

Architecture of 3D CAD part data simplification system for ship and offshore plant equipment

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The construction of an equipment catalog is necessary in ship outfitting design and offshore plant design. Equipment supplier's CAD data have high complexity while shipyard needs CAD data with low complexity. Therefore, an automation tool supporting the simplification of equipment 3D CAD data is necessary. In this paper, architecture of 3D CAD part data simplification system is presented and a prototype system was developed.

KEYWORDS : 3D CAD part; Ship and offshore plant equipment; Simplification; System architecture

1. Introduction

Equipment 3D data take on different level of details (LODs) depending on usage purposes [2]. Therefore, an automation tool supporting the simplification of equipment 3D CAD data is necessary. In this paper, architecture of 3D CAD part data simplification system is presented and a prototype system was developed.

2. Design of a 3D CAD data simplification system

3D CAD data simplification system (Simplifier) consists of geometry processing, data, and application function layers. The geometry processing layer has ACIS Shape Modeler and InterOpAdapter. The data layer has Model File, Boundary File, Port File, and Specification File Readers. The application function layer has Simplifier Engine, Feature Rearranger, and Port Manager.

For the 3D CAD data simplification, an algorithm based on volume, port adjacency, and main dimension [1] was implemented in the Simplifier Engine.

3. Implementation and experiment

Prototype Simplifier was developed according to the proposed system architecture. For the implementation of Simplifier, ACIS R22 and HOOPS 19 were used for geometric modeling and 3D visualization.

Butterfly valve model, as shown in Fig. 1(a), was used for the experiment. The result, shown in Fig. 1(b), is 3D CAD data simplified automatically by Simplifier. The 3D CAD data, shown in Fig. 1(c) for comparison, is a manually drawn up model. The two models have minimal differences and have high coincidence.

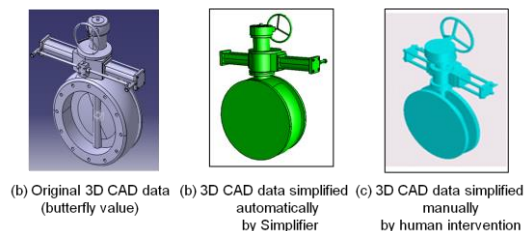


Fig. 1. Test case and its simplification result

4. Conclusions

In this paper, architecture of 3D CAD part data simplification system (Simplifier) is presented and a prototype system was developed. The prototype system was demonstrated through experiment with test cases. The experiment showed that Simplifier has a high probability of industrial application.

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