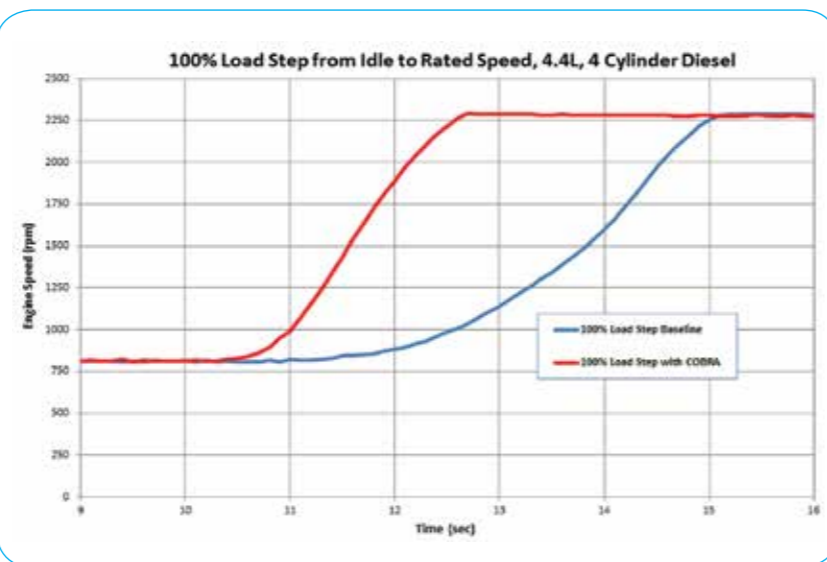


COBRA Performance

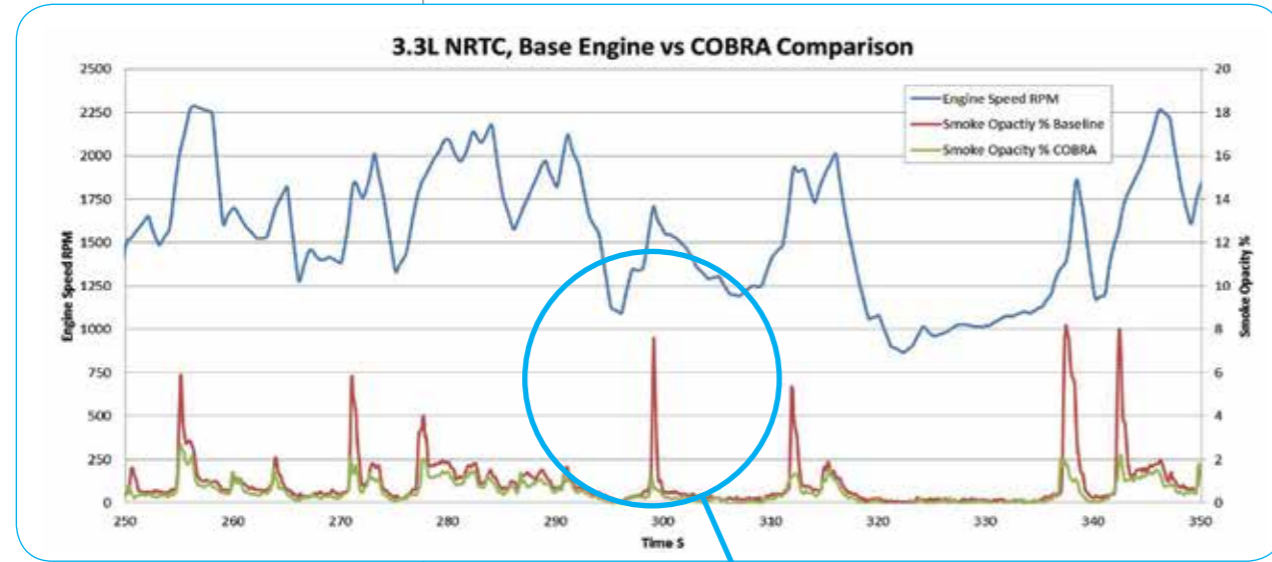
Off Highway application - Excavator

- Example shows transient load step.
- Transient response time from low idle to rated speed reduced from 4.5s to 2s, (55% reduction).



