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PECULIARITIES OF FORCE CONTACT OF PULSED IMPACT ACTUATOR WITH SURFACE

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At present stage the problem of resource-saving technologies is particularly relevant which causes the development of treatments by methods of strain hardening. The foundations of most metal-cutting machines have non-hardened guides which in practice have low wear resistance. Therefore, such guides with the purpose of increasing their wear resistance are subjected to deformation hardening, one of which is pulse impact pneumovibrodynamic machining.

Plastic deformation of the processed flat surface in pulse impact pneumovibrodynamical processing occurs due to the fact that the ball blowers strike blows on the balls strikers under the action of compressed air jets, and those, in turn, over the surface of the billet.

To examine the parameters of the force contact between the balls of an actuator and the surface to be treated and to determine the effect of processing modes on the characteristics of a hardened surface layer, the development of a computer model is most preferable. The task of research of the impact interaction of balls with a plane surface relates to contact types of problems, for which the finite element method of the ANSYS package is well suited, which is a powerful, reliable and modern means of testing of the behavior of structures under conditions of various contact effects.

The statement of the problem in ANSYS begins with the alignment of the forces applied to the instrument and elimination of the movement of the part. The result of the solution is building diagrams with the forces distribution and deformations.

It has been established that the indentational microrelief of the surface with pulsed-shock pneumovibrodynamic treatment is not an accurate mark of the deforming sphere, since the plastic flow of metal occurs both in the direction of feed and in the direction of feedback, causing distortion of the neighboring imprint of the ball formed earlier.

Based on the developed computer model, the deformation of the contact zone has been analyzed, the status and contact pressures have been determined in the contact pair of the ball - the machined surface.

Optimum design parameters of the pneumatic gun have been selected allowing to process a surface with admissible values of forces of impacts, excluding mechanical overhardening of a surface.