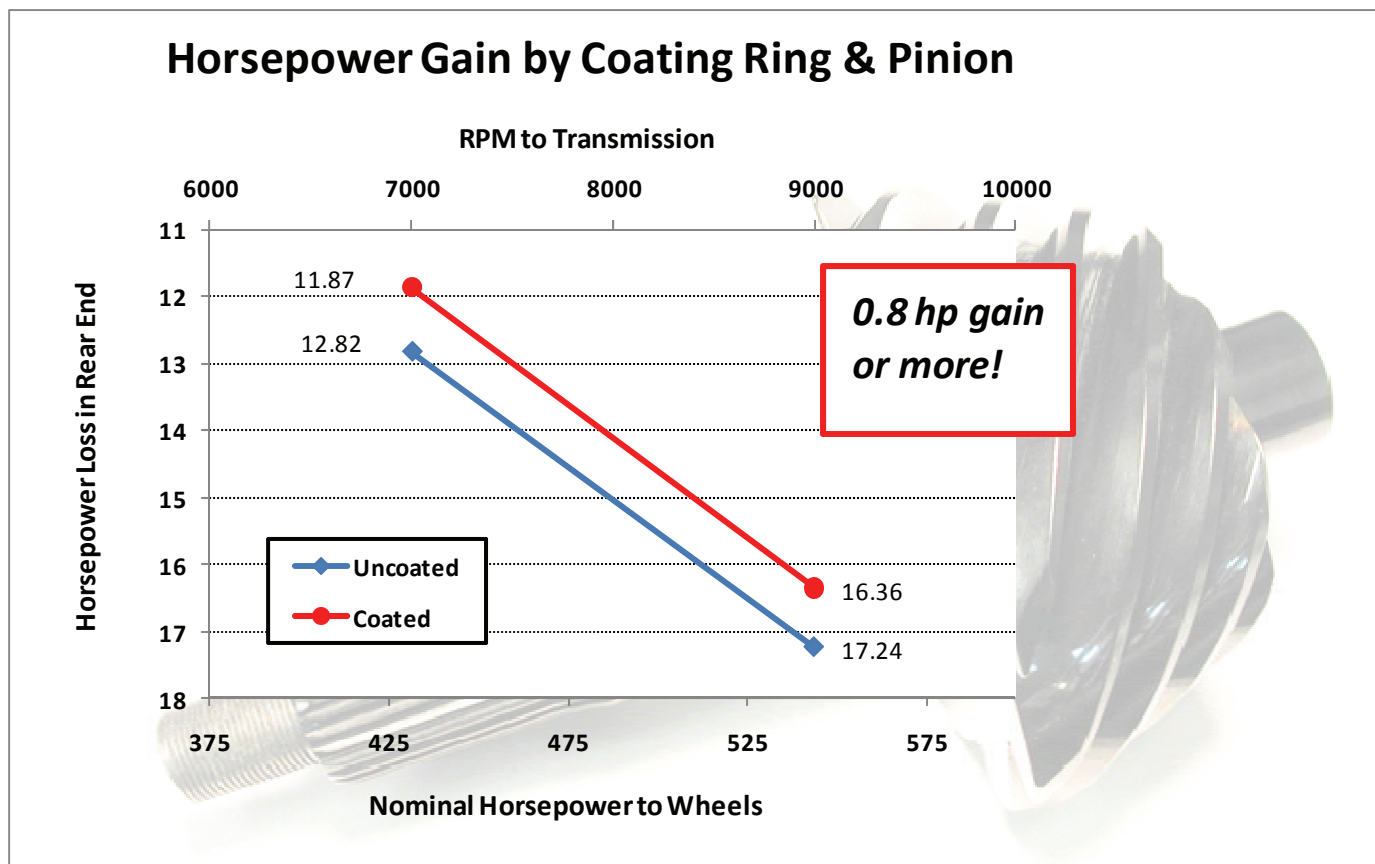


Significant Horsepower Gain with Extremeion Hard Carbon Coating on Ring and Pinion Gears

Dramatic gains of up to 0.95 Horsepower and 0.21% Efficiency were recently achieved by Extremeion hard carbon coated ring and pinion on the ARC chassis dyno in Mooresville, NC.

The Extremeion® Racing Division of Anatech LTD in partnership with C & R Racing^a recently engaged Auto Research Center^b for comparative testing of ring and pinion gears. Two Ford SVO 9” ring and pinion sets (P/N M-4209-R375) were used for the test. Both sets were first processed using C&R Racing’s REM ISF® chemically assisted vibratory finishing equipment to create a surface finish widely accepted by the racing industry. Extremeion proprietary hard carbon coating was then applied to one gear set for the dyno test.

The Auto Research Center (ARC) dyno has a number of exceptional testing capabilities. First, hydraulic motors are used to allow testing of a gear box (transmission) and rear end independently from a vehicle. Since all components of the dyno can be left in place while ring and pinion sets are changed out, tests of different ring and pinion sets can be directly compared. Second, at 9000 RPM input to the transmission and 550 hp to the wheels, the ARC dyno creates testing conditions which are considerably more meaningful than with other dynos. Finally, highly accurate RPM and torque sensors are used so that very small changes in horsepower can be detected. For example, the error associated with 550 hp to the wheels at 9000 RPM to the transmission is only +/- 0.38 hp, or less than 0.07%. Data kept for the dyno over time has shown a repeatability of +/- 0.25 hp.



