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Research Article

Planning of Creative Commercial Components Virtual Warehouse Platform

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Abstract: In this study, through the analysis of actual goods warehouse application, creative commercial components virtual warehouse platform over the networks is proposed to support the complex mechanical product commercial work mode. This platform may play an important role during the collaborative commodity design process, especially the geometrical model to the commercial model. First, the framework of commercial design process was described detailed with the supporting of virtual components warehouse platform. Then, those platform features such as networks-based, agent-oriented and enterprises alliance-served were discussed. The platform application modes, on-line stocking and inquiring were also classified. Finally, the planning framework of the commercial components virtual warehouse platform was studied detailed.

Keywords: Commercial components, planning, virtual warehouse

INTRODUCTION

In 21 century, modern R&D enterprises face many challenges, one of these is the product living cycle becomes shorter than before but its design scheme becomes more complicated (Chung, 2008). In the scheme design stage, there existed two problems: one is how to re-definition of the "designing object", that is Wang *et al*. (2005a) and Wang and Xing (2005b), the traditional product designing process should be changed into the creative commercial design process. The other is how to suitable for this changing, especially on the condition of the advanced networks technology application, as well as large of modern manufacturing enterprises opening their gateway to the world by the Internet (Mei *et al*., 2011).

The second one is relevant of application of commercial components data by networks technology**.** In this study, the author studied specially on the commercial components virtual warehouse platform on the networks, which will provide the powerful supporting for the creative collaborative commercial work process.

By the development of the commercial components virtual warehouse platform, one hand, it will enhance the spirit of modern enterprises' innovation. For some technical restrictions, especial the lack of advanced computer aided development, many traditional manufacturing enterprises faced serious growth problems (Chu *et al*., 2012; Shan *et al*., 2011). The lifecycle of one product is long. The update of modern products is slowly. Those various and quickly market demanding could not be satisfied timely. Sometime, it is not the lack of computer aided tool, it is the reasonable application about them (Wang *et al*., 2006a, b). The commercial components virtual warehouse will provide one integrated computer aided working platform for those enterprises. The integrated market information captured by the help of informational technology will enlarge the viewpoint of enterprises' strategy. Advanced aided tools will help developers to change their novel ideas into reality efficiently. The innovative abilities of an enterprise will be aroused.

On the other hand, it will promote greatly the efficiency of global R&D resource application. In the long period of development work (Erven *et al*., 2007; Wang, 2012), many R&D enterprises have built a great deal of designing and manufacturing resource about products or components (Drawing, file, data, experience, standard and criterion etc.) To explore and make use of these data fully and make them to be the useable resource of other development process is the main aim of the commercial components virtual warehouse platform (Lee *et al*., 2008). Through this platform, many participators could share their product data with other cooperative members.

During the creative commercial work process, the "designing scheme" treated by the designers could be divided into three sub-schemes (Wang *et al*., 2008a; Wang, 2008b): the geometrical model sub-scheme, the commercial model sub-scheme and the assembling model sub-scheme. Compared with the traditional design style, the commercial model sub-scheme will provide the detail and explicit commercial components

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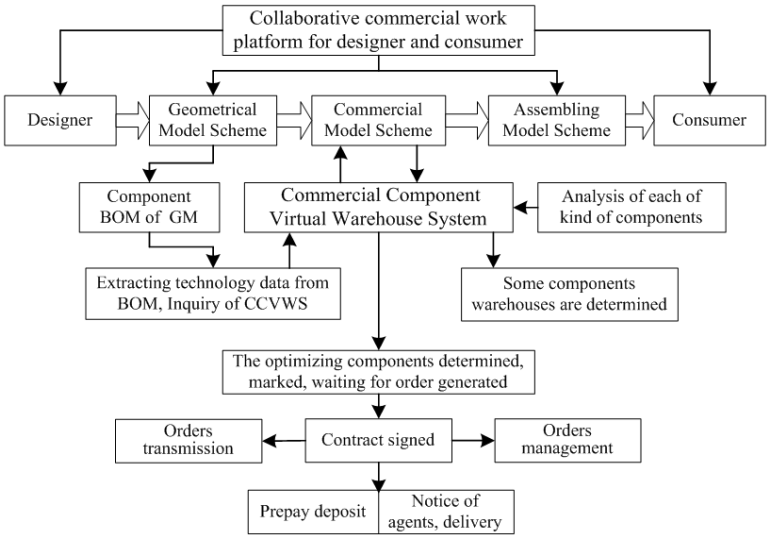

