

Chapter 6 : Future Scopes

The present work represents an approach towards affordable dissimilar welding of highly reactive titanium alloys using pulsed-GTAW. High-quality, atmospheric contamination-free successful welding of dissimilar titanium alloys (CP-Ti/Ti-6Al-4V) was achieved at a very low cost. Based on the obtained results and the demand for dissimilar welding in modern industries, the future scope of this work has been deduced and listed pointwise.

1. The design of the developed shielding setup is novel and cost-effective. Modifications to the design could enable the automatic welding of highly reactive materials with various shapes and in different welding positions.
2. The amount and morphology of different phases have the most significant impact on the mechanical properties. Therefore, electron backscattered diffraction (EBSD) analysis could be performed in different regions of the weld to accurately determine the causes of variation in mechanical properties throughout the weld.
3. Improvements in hardness and tensile strength were observed in welds prepared using pulsed-GTAW due to the formation of a small amount of martensite, in addition to grain refinement. Transmission electron microscopy (TEM) analysis of weld and HAZ samples should be performed to determine the exact phases and their quantities.
4. Oxidation is the primary cause of weld cracking. Advanced characterization techniques such as X-ray photoelectron spectroscopy (XPS) could be used to determine the exact amount of oxygen, if any, on the surface of the weldment.