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Effect of volume fraction of alpha and transformed beta on the high cycle fatigue properties of bimodal Ti6Al4V alloy

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The present study was performed to investigate the effect of volume fraction of alpha and transformed beta phase on the high cycle fatigue (HCF) properties of the bimodal titanium Ti6Al4V alloy. The effect of such morphology on mechanical properties was studied using tensile and rotating bending fatigue test as per ASTM standards. Ti6Al4V alloy samples were heat treated to have three distinctive volume fractions of alpha and transformed beta phase. With an increase in quench delay from 30, 50 and 70 s during quenching after solutionizing temperature of 967°C, the volume fraction of alpha was found to be increased from 20% to 67%. Tests on tensile and rotating bending fatigue showed that the specimen with 20% volume fraction of alpha phase exhibited the highest tensile and fatigue strength. However, the properties gets deteriorate with increase in volume fraction of alpha.

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Analysis on effect of drilling parameters on delamination of epoxy polymer composite reinforced with carbon fiber and silicon nitride

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Polymer matrix composite materials (PMC) proved their adaptability for the modern material field because of their low density and high strength to weight ratio. The carbon reinforced composite material plays an important role in aerospace, naval, automobile and many other industries. Its high strength to weight ratio made it most promising in the emerging technologies. Silicon nitride is one of the materials which has high fracture strength and also acts as self-lubricating material during machining processes. Drilling is one of the major operations to be performed on the component to assemble various assemblies. Delamination is one of the major problems identified as the cause for the failure of material during its operation. This paper reveals dominant factors like vibration, thrust force and temperature during the drilling process which causes delamination and summarized optimum values of drilling parameters like feed, spindle speed, diameter of drill bit, analyzed for drilling parameters. Several factors influence the quality of drilled holes like inside diameter, surface roundness. The quality of the drilled hole depends on the thrust force and torque induced during drilling, which is affected by the factors such as, cutting speed, feed rate etc. Experiments to measure the delamination are conducted for different input parameters along with various weight percentage of silicon nitride Viz., 0%, 6% and 10%. Video measuring machine is used to measure the circularity, cylindricity and delamination. FEM analysis is also performed to find the theoretical values. Both theoretical and experimental are compared. This paper presents about cutting force and stress developed during drilling processes which influence on the generation of heat, tool wear and quality of machined surface and accuracy of drilled holes. To analyze the delamination of the drilled holes both experimental and finite elemental analysis are used. Validation is also done between theoretical and experimental values.

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