

The aim of this study is to create a FEM simulation model in order to obtain Numerical solutions of cutting forces, for a range of coated tool materials and defined cutting conditions. Commercial implicit finite element code MSC.Marc has been used in simulations of orthogonal cutting processes performed by means of multi-coated tools. The latter were equipped with progressively increasing number of thin layers including TiC, TiN and Al₂O₃ films deposited onto ISO P20 carbide substrates. Results showing the tool–chip interfacial friction influencing the force distribution fields, as the consequence of using coated tools. The various force simulation results obtained were compared with the measurements of cutting force and discussed in terms of literature data. This paper also reports the procedure and specific modeling techniques for simulating the orthogonal metal cutting process using a general-purpose finite element computer code. The finding of this paper provides useful insights for understanding and for improving the orthogonal metal cutting process. The predicted value of F_c is in good agreement with the experimentally measured with an error of 8%