Fig. 1: The workflow of commercial model scheme development

data such as price, quality etc. about the whole design scheme for designers during this process. That is, by the application of commercial components virtual warehouse platform, the commercial sub-scheme information could be collected timely at this developing stage.

So, the commercial model sub-scheme design process is the core for the creative commercial design process. This designing stage is supported by the commercial components virtual warehouse platform.

As the Fig. 1 shown, first, with the supporting of commercial components virtual warehouse platform (for short CCVW), the designer could collect up enough of useful geometrical data such as the dimension, tolerance, material etc. from the geometrical model sub-scheme. Those key geometrical data are generated by the collaborative commercial work supporting platform. By using of those data, the detailed commercial data with each component such as price, quality etc. will be generated through out of searching for the commercial components virtual warehouse platform. After that, some of components supply warehouses will be pre-selected according to the components' searching engine by the virtual system. And further determination for those pre-selected warehouses will be waited for. If the commercial components data such as price, delivery time and quality etc. is satisfied for the whole designing scheme without any objection, then this component will be marked and the corresponding supplier will be determined. The system should be turned into the component order treated interface. Otherwise, the commercial component negotiation supporting system will be started to solve those different requirements.

At the component order treated stage, each of selected component renting agents will be notified by the order parallel issued and managed system to prepare for the supplying activities. As a result, the deposit about the purchasing in advance has to be prepaid by the demander such as the designer. And the contract of components supplying will be signed between the renting agent and designer.

From the Fig. 1, it could be found that the commercial components virtual warehouse platform is the core part for the whole collaborative commercial work. It is very important for using of the commercial components resource data through out of the network. Development of this commercial components virtual warehouse platform will provide a strong foundation for those R&D enterprises to carry out this novel research work. As a result, the creative capacities of those R&D enterprises will be enhanced greatly and the accurate market information will be obtained timely.

Compared with the traditional supplying chain system, the commercial components virtual warehouse platform holds three main status such as networks-based, agent-oriented and enterprise alliance-served.

Networks-based: As we know, as the traditional supplying chain system, it is needed their own warehouse to store those commercial components for suppliers. Generally speaking, one hand, the extra logistic fees are often needed. On the other hand, special personnel charging for the distribution are also hired. In order to solve these problems, the commercial components virtual warehouse platform is built up. That is, different from the traditional supplying chain system, the real mechanical components do not be stored in their warehouse. The virtual warehouse only holds those virtual components commercial data. This will be very convenient for those customers to browse their interested commercial components through the computer screen rather than enter into the practical selling place. At the same time, this virtual warehouse platform could be opened for 24 h a day as long as

suppliers wanted. Compared with the 8 h a day, the chances for getting more components orders will be enhanced and extended.

In addition, the commercial components virtual warehouse platform could help those sellers to decrease their logistic fees. Commonly, the higher logistic fee is the main reasons for a component holding higher selling price. In the virtual environment, the practical logistic space would be saved. As a result, a middle platform is provided by the virtual warehouse agent between the customers and suppliers. Those agents will help them to deal with the synchronous or asynchronous ordering process according to some strategy.

Considering of the current popular e-business system, the commercial components virtual warehouse platform is served as one part of the creative commercial work process. It provides the specialized commercial components supplying service only for those D&R enterprises.

Agent-oriented: Different from the current e-shopping system, the CCVW platform is only served as a common platform function for the commercial components application. The business agent defined in the CCVW play an important role during the commercial components supplying process. Each of business agents holds its own data storage space. That is, the CCVW platform will help the components' transaction behavior transformed from the real place to the virtual platform. With the help of the CCVW business agents, the components supplier can rent the transaction platform freely to carry out his daily management. For the reason of transaction changing, the components supplier daily work is also changed. The attribute of agent-oriented will enhance CCVW the ability of self management. This will decrease greatly the labor cost.

