Review of: "The Influence of Hot Extrusion on The Mechanical and Wear Properties of an Al6063 Metal Matrix Composite Reinforced With Silicon Carbide Particulates"

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Potential competing interests: No potential competing interests to declare.

The utilization of lightweight composite materials in industrial and structural applications has witnessed a substantial surge in recent years. Among these materials, aluminium alloys have gained prominence due to their versatility in design and engineering. This article delves into a detailed exploration of the mechanical and wear behavior of the aluminium 6063 alloy reinforced with various weight fractions of silicon carbide, particularly focusing on 'as-cast' and 'hot extruded' conditions.

Methodology: The study employed the stir casting technique to develop composite systems, and a subset of samples underwent hot extrusion at 500 degrees Celsius with an extrusion ratio of 9.0. Both the 'as-cast' and 'hot extruded' samples were rigorously examined for their mechanical and adhesive wear properties, providing a comprehensive understanding of the material's performance under different processing conditions.

Findings: The incorporation of silicon carbide reinforcement in the aluminium 6063 alloy demonstrated a noteworthy enhancement in both mechanical properties and wear resistance. This improvement is attributed to the synergistic effects of the two materials, combining the lightweight nature of aluminium with the high strength and hardness of silicon carbide. The reinforcement not only positively influenced tensile strength, hardness, and impact resistance but also imparted superior wear resistance to the composite material.

Furthermore, the study revealed a significant leap in mechanical and wear resistance properties when the composite samples underwent secondary processing through hot extrusion. This enhancement can be attributed to the refinement of the microstructure and the consolidation of the composite during the extrusion process. The increased density and improved interfacial bonding between the aluminium matrix and silicon carbide particles played a crucial role in achieving superior mechanical and wear properties.

Implications: The findings of this study have significant implications for the advancement of lightweight composite materials in industrial and structural applications. The tailorable nature of these composites allows for precise engineering to meet specific requirements, making them a compelling choice for diverse applications.

Conclusion: In conclusion, the article provides valuable insights into the mechanical and wear behavior of aluminium 6063 alloy reinforced with silicon carbide. The study's methodology, encompassing 'as-cast' and 'hot extruded' conditions, highlights the impact of processing techniques on the material's performance. The positive influence of silicon carbide

reinforcement on mechanical and wear properties, coupled with the substantial improvement through hot extrusion, positions these lightweight composite materials as promising candidates for a wide range of applications.

Comments ;

1. In all the graphs/images used, they are not very clear. Increase the resolution if possible.
2. Mention "Fig. No." as captions below all the graphs and images. You have mentioned "Graph No." under graphs/plots. Change them to "Fig. No."
3. Additional information/explanations may be provided for how the hardness/wear resistance varies for as-cast/extruded/composites. You may refer to the following papers and cite them in the references. (a) B. M. Girish, B. M. Satish, Sadanand Sarapure, D. R. Somashekar & Basawaraj (2015) Wear Behavior of Magnesium Alloy AZ91 Hybrid Composite Materials, Tribology Transactions, 58:3, 481-489, DOI: 10.1080/10402004.2014.987858. (b)Girish, B.M., Satish, B.M., Sarapure, S. *et al.* Optimization of Wear Behavior of Magnesium Alloy AZ91 Hybrid Composites Using Taguchi Experimental Design. *Metall Mater Trans A***47**, 3193–3200 (2016). https://doi.org/10.1007/s11661-016-3447-1 (c) S. Sarapure, *Materialwiss. Werkstofftech.*2023, 54, 168.https://doi.org/10.1002/mawe.202200074
4. The article provides well-founded recommendations and implications for the future development and application of lightweight composite materials. The concluding remarks effectively summarize the key findings and their broader significance. In light of these positive aspects, I recommend the acceptance of this article for publication. The study's methodology, findings, and implications contribute meaningfully to the scientific discourse on lightweight composite materials, and the article aligns well with the objectives of our journal.