

Team 25: Rotary Kiln Training Tool

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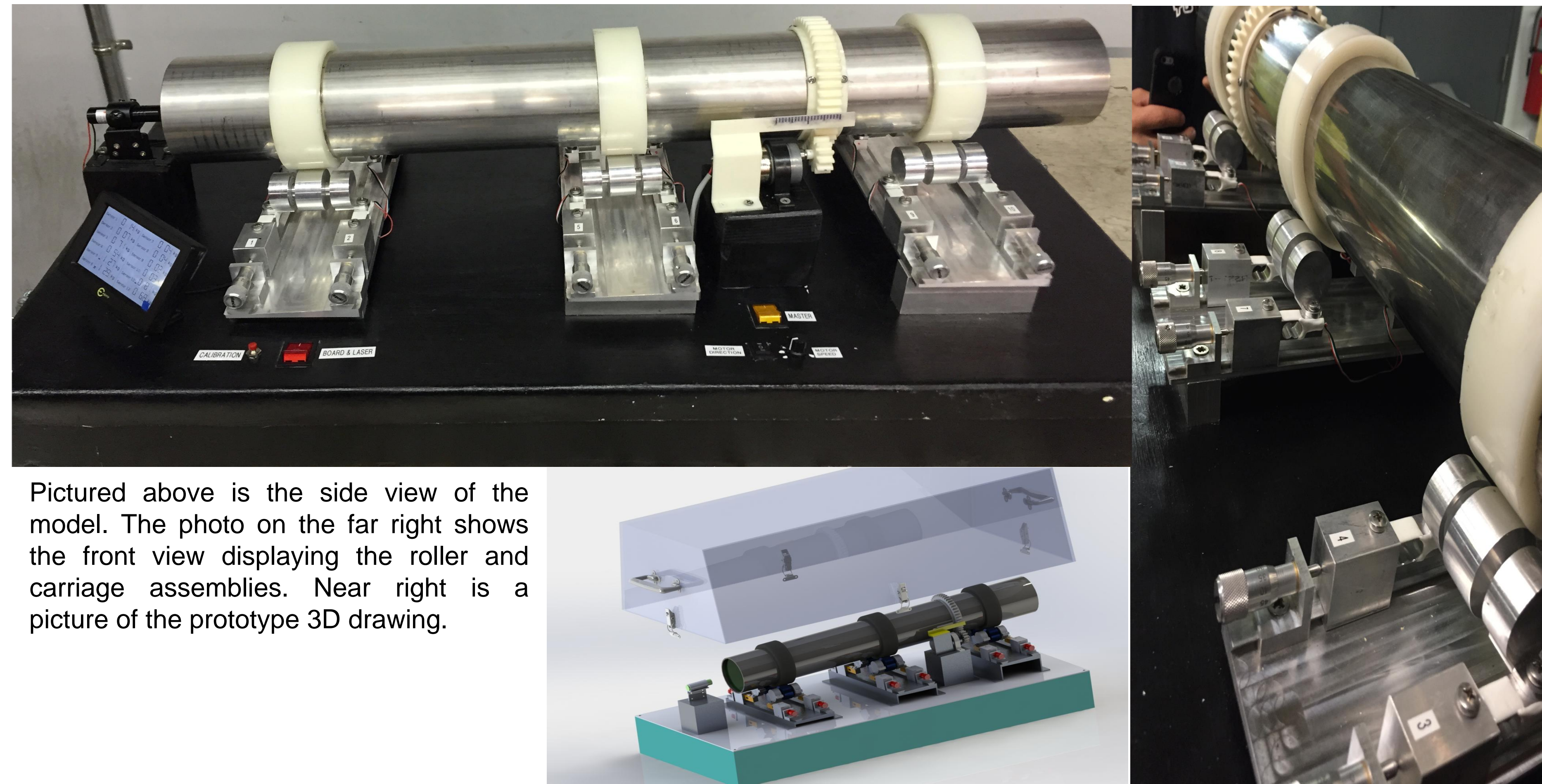


Background

- Phillips 66 Westlake facility uses a rotary kiln to process petroleum byproducts
- Adjustment methods are used to correct misalignment to prevent mechanical damage
- Current training methods are ineffective and/or costly



Pictured above is the actual kiln at Phillips 66.



