

Technical Award

Fully Precast Construction of Rahmen Viaduct for Improved Productivity and Reduced Construction Period



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The Fukui Kaihatsu viaduct is a 2.3 km section of bridge and viaduct for the Hokuriku Shinkansen bullet train line constructed on the Kanazawa side of Japan Railways (JR) Fukui Station. The construction project was constrained by the accelerated schedule for opening the Hokuriku Shinkansen as well as severe restrictions on construction, such the very narrow site sandwiched between the JR Hokuriku Line and the Tochizen Railway, and poor supplies of labor, materials, and equipment due to demand induced by the Olympics. To overcome these problems, a full precast (PCa) construction method was used for the first time on Japan's railways to construct the 11-span reinforced concrete (RC) Rahmen viaduct.

In this method, mortar sleeve joints were used to join the rebars between PCa members and the column-beam joints were fabricated with through-holes to implement a fully PCa structure for the column-beam frame. In the design of the PCa member joints, cyclic loading tests were carried out to verify their effect on the deformation performance of the column and beam members.

The application of these methods achieved a 45% reduction in on-site labor, which was required only to assemble the PCa members and fill the joints with mortar. Also, the construction period for the frame structure was reduced by up to 65% as compared with the conventional cast-in-place construction method under such restrictions. Furthermore, the use of PCa RC members is expected to extend the service life of the structure and rationalize maintenance and management.

This achievement fulfills the aim of the government's "i-Construction" initiative to improve productivity in construction, while also assuring the quality of the structure in spite of the severe construction restrictions. It has been evaluated as a technology that greatly contributes to improved civil infrastructure and is judged to be suitable for the Technology Award.