MAIN PROBLEMS OF QUALITY MANAGEMENT IN MODERN HONING PROCESSES

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Numerous studies show that machines with exactly the same design often have varying reliability. This arises from the differences in their manufacturing technological processes. This reason necessitates the management of operational parameters through technological methods. This necessity is more pronounced in the processing of high-precision machine components.

The challenge of removing a thin material layer from the surface lies in performing the processing with free abrasives, as well as in executing it under the influence of numerous functional and random factors [2]. One of these factors is the diversity of the geometric shapes of cutting particles-abrasive grains and the possibility of their free movement.

During processing, the interaction of abrasive grains that change their positions freely with the surface becomes complex, and studying the influence of various technological parameters of friction on the quality and accuracy of the processed surface poses challenges [4].

There are strong interconnections among the numerous factors involved in the technological processes that ensure the functional purpose of machine components and their formation. Most of these interconnections are reflected in the theoretical and experimental results of several mechanical processing methods that form the foundations of machine manufacturing technology and actively participate in the formation of geometric parameters of component surfaces and the physical-mechanical properties of the surface layer [3]. Despite all this, the application of all mechanical processing methods, including abrasive processing methods, does not sufficiently meet the functional quality indicators expected for the quality assurance of machine components.

The provision of the geometric parameters of high-quality machine component surfaces and the physical-mechanical properties of the surface layer is directly related to the selection of final processing methods and execution technologies. In choosing final processing methods, productivity issues are also of high importance alongside quality. This raises the relevance of using economically viable processing methods and technologies to ensure the quality indicators of machine components. In modern technological support systems, this necessitates that quality indicators be based on the application of economically efficient technologies.

The study of the formation regularities of the precision indicators of the internal cylindrical surfaces of parts processed by honing, as well as the determination of optimal values of cutting regime elements that ensure minimal surface roughness, is achieved through both theoretical and experimental research. The intensity of the influence of the aforementioned factors is directly dependent on the movement scheme of the honing tool and the workpiece, the distribution

characteristics of abrasive grains and specific pressure in the contact zone, cutting force effects, and other factors. In this regard, it is essential to investigate how the main parameters of the honing process affect the generation of cutting forces, as well as to explore the technological capabilities of the processing to achieve precision on the internal surfaces of the components during the processing [5, 6].

The results of experimental research indicate that the variation of cutting force generators in lapping and honing processes is non-linear, depending on the values of speed and pressure. One of the main reasons for this is the acceleration of abrasive grains as they move across the surface being processed. Due to the complex movement patterns of the lapping tool's surface and the microrelief of the part's surface, the working conditions of the abrasive grains during the lapping process are subject to constantly changing cutting and deformation conditions [1, 7].

However, despite the complex nature of the lapping process, the effect of the particle size of the lapping pastes on the cutting force generators follows certain regularities. It has been established that with the increase in graind size in lapping pastes, the values of cutting force generators monotonically decrease. It is known that during the lapping process, an increase in the gap between the part and the lapping tool leads to a reduction in the inequality of material removal along the axis of the part. The disruption of contact between the lapping elements, the decrease in specific pressure, and the naturally reduced intensity of the restoration of form errors are related to the wear of the lapping tools.

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