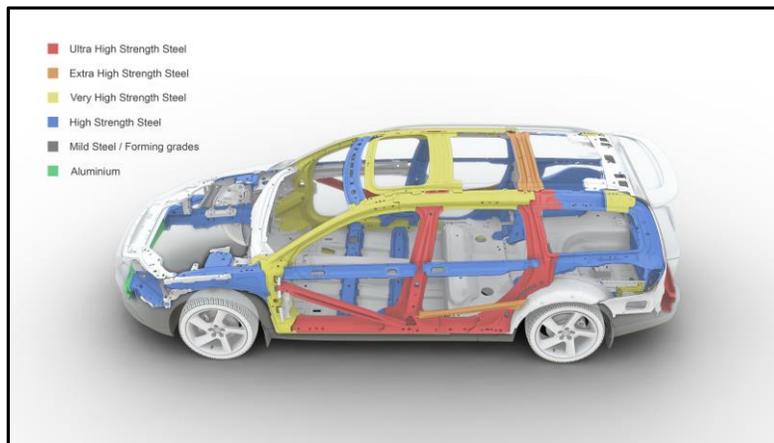


## EWI's Commercial Matrix Array Ultrasonic Weld Inspection for Multi-Material Light Weight Vehicles

The next generation of light weight vehicles will bring certain types of materials and material combinations to the mainstream that have only been used for high end, limited production vehicles. The many combinations of plastic and metal types, alloys and grades that comprise the suite of materials use in vehicle light weighting require equally advanced methods to insure quality and processes control. Today, quality and process control of spot welding is done by destructively testing a statistically significant number of welds during a production cycle. Though this technique has proven very effective, the superior properties of the newer materials keep this technique from transitioning to the manufacture of light weight vehicles.

The Problem:

How is quality and process control for the next generation of advanced light weight vehicle manufacturing going to be achieved?

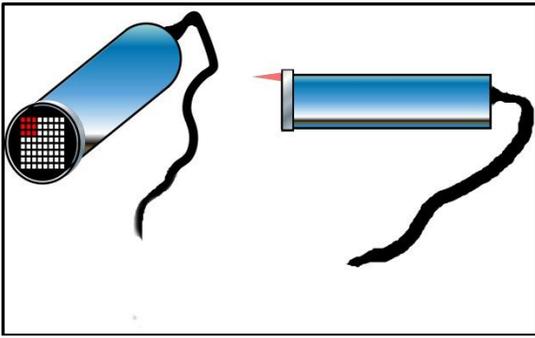


Typical Modern Auto Steel Grades

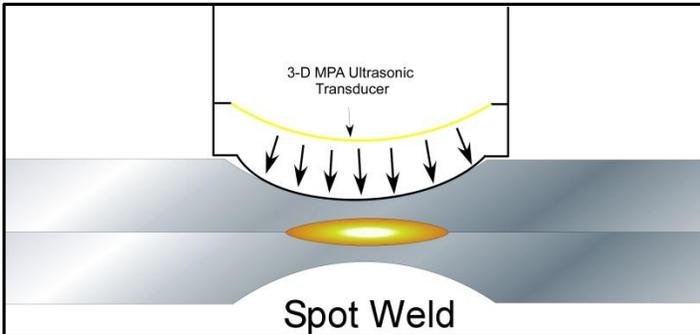
Solution:

One approach to obtaining more quantitative assessment of joined material is to use matrix phased array ultrasonics to quickly and accurately assess the nugget size in resistance spot welded (RSW) material. The use of ultrasonics as a method for nondestructively testing materials has been around since the middle of the last century. This technology has become integral in the medical industry to image different parts of the body (routine prenatal ultrasound, for example). In manufacturing the use of this technology to image industrial parts from aircraft to pipelines is well understood.

By using an array of piezo electric elements, and rapidly transmitting and receiving ultrasonic energy through a welded area, it is possible to generate an image of a weld nugget. Once this image is obtained, it is possible to determine the diameter and area of the nugget at the material interface.



Matrix Phased Array Transducer



Inspection of Spot Weld

Because this technique utilizes sound energy to probe the material, it can be applied to many different materials and combinations of materials. This solution, though very sophisticated and state-of-the-art technologically, is a relatively straight forward technique that an operator with minimal experience in the field of nondestructive evaluation (NDE) can learn quickly with minimal training.

This technology is not just limited to the measurement of spot welds in advanced materials. Matrix phased array imaging has also proven very effective at measuring the amount of braze in a braze joint and quantifying the weld quality in plastics.

With the ultimate goal of eliminating or drastically reducing the amount of destructing testing required in manufacturing while increasing quality and reducing costs, matrix phased array imaging is one of the most powerful tools available for the "Right" application. If you and your company are interested in this or other technologies that can reduce costs through the use of nondestructive statistical process control please contact Ron Brown at 614.688.5085 or [Rbrown@ewi.org](mailto:Rbrown@ewi.org) or Sean Gleeson at 614.688.5188 or [Sgleeson@ewi.org](mailto:Sgleeson@ewi.org).

