Preliminary analysis of grinding of PA66 thermoplastics

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Abstract. The intent of this work is to present a preliminary analysis of grinding of polyamide 6/6 (PA66) thermoplastics, searching for parameter sets optimizing the process. Natural PA66 parts were grinded with different cutting speeds, feed rates, depth cuts and abrasive materials. Surface quality of the machined parts was measured and evaluated as well as temperatures during the material removal process. The experimental procedure and the main results of the grinded surfaces were evaluated with the aim of achieving a final surface quality similar comparable to metallic material parts.

Polyamides (PA) have been a recent trend in manufacturing due to its low cost, good chemical resistance, satisfactory mechanical properties, continuous operating temperature up to 120°C and low density. This combination of factors makes engineering thermoplastics, in particular Nylon 6/6, an attractive candidate to metal replacement for several tribological applications such as torque transmitting shafts and rollers that are very present in the automotive industry. However, in these types of applications, the surface of the part must be highly smooth and contain tight tolerances in order to function properly. Hence a larger understanding of PA66 grinding is necessary. To achieve such understanding, the material was grinded with two types of abrasive materials, Al_2O_3 and SiC, varying the feed rate, cutting speed and depth of cut, and always verifying the rugosity and planarity of the finished parts. Achieved surface quality was very high as can be observed in **Figure 1**. These tests were performed with no cooling and with air cooling so that process temperature could be measured by a thermal camera, in this way, determining that grinding occurs over the glass transition temperature of the material.

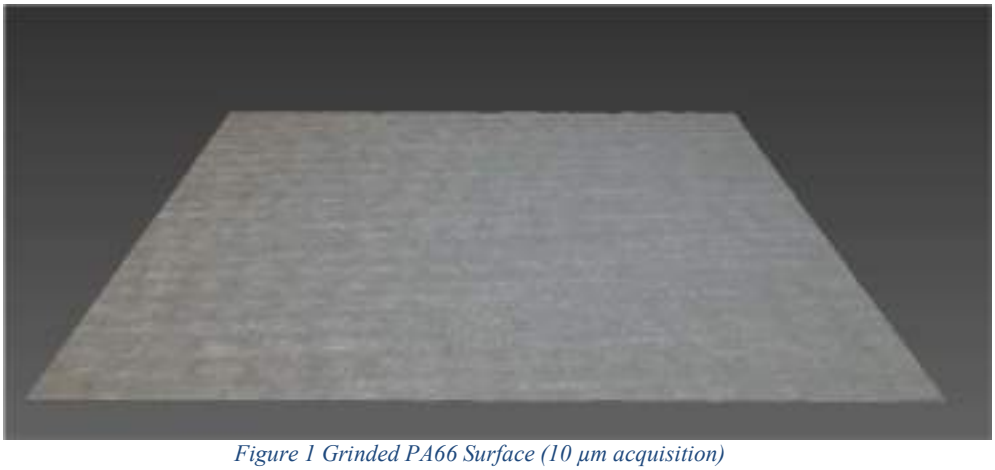

Figure 1 Grinded PA66 Surface (10 µm acquisition)

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