COMPUTER-AIDED DESIGN OF AUTOMATED SYSTEMS

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ABSTRACT

The efficiency of the enterprise (labor productivity, quality and competitiveness of products, etc.) implies the ability to quickly access reliable and accurate information from any point of production management.

KEYWORDS*: nodes, automation, programs, local network, information, document flow, aggregate, top-level processing.*
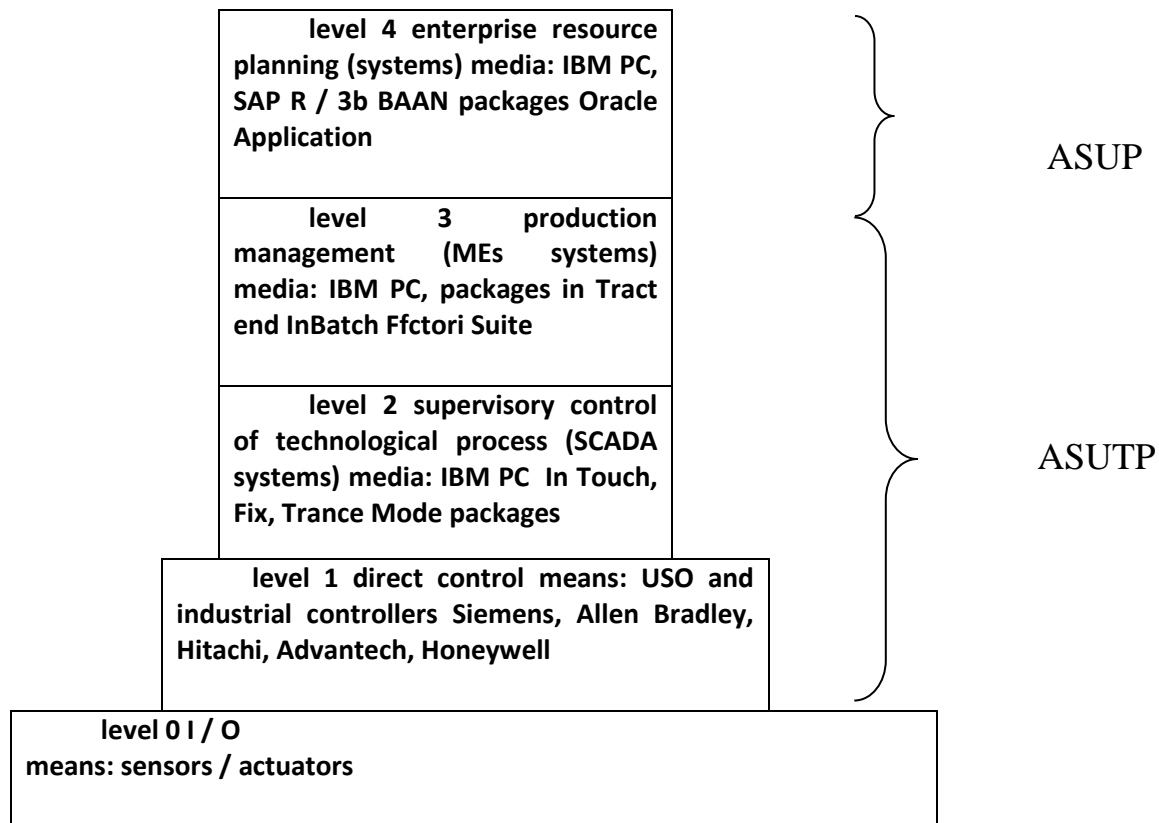
DISCUSSION

Taking into account the hierarchical structure of the enterprise, this problem is solved on the basis of a multilevel ACS, shown in Fig. 4.1.1. in the form of a five-level pyramid. Zero level (I / O –input / output– input / output level). Includes a set of primary converters (sensors) and actuators built into structural units of technological equipment and intended, respectively, for inputting primary (technological) information and output (implementation) of control actions.

The first level (control - direct control). Serves for direct automatic control of technological processes using industrial controllers (programmer logic controller - PLC), for example, Allen-Bradley, Simatic, Honeywell, Advantech, etc. The need to exchange information between the zero and the second levels at the rate of a real process imposes rather severe restrictions on this mode. Programs and data from computers of the second level (SCADA-level) are loaded into the PLC (for example, settings that ensure coordination and control of the unit according to the criteria of optimality of control as a whole), and on the second, it displays operational, diagnostic and service information, i.e. data on the state of units, technological process.

The second level (SCADA - Supervisory Control and Data Acquisition - data collection and supervisory control). Designed to display (visualize) data on the production process and operational integrated control of various units with the participation of dispatching personnel. (see p. 4.3.) Computers of the second level are united into a homogeneous local network of the enterprise (such as Ethernet) with access to the third level of control. The third level (MES - Manufacturing Execution System). Performs orderly processing of information on the progress of manufacturing products in the shop, and is also a source of necessary information in real time for the upper level of enterprise management - enterprise resource planning (MRP and ERP levels) and optimization of shop resource management as a single organizational and technological object according to tasks, coming from the upper level.

