REPORT

Overly Hautz Motor Base Comparison Tests

March 3rd, 2016

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Advanced Energy

advanced energy

INTRODUCTION

Overly Hautz has developed a line of automatic motor bases for belt driven systems that are designed to extend belt life, maintain optimal belt tension, and increase energy efficiency. Tom Copanas, of Overly Hautz approached Advanced Energy to perform comparative testing between their automatic motor mounting base and one of their standard static motor bases. The goal of this comparative testing was to quantify the difference in energy usage between the two bases under different loading conditions.

Overly Hautz provided their 600 series, spring loaded automatic motor base and a standard single adjusting, Style-B motor base for testing. Each base was sized appropriately to fit a NEMA size 254T motor frame. Contracting with Morsco Machinery Services, Overly had an adapter plate fabricated to mount the motor base to Advanced Energy's dynamometer. The adapter plate extended past the edge of the dynamometer table and provided the space necessary for the belt horizontal center distance. Overly Hautz also supplied a 15Hp 4 pole electric motor and all necessary belts and pulleys to connect to Advanced Energy's dynamometer. Motor nameplate information is provided in Appendix I.

Sensors were also installed on the motor and both bases to provide additional measurements during testing. Morsco installed an encoder on the motor to record motor speed, a low profile donut style load cell on the adjustment nut of each motor base to record horizontal force, and a sensor to measure horizontal displacement of the automatic motor base. Mr. John Heath with Morsco traveled with the test setup and configured each of the sensors during testing.

TEST PROCEDURE

Test Setup

Comparative testing was performed using Advanced Energy's eddy current dynamometer. A four groove pulley and V-belt system coupled the motor and dynamometer and were sized to provide a 2:1 speed reduction. Torque and driven speed were recorded using Advanced Energy's dynamometer. All electrical measurements were recorded at the motor terminals using Advanced Energy's Yokogawa WT-3000 precision power analyzer. The three sensors installed by Morsco were configured to provide a scaled 0-10Vdc output signal and were read into Advanced Energy's data acquisition system. Set up of the automatic motor base is shown in **Figure 1** below.

