

Automated Stiffener Placement and Tacking

Project Description:

We have been tasked with developing an **automated stiffener placement and tacking system** utilizing **robotic arms**. This system serves to reduce labor and improve the accuracy and efficiency of the placement and tacking process.

Our Approach:

We will be programming an Epson T6-B and VT6L to **place stiffeners onto flexible printed circuit boards**, and **apply pressure / heat using a heat-bed or hobby-iron** to adhere them. We are creating the "hand" attachments for each arms custom bracket connections using **Solidworks** and conducting thermal analysis with **Ansys** to ensure proper adhesion and lack of deformations in any of the involved materials.

Heating Element Options

Option 1: K Kernowo Mini Iron



Temperature Range:

❖ **212 – 752 °F**

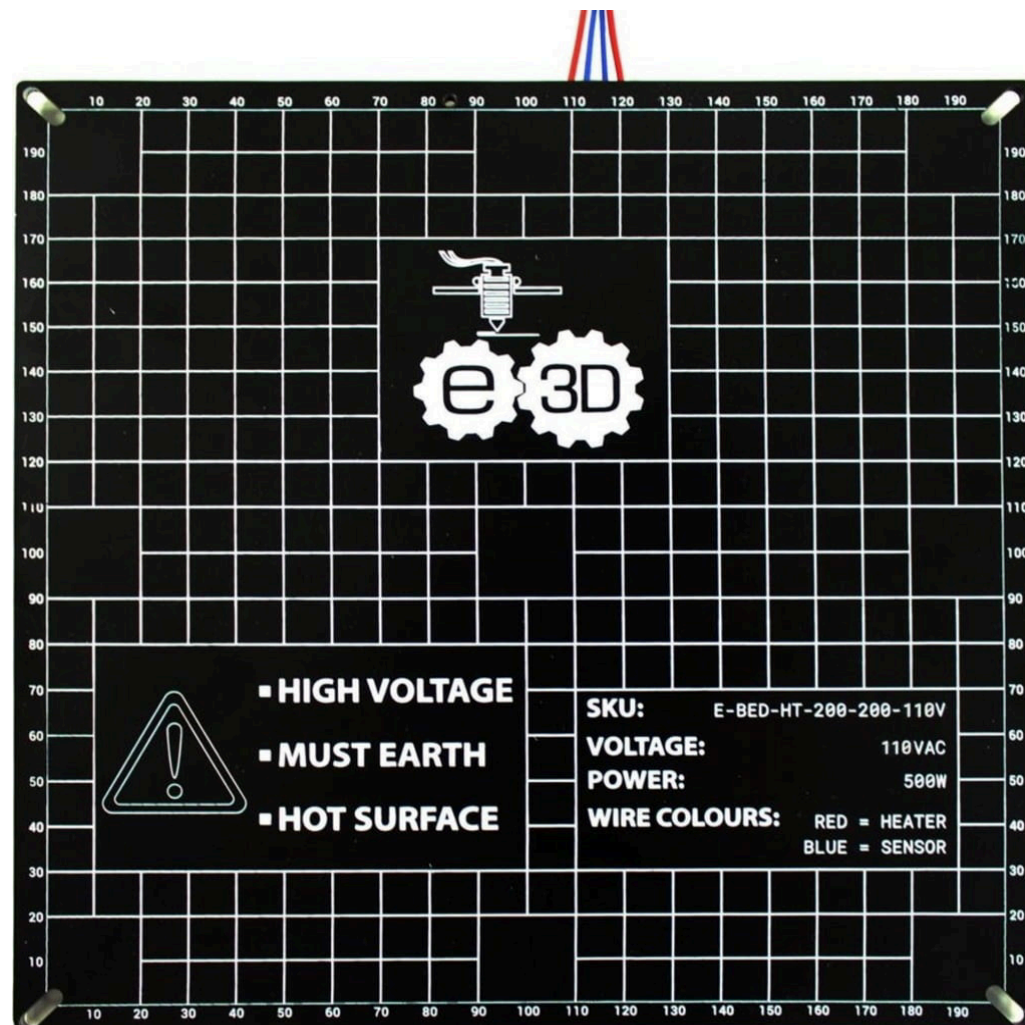
Pros:

- ❖ Capable of applying both heat and pressure
- ❖ Can reach higher temperatures

Cons:

- ❖ Additional weight
- ❖ Cable tension issues

Option 2: E3D High Temp Heated Bed



Temperature Range:

❖ **212 – 392 °F**

Pros:

- ❖ Capable of heating multiple elements simultaneously
- ❖ Can heat entire surface at once

Cons:

- ❖ Large heating area could possibly lead to slower heat transfer

Adhesive Activation Temperature : **200 °F**

Lamination Temperature : **375 °F**

Robotic Arms



Epson T6-B



Epson VT6L

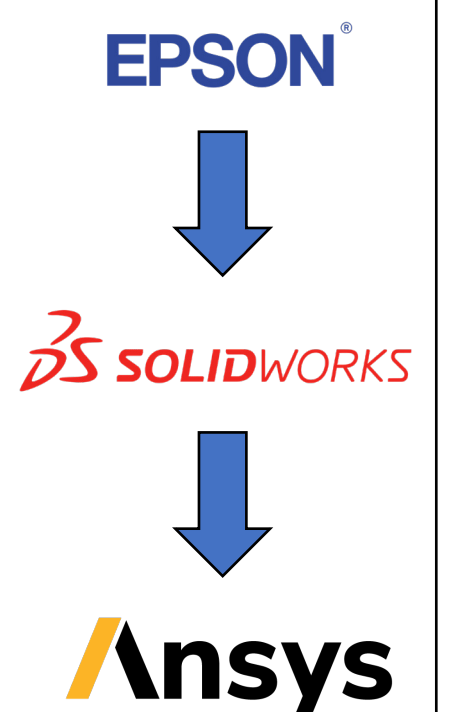
Expected Outcomes

- ❖ Automated stiffener placement and tacking system design

 Epson interface - Simulink program

 Solidworks - CAD models

 Ansys - Heat analysis



- ❖ Bill of materials

- ❖ System replication instruction

- ❖ Validation testing process

System Requirements

Performance:

- Misalignment correction
- Placement accuracy: +/- 0.001 inch
- Versatile for various circuits & stiffeners

Functional:

- Automated grab & placement
- Alignment in 3 DOF (X, Y, θ)
- Heat & pressure adhesive activation



Michael Ross

- **Project Lead**
- Programming and Automation Engineer
- CAD Design Engineer Lead
- 3D Printing Engineer
- Electronics Integration Engineer
- Test and Analysis Lead Engineer

Aerospace Engineer



Kenneth Griswold

- Budget Coordinator
- Materials Engineer
- Calculations Engineer

Mechanical Engineer



Toby Webber

- CAD Modeling and Design Engineer
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- Heat Transfer Analyst
- Thermal and Pressure Systems Engineer
- Documentation Coordinator

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