

Technology Development Award

Development of Design and Construction Technology (Cotter Slab Method) for Precast PC Deck Slabs with Cotter Joints for Bridges

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Reason for the Award

On the RC deck slabs of road bridges constructed in Japan in the period of high economic growth, much damage including fatigue damage has occurred. As a radical countermeasure, replacement with precast PC deck slabs is in progress, mainly on expressways, while traffic restrictions are imposed. However, in this replacement work, panels are joined together on site, so it is necessary to incorporate joints into each panel. Also, loop joints have been developed as a standard method of constructing the joints, and thereafter joints with anchorages provided to the ends of reinforcement were developed. However, with these conventional methods the width of the joint is large at about 30 to 40 cm, so there was a need for an improvement that would shorten the time of the jointing operation and improve the constructability. Also, the joints have an RC structure, so it is necessary to sufficiently consider ensuring durability. To solve such issues, the “Cotter Deck Slab Method” was developed to improve productivity, contribute to the reform of working practices, and enable it to be widely and conveniently used. With this method cotter joints are used to reduce the width of the joints to 20 mm, panel connection can be completed with the light work of tightening bolts and filling with joint material, and reinforcement, formwork, falsework, and concrete placement operations are not required. As a result, the excellent features that deck slab installation time is shortened, labor requirement is reduced, quality is increased, and partial replacement is easy, etc., can be obtained. Also, the derived theory and the advantageous properties in terms of the various performances utilizing these characteristics have been demonstrated in test and actual construction results. As a result of the above, it is evaluated that an extremely innovative mechanical joint structure has been developed, which will greatly contribute to the construction and maintenance of present and future infrastructure, so this work and deserves the JSCE Technology Development Award.