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V.V. Spirintsev

SOFTWARE OF PLANNING PROCESSES DURING ORGANIZATION OF MODERN PRODUCTION

Summary. Methodology of organization of modern production with the use of computer-aided and worked out software of planning processes designs is offers, taking into account the method of discrete interpolation on the basis of the set law of change of angular parameters.

Keywords: the automated planning, discrete interpolation, software, Delphi, Turbo Paskal, Visual C#

Raising of problem. Now in the world market of capacious science industrial wares clearly there are three basic tendencies: increase of complication and capacious in resources wares, increase of competition at the market and development of co-operation between the participants of life cycle of good. The most progressive and perspective condition of organization of modern production are creations and introduction in practice of the computer-aided (CADD) designs provided modern PECM with the developed terminal systems, and development of the specialized software of planning processes taking into account modern scientific developments and methodologies. Automation of preproduction gives an opportunity to the enterprises quickly to react on changing of demand, in short space produce the new types of products and promote their quality, quickly to modernize products that is produced, watch the life cycle of wares.

Analysis of the last researches. The modern market of automation of preproduction software is saturated the most various universal CADD, that is able substantial character to facilitate work of designer. At the same time, further development of production stipulates perfection of technological processes and equipment, and puts before science new tasks that is oriented to the search of new approaches and decisions in organization of modern production.

In-process [1] the functional diagram of process of the automated planning of model wares offered taking into account the modern terms of production. Further researches [2-4] were sent to generalization and systematization of going near development of methodologies on forming of dynamic surfaces at planning of wares

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taking into account researches [5], that is conducted within the framework of variant discrete geometrical design (VDGD).

An aim hired are generalizations and systematization of results of researches on software of planning processes development during organization of modern production of wares that have difficult to geometry of working surface.

Theoretical information. Offer in-process [1] a functional diagram represents the process of organization of modern production mainly of model wares of engineer to a full degree. However, taking into account the specific of separate areas of production, she needs adjustment. Especially it touches gas-turbine structure - one of the most difficult and capacious science areas of engineer, that dynamically develops and finds a more wideuse (shipbuilding, aircraft building, gas-transport area, stationary energy).

Efficiency of gas turbo-engines (GTD) of the different having a special purpose setting substantially depends on such factors [6], as: geometry and amount of shoulder-blades of driving wheel of turbine, size and form of channel of turbine, form of shoulder-blades of rotor of compressor, and also geometry inlet and exhaust channels of corps of compressor.

The power converting into the compressors of GTD is related to the blast, that is limited to the working surfaces of shoulder-blades, and also surfaces that form the meridional profile of running part of compressor.

Turbine and compressor shoulder-blades are most mass and in the same the time by the most difficult from the point of view of geometry details of GTD. Therefore even in the conditions of small-scale production of engines considerable attention is taken planning and making of shoulder-blades of turbines and compressors. However, in spite of considerable progress in the improvement of methods of geometrical design, treatment and separate operations of technology of making of shoulder-blades of compressors, the whole complex of questions, related to providing of exactness, removal of handwork and increase of level of the computer-aided manufacturing, remains actual.

Aerodynamic descriptions of channels are determined, mainly, by the form of running part of corps of turbo-compressor. Development of optimal construction of this part of the system influences on power of work of all mechanism. One of effective facilities of reduction of losses of energy in a channel is providing of smoothness of transition from one section of running part of channel to other at how pleasingly plenty of formative. Therefore research in the direction of computer design and automation of processes of planning of running part of corps of turbo-compressor are actual.

Task of construction of dynamic surfaces (in particular, to the working surface of rotor) for forming of wares in that use the crooked lines with the monotonous change of curvature along the line of current located on a surface I am actual enough. When to the model make great demand to exactness of the modelled surface, there is a necessity of development of the programmatic module that would give possibility in automation of construction of such curves with the set exactness.

Analysing the expounded material it should be noted that there is a number of tasks in organization of modern production of wares of difficult geometry of working surface, that need individual approach at planning. Especially it touches planning and making of shoulder-blades, running parts of corps of turbines and turbo-compressors, working surfaces of rotors, etc. To the decision of these questions and further researches will be devoted.

Results. At development of geometrical model of shoulder-blade of axial compressor as base the profiling methodology based on distribution on the height of running part of certain totality of flat sections is accepted. Conducted within the framework research VDGD [5] showed efficiency of the use of the worked out methods of discrete interpolation for forming of profiles of sections. Feather of shoulder-blade is set by totality of the got flat sections, here a lower section determines the form of transition of feather of shoulder-blade in her lock part. The profiles of all sections are set in the main co-ordinate system that is related to the root section of shoulder-blade, and beginning of the co-ordinate system is situated in the centre of gravity of section.

In-process [4] the functional diagram of the automated planning of shoulder-blade of turbo-compressor, that plugs in itself the next modules, offered: module of calculation of points of profiles of sections of shoulder-blade (leans against the algorithm of adaptive method of discrete interpolation [5]); module of forming of surface of shoulder-blades; module of tests of detail on aerodynamic and durability descriptions; module of development of control program for treatment of detail on a machine-tool with NS.

