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# Sustainable Milling Process for Tensile Specimens

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**Abstract :** Machining of aluminium extrusion profiles in the automotive industry has gained much interest in the last decade, particularly due to the higher utilization of aluminum profiles and the weight reduction benefits it brings. Milling is the most common material removal process, where the rotary milling cutter is moved against a workpiece. The physical contact of the milling cutter to the workpiece increases the friction between them, thereby affecting the longevity of the milling tool and also the surface finish of the workpiece. To minimise this issue, the milling process uses cutting fluids or emulsions; however, the use of emulsion in the process has a negative impact on the environment ( such as consumption of water, oils and the used emulsion needs to be treated before disposal) and also on the personal ( may cause respiratory problems, exposure to microbial toxins generated by bacteria in the emulsions on prolonged use) working close to the process. Furthermore, the workpiece also needs to be cleaned after the milling process, which is not adding value to the process, and the cleaning also disperses mist of emulsion in the working environment. Hydro Extrusion is committed to improving the performance of sustainability from its operations, and with the negative impact of using emulsion in the milling process, a new innovative process- Dry Milling was developed to minimise the impact the cutting fluid brings. In this paper, the authors present one application of dry milling in the machining of tensile specimens in the laboratory. Dry milling is an innovative milling process without the use of any cooling/lubrication and has several advantages. Several million tensile tests are carried out in extrusion laboratories worldwide with the wet milling process. The machining of tensile specimens has a significant impact on the reliability of test results. The paper presents the results for different 6xxx alloys with different wall thicknesses of the specimens, which were machined by both dry and wet milling processes. For both different 6xxx alloys and different wall thicknesses, mechanical properties were similar for samples milled using dry and wet milling. Several tensile specimens were prepared using both dry and wet milling to compare the results, and the outcome showed the dry milling process does not affect the reliability of tensile test results.

**Keywords :** dry milling,tensile testing, wet milling, 6xxx alloy
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