



# **Friction Stir Superplasticity for Unitized Structures: A volume in the Friction Stir Welding and Processing Book Series**

*Zongyi Ma Ph.D., Rajiv S. Mishra*

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This book describes the fundamentals and potential applications of ‘friction stir superplasticity for unitized structures’. Conventional superplastic forming of sheets is limited to the thickness of 3 mm because the fine grained starting material is produced by rolling. Friction stir superplasticity has grown rapidly in the last decade because of the effectiveness of microstructural refinement. The thickness of the material remains almost constant, and that allows for forming of thick sheets/plates, which was not possible before. The field has reached a point where designers have opportunities to expand the extent of unitized structures, which are structures in which the traditional primary part and any supporting structures are fabricated as a single unit. With advanced optimization and material considerations, this class of structures can be lighter weight and more efficient, making them less costly, as well as mechanically less complex, reducing areas of possible failure.

- Discusses how friction stir processing allows selective microstructural refinement without thickness change
- Demonstrates how higher thickness sheets and plates can be superplastically formed
- Examples are presented for aluminum, magnesium and titanium alloys
- Covers the production of low-cost unitized structures by selectively processing cast sheets/plates

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