



**IntSym**

South Eastern University of Sri Lanka

# CONFERENCE PROCEEDINGS

**13<sup>th</sup> International Symposium 2025**

Navigating Technology Transformation for Sustainable Development:  
Bridging Sciences, Technologies, and Humanities

**10<sup>TH</sup> SEPTEMBER 2025**



**South Eastern University of Sri Lanka**

# **Conference Proceedings**



**13<sup>th</sup> International Symposium – 2025**

**on**

**Navigating Technology Transformation for Sustainable  
Development: Bridging Sciences, Technologies, and  
Humanities**

**10<sup>th</sup> September 2025**

**Organized by**

**South Eastern University of Sri Lanka**

**University Park, Oluvil, #32360**

**Sri Lanka**



13<sup>th</sup> International Symposium - 2025  
South Eastern University of Sri Lanka

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# MICROSTRUCTURAL EVOLUTION IN THE CO-EXTRUDED ALUMINIUM-TITANIUM BI-METAL COMPOSITE

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## ABSTRACT

Aluminum-titanium alloys play a vital role in the aerospace and automotive industries. This work makes use of Al-6061 and grade 2, which possess good toughness, good surface finish, and medium to high strength. Here, aluminum and titanium bi-metal co-extrude to predict the mechanical property and analyze the feasibility in use of using this bi-metal in engineering applications. Holes are made in the Al-6061 alloy, and titanium rods are inserted in these holes. Aluminum and titanium are subjected to hot extrusion at a 2:1 ratio. The initial diameter of work workpiece is 30mm, and after extrusion, it is reduced to 15mm. The metallographic analysis is carried out after the resultant metal has been sectioned.

**Keywords**— *Macro-composite, Extrusion, Aluminium 6061, Titanium, Corrosion.*

## Introduction

Bimetal systems are unique in that many of the collective properties are governed by the properties of the individual metals, as well as influenced by the extent of bonding between the metals at the macro-interface. Ti-Al Bimetal compounds have great potential as high-temperature structure materials in the applications of automobile and aerospace industries due to their low density, high specific strength, high melting temperature, and environmental resistance at elevated temperatures [1-2]. The application of Ti-aluminide sheets is considered a breakthrough in the practicality of Ti-Al intermetallic compounds [3]. However, Ti-aluminide sheets are challenging to manufacture and have not been commercialized for their poor room temperature ductility and fracture toughness [4]. Growth of applications utilizing bi-material extruded products inspired many theoretical and experimental works that have been performed in recent years [1–13]. Properly designed bi-material products exhibit an optimal combination of desired properties while minimizing their restrictive properties. Many factors controlling bi-material rod and wire manufacturing processes were established and optimized. Significantly, it is not the inherent properties of the materials making up the billet that have the greatest effect, but rather a combination of geometric and process parameters. Marcus Engelhard et al. [9] focused on the extrusion of the aluminium alloy and Titanium grade 1(Ti Gr1). The extrusion was carried out at 450°C. It is found out that the titanium grade 1 cores fractured during extrusion. It is due to the combination of tensile and shears stress caused by the material flow of non-symmetrical cross section of the profile. M. Thirumurugan et al. [10] produced the ZM21 Magnesium–aluminium macro composite by the co-extrusion process. He found that the ductility of Magnesium was increased.