The establishment of three dimensional test model

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Abstract. To solve the problems of 3D mode quality inspection ,the automatic extracting software of 3D annotation based on process model is programmed by UG NX8.0 developing platform and C#10.0 developing environment. Achieve the function that drawing the model process information from 3D techology model, provides the interfaces of the secondary development software which can editing the examination-characterization, technologist can be re-edited according to the requirements of the guidance documents (such as inspection outline, inspection procedures, etc.), and establish a 3D inspection model. Automatically generate inspection plans through inspection model, import inspection plan into the management end of digital quality inspection system, guide the inspector or field workers detection. Finally, the feasibility and effectiveness of 3D inspection model are verified by an example test.

Introduction

With the rapid development of digital design and manufacturing technology of civil aircraft, many of the parts quality inspection process is still according to 2D drawings[1], 3D model test for the realization of digital quality detection system based on 3D model test research UG two based on the development of the building is particularly urgent, currently used in the inspection process model for process model, less there is no special test model, test model of special testing guide, affect the digital inspection process, the PLM can not form a closed loop, not with other enterprise management system integration, restricting the production efficiency of the enterprise, the inspection has become a bottleneck of enterprise digital link.

Based on the 3D model test as the core, based on the Windows operating system, using UG8.0 two software development tool UG Open/API, developed the MBD model aided design module, realize the automatic extraction of relevant information in the inspection process based on the model, and according to the inspection regulations on each of the PMI information to re edit, so that it can provide the inspection plan data source of effective software digital quality detection system. The measured data in the digital quality testing software can also be returned to the three-dimensional detection model, which is convenient for designers and relevant managers to grasp the overall quality of the quality[2].

Three dimensional test model to establish a whole scheme. Support the development of foreign mainstream 3d software of CAD MBD is only reflected in the 3D annotation function above, there is no uniform standard mode of operation, the product design is still the basic functions of the software itself as the main means, the lack of test information entry tool supporting, not flexible and reasonable expression of MBD test data.

This article selects C# and Journaling (log) for two development. Based on the two development of UG, the 3D inspection model is composed of three parts, that is, the editing of test models, the issuance of audit and inspection plan, and the return of measured data, as shown in Figure 1. The inspection process technician to enter the UG to open a 3D model, click into the user interface, click on the background of a certain size, extraction program automatically into the test attribute, information editing interface, information editing after the completion of inspection of the desired size of the selected test methods in the library, support manual editing test method; if the size of need measuring

machine, direct call measurement program library. After the completion of the inspection information editor, enter the inspection model audit, after the verification is no error, the generation inspection plan to send to the digital quality testing software system management. After the testing of the digital quality testing software is completed, the measured data are returned to the test model, and the user can right-click the size of the user interface to see it.
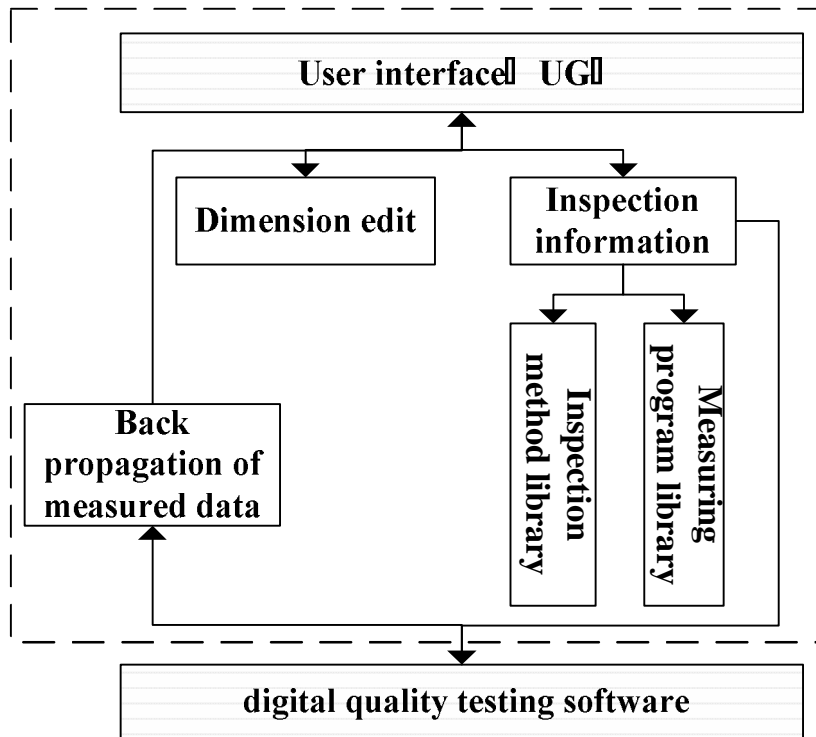

