



# StirLight

## CASE STUDY: PRECISION FSW FOR THIN-SECTION ALUMINIUM BUTT JOINTS

High-strength, defect-free thin-section butt joint in aluminium using FSW, optimising structural integrity for lightweight assemblies

### KEY BENEFITS

- **Enhanced Durability:** The joint strength and fatigue resistance make it ideal for lightweight yet high-load components.
- **Cost Efficiency:** up to 4m per minute weld speed. Eliminates post-processing and reduces material waste.
- **Precision Fit:** Maintains dimensional stability in thin sections, suitable for intricate assemblies.



# StirLight

### Our FSW Services:

- Research and Development
- Consultancy and Design
- Prototyping and Manufacturing
- Quality Control

Get in touch to discuss your project:  
[info@stirlight.com](mailto:info@stirlight.com)

### CHALLENGE

- Create a reliable, high-strength butt joint in thin-section aluminium, which is prone to warping and defects with traditional welding.
- Maintain joint strength and minimise distortion to suit applications with strict weight and durability requirements
- Unable to weld 2000 and 7000 series with fusion welding

### APPROACH

- Utilised robotic stationary shoulder FSW to join thin aluminium sections without melting the material.
- Use the FSW process to prevent heat distortion, achieving a strong, defect-free joint at thicknesses from 0.3 mm up to 50mm.

### OUTCOME

- Consistently strong joints with tensile strength up to 95% of the base material.
- Minimal to zero distortion and reduced residual stress, maintaining dimensional accuracy.
- High surface quality, reducing the need for additional finishing.

### APPLICATION POTENTIAL

- Aerospace panels and fuselage, train panels, automotive chassis components, lightweight structures in electric vehicles.