Impeller Manufacturing Conversion

Overview
Dresser-Rand is a company that manufactures high-speed impellers. They previously used a riveting process to join “Z-blade” impellers, but no longer have the equipment to continue manufacturing them, but still have customers that require them, therefore they spend large amounts of time and money redesigning these models to fit their more advanced welding processes used at the plant.

Objectives
Determine a feasible manufacturing process or multiple processes for the Z-blade family of impellers that will decrease or eliminate the time and cost due to engineering redesign.

Approach
The approach of the project can be classified into three main sections: process investigation, simulation modelling, and physical testing.

- Process Investigation: The team researched possible joining methods and determined which would carry into simulation testing
- Simulation Testing: The team ran the chosen processes in a simulation to determine which processes would advance into physical testing
- Physical Testing: The remaining processes were tensile tested using test pieces created using the chosen processes

Outcomes
There were three processes that were chosen by the team for Dresser-Rand to continue research into implementation in their manufacturing facility.

- MIG welding – showed to be plausible in physical testing and should be fine-tuned to fit their needs
- TIG welding – showed to be plausible in physical testing and should be fine-tuned to fit their needs
- SPOT welding – was the most successful in simulation testing and should be carried into physical testing (not tested by the team due to equipment restrictions)

With a rough estimate of these processes fitting 50% of their impellers, Dresser-Rand would see savings between $32,000 and $160,000 per year