



MAGTROL, INC.

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Buffalo, New York 14224 USA

MAGTROL, SA

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Customer Motor Analysis

Doc. No.

CMA #0001

Customer

ABC Company

123 Main Street
YourTown, NY 11111
Phone: (123) 456-7890

Contact: John Doe

Testing Date(s): 1/1/2018

Test Performed: Motor Performance Test

Application: n/a

Lab Location: Buffalo, NY

Tested By: <Test Engineer's Name>

Report Prepared By: <Test Engineer's Name>

Reference Sales Order: #XXXXXX

Table of Contents

1.	Tests Performed	3
2.	Performance Testing.....	3
3.	Description of Samples	4
4.	Test Equipment.....	6
5.	Motor Preparation & Mounting Techniques	7
6.	Equipment Calibrations	9
7.	Test Room Environment	9
8.	Data Collection, Calculation & Analysis	10
8.1	Individual Motor Tests	10
8.2	Motor Comparison Tests	11
9.	Summary of Characteristics	13

1. TESTS PERFORMED

The test performed was a complete performance curve from free run down to locked rotor. Locked rotor measurements were taken at the end of each test.

The parameters measured were:

- Amps
- Volts
- Watts In
- Speed
- Torque
- Time

Calculated values were:

- Power Factor
- Watts Out
- Horsepower
- Efficiency

2. PERFORMANCE TESTING

Ramp Testing – Average D/U (Down/Up)

The motor was coupled to the dynamometer using the appropriately sized coupling then mounted to a fixed motor fixture. Power was applied to the motor under test and run from free run speed down to the locked rotor. All measured parameters were sampled throughout the test at a high rate. This provides many data points and allows actual performance curves to be drawn.

When a motor is accelerated or decelerated, the system inertia will affect the torque reading, and thus alter the performance. To reduce the effects of inertia, a ramp down and ramp up curve were taken and the two averaged. If the deceleration and acceleration rates are equal, the corrected data is simply an average of the two curves. By averaging the two curves, this cancels the effects of inertia. The inertially corrected curve continues for every point on the curve. If no exact matching speed is found on the acceleration curve, the data will be interpolated to create a match.

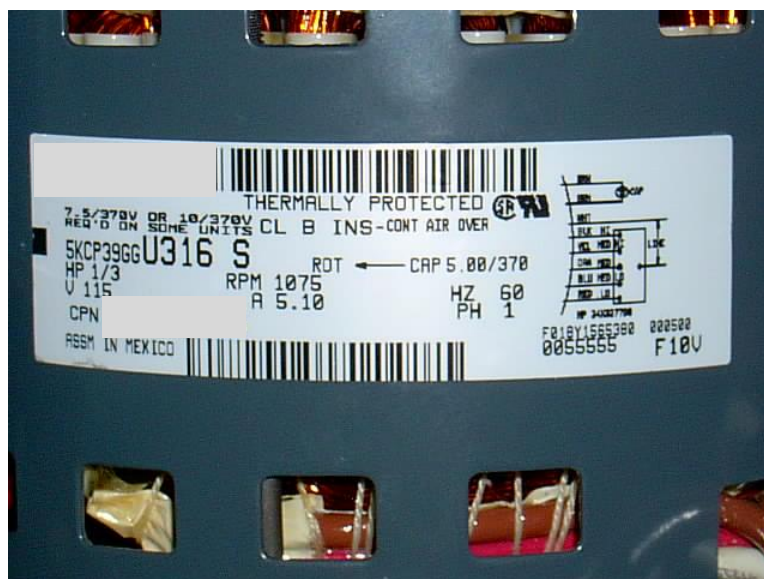
If locked rotor is specified as a minimum speed, the DSP7000 will run a separate procedure immediately after the acceleration ramp that will quickly take the motor to stall and record the data. After acquiring the locked rotor data the motor will accelerate to its free run speed.

The raw data is saved with the file extension **.mdf** in the DATA folder on the media. These are tab-delimited text files and may be opened using Microsoft Excel for further analysis. Reference the graphs for more characteristics of a particular motor.

3. DESCRIPTION OF SAMPLES

Motor Sample #1

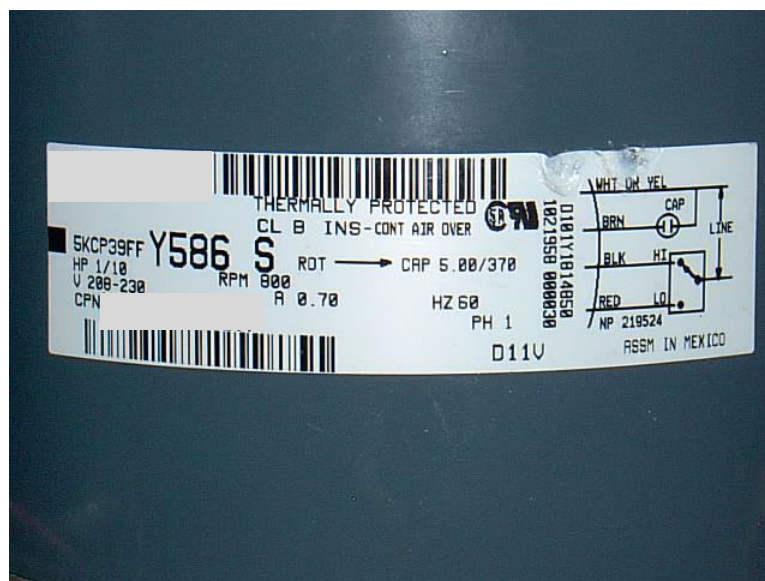
Motor Manufacturer: <Motor Manufacturer>
Motor Model Number: <Model Number>
Description: AC Motor
Output Power: 1/3 HP
Voltage: 115 VAC
Amps: 5.10 A
Rated Speed: 1075 RPM
Phase: 1



