The ultra-quiet interior is said to make the Hall so quiet that the heartbeats of the guests can be heard.



### ↪ Grand Foyer

The Grand Foyer is the showcase of *Esplanade-Theatres on the Bay* and is the meeting place for guests attending performances and meetings.

Three types of specially manufactured sheet glass have been utilized to provide high insulation value while shielding occupants from the sun's infrared rays. The panoramic view of the surrounding city is nothing less than breathtaking.



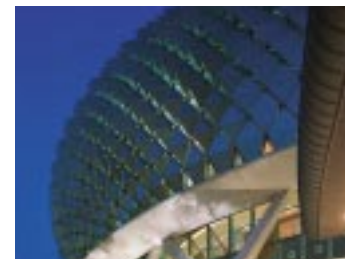
### ↪ Entrance

Guests enter through a courtyard and walk down a concourse laid out in a zigzag design that leads to the main concert hall on the left, the theatre on the right, and to the shopping mall straight ahead.



### ↪ Spectacular Design

The concert hall and the theatre are designed to resemble the appearance of a durian and are constructed of spherical concrete roofs and glass panels supported by specially designed framing. The durian-shaped sunshades have elaborately designed fins angled in various directions to catch the sun's rays as it moves across the sky. The linking garters supported by V-shaped columns are three-dimensional and have been constructed to eliminate electrical distortion, a key factor in providing an interference-free environment for computers.



## Review of Operations

### Overseas Projects >>

Among the overseas projects in which the Company and its consolidated subsidiaries engaged in the term under review, the most notable is the completion of the *Esplanade-Theatres on the Bay* in Singapore. The project included excavation and the construction of an underground foundation structure that required advanced construction technology capabilities and expertise in marine construction, for which Penta-Ocean is best known. The Group also won the bid to build the superstructure, owing to its highly successful cost-saving proposals, which included the facility's spectacular steel truss roof. This project represents the pinnacle of Penta-Ocean's technology and business expertise.

The substructure and superstructure portions were completed through a painstaking effort of collaboration with designers of the overall structure, the facilities and equipment, acoustic and theater requirements, exterior and interior designers, and special facilities. The collaboration was an international effort, with designers coming from Singapore, the U.S., the U.K., Germany, Hong Kong, and other countries. The majority of large-scale projects in Singapore is carried out by overseas construction companies and as such, is carried out predominantly in five languages. Penta-Ocean receives many of these projects owing to its exceptional supervisory skills multinational working environments.

The grand opening festival for the *Esplanade-Theatres on the Bay* was held in Singapore in October 2002, followed by strenuous efforts to complete the mammoth project in a record 3.9 years.

Other completed works included the Port of Colombo Extension Project for the development of a north pier, from the Bureau of Port and Harbor, the Government of the Democratic Socialist Republic of Sri Lanka. The new facility has greatly expanded cargo loading and unloading capabilities at the port. The project was completed in three stages — the Urgent Plan Project (Stage I), the Major Works Project (Stage II), and the Equipment Project (Stage III).

Notwithstanding these accomplishments, consolidated net sales for overseas markets in the term under review declined by 22.2% year-on-year to ¥60,644 million (US\$504 million). In the Southeast Asian market, in particular, Penta-Ocean suffered a 27.7% drop in consolidated net sales to ¥49,997 million (US\$415 million), owing to the falloff in economic growth in the region.

During the term, the Group received a major order for Engineering Infrastructure Works for Pak Shek Kok Development Package I from the Territory Development Department of the Hong Kong Government, SAR. This project represents the first phase of a very-large-scale infrastructure improvement project in Hong Kong and includes a science park, recreation facilities, and large residential buildings. Construction is expected to take three years. As the Government of Hong Kong is planning full-scale redevelopment of the area, Penta-Ocean's long-term involvement in the mega-project is anticipated.

Also in Hong Kong, the Group received an order for construction of the Lockhart Road Commercial Building project at Wanchai. The project involves construction of a 25-storied 87-meter-high commercial office building, to be completed in March 2004. Penta-Ocean has also received an order to construct a 7-story, 36.6-meter-high building that will house 24 classrooms at the Chai Wan Elementary School. Completion is scheduled for May 2004. Another project, to rebuild Hong Kong's St. Andrew's Church, will reach completion in March 2004.

In Singapore, Penta-Ocean succeeded in receiving an order from the Land Transport Authority of the Singaporean Government for construction of the MRT Circle Line Harbour Front Interchange Station building.

The Grand Foyer of Esplanade-Theatres on the Bay, Singapore



This project will involve the construction of new platforms and concourses that will connect the station with the neighboring Harbour Front Station building. Construction is expected to take two years.

