

Welcome to **The RSR Brief**, a new quarterly publication from [CenterLine \(Windsor\) Limited](#) and [Howmet Fastening Systems](#) focused exclusively on Resistance Spot Riveting (RSR).

Each issue will focus on providing technical or practical insights into a specific topic or issue, and is designed to be read in five minutes or less. Enjoy the read!

RSR of Thick Aluminum to Thin Steel Joining – 2026 Q1 Edition

Conventional resistance spot welding (RSW) of thin steel sheets to structural steel members is an industry-wide challenge as the thickness ratio exceeds 3x and thin gauges are under 1.0 mm (Figure 1). Achieving a satisfactory joint with adequate weld penetration into the thin sheet can be difficult and typically addressed with advanced weld schedules and parameters.

As next generation designs employing thin steel sheets to structural aluminum members increase, joining technologies have migrated from RSW to mechanical fastening. This has presented a new set of challenges ranging from capital, logistics, and most importantly performance. Of particular concern are joints composed of structural gigacastings (often shock towers and underbody components) in the 2.5-4.0 mm range to nonstructural mild steel components in the range of 0.6-1.2 mm. Many mechanical technologies have inherent issues with aluminum die castings due to low ductility creating a propensity for cracking which is a cause for concern.

RSR is a hybrid process that exploits the RSW heat to effectively address the lack of ductility in these thick, non-ferrous materials while simultaneously producing a welded connection to the steel sheet. RSR enables multi-material joining in the applications where the thick steel is replaced with aluminum (Figure 1). Since the RSR process does not employ any prehole prior to installation, aluminum's electrical and thermal conductivity presents similar challenges observed in conventional RSW.

During 2025, RSR focused efforts for stack ups like the one shown in Figure 2. Currently RSR guidelines suggest a maximum ratio of aluminum to steel thickness of 3:1 with best performance observed with a ratio less than 2.5. Typical recommended minimum steel sheet gauges are 1.0 mm and above when joining to thick casting. Improvements to date have been completed through conventional weld parameter enhancements.



Figure 2 – RSR Cross Section: 3.0 mm ADC to 1.2 mm 980 MPa GA Steel

Similar Material	Dissimilar Material
Thick Steel	Thick Aluminum
Thin Steel	Thin Steel

Figure 1 – Challenging Thickness Ratio Joints

Our 2026 R&D portfolio goals are to expand the thickness operating window (aluminum thickness above 3mm, steel sheet thickness under 1mm resulting in stack up ratios up to and above 3:1) while maintaining joint performance through the following techniques:

- Advanced welding parameters
- Equipment and consumable optimization
- Proprietary methods

All developments will be validated with cross sectional analysis and mechanical testing. Methods will be validated against other industry relevant material combinations.

Want to learn more about this topic or RSR? Have feedback on the topic? Do you have a topic or development request?

Please reach out to your RSR representative. We would be happy to meet and discuss solutions for all your joining challenges!