

Surface Roughness of Al-Si/10% AlN MMC Material in Milling Operation Using the Taguchi Method

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Abstract : Metal matrix composites have demand for light-weight structural and functional materials. MMCs have been shown to offer improvements in strength, rigidity, temperature stability, wear resistance, reliability and control of physical properties such as density and coefficient of thermal expansion, thereby providing improved engineering performance in comparison to the un-reinforced matrix. Experiment were conducted at various cutting speed, feed rate and difference cutting tools according to Taguchi method using a standard orthogonal array L9. The volume of AlN reinforced particle was 10% in MMC. The milling process was carried out under dry cutting condition using uncoated carbide, TiN and TiCN tool insert. The parameters used were the cutting speed of (230,300,370 m/min) the federate used were (0.4, 0.6, 0.8 mm/tooth) while the depth of cut is constant (0.3 mm). The tool diameter is 20mm. From the project, the surface roughness mechanism was investigated in detail using Mitutoyo portable surface roughness measurements surfest SJ-310. This machining will be fabricated on MMC with 150mm length, 100mm width and 30mm thick. The results showed using S/N ratio, concluded that a combination of low cutting speed, medium feed rate and uncoated insert give a remarkable surface finish. From the ANOVA result showed the feed rate was major contributing factor (43.76%) following type of insert (40.89%).

Keywords : MMC, milling operation and surface roughness, Taguchi method

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