Other projects included an order for road improvement for the State of Yap, from the Ministry of Foreign Affairs of the Government of Micronesia. This is an asphalt concrete pavement work project covering a total of 14.4 kilometer, two-lane road. During the term, Penta-Ocean also received an order for the construction of the Fiji Pharmaceutical Services Center building in Fiji.

### Civil Engineering Projects >>

The Japanese construction market continued to be depressed during the term under review. Tightened financial conditions and the resulting falloff in public and private sector investment exacerbated the situation. In the private sector, housing investment and capital investment were down from the previous year's level, fueled by uncertainty about employment security and a lethargic stock market.

Under these circumstances, consolidated net sales of domestic civil engineering and construction amounted to ¥326,217 million (US\$2,713 million), a decrease of 10.0% from the previous term.



Hanshin Highway, Kita-Kobe route, Hyogo

Major project completions during the term included:

Phase II of the Kansai International Airport Island revetment construction work (Order for Phase III received from the Kansai International Airport Land Developing Co., Ltd.), Penta-Ocean has been the sole contractor for this work.

Phase III of airport island construction work for the Central Japan International Airport Co., Ltd., Penta-Ocean completed this project at the end of April despite resource shortages and an exceptionally short turn-around schedule. Construction of the airport is being carried out at an accelerated pace in order for completion to coincide with the opening of the Aichi International Exhibition in March 2005.

The Fujieda Tunnel No. 1 project for Tomei Highway No. 2 in Shizuoka Prefecture, ordered by the Japan Highway Public Corporation.

The Nakajo Interchange on the Tohoku Highway along the Sea of Japan, ordered by the Japan Highway Public Corporation. On October 20, 2002, the Highway opened service to the Nakajo Interchange in northern Niigata. Since this highway connects Niigata and Aomori along the Sea of Japan, this opening will contribute significantly to the development of industry and tourism in the region.

A triple tracking, grade separation project between Nakamurabashi and Fujimidai stations on the Seibu Ikebukuro Line in Tokyo, ordered from the Seibu Railway Co. This grade separation project took nine years to complete owing to heavy road and rail traffic during construction. The grade separation and double tracking in each direction has helped alleviate traffic congestion in the vicinity.

The Oji Chip Yard project in Tokushima Prefecture ordered by Oji Paper Co., Ltd. is now accepting wood chips on a 24-hour basis.

The South Kotokuji-dai Housing Lots Development ordered by Nangoku Land Service Co., Ltd. aims at relieving a housing shortage in Kagoshima City and offers housing lots for 89 buildings that will accommodate 1,360 families.

Central Japan International Airport" centrair, "Aichi



Oji Paper, Tomioka Mill Chip Yard, Tokushima





Aki-Nada submarine pipe-embedding work site, Hiroshima

The Aki-nada No. 6 submarine pipe-embedding project in Hiroshima Prefecture has increased the supply of city water to 30,000 island residents. Penta-Ocean's super-large submarine pipe-embedding vessel, the *Tekkai* was used to complete the work. Submarine pipes, 400 mm in diameter, were connected one after another to span approximately 3.5 kilometers, at the maximum sea depth of about 60 meters. The Group's expertise in marine construction and advanced technology made it possible to complete the large-scale project.

New orders received during the term included the following.

Japan Highway Public Corporation has placed an order for the new Arimatsu ramp on East Meihan Highway. This is part of a project to construct a highway between National Highway No. 1 and the Nagoya South IC/JCT, together with a new ramp for relieving traffic concentrating in central Nagoya City.

Hiroshima City has placed an order for the construction of a pumping station in its western coastal area. This pumping station is constructed to protect the commercial and industrial centers in Nishi Ward, Hiroshima City from typhoons. The construction period is set for four years.

The Bureau of Port and Harbor, Tokyo Metropolitan Government has placed an order for a revetment construction project (Part II) in the Block G West of a new landfill disposal site for Fiscal 2005. This project is to construct revetments for securing a site for final disposal of household and industrial waste as well as construction waste in the coastal area around Tokyo Bay.

The Kansai-kan of the National Diet Library, Kyoto



## Architectural Projects >>

Architectural projects completed in the term under review included several condominiums. The *Alpha Grande Narita* residential building No. 2 ordered from Starts Co., Ltd. was completed in July 2002. The facility is located at the center of Narita New City and is designed as if it was an art museum and fully equipped with an advanced security system. The design of the building reflects the developer's desire to create as much privacy as possible for the occupants. *Estaterra Shonan-dan Mansion*, in Fujisawa City, Kanagawa Prefecture, was built for Itochu Urban Development Co., Ltd. In the center of the complex are the Plaza Tower and six other buildings containing a total of 619 apartments housing approximately 3,000 people. This residential facility is beautifully designed and includes a daycare center, meeting and multipurpose rooms, surrounded by lush gardens.

