



AVL HYPER 200 KW/LITRE: TGDI HIGH PERFORMANCE DEMONSTRATOR

Matthias Neubauer

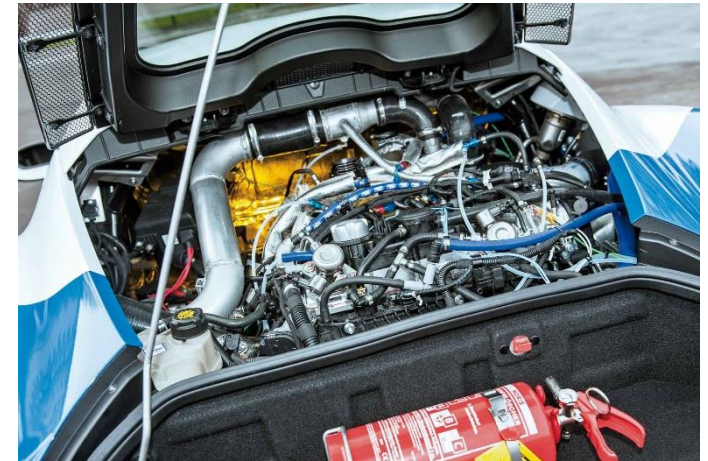
AVL List GmbH (Headquarters)

Confidential

AVL HYPER 200KW/L HIGH PERFORMANCE CONCEPT

Main aspects:

- 1.75l GDI TC Fam B engine
- Reinforced crankshaft, con rods, pistons
- New cylinder head material and cooling concept
- Updated combustion system
- New fuel injection system layout
- Revised valve train
- Bi-turbo charging with dual compressor
- Electric Supercharger (48V)
- Optimised periphery

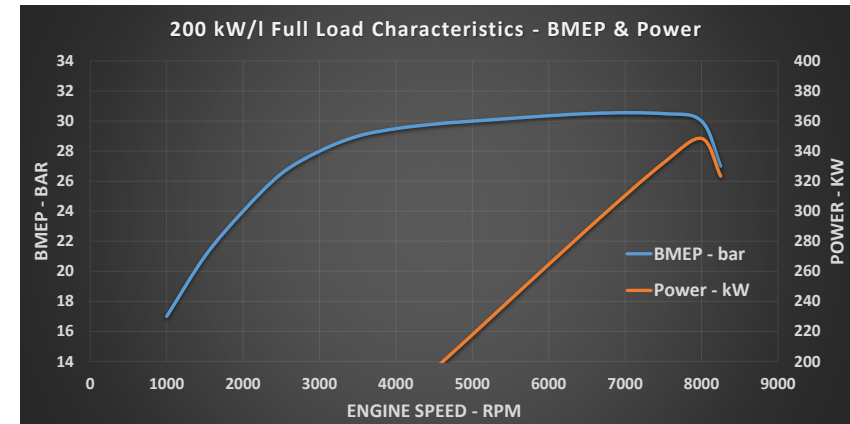


AVL HYPER 200KW/L HIGH PERFORMANCE CONCEPT

Engine Key Performance:

349 kW (474 HP) @ 8000 1/min

422 Nm (30.5 bar BMEP) @ 7000 1/min



Boost on demand (trans.)

-eSC 48V (post TC)



Main CAC

Air charge cooling

-Air, water, iCAC

interstage CAC

Compact EX manifold

Bi-turbo

- 1 stage expansion FG-turbine
- 2 stage compressors (HTT)
- Interstage cooling (LT-circ.)

Catalyst EU6

- Double brick, increased cross section for low pressure drop

SPECIFIC POWER VS. GLOBAL PRODUCTION VOLUMES - TGDI

Realised Engines and Vehicles (confidential Projects not to be named):



