

High-Efficiency Automated Thermal (H.E.A.T.) Welding Robot



Team

Alfred Danquah, Leo Flentje, Michael Hart,
John Wallace, Adam Zopf

Clinic Advisor

Chris Haas

Industry Rep

Kurt Scepaniak



Project Summary

Leaks in commercial roofs cause damage to the inside of buildings. These leaks make up 26% of all commercial roofing costs and repairs. Human error during the roof installation process is often the source of roof leaks. This project aims to reduce human error during roof installs. We accomplish this by increasing automation of the roofing process. Presently, large flat roofs are installed by welding large sheets together by hand. Our solution automates the welding process by using a variety of sensors, heat models, and control

algorithms to control a formerly manually operated plastic roof welding machine. The automation of the welding process creates more consistent welds, reducing the chance of roof leaks and building damage.

Design Goal

To reduce human error during the roof welding process in order to create consistent welds under various weather conditions.



Design Constraints

- Ability to operate and collect data on a 240 Volt, single phase system.
- Ability to collect employee log in, date, and time
- Ability to collect all sensor data
- All sensor data must be stored in external memory for later data analysis
- All thermodynamic ANSYS models must be verified with independent lab results
- Ability to track operator location and movements via GPS
- Ability to track obstacles in front of it
- Ability to shut down if obstacle in its path does not move
- Have an emergency shut down procedure