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ESPECIALLY SCREW ROTARY ENGINES CYCLOIDAL

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In this work we consider a question of quality making screws and getting their profiles in strict accordance with the form. Modeled the main technical parametric such as transformation of the original curved surface on the basis of the kinematic screw parametric rotary engine.

Keywords: manufacturing screws, screw pumps cycloidal, cycloidal engagement, pair of curved surfaces.

Formulation of the problem. The main objective in the manufacture of propellers are getting their profiles in strict accordance with the form. To obtain high quality screws made required performance of all of the following conditions:

- the accuracy of calculation of cutting and measuring tools;
- making careful cutting and measuring instruments according to calculation;
- proper construction process.

Therefore, when profiling cutting tool, consider the typical sections screw pumps with cycloid gearing.

Analysis of recent research and publications. Currently, in various fields of industry and transport is widely used screw rotary engine, compressor and pumps with cycloid gearing [1.2]. Such mechanisms are different economy, a large number of turns, relatively small dimensions and weight. They have been used in industry and transport, in hydro, steam and gas turbine for hazoduvnyh machines, oil, pumping stations, etc. Pumps are used for transporting liquids or grease machines and as a source of pressure in hydraulic power various devices (hydrodrives), due to the increasing power of machines and the widespread introduction of automation.

The wording of article purposes. Increase the efficiency of settlement - graphic works in the design of screw pumps and engine of cycloid gearing.

Main part. The working body helical rotor pump is interacting pairs of screw rotors placed in their tight cavity. Profile of teeth of one of the rotors in a pair of end section formed long sections эpytsykloydy and the other rotor tooth profile in a pair of concave sections formed эpytsykloydy

of gap junctions between them. Geometric ratio narizok screws chosen so as to ensure the tightness of the working bodies in the absence of transmission of torque between the rotors, ie between the screws are slotted gap. With slotted rotor gap will move the tooth height and surface cracks in rotors have different speeds, as the rotor cycloid tooth shape always slipping relative to each other. This difference in flow velocity in the surface of the rotors causes the cavitation, which limits the speed of rotation of the rotors. Synchronization of the rotors is provided only by the pressure of the environment, and in its heterogeneity (eg, the presence of gas inclusions in a liquid medium), this synchronization will be disrupted, leading to violations of integrity, appearance rotors and power contacts to increase their wear. Such contact is particularly harmful to the slave rotors with sharp edges. [1] For each surface, line cutting is a continuous smooth curve. Screws can produce the following methods: frezerovkoyu using a disk, digital or worm milling, planing special cutters, trim profile cutter on lathe.

Productive way to handle screw - worm bahatozahidnymy cutters with greater lifting angle turns. These mills to handle the new technology in one installation and one pass bahatozahidni screws with a greater angle of ascent, with no congruent profiles grooves. The surfaces of the screw and worm mills are spryazhenymi. In order to improve the accuracy of conjugated surfaces of their products requires spatial profile of the tool cutting edge.

Based on the theorem of Professor A. Podkorytov initial helix Σ_A formed helykoyidiv family that envelope, each of which is given axis surface $i = AA$, its screw parameter directs - screw parallel intsedentna forming a straight line. The provisions creating the conditions selected supplies its tangent plane to the surface Σ_A the points on the selected screw parallel kinematic diagram and satisfaction screws. Each of the said helicoid family is associated with a kinematic diagram for another helicoid screw with an axis that coincides with the axis of desired helical surface Σ_B, conjugated with the surface Σ_A. Geometric kinematic model of the method of conjugate screw surfaces.

Consider building konvolyutnoho helykoyida (Σ_B), given the parameters of the diagram shown in fig. 1.

