

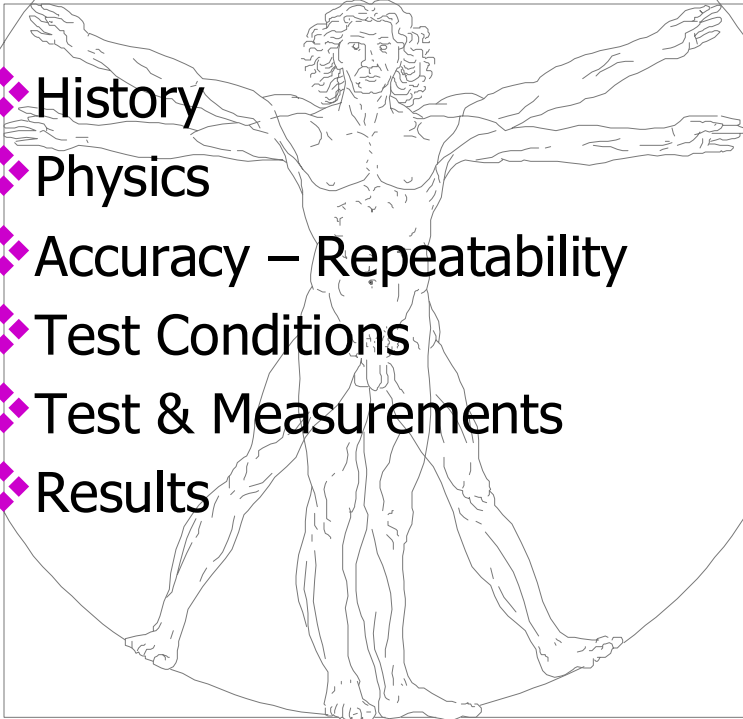
Performance measurements on chassis dynamometers

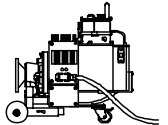


Performance measurements on chassis dynamometers

2

Contents

- 
- ❖ History
 - ❖ Physics
 - ❖ Accuracy – Repeatability
 - ❖ Test Conditions
 - ❖ Test & Measurements
 - ❖ Results



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Part 2/2, page 15-22/22

SAL-N05030802-CH2-PRI04.PDF

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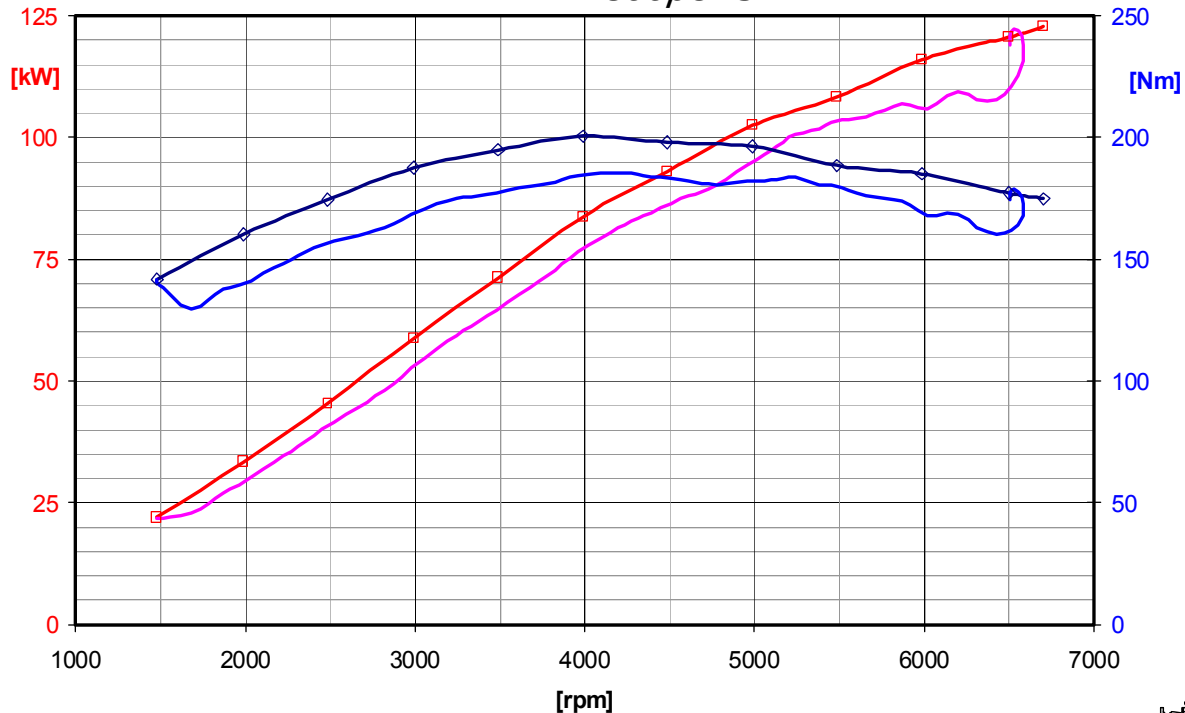


