

BNM

Research

Test Report

CLS Bond™ Engine Oil Additive

VOLVO-PENTA MD-1 Engine

Commissioned by

Tribolator AB

January-March 2002

1) Introduction

Tests with Motor Silk™ engine additive during the spring of 2002 at the BNM research engine laboratory-

2) The test setup

Volvo-Penta MD1 engine in a test bench configuration according to BNM research standard setup.

3) The test

The engine was fully overhauled and restored and the tests was run through February and March. The was done in parallel to the diesel additive tests.

4) The result

The tests are indicating a >5% reduction in fuel consumption

Initial tests are indicating a 5% reduced fuel consumption. Long term benefits will be reduced wear due to reduced friction.

5) Conclusions and Tendencies

- Decreased fuel consumption, >5% for Boron CLS Bond™ diesel additive
- No Acid in used fuel
- Significant reduction of metal residues in the engine oil (When testing the CLS oil additive)
- Significant tendencies of corrosion
- Significant reduced wear
- Decreased HC emission
- Density 1.5 g/ml. Particle size < 0.2-0.5 u, therefore no risk for clogged fuel and oil filters
- Patent, patent no. 5,431,830
- All Boron CLS Bond™ products are certified at American Bureau of Shipment
- All Boron CLS Bond™ products has or has pending MIL specification. All indices points to all products will qualify
- Boron CLS Bond™ are not aggressive vs. other materials such as metals (Al) or rubber. (Common for other lubricants)
- Boron (CLS Bond™ does not use PTFE (e.g. Teflon) or ZDDP (Zn) which combine with H2O (condensation for example) is transformed into a corrosive acid which leads to a higher degree of toxicity for the lubricant.

The content of metals particles are decreasing by around 70% already within 10 hours of testing-

This test has been performed on the same engine in a controlled environment.

Further testing points to a further reduction of metal particles > 85%. The highest measured value is 92%.

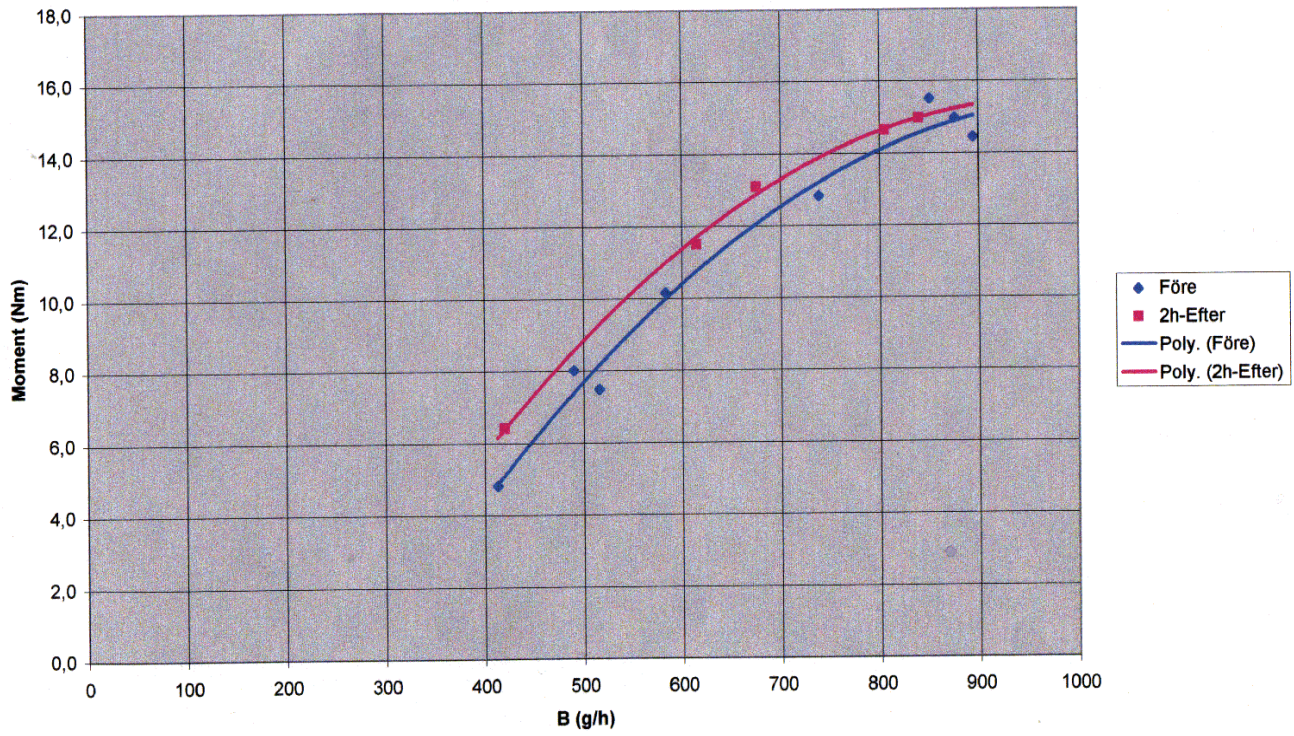
This gives lower fuel consumption, reduced wear, and a more efficient engine.

