FEATURES OF ROTATIONAL AND TANGENTIAL TURNING

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The spread of hard turning has significantly increased the economic efficiency of machining hardened parts. This type of turning often replaced grinding methods and manufacturing processes were significantly shortened. Although there is no special difference between accuracy and roughness, the surface topography or texture produced by the two methods is different.

The hard machined topography is periodical; it consists of regularly repetitive elements, which are extremely delicate and are located in a thread-like form on the surface of a workpiece. The pitch of this thread-like topography is equal to the feed per revolution and the depth of the thread is the same as the value of the maximal roughness. Although the sharp thread produced on the hardened steel surface is very fine, it cannot be applied in some functional roles of mechanical mechanisms.

The main aim of the development of hard turning was to avoid the application of the grinding method and to make the random topography similar to the ground one possible to create.

Rotational and tangential turnings are two special variants of hard turning. They can eliminate a disadvantageous characteristic of ordinary hard turning, namely, the generation of periodical topography. We reveal common and different features of both rotational method and the long-known tangential turning method. Common features make the complex chip removal mechanism of rotational turning easier to understand. The calculation of chip thickness and width becomes simpler. However, while the cutting technical parameters can be drawn on planar surfaces in a tangential method, these parameters obtain a 3D spatial form in rotational turning due to the helical edge. The extremely high productivity of rotational turning and the kinematical relations of the machining system are shown.

Rotational turning works with different material removal and chip formational mechanisms than classical turning. It has been known for a long time in some aspects, but in a broader sense it has never been applied in the tangential method. Since the tool makes a slow rotary movement instead of the rectilinear movement, this method substantially differs from the tangential method. Rotational turning has become a more widely applied method in making bores, flat surfaces, shape surfaces and cones than the tangential method. There is no observable periodical topography on the surface, so it is suitable for sealing, needle roller bearings and connecting surfaces. In addition, its productivity is the highest among the hard turning methods. Precision ground surfaces are made in a few seconds.