INDUSTRIAL ENTERPRISES' STUDY
OF AUTOMATIC CONTROL SYSTEMS

Valeriy Dyadichev, Andrey Kolesnikov

Volodymyr Dal East-Ukrainian National University, Lugansk, Ukraine

Summary. A research of opportunities and benefits of automated enterprises' control systems has been carried out. Generations, models, objects and components of automated control systems have been studied. Recommendations on how to adaptate the systems for the enterprise have been given.

Key words: automated control system, database, request, report, object, resources, planning, sales, purchase, accounting, fixed assets, finance, quality management, models.

INTRODUCTION

As the structuring of industrial companies develops, modern automated enterprise management systems, so called, ERP-systems (from Enterprise resources planning - Enterprise Resource Planning) become more popular.

CAM system is a set of integrated applications that are integrated into a single information space, is supported by all major aspects of enterprises' management - planning resources (financial, human, material) for the production of goods (services), operational management of the implementation of plans (including the supply, sales, maintenance contracts), all kinds of accounting, analysis of economic results [1].

The main requirements for CAM systems are: centralization of data in a single base, close to the real time mode, preserving the common management model for companies in all industries, support for geographically-distributed structure, work on a wide range of hardware and software platforms and database management systems.

CAM is a computer system designed to handle the business operations of the organization and to promote integrated and operational (in real time) planning, production and customer service. In particular, CAM systems have following characteristics:

ready software developed for client-server environment, both traditional and Internet-based technologies;

these systems integrate the majority of business processes;

they handle most of the business organization;

these systems use a database of companies, each sample of data which is stored as a rule, once;

they provide access to data in real time;

in some cases, these systems can integrate the processing of business and action planning (for example, production planning).

Moreover, more and more often CAM systems have such additional features as:

support multiple currencies and languages (which is very important for multinational companies);

support for specific industries (example, SAP supports a large number of industries, including oil and gas industry, health care, chemical industry, and banking);

ability to configure (customization) without programming (example, installing "switch").

Here are the main benefits of the introduction and use of CAM systems:

CAM systems integrate activities of the company.

Processes of Enterprise Resource Planning are cross-functional, forcing firms to go beyond the traditional, functional and local framework. In addition, various business processes of enterprise are often linked. Moreover, the data were located previously on various heterogeneous systems, now integrated into single system [2-3].

CAM systems use "best practices".

Enterprise Resource Planning systems have embraced more than a thousand of the best ways of organizing business processes. These best practices can be used to improve the performance of firms. Selection and implementation of CAM requires the implementation of best practices.

CAM systems make organizational standardization possible .

Enterprise resource planning systems make it possible to standardize the various organizational units which are geographically separated. As a result, units with non-standard processes can be made to be the same as other units with effective processes. Moreover, the company could appear as a unified organization to the outside world. Instead of receiving various documents, when one company has to deal with different branches or establishments of the company, this company can be brought to the world as a single, common way that leads to the improvement of its image [4].

CAM eliminate information asymmetry.

Enterprise resource planning piles all the information in the same primary database, eliminating the numerous information discrepancies. This leads to several results. First, it provides increased control. If a user is not doing his job, the other sees that something was not done. Second, open access to information for those who need it, ideally, provides better information for decision-making. Thirdly, the information ceases to be the subject of mediation, as it becomes available and for the leadership and the employees of the company. Fourth, the organization may become a "flat": since the information is widely available, there is no need for additional low-grade employees, whose primary activity is to prepare information for distribution to management and employees of the company.

CAM provides information in real time.

In traditional systems, a large amount of information is recorded on paper and then transferred to another part of the organization where it is reissued (usually aggregated), or transferred into computer format. With CAM system large amount of

information is collected at source and placed directly into the computer. As a result, the information immediately becomes available to others.

CAM provides simultaneous access to the same data for planning and control.

Enterprise resource planning systems use a common database, where most of the information is entered once and only once. Since the data available in real time, virtually all the workers of the organization have access to the same information for planning and control. This may facilitate a more coherent planning and management compared with conventional systems.

CAM systems promote interaction and cooperation within the organization.

Enterprise resource planning systems also promote interaction and cooperation within the organization (between the various functional and geographically separated units). The presence of interrelated processes lead functional and geographically separated units to interaction and cooperation. The processes' standardization also promotes cooperation because it leads to less controversy between processes. In addition, a single database facilitates interaction, providing each geographically divided and functional unit the information they need [5-6].

CAM systems promote interaction and cooperation between organizations.

