

Development of Ultra Lightweight Parts Using Hot Stamping and Laser Welded Patchwork Technology (3rd Report)

- Application to B-pillar and performance evaluation -

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By combining optimization method, laser welding patchwork, and hot stamping, B-pillar was with more reinforcement effect than spot welding patchwork, a common partial thickening technology. Furthermore, the performance of prototype was evaluated. The procedure is shown below.

1) Design and fabrication of laser welded patchwork blank.

In order to control both joining cost and welding fracture during B-pillar forming, patchwork blanks are fabricated with different laser irradiation patterns on ridge side and web side (Fig. 1).

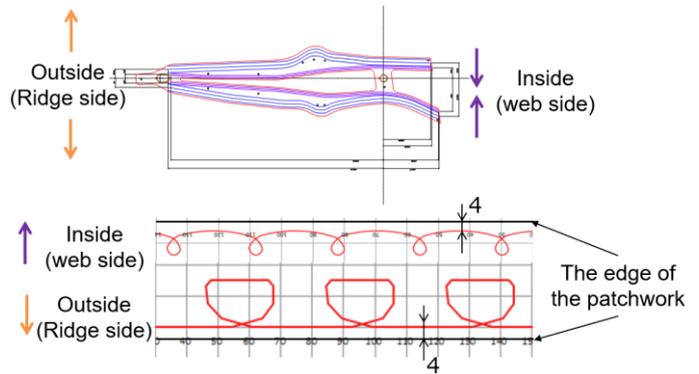


Fig. 1 Laser welding pattern of B pillar

2) Hotstamping

By modifying partial patch areas from forming perspective and hot stamping, a laser welded patchwork B-pillars without cracks or wrinkles is fabricated. (Fig. 2).

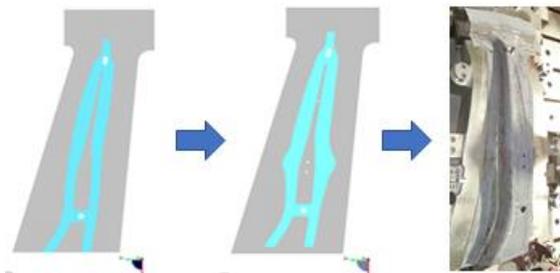


Fig. 2 Patchwork Blank and B-pillar

3) Performance evaluation

A performance evaluation test (Fig. 3) based on IIHS was conducted, and trial calculation of weight reduction effect revealed that laser welded patchwork B-pillar had at least 15.4% weight reduction effect compared with spot welded one (Table 1).



Fig. 3 patchwork B-pillar crashing device

Table 1 Test results of Specimen

TP	Material Grade	Welding	Max. moment (N-mm)	Lightweighting percentage
1	1.5GPa	Spot	22.4	0.0%
2			23.1	2.9%
3	1.8GPa	Laser	26.3	15.4%
4			29.2	23.0%