Basis of functional diagram is the worked out software in high-level of programming of Delphi (Fig.1) language.

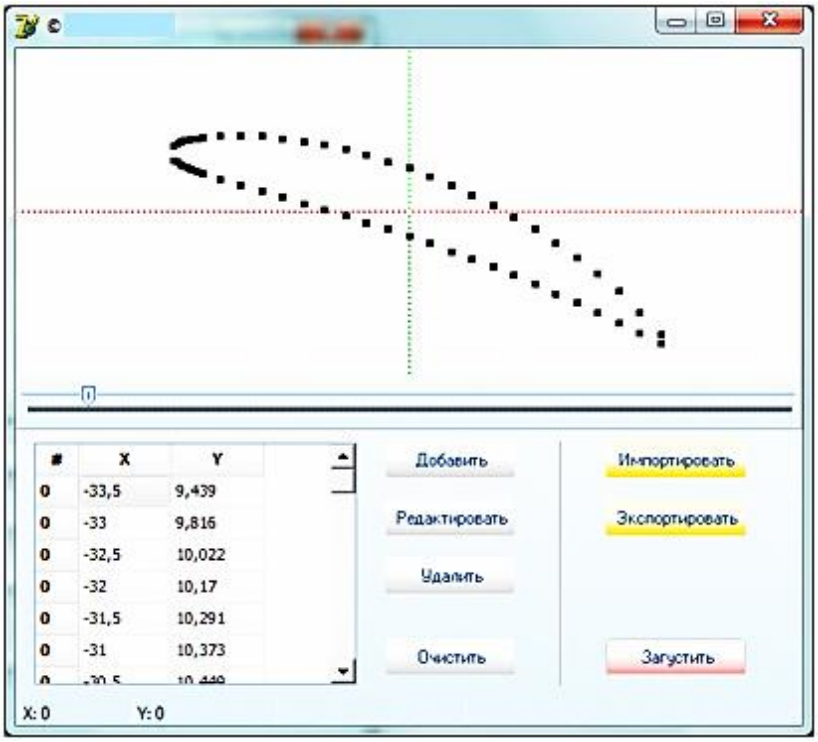

Figure 1 – Forming of profile of flat section of shoulder-blade

Lately high-speed highly technological processing centers, that on the base of the entered profiles of flat sections of shoulder-blades the software is form the geometrical model of shoulder-blade that is subject to treatment, appeared in the world market. These processing centers allow to make the shoulder-blades of difficult enough spatial form due to that have a high degree of freedom of moving of toolpiece on NS. Therefore at application of the indicated processing centers functional diagram [4] needs adjustment, as a module of forming of surface of shoulder-blade and module of development of control program for treatment of detail will be realized on a processing center.

A next task that needs consideration is a design of running part of corps of turbo-compressor. Her it is conditionally possible to divide by two interdependent tasks: design of axial line; distribution of aerodynamic profile along this line.

A basic element that links all parameters of channel surface of corps of turbo-compressor is an axial line. And a task consists in that, to attain the smooth change of curvature of this curve, as it influences on the decline of internal losses of energy of stream of gas environment in a channel.

As a result of undertaken studies [2] software (Fig. 2) offered for automation of process of calculation of axial line of channel and computer design of running part of corps of turbo-compressor on the basis of method [5].

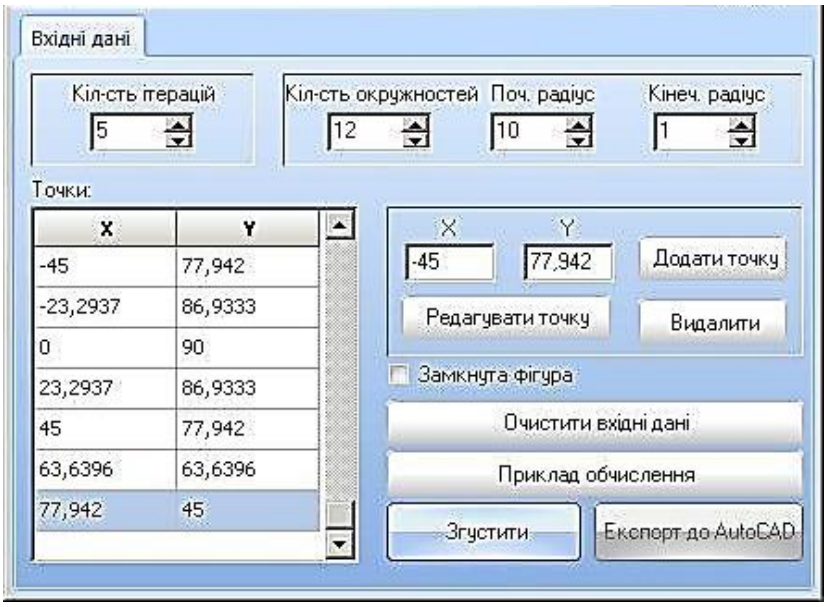

Figure 2 – Interface of the programmatic module

As a programming language a programming of Delphi environment was used. The graphic reflection of the decided task comes true in the programmatic package of AutoCAD. Connection of Delphi with AutoCAD will be realized by means of the use of COM- of objects.

