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Functional and programmatic simulation of architecture for computing design of flexible manufacture

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Abstract

The article is sanctified to the problem of development of architecture of programmatic instrument for computing design of flexible manufacture. The basic problem of research like creation of subsystems functions of architecture of computing design of flexible manufacture on the basis of analysis of the existent computer aided design of technical objects and manufactures is defined. Using stage-by-stage approach, the functional and programmatic analysis of architecture of instrument of computing design of flexible manufacture is done. The programmatic instruments of constructor, mathematical, informative and intellectual design, that are used for realization of every subsystem of the architecture, are presented in the article. The software of architecture of the instruments of computing design of flexible manufacture is realized on a base of Delphi.

1. Introduction

Experience of introduction of the flexible manufacture (FM) in different area of industry [1,2] showed that for development of its basic components such as non-standard elements, composes scheme and its control system of FM, creation of new architecture of instrument for computing design of FM and determination of principles of realization of the scheme of functioning and simulation of this architecture is required [3].

In this connection, the basic problem of research in the article - realization of functional and also programmatic simulation of architecture of instrument for efficiency computing design of FM is defined.

2. Solution

Every subsystem and block of architecture of instrument of computing design of FM we will designate as follows: P_{os} - a subsystem of the programmatic-operating system providing functioning open complex subsystem of computing design of FM; P_i - a subsystem of interface

including set of menu for activation of commands, corresponding to the blocks of subsystem of computing design of FM and auxiliary subsystems providing flexibility on the whole; P_{ap_i} (where $i = \overline{1,5}$) - a subsystem of computing design of FM; (P_{ap_1} - a block of computing design of composes structure of FM; P_{ap_2} - a block of standard active elements of FM; P_{ap_3} - a block of computing design of automation scheme of FM; P_{ap_4} - a block of computing design of technical control and diagnostic system of FM; P_{ap_5} - a block of computing design of non standard elements of FM); P_{sp_i} (where $i = \overline{1,3}$) - a subsystem of special packets of the applied software and programming – language systems (P_{sp_1} - a block of constructor packets on the base of AutoCAD and T-FLEX CAD; P_{sp_2} - a block of packets of the applied software for creation of data base and control system of data base; P_{sp_3} - a block of the mathematical packets of the applied software on the base of MathCAD; P_{sp_4} - a block of the applied software on the base of Delphi; P_{sp_5} - a block of the intelligence software on the base of PROLOG); P_{bdz_i} (where $i = \overline{1,2}$) - a subsystem of data base and knowledge (P_{bdz_1} - a block of data base; P_{bdz_2} - a block of knowledge base); P_{arm_i} (where $i = \overline{1,2}$) - a subsystem of algorithmically calculation and simulation (P_{arm_1} - a block of algorithmically calculation; P_{arm_2} - a block of simulation); P_{pv} - a subsystem of searching and option; P_{qs} - a subsystem of global computer network; P_{to} - a subsystem of technical support with periphery units of design document printing and connection with Internet.

The instrument of computing design architecture of FM works as following:

2.1. First Stage

After plugging (t_1) of the operating system P_{os} in the subsystem of hardware of P_{to} , through a main menu shell program of the same name complex subsystem is opened;

2.2. Second Stage

Designer using the subsystem of interface of P_i , which works after including (t_2), opens the library of subsystem of computer design of P_{ap_i} with the before worked out prepared composes structures, scheme of automation of every FM_i on the whole, and also data base of these standard active elements of P_{ap_2} and if necessary edits this file and saves the edited information in computer memory.

2.3. 3rd Stage

By means of command (t_2) a designer creates files with new developments of layout chart corresponding to the scheme of automation in the subsystem of computing design of composes structure of P_{ap_1} and scheme of automation of P_{ap_3} and technical control and diagnostically of FM design in the subsystem of computing design of the technical checking and diagnostically of P_{ap_4} , kinematics scheme and

construction draft of gripper devices, special manipulators in the subsystem of computing design of non-standard active elements of FM P_{ap_5} .

On the 3rd stage in the process of new file, subsystem of P_{ap_1} creation, P_{ap_2} , P_{ap_3} , P_{ap_4} , P_{ap_5} co-operate with the subsystem of the special application packages and programmatic-language system P_{sp_1} , P_{sp_2} . Thus subsystems of P_{ap_1} , P_{ap_3} , P_{ap_4} , P_{ap_5} co-operate also with the subsystem of algorithmic calculations and design of P_{ar} , P_{am} . For this purpose in a control of open complex subsystem of computing design of FM panel commands (t_3) get out for drawing composes scheme or calculation of parameters of non-standard elements and design of automation scheme of FM.

