

Selection of a suitable tungsten carbide grade for the machining of titanium

The IFW (Institute for Production Engineering and Machine Tools) at Hanover University has launched a multilateral project with the aim to increase productivity in the rough milling of β -Ti-6Al-4V.

Premium AEROTEC (user), CemeCon (coating) and EXTRAMET (tungsten carbide) were involved in the project. The investigation was carried out by the IFW. From Figure 1 it is clear that different materials sometimes cause very different states of stress at the cutting edge when cutting the material. This must be taken into account when developing and selecting the tungsten carbide, in order to create an efficient tool that will meet the high demands with regard to toughness and wear resistance. This was the EXTRAMET's task.

Summary:

The choice of a suitable tungsten carbide depends on a variety of factors.

An example of this is the influence of the machine tool. In modern high-performance machining centres, the toughness of the substrate should be chosen to be just high enough to avoid chipping when milling. If smaller, local bursts cannot be prevented on the cutting edge, for example due to poor chip removal, tougher substrates are more suitable. In addition to tungsten carbide, the multilateral project also covered the optimisation of the coating, tool geometry, cooling lubricant supply and setting variables (Figure 2). By increasing the removal rate to 150% of the initial value, it was possible to improve the service life by 217%. The maximum removal rate was achieved with the milling tool that resulted from the final stage of development and is 196% greater compared to a standard tool.

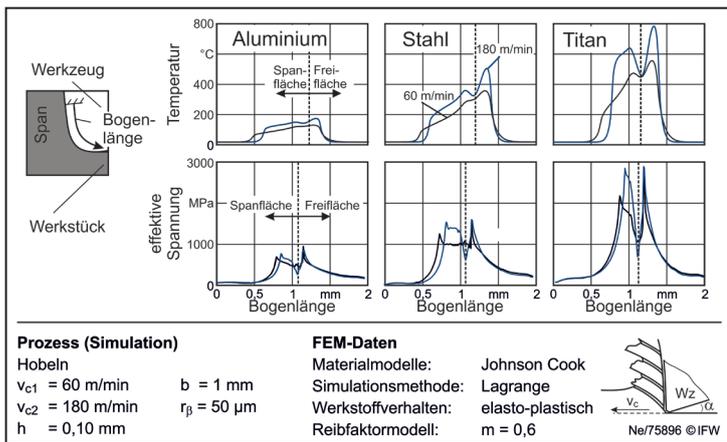


Fig. 1: FEM simulation, increased local stresses when machining titanium

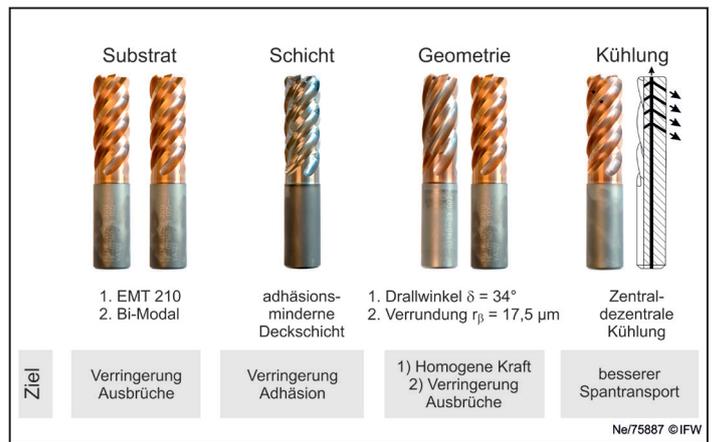


Fig. 2: Tool parameters