Selection of equipment for machining processing of parts using NX and TEAMCENTER programs

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Annotation: The article describes the current methods for selecting of process equipment for machining of parts on metal cutting machines. The authors suggest the method of selection of equipment based on the use of NX and Teamcenter software as well as the recommendations to improve the program's database of Teamcenter. The offered method allows to reduce the terms of technological preparation of production due to the simultaneous selection of equipment, tools, equipment and the formation of the control program.

Currently, we have the most common method of selecting of process equipment for machining of parts, when the technology chooses hardware, relying only on his experience. The disadvantages of this method are the requirements for the qualification of a technologist and a great time for search of details about this available equipment. A literature review showed that other methods have been offered, such as the use of a data bank [1] and the so-called "modular technology" [2]. The disadvantages of these methods is the excessive formalization of the procedure, and as a result, you can not answer the problem of nonstandard.

A method based on the use of simulation processing in the module of NX CAM system and
The relationship between the parameters of a part the TA and the parameters of the machine was determined in order to use this technique.

Table 1 - Parameters of a part- description of the equipment.

| Parameters of a part                      | Equipment performance                                      |
|--------------------------------------------|------------------------------------------------------------|
| Shape of a part                            | The type of equipment movements (number and types), the type of machine adjustment |
| Overall dimensions                         | Working space                                              |
| The number and kinds of processed surfaces | Movements (number and types), the amount of bearing instrument and its nomenclature |
| Workpiece material                         | Cutting, power drives                                      |
| Accuracy of part manufacturing            | Accuracy of machine                                        |
| Roughness                                  | Cutting conditions                                         |
| Tact and the release program              | Productivity                                              |

The initial data are three-dimensional models of parts and blanks, and later the models of equipment and tools [3].

At the first stage the operation is created in the module NX CAM. As a result of this step the number of required coordinates is determined while the surface treatment as well as the required length and diameter of the tool, the range of surface treatment with a single install. These results provide baseline data for further procedures.
For further calculations it is necessary to choose the tool. Its length and diameter are selected from the previous calculation, the necessary tool is inserted from the NX library or from public sources, or from Teamcenter, with the possible creation of an assembly tool [4].

Further, the cutting conditions are determined according to the recommendations of the manufacturer tool. The main criteria necessary for choosing the cutting modes are a material part, tool and cutting method [5]. And it is possible to choose the modes from the NX library. Then we find the required power of cutting, and paste it into MS Excel file titled "Power of of Cutting". The result of this phase is the cutting power by which the capacity of main drive is determined, the required spindle speed and the required feed, which serves as a guideline for the selection of the machine with the appropriate parameters.

The next step - determining the length of stroke. The stroke length is determined either from the tool control program or by the simulation of the machine. As a result of this stage the length of the stroke as well as the required size of the working area of the machine are determined.

Thereafter, the files are attached to an item in the items database Teamcenter as attributes. Currently, the application Classificator is used to describe all the resources available in the enterprise. The search of tools is also carried out in this application. Technological equipment is described in two tabs: "Resource Management" and "Hardware".

The tab "Resource Management" describes the following resources: Fastening devices, Machines and Devices, Automated robots and Welding tongs tools.

In the Hardware tab, classification is carried out on several types: By type (metal cutting, automatic transfer lines, assembly, etc.), the production (Foundry, Engine plant, etc.), model (metal-cutting equipment, automated production lines, assembly etc.).

In the program NX machine tool is inserted from the tab "Resource Management". In the search for tools the received Excel files are being opened and the desired values are input in the appropriate box. The system finds a certain number of machines and it is still necessary to determine whether the selected machine suits by the tool performance. For this it is proposed to introduce the "load factor Ks" to identify opportunities for the production of new parts. It is also recommended to enter the column "Plant" and "Inventory number" in the tab "Resources Management" to exclude transitions between the Applications tab and reduce the time to choose machines. If Ks is above 0.85, the search is on (on another inventory number or other plant). Only then we can finally assign the equipment to a particular item.

When the simulation program is running the run time is displayed, and through Ks we assess, whether the machine tool is able to handle this item with the specified performance.

Thus, the proposed method allows to simultaneously perform the following tasks: to shape UP, tool selection, calculation of cutting conditions and selection of equipment. As a result, it reduces the time and increases the efficiency of CCI of choosing equipment [6].

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