

Influence of Chip Segmentation of Ti64 on the Topography of the Machined Surface

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Abstract. Chip segmentation is a common phenomenon that occurs during the high and low speed machining of Ti64. At low cutting speed the lack of ductility is the responsible for the segmentation of the chip, while for high cutting speeds the adiabatic shearing is the predominant phenomenon. However, that segmentation is commonly only linked to worsening of tool life due to fluctuating forces not to the surface integrity of the workpiece. Therefore, the aim of this research is to make a correlation between the chip segmentation and the surface topography derived from the machining process. For that, different linear cutting tests were carried out varying the cutting speed and feed, producing different chip segmentations. Afterwards, the surface was analyzed by contact rugosimeter and optical measurement device Alicona IFG4. Moreover, to analyze the material flow in the tertiary shear zone during the chip segmentation, the process was filmed with a high speed and infrared radiation camera. The results showed that higher chip segmentation produced more severe undulations in the surface due to higher quantity of material flowing into the tertiary shear zone that worsen the surface roughness.