Strain Gauge Requirements

Issued to Depart: Aero, ES, HE
Issued to: Paige Roy

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Prepared:	Name *Team Title*	*Signature*	11 July 2023 *Date*
Approved :	Name *Team Title*	*Signature*	11 July 2023 *Date*

Ontario Tech Racing
Ontario Tech University
2000 Simcoe St. North
Oshawa, Ontario L1H 7K4

ontariotechu.ca/ace

RECORD OF REVISIONS

REV	DESCRIPTION	DATE	REVISED BY
A	First Testing	14-01-2024	Paige
B	Validation that it's possible with current hardware	17-01-2024	Paige

1. INTRODUCTION

Measuring the compressive strain within a carbon tube using multiple strain gauges. This involves tuning strain gauges, researching best practices to get the best adhesion from the strain gauges, adhesive selection, basic circuit design and finally C programming.

2. OBJECTIVE

Aero needs to know what forces the carbon fiber tubes are under during testing, the measured maximum strain before failure was measured to be 0.065325. By mounting strain gauges on the carbon fiber tubes we can verify that the tubes do not go exceed the maximum strain or at least predict if the tubes are about to fail.

3. SCOPE

Attaching the gauges is difficult, as well as tuning them properly. Additionally its currently up in the air whether or not this system will be used within the car in the end or if it is purely for testing the force experienced within the carbon fiber tube.

4. REQUIREMENTS

Must adequately measure the strain within the carbon fiber tubes in order to accurately give information before failure. Should not rely on excess circuitry. A majority of the readings take place at a very low strain which means the input device should properly read very small output values from the strain gauges. Should use multiple strain gauges to get the most accurate readings possible and as to minimize the effects of temperature on the output readings.

5. ADDITIONAL NOTES

Need to buy
https://www.staples.ca/products/2907157-en-krazy-glue-10810-maximum-bond-19-ml?CID=P[…]gclid=EAIaIQobChMImZ-F973fgwMVAAKtBh2GFQG5EAQYASABEgKRKfD_BwE

as recommended by Professor Aaron due to its low cost and resistance to cracking under deformation. According to him it is used quite extensively within exoskeleton research for the purposes of attaching thin nanotubes to hard rods.

6. REFERENCES

Great Scott video on strain gauges https://www.youtube.com/watch?v=lWFiKMSB_4M

Really good instrumentation paper to familiarize with strain gauges and wheatstone bridge

http://elektron.pol.lublin.pl/elekp/ap_notes/ni_an078_strain_gauge_meas.pdf

HX711 Strain gauge amplifier hookup guide

https://www.digikey.com/en/htmldatasheets/production/1836466/0/0/1/load-cell-amp-hx711-breakout-hookup-guide

Prof Aaron Yurkewich for information regarding best adhesive for use with strain gauges