EXPERIMENTAL STUDY OF MACHINED SURFACE DURING SKIVING

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Rotational turning is a special type of hard turning. In this method the cutting edge of the tool is a helical curve and the chip formation is different from the ordinary turning due to the circular feed of the tool. Therefore the cutting conditions will be better than in case of other widely used hard turning methods. Due to the helix angle of the cutting edge the rotational turning shows similarities to skiving in the contact point.

Our approach in the research of rotational turning was the mathematical definition of the machined surface and the cross section of the chip. The main requirement for the equation was that it should be able to describe both investigated cases (rotational turning and skiving) with the proper changes of the parameters.

To define the machined surface's two-dimensional equation the method was applied. The purpose of the method is to calculate the generated surface after giving the proper definition of the coordinate systems. In order to do this the transformational equations must be defined between the coordinate systems. These equations contain two parts matrix of rotation and the vector of translation.

In order to validate the equation experiments were carried out using the simpler method. As the workpiece material EN AW-6082/ISO: Al Si1MgMn (Al0.9Mg1.0Si0.7Mn) grade aluminium alloy was chosen. It has good cutting attributes, corrosion resistance, and due to its mechanical parameters the machined surface can be easily observed.

An aluminium workpiece was machined with tools of different inclination angle. Finally the measured and the theoretical two dimensional curve of the surface were compared.

Based on the comparison of the theoretical curves and the measured values we can state that the curve almost perfectly fits the surface generated by the cutting process (the deviation is below the resolution of the measure). Therefore we can continue further our investigations by describing more complex cases. By using the equation the theoretical values of the surface roughness can be defined and the theoretical cross-section of the chip can be described. After that the optimal inclinational angle for skiving or the optimal helix angle for rotational turning can be determined.

Furthermore, we can say that the machining of shaft shoulders is not possible in skiving, however with the application of rotational turning it can be achieved.