Motor Sample #1

Motor Sample #2

Motor Manufacturer: <Motor Manufacturer>
Motor Model Number: <Model Number>
Description: AC Motor
Output Power: 1/2 HP
Voltage: 115 VAC
Amps: 7.5 A
Rated Speed: 1075 RPM
Phase: 1



Motor Sample #2

4. TEST EQUIPMENT

Hysteresis Dynamometer, Model HD-810-5N

Max Torque: 14.00 N.m

Max Speed: 12,000 RPM

Max Power: 3,500 W (5 min)

Max Power: 3,000W (continuous)



http://www.magtrol.com/motortest/hd_dynamometers.html

Dynamometer Controller, Model DSP7001



http://www.magtrol.com/motortest/dsp7000_dynocontroller.html

Power Analyzer, Model 7510

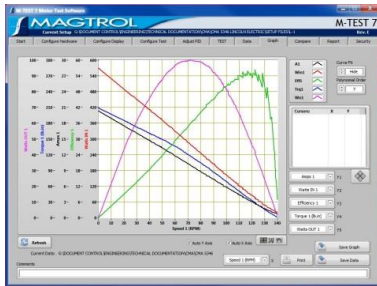


<http://www.magtrol.com/motortest/poweranalyzers.html>

M-TEST 7 Motor Testing Software

National Instruments LabVIEW

Revision: V



<http://www.magtrol.com/motortest/mtest.html>

Staco Energy Products Variable Transformer PPS-5551

0-608 VAC

70 AAC

69.7 kVA

<http://www.stacoenergy.com/>

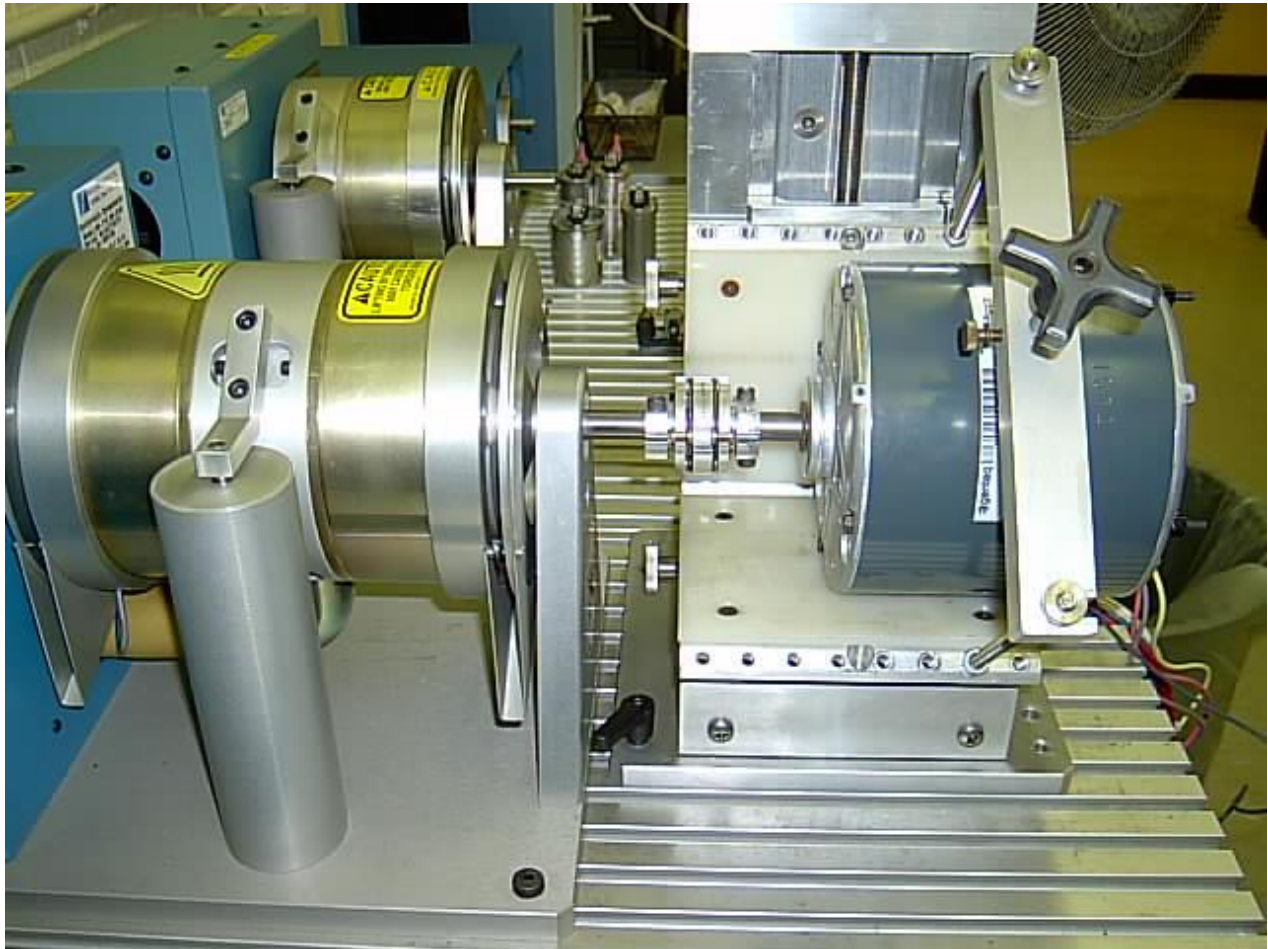
Adjustable Motor Fixture (AMF-3)