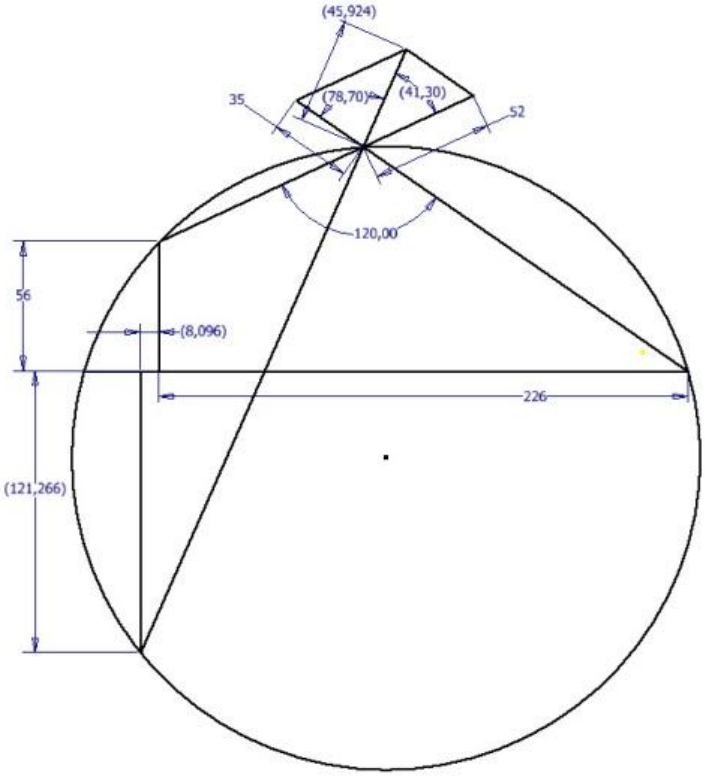

Fig.1. Figure kinematic screw

Helicoid helix Σ_B (1) given formula:

$$\begin{cases} X = \sqrt{b^2 + \frac{\omega_a^2 * sin^2\beta}{cos^2\alpha}} * cos\varphi - e; \\ Y = \sqrt{b^2 + \frac{\omega_a^2 * sin^2\beta}{cos^2\alpha}} * sin\varphi * cos\theta + \left[\rho * \varphi + \frac{\omega_a * cos\beta}{cos\alpha}\right] * sin\theta; \\ Z = \sqrt{b^2 + \frac{\omega_a^2 * sin^2\beta}{cos^2\alpha}} * sin\varphi * sin\theta + \left[\rho * \varphi + \frac{\omega_a * cos\beta}{cos\alpha}\right] * cos\theta. \end{cases} \quad (1)$$

From fig. 1 and equation (1) we obtain the following values: $\alpha = 78{,}7^0$; $\beta = 41{,}3^0$; $\theta = 120^0$; *b=8,096 мм;* $\omega_a = 35$; *e=226 мм*; $\rho = 56$ мм. We assume values $\varphi = \left[0 : \frac{\pi}{30} : 10\pi\right]$.

Construct to set parameters spiral system MatLAB. Results for constructing lines shown in fig. 2.

Consider building a family of curves on the screw diagrams depicted in fig. 3-6.

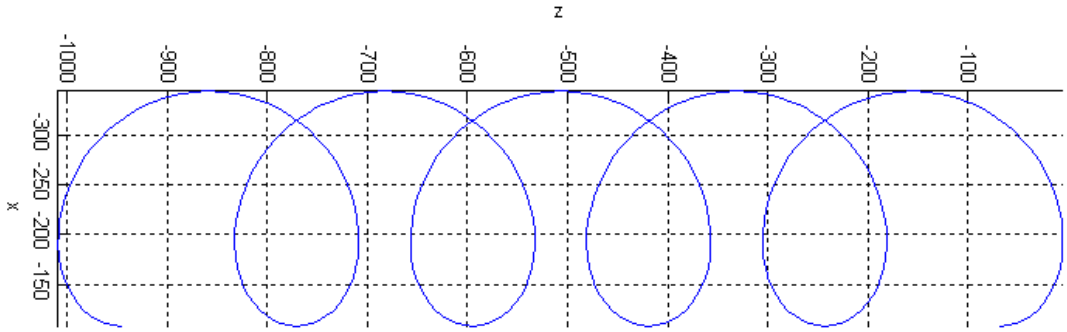

Fig. 2.

Consider building a family of curves on the screw diagrams depicted in fig. 3-6.

