No Need for Adhesives! A New Solution to Change Structural Design

New Joining Solution for Composite Materials : ADL

Anchor formation and Dissimilar material joining method with Laser

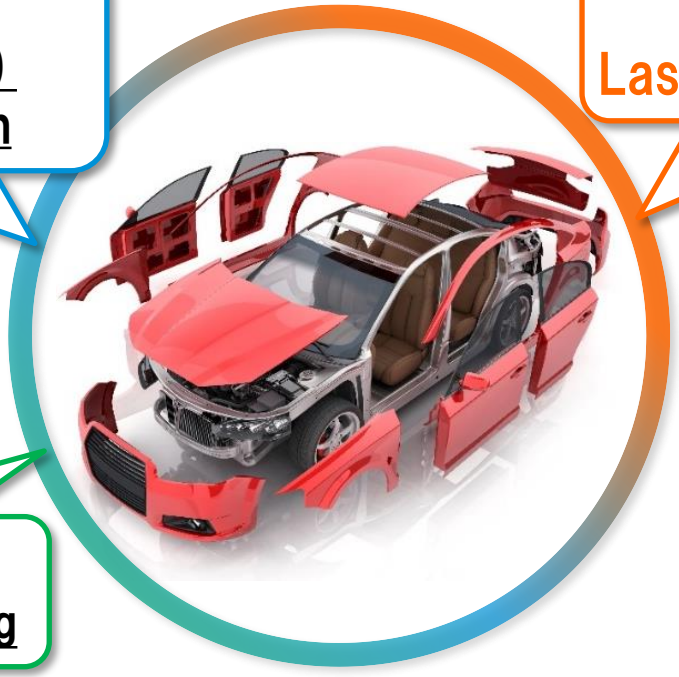
2024 Japan International Welding Show

Background

Weight reduction to improve fuel and electric costs is required

High tensile steel
Cold Spot Joining (CSJ)
Synchro-feed Evolution

Plastic + metal
Laser joining system “ADL”

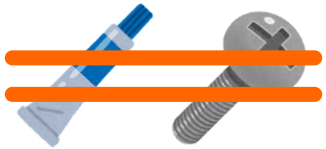


Aluminum + Steel
Laser-Arc Hybrid Joining

Plastic + Metal joining – Issues in Conventional Method

Conventional method	Cost	Cycle time	Handling
Silane coupling agent	High	Long	Difficult
Adhesive	High	Long	OK
Mechanical fastening	High	OK	OK

Sub-materials required



Adaptability to production line has some issues

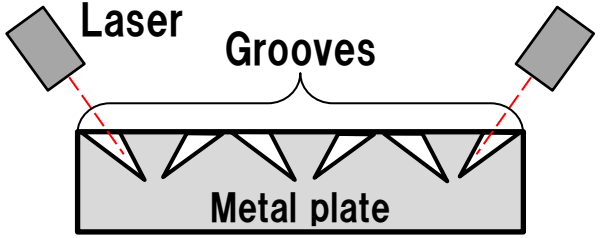
Laser joining system “ADL” solves this problem!

ADL (Anchor formation and Dissimilar material joining method with Laser)

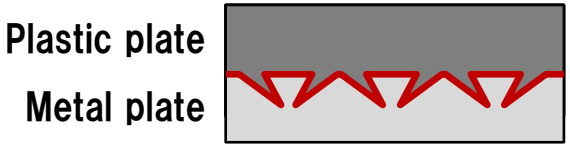
Realization of direct joining of plastics and metals with anchor effect

Method: forming grooves by laser※

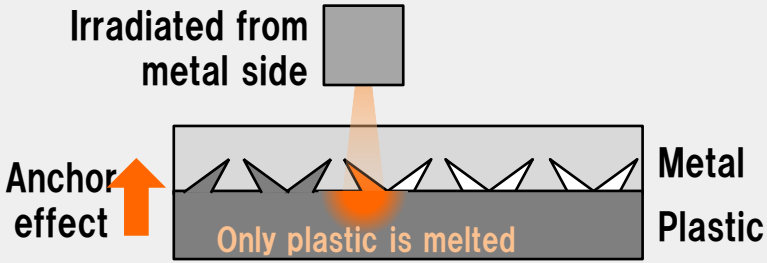
※Patent pending



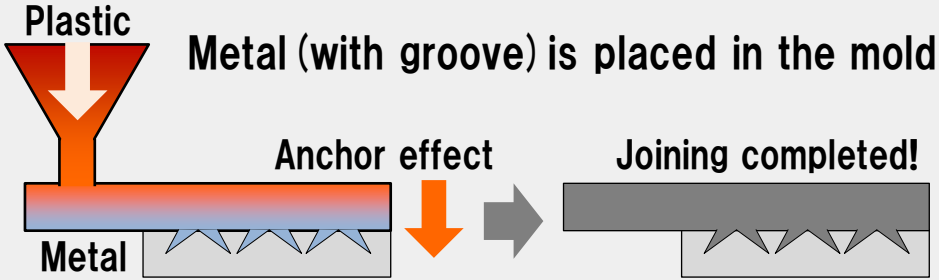
Anchor effect : The plastic is penetrated into grooves and strong joint is achieved