http://www.magtrol.com/motortest/amf_motor_fixtures.html

5. MOTOR PREPARATION AND MOUNTING TECHNIQUES

An Adjustable Motor Fixture (AMF-3) was secured to the T-slot base plate of the dynamometer and the motor under test was secured to the AMF. An appropriately sized flexible coupling was used to couple the motor shaft to the dynamometer. Power connections were made with high current test clips and voltage sensing for power supply feedback and data measurement were taken as close as possible to the motor.



Motor Mounting & Coupling

6. EQUIPMENT CALIBRATIONS

Hysteresis Dynamometer, HD-810-5N

S/N: 6C810102L

Cal Date: 10/4/17

Cal Due: 10/4/18

Dynamometer Controller, Model DSP7001

S/N: 14B701234

Cal Date: 3/20/17

Cal Due: 3/20/18

Power Analyzer, Model 7510

S/N: 17L00A01063

Cal Date: 12/1/17

Cal Due: 12/1/18

7. TEST ROOM ENVIRONMENT

(Extech Hygro-Thermometer, Model #445703)

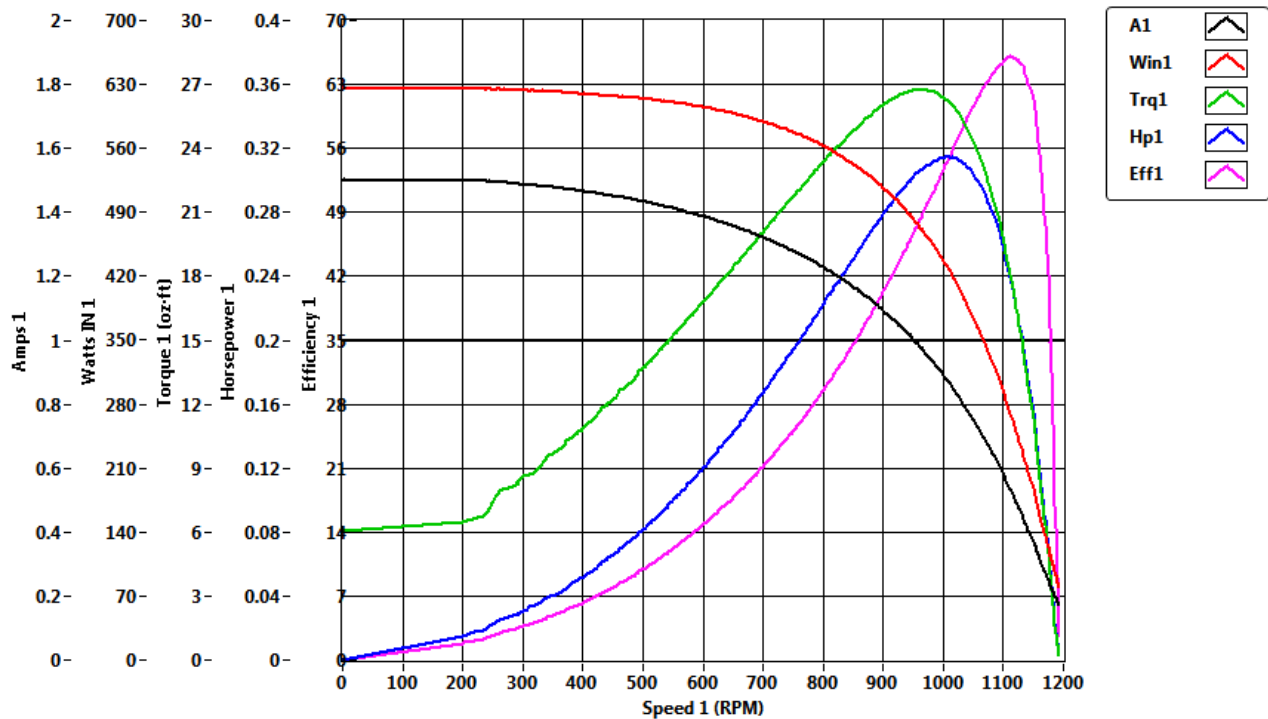
Temperature: 74.3°F

Relative Humidity: 32%

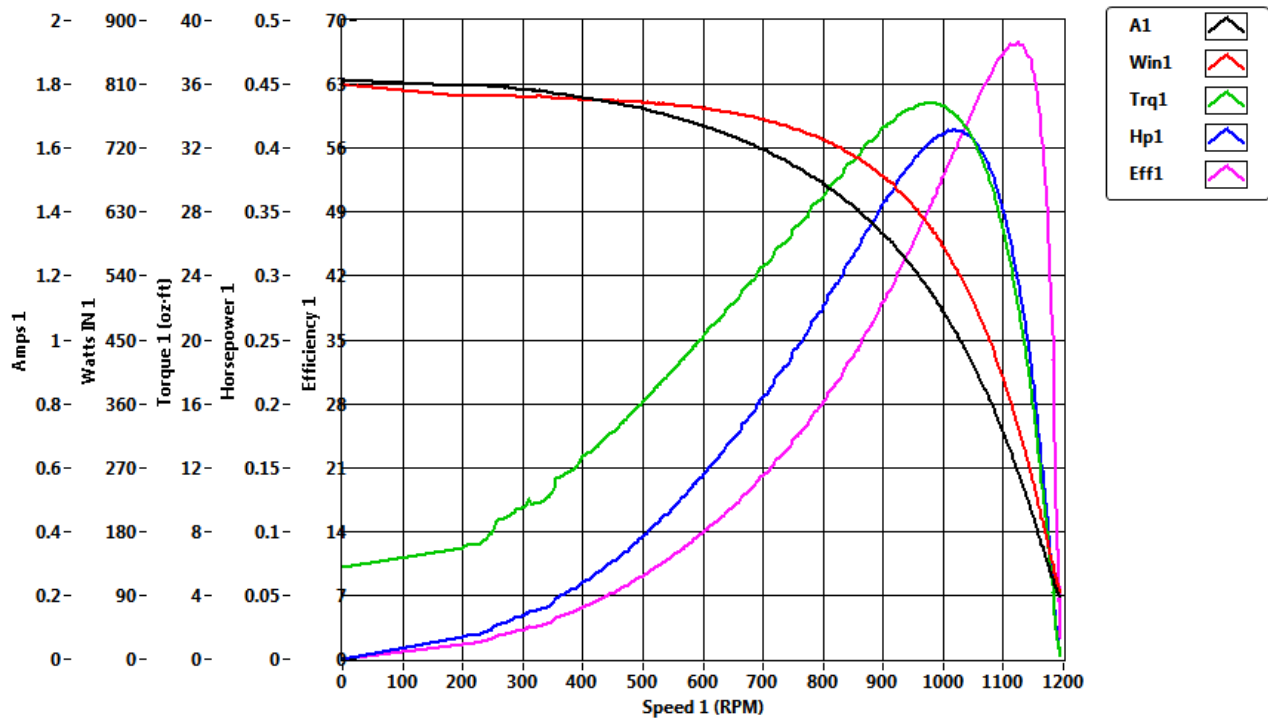
Date: 1/30/18

8. DATA COLLECTION, CALCULATION & ANALYSIS

8.1 Individual Motor Tests

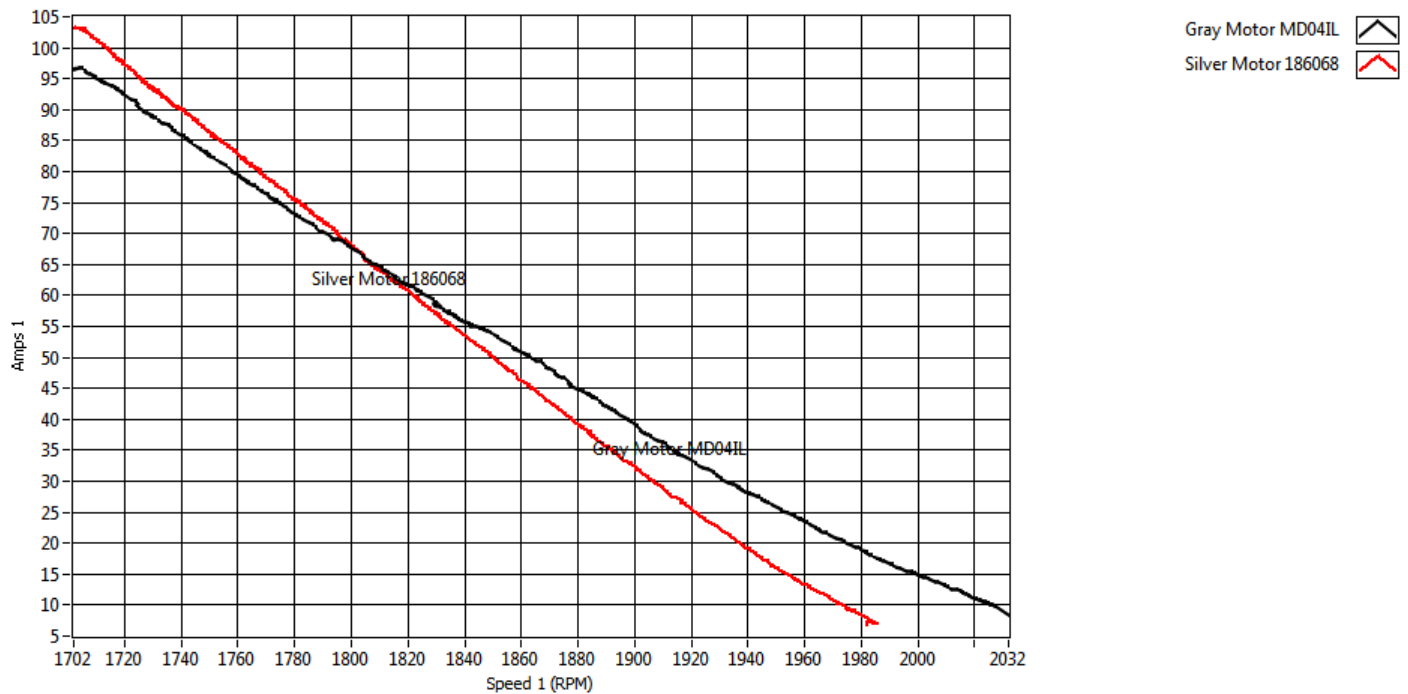


Motor Sample #1

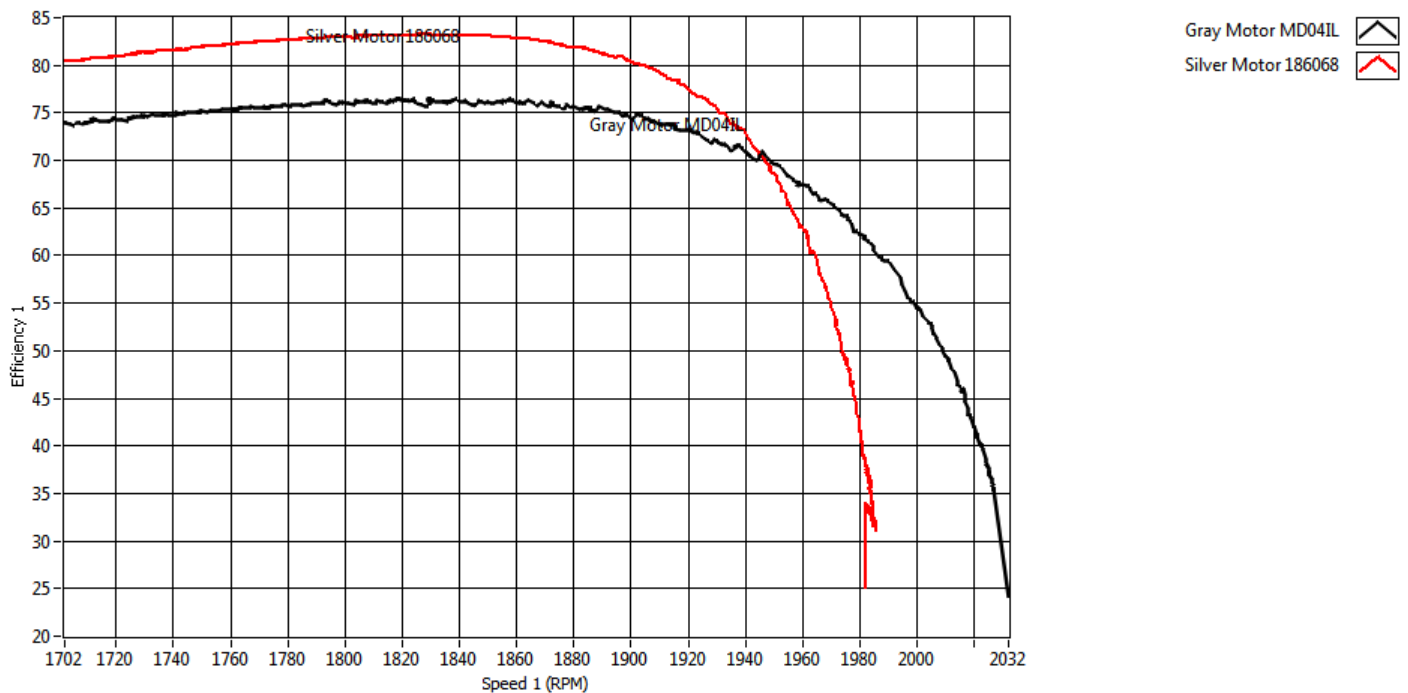


Motor Sample #2

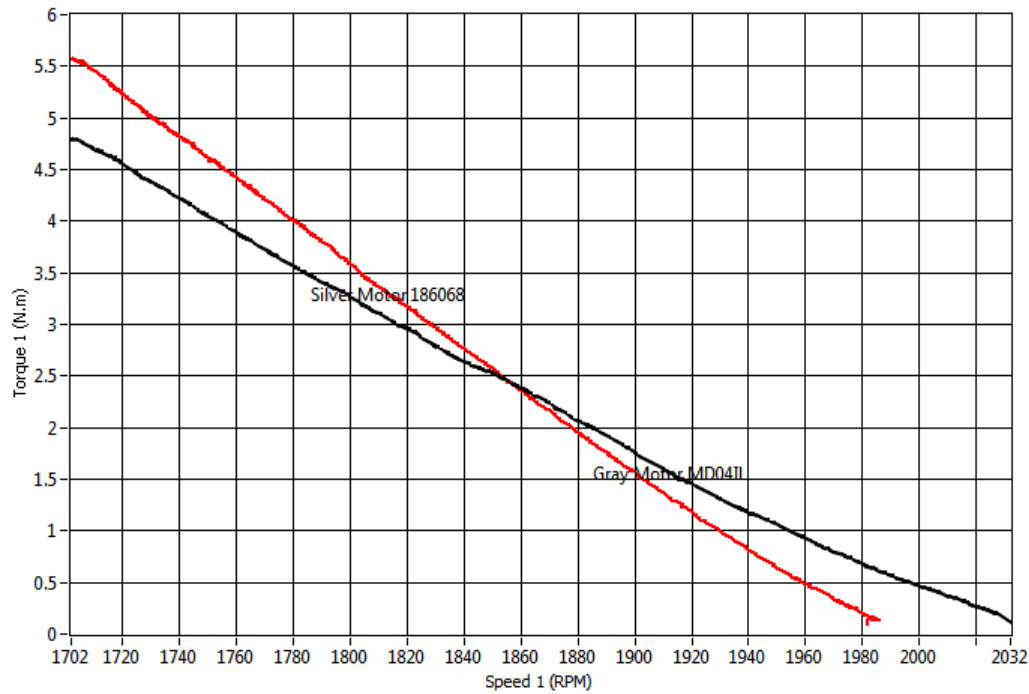
8.2 Motor Comparison Tests



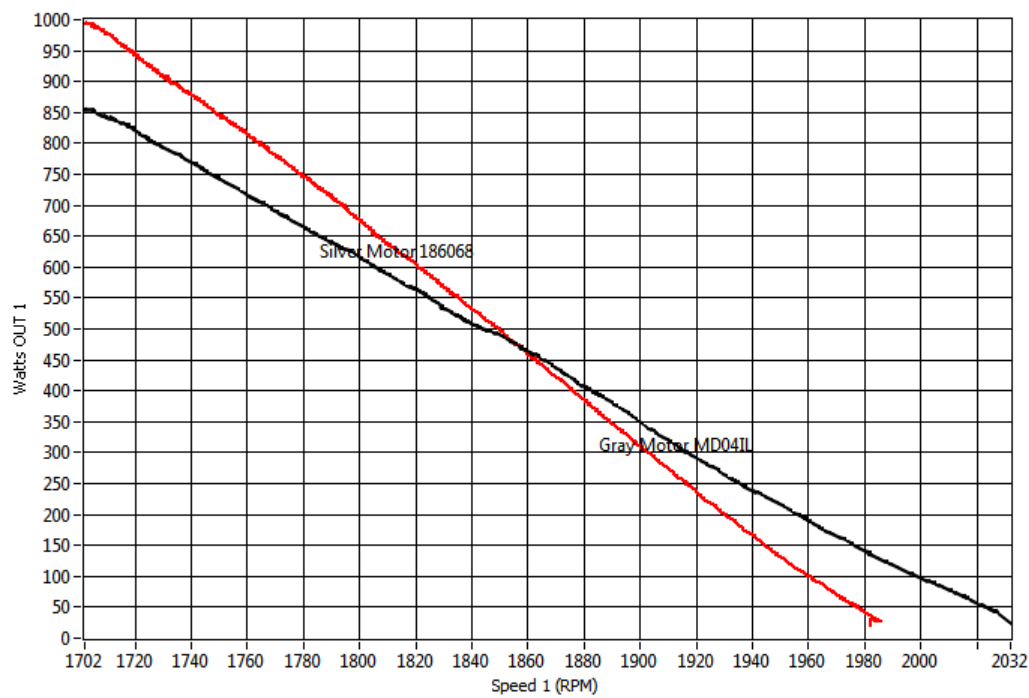
Amps vs. Speed Comparison, (2 Samples)