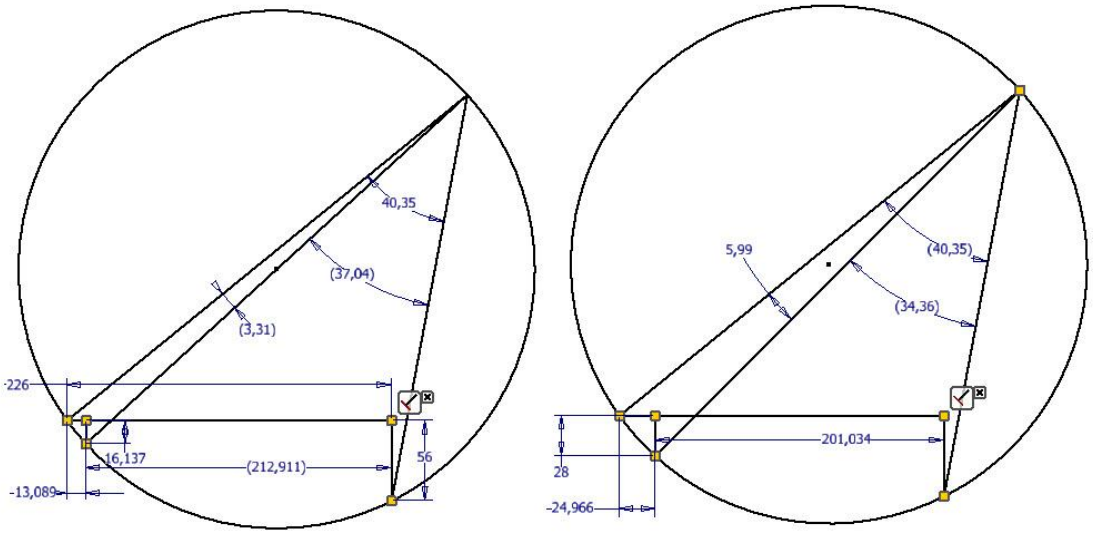

Fig.3. Diagrams 1-2

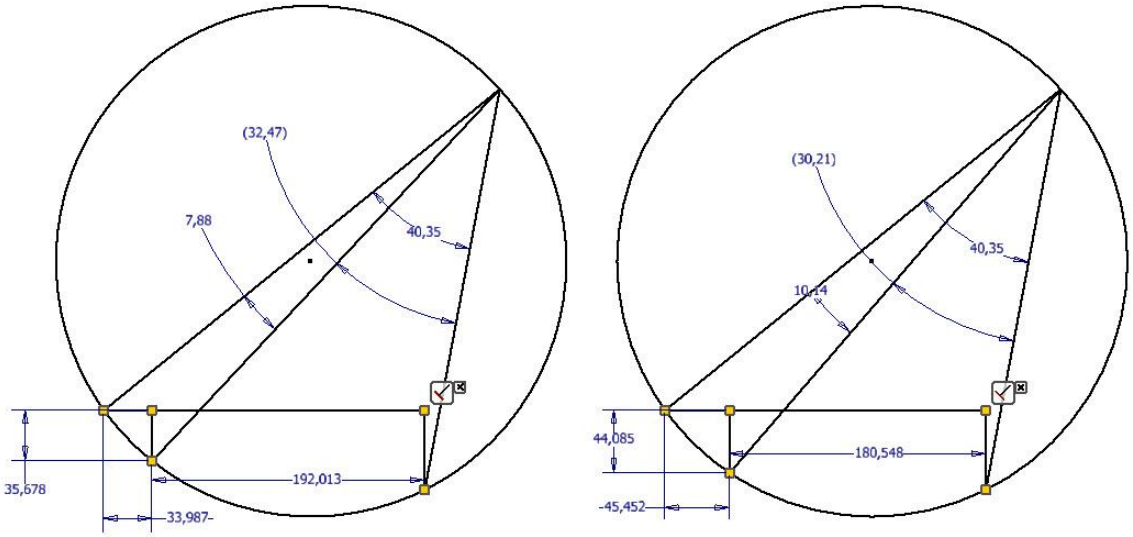

Fig.4. Diagrams 3-4

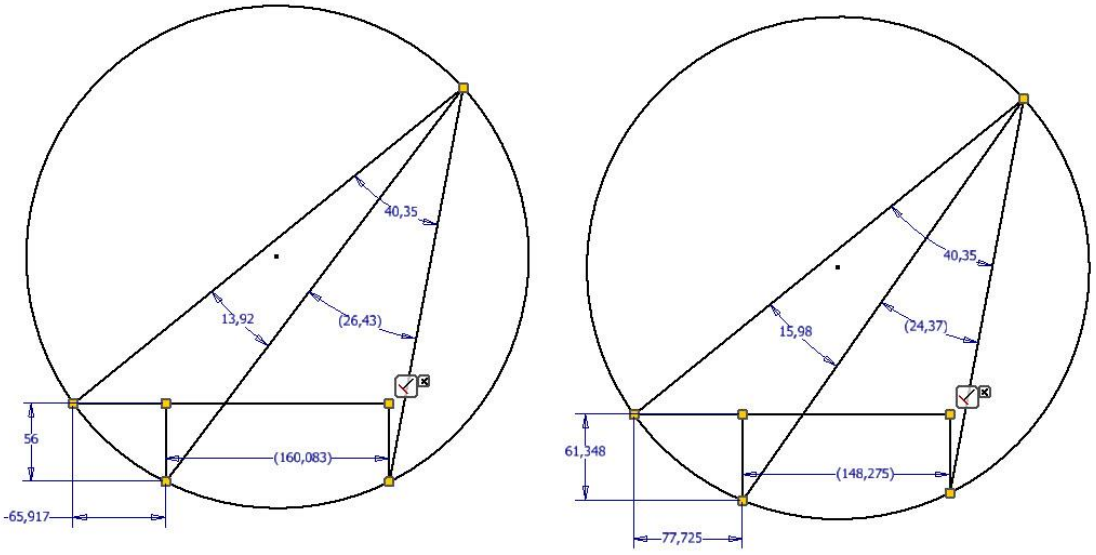