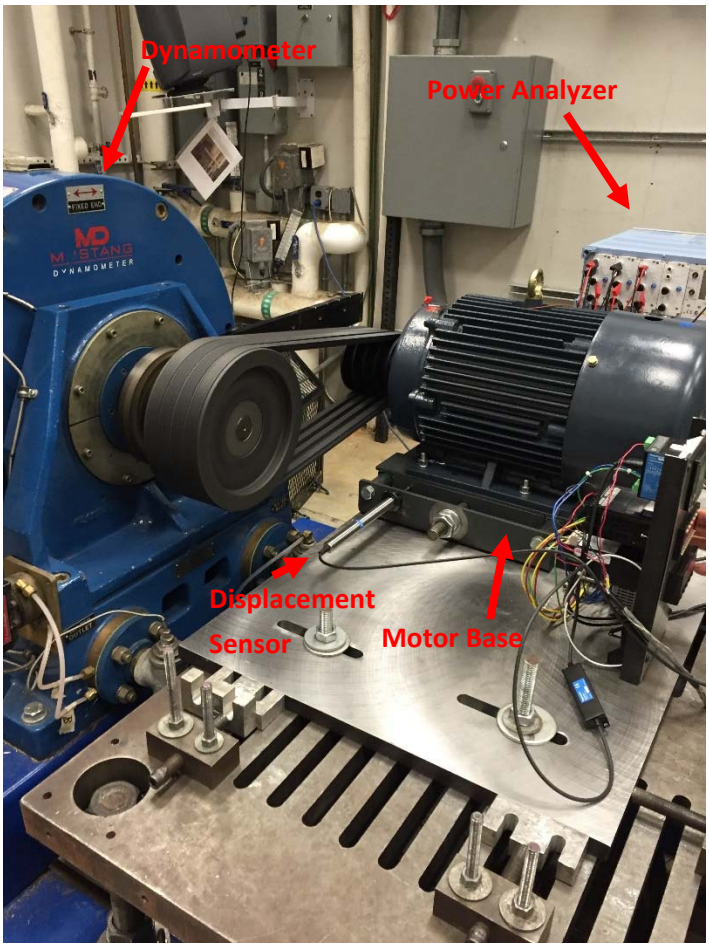

Figure 1: Automatic motor base setup

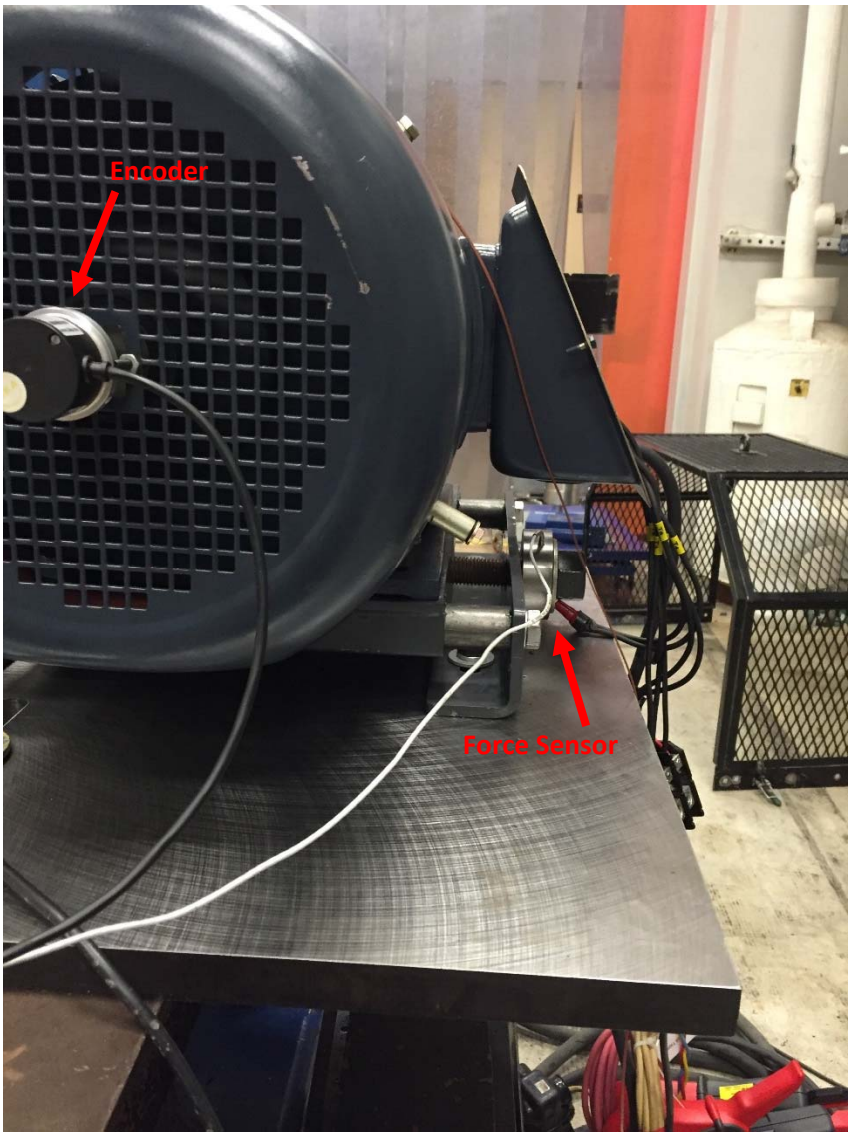

Figure 2: Automatic base setup

Using a pencil style tensioning gauge belt tension was adjusted to approximately 13 lbs at ½" of travel measured at the belt center span. The strain gauge installed on the motor base was then zeroed and the motor operated at full load torque until the belts were considered warm. The motor was then stopped and belts re-tensioned back zero as measured on the strain gauge. This procedure was performed before beginning tests on each motor base design.

Test Data Points

With input from Overly Hautz, Advanced Energy created three load profiles. The first profile ramped from zero to 70% of motor full load torque (FLT), remained constant at that load then ramped back down before ending the test. The second profile ramped from zero to 20% of FLT followed by a series of controlled transitions between 20% and 100% FLT. The final load profile ramped to 25% of FLT followed by a series rapid loading cycles to approximately 125% of FLT. During each profile torque was regulated with a PI loop to maintain consistent loading. Plots of the resulting load profiles are shown in Figures 3 through 5 below.

