Pacific Northwest National Laboratory

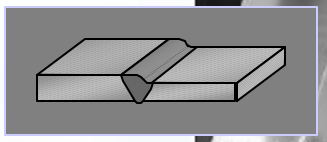
Operated by Battelle for the U.S. Department of Energy

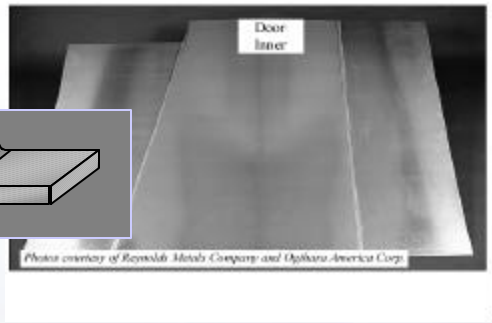
Characteristics of Aluminum Tailored Blanks for Automotive Panels and Structures

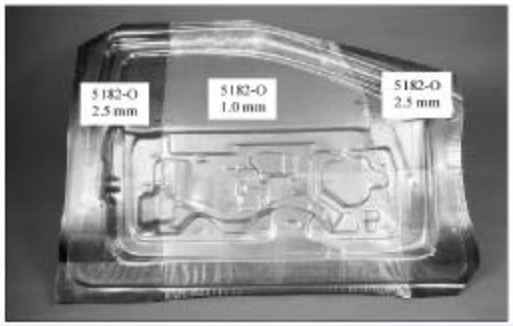
Importance of Our Work

At Pacific Northwest or researchers

- **develop technology to facilitate cost-effective production of lightweight aluminum tailor welded blanks for automotive panels and closures**
- **investigate limits of formability during stamping**
- **investigate response to cyclic loading (fatigue)**
- **investigate corrosion resistance.**







Photographs illustrate alluminum alloy tailor welded blanks (left). AATWB viewed in the as-welded condition, ready for submission to the stamping process. The shape shown is typical for a door inner stamping operation (right). Aluminum tailor welded blank after s tamping produce a door inner panel. The door inner stamping shown consists of AA5182-0 in varying thickness. However, components of multiple alloys and different thickness are possible.

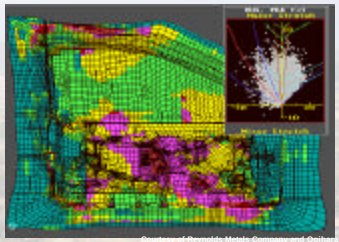
Project Benefits

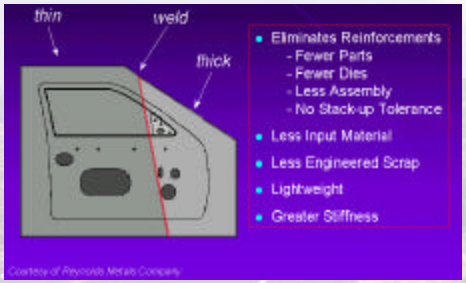
- **Reduce weight for high fuel efficiency**
- **Tailored blanks reduce cost of aluminum panels and closures**

Project Participants

Pacific Northwest National Laboratory
Reynolds Metals Company

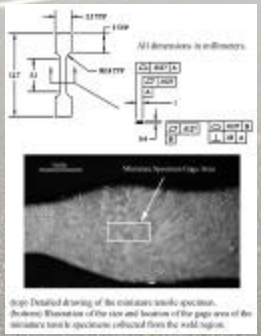
Numerical Simulation of TWB Stamping

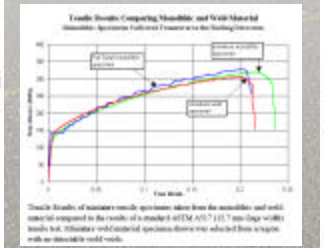


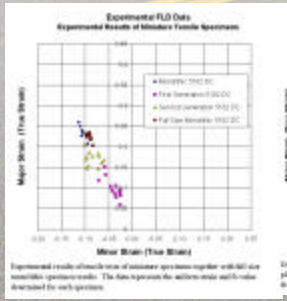


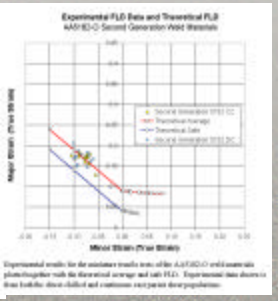
Aluminum Tailor Welded Blank Formability

The ductility of weld material and weld geometry becomes the primary focus when describing tailor welded blank formability. The formability was investigated for the overall blanks and at the miniature scale. The figures below represent miniature scale investigations of the formability of weld materials using tensile specimens, numerical modeling of formability, and statistics.



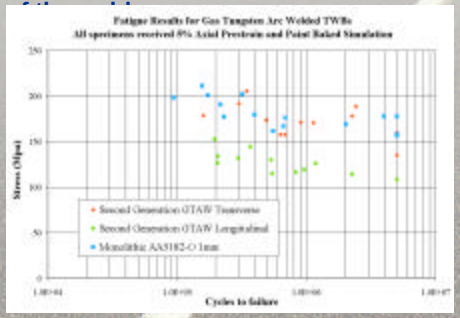




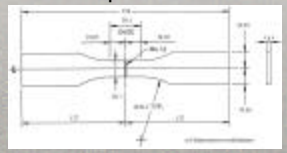


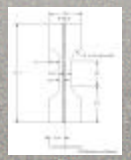
Aluminum Tailor Welded Blank Fatigue

The response of the weld region to cyclic loading becomes a key aspect of tailor welded blanks during their in-vehicle life. The fatigue performance was investigated for the weld region under tensile conditions both longitudinal and transverse to the weld. The figures below represent experiments and results representative of the response



Transverse Specimen





Longitudinal Specimen