Preliminary Milling Tests on STAVAX ESR 52 HRC using 2 mm carbide tools in the range 20 – 200 m/min - DTU Orbit (20/02/2019)

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The opportunity to machine hardened tool steels, as widely demonstrated by many authors, is strictly connected with the high speed machining philosophy, namely that, increasing the cutting speed, the percentage of the generated heat during machining that goes away with the chip, increases as well. This consciousness has opened a new field of investigation in material removal machining operations. This new machining concept can be applied with good results to the manufacturing of dies and molds. In fact, reduced manufacturing lead times and costs can be achieved by machining directly in pre-hardened materials since this eliminates the need to finish machine the component after hardening in order to compensate for the thermal distortions. To be effective, this requires state of the art tooling and high speed cutting conditions. While using state of the art tools is always possible and obviously necessary in order to test the actual potentials of the present manufacturing solutions, the high speed cutting range can’t always be reached, since it depends not only on the maximum spindle speed of the available machine, but, when dealing with milling, also on the tool diameter. This is obviously a limitation for micromilling which is aimed at using mills of diameters of 0.5 mm and smaller; for instance, with a diameter of 0.2 mm, which is the smallest diameter sold by most of the tool suppliers, and with a maximum spindle speed of 100000 rpm, the achievable cutting speed is 63 m/min. Thus it’s apparent that the majority of the micromilling operations are still carried out using cutting speeds that fall within the conventional range.

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