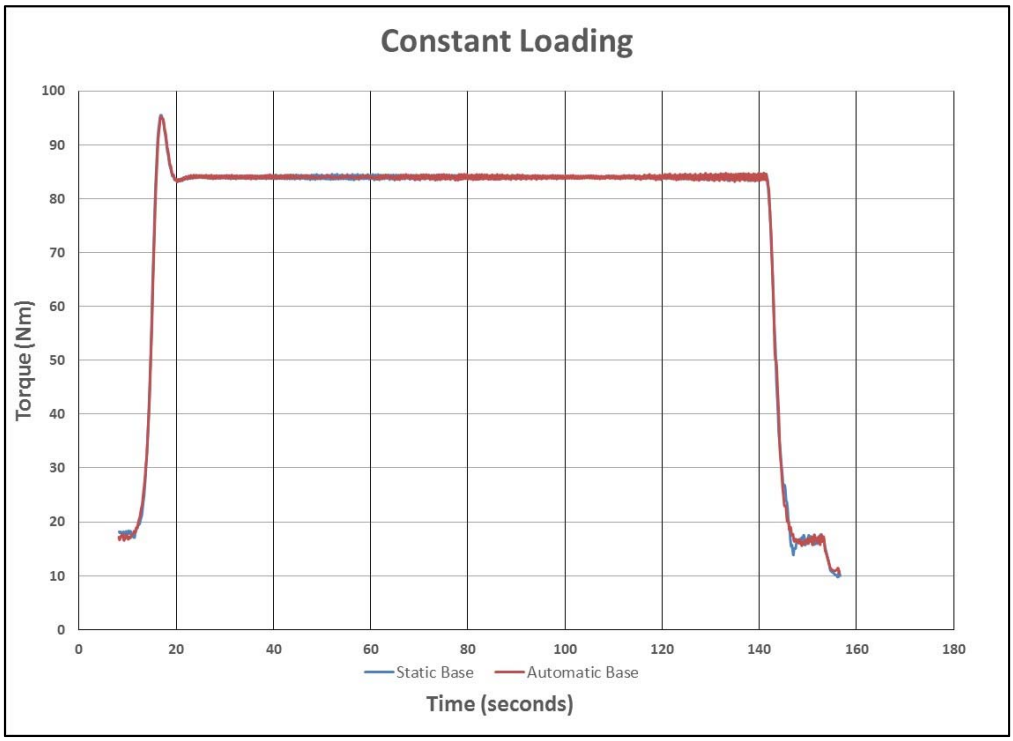

Figure 3: Constant loading torque profile

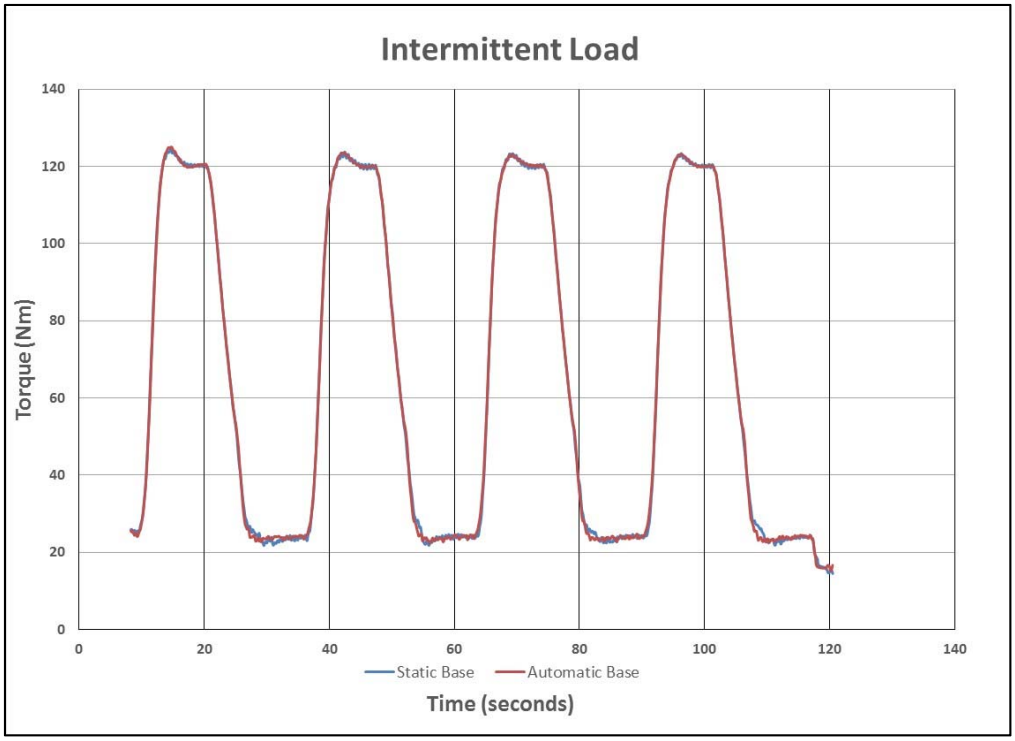

Figure 4: Intermittent loading torque profile

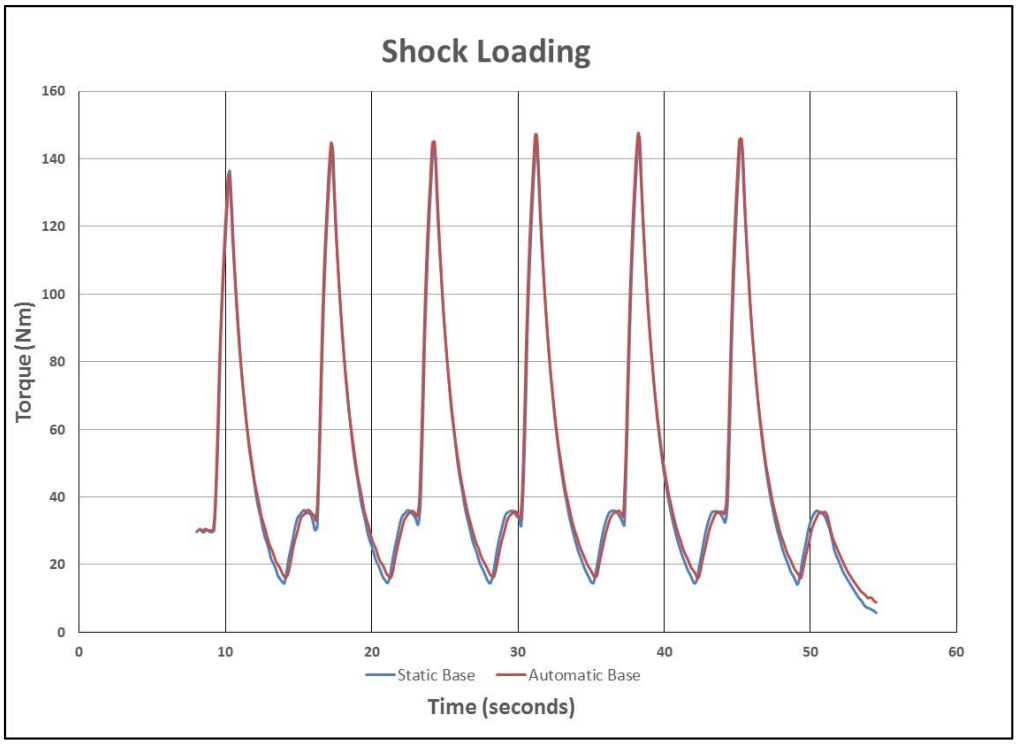

Figure 5: Shock loading torque profile

Through each load profile run, energy input to the motor was recorded using the built in watt-hour register functionality of the WT-3000. Each profile was applied four times to the 15hp motor mounted to the static and automatic motor base. The watt-hour register on the WT-3000 was cleared before each run.

TEST RESULTS

A performance comparison was carried out on the basis of total energy (watt-hours) into the 15Hp motor as measured at its input terminals. Four runs through the each of the three load profiles on the automatic and static motor bases were compiled and used in the comparative analysis.

Table 1: Constant load profile comparison

Constant Load		
	Static Base	Automatic Base
Trial	Watt-hour	Watt-hour
1	342.1	337.4
2	341.4	337.7
3	341.4	337.9
4	341.2	337.8
Average	341.5	337.7
% Energy Reduction		1.1%

Table 2: Intermittent load profile comparison

Intermittent Load		
	Static Base	Automatic Base
Trial	Watt-hour	Watt-hour
1	228.3	225.3
2	228.6	225.4