Performance measurements on chassis dynamometers

24

Results

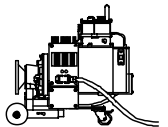
Steady state / acceleration at constant rate
Mini Cooper S



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This is a comparison of steady state vs acceleration at a constant rate. The acceleration is started at 1500 rpm and stopped at 6500 rpm. The main difference is caused by the inertia of the drive train but also the fact that the engine is running in a different way when it is accelerating compared to steady state.

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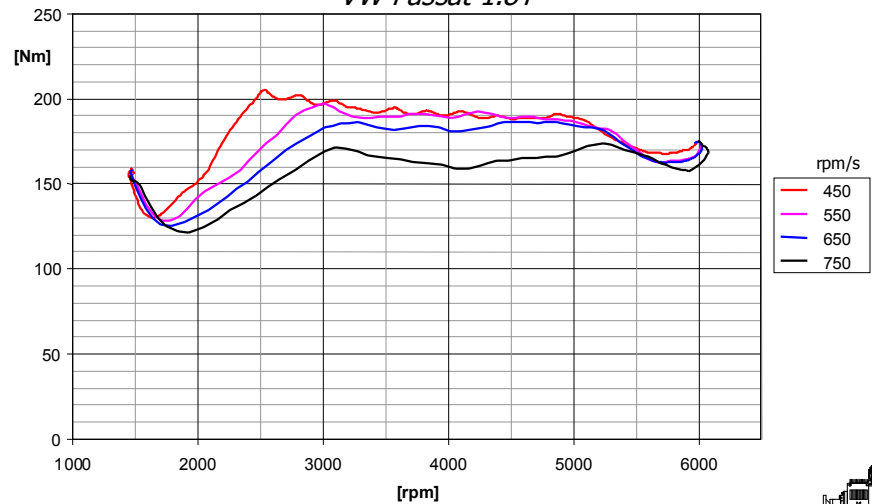


Performance measurements on chassis dynamometers

25

Results

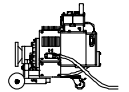
Torque at different acceleration rates
VW Passat 1.8T



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The influence is even more evident in the following figures. As the rate increases full torque is reached later and the torque available is decreased. The inertia of the drive train is reducing the available torque directly related to the rate. However it is obvious that the difference is related to other variables as well, especially if you compare the fastest rate to the others.