Another project, completed by Penta-Ocean in April, is *Life Pal Ichikawa*, built for Hitachi Metals Estate Co., Ltd. Located in Ichikawa City, Chiba Prefecture, the condominium was designed and constructed by Penta-Ocean and is comprised of rental compartments that accommodate family pets. The condominium has two entrances, a central one and a second for residents with pets that features a foot bathing and grooming area for animals. Penta-Ocean also developed an optical deodorizing parallel beam installed in the entrance that deodorizes and sterilizes pets as they pass through. Due consideration has also been given in the design for extra indoor ventilation.

In February 2003, *Refill Nihonbashi Hamacho* was completed for Yasuda Real Estate Co., Ltd., a fashionable 12-storied condominium designed to create a calm atmosphere in a central urban area. The complex is located within the Nihonbashi Hamacho redevelopment project, an area Penta-Ocean has been actively involved in.





Shirone-Ohdori Hospital, Niigata

During the term under review, Penta-Ocean completed design and construction work on several physical distribution centers, including the *Aeon Kanto RDC* and *Fukuyama Transport Kanto Distribution Center* for the Fukuyama Transport Co., Ltd. *Kamigumi Idetamachi Vegetable and Fruit Center* in Kanagawa Ward in Yokohama City was built for Kamigumi Co., Ltd., as was the *Kamigumi Constant-Temperature Warehouse*, in Niigata, were also designed and built by the Group.

During the term, Penta-Ocean also completed work on several medical facilities, including the *Shirone Ohdori Hospital*, in Niigata, for the *Medical Corporation Hakubikai* and *Tobata Rehabilitation Hospital*, in Fukuoka, for the Kyoaikai Medical Corporation. Both hospitals have the appearance of hotels, an unusual concept in Japan, and both were designed and constructed by Penta-Ocean.

The comprehensive research building of *National Muroran Institute of Technology*, completed November 2002, is a multipurpose building housing a museum on the first floor and research facilities on the third and fourth floors. The structure was designed to reflect the heritage of the region in which it is located.

Construction work on the *Ujina passenger terminal building*, in Minami Ward, Hiroshima was completed at the end of 2002. The structure is highly rated as the new maritime entrance to Hiroshima Port.

Penta-Ocean also completed construction of a gymnasium belonging to the Shimonada Athletic Park in Sokai-cho, Ehime Prefecture. The region is famous for its sunsets and pristine forests, and local timber was used in the construction of the uniquely shaped gymnasium.

Other architecture-related works included the construction of the head office building of Isewan Marine Transport Co., Ltd. in Aichi Prefecture and *Clear Garden Mochida Condominium*, for the Central Comprehensive Development Co., Ltd. in Matsuyama City, Ehime Prefecture.

During the term, a group of companies headed by Itochu Urban Development Co., Ltd. placed an order with Penta-Ocean for the construction of a 31-storied, 501-compartment condominium, *Laguna Tower*, to be completed in February 2005, in the Tennozu Isle Area. The project has attracted considerable attention as a result of the opening of the Japan Railways Rinkai Line service. Penta-Ocean will handle all design, supervision and construction work for the project.

The construction work the Group has accepted from an urban redevelopment association in the Nihonbashi Hamacho area, includes the construction of a 10-storied composite building, the *Nihonbashi Yasuda Sky Gate*, an intelligent building that will offer comfortable office environments suitable for the era of advanced information in the 21st century.



Nihonbashi Yasuda Sky Gate, Tokyo

Construction of the *Kamigumi Comprehensive Physical Distribution Center*, on an artificial island (Port Island) in the Port of Kobe has begun with a construction period of one year. The facility is a comprehensive physical distribution warehouse, equipped with constant-temperature storing rooms and constant-temperature fumigating areas, as well as ordinary storage areas.

Tobata Rehabilitation Hospital, Fukuoka



## R&D as a Business Strategy >>

Penta-Ocean is involved in four areas, creating environmentally safe marine disposal sites, recycling and environmental cleanup, maintenance, updating, and seismic reinforcement, and urban renewal. Drawing upon its accumulated technological expertise in a wide range of disciplines, the Group is rapidly developing this segment of its operations into a major business area.

Penta-Ocean is developing new technologies that meet the rapidly evolving demands of public and private sector clients in both civil and architectural engineering, and this effort is expected to generate sustainable business growth in multiple areas for the long-term future. Reflecting this commitment to maintaining its technological edge, Penta-Ocean invested ¥1,764 million (US\$14.6 million) in research and development projects during the term under review.

### Principal R&D projects and results in the term under review follow:

#### Vacuum consolidation draining method

This method was designed to improve extremely soft ground. An airtight cap and a water-discharging hose are coupled to a drainage system and then directly connected to a vacuum pump. This process gives load to the drainage and improves the soil. Not requiring conventional sealing sheets or sand mats, the new method is both cost and time efficient, and since it does not use any solidifying agents, it is friendly to the environment.



