

Finite-Element Simulations of AL7075-T6 Orthogonal Cutting: Effect of Part Geometry and Mesh on Chip Morphology and Formation Mechanism.

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Abstract. Machining of aluminum alloys is of great interest for the aeronautical industry. Amongst those, the Al7075-T6 alloy remains a major component. Numerical studies of the orthogonal cutting of such alloys present a few challenges. One of them seems to be the absence of a unified way to capture the chip morphology without artificially modifying the mesh or the piece geometry to facilitate a particular chip formation mechanism. It is accepted that Al7075-T6 forms segmented chips for typical industrial cutting speeds. In this contribution, a FEM model with a structured mesh is used with the commercial code Abaqus/Explicit v6.14 in the Lagrangian scheme. With this simple approach, it is possible to reproduce the cutting forces and the chip morphology obtained in practical cases. The results are validated against experimental tests found in the literature.