Water in lubricant could exist and not be visible to the eye and could reduce the life-time of vital parts (e.g. bearings by 75%). Water in lubricants causes oxidation, acid, fernice, pollution and viscosity problems. Water makes the lubricant initially thicker and then thinner than the original viscosity. Water dramatically increases the corrosion, especially engines and machinery that not are running constantly (ex. Marine engines etc.). Boron CLS Bond™ combined with H2O (Water) creating a self-repairing film due to the bonding of the Boron. The bonding isolates the metal surface against corrosion.

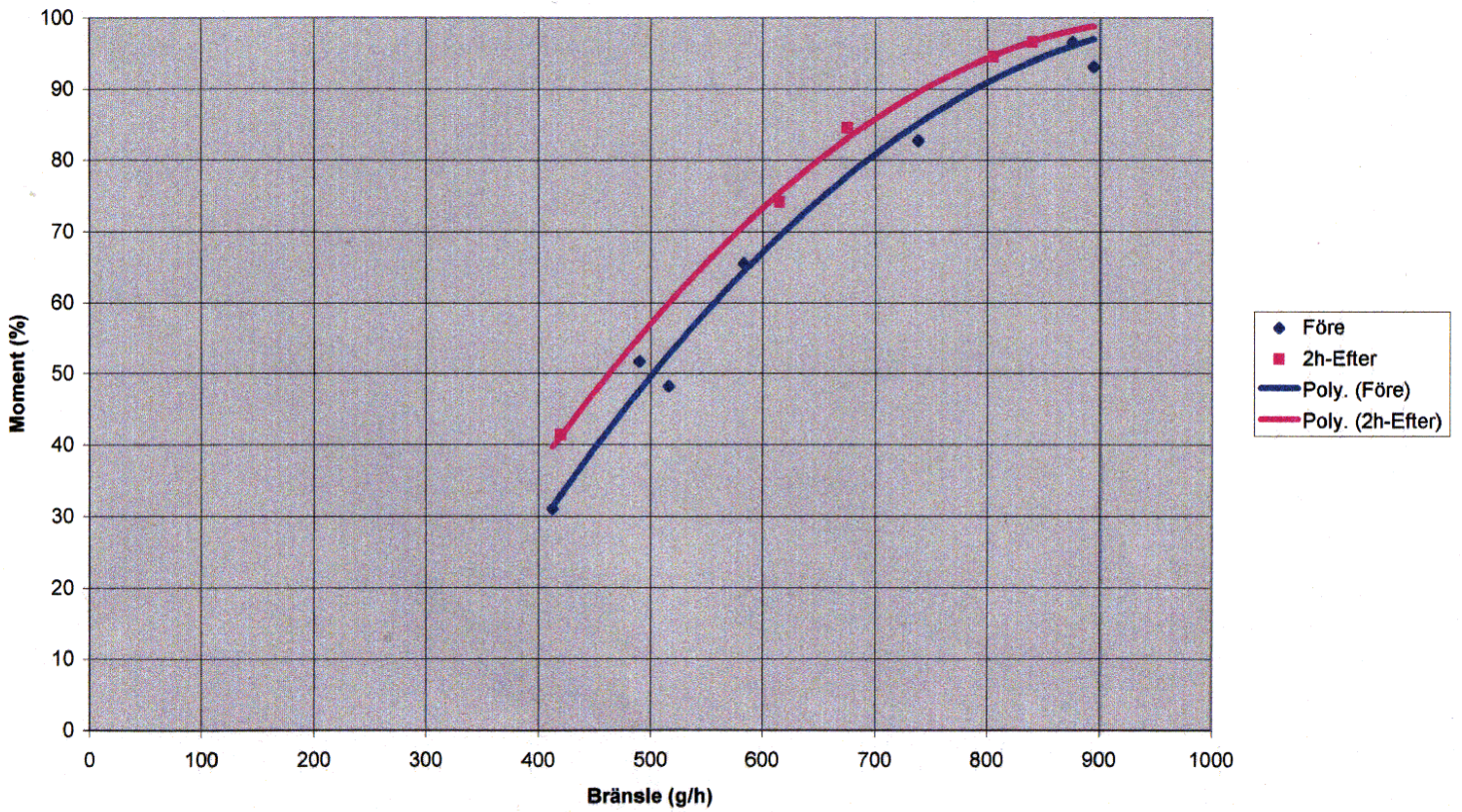
BNM Research

Bengt Norberg

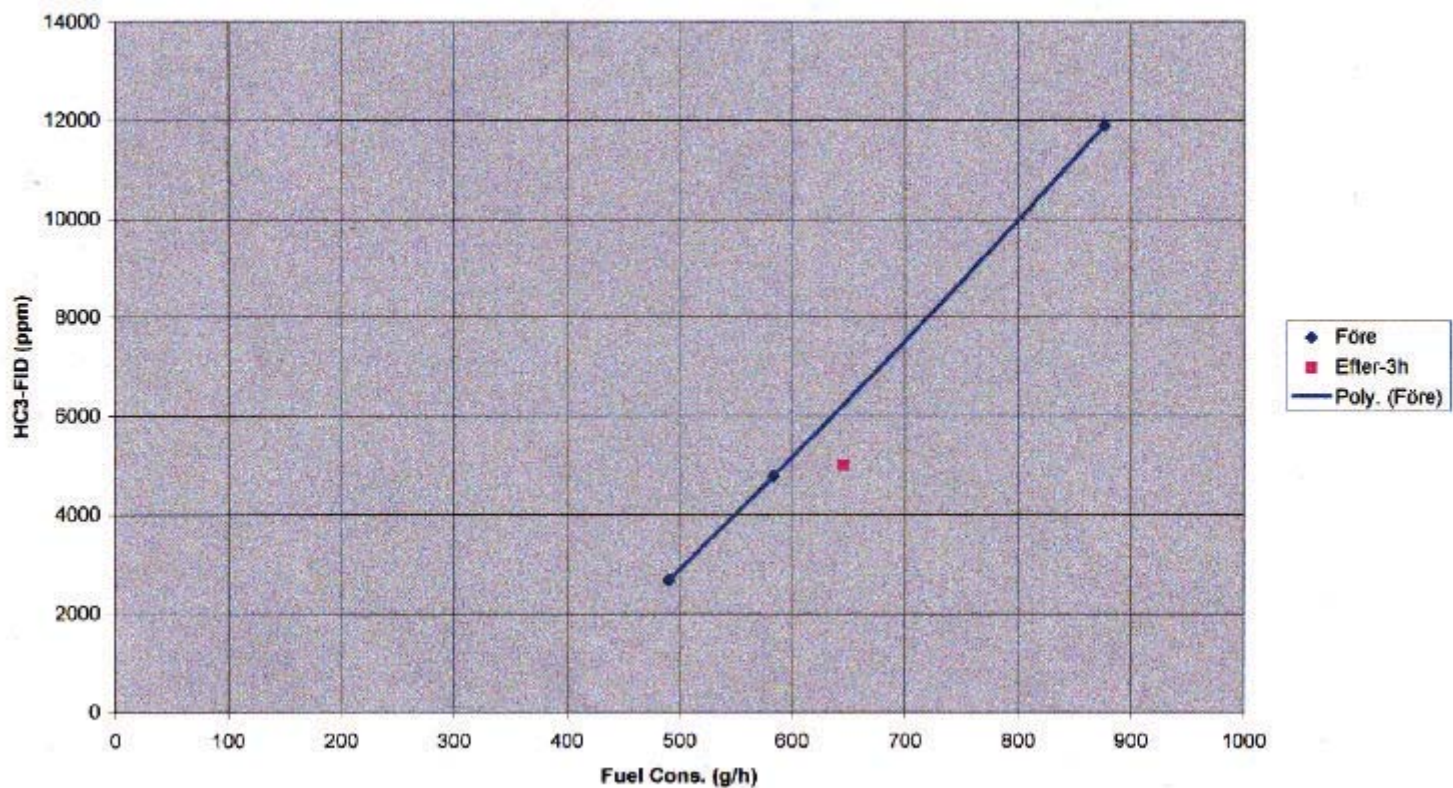
Moment sfa Bränsleförbr vid 1200 r/min



Moment sfa Bränsle-förbr. Vid 1200 r/min



HC3-Conc. vs Fuel Consumption at 1200 r/min



Avgastemperatur

