Automation System Goals for the Creation and Operation of the Tool

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Abstract. Complex automation of processes for creation and operating the instrument, consistent linking of hierarchical levels in the single system of collection and processing of data and operations management, integration with TEAMCENTRE PLM and SAP/R3 ERP significantly improve the quality and efficiency of production preparation.

1. Introduction

Implementation of the automated system for the creation and operation of the instrument (ASCOI) of engineering company with intellectual support of the automated system for the selection and design tool for machining of complex product surface and automated control of the production preparation in the process of establishing and operating the tool with their integration into a single information system of the enterprise is an important scientific production problem. [1,2]

For the formation of intelligent automated systems for the selection and design tool, it is necessary to develop its structural-hierarchical model, which would reflect a modern state of scientific knowledge in this field.

2. Basic part

The need to develop invariant structural-hierarchical model of the instrument is connected with the formation of the intellectual support of the automated unit for the selection and design of the instrument as an integral part of ASCOI enterprises. The proposed model is flexible and allows you to embed any structural unit as an indication of the instrument.

The block of automated intellectual support for establishing and forming tool built on block-modular principle. The unit includes a database tool (database), the module of computer simulation of surface treatment of components, module profiling forming tooling surfaces (TS), the module the design of the structural parameters of the tool, as well as means of computer graphics. [5,6]
Fig. 1. Enlarged structure and links in unit of intellectual support of the automated selection and forming tool.

Fig. 2. The integrated block-scheme of work of the system of selection and designing tool.
The calculation of results are passed to the DB tool to pick a similar tool. An important task is to identify the profile of the instrument stored in the database. [7]

Comparison of theoretical and profiles stored in the database is performed by the algorithm presented in figure 2.

If the solution using information from the database did not lead to the desired solution, we introduce a special stage for forming systems - design module design parameters of the tool, which is closely linked with the system forming TS, computer simulation system and database.[8]

Initial data for design module of design parameters are geometric parameters of the tools, previously calculated profile forming a TS, and information about types of basic material (BM) and instrumental material (IM), the technological process of manufacturing of details, passport characteristics of the components of technological system. Since the profile forming TS is defined when performing a selection tool, its design is the calculation of the connecting part on the known correlations and making a drawing. [8]

To create a database tool preceded by the analysis of surfaces of details and the link between the basic surfaces of parts and tools, which can process them.

In practice, the actual effect of scientific methods with application of means of automation is attained only when various systems integrated into a single information space, only this solution gives a general synergetic effect, measured in terms of improving quality, the maximum human factor in the reduction of deadlines and cost optimization. That is why there is an acute need in development of the automated control system of manufacturing preparation (ACSMP), due to the fact that the major machine-building companies, where there is a simultaneous preparation of production on thousands of original parts and tens of thousands of positions of the developed tool, it is very difficult to ensure the functioning of the developed system through design, production and implementation of the tool. [9]

The review of the market of published software revealed that a system that meets these requirements does not exist.

The package of applied programs intended for the effective management of production large machine-building enterprise in the process of establishing and operating the tool has been developed.

Thus, the developed software is a complete solution for organization of work on achieving the targets of the enterprise production of a new product. [10]

Introduction of the developed ACSMP helped to ensure the design, manufacture prototypes of the original instrument and conducting a trial of treatment in 4 times faster than the average performance of holding TPP in KAMAZ OJSC.

Complex automation of processes of creation and operating the tool to achieve the required geometric precision and quality of products with complex surfaces, as well as automated and intelligent selection, design and control instrument taking into account the laws and the relations between the geometric parameters of the details and geometrical parameters of the tool, consistent linking of hierarchical levels in the single system of collection and processing of data and operations management, integration with TEAMCENTRE PLM and SAP/R3 ERP allow to raise quality and the efficiency of production preparation considerably.

3. References
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