

Potential +/- Difference Inc.
MAGNA INTERNATIONAL
Regenerative Acceleration Dyno Testing
September 18TH, 2009

Dyno testing of the PDI generator prototype was accomplished by employing an induction generator as a torque sensor.

Output from the induction generator at specific RPM was monitored and recorded as photo data.

A DC motor was used to supply the prime mover drive shaft torque with a fixed motor input.

The drive shaft torque was calculated under various PDI generator load conditions using the IEEE accepted equation:

$$\text{Torque (Nm)} = \frac{\text{KW} \times 9550}{\text{RPM}}$$

The load conditions included:

- 1) No Load
- 2) Conventional Generator 7.4 W Loading
- 3) Regenerative Acceleration Generator 44.8 W Loading
- 4) Conventional & Regenerative Acceleration Generator 52.3 W Loading
- 5) Maximum Regenerative Acceleration Generator Loading (infinite load)

Quick Reference Drive Shaft Torque Data and PDI Generator Output

- 1) No Load Torque = 0.29 Nm
- 2) 7.4 Watt Conventional Generator Torque = 0.26 Nm
- 3) 44.8 Watt Regenerative Acceleration Generator Torque = 0.31 Nm
- 4) 52.3 Watt Conventional & Regen Loading Torque = 0.29 Nm
- 5) Maximum Regen Infinite Loading Torque = 0.34 Nm

(notes: conventional gen reduces drive shaft torque)
(notes: Regen-Accel gen increases drive shaft torque)
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(notes: Regen-Accel gen increases drive shaft torque)

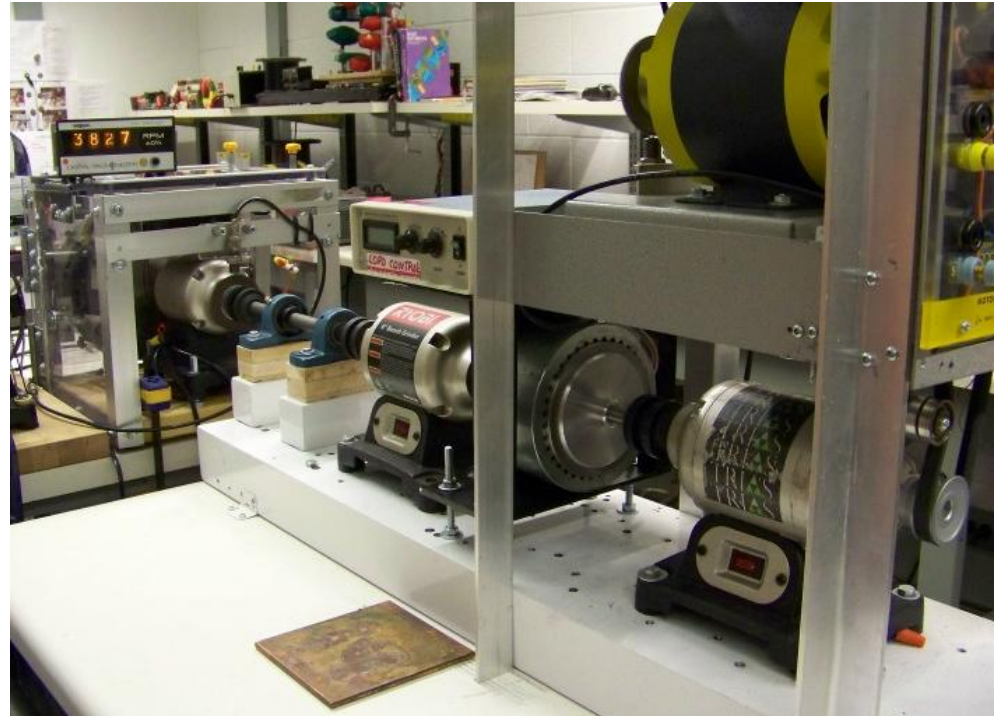


Fig 1 Dyno test bench showing PDI generator Ryobi Dyno Coupling

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Fig 2 NO LOAD Generator o/p = 115 watts @ 3770 RPM

Drive Shaft Torque = 0.291 Nm



Fig 3 7.5 Watt ON LOAD Conventional Generator Loading @ 3755 RPM

Drive Shaft Torque = 0.26 Nm

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Fig 4 44.8 Watt **ON LOAD** Regen-Accel. Generator Loading @ 3779 RPM

Drive Shaft Torque = 0.31 Nm



Fig 5 52.3 Watt **ON LOAD** Conventional & Regen-Accel. Generator Loading @ 3773 RPM

Drive Shaft Torque = 0.29 Nm

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Conclusions

The Conventional Generator **reduces** the drive shaft torque by 10.3 % when a load is applied because the armature reaction is of a **counter-torque** nature.

The Regenerative Acceleration Generator **increases** the drive shaft torque by up to 17.2% when a load is applied because the armature reaction is of a **complementary-torque** nature to that supplied by the prime mover.



Fig 6 Infinite Load Regen-Accel.Generator @ 3788 RPM

Drive Shaft Torque = 0.34 Nm

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Loading	Induction Generator Output	Drive Shaft Speed	Torque	Data Interpretation
No Load	115 W	3770 RPM	0.291 Nm	
Conventional Generator 7.4 W Loading	102 W decrease	3755 RPM decrease	0.26 Nm decrease	Conventional generator coil <u>reduces</u> drive shaft speed and torque.
Conventional & Regenerative Acceleration Generator 52.3 W Loading	115 W	3773 RPM	0.29 Nm	Regenerative acceleration generator produces 52.3 watts with <u>no</u> external increase in drive shaft torque.
Regenerative Acceleration Generator 44.8 W Loading	124 W increase	3779 RPM increase	0.31 Nm increase	Regenerative acceleration generator <u>increases</u> its own drive shaft speed and torque internally.
Infinite Load Regenerative Acceleration Generator	134 W increase	3788 RPM increase	0.34 Nm increase	Infinite load produces maximum drive shaft torque and speed increase..

Third party testing and set up performed by Pierre Guillimette, President of Trias Innovations.
Dr. Habash / University of Ottawa confirmation available upon request.

Data compellation by Thane C. Heins of Potential Difference Inc.
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