Tool Wear Observation During Unconventional Low Speed Machining Using Low Cost Micromilling

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Abstract. Nowadays, biomedical, aerospace, electronics, and military industries have high demand for miniaturized components due to their rapid technology development on high precision devices. Micro milling process is one of the processes that is expected to be able to produce micro-size 3-dimensional features onto workpiece. This process can be considered as costly and difficult due to dimensional effect and low cutting energy generated. It can be considered that one of its crucial components in the process is the micro size tool itself. The study challenges the capability of low cost micro milling tool during machining aluminum alloy 6065 and AISI 1045 steel material, where a 1.0 mm end mill tungsten carbide (WC) tool is chosen. The experiment is conducted using a different combination of machining condition. The surface roughness of the workpiece and size of wear length is measured using a 3D measurement laser microscope. It can be observed that the wear length increases proportionally with cutting length, resulting to the increment of the surface roughness. Machining process of higher strength material tends to wear the tool faster, shortening the life of the tool, although the machining process is possible. It is assumed that that a proper selection of machining parameter is required to reduce tool wear rate and promotes a longer tool life.

Keywords: Low cost tooling, Micro milling process, High Precision Machining

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