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Theoretical and Experimental Aspects Concerning Elastic Behavior in the Grinding Technological System

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Abstract

In this paper will be treated the problem of strains and stresses within the connections and elements from the grinding technological system. These system deformations can lead to positive or negative effects. Main negative effects will be occurrence of processing errors on the part profile, but also the excessive tension from system elements. Cause of processing errors and the low safety due of the system rigidity must be sought in its joints between parts, stiffness of moving pieces, low number and reduced rigidity of parts used to assembling (bolts, cotter joints, pins). Elastic properties of the assembly are modeled by the inserted connections with specific characteristics. The elastic deformation of the work piece must be taken into account, besides the elastic behavior of the device which appears in manufacturing process. A very important aspect in the study of elastic behavior of the whole system is how the abrasive tool interacts with the work piece, namely the displacement of contact zone. Contact stresses lead to a deformation of the grinding wheel and the work piece, and as a result the work piece loses from precision of tooth profile. The rigidity of system can be

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characterized by two aspects, one static and one dynamic and we will describe both aspects using CAE simulations and classical mathematical models. It will be presented some results of numerical simulation of the stiffness of gear grinding system using finite element method (FEM). The elastic dynamic model was design using the forces of inertia and gravity that occurs during grinding process. Also by permanent pursuing of the technological forces variation during the grinding process will be sought the dynamic deformation of the system. The study its concentrated around the low stiffness of components inside the system, in order to find errors that may affect the precision on the horizontal, vertical and rotational direction of technological system elements. Since through this analysis it tried to find how the forces influence on the ETS stiffness, it will present numerical values of the system displacements and stress distribution. Knowing the direction, sense and numerical values of these errors can be made interpretation of the results, namely the removal of these consequences.