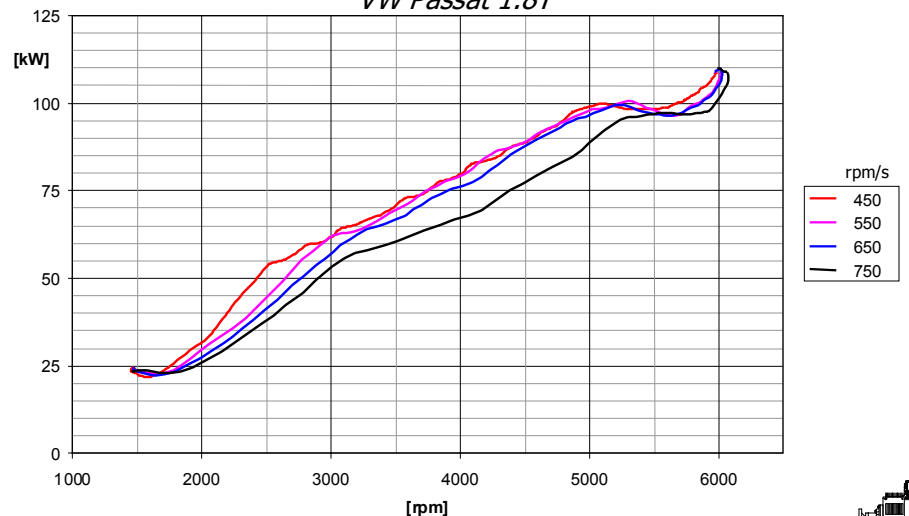


Performance measurements on chassis dynamometers

26

Results

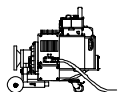
Power at different acceleration rates
VW Passat 1.8T



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27

Results

Consequences of minor power discrepancies
 Measurements of 3
 one type series racing cars
Volvo S60 racing cars 2003
 from team Ferrita Sweden
 on a ROTOTEST VPA-R5 Chassis dynamometer

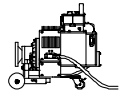
Three racecars from the same team were tested and compared. The racing class uses the same type of car and engine. Sealed engines are delivered from one source. If the seal is broken the car is not allowed to run.

First tests were made at steady state and one of the cars was clearly making more power than the other two, close to 10 hp more.

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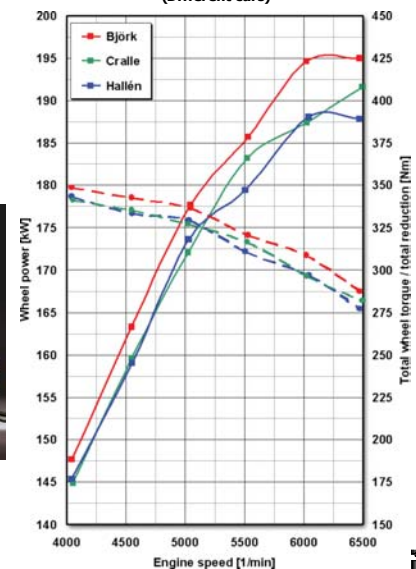
Performance measurements on chassis dynamometers

28

Results

Steady state performance
 (Different cars)

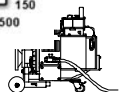
Swedish Volvo S60 Challenge 2003
 Sealed "equal" engines
 2.3 litre "275 hp"!?
 Acceleration behaviour due to
 power discrepancies?



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29

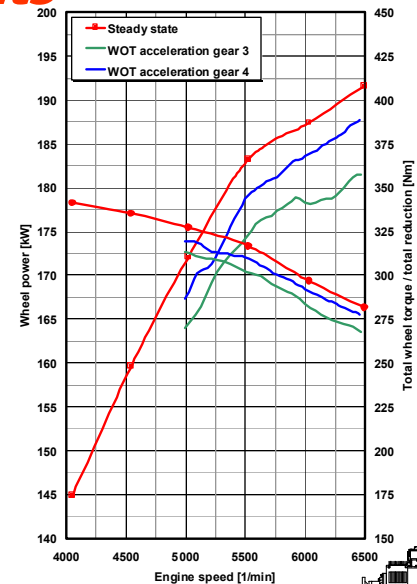
The cars were also tested during acceleration. A lower gear results in a higher acceleration, which in turn means more inertia losses. In other words, less power available on the wheels.

