Chip Formation Comparison- Merchant´s Model vs. Model with Rounded Cutting Edge

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Merchant's model of chips formation considers an "ideal" (sharp) cutting edge. However, nowadays many manufacturers of cutting tools modify the tool geometry with the goal to increase the tool life and to improve the surface quality. The processes, at which the modified tools are used, go along with chip formation and physical phenomena that differ from Merchant's model.
The article deals with the simulation of chip formation at various ratios of rounded cutting edge and cutting thickness. Aim of the research has been focused on the interpretation of new knowledge from the cutting theory. Authors have tried to understand the theory of cutting process by means of simulation and provide the recommendations for practical usage. They explain the differences between the Merchant's model with a sharp edge and a model with a rounded cutting edge. The contribution describes changes and manifestations of physical phenomena result from given conditions. There were also simulated dependencies of the tool load on the radius of cutting edge in the article. Achieved results will enable not only better integration of cutting tools into the manufacturing, but they also allow to increase the machining efficiency.

Keywords: Cutting Edge, Merchant´S Model, Simulation, Chip Formation

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