Pictured above is the side view of the model. The photo on the far right shows the front view displaying the roller and carriage assemblies. Near right is a picture of the prototype 3D drawing.

Testing Objectives

- Handle and Latch Mounting Points: strength of mounts
- Fiberglass Tensile Test: robustness of case
- Shell Deformation
- Document Rubrics: usefulness and understanding
- Temperature: overheating of electronics

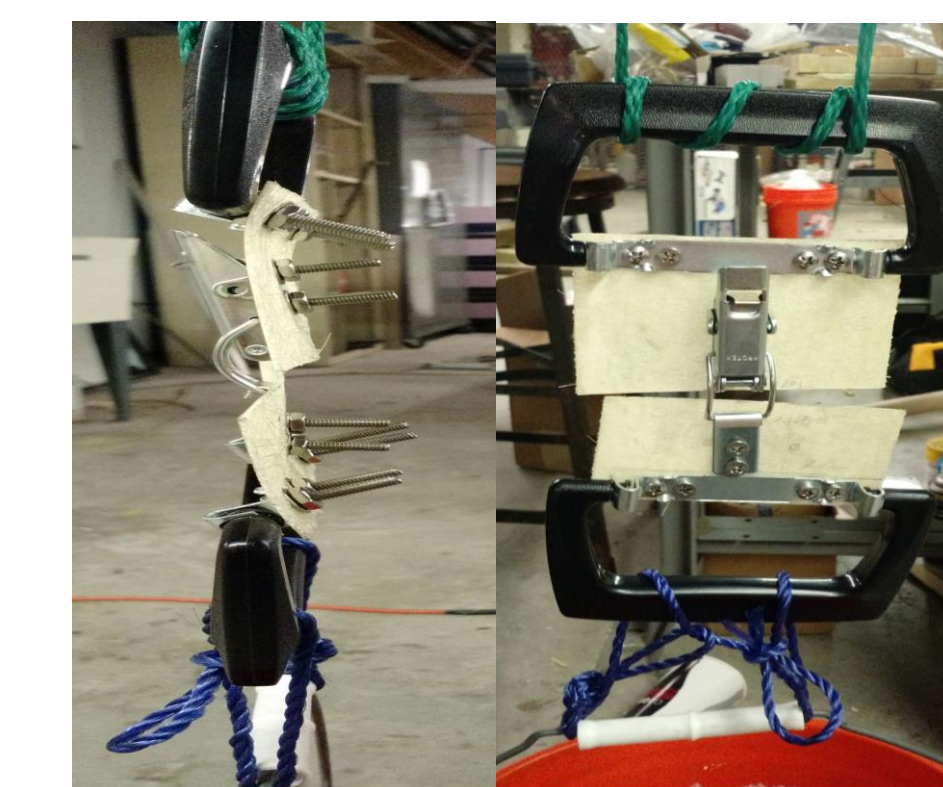
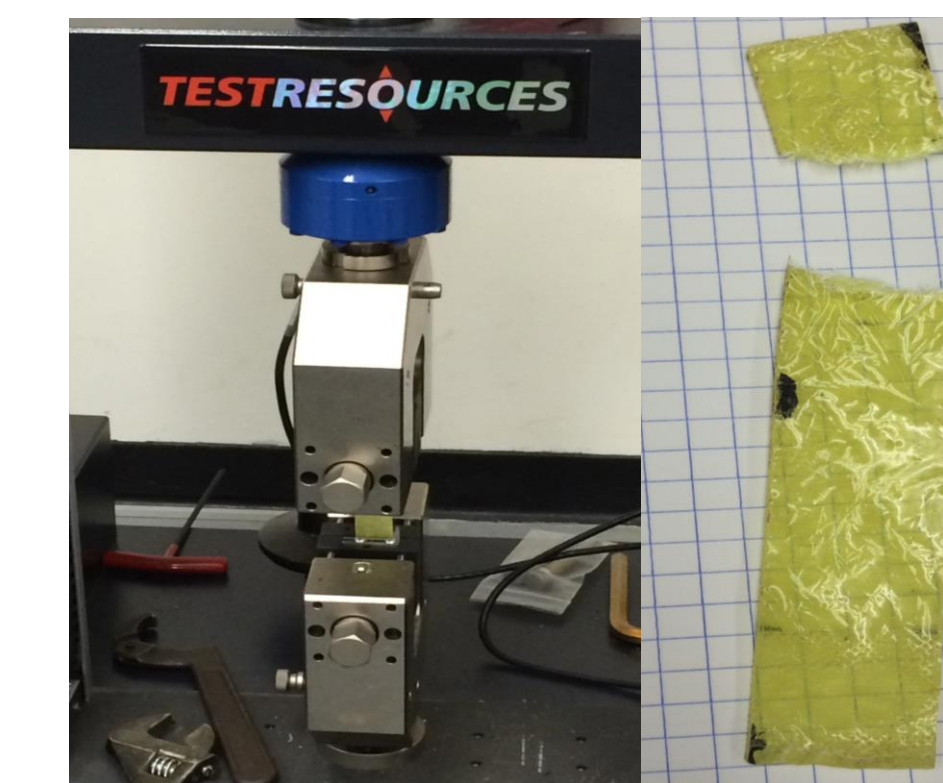
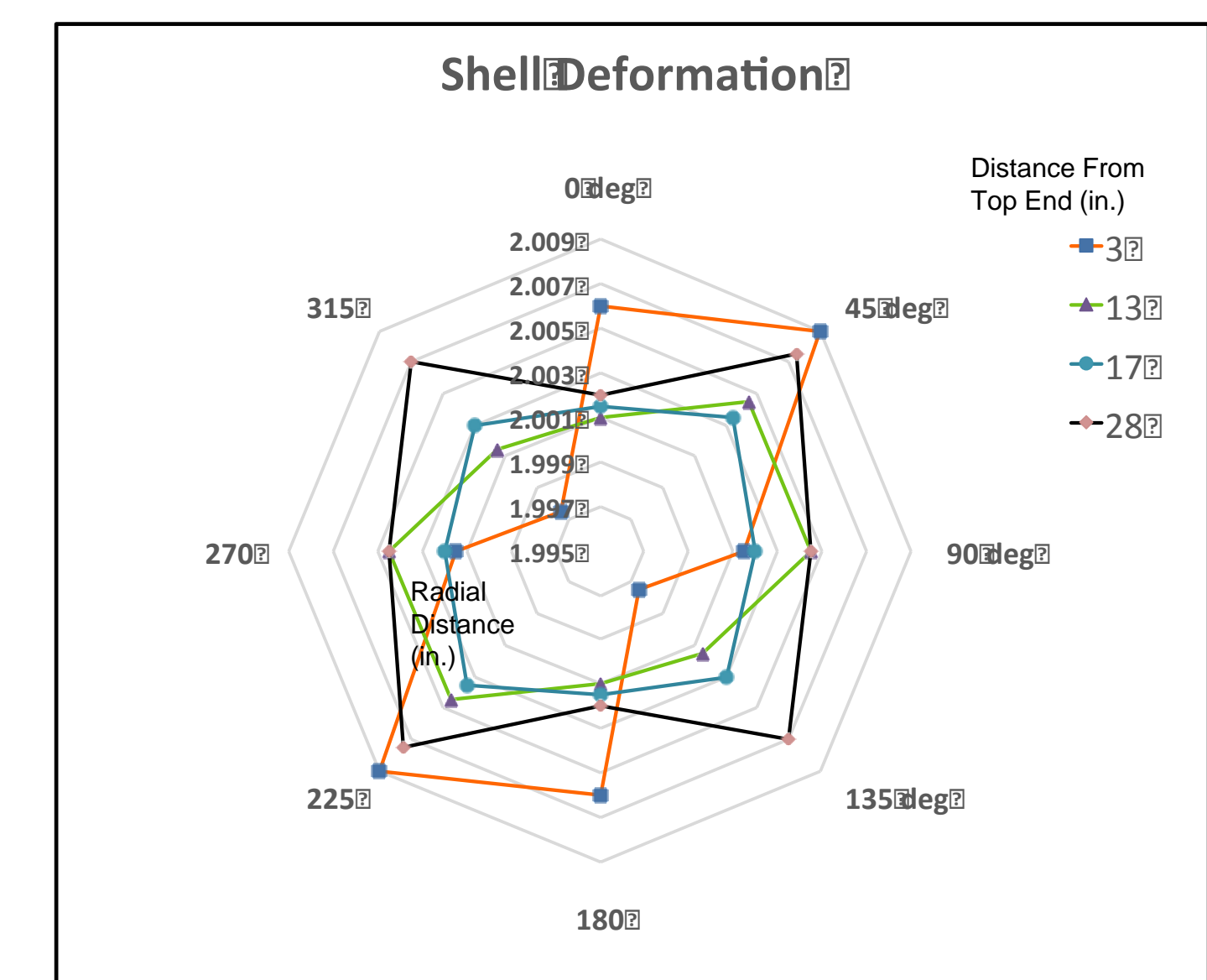
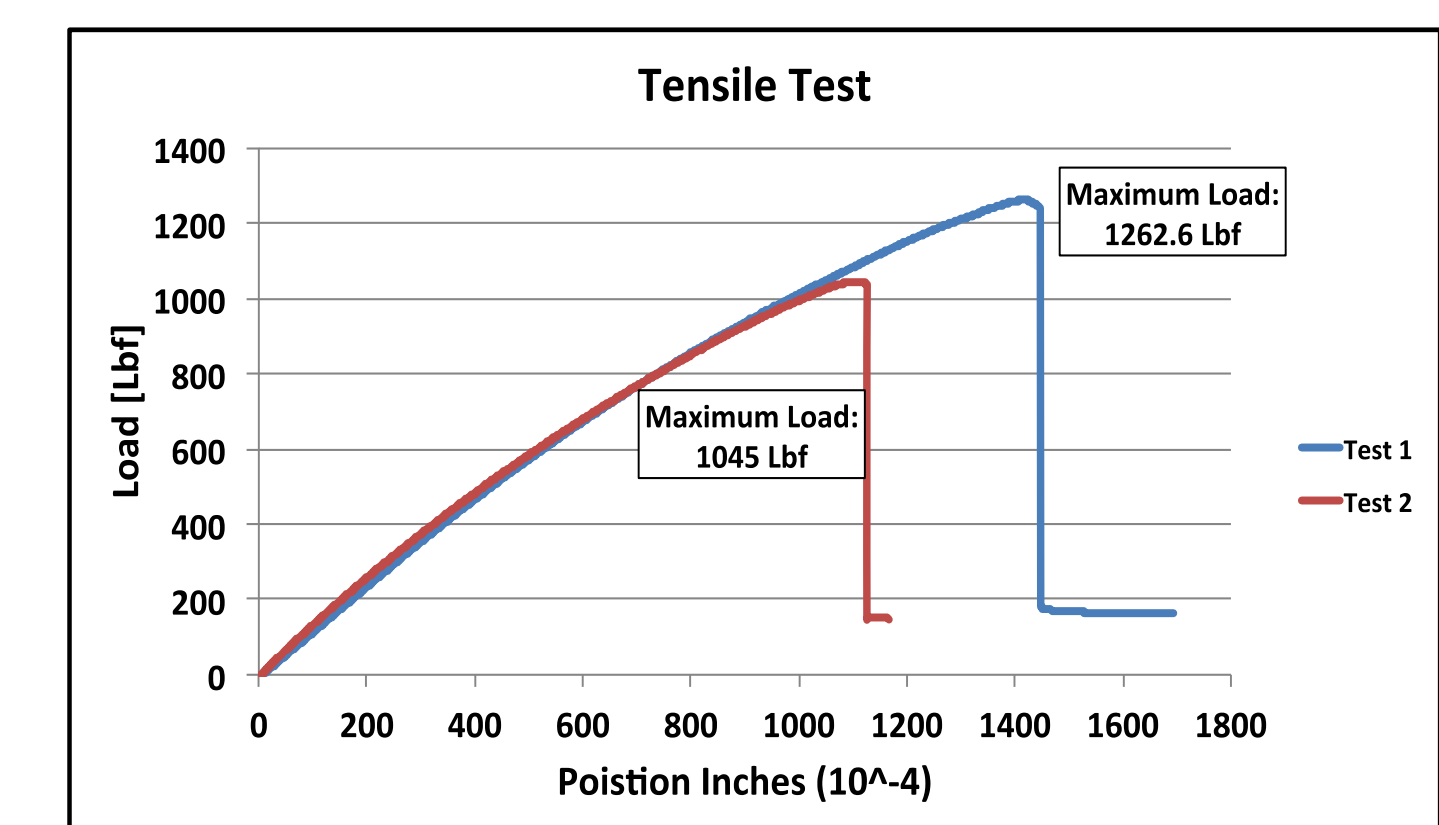


