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ScienceDirect

Procedia Engineering 174 (2017) 456 – 464

Procedia Engineering

www.elsevier.com/locate/procedia

13th Global Congress on Manufacturing and Management, GCMM 2016

The Research of System Architecture of Dynamics Modeling System Based on Virtual Assembly for Integrated Transmission

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Abstract

The function characteristics and the realization modes of dynamics modeling based on virtual assembly for integrated transmission are analyzed. On this basis, the system architecture and analysis process of dynamics modeling system for the dynamics modeling based on virtual assembly for integrated transmission are proposed. According to the architecture, the system is divided into the human-computer interaction, functional implementation, core analysis and data supporting layer, and the complete system architecture is established. The dynamics modeling process is divided into the modeling of multi-attribute parts, system modeling based on assembly features, dynamics modeling and system implementation stage from the analysis process. These can provide the systematic, integrated and practical basis for the dynamics modeling and establishment for modeling platform.

Peer-review under responsibility of the organizing committee of the 13th Global Congress on Manufacturing and Management

Keywords: Virtual assembly; Integrated transmission; Dynamics modeling; System architecture

1. Introduction

System dynamics simulation based on virtual assembly can observe and analyze the operation of fully assembled system in the virtual environment, it improves design performances and shorten the design cycle by design models, assembly models and integrated information of system dynamics before the manufacture of physical prototype[1-2]. This provides a method for design optimization of the system. Currently, the process of the dynamics modeling based on virtual assembly in virtual environment is still at the exploratory stage. There are no complete research

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Peer-review under responsibility of the organizing committee of the 13th Global Congress on Manufacturing and Management
doi:10.1016/j.proeng.2017.01.166

methods, even no more effective definitions and analysis for the system dynamics modeling based on virtual assembly macroscopically, engineering practically and integrated.

Accordingly, this paper discusses and analyzes those features and functions of system dynamics for integrated transmission based on virtual assembly. On the basis of above-mentioned conclusions, the system dynamics for integrated transmission based on virtual assembly has been proposed and the achievement of its process has been discoursed. These achievements provide the basis for technology researches and construct modeling platform of the system dynamics for integrated transmission based on virtual assembly systematically, integrally and practically.

2. The function of Integrated Transmission System and Dynamic Modeling based on virtual assembly

2.1. Characteristics

Dynamic modeling based on virtual assembly for integrated transmission is based on the CAD design model of transmission system. By data conversion and information transform, the creation of system assembly modeling in virtual environment becomes possible.

According to the relevant information of the assembly models, the data mapping of the assembly characteristic information to the dynamic model is realized. The simulation analysis about related properties of system dynamics is implemented by relevant calculation and analysis of the dynamic modeling which is established in the virtual assembly system. It has four main features:

(1) Virtuality

The basis of model data of the dynamics simulation analysis for integrated transmission based on virtual assembly is CAD models, but the basis of analysis is the virtual assembly model of the system. Dynamic modeling based on assembly is the set of virtual assembly technology and dynamic modeling which is completed in virtual world.

(2) Real-time

To achieve real-time simulation and make dynamic modeling for assembled system in virtual environment is the research purpose of dynamic modeling based on virtual assembly for integrated transmission system. Thus, the emphasis of dynamic modeling for transmission system based on virtual assembly is the real-time solving of kinetic models which can truly reflects the operating state of the system. The real-time simulation is an important requirement of systematic kinetics analysis in virtual environment. Only when the system can guarantee the real-time analysis, the dynamic modeling for integrated transmission based on virtual assembly can be practicability in engineering [3].

(3) Interactivity

The feature of HCI (Human Computer Interaction) has been emphasized in the dynamic modeling based on assembly models in virtual environment. According to the requirements of designers, in the process of assembly modeling and the dynamics simulation analysis, people can do real-time observation, interactive adjustment and modification. The characteristic make the model assembly and system simulation and analysis better meet the requirements of the operator.

(4) Integration

The dynamic modeling for the integrated transmission system based on virtual assembly is used for the integrated dynamics modeling and simulation analysis, which can realize the integration of the design models, assembly modeling and dynamics simulation. In the same time, it also converses and transfers available information of CAD models, assembly feature models and dynamic models.

2.2. Realization Mode of Dynamic Modeling System

According to the characteristics of dynamic modeling based on the virtual assembly for integrated transmission and the different requirements of input and output devices, the realization pattern of dynamic modeling based on virtual assembly in fictitious environment mainly includes these four following points:

(1) Desktop mode

Computer is the mainly application equipment in the desktop mode. It gives dynamics simulation analysis of the system through basic external equipment and the established simulation system which can finish the process of