

## **UC Irvine**

### **SSOE Research Symposium Dean's Awards**

#### **Title**

Portable Supercharger Strip Measurement and Refurbishing Tool

#### **Permalink**

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### Project Goal

Design a bench mounted, portable, inexpensive, and safe tool capable of measuring and cutting a plastic strip installed on a helix type supercharger rotor with accuracy and precision of 0.001" with the ability to cut with a taper of 0.010" max.

### Design Description

#### Measurement System

- Laser displacement sensor is mounted adjacent to rotor
- Installed cam buttons allow rotation of rotor in alignment with laser
- Allows for measurement along the rotor

#### Cutting System

- Cutting tool provides continuous cut with trim router bit
- Lab jack used to adjust height of cutting tool

#### Height Adjustment System

- Use of a laser displacement sensor, motorized lab jack, and PID control to adjust height of cutting tool
- Allows for both linear and nonlinear cut according to desired tapering

### CAD Designs

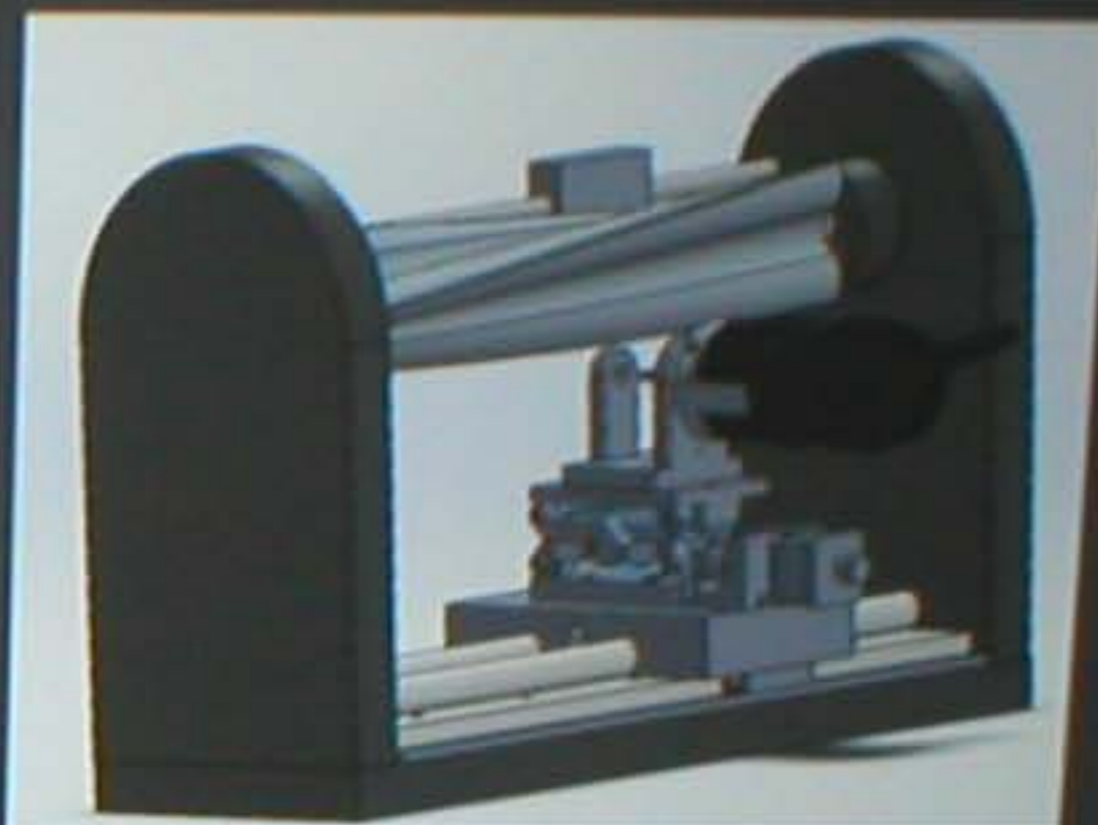


Fig. 4. Integrated final design with ability to measure & cut OD & ID



Fig. 1. TRD Funny Car

Fig. 2. Supercharger Blower

### Existing Solutions

- No measurement capabilities
- Low accuracy and repeatability
- Low rigidity
- No ID strip capability