3	228.7	225.5
4	228.9	225.8
Average	228.6	225.5
% Energy Reduction		1.4%

Table 3: Shock load profile comparison

Shock Load		
	Static Base	Automatic Base
Trial	Watt-hour	Watt-hour
1	71.8	69.8
2	72.5	69.6
3	72.3	69.1
4	72.6	69.2
Average	72.3	69.4
% Energy Reduction		4.0%

CONCLUSION

Comparative energy consumption testing was carried out between a standard static motor base and an automatic motor base manufactured by Overly Hautz. This report covers the findings of the comparative testing performed using the two types of motor base designs.

Test results show that the automatic motor base does provide some potential for energy savings over the standard static base under the load profiles tested. The energy savings potential also appears to increase with an increase in load variability.

Appendix I: Motor nameplate Data

Motor Nameplate Data			
Manufacturer:	Leeson	Serial No.:	
Model:	C254T17FB1	Phases:	3
Rated Voltage:	230/460	Hz.	60
Rated Horsepower:	15.0	RPM	1770
Rated Current:	37/19	Sync. RPM	1800
Frame:	254T	Type:	
NEMA Design:	B	Encl.	TEFC
Nameplate Eff.(Nom):	92.4%	Ins. Class:	F7
Power Factor	0.82	SF:	1.15

Appendix II:
Reported Data and Republication

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