CAM provides the information backbone for the organization of interaction and cooperation with other organizations. Companies more and more open their databases for their partners to facilitate procurement and other activities. In order this system to work, you need a single archive for use by partners, and CAM can be used to facilitate such exchanges.

CAM SYSTEMS' CAPABILITIES

Main features of CAM system can be presented in the form of four units: planning, accounting, analysis, management.

Planning

To carry out planning activities of the enterprise at different levels means:

To form the program marketing.

To provide planning and scheduling (specified and approved marketing program is the foundation of the production plan, the integration of data from these plans facilitates the process of production planning and ensures their inextricable link).

To form the main production schedule (detailed operational production plan on the basis of which works the planning and management of purchase orders and production).

To form purchase plans.

To provide financial planning and budgeting.

To conduct a preliminary assessment of the feasibility of the plans formed at various levels of planning to make the necessary corrections or a decision on raising additional resources [7].

Accounting

If the plans have been confirmed, they acquire the status of current plans, and their implementation starts. Previously modeled flow of dependent orders transforms into a real one, which generates demand for materials, labor resources, power and

money. Addressing these needs creates user actions to ensure the prompt registration of direct costs related to production (material, labor, operating costs in relation to tasks, process operations, design, maintenance work ...), and indirect costs that are allocated to the centers of financial responsibility. All operations on the registration of direct costs are introduced, usually in a kind of normative consumption (material - in the relevant units of measurement, labor - time ...). To reflect the financial results of the CAM system offers powerful set of financial integration, allowing the automatic the transfer of consumed resources into their financial equivalent.

Analysis

Due to the reflect of operational activity, management staff gets the opportunity to implement real-time comparative characteristics of plans and results, and the availability of additional modules for the calculation of key indicators and construct mathematical models greatly simplifies the process of business planning.

Management

The presence of operational informational feedback on the state of object control, as is known, is the foundation of any system of management. CAM provides this kind of backward (accurate and timely) information on the status of projects, production, stocks and cash flow, etc., that as a result you can make informed management decisions.

CAM SYSTEMS' MAIN COMPONENTS

Enterprise resource planning systems can provide a wide variety of functionality, using components that are often called "modules" [8].

As an example we list the main components of the SAP R / 3:

AA (asset accounting - Accounting for Fixed Assets) responsible for the information on the wear and tear, insurance, fixed assets, etc.

CO (controlling), including such blocks as «Accounting cost center", «cost control» and "value analysis" (activity-based costing, ABC).

FA (financial accounting), including units of "Home Book", "Accounts receivable", "Accounts receivable" and "The consolidation in accordance with the law" (legal consolidations).

HR (human resources), including blocks "Personnel Management" and «Planning and Development».

MM (materials management), including blocks "Inventory Management", "Control of invoices", "Warehouse Management".

RM (plant maintenance), including units of "Production and technical objects", "Preventive maintenance", "Maintenance Management", "Control orders for maintenance."

PP (production planning), including units of "operational planning and scheduling of sales", «Material planning and capacity planning».

PS (project system), which includes blocks "Project Management" and "Budget Management".

QM (quality management), including units of "Quality Certificate", "Inspection", "Tools for Planning" and "Notice of quality."

SD (sales and distribution).

In addition, the system has a so-called "common" (cross-application) modules, which can be used in the R / 3 everywhere. Among them - SAP business workflow (workflow support) and SAP office (support office work).

CAM SYSTEMS' MODELS, OBJECTS AND PROCESSES

The concept of model, object and process (MOP) are key for any CAM system. The process of configuring CAM consists of selecting and integrating the system of models? Objects and processes used be organization.
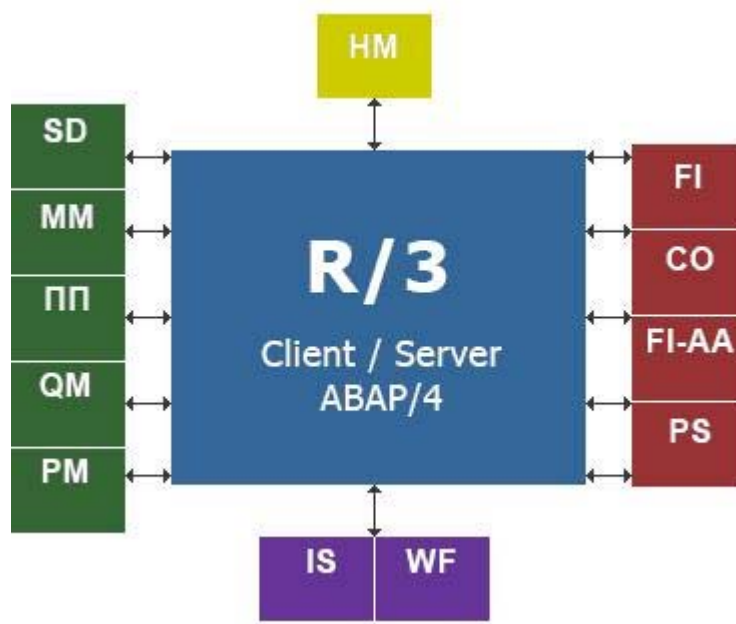

