'04 TOPICS

Hiroshima's Landmark Building Completed

During the term, the domestic construction market continued to suffer as public and private sector capital investment continued to decline. Despite the severe operating environment for construction companies, Penta-Ocean's medium-term management program, called "Challenge 21," initiated in October 2002, guided the Group towards a profitable year.

Owing to the downward trend in the domestic construction market, Penta-Ocean continued to streamline its operations at home. These efforts translated into the completion or elimination of unprofitable activities and a steady increase in operating profits for other projects, putting the Group back into a position of profitability ahead of schedule and several years ahead of its competitors. This accomplishment is significant because it was achieved under the most severe market conditions.

During the term, completion of a landmark high-rise office building in Hiroshima, Penta-Ocean's hometown, was especially important to the Group. The 43-story Urban View Grand Tower, stands 166 meters high and is one of western Japan's tallest buildings. It was built on the site of the historic Grand Hotel and is an RC-structured building that accommodates office, residential and retail facilities. The multipurpose structure is part of Hiroshima's comprehensive development plan that aims to transform the city and its economy.

The foundation of the previous building made the construction work difficult and created unique challenges for the engineers. In order to minimize the disturbance and noise caused by construction work, an innovative method for driving concrete piles through the old foundation was developed.

Existing framework and pilings in the way of the new foundation were removed using an all-casing excavation method developed with original technology. New piling was installed by drilling new holes using ordinary earth drills. The all-casing method uses a casing tube equipped with bits mounted on both ends.

Earth retaining walls for the Tower were formed by applying the SMW (Soil Mixing Wall) method. This method makes it possible to form water-preventing earth-retaining walls quickly by mixing earth collected at a construction site with cement slurry. The rigidity of the earth retaining walls was further enhanced by forming a compound earth-retaining wall with main underground RC walls and H-shaped steel materials welded with studs that act as stress material arranged within the improved soil walls. The upper two struts supporting each earth-retaining wall can be dismantled simultaneously; thereby reducing the time needed for constructing the foundation.

Foundation work consumed more than one third of the total construction period and the superstructure was completed in 18 months. A new outer-shell precast method was used instead of the conventional method, which would have

extended construction time significantly. With the new method, an outer shell was constructed with built-in shear-reinforcing ribs, hollow square pillars, and hollow bottomless beams composed of two outer shells. Pillars were hoisted by crane as each floor was framed in, inserted into a pillar rod built in position, and connected to complete the overall framework. Beams were assembled on the ground into cross, T-shaped, or L-shaped forms, according to the pillars with which they were coupled. Then, the beams were unitized with the main supporting rod and hoisted to each floor. This process enabled Penta-Ocean engineers to complete the framing and bar-reinforcing work at the same time. Although the pillar materials were developed jointly with other construction companies, the beams were built by Penta-Ocean using original technology and adopted in this project for the first time.

The Urban View Grand Tower is the tallest high rise building that Penta-Ocean has constructed in Japan. The Group has constructed numerous buildings and structures in many locations throughout the world and has accumulated formidable comprehensive architectural engineering capabilities as a result.

Increasingly, new structures are being built over old ones in Japan, using new methods such as those described above. Penta-Ocean continues to develop construction methods and materials that will make it possible to complete construction works with time and cost savings.

The Group is completing various other high-rise buildings in urban centers throughout Japan, including the very large capacity residential buildings of The Laguna Tower and other condominiums at Tama Center.

New Outer-Shell Precast Method

Utilizing this newly developed precast method, an outer shell was constructed with built-in, shear-reinforcing ribs, streamlining the process and reducing the time and cost of the project.

Carrying in a building site

Pillar rods built in position

Cross-shaped frame

Completion of the framing work