2.4. 4th Stage

On this stage for the wearing-out (t_3) of subsystem of search and choice of P_{pv} of composes structures, active elements the commands of subsystem of database of P_{bdz_1} and knowledge of P_{bdz_2} get out on the basis of terms-queries. At the choice of database the software environment of the system Microsoft Access is opened and a query is set for a search and choice of the prepared types of active elements with their specifications. At the choice of files of base of knowledge the intellectual programmatic system PROLOG (subsystem of P_{sp_5}) is opened where a query is set for a search and choice of elements of control system, worked out non-standard active elements, composes structures and automation scheme of FM on the basis of calculation algorithms. In case of search of the prepared composes structures of FM with standard elements the command of the network including (P_{qs} - subsystem of global computer network) gets out from menu of search. Thus choosing the certificate menu (t_4) of subsystem of global computer network of P_{qs} it is possible to get additional information about open system of the computing design of FM.

Summarizing the conclusions of stage-by-stage realization of architecture of the computing design of FM it should be noted that taking into account the basic requirements to creation of instrument of the computer design of FM, subsystems provide universality and flexibility of the system at development of FM of different areas of metallurgical industry.

The subsystems of the algorithmic, mathematical providing, expert and information retrieval operations [3,4], used as autonomous blocks provide authenticity, fast-acting and reliability of executable project operations and procedures [5].

Results of programmatic realization of the architecture subsystems for computing design of FM [6] given on a figure 1. As be obvious from a figure 1 in a control of computer-aided design panel for creation of new project, opening of existent projects, organization of work with the subsystems of architecture of instrument of the computer designing of FM is used procedures of programmatic block "File" [8].

Programmatic block the "Search" included in a control panel is intended for realization of searching procedures and choice of the required engineer-project materials from bases given [7, 9].

The programmatic block, "Tuning of interface" of control panel carries out procedures of tuning of

subsystems architecture of the computing design of FM and searching operations in accordance with an application of the designed object domain [10].

In a control panel for providing extended search of project information the programmatic block is envisaged with corresponding procedures of INTERNET.