Photo above (left) shows the side view deflection on the fiberglass. Pictured right is the front view.



Left photo shows the tensile machine used. Right photo is the sample specimen after failure.



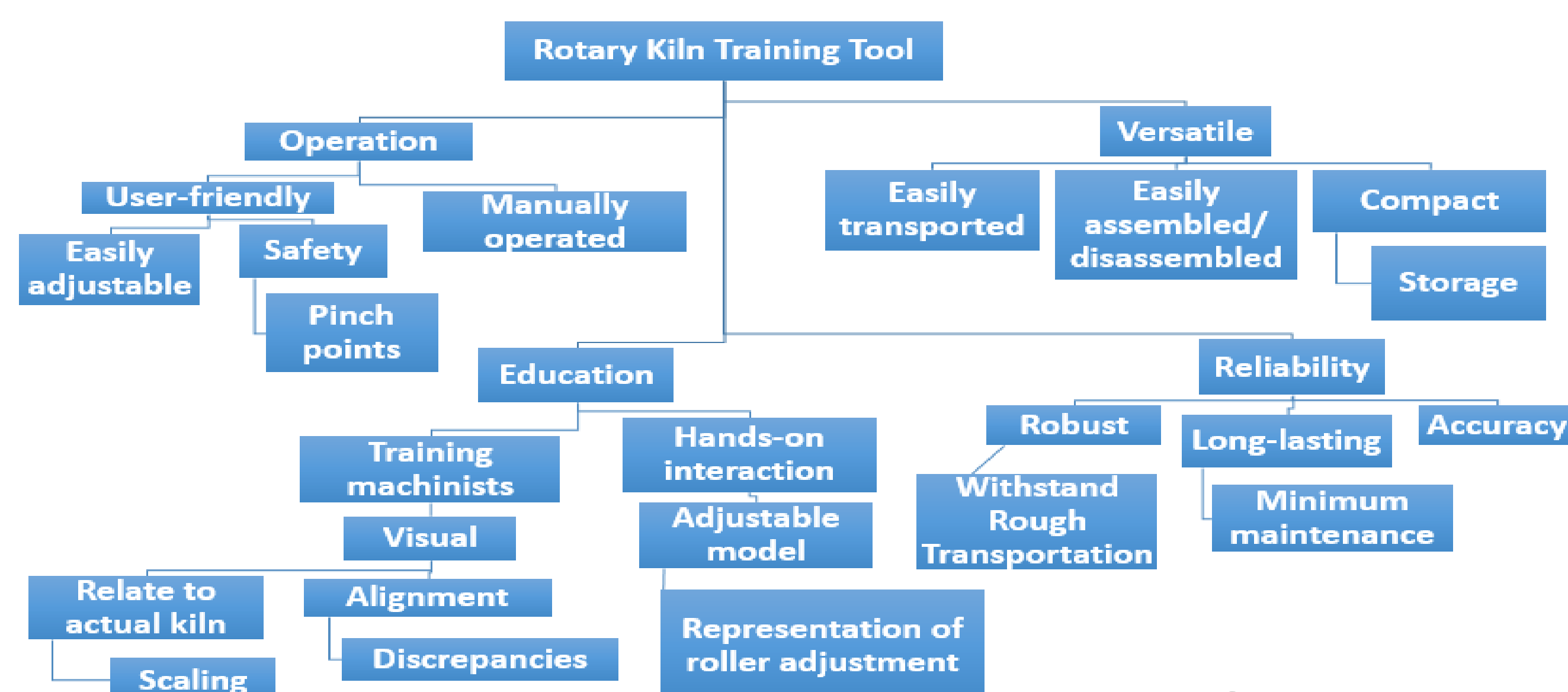
Objectives

- To create a scaled model of the existing kiln for a better method of training employees
