

# Improvement of Bending Crash Energy Absorption and Vibration Characteristics of Ultra High Strength Automotive Structural Members with Multi-Material Structure

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**KEY WORDS:** Vehicle development, Weight Reduction, Multi-material, Structural member, ultra-high strength steel (B2)

A Multi-material structural member for Automobile which absorb the crash energy by deforming in the automotive body collision were developed by sandwiching a small amount of resin between an ultra-high strength steel structural parts and a resin fixing plate made of a thin mild steel. (Fig.1(a)).

As a result of applying the developed structure to the 980MPa grade steel parts, the maximum load was improved in comparison with the conventional structure (Fig.2 and Fig.3), and crash energy absorption in the bending was improved over 45%, and the weight was reduced by 6% in comparison with the parts of the same performance (Fig.4), and vibration characteristics by hammering test were improved (Fig.5).

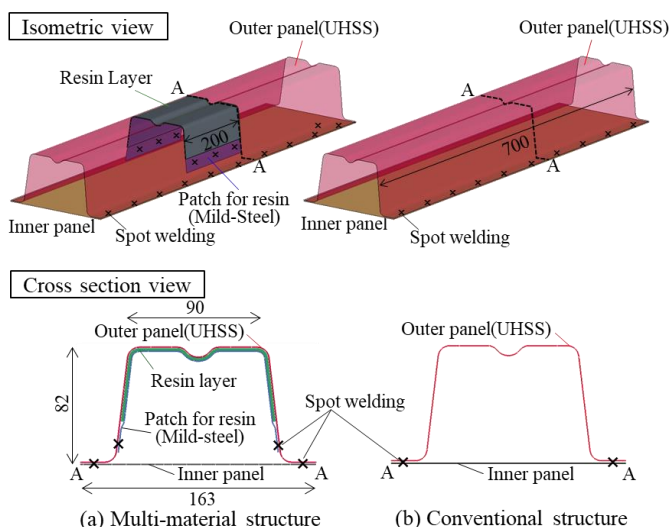


Fig.1 Schematic geometry of multi-material structure

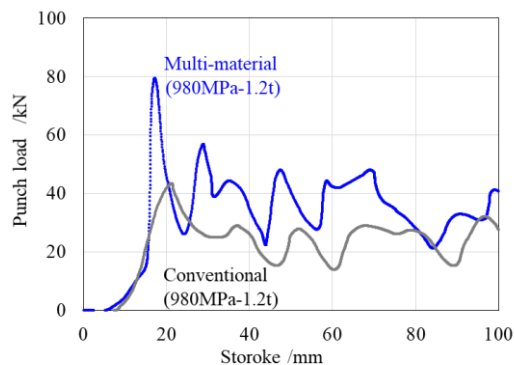


Fig.2 Load-stroke curves during dynamic impact deformation

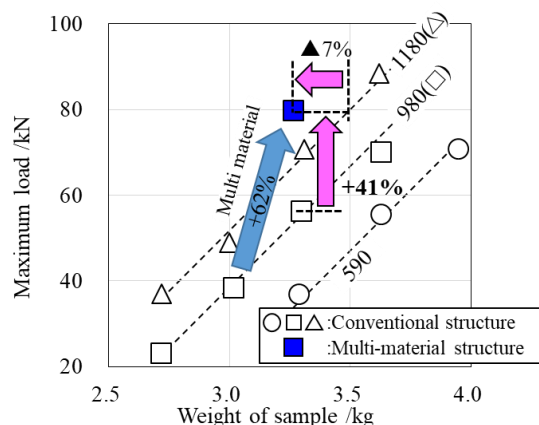


Fig.3 Relationship between maximum load and weight of sample

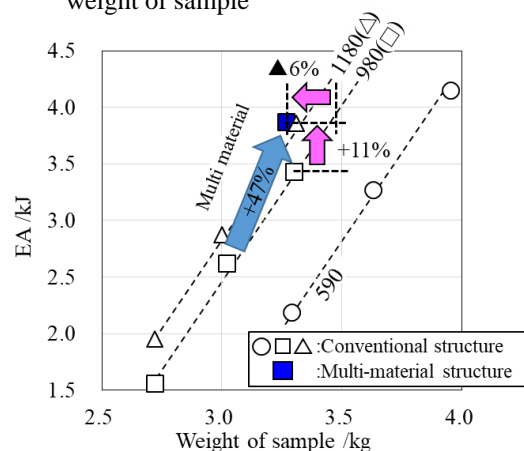


Fig.4 Relationship between absorbed energy and weight of sample

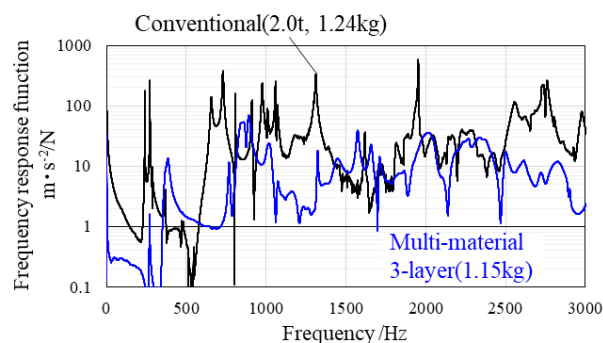


Fig.5 Effect of sample structure on frequency response function