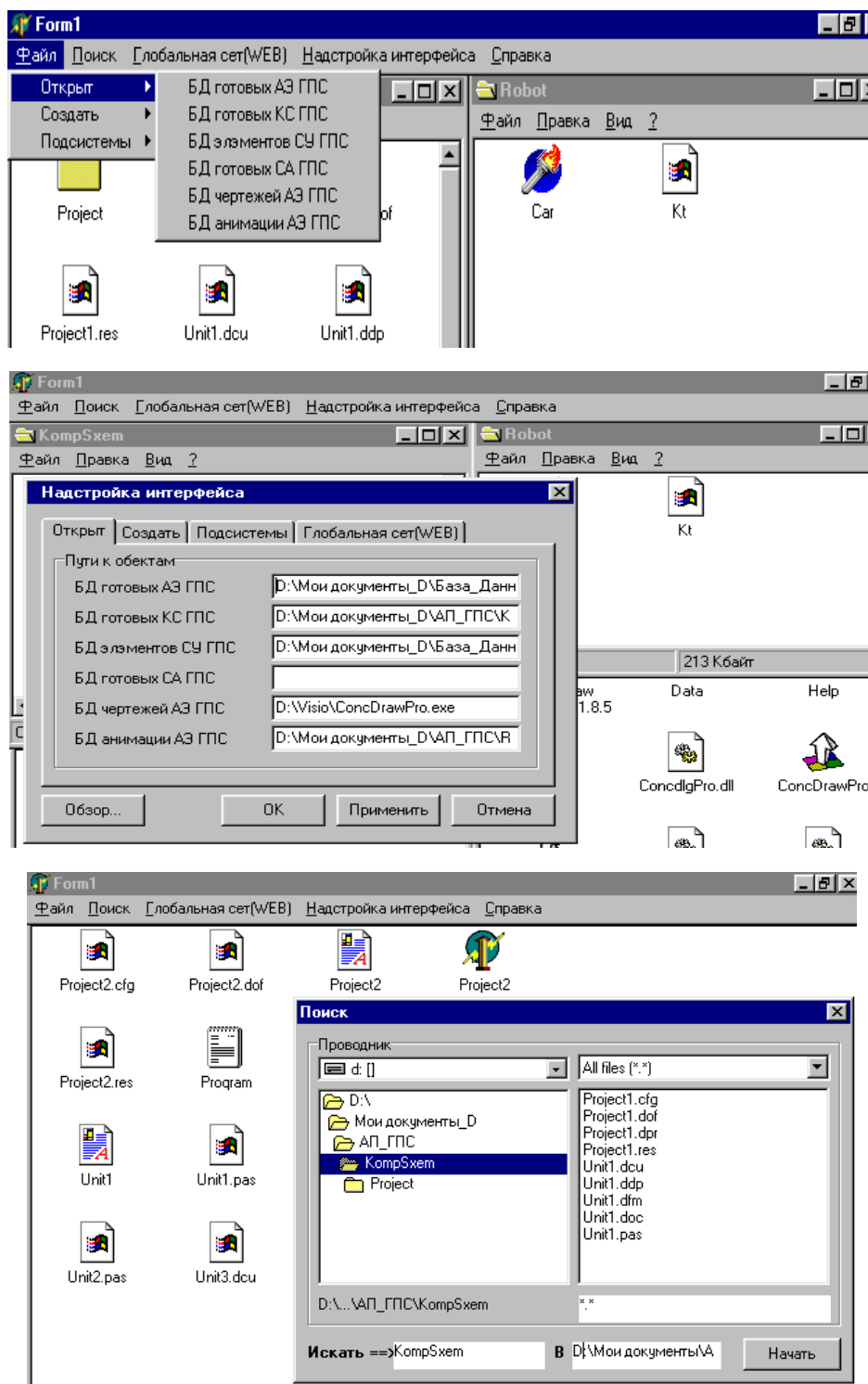


Figure 1. The programmatic simulation of the subsystems architecture for computing design of FM

3. Conclusion

On results this article it is possible to do the following conclusions:

1. New architecture of subsystems for computing design of flexible manufacture is proffered;
2. The algorithm of functioning subsystems of the architecture of computing design of flexible manufacture is worked out;
3. Complex programmatic panel of control of architecture with procedures of planning its functions for computing design of flexible manufacture is created.

References

- [1] Norenkov I.P.. Bases of the automated planning: studies. for institutions of higher learning. it is a 4th publ., - M.: Publish of MSTU the name of A.D. Bauman, 2009. - 430 p.
- [2] Convo Li Basis CADD of CAD/CAM/CAE. "Peter", Moscow, is Saint Petersburg, 2004, 560 pages
- [3] A. E. Sabunin Altium Designer. New solution in design of electron equipments. Publisher: Solon-Press (<http://www.solon-press.ru/shop.html?id=474>), 2009 г.
- [4] Marikovskaya M.P. Automation informative of intelligence system for design of technological equipments. Tambov, Dissertation 05.25.05, 2008.
- [5] 5. Brizqalov Y.N., Novikov A.A., Trofimov A.V. Automated planning of electrical engineering devices in an environment CAD of chains of secondary commutation of electro units. - ELECTRO-. Electrical engineering, electroenergy, electrical engineering industry, 2004, № 6.
- [6] Mamedov J.F. Development of structure of interface of complex automated planning of the technical systems software. Moscow, "Announcer of computer and informative technologies" № 5(107), 2013, p. 18- 21.
- [7] Mamedov J.F., Ghuseynov A.H. Application of agent technology at computing option of flexible manufacture system element and composes structure. Science, Technology and Higher Education MATERIALS OF THE INTERNATIONAL RESEARCH AND PRACTICE CONFERENCE Vol. II December 11th–12th, 2012 Westwood, Canada, 454-460.
- [8] Mamedov J.F. Tools of intellectual computer-aided design of FMS (on the example of the flexible manufacture system of metallurgical industry). Palmarium Academic Publishing ISBN-13: 978-3-8473-9538-6 ISBN-10: 3847395386. <https://www.palmarium-publishing.ru> 2013-02-14, 384 p.
- [9] Aliyev R.A., Akhmedov M.A. Mamedov J.F. Development of computer design instrument of control system of flexible manufacture system. «Mechatronic, automation, control», № 9, 2005, p. 27-35.
- [10] Mamedov J.F., Huseynov A.H. Algorithmic and programmatic providing of the automated layout of the flexible productive system // design Information technologies in planning and production. Scientific and technical magazine, Moscow. №1, 2011, page 49-52.