Enterprise alliance-served: In the whole of creative collaborative commercial work process, one virtual enterprise alliance system involved of different members will be organized. In this system, each of members are undertaking of different functions such as: designing function, managing function, supplying function and assembling function etc. The CCVW platform will serve for all of these functional requirements. For example, as the designing member, he could find immediately that whether or not his designing scheme suit for the market. As the managing member, he could obtain the designing scheme cost information quickly with the real commercial components data. Then the designing process could be adjusted timely if it necessary. As the supplying member, the CCVW platform will provide him a virtual transaction platform.

MATERIALS AND METHODS

The stocking application mode: By this application mode, the CCVW platform could give a common and convenient way for those purchasers who hoped to select their interested components in the system database. With its help, a synthetically decision for the components commercial data such as price, quality could be made by those purchasers. Then the correct choice will be determined. The shortcoming of this application mode is that the components commercial data are static data and needed maintain frequently by those suppliers.

The inquiry and quoted application mode: Different from the stocking application mode, the inquiry and quoted application mode is used for those components that the purchasers could not get their interested components data from the static database system. The real-time operation is its main feature of this application mode. Through out of the real-time consultation process, the purchaser can obtain relevant newly components data information such as the price, delivery time as well as quality etc timely. This application mode should solve the problem of "static state data" of the on-line stocking mode.

Like the discussion above, the application of components commercial data information based on the networks is a core factor to determine the creative collaborative commercial work. Correspondingly, the development of supporting platform CCVW platform should be made to provide this application. In this section, the researching work mainly focused on the framework and module designing of this platform.

The framework planning of CCVW: Considering of the design of the CCVW framework, the core work is the development of large scale of components supplying database system. This database system is used to store huge data of commercial components coming from the worldwide. The daily management and maintenance of these data is charged by database management system. The application operation of the commercial components is finished by the commercial components supplying management system. Some common operations such as inquiring, ordering, deleting and revising etc. provided by the data application technology supporting module to users. All of those modules are realized to satisfy the applications over the network.

The main modules planning of CCVW: The main modules of CCVS platform included four sub-modules: the virtual warehouse sub-module; the advertising sub-module; the warehouse planning sub-module and the user managing sub-module. The virtual warehouse sub-module is the base of CCVW. This module should be designed with B/S style according to the current popular networks application technology. In the server, huge of components commercial data are stored. Varied of supplying data are classified by different index such as the supplier, place etc. In order to make full use of those varied of data, the distributed database system is