Fig.5. Diagrams 5-6

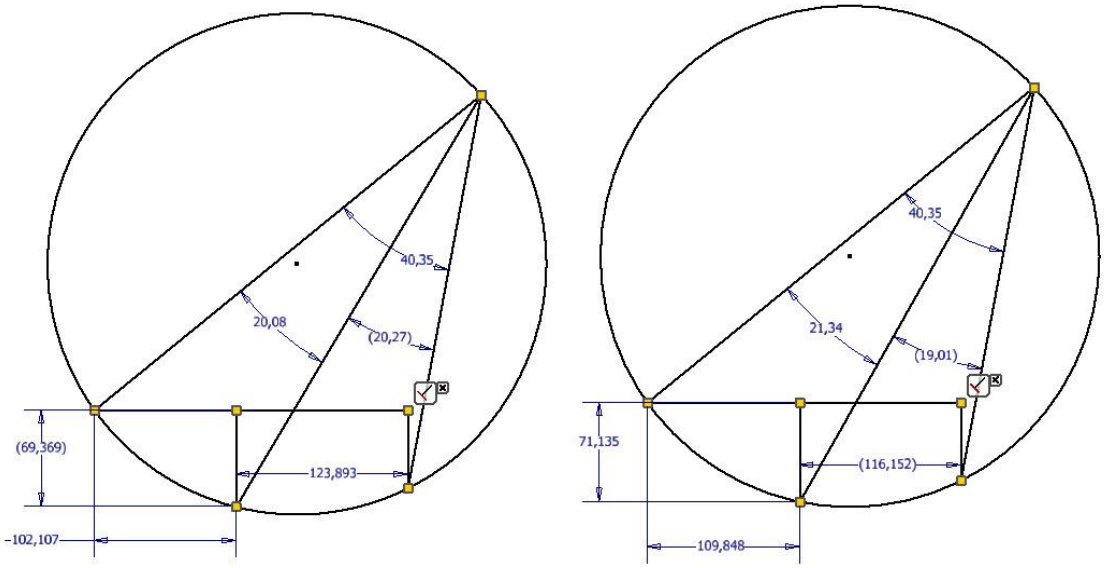

Fig.6. Diagrams 7-8

Results for constructing family are spiral curves (fig. 7).

