Methods for Surface Mount Soldering for Novices

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Introduction

Soldering circuit board components is a skill that can be applied not only in an educational setting, but in future occupational uses for students. The goal of this project is to teach beginning students the most effective ways to solder in preparation for a potential instructional course. The procedure followed was based off of the DStat potentiostat schematics.

Materials and Methods

- Quik Chip Solder Paste
- Dstat circuit boards
- Maxwell 8858-I Heat Gun
- DStat components

To start, the solder was applied all at once to the board by the Chip Quik applicator. The chips, components, and resistors were all added at once then placed on a hot plate to melt the solder into place.

Experimental Applications

- Components shifting and locking together
- Bridging along the chip feet
- Shifting feet of the chips in response to too much solder paste
- Magnetic Stir bar in heat plate displaced Components.
- Unequal and uncontrolled heating of the board via hot plate
- Heat gun was used instead of the hot plate, but the heat gun was too large

Summary of Success

The best method found in this procedure to apply solder paste can be summarized in less solder paste and lots of patience. After downsizing to a much smaller heat gun with a nozzle to condense the air even further, the components were soldered on one at a time. This was done to help minimize the parts coming together. In heating the parts individually, the board as a whole was heated as well. This made the solder application much easier because it softened the paste from the heat gun was also determined to leave the chips to be attached by the instructor.

Final Method:
- Heat board slightly
- Apply solder paste
- Place component
- Heat with hot gun

Future Goals

This soldering procedure allows a simple and accurate application of soldering paste for novices. After completing this specific board, it can be programmed and locked into the 3D printed holding box pictured below. Once the DStat is finished, it will be tested against officially made potentiostats.

Final Board:

With the new method, none of the components fused together. There were still small issues with one sided flipping, but because all the focus was on one part instead of heating the whole board at once, it was easily corrected. It was also determined to leave the chips to be attached by the instructor.

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