Valuation of Strength Enhancement in Heat Treated SiC Nanoparticles Reinforced 2024 Aluminum Alloy Metal Matrix Composites using FEA

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ABSTRACT

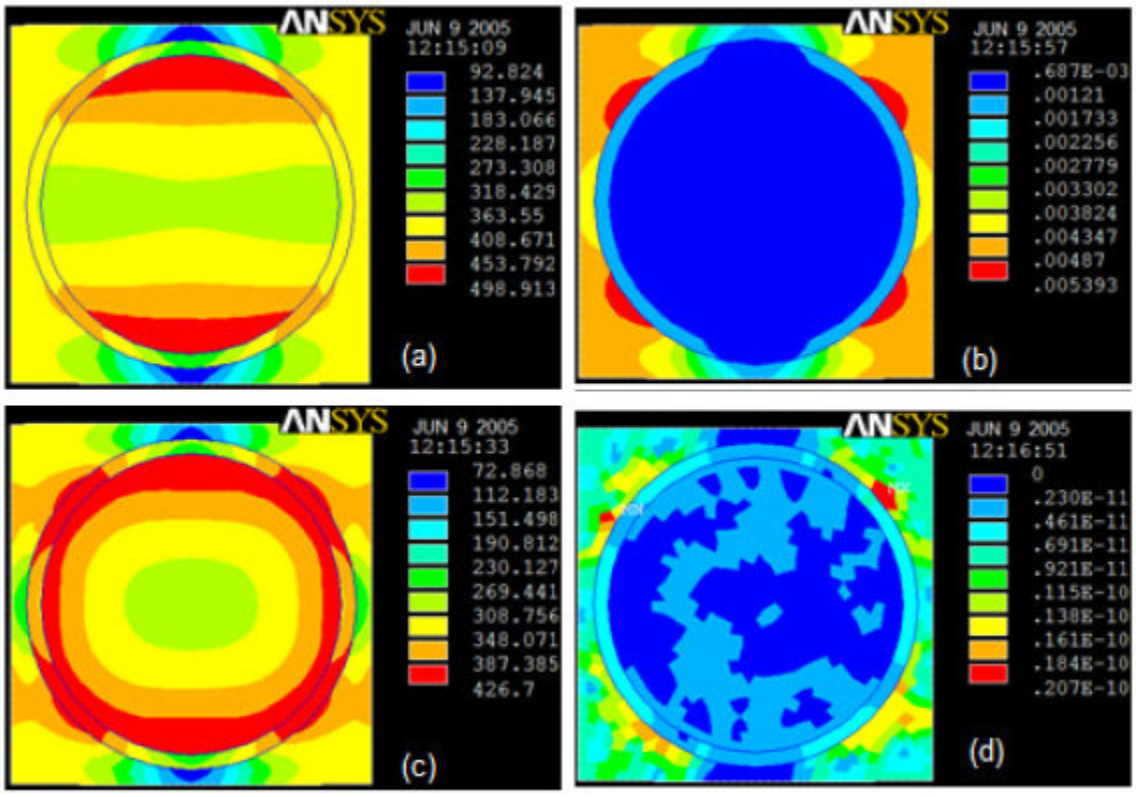

Figure 7: FEA results for heat treatment, T6 (a) tensile strain, (b) tensile strength, (c) von Mises stress and (d) strain energy.

SiC is known for its very high hardness and abrasion resistance. Common applications include pump seals, valve components, and wear-intensive applications such as rollers and paper industry retainers. Alloy 2024 is Al-Cu-Mg alloy. With its relatively good fatigue resistance, alloy 2024 continues to be specified for many aerospace structural applications. The fracture of particle reinforced metal matrix composites is dependent on the particle strength and particle/matrix interface strength. The toughness decrease slightly with decreasing particle size, the effect of particle size is less because decreasing particle results in a lower inter-particle spacing. The present work was focused on the effects of heat treatments such as T3, T4 and T6 on the properties of alumina (Al_2O_3) reinforced AA2024 composites. The results obtained the finite element analysis (FEA) were validated with those of experimentation.

The matrix material used in the present work was AA2024 alloy. The reinforcement material was Al_2O_3 at 30% volume fraction of the composites with average size 100nm. The matrix alloys and composites were prepared by stir casting process.

The results obtained from FEA procedure were within the limits of experimental results. In the AA2024/SiC metal matrix composites, the strength improvement was highly appreciable with heat treatment, T6.

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