Efficiency vs. Speed Comparison, (2 Samples)



Torque vs. Speed Comparison, (2 Samples)



Watts Out vs. Speed Comparison, (2 Samples)

9. SUMMARY OF CHARACTERISTICS

All raw data is saved with the file extension **.mdf** in the DATA folder on the media. Reference the graphs for more characteristics of a particular motor.

Summary of Characteristics at Max Efficiency

Motor Samples	Amps (A)	Volts (V)	Watts In (Win)	Power Factor	Efficiency (%)	Speed (RPM)	Torque (N.m)	HP	Watts Out (Wout)	Time (Sec)
Sample #1	2.5866	219.607	401.07	0.704	73.7	2909	8.588	0.396	295.581	0.306
Sample #2	3.6139	219.583	622.597	0.784	65.78	2863	12.09	0.549	409.54	0.405

Summary of Characteristics at Max Torque

Motor Samples	Amps (A)	Volts (V)	Watts In (Win)	Power Factor	Efficiency (%)	Speed (RPM)	Torque (N.m)	HP	Watts Out (Wout)	Time (Sec)
Sample #1	8.6047	219.065	1609.13	0.854	44.8	2442	24.948	0.967	720.811	3.286
Sample #2	8.3609	218.952	1572.161	0.859	43.38	2517	22.902	0.915	682.048	2.803

Summary of Characteristics at Max Watts Out

Motor Samples	Amps (A)	Volts (V)	Watts In (Win)	Power Factor	Efficiency (%)	Speed (RPM)	Torque (N.m)	HP	Watts Out (Wout)	Time (Sec)
Sample #1	7.7936	218.972	1473.545	0.864	50.11	2529	24.677	0.99	738.401	2.721
Sample #2	7.6298	219.097	1444.12	0.864	47.94	2588	22.61	0.928	692.331	2.358

Sample Test Data (comes in a text file format)

