

P. Sakthivel

Mangalaraja Ramalinga Viswanathan

K. Ravichandran *Editors*

Proceedings of the 1st International Conference on Recent Advancements in Materials Science and Technology, Volume II

ICRAMST'24, 29–30 January,
Coimbatore, India



Springer

Enhancing the Mechanical Strength of Dissimilar Friction Stir Welded Joints Using Parametric Optimization



N. Senthilkumar, S. Santhanakrishnan, B. Deepanraj, and A. Thanikasalam

1 Introduction

A solid-state welding procedure, friction stir welding (FSW), involves attaching two confronting parts without melting them using a non-consumable tool. Regarding aluminum high-strength extrusion, FSW is the way to go. This includes alloys from the 7000, 6000, and 2000 series, which are notoriously challenging to weld using traditional fusion methods due to heat-induced mechanical property loss and vulnerability to cracking during solidification. In industries where lightweight is a primary need, such as transportation (rail, automotive, naval construction, aviation), defense, and energy, these production attributes are given special attention because of the weight savings compared to traditional welding methods (Akinlabi & Mahamood, 2020).

For lightweight applications, aluminum and magnesium alloys are used widely in engineering applications. During FSW of these dissimilar alloys, the alloying procedure produces a magnesium-aluminum alloy when aluminum particles are added. This alloy possesses several desirable properties: lightweight,

N. Senthilkumar (✉)

Saveetha School of Engineering, Saveetha Institute of Medical and Technical Sciences, Chennai, Tamil Nadu, India

S. **Santhanakrishnan**

Department of Mechanical Engineering, Meenakshi Sundararajan Engineering College, Chennai, Tamil Nadu, India

B. Deepanraj

Department of Mechanical Engineering, College of Engineering, Prince Mohammad Bin Fahd University, Al-Khobar, Saudi Arabia

A. Thanikasalam

Academy of Maritime Education and Training (AMET), Chennai, Tamil Nadu, India