- Show shell manipulations and adjustments
- Include a scaling document to estimate resulting movements from supporting roller adjustments

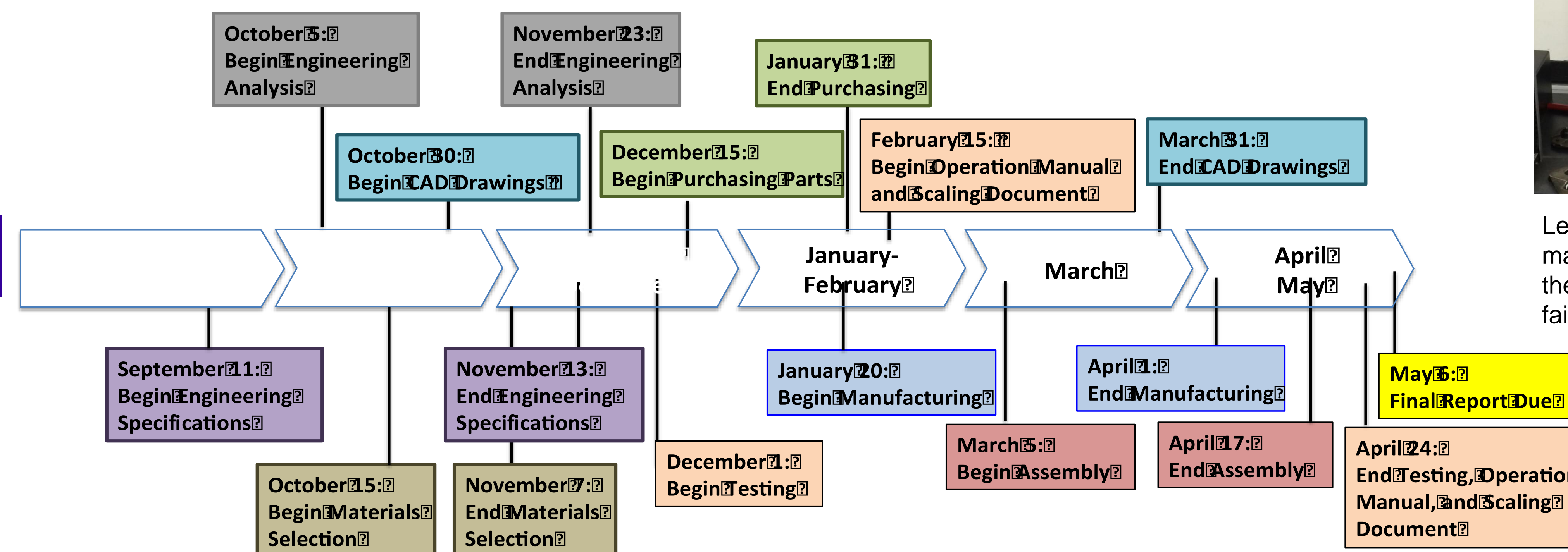
Customer Requirements

- Visually train maintenance personnel on alignment discrepancies
- Hands-on interaction with representation of roller adjustment

