

Upgrading of Design with Inspection Simulator

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1. Introduction

In the BIM/CIM (Building and Construction Information Modeling/ Management), which has been promoted by the Ministry of Land, Infrastructure, Transport and Tourism ("MLIT"), front loading in the design phase has been studied for the purpose of hand rework prevention.

National Institute for Land and Infrastructure Management (NILIM) is studying a simulator ("inspection simulator") that checks in the design phase whether a new bridge has a structure enabling visual inspection from a proximity distance as one of the front loading requirements. This paper reports the results of analyzing applicability of the inspection simulator in each of the items we organized concerning "certainty and ease of maintenance," which is confirmed in the conventional design stage.

2. Research of items to be checked in the inspection simulator

In this study, we surveyed the items concerning "certainty and ease of maintenance" that should be checked with the inspection simulator through existing materials including specifications for highway bridges, commentary thereof, and road bridge inspection passage installation procedure (draft) and hearings from the organizations concerned. As a result, shape of girder end, securing of work space near support, etc. were identified as items to be considered in the design phase. It was also found to be necessary to verify whether the inspection method using inspection passage, inspection vehicle, etc. can be implemented and to what extent checking with visual inspection from a proximity distance is possible, etc.

3. Analysis of the functions of inspection simulator

Based on the research results stated in section 2 above, we analyzed whether "certainty and ease of maintenance" can be verified by the inspection simulator with the reproduction image using three-dimensional models. Fig. 1 shows the image of inspection simulator. As Fig. 1 shows, use of the inspection simulator enables visual indication of girder end and work space as well as confirmation in the design phase as to whether design meets the items requiring consideration.

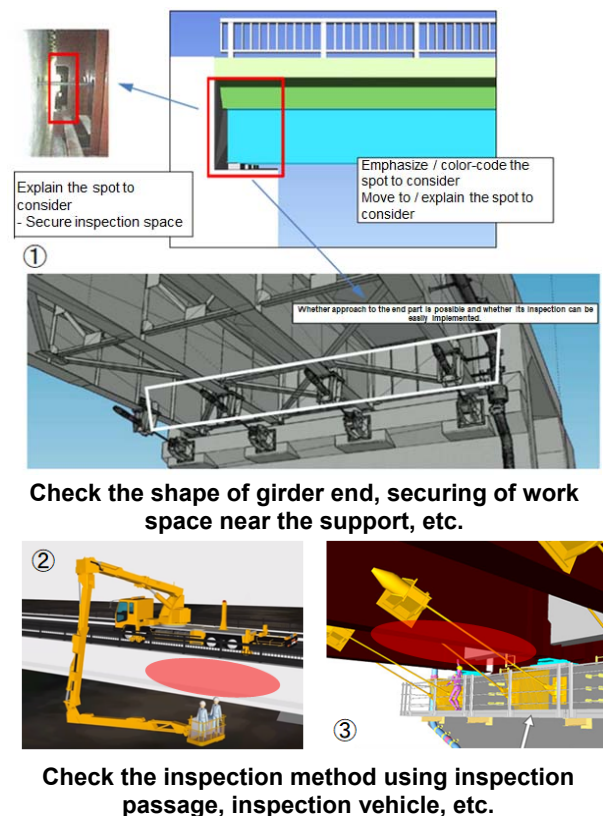


Fig. 1. Image of the inspection simulator

In addition, inspection method of structures can be examined with three dimensional images of the shapes and peripheral environment of structures. It is further possible to check whether all the spots can be inspected without omission with color-coded indication of the area that can be visually inspected from a proximity distance in a range from inspection passage or inspection vehicle.

Through the analysis above, we prepared the functions (draft) required to check the certainty and ease of maintenance with the inspection simulator.

4. Future development

We intend to produce the inspection simulator on a trial basis based on the prepared functions (draft) and confirm the effectiveness through trial use on the site. We also intend to develop the functions (draft) into functional requirements (draft) and promote installation in simulation software using CAD software and three-dimensional models.