

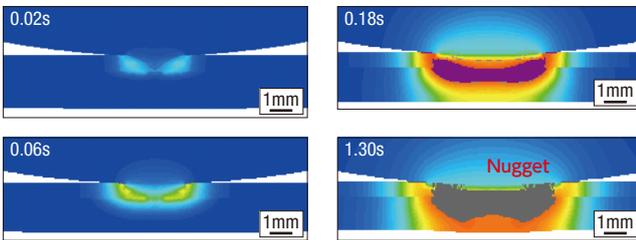


# Joining & Strength

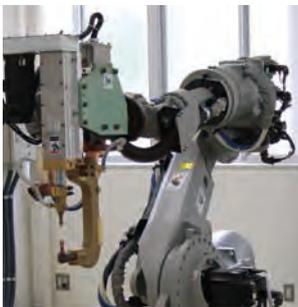
We develop the ingenious technologies and products for welding and joining to offer customers utilizing JFE's steel products with assurance and efficiency.

## Welding & Joining Technologies for Steel Sheets

Intelligent Spot™ welding, Pulse Spot™ welding, Single-Side Spot™ welding, adaptive controlled spot welding and remote laser welding technologies are developed as the advanced welding technologies. Further numerical simulation technologies for analysis of welding process and weld joint strength are developed.



Temperature analysis of Single-Side Spot™ welding process



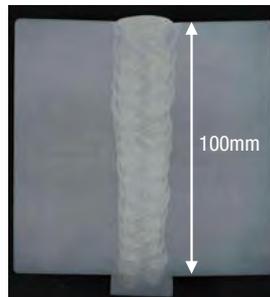
Resistance spot welding



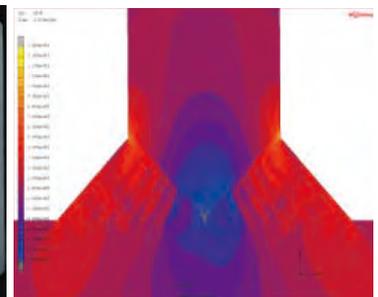
Remote laser welding

## Welding & Joining Technologies for Steel Plates & Pipes

Innovative welding and joining technologies (various types of arc, electroslag, laser beam, etc.) for thick plates and pipes are researched and developed for customers to use JFE's products with confidence.



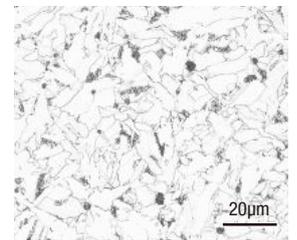
Narrow-groove welded joint by applying J-STAR™ welding



Residual stress analysis of fillet joint



Ultra-high heat input electroslag welded joint (left) and microstructure of weld metal (right) using high-performance welding consumables



## Technology for Safety Assessment & Analysis

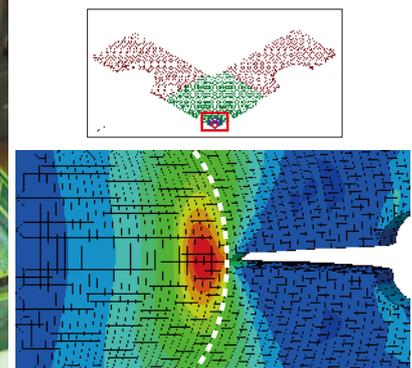
In order to improve the safety of welded steel structures, we propose steel material development and application technologies utilizing fatigue and fracture assessment and analysis techniques.



80 MN structural tensile test machine



Full scale pipe bending test machine



Stress analysis of spot welded joint in cross tension test