# BIM/CIM Generating Methods for the Efficient Maintenance and Management of Existing Port Facilities

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#### 1. Introduction

BIM and CIM (Building/Construction Information Modeling/Management) are expected to be effective in improving the efficiency of maintenance and management, such as in the visualization of inspection and diagnosis records, the centralized management of maintenancerelated data, and as an information platform function in connection with measuring equipment. However, current guidelines for BIM/CIM are mainly aimed at new port facilities, and if applied as is to existing port facilities is a risk of creating unnecessarily high-precision 3D models. This study examines the minimum requirements for 3D models needed for maintenance and management and proposes a method for generating 3D models for existing port facilities.

## 2. Procedure for Examining the Requirements of 3D Models for Existing Port Facilities

The method for generating 3D models for existing port facilities adopts a method which uses the cross-sections and plan views that accompany maintenance and management plans which are available for most port facilities. Also, the maintenance and management plan and the results of inspections and diagnosis were directly or indirectly (by external reference) assigned as attribute information for the 3D model, depending on the content.

In this study, we first created a detailed 3D model of open-type wharves on vertical piles similar to that for a new port facility construction. We then conducted interview surveys with facility personnel, etc., considered the minimum requirements for 3D models needed for maintenance and management, and recreated a 3D model that met these minimum requirements.

### 3. Main Conclusions

The left of Fig. 1 shows a detailed 3D model similar to that for a new port facility construction, with a 3D level of detail (hereinafter "LOD") of about 300. On the other hand, the right of Fig. 1 shows the minimum 3D model needed for maintenance and management as considered in this study.

From the interviews with facility personnel, it was learned that it was important that 3D models needed for maintenance and management be capable of allowing the visualization of the degree of performance degradation and deterioration and allowing the efficient searching of past inspection and diagnosis results, so the LOD was lowered to 200. The right side doesn't accurately reproduce the haunch on the underside of the superstructure and the pile heads, etc., but the type of components, location of installation and number of components can be identified, so this is considered sufficient for maintenance and management BIM/CIM. The lowering of the LOD to 200 also reduced the creation time by about 50%.



Fig. 1 Existing port facility BIM/CIM 3D model (Top: superstructure; Bottom: Entire wharf)

### 4. Future Issues

In the future, it will be important to consider the most efficient methods for generating 3D models and adding attribute information based on the results of setting the requirements for existing port facility 3D models.