The University of Texas at Austin
Aerospace Engineering
and Engineering Mechanics
Cockrell School of Engineering

ASE 375 Electromechanical Systems
Section 14115

Monday: 3:00 - 6:00 pm

Report 3:
Measuring Displacement

Andrew Doty, Andres Suniaga, Dennis Hom
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1 Introduction

2 Equipment

3 Procedure

4 Data Processing

Calibration:

X Position	Voltage Response	Standard Deviation
$10mm$	$0.5706V$	0.0007
$20.09mm$	$1.013V$	0.00071
$29.99mm$	$1.82V$	0.00088
$40.04mm$	$2.485V$	0.0009
$50.01mm$	$3.023V$	0.0008
$60.09mm$	$3.699V$	0.00078
$80.06mm$	$4.996V$	0.0004

Table 1: Table of X Position and Voltage Response

C = 100.8 mm

X Position	Voltage Response	Standard Deviation
$0mm$	$2.146V$	0.00093
$10mm$	$2.164V$	0.00099
$20mm$	$2.184V$	0.00095
$30mm$	$2.200V$	0.0010
$40mm$	$2.227V$	0.00093
$50mm$	$2.256V$	0.0010
$60mm$	$2.279V$	0.00099
$70mm$	$2.306V$	0.00098
$80mm$	$2.334V$	0.00097
$90mm$	$2.363V$	0.00100
$100mm$	$2.384V$	0.00096

Table 2: Table of X Position, Voltage Response, and Standard Deviation Trailing Edge

Calipers go to 0.5 mm in least count 250g weight

4.1 Part 2

5 Results and Analysis

6 Conclusion

X Position	Voltage Response	Standard Deviation
$0mm$	$1.979V$	0.00096
$10mm$	$1.988V$	0.00096
$20mm$	$1.988V$	0.00096
$30mm$	$1.985V$	0.00095
$40mm$	$1.993V$	0.00096
$50mm$	$1.997V$	0.00100
$60mm$	$1.990V$	0.00099
$70mm$	$2.004V$	0.00097
$80mm$	$2.005V$	0.00099
$90mm$	$2.014V$	0.00100
$100mm$	$2.014V$	0.00098

Table 3: Table of X Position, Voltage Response, and Standard Deviation Leading Edge

Potential Position	Weight Position	Volts	Std
5	6	$2.501V$	0.00093
2	6	$2.234V$	0.00099
4	6	$2.809V$	0.00095
1	6	$2.471V$	0.00090
3	6	$1.988V$	0.00097
6	6	$2.102V$	0.00100
5	5	$2.599V$	0.00100
2	5	$2.312V$	0.00096
4	5	$2.873V$	0.00096
1	5	$2.505V$	0.00090
4	4	$2.904V$	0.00099
1	4	$2.564V$	0.00098

Table 4: Table of Potential Position, Weight Position, Volts, and Std

Appendices

Appendix: t-Distribution Tables

Table A11. *t*-Distribution

Values of z for given values of the distribution function $F(z)$ (cf. p. 754).
Example: For 9 degrees of freedom, $z = 1.83$ when $F(z) = 0.95$.

	Number of Degrees of Freedom									
$F(z)$	1	2	3	4	5	6	7	8	9	10
0.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.6	0.33	0.29	0.28	0.27	0.27	0.27	0.26	0.26	0.26	0.26
0.7	0.73	0.62	0.58	0.57	0.56	0.55	0.55	0.55	0.54	0.54
0.8	1.38	1.06	0.98	0.94	0.92	0.91	0.90	0.89	0.88	0.88
0.9	3.08	1.89	1.64	1.53	1.48	1.44	1.42	1.40	1.38	1.37
0.95	6.31	2.92	2.35	2.13	2.02	1.94	1.90	1.86	1.83	1.81
0.975	12.7	4.30	3.18	2.78	2.57	2.45	2.37	2.31	2.26	2.23
0.99	31.8	6.97	4.54	3.75	3.37	3.14	3.00	2.90	2.82	2.76
0.995	63.7	9.93	5.84	4.60	4.03	3.71	3.50	3.36	3.25	3.17
0.999	318.3	22.3	10.2	7.17	5.89	5.21	4.79	4.50	4.30	4.14

	Number of Degrees of Freedom									
$F(z)$	11	12	13	14	15	16	17	18	19	20
0.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.6	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
0.7	0.54	0.54	0.54	0.54	0.54	0.54	0.53	0.53	0.53	0.53
0.8	0.88	0.87	0.87	0.87	0.87	0.87	0.86	0.86	0.86	0.86
0.9	1.36	1.36	1.35	1.35	1.34	1.34	1.33	1.33	1.33	1.33
0.95	1.80	1.78	1.77	1.76	1.75	1.75	1.74	1.73	1.73	1.73
0.975	2.20	2.18	2.16	2.15	2.13	2.12	2.11	2.10	2.09	2.09
0.99	2.72	2.68	2.65	2.62	2.60	2.58	2.57	2.55	2.54	2.53
0.995	3.11	3.06	3.01	2.98	2.95	2.92	2.90	2.88	2.86	2.85
0.999	4.03	3.93	3.85	3.79	3.73	3.69	3.65	3.61	3.58	3.55

	Number of Degrees of Freedom									
$F(z)$	22	24	26	28	30	40	50	100	200	∞
0.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.6	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.25	0.25	0.25
0.7	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.52
0.8	0.86	0.86	0.86	0.86	0.85	0.85	0.85	0.85	0.84	0.84
0.9	1.32	1.32	1.32	1.31	1.31	1.30	1.30	1.29	1.29	1.28
0.95	1.72	1.71	1.71	1.70	1.70	1.68	1.68	1.66	1.65	1.65
0.975	2.07	2.06	2.06	2.05	2.04	2.02	2.01	1.98	1.97	1.96
0.99	2.51	2.49	2.48	2.47	2.46	2.42	2.40	2.37	2.35	2.33
0.995	2.82	2.80	2.78	2.76	2.75	2.70	2.68	2.63	2.60	2.58
0.999	3.51	3.47	3.44	3.41	3.39	3.31	3.26	3.17	3.13	3.09