The use in the manufacture of curved products with removable screw parameters, in turn, requires the development of effective kinematic origin conjugate curved surfaces, providing high accuracy, but that can extend the scope of the most advanced methods of processing complex products.

One of the main theories on the formation of interface surfaces with different coil parameters is to determine the surfaces of products, widely used in automatic lines.

Definition families conjugated helix by using kinematic screw that is an image three dimensional movements, one of which must be a screw.

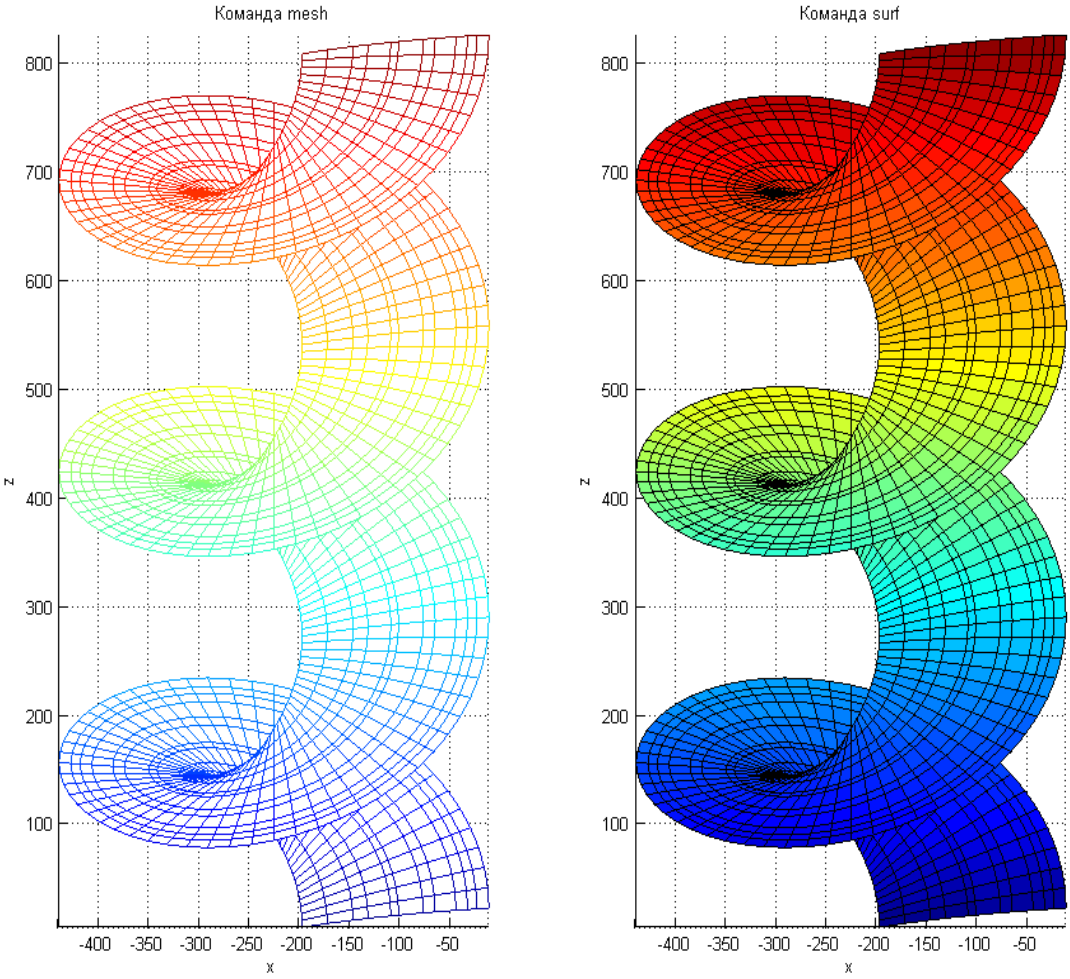

Fig. 7. Projection XZ

Conclusions. Creating a simulation output surface kryvoliniynoy screw machines with increasing rotor speed, reducing the size and weight of the machine, avoiding the appearance of cavitation, which limits the speed of rotation of the rotors.

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