



Note 108B

Recent increase in Naturally-Aspirated (NA) Peak Power BMEP (BMPP)

Over the 8 year period of the 2.4 Litre NA formula from 2006 to 2013 a typical Grand Prix engine BMPP rose from about 14 Bar to about 16 Bar. This important increase was stimulated by the imposition by the FIA of limits to the permissible "Red Line" RPM. In 2007 this was 19,000, reduced to 18,000 in 2009

This Note analyses – mostly in qualitative terms – how the increased BMPP was achieved by Cosworth. The basic data was given in Race Engine Technology issue 73 of September/October 2013 (DASO 1107). The power figures are taken from the published chart and vary slightly from a previous source (DASO 1070).

Development of the Cosworth CA series from 2006 to 2013

90V8 Bore (B) 98 mm/Stroke (S) 39.77 = 2.464 Swept volume (V) 2,400 cc

2006 Series 6 Unlimited RPM

Peak Power (PP) 750 BHP @ 19,000 RPM (NP)

Peak Power BMEP (BMPP) = 14.72 Bar @ Peak Power Mean Piston Speed (MPSP) = 25.19 m/s.

2013 Series 19 Max. RPM (Red Line) by rule 18,000

PP 768 BHP @ 17,250 RPM

BMPP = 16.60 Bar @ MPSP = 22.87 m/s.

There was therefore +12.8% BMPP at -9.2% MPSP.

On the CA.6 Power Curve, if the RPM had simply been pulled back to 17,250 RPM the value of PP would have been 700 BHP and BMEP 15.13 Bar (+2.3% above 14.72, which would mostly have been gained from lower friction). So development produced an extra 768 – 700 = 68 BHP (+9.7%).

Identified changes from Series 6 to Series 19.

Grouping the identified changes:-

Retuning to lower RPM

- Longer inlet trumpets
- Revised cams
- Exhaust changes

+ Volumetric Efficiency

- Larger airbox ("snorkel")
- Inlet valve lift increased from 16 mm to 17 = +2 HP

+ Mechanical Efficiency

- Reduced crankcase pressure; depression increased from 125 mBar to 425
- Reduced oil flow
- Lower viscosity oil
- Oil run hotter; +10°C
- Improved oil (Castrol) = +3.5 HP

Other

- Improved BP fuel = +5 HP
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