V

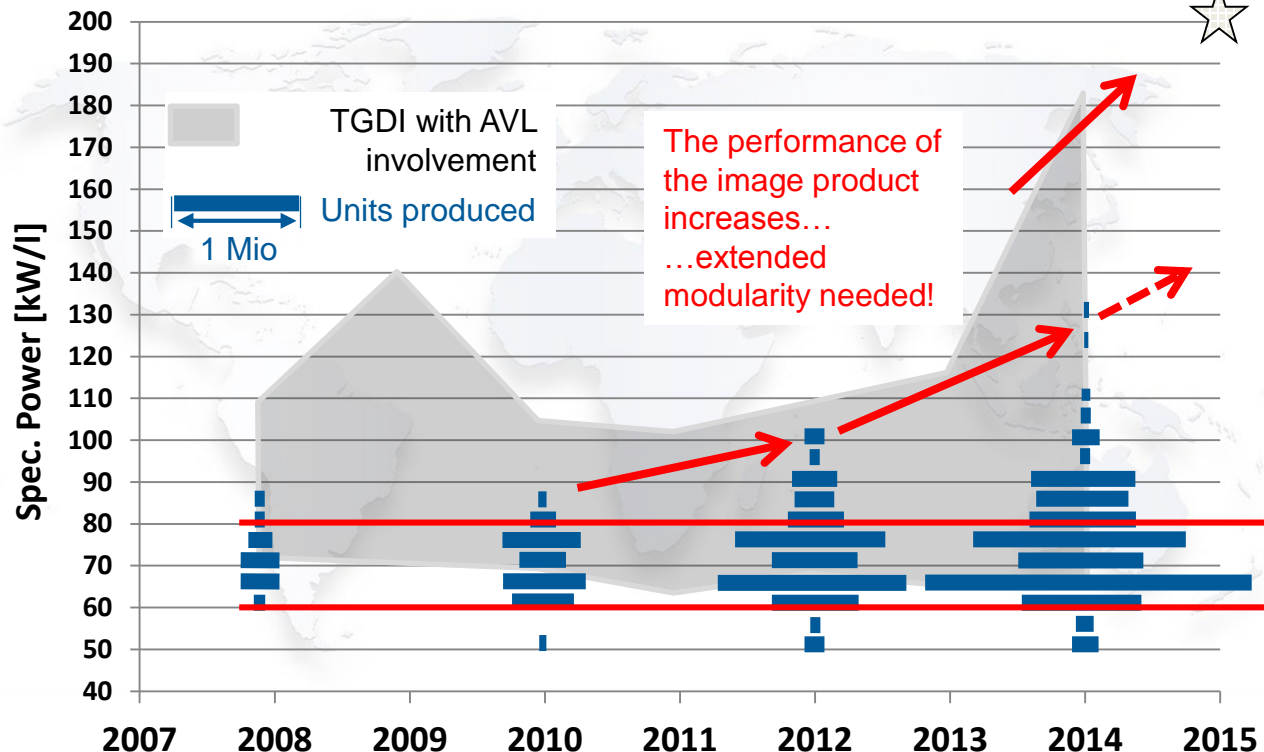
W

X

Y



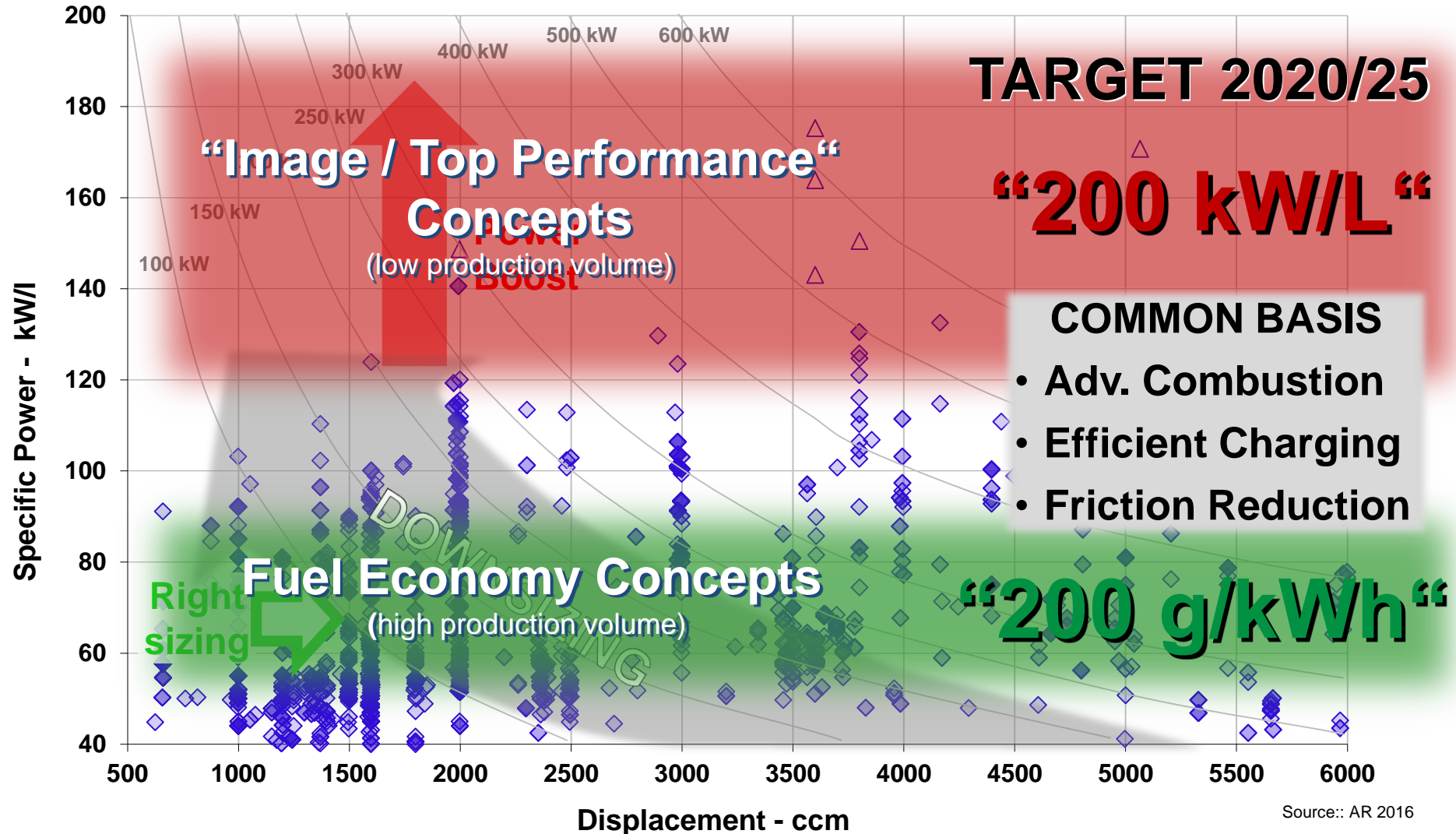
AVL Demo Car
200 kW/l



The mass market stays between 60 and 80 kW/l

Over the years, the specific power of high performance engines clearly increased. AVL's latest demonstration vehicle pushes the limit up to 200kW/l specific performance, respecting production constraints.

EVOLUTION OF FUEL ECONOMY TECHNOLOGIES WITH GASOLINE ENGINES



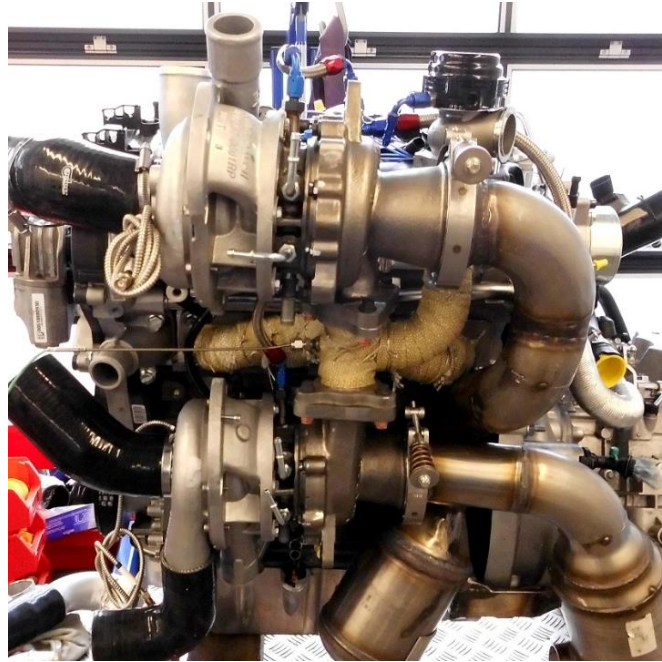
In order to combine both efficiency and top performance engines in one engine family, the base engine needs to support mechanical robustness on the one hand and low friction on the other hand respecting boundaries and interfaces of a given production line.

REALISED BOOSTING SYSTEM

Honeywell Bi Turbo charging
with series compressors



Honeywell 48V E-supercharger



The realised boosting system consists of two parallel exhaust gas driven turbo chargers with two stage compressors, each to provide the required boost pressure with a good overall turbo charger efficiency. A 48V E-supercharger supports low end torque and transient response.

VEHICLE MODIFICATIONS

Increased Radiators



12V Battery



48V System



Heat Insulation



Air/water
charge air
coolers



The vehicle cooling system was upgraded to meet heat rejection requirements for both the low and high temperature coolant circuits.

The 12 and 48V energy storages and the DC/DC converter are located in the front in order to achieve the targeted vehicle's weight distribution.