ENGINEERING DESIGN IN INTEGRATED PRODUCT DEVELOPMENT
Design Methods that Work

ENGINEERING DATA MANAGEMENT

BY INTERNET IN MACHINERY DESIGN

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Abstract. *In the paper it is summarized for the realities that Internet has a great impact on the development of science and technology and people's behavior as well as potential action of its on the future scientific and technical progress in mechanical engineering. The conception of Remote Engineering Data Management (REDM) for international team work in machinery design is proposed. Also methods of REDM are studied. An example of application of REDM is given out.*

1. INTRODUCTION

The future society is going to be information society because convergence of computers and communication technology continues with a great pace. Information flow rather than passenger flow and goods flow to people rather than people going to goods could be the outcome.

With rapid advances in technology, network configuration are transgressing to provide high band width connectivity using fiber optics, fast Ethernet fast distributed data interface (FDDI), Asynchronous Transfer Mode (ATM) and high speed satellite broadcast/delivering. In future as said there will be more and more IT developments in mind while planning for mobility in future. On the other hand, it indicates that economic competition is fierce; every area of manufacturing is facing with being challenged with continually changing and unpredictable global market competition. The essence of the competition is to produce new products based on new knowledge. In order to promote and enhance competitive capabili-

ties, advanced manufacturing enterprises must meet customer requirements in the shortest possible time with high quality product, at low cost, with satisfactory service and with minimal environmental pollution. In the last ten years, manufacturing technology has been combined with information technology, automation technology and advanced management technology to produce a new generation of advanced manufacturing technology that is the most effective method for improving the production process in these areas

Internet is playing an important role in promoting intercommunication and cooperation for people between different countries and regions. More and more people have been aware of the benefit from the Internet. It can almost affirm that Next Generation Manufacturing (NGM) trends to Network Manufacturing (NM). Machinery CAD/CAM, without question, for an important area of mechanical manufacturing, mechanical engineering even the whole industry, is challenged by the network technical revolution either. Internal potential and the development tendency have interested entrepreneurs,

professors and scholars who engage in similar re-searches and have responsibility. Therefore, many people are applying oneself to Internet resources servicing in engineering technical data processing such as E-commerce, enterprise management, enterprise-business-sell and network manufacture, etc. Here we will discuss the application of Internet tools to international team work in remote engineering data management (REDM), and an example is given out in this paper.

2. CONCEPTION AND CONTENTS ON REDM

In order that share information, knowledge and resources of contacting one another, it is necessary that research the approaches and methods of REDM that includes remote data access technologies. Microsoft's technologies of remote data services (RDS) make it possible for different countries and
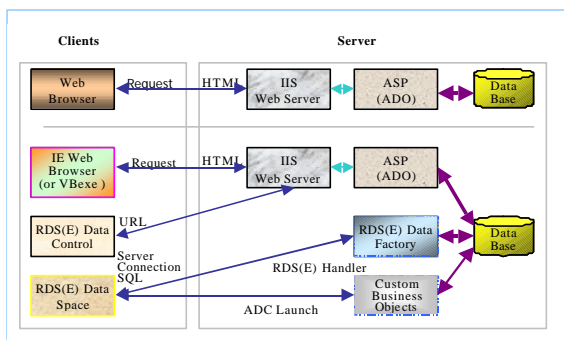

Fig. 1 The principle of REDM

regions to implement engineering data management. It allows end-users to bring one or more disconnected ActiveX Data Object (ADO) recordsets from a remote server to a client computer using the HTTP (Hypertext Transfer Protocol), HTTPS, or DCOM protocols. Here, a figure of RDS' principle is quoted in order to illuminate the conception of REDM, as follows.

RDS is part of Microsoft Data Access Components (MDAC) that contains ADO, RDS, ODBC, and OLE DB core components as well as the ODBC Drivers and OLE DB Providers, and Ms windows 2000 Personal has contained all components

On the client-side, the key RDS components are the RDS DataControl and the RDS DataSpace. The RDS Data Control is a non-visual, data-binding control. It can be used to get and maintain data on a remote server by some special techniques such as setting URL property, Server/Connect/SQL Properties, etc. The RDS Data Space is a non-visual, client-side object. It allows you to create an instance of a business object that is located on a remote server using RDS over HTTP, HTTPS, or DCOM. The RDS DataSpace creates a client-side proxy for the business object. Client-side proxies help with the

packaging, transport (marshaling), and un-packaging of disconnected ADO recordsets across process or machine boundaries.The RDS Data Space can be used to get and maintain data on a remote server by technique of RDS DataFactory or Custom Business Object.

On the server-side, the key RDS components are the RDS DataFactory, Custom Business Objects, and ASP web pages (used with the RDS DataControl's URL property). For this reason, it is necessary to install Ms Windows 2000 Server that contains MDAC. The RDS Data Factory is Microsoft's default business object and provides methods for sending SQL to a DBMS and passing back the results in the form of a disconnected ADO recordset. The RDS Data Factory doesn't contain any validation or business rules logic. If you need this type of logic, then you will have to create your own custom business object. If you want your web-based database application to perform validation or business rule logic, then you will need to create a custom business object (and not use the RDS DataFactory object). Besides, if you use the RDS DataControl's URL property, then you will need to create "separate" ASP Web Pages (ASP) that are able to get and maintain data on a remote server.

