The automated modeling system for FEA analysis by Navia Integral

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ABSTRACT

Author developed the new system which is a kind of a middle ware for developing an automation modeling system of a computer simulation. Since the FEA method was developed, lots of research engineers and simulation engineers have developed the simulation techniques which are a kind of mesh distributions and boundary conditions and so on to get the good results in accord with the experiments.   The progress of computer has contributed the growth for the utilization of computer simulation. Automobile industry, airplane industry, shipbuilding industry, electricity industry and so on have solidly adopted the FEA techniques to develop the products faster. The results created the lots of standardization at simulation techniques of how to make the mesh and boundary condition.

Nowadays, the requirement of market has made the product high quality, and it complicates the simulation model. For example, lots of element number is necessary to build the FEA simulation model. Complicated boundary condition is also required to do it. Lots of operators are forced to consume their much time for building the simulation model.

The cellular phone and compact digital camera are putted in the market twice a year. The production speed is faster than the modeling period of FEA and evaluation speed of FEA. Hand-made-modeling does not come up with production.
The automated-modeling system is required from the industry engineers to build the simulation model in place of hand-made modeling.

Fig.1 shows the constitutive model of Navia that consists of the general-purpose part and the customizable part. The functions of the general parts are load the program of the

General-Purpose Program Part
Main body of Navia

Customized Program Part
XML,C++ ,Perl and Other Language are available.
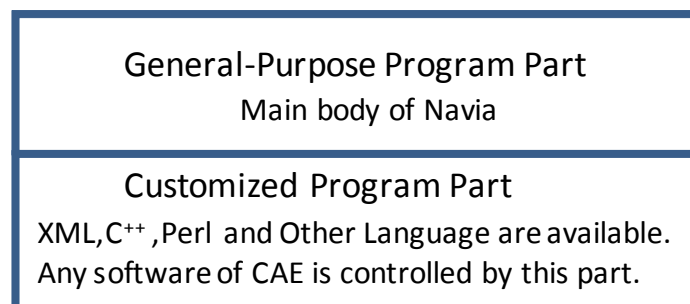Any software of CAE is controlled by this part.

Fig.1 The Structure of Navia

customizable part, and then send the commands to the software of the commercial software and so on, which are used in the customers and is gone into the use of the simulation. The program languages used in the customizable part which is about the automation of CAE modeling process are XML and Perl that are executed in cooperation with each other.

Automation system of modeling process is divided into two branches that are the stage of assembling CAD data and the auto-modeling for FEA. The sole thing of hand-made operating is to assemble the CAD files which the operator wants to evaluate the product quality. After that, Navia works by itself and then makes the FEA model automatically. The feature of Navia automate system does not concentrated the product itself but the analysis procedure.
The accountability to the analysis target product is the CAD assembling stage that the operator will get up.

The mesh size, boundary condition and load condition registered in the any kind of D/B of Navia is come into use of building up the simulation model. Navia refers the D/B, and sends the commands for the pre-software to makes the simulation model based on the method that is registered in the D/B. The process is shown as Fig.2.

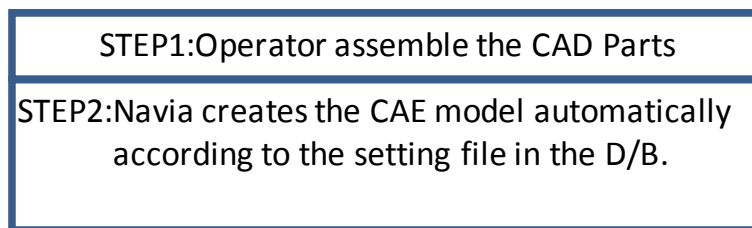| STEP1:Operator assemble the CAD Parts |
|---|
| STEP2:Navia creates the CAE model automatically according to the setting file in the D/B. |

Fig.2 Process of Modeling by Navia

The example of application is the simulation system for the cellular phone. Navia automatically creates the simulation model which consists of 300 parts including the contact condition et al. The system requires just 30 minutes of human operation. After that operation of human, Navia automatically create the simulation model with controlling the pre-post processor, solver, excel and other software.

Navia is applied to the automobile industry. The target of modeling period for W/B FEA modeling is just 2 or 3 days.

REFERENCES
[1] Navia EO User's guide, Integral Technology, Osaka, Japan