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New generation of the cutting tools when the AM (Additive Manufacturing) technology is used

AM technology is used in many areas of the nowadays civilization. The leaders of these technology are aerospace and automotive industry because through this is possible to create a special design with very low weight and costs. However, very interesting area is production of the cutting tools. There is possible to use the advantages of the AM technology like production non-traditional shape, special internal cooling systems and their modification and repass of damage tool. With this idea, the special milling head was built. The major advantage of this new generation milling head is the radical reduction of the weight by more than 50% versus standard cutting tools. Final mechanical stability is similar to the full volume body milling head. A further advantage is the possibility of using a special internal cooling system for the clearance and rake faces of the cutting inserts, as in this case. To verify the milling strength and stiffness, FEM analyses were made and the weak points were optimized. After these analyses, the cutting tool was printed and tested. Firstly, material analyses, modal analyses and stability analyses were carried out, and subsequently a long-term test was conducted. Before of all the big material research of 3D metal printing were made. The grain size and chemical quality analyses of the input material were made and the mechanical properties was evaluated too with the different setup.

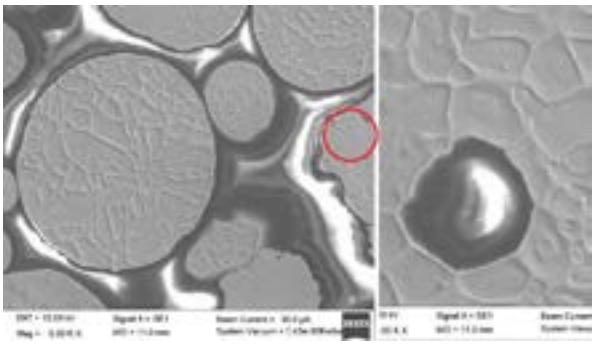

Figure 1: *Microstructure of the MS1 grain.*

Figure 2: *Milling head made by AM.*

Biography

Miroslav Zetek has completed his Habilitation work from University of West Bohemia, Pilsen, Czech Republic. He is the Head of the Department of Experimental Machining in the Faculty of Mechanical Engineering, Regional Technological Institute, University of West Bohemia, Czech Republic . He and his team have published more than 42 papers which are in database Scopus and WoS and has been serving as an Reviewer Member of repute journal. He is a leader of few projects supported by the Czech Ministry and one international project. He is an Associated Professor in the Department of the Machining Technology where he leads bechelourm, and doctoral program (Magister) students with their final works.

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