3. DEFINITION OF INTERNATIONAL TEAM

International Team is a research group that works in different countries and regions, which based on Internet. Its members will accomplish not only co-operation and exchange in technique by means of Internet tools, but also developing practical application and multi-language client platform. What is more, The international team will be the basis of NGM---NM, which involves in advanced design technology and advanced manufacturing technology. This includes computer aided design, engineering and manufacturing (CAD/CAE/CAM).

4. SOLUTION OF REDM

Here, it will be put forward for some thoughtway on solution of REDM.

Firstly, we have organized an international team that works in several countries and regions to bring into effect international cooperation projects.

Secondly, we are carving out a channel on the basis of Internet, and then establish a pattern of international teamwork. Under the pattern, we will develop all-sides exchange and cooperation of globality. We first begin from CAD in machinery; with the development of IT in mechanical industry, we will gradually expand the range of cooperation and exchange to consumers and market. Hence, we

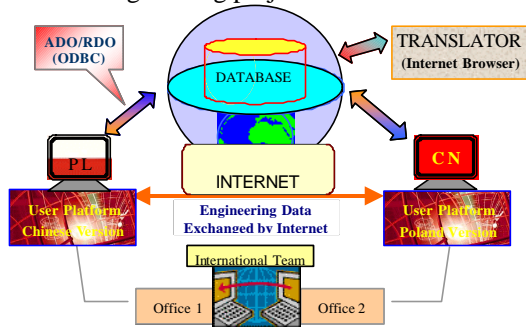have to develop relevant application to carry out REDM in engineering projects.

Fig.2 A Pattern of Application

Finally, we have founded a few design offices (DO) in several countries and regions; for instance, one DO is situated in Poland and another in China. These DOs are consisted of a group of researchers and suited tools for products development as well as essential communication means, which implement intercommunication by Internet. The detail thought is shown as figure 2.

🗁 We will develop a public work platform that can support Chinese, Polish and English as well as more other languages, at the same time, can carry out transforming each other between different languages.

🗁 The Polish clients, Chinese clients and others can be connected by Internet Server, and they will share public database resources. Internet browser can be viewed as client's interface tool that converts information into language you want by means of the website and ASP (Active Server Page) Scripts from Remote Server.

🗁 Under AutoCAD environment that holds Auto LISP language and DCL, ODBC links VBA to Server Database. ODBC (Open Database Connectivity) is used for carrying out data exchange between Clients and Server.

5. AN EXAMPLE OF APPLICATION

5.1 Data Transferring

A principle of simple REDM system is shown as figure 3, which supports several kinds of way and method to implement REDM.
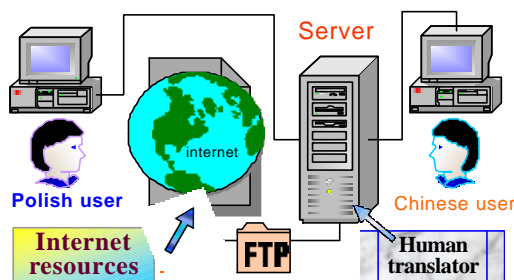

Fig. 3. Conception of Conversion System

In general, Electronic mail (Email), File Transport Protocol (FTP) and Web Site Services (WSS) are all very efficient and feasible approach to carry out REDM. FTP is more befitting for our instance. There are two kinds of method of registering to FTP service; one of them is that adopts assigned account and password to log in, which is used for special FTP service; another method is anonymous logon, which take separately anonymity and E-mail address as its user ID and password but access authorization to be limited. Its connected status is shown as figure 4 and figure 5.
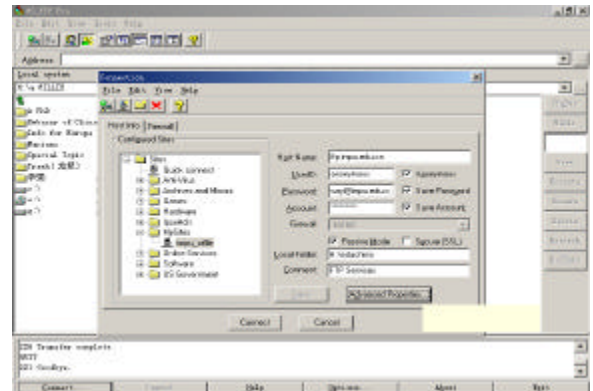
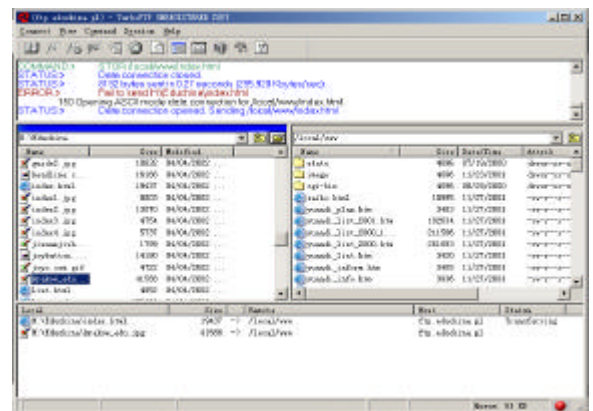