Amps	Volts	Watts IN	PF	Efficiency	Speed (RPM)	Torque (N.m)	Horsepower	Watts OUT	Time
8.413	11.995	100.421	0.995	24.156	2032	0.114	0.033	24.258	0
9.858	11.994	117.802	0.996	35.464	2027	0.2	0.057	42.347	0.04
9.879	11.994	118.04	0.996	35.595	2027	0.201	0.057	42.559	0.057
9.901	11.994	118.302	0.996	35.227	2027	0.199	0.057	42.241	0.105
9.915	11.994	118.477	0.996	35.668	2027	0.202	0.057	42.772	0.119
10.012	11.994	119.656	0.996	35.76	2026	0.205	0.058	43.387	0.136
9.934	11.994	118.721	0.996	35.892	2027	0.203	0.058	43.09	0.177
10.021	11.994	119.781	0.996	36.017	2026	0.206	0.058	43.706	0.193
10.031	11.994	119.906	0.996	36.37	2026	0.208	0.059	44.13	0.239
10.157	11.995	121.417	0.996	36.844	2025	0.214	0.061	45.38	0.253
10.069	11.994	120.35	0.996	36.532	2026	0.21	0.059	44.448	0.27
10.198	11.995	121.894	0.996	37.092	2025	0.216	0.061	45.804	0.286
10.225	11.994	122.215	0.996	37.286	2025	0.218	0.062	46.123	0.301
10.286	11.994	122.957	0.996	36.98	2025	0.217	0.062	46.016	0.315
10.304	11.994	123.171	0.996	37.576	2025	0.221	0.063	46.758	0.332
10.431	11.994	124.694	0.996	37.934	2024	0.226	0.064	47.901	0.346
10.345	11.994	123.654	0.996	37.716	2025	0.222	0.064	47.076	0.363
10.456	11.994	124.979	0.996	38.317	2024	0.229	0.065	48.431	0.379
10.464	11.994	125.069	0.996	38.383	2024	0.229	0.065	48.537	0.394
10.47	11.994	125.138	0.996	38.547	2024	0.23	0.066	48.749	0.41
10.592	11.994	126.624	0.996	39.54	2023	0.239	0.068	50.737	0.424
10.604	11.994	126.77	0.996	39.772	2023	0.241	0.069	51.056	0.441
10.62	11.994	126.968	0.996	39.805	2023	0.241	0.069	51.162	0.455
10.78	11.994	128.907	0.996	39.978	2022	0.246	0.07	52.194	0.472
10.639	11.994	127.2	0.996	40.101	2023	0.243	0.069	51.585	0.486
10.815	11.994	129.308	0.996	40.312	2022	0.249	0.071	52.724	0.501
10.845	11.994	129.668	0.996	40.113	2022	0.248	0.07	52.618	0.515
10.916	11.994	130.511	0.996	40.961	2021	0.256	0.072	54.074	0.532
10.934	11.994	130.712	0.996	40.811	2021	0.255	0.072	53.968	0.548
10.94	11.994	130.801	0.996	41.319	2021	0.258	0.073	54.603	0.563
10.961	11.994	131.061	0.997	41.15	2021	0.258	0.073	54.497	0.579
11.11	11.994	132.867	0.997	42.165	2020	0.268	0.076	56.691	0.61
11.133	11.994	133.146	0.997	41.991	2020	0.268	0.075	56.585	0.624
11.207	11.994	134.024	0.997	42.864	2019	0.275	0.078	58.143	0.665
11.235	11.994	134.349	0.997	42.85	2019	0.276	0.078	58.249	0.679
11.271	11.994	134.781	0.997	43.236	2019	0.279	0.079	58.883	0.699
11.401	11.994	136.339	0.996	43.268	2018	0.282	0.08	59.7	0.714
11.433	11.994	136.726	0.997	43.747	2018	0.286	0.081	60.439	0.728
11.489	11.994	137.405	0.997	43.958	2018	0.288	0.082	60.968	0.748

11.688	11.994	139.808	0.998	44.636	2017	0.299	0.084	63.154	0.763
11.712	11.994	140.099	0.998	44.963	2017	0.301	0.085	63.683	0.777
11.727	11.994	140.269	0.998	45.41	2017	0.304	0.086	64.317	0.795
11.752	11.994	140.56	0.998	45.4	2017	0.305	0.086	64.422	0.81
11.905	11.994	142.384	0.998	45.965	2016	0.313	0.088	66.079	0.824
11.971	11.994	143.17	0.997	45.63	2016	0.312	0.088	65.974	0.841
12.035	11.994	143.937	0.998	45.874	2016	0.316	0.089	66.607	0.855
12.245	11.994	146.469	0.998	45.73	2015	0.321	0.09	67.629	0.872
12.126	11.994	145.027	0.998	45.932	2016	0.318	0.09	67.135	0.887
12.315	11.994	147.293	0.998	46.186	2015	0.325	0.092	68.578	0.903
12.328	11.994	147.451	0.998	46.136	2015	0.325	0.092	68.578	0.919
12.442	11.994	148.835	0.998	46.404	2014	0.33	0.093	69.599	0.936
12.465	11.994	149.116	0.998	46.393	2014	0.331	0.093	69.704	0.968
12.491	11.994	149.415	0.998	46.767	2014	0.334	0.095	70.337	0.984
12.568	11.994	150.338	0.998	47.75	2013	0.344	0.097	72.41	1.004
12.608	11.994	150.832	0.998	48.113	2012	0.347	0.098	73.112	1.022
12.619	11.994	150.981	0.998	48.064	2012	0.347	0.098	73.112	1.036
12.81	11.994	153.281	0.998	49.007	2011	0.359	0.102	75.707	1.054
12.856	11.994	153.832	0.998	48.825	2011	0.359	0.102	75.707	1.071
12.898	11.994	154.325	0.998	49.196	2011	0.363	0.103	76.445	1.085
12.947	11.994	154.918	0.998	49.077	2011	0.363	0.103	76.55	1.1
13.093	11.994	156.646	0.998	49.556	2010	0.371	0.104	78.09	1.116
13.14	11.993	157.212	0.998	49.296	2010	0.37	0.104	77.985	1.131
13.275	11.993	158.825	0.998	49.962	2009	0.38	0.107	79.84	1.145
13.305	11.993	159.178	0.998	49.92	2009	0.38	0.107	79.945	1.162
13.331	11.993	159.498	0.998	50.326	2009	0.384	0.108	80.681	1.176
13.473	11.993	161.256	0.998	50.558	2008	0.39	0.11	82.008	1.193
13.538	11.993	161.988	0.998	50.68	2008	0.393	0.111	82.534	1.207
13.625	11.993	163.03	0.998	51.209	2007	0.4	0.113	83.964	1.224
13.637	11.994	163.173	0.998	51.446	2007	0.402	0.113	84.385	1.238
13.698	11.993	163.912	0.998	51.805	2006	0.406	0.114	85.287	1.253
13.76	11.992	164.628	0.998	51.709	2006	0.407	0.115	85.498	1.267
13.933	11.992	166.714	0.998	52.373	2005	0.418	0.118	87.764	1.282
13.986	11.992	167.359	0.998	52.37	2005	0.419	0.118	88.079	1.296
14.023	11.992	167.796	0.998	52.845	2005	0.424	0.119	89.024	1.316
14.178	11.992	169.654	0.998	52.824	2004	0.429	0.12	90.029	1.331
14.22	11.992	170.172	0.998	52.994	2004	0.431	0.121	90.554	1.345
14.401	11.992	172.332	0.998	53.293	2003	0.44	0.123	92.187	1.377
14.457	11.993	173.024	0.998	53.674	2002	0.445	0.126	93.294	1.392
14.588	11.994	174.594	0.998	54.38	2001	0.455	0.128	95.343	1.407
14.63	11.994	175.101	0.998	54.28	2001	0.456	0.128	95.447	1.427
14.821	11.993	177.395	0.998	54.685	2000	0.465	0.131	97.389	1.443
14.899	11.992	178.335	0.998	54.382	2000	0.465	0.131	97.389	1.458