With laser heating



With injection molding



Evaluation results

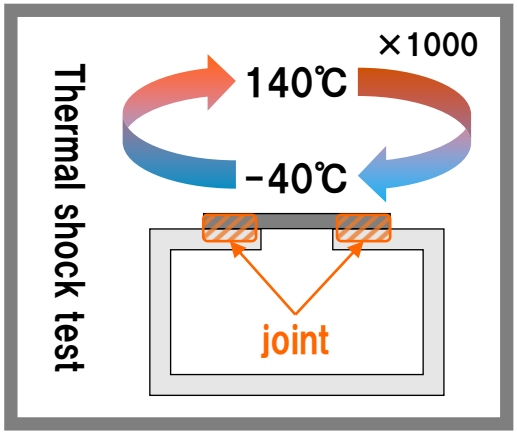
Tensile Strength Test : Strength to rupture at plastic plate confirmed!
(Joint with laser heating)

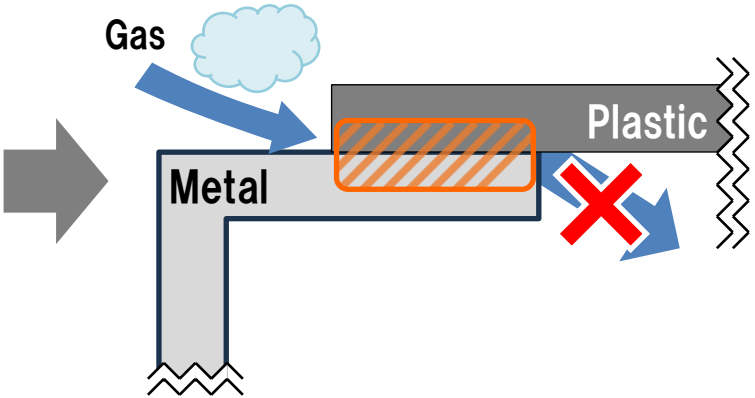
PP: Polypropylene GF: Glass fiber
PPS: Polyphenylene sulfide

Thermal Shock Test:Strength to rupture at plastic plate and high airtightness confirmed!
(Injection molding※)

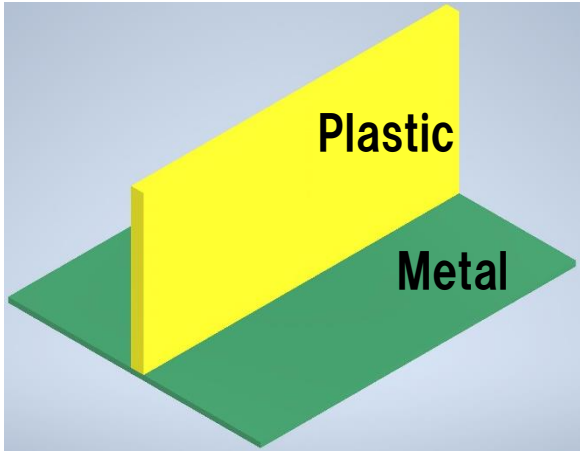
※Injection molding: Daiichijushi Industry Co.,Ltd.

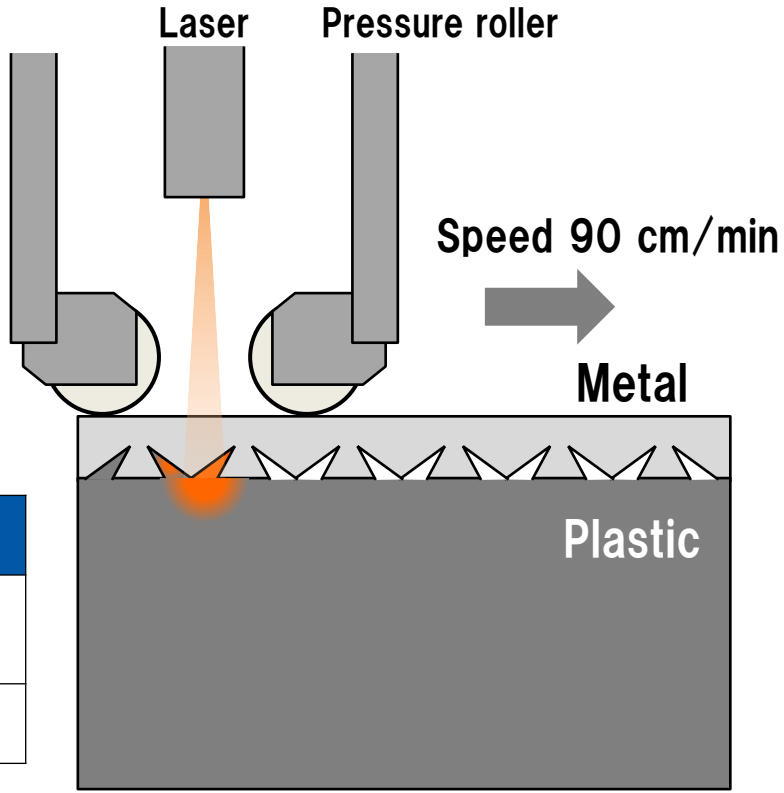
Thermal shock test specimen





Performance





	Plastic	Metal
Material type	Polypropylene	Galvanized steel plate GA 45/45
Thickness	t8 mm	t1.6 mm

Plastics and metals joining system “ADL” contributes to weight reduction of car bodies.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