

Preface

This special edition is devoted to joining technologies and weld metallurgy, with a primary emphasis on steel and advanced alloys. The articles examine conventional and emerging welding processes — including friction stir welding, electron beam welding, and soldering — applied to materials ranging from pipe welds to aluminium foam structures and electronic components. Particular attention is given to weldability analysis, welding distortion control, and strain ageing, as well as to microstructural evolution in the weld metal and heat-affected zone. The roles of non-metallic inclusions and process-induced thermal cycles are analysed in relation to mechanical properties and thermal fatigue behaviour. Collectively, the contributions highlight the critical links between processing, microstructure, and performance in modern welding and joining applications.