Clay Guard method work site

#### Clay Guard Method (Deformation-following water-sealing method)

This method seals out water by using a deformation-following water-sealing material made by adding gap-regulating and gelling agents to marine clay and keeping the clay from solidifying so that it can follow any changes in ground formation. Since the clay does not crack even when it moves to the contours of changing formations, it has high water-sealing characteristics. This method has been applied in the construction of final waste disposal sites in marine environments, a common practice in Japan.

#### Environmental Dredging Method (END Method)

This bottom-dredging method uniformly removes silt to a minimum soil depth. The method combines a thin-layer dredging grab developed by Cable Arm Corp. of the U.S. with dredge/vessel-controlling system technology developed by Penta-Ocean. The method is most suited for removing obstacles embedded in riverbeds and estuaries. This dredging system is considered environmentally friendly, owing to its minimum displacement of muddy water during operation, and has been employed in the dredging of the fairway in the Port of Hiroshima.

#### Remote control earthmoving system

This remote-control system makes it possible to operate machinery using a local area wireless network in locations deemed unsafe or impractical for operators. By transmitting a large amount of data in a single frequency range through the wireless LAN system, radio interference, a common problem of remote systems, is avoided. This has expanded the range of use for this technology to areas such as disaster restoration work in earthquake-stricken areas.

Remote control earthmoving system and control room



END method work site



On-site dioxins decomposition system

### Dioxins decomposition technology

Environmental concern over dioxins has become more heightened in recent years, as the public has become more aware of their negative effects on humans and the environment. In Japan, incinerating facilities that cannot meet new pollution control laws are being closed down and dismantled. Penta-Ocean has acted quickly in securing this new market by developing a portable, dioxin-neutralizing system that can be transported by disassembly into modules. The remote-control operated machinery has also been utilized in dismantling incinerator chimneys.

In the architectural business segment, the Group took part in joint research with nine private companies to develop software for diagnosing degradation of concrete structures. The advanced diagnostic system will be used to monitor and repair a wide variety of structures.

Penta-Ocean is also involved in physical distribution facilities, and during the term under review developed a *double twister* air shower system used for sealing airflow at entrances and exits of food-processing and other factories. This is accomplished by adopting a swirling induction system so that dust and dirt does not adhere to surrounding components.

## New Business, Real Estate Development and Other Businesses >>

The New Business Promotion Division was established in fiscal 2000 to handle the Group's growing environmental businesses. Revenues from this division have continued to rise steadily. Penta-Ocean has expanded the scope of its environmental business to include wind-powered electric generation plants, drawing on its formidable R&D capabilities and accumulated experience in the field of infrastructure construction.

In April 2001, the Group's first wind generator was set up at the Nakaumi Agricultural Park in Yasugi, Shimane Prefecture. In March 2002, a total of 28 generators were installed at Horobetsu in Hokkaido. Penta-Ocean also took charge of 17 of the 28 generators at the Otonrui Wind Plant, as well as the construction of substations and an administration/warehouse building. The large-scale power plant facilities form a straight line 3 km from north to south.

Each wind plant generates 750 kW, the total output being 21,000 kW. The facility is located near the Sarobetsu Wilderness and Flower Park and commands a fine view of Mt. Rishiri. The area is a popular tourist destination.

The Tokyo Coastal Wind Plant, completed in March 2003, is located in Koto Ward, Tokyo and is the first wind generation project located in the Tokyo metropolitan area. The Tokyo Municipal Government carried out the project and Jay Wind Co., Ltd. Penta-Ocean constructed the foundations for the facility, which is capable of generating enough electric power to sustain 800 households.



Tokyo Coastal Wind Plant, Tokyo



Setting up wind generation electricity plant at Setana coast, Hokkaido

Off the coast of Setana, Hokkaido, another wind power station is currently under construction. Scheduled for completion during the current term, the Setana plant will be Japan's first floating wind power station. The project is part of a larger project underway to build multipurpose wharfs to protect coastal areas in that region. The wharf foundation, constructed by Penta-Ocean, has been specially designed to provide a habitat for native marine life.

Despite the continued slump in the domestic real estate market, consolidated sales in the Group's development business segment increased by 65.6% over the previous term's level to ¥3,560 million (US\$29 million). Operating amounted to ¥501 million (US\$4.1 million). Consolidated sales from the Other Businesses segment totaled ¥9,132 million (US\$75 million), a 13.5% year-on-year increase. However, no operating profit was recorded. Consolidated operating loss in the term under review was ¥88 million (US\$0.7 million), a decline of 22.1% from the previous term.