*Swedish Volvo S60 Challenge 2003
Sealed "equal" engines
2.3 litre "275 hp"!?
Acceleration behaviour due to
power discrepancies?*



Results

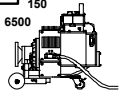
Acceleration performance (the same car)



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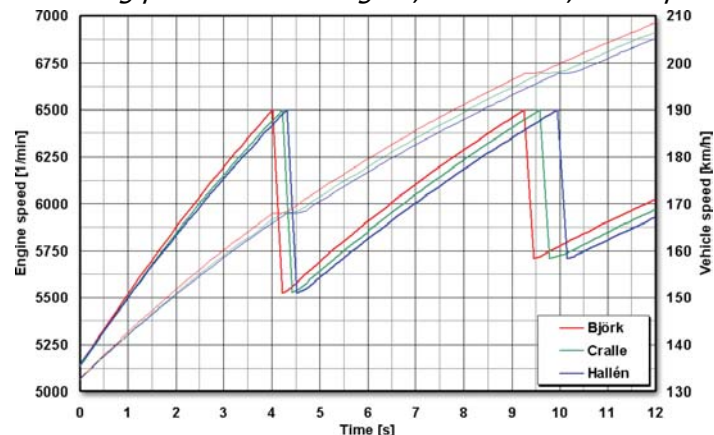


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30

Using the data from the acceleration tests acceleration was simulated down a long straight. All cars were said to have the same exit speed, shift point and shift time. As one could suspect the "red" car is faster. The important question is: How much faster and does it matter?

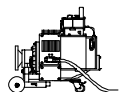
*Swedish Volvo S60 Challenge racing cup 2003
Sealed "equal" engines 2.3 litre "275 hp"
Acceleration behaviour due to power discrepancies
"Starting point 0-sec" 3th gear, full throttle, 5025 rpm*



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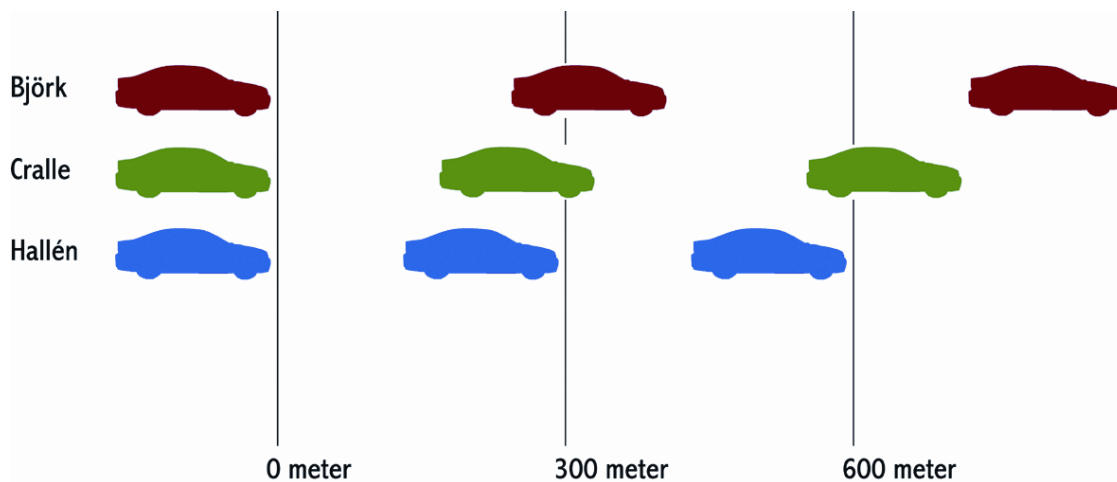


Performance measurements on chassis dynamometers

31

Results

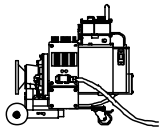
Swedish Volvo S60 Challenge racing cup 2003
Sealed "equal" engines 2.3 litre "275 hp"
Acceleration behaviour due to power discrepancies
"Starting point 0-meter" 3th gear, full throttle, 5025 rpm



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Converting the difference into distance instead makes it easier to understand how important it can be to have those last horsepower's.

If the drivers are equal in driving the driver in the red car will always win!