Fig. 3. Existing solution

### Measurement Sensors and Cutting Tools



### Project Plan

For questions please contact  
Christoph Seeliger at cseeliger@ucl.edu

### Bill of Materials

Jig Assembly							
Item	Notes	Weight (kg)	Unit Price	Qty	Vendor	Catalog #	
2004 1/4" 8002 Aluminum	2 Pieces (end plates and bottom plate)	6.33029	\$79.34	1	McMaster-Carr	8002040	
Twin Rail Shaft Assembly	1 piece	2.20587	\$212.85	1	LinTech	TR5A8-24	
1/2" 2 ft long Steel Chrome Plated Shafts	2 Pieces		\$98.50	2	McMaster-Carr	8034K25	
SL30-8 Pillow Block with open bearing	4 Pieces	6.121417	\$188.73	2	LinTech	SL30-8-CK	
High Capacity Steel Ball Bearings	2 pieces		\$48.90	2	McMaster-Carr	8032T18	
Cutting Tool							
Item	Notes	Weight (kg)	Unit Price	Qty	Vendor	Catalog #	
Motorized Lab Jack	Stepper Motor Drive	1.3 kg	\$294.00	1	optics-focus	MDC-80-30	
DeWalt Laminate Trimmer S.A	1/4" collet fits wide variety of router bits	2.26796	\$41.00	1	Home Depot	020670	
Flute Trim Router Bit	2 flutes carbide tipped		\$17.51	1	partolids	0402002	
Sensors							
Item	Notes	Weight (kg)	Unit Price	Qty	Vendor	Catalog #	
Laser Displacement Sensor	Accuracy 0.001"		\$1,390.00	1	Mess	K2.1302-20	
Linear Encoder	System Accuracy 30 microns		\$91	1	Balluff	BWL-11A	
Aravis One			\$26.43	1	Autome	A00000	
					summit	\$1,614.53	
					Talcorp	7.775	\$78.00
					TOTAL	\$2,864.21	

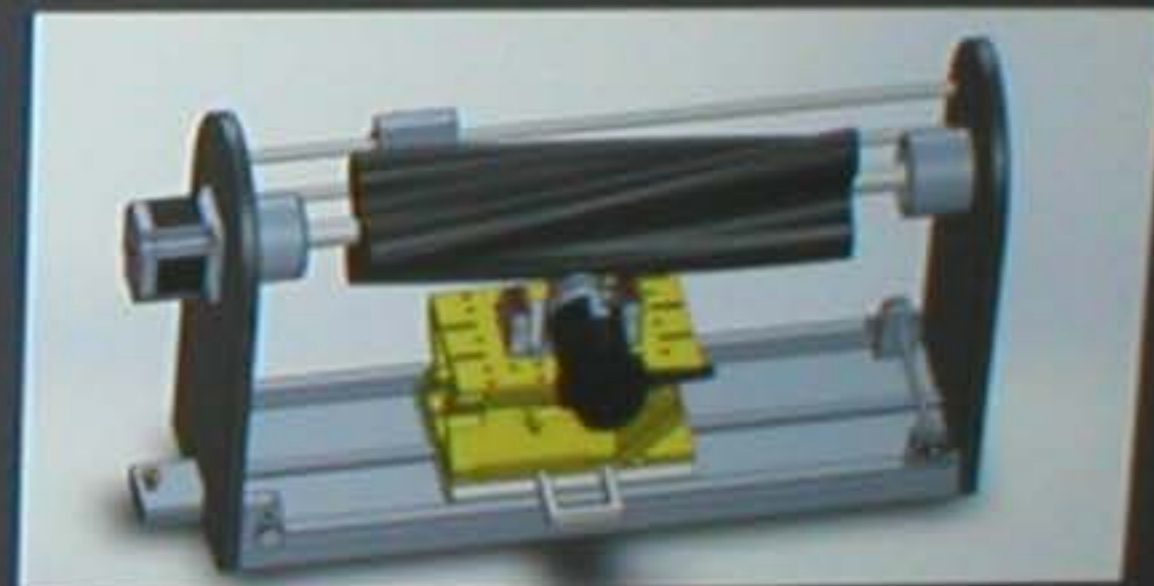


Fig. 5. Taper controlled by mechanical screw mechanism

### Results & Summary

- Designed and developed plans for the manufacturing of the fixture
- Satisfied requirements of being able to cut and measure to a tolerance of .001"
- Automated control of linear stage, allowing for precision taper cuts
- Portably built to be used by a traveling top fuel race team