

Studies in Friction Stir Welding

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EXTENDED ABSTRACT

Friction Stir Welding (FSW) is a solid state joining process of welding that involves the movement of material using a rotating bit that plasticizes the parent material without ever melting the material. This process preserves more of the mechanical properties as well as the microstructure of the parent material than other forms of fusion welding such as electric arc welding and additive welding. As FSW becomes more commonplace in industry, the technicalities of what is happening to the material being welded and what advantages and disadvantages FSW holds become of more interest for researchers. With a focus on defects generated by FSW, this project discusses data collection methods and possible links between collected data and defect formation in FSWed aluminum specimen. The goal of this project is to understand what happens in the FSW process that causes defects and to come up with new methods on ways to study the samples to collect data in a way that is nondestructive to the material.

The team consists of four undergraduate research members and one graduate student research advisor. The graduate student does most of the analysis while the undergraduates collect a majority of the data. However, ideas for improving testing and data collecting techniques are shared among everyone.

The results of the project have given the team an idea of one of the major factors in FSW defects: shoulder contact of the tool. Without good shoulder contact, the weld is bound to have defects. Also, one of the most effective techniques for studying the defects of FSW has been to study the microstructures of the samples along with hardness testing.