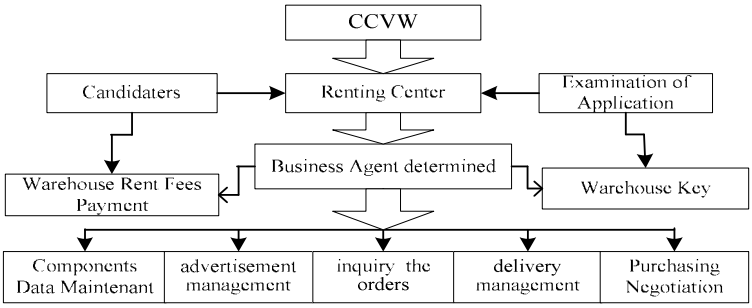

Fig. 2: The warehouse rent charging chart

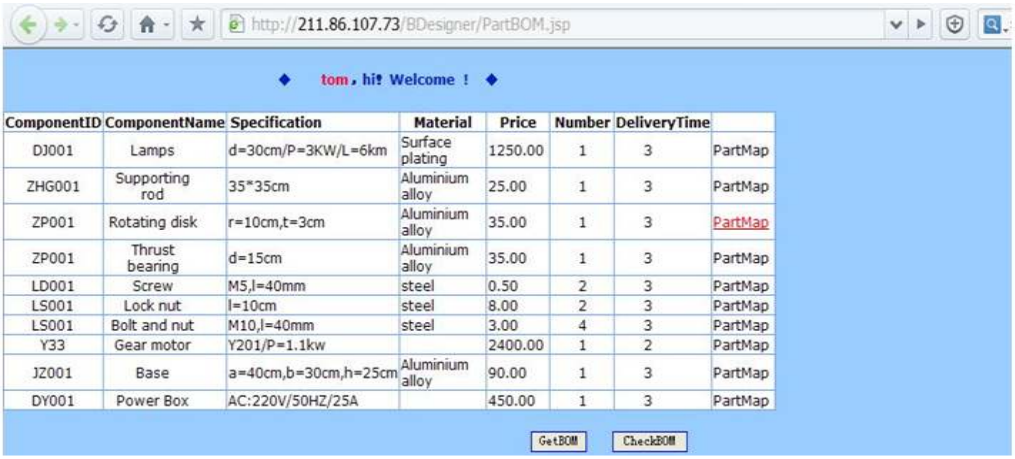

Fig. 3: The interface of commercial components

adopted. In the client, the common interface is provided for different users. What they are needed is a computer connected to the network. Different places and different demanding could be very easy to satisfy by the network application.

In order to execute successfully the virtual warehouse tasks, the virtual warehouse sub-module permits four different user roles to enter its platform. That is, the administrator role, the project manager role, the components supplier role and the project designer role. According to the up to down sequence, the administrator holds the highest-level membership, the components supplier and project designer role holds the lowest-level membership. Different role will operate his respective interface.

In general, the administrator will manage all of the user's data, included of the designing data resource such as the CAD tools etc. In this sub-module, the administrator only takes responsibility for the management of the project manager roles. And the others roles such as components supplier roles and designer roles will be charged by the project manager.

The advertising sub-module put its focus on the propaganda for the CCVW. That means those excellent suppliers can be recommended if it is necessary. This sub-module will generate two advantages: one is the enthusiasm of suppliers will be enhanced. Another one is the CCVW will be known by more and more companies.

About the warehouse planning sub-module, it will be generated automatically according to those authority user asking. For example, if a components supplier or a project designer hopes to transaction on this platform, he will first apply for his accessing authority from the system administrator. After passing to the examination, this module will help him to set up his warehouse. And he will carry out the daily maintain and manage activities.

As for the user managing sub-module, all of the users will be managed by the CCVW such as the suppliers, the visitors, the purchasers etc. The managing sub-module could be designed into two levels: the higher level is the administrator level. The lower level is the user level. In this managing level, every of the user has his own authority to manage his data and action.

The whole platform is like a large-scale virtual components market. It provides for two kinds of running mode. One kind is for the components suppliers running mode. The other is the components manufacturers running mode. For the latter, it will decrease greatly the running cost by this platform. The key of CCVW successful implement is the large quantities of good faith, legitimate management users. Simultaneously, widely and deeply propaganda is needed too.

The rent charging process planning: The virtual warehouse renting process is shown as Fig. 2. First, the candidates need to submit their application to the CCVW warehouse renting center through of connecting into the correlative interface. After through examination, the applicant needs to pay the warehouse renting fees. Then he will obtain the warehouse key to "open" it. This role has the following operating function: the daily maintenance about the commercial components data; the commodity advertisement management; the inquiry of the orders; the goods delivery management; and the negotiation of the components bargaining.

The supplier agents should keep good faith and carry out legitimate management. Their managing behaviors should be restricted by the national law as well as the network principle. In addition, it should be strictly verify those candidate actual operating capacity to guarantee the authenticity of his submitted application by the CCVW platform.

RESULTS

On the basis of discussion above, the commercial components virtual warehouse platform prototype including of the commercial components data information serving subsystem and the collaborative design subsystem is developed. Figure 3 is the interface of the commercial components supplying. With its help, the creative collaborative commercial work mode could be carried out.

CONCLUSION

As one of the applications of network advanced technology, the creative commercial components virtual warehouse platform over the networks can support those modern manufacturing enterprises to enhance their competition. Some research results showed that this components virtual warehouse can support project designers to carry out the creative collaborative commodity development. This study had given some core technology to build the virtual warehouse platform. In the future, the system implement and management of business agents will be also discussed deeply.

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