

Abstract

WC-Co Filament for Material Extrusion (MEX) [†]

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Harder, better, faster, and stronger are requisites that are constantly being craved by manufacturing industries to match the ever-challenging productivity of new materials, geometries, and production cycles. Cutting tools fall in these demands as one of the protagonists of the machining process. New geometries, harder and tougher grades, optimized machining strategies, and better cooling for improved tool life are characteristics that are constantly being improved and pushed to new boundaries. By using additive manufacturing (AM) technologies to produce cutting tools, new doors open for the generation of more versatile and optimized geometries, having in mind the particularities of their applications.

Material extrusion (MEX) is an AM technology that has the potential to generate WC-Co cutting tools with new geometries and optimized cooling systems. A balance must be achieved between the properties of the filament used for the MEX process and the sinterability requirements to guarantee the exceptional quality of a tool. In this study, feedstock was prepared with WC-Co powder and an optimized binder/additive feedstock. The powders were evaluated through the 4Ss (particle size, particle size distribution, particle shape, and particle structure) and the feedstock by the critical powder volume percentage (CVCP) and its rheologic behavior. Finally, filaments were extruded and their “printability” as well as sinterability were tested.

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