An important role models the chart of change of planes of sections plays along a mid-channel. A chart of planes is a flat curve that characterizes the law of change of planes of crossrunners along the accepted distance of channel. In the process of constructing of model of channel, coming from the chart of planes and form entrance and output sections of channel, a form and positions of crossrunners of channel are determined.

The process of testing of the worked out model on aerodynamic indexes confirmed efficiency executed actions.

The task of design of working surface of rotor of anchorman conditionally can be divided by two interdependent tasks: design of formative line of surface of rotor; distribution of profile along this line.

For automation of calculation of the crooked dynamic surface and constructing of working organs of rotor of anchorman was created software in programming of Visual C# language [3]. The interface of the programmatic module is presented on a Fig. 3.

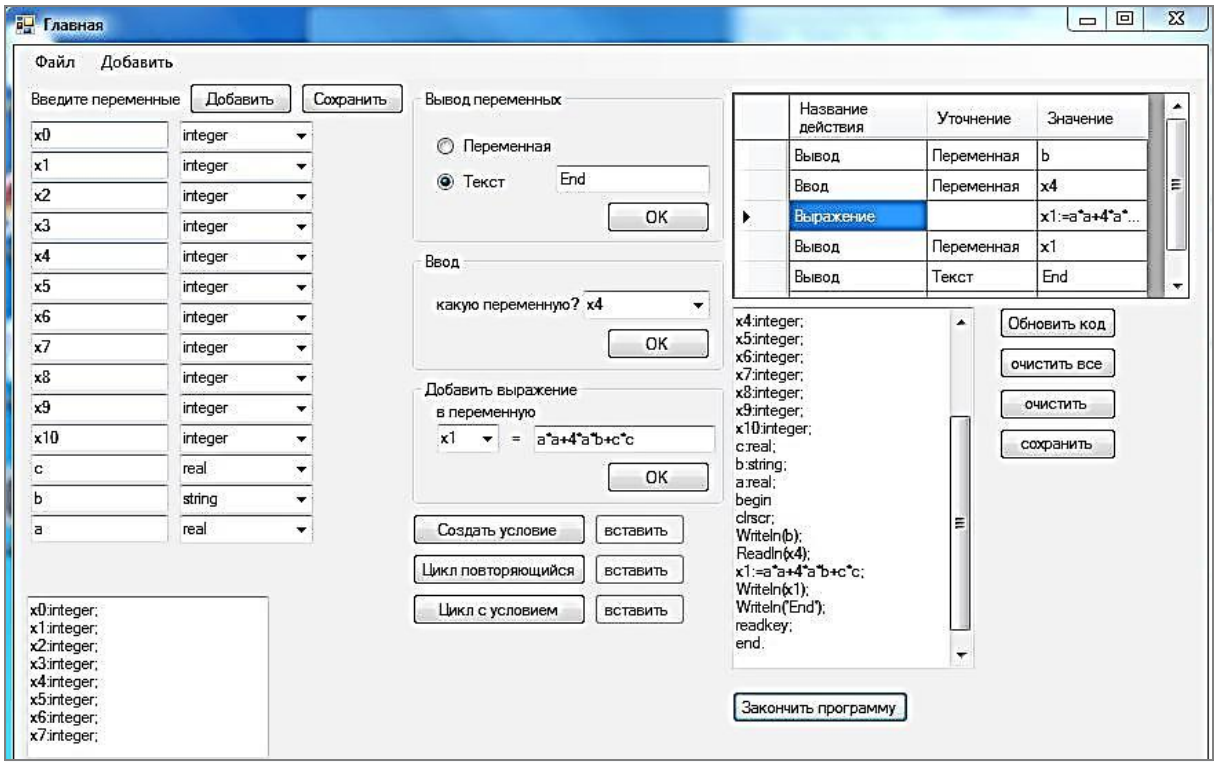

Figure 3 – Interface of the programmatic module

Main Window of the program includes: block of task of variables, block of introduction and conclusion of data, table of algorithm, block of code conclusion, and block of introduction of operators. In the total after creation of all algorithm a program code that it is possible to look over and edit by hand is automatically generated. This code is represented in the same kind in that he will leave in Turbo Paskal, what lets to see as every operator, action, condition, cycle, is written. After completion of work it is necessary to save a file, and to open him in Turbo Paskal, to push the button of compiling and get a job of algorithm performance. The got coordinates of points of condensing form a formative line that forms the working surface of rotor of anchorman.

Conclusions. In-process offered approach to organization of modern production with the use of computer-aided and worked out software of processes of planning, that allows to promote the productivity of work of designers, reduce the terms of planning and expense for development of technical documentation, designs, to increase the amount of annual projects and make to the products with maximal consumer qualities.

Further development of offer researches it maybe to conduct in the direction of search of new ways of organization of production due to introduction of new results of scientific researches (within the framework of geometrical design and software of processes).

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