15.042	11.992	180.051	0.998	54.959	1999	0.475	0.134	99.329	1.474
15.093	11.992	180.678	0.998	55.139	1999	0.478	0.134	99.957	1.492
15.281	11.992	182.915	0.998	55.065	1998	0.483	0.136	101.058	1.507
15.34	11.992	183.663	0.998	55.264	1998	0.487	0.137	101.79	1.526
15.482	11.992	185.297	0.998	55.524	1997	0.494	0.139	103.203	1.543
15.543	11.992	186.029	0.998	56.365	1996	0.503	0.141	105.137	1.561
15.724	11.992	188.187	0.998	56.868	1995	0.513	0.144	107.278	1.575
15.751	11.992	188.527	0.998	56.941	1995	0.515	0.144	107.591	1.59
15.906	11.992	190.4	0.998	57.703	1994	0.527	0.148	110.043	1.604
16.169	11.992	193.555	0.998	58.435	1992	0.543	0.152	113.375	1.621
16.261	11.992	194.638	0.998	58.441	1992	0.546	0.153	114.001	1.637
16.455	11.992	196.976	0.998	58.929	1991	0.558	0.156	116.341	1.652
16.542	11.992	198.017	0.998	58.945	1991	0.561	0.157	116.967	1.666
16.749	11.992	200.482	0.998	59.416	1990	0.573	0.16	119.305	1.683
17.085	11.991	204.534	0.998	59.424	1988	0.585	0.163	121.787	1.697
17.143	11.991	205.231	0.998	59.707	1988	0.59	0.164	122.724	1.714
17.218	11.991	206.135	0.998	59.721	1987	0.593	0.165	123.286	1.73
17.316	11.991	207.305	0.998	59.797	1987	0.597	0.167	124.118	1.744
17.621	11.991	210.98	0.998	60.55	1985	0.616	0.171	128.047	1.761
17.677	11.991	211.649	0.998	60.986	1985	0.622	0.173	129.294	1.775
17.988	11.991	215.356	0.998	61.12	1984	0.634	0.176	131.826	1.792
18.115	11.991	216.885	0.998	61.303	1983	0.641	0.179	133.213	1.806
18.21	11.991	218.02	0.998	61.532	1983	0.647	0.18	134.356	1.824
18.492	11.99	221.368	0.998	61.811	1981	0.661	0.184	137.125	1.841
18.491	11.991	221.363	0.998	61.928	1982	0.661	0.184	137.298	1.855
18.861	11.991	225.806	0.998	62.311	1980	0.679	0.189	140.891	1.871
19.007	11.991	227.552	0.998	62.102	1980	0.682	0.19	141.513	1.888
19.209	11.99	229.981	0.998	62.554	1979	0.695	0.193	144.032	1.902
19.318	11.99	231.28	0.998	62.496	1978	0.699	0.194	144.684	1.917
19.489	11.99	233.333	0.998	63.517	1977	0.717	0.199	148.337	1.934
19.718	11.99	236.082	0.998	63.776	1976	0.729	0.202	150.746	1.959
19.815	11.99	237.243	0.998	64.148	1976	0.736	0.204	152.298	1.975
20.075	11.99	240.374	0.998	64.144	1974	0.746	0.207	154.314	1.99
20.187	11.989	241.709	0.998	64.317	1974	0.752	0.209	155.554	2.011
20.512	11.99	245.597	0.998	64.668	1973	0.769	0.213	158.988	2.026
20.762	11.99	248.558	0.998	65.186	1971	0.785	0.218	162.13	2.042
20.866	11.99	249.803	0.998	65.328	1971	0.791	0.219	163.264	2.056
21.155	11.99	253.329	0.999	65.597	1969	0.806	0.223	166.294	2.073
21.239	11.99	254.324	0.999	65.76	1969	0.811	0.224	167.325	2.087
21.545	11.989	257.966	0.999	65.858	1968	0.825	0.228	170.023	2.104
21.671	11.989	259.466	0.999	65.837	1968	0.83	0.229	170.951	2.127