Fig. 4 FTP of Anonymous Log in

Fig. 5 FTP of Account Log in

5.2 Data Convertin

Likewise, data converting is also most important part in our research. The database based on MS Access has stored a lot of text information in different languages. In addition, the database has to be connected to AutoCAD graphical environment that apply VBA programming language to establishing connection and getting or putting data as well.

The translator can utilize database from special website that is employing Active Server Technology

to connect to database; and it can be connected directly by other applications too.

The example in the paper is based on some drawings that were drawn by AutoCAD in Polish version and sent to Chinese users (designers). They have to convert the drawings of Polish version into Chinese version by the conversion application when these users receive the drawings.

AutoCAD interface has to be extended in order to execute translation command in AutoCAD environment, shown as figure 6.

Fig. 6 Add a button for language select

The process of converting text and Languages is illustrated by figure 7. Figure 7 brings forth a user selection box, which decides if the program control will continue to translate or not. Information of translating for objects found in ModelSpace and information of updating database are separately shown as figure 8, figure 9.
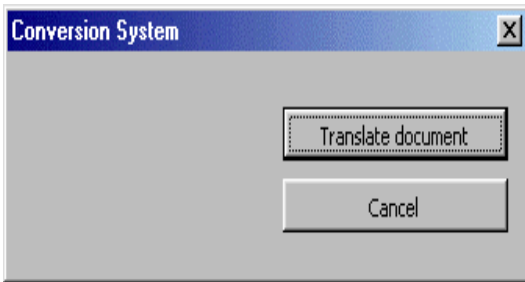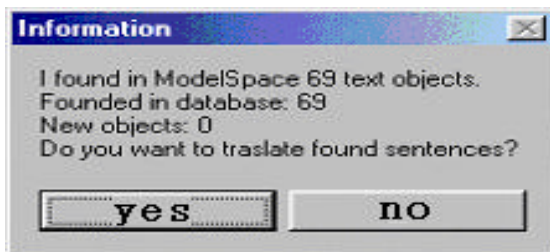

Fig. 7 Running application

Fig.8 Information of finding objects

The result of before and after converting language is illustrated by figure 10, figure 11.
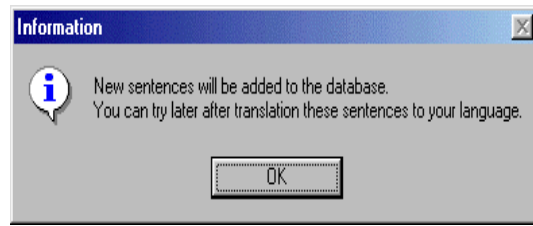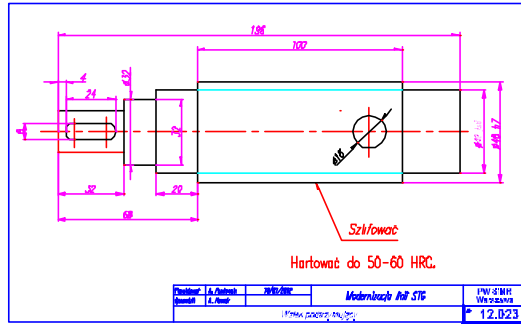

Fig.9 User instructions
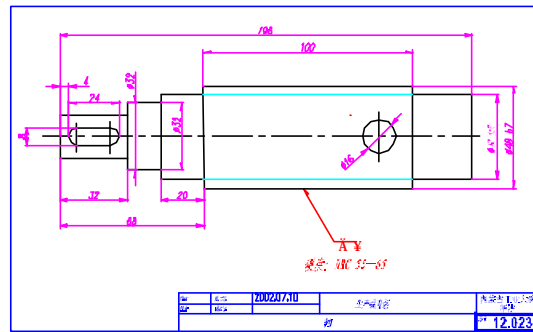

Fig. 10 Drawing before conversion

Fig.11 Conversion into Chinese version

6. CONCLUSIONS

☐ There are many approaches of REDM, however, it is necessary for client, whichever, to develop relevant applicatian on the base of integrating correlative Internet resources, in order to meet the requirement for special engineering project services and implement some given tasks.

☐ RDS is one of efficient and feasible method to implement REDM. Contrastively, to use FTP way is more economic and applied, which almost need not any particular spending to be able to fulfill data exchange. On the other hand, if anonymous log in is adopted, the security of data exchanging will be unable to be protected.

☐ Internet is the basis of international team collaborating and intercommunicating, and it is a powerful carrier to develop engineering IT. Therefore, there are a lot of new subjects to be waiting for us to research.

 The client application in the example is reasonable and feasible and can meet the requirement for the project.

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