Educational Points



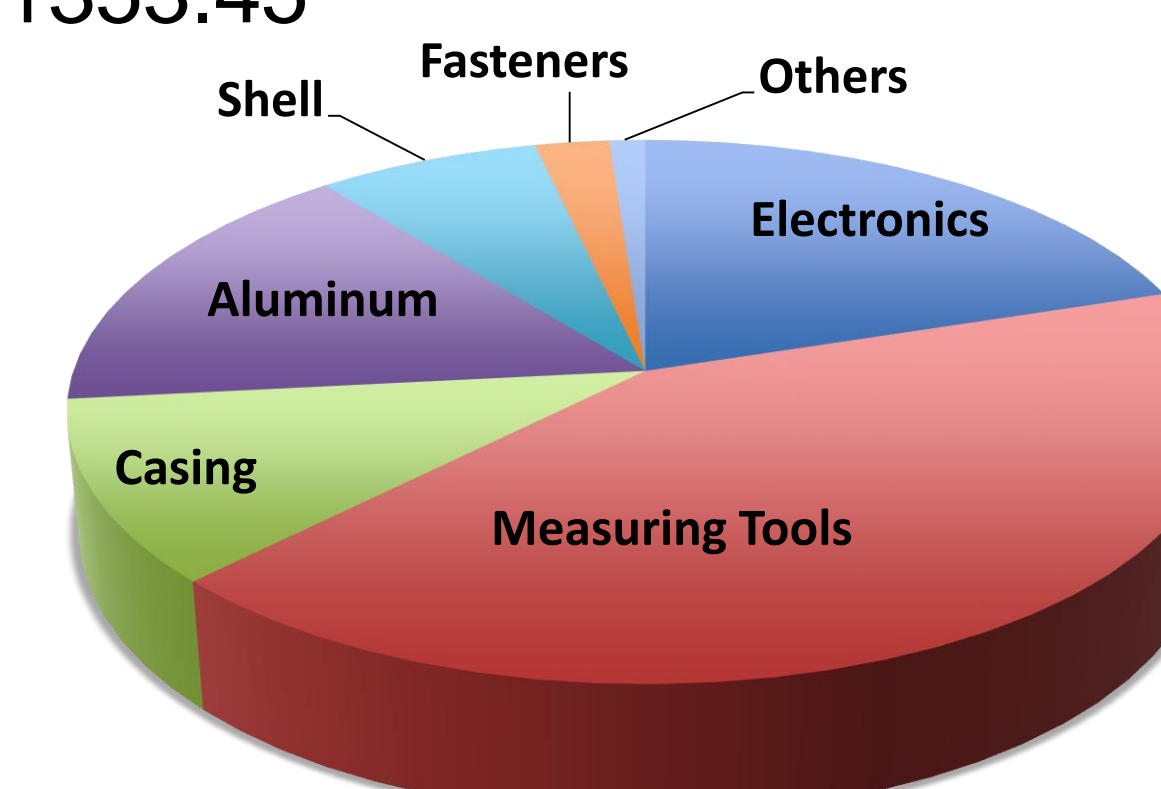
Timeline (Major Milestones)



Engineering Specifications		
Constraint	Goal	Actual Value
Weight	≤ 50 lbs	57 lbs
Cost	≤ \$2500	\$2485.25
Accuracy	5% of Travel	.1% of Travel
Set Up Time	5 min	2.5 min
Size	8ft ²	4.5ft ²

Budget

- Materials: \$749.96
- Instrumentation: \$1353.45
- Others: \$381.84
- Total: \$2485.25



Testing Results

	Desired Values	Experimental Values
Mounting Weight	>40 lbf	At least 46.3 lbf
Document Rubrics	95% satisfactory	98% satisfactory
Temperature	<122° F	82.4° F

Safety Considerations

- Pinch points
- Rotating Machinery
- Heavy lifting
- Laser brightness
- Electrical shock



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