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Design solutions for the integration of production information systems

The results of research on the development of an information support system for the integration of data from integrated production systems are presented. The way of integration of information systems is offered. A functional-structural scheme for implementing the proposed method is described. The recommendations for practical use in the conditions of operating industrial enterprises are given.

Effective use of integrated production systems in the information environment of engineering enterprises (CAD/CAM/CAE, PDM, MES, ERP and other systems) from various developers hampers the lack of reliable unified formats and data interfaces [1].

Problematic issues of integration and inconsistency of data in production information systems also arise when using proprietary software developed by enterprise specialists. Using APIs and universal data formats does not always implement reliable data integration. Developers of production information systems, such as Dassault Systemes (France) and Siemens PLM Software (Germany), etc., usually use several different methods to integrate data from their systems. For the existing industrial enterprises (especially the discrete type – machine, aviation, etc.), new solutions are needed that will be based on the joint use of most integration methods, does not contradict the basic requirements for the organization of interaction and the functioning of existing (implemented) production information systems. That is, new scientific and design solutions are needed for the integration of data from industrial information systems [2].

This approach allows us to create a single integrated database for the adoption of optimal design and production solutions for both the technical preparation of production and the management of production as a whole, with full functional interaction between all stages of the product manufacturing life cycle. Such system integration will ensure the interaction of two or more different software systems (from different developers) with the "simplification" of the user's impact on the migration of data between systems due to the formation of a structured public data base; "Embedding" the media; transformation and transfer of data to the original software solution while maintaining its stability and integrity; creation and use of intermodule interfaces.

To implement such system integration, software tools are created for an information support system (ISS) for the integration of production data that allows data exchange with the ability to control and correct the broadcast data based on the initial structural descriptions, taking into account the error in the construction and display of data, and transfer and support the integration of information systems. ISS has a kernel that allows you to organize: the archive data composition; identity management; management of data transformation processes; flow control of information data;

management of normative-reference information; management of the logistics model of data; reporting subsystem; user management and their access rights auditing user actions; correction of data; classification of data; manual data entry; reporting on the status of data availability.

To implement the integration of CAD/CAM/CAE- and MES/ERP systems and test programs, the authors propose to apply the existing capabilities of the universal FDMA system ENOVIA (developer Dassault Systemes, France), MS SQL and ERP SAP R3 (developer SAP SE, Germany), which was tested in the conditions of the operating enterprise of Sumy Machine-Building Research and Production Association (Sumy) [3].

For this technology, a set of SQL Server 2008 business logic programs is used that includes Integration Services (SSIS), Analysis Services (SSAS), and Reporting Services (SSRS). Integration Services provides enterprise-level integration and processing that allows you to extract, transform, and load (ETL) data from different sources by different destinations. Integration Services includes a wide range of tools that help in creating control logic and data flows.

Taking into account the peculiarities of ERP-system SAP ERP (the system used at the base enterprise and is the most common in the machine-building enterprises of Ukraine), it is proposed to use LSMW (Legacy Systems Migration Workbench) for integration with it. LSMW is a tool that performs one-time and periodic data transfers from external systems to SAP.

The main functions of LSMW:

- reading data files from the external system to the internal format LSMW – reading (Read data);
- data conversion, that is, formatting and distribution of data into the necessary structures – conversion (Convert data);
- call the standard transfer program (BAPI or Idoc), which provides data transfer in the SAP table – Import (Import).

That is, LSMW reads external files and converts their contents according to the target structure, creating the output file in the desired format. This output file is translated by the applications in the SAP system table.

Ensuring the reliable integration of production data allows solving the main issues that contribute to increasing efficiency and speeding up the technical preparation of production and manufacturing of products in the integrated information environment of production information systems:

- create a centralized store of aggregated data for individual units that are used in the operation of systems and subsystems of the integrated information environment (for example, the design (design) and production plant of the enterprise's products as of the indicated date);
- establish a centralized repository of normative and reference information (NRI), which operates within a single information space of the enterprise and includes the entire range of directories of material and technical resources, brands of materials, professions, technological equipment, units of measure, counterparties, countries, regions, cities, etc.;
- implement the implementation of NRI classifiers and directories in existing information systems, allowing to streamline and reduce the cost of maintaining NRI;

- create common regulations and a technological environment for users to access data, to maintain experts classifiers and directories, to support the system by administrators;
- use the software built into the system that maintains the necessary level of data security and keeps them up to date, eliminating the storage of duplicate, erroneous or obsolete information;
- promptly provide management with the information necessary to make effective decisions.

Figure 1 presents a structural and functional scheme for the implementation of the technology under consideration for the integration of information systems for industrial purposes in the conditions of the existing machine-building enterprise. For its implementation, new design solutions are being developed for their software interaction and implementation.

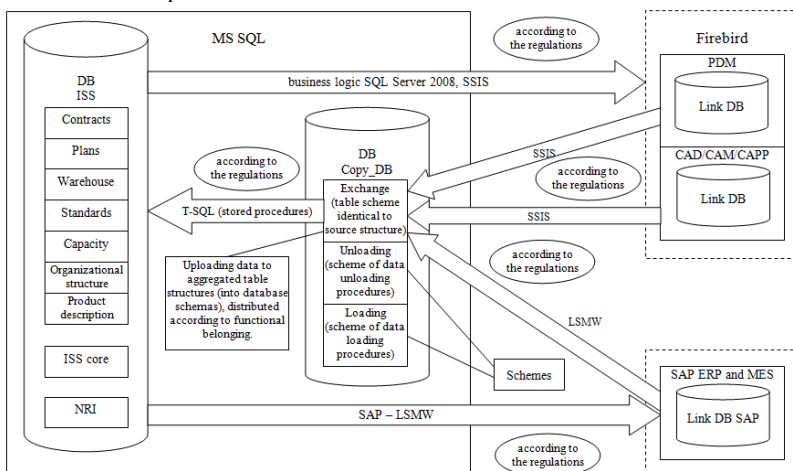


Fig. 1. Structural and functional scheme of implementation of the technology of integration of information systems of production purpose

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