Fig. 1 system structure

Attribute extraction of 3D model information Page Numbers. Open the selected model in the UG program, invoke the dynamic link library.Dll file created by the WinForm dialog box, and complete the call to the dialog box in the c#10.0[1]. Taking Figure 2 as an example, we want to extract the attributes of diameter size. First we query dimension class including AngularDimension, BaseHorizontalDimension, BaseVerticalDimension, ComputedSize, NominalDecimalPlaces, ToleranceType, UpperMetricToleranceValue, etc. To provide a source of information for the establishment of a test model, only the function dimension.GetUserAttributes () can be proposed.
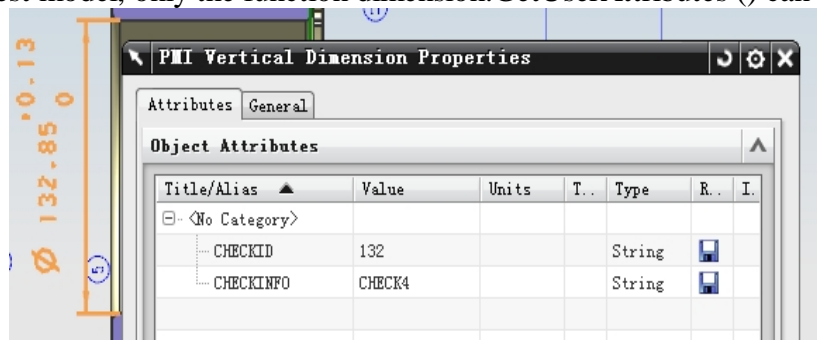

Fig. 2 horizontal dimension attribute editing interface in UG

Inspection information editing interface. The inspection technician is responsible for the editing of the interface. MBD test data set should be used as the only carrier of information driven test process, which includes not only the process of detecting the size of the staff, measuring tools, measuring equipment, auxiliary tools, testing methods and other requirements, and also need to consider the testing result of the storage process is completed when the storage. Combined with the actual application of the production site, the inspection data annotation method is embedded in the three-dimensional CAD system. It supports users to carry out the annotation of inspection data under

the constraint of inspection data specification, and provides the method of exporting 3D CAD system to other external systems.

Fig. 3 dimension editing interface

Initialization. First, open the 3D process model, click on the menu bar in UG Insepect information (NX Open for.NET using the options developed in Figure 3) pop-up dialog box, the detection performance of UG 3D model, including the characteristics of serial number, form and position tolerances, geometric dimensions, tolerances, standard and technical conditions of information automatic extraction and storage at the same time, technological comments in the file information, measuring tool information and measurement standard, for editing and generating module. Of course, if the original size information part is missing or wrong, or the labeling method is not standardized, the size and theoretical dimension of the process model can not be correctly identified or extracted by the attribute extraction module, and it can be modified. The standard tolerance database is set up according to the tolerance standard. For all the uninjected tolerance dimensions, the national standard, the navigation mark and the military standard are automatically perfected according to the inspection rules[3].

the composition of Inspection information. The product inspection information according to the actual situation of the production site, the project can contain source information, unit information, product information, process information model, namely all the size of the process of mutual information; also includes size information, measuring information, detection process information, inspection personnel information etc.. According to the actual situation of the production site, all or part can be presented in Figure 3. For example, size types include geometric size, annotation / label, shape tolerance, surface finish, etc.

Inspection method library. According to the description of the inspection method, formula (mean value, range value and other calculation formulas) and judgement method in the conventional process regulations and inspection rules, a unified judgement method is added to the inspection method library to facilitate the selection of inspection information editing.

Measuring program library. A measurement program library is established. Taking the measuring machine as an example, the measurement program can be generated and saved on the inspection model, which is directly selected for other measuring machines when the size is edited.

Back propagation of measured data. The final inspection data collected by the digital quality inspection software system can be backfilled to the database one by one, and finally displayed to the actual size location of the Insepect information interface. It supports real time return.

Conclusions

The inspection technician is responsible for the editing of the interface. MBD test data set should be used as the only carrier of information driven test process, which includes not only the process of detecting the size of the staff, measuring tools, measuring equipment, auxiliary tools, testing methods and other requirements, and also need to consider the testing result of the storage process is completed when the storage. Combined with the actual application of the production site, the inspection data annotation method is embedded in the three-dimensional CAD system. It supports users to carry out the annotation of inspection data under the constraint of inspection data specification, and provides the method of exporting 3D CAD system to other external systems.

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