The fourth level (MRP - Manufacturing Resource Planning and ERP - Enterprise Resource Planning - enterprise resource planning). Designed to automate production planning and financial activities, procurement and sales, analysis and forecasting, etc. The most famous systems of this level are offered by SAP, Oracle, BAAN, etc.

level 4 enterprise resource planning (systems) media: IBM PC, SAP R / 3b BAAN packages Oracle Application

ASUP

level 3 production management (MEs systems) media: IBM PC, packages in Tract end InBatch Ffctori Suite

level 2 supervisory control of technological process (SCADA systems) media: IBM PC In Touch, Fix, Trance Mode packages

ASUTP

level 1 direct control means: USO and industrial controllers Siemens, Allen Bradley, Hitachi, Advantech, Honeywell

level 0 I / O means: sensors / actuators

Fig. 1. Integrated and distributed ICS levels

Exchange in local industrial networks is carried out in the standards Bitbus, Profibus, etc.

ACS design stages. The following main stages are distinguished: pre-design survey, technical design, detailed design, implementation. Recently, the stage of system (software product) maintenance has been added. Pre-design survey. The goal is to study the existing model of the enterprise, improve it and justify the feasibility of introducing an automated control system.

Here, a special emphasis is placed on the systems approach, which is best mastered by the specialists in automated control systems ("system specialists").

During the pre-design survey, the following components are distinguished.

• Work schedule for individual groups of researchers with the approval of these works;

• Forms of primary documents that are filled in during the survey;

• The results of the survey in the form of workflow diagrams, allowing you to give recommendations for improving the enterprise model.

The stage lasts up to six months, starting with an order for the organizations of the contractor and the customer, and ends with a report on the results of the survey. Based on the results of the report, a feasibility study is drawn up for the development of an automated control system, which must be defended at a technical council from representatives of the customer and the contractor.

At this stage, an integrated calculation of the payback period of the system is carried out. If the payback period does not exceed 3.3 years, then the development of an automated control system is considered appropriate. In this case, a technical assignment (TOR) is drawn up for the development of an ACS.

Technical design. The goal is to test all fundamental technical solutions. At this stage, which begins with the approval of the terms of reference, the following work is carried out:

• determine the schedule for the development of ACS, the composition of the subsystems, the complex of tasks to be solved and form their statements;

• choose and order the appropriate set of technical means;

• make up a technical assignment for non-serial equipment (for example, various kinds of displays);

• create information languages, classifiers and encryption systems, develop a database;

• form a library of programs with which you can solve all available types of tasks;

• form the user interface;

• make up a list of measures to prepare the facility (enterprise) for the implementation of ACS.

Working design. The goal is to fully implement all the functions and technical solutions that were adopted at the technical design stage. This stage ends with the preparation of detailed design documentation.

Implementation. Two stages are envisaged: pilot implementation and industrial implementation. The goal of the first stage is the transition from manual control to parallel manual and automated control to test the system's performance. At this stage, the actual payback period of the system is determined. The goal of the second stage is the final industrial implementation of automated control.

REFERENCES

1. *Adjustment of measuring instruments and technological control systems. Edited by A.S. Klyuev. 2nd edition. - M .: Energoatomizdat, 1990.*

2. *Minaev P.A. Installation of control systems and automation. 2nd edition. - M., Stroyizdat, 1990.*

3. *Klyuev AS Adjustment of automatic systems and control devices for technological processes. –M .: Energoatomizdat, 1990.*

4. *Martynenko I.I. and other Design of automation systems 2nd edition. - M .: Energoatomizdat, 1991.*

5. *Emelyanov A.I. and other Design of systems for the automation of technological processes. 2nd edition. - M .: Energoatomizdat, 1991.*

6. *Yusupbekov N.R., Mukhamedov B.I., Gulyamov Sh.M. Control and automation of technological processes. - Tashkent: teacher, 2011.*

7. *Klyuev A.S. and others. Design of automation systems for technological processes; 2nd edition. –M .: Energoatomizdat, 1990.*

8. *Klyuev A.S. and other Technique for reading automatic control and technological control schemes. 3rd edition. –M .: Energoatomizdat, 1990.*

9. *Tregub and others. Design, installation and operation of automation systems in the food industry. –M .: Agropromizdat, 1991.*

10. *Yusupbekov N.R. etc., Technological process control systems. - Tashkent: teacher, 1997.*

11. *16. Kaminsky M.L., Kaminskiy V.M. "Installation of automation tools and systems", Teacher,1997.*