# Dimple Welding Technology for Aluminum Doors

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   In recent years, the aluminum alloy is applied to some of the car body especially a door and hood, for weight reduction. In this article, the application of dimple welding to aluminum doors is reported. By using dimple welding, the width of the flange of the door sash can be reduced, and as a result, the viewing angle of the driver can be secured widely, which is expected to increase the commercial value of the vehicle. (Fig.1, Fig.2)

   The dimple weld is a kind of projection welding of resistance welding. In dimple welding, a dimple and emboss are press formed before welding process.(Fig.3) Dimple welding can control a welded area due to concentrate welding current on top area of a emboss. Dimple welding can make oval welded area using specific emboss and dimple shape in contrast with general spot welding.

   Quality assurance plan was made by experiments especially following three experiments.
1)    Relationship between current waveform (peak and time) and weld diameter.(Table1, Fig.4, Fig.5)
2)    Relationship between electrode pressure and weld diameter.
3)    Relationship between disturbances in a mass production and weld diameter.
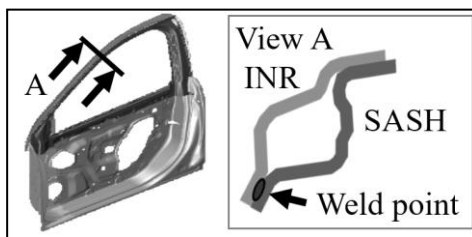


Fig.1 Dimple welding adaption part in aluminum door



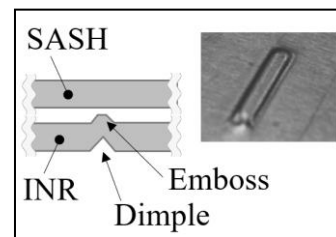Fig.2 Dimple welding adaption point in aluminum door sash



Fig.3 Dimple welding sheet specification

Table1 Experimental setting value

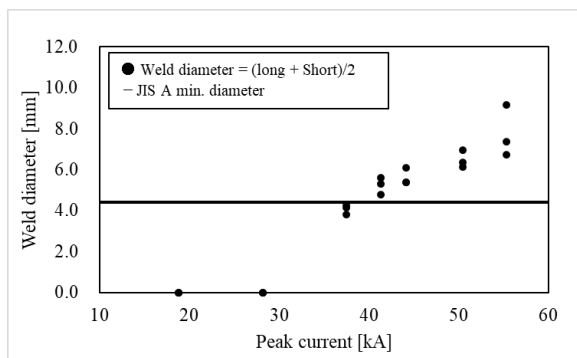| No. | Peak current [kA] | No. | Current time[msec] |
|-----|------------------|-----|--------------------|
| 1-1 | 18.8 | 2-1 | 10 |
| 1-2 | 28.2 | 2-2 | 20 |
| 1-3 | 37.5 | 2-3 | 25 |
| 1-4 | 41.3 | 2-4 | 30 |
| 1-5 | 44.1 | 2-5 | 35 |
| 1-6 | 50.5 | 2-6 | 40 |
| 1-7 | 55.3 | 2-7 | 50 |
|     |      | 2-8 | 70 |
|     |      | 2-9 | 90 |



Fig.4 Weld diameter and peak current
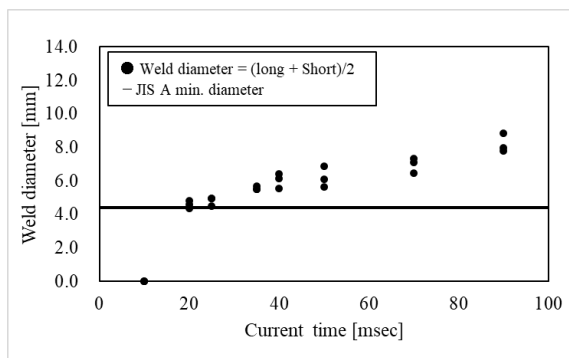(Current time 30msec, Electrode pressure 3.1kN)



Fig.5 Weld diameter and current time
(Peak current 41.3kA, ,Electrode pressure 3.1kN)