

**MISSION STATEMENT:** The purpose of the project is to increase the capacity of an ion selective paste dispense machine.

# DADE BEHRING

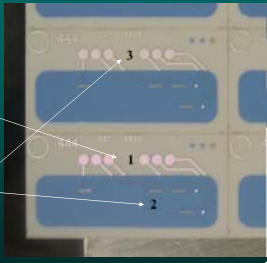
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Advisor: James Glancey

## Concepts and Validation

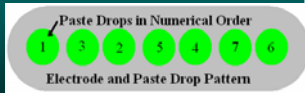
### Current Process:

1. Laser Scan to Measure Electrode Elevation
2. Dispense Paste using Stitch Pattern Onto Electrode
3. Move to Next Laser Read Location

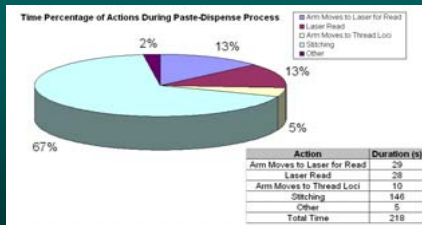


### Apparent Design Flaws:

- Paste Stitch Pattern
- Too Many Laser Reads
- Slower, Outdated Control Device



### Time Breakdown of Paste Dispense Process:



- Areas of Focus:**  
 Paste Stitch Time (67%)  
 Laser Reads (26%)

### Key Customer Wants To Metrics:

1. Productivity – 170s/per plate
2. Simplicity – Minimal Hardware Changes
3. Quality – Paste Width of 0.024 to 0.036 inch
4. Low Cost – Below \$5,000
5. Accuracy – 95% Acceptable Lines of Paste

### Cost:

Prototype	
Benchtop Paste Dispense Machine	\$150
Vacuum Plates	\$170
<b>Total</b>	<b>\$320</b>
Cost of Implementation for Dade	
Their Own Testing	\$20,000
Paste Dispense Software Changes	\$5,000
Sensor Read Reduction Software Changes	\$5,000
<b>Total Cost to Dade</b>	<b>\$30,000</b>

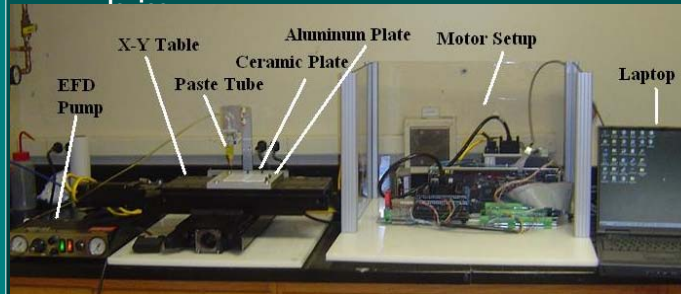
### Part 1

#### Altering Dispense Method:

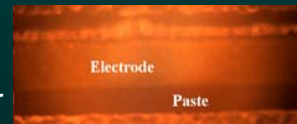
- Reduce Dispense Time - 16 lines of paste
- 5 seconds per line currently
- Reduce to 3 seconds
- Reduce Total Time by 32 seconds
- Increase speed while maintaining accuracy

#### Validation

- Develop new paste dispense methods using offline test



- Toothpaste method
- Analyze Electrodes with Light Microscope
- Record Dispense Time for One Electrode



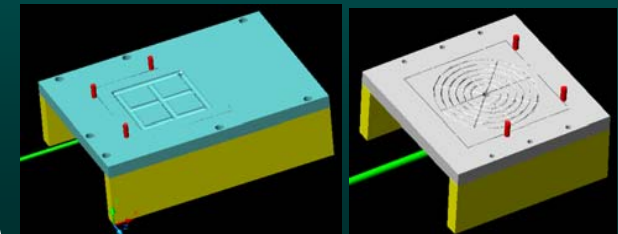
### Part 2

#### Decrease Laser Reads:

- Decrease number of laser reads ~ 28 to 20
- Reduce Total Measurement Time by 16 seconds
- Increase Measurement Speed while maintaining accuracy

#### Validation

- Scan multiple plates using CCM laser scanner
- Test original design to see if electrodes vary consistently in elevation.
- If shown, laser reads can be reduced.
- Test new design to hold down plate flatter than original design
- Show that electrode elevation varies consistently



Current Design

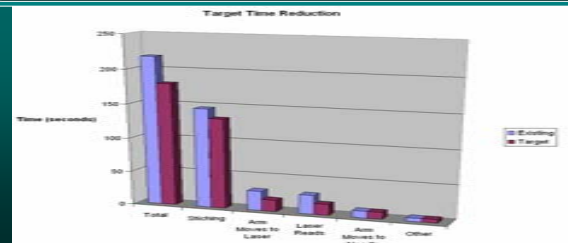
New Design

### Part 1 Results:

- Metric 1 - Paste Line Dispensed in 3s
- Metric 2 – No Hardware Changes
- Metric 3 – Paste Width Average of 0.700 inch
- Metric 4 – Low Cost
- Metric 5 – 96% Acceptable Lines of Paste

### Implementation for Dade:

- Testing Using Toothpaste Method
- Programmer Costs to Change C Control Code



### Part 2 Results:

- Metric 1 – Electrodes all within 0.002 inch
- Metric 2 – Number of Scans can be reduced to 4.
- Metric 3 – Reduces Total Production Time by 56s.
- Metric 4 – One Hardware Change of New Vacuum Plate
- Metric 5 – Low Cost to Make Vacuum Plate

### Implementation for Dade:

- Fabricate a Vacuum Plate Using Our New Design
- Perform Their Own Testing Using New Vacuum Plate Design

### Acknowledgements:

James Glancey for his guidance  
 Jim, Peter and Matt from Dade Behring  
 for their resources  
 Mr. Beard for machining aid