Fig. 1. Application modules for information system SAP R/3

Models

CAM contains several models, such as, for example, a model of organizational structures in the SAP R / 3 (Fig. 1). These models show the real world system, and their quality is important for reflection reality. For example, a model of organizational structures can record information up to the buffer storage. And information can be combined, starting from the buffer memory, up to the level of the corporate group.

These capabilities give benefits but also increase cost. On the one hand, they can provide the system a certain level of detail of the organization, necessary for modeling firm. On the other hand, if the company model is changing, the system should be changed. As a result, if the models change often, it costs quite expensive.

There are certain assumptions relating to those basic models, which should be adapted for implementation. For example, as indicated, the organizational model of the R / 3 required from Microsoft to describe each unit for the purposes of simulation evaluation whether as cost center, or as a profit center. Unfortunately, this view differs from the existing organizational models, and Microsoft had to adapt to the model.

Object

Object can be defined as an interface between the "internal" environment - the content and organization of the object itself - and the "external" environment - environment in which it operates. The internal environment - is a computer program, and external - is a world in which the operating system works.

Enterprise's objects is a food for the informational processes. For example, under such company's facilities as "document" is generally understood accounting. In addition, the objects are also the implementation of the models (in the form of a list of accounts, lists of manufacturers, lists of products, etc.). Objects enterprise known as the documents generated by the system as output data (example, bills) or used as input data (customer orders). Objects of the company which are the implementation of models (example, lists of producers), provide the structure of production systems [9].

CONCLUSION

• Using full-featured unified resource management can provide huge benefits to enterprise organizations in effective management of the company, increasing responsiveness to changes in the external environment, improving the quality of customer service.

• Implementation of CAM system to the enterprise not only helps to increase the automation of certain processes, but also to re engineer themselves these processes. As a result of the introduction majority of operations are standardized, manageability of the organization significantly increases, the degree of information transparency increases.

• Interaction with CAM is done by entering data and receiving reports. Entering data is organized in such a way so to avoid any duplication and to ensure the proper level of control over the correctness of the input to eliminate possible operator error. Output can be provided in the form of standard reports, and results of specific user requests. For ease of use records are placed in corporate or global network and are integrated into various custom applications.

• Obviously, CAM in the near future will become an integral part of the management system of any enterprise, whether it is a small trading company or a multinational corporation. The popularity of such systems is growing rapidly, and the price of their implementation and operation has been steadily decreasing. For the moment the introduction of CAM is justified step in improving management of any company.

References

1. SAP R/3 System. Function in detail. Material Management / Production Planning, SAP. 1994
2. Automation of enterprise management systems standard ERP-MRPII / Obuhov I.A., Gayfullin B.N. - M:Interface-press, 2001
3. ERP-systems: choice, implementation, operation. Modern planning and management of enterprise's resources / D. O'Liri - M.: Vershina, 2004
4. Practice of ERP-system usage / Piterkin S.V.and others, M.: Alpina. business book, 2002
5. Karasik I. Software and hardwear for information protection for personal computers // ComputerPress №3, 1995
6. Maftik S. Mechanisms of protection in computer networks /translation from english. M.: MIR, 1993
7. Petrov V.A., Piskarev S.A., Shein A.V. Informational security. Protecting information from unauthorized access to automated systems. - M., 1998
8. www.erp-online.ru
9. www.erppeople.com

ИССЛЕДОВАНИЕ АВТОМАТИЗИРОВАННЫХ СИСТЕМ УПРАВЛЕНИЯ ПРОМЫШЛЕННЫМИ ПРЕДПРИЯТИЯМИ

Дядичев В., Колесников А.

Аннотация. Проведено исследование возможностей, а также преимуществ использования автоматизированных систем управления предприятиями. Рассмотрены поколения, модели, объекты и компоненты автоматизированных систем управления. Даны рекомендации по способам внедрения систем на предприятия.

Ключевые слова. Автоматизированная система управления, база данных, запрос, отчет, объект, ресурсы, планирование, сбыт, закупка, учет, основные средства, финансы, управление качеством, модели.