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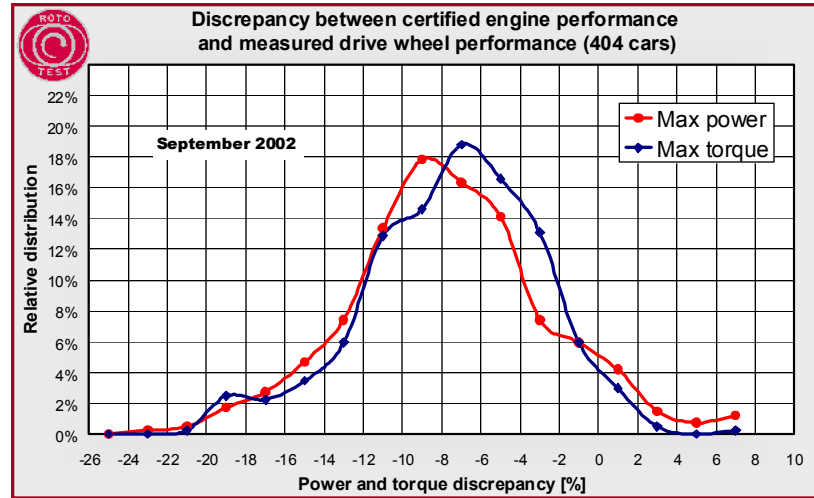
At Rototest we do a lot of testing ourselves. This means we can produce some interesting statistics. This figure shows a comparison of what the manufacturer claim in the engine specification and what we measure on the wheels. The average difference turned out to be about 7-9%, which can be said to be a good estimate of a normal transmission loss. However we have seen cars producing quite a lot more on the wheels than the engine spec says. At the other end there are examples of -25% difference too. If this were to be the losses then the oil would boil in the transmission.



Performance measurements on chassis dynamometers

32

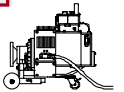
Results



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35

Results

True measurement™ Certificate of Performance

Steady state measurements with background facts on page 2

BMW M5 -02

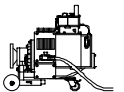


Engine	Year	Power (kW)	Torque (Nm)	Fuel (l/100km)	CO2 (g/km)
BMW M5 (E28)	1985	250	350	12.5	210
BMW M5 (E28)	1985	250	350	12.5	210
BMW M5 (E28)	1985	250	350	12.5	210
BMW M5 (E28)	1985	250	350	12.5	210
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true measurement™ 2WD &
4WD chassis dynamometers**



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36

Models from 309 kW to 1.1 MW
(420 hp – 1500 hp) for 2WD
dynamometers.

Features:

Measurement of drive line
performance during: Steady
state & Defined acceleration.

Direct measurement of wheel
torque and wheel speed with
extremely accurate sensors.

Air cooled system with
integrated test car cooling.

Portable dynamometer units on
wheels ($\leq 200\text{kg}$)

ROTOTEST VPA-R 2WD & 4WD

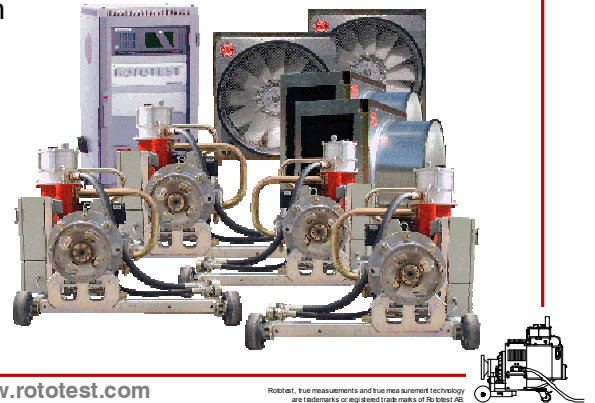
True Measurements™

- ✓ No slip
- ✓ Direct measurement of torque & speed
- ✓ Industrial direct calibration

Turn-key system

Test modes:

- ✓ Steady state
- ✓ Defined accelerations



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37

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