^aC&R Racing South Incorporated
 301 Cayuga Dr, Unit A
 Mooresville, NC 28117
 www.crracing.com

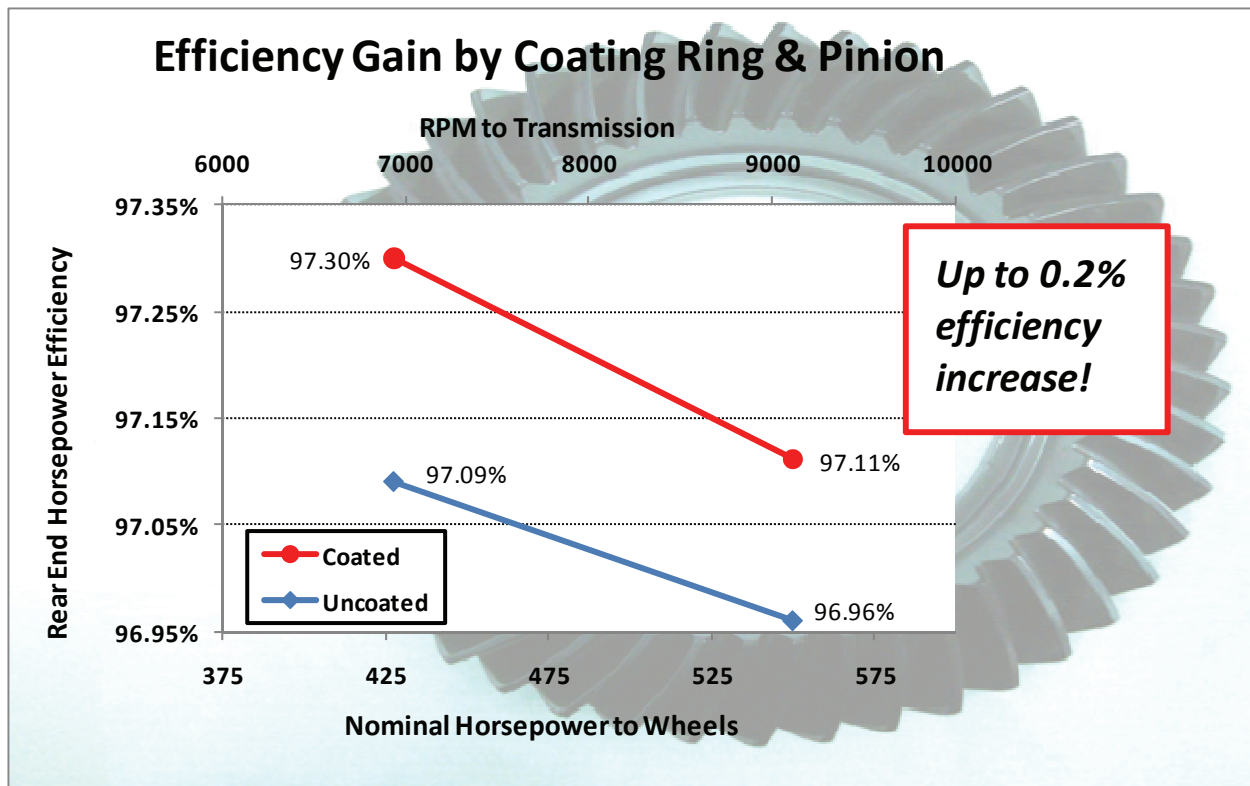
^bAutomotive Research Center, NC LLC
 171 Byers Creek Rd, Suite 107A
 Mooresville, NC 28117
 www.arcindy.com

Each ring and pinion set was tested using Mobil 1 75-90 Delvac lubricant which was completely flushed and replaced for each set. Flushing and refilling with the same lubricant type minimizes any effects due to lubricant breakdown. Oil temperature ranged from 180 to 189 °F with the cooling system set at 200 °F. After setting the RPM and confirming 180 °F oil temperature, torque and RPM into the transmission, into the rear end (out of the transmission) and out of the rear end were logged for three minutes. At 7000 RPM the nominal horsepower to the wheels was 428, and 550 hp at 9000 RPM as stated above. Both RPM settings were run at least three times to ensure repeatability of the data in all tests.

Extremeion® Hard Carbon coatings moved to the front of the pack with NASCAR's switch to unleaded fuel in the 2007 season when traditional diamond-like carbon (dlc) coatings could no longer remain intact on valve train components for a complete race. Extremeion® coatings are characterized by both extreme hardness and flexibility which cannot simultaneously exist in

traditional dlc's. High hardness for protection, high flexibility for excellent adhesion and remaining intact, and low friction for increased efficiency combine to offer a unique coating solution for racing's most extreme applications. For this reason, as the single engine for practice, qualifying and racing restriction has come into play and valve train tuning is increasingly aggressive, Extremeion® coatings continue to be the coating of choice for NASCAR's top teams.

Prior to the ring and pinion testing, Extremeion® customers suggested that increases of 0.25 hp and 0.1% efficiency would be significant and valuable. As shown in Figures 1 and 2, increases well beyond these minimums were achieved. Figure 1 displays lower horsepower loss across the rear end which equates to mean horsepower gains of 0.95 hp and 0.88 hp which were achieved at 7000 and 9000 RPM, respectively using the coated ring and pinion. Figure 2 shows the increased rear end efficiency at 7000 and 9000 RPM of 0.21% and 0.15%, respectively for the coated ring and pinion.



ANATECH LTD

The expert knowledge of employees throughout the Anatech LTD family of businesses are available to assist with many aspects of your engineering applications.

- Coating selection from μm to mm thickness
- Surface finishing
- Surface roughness analysis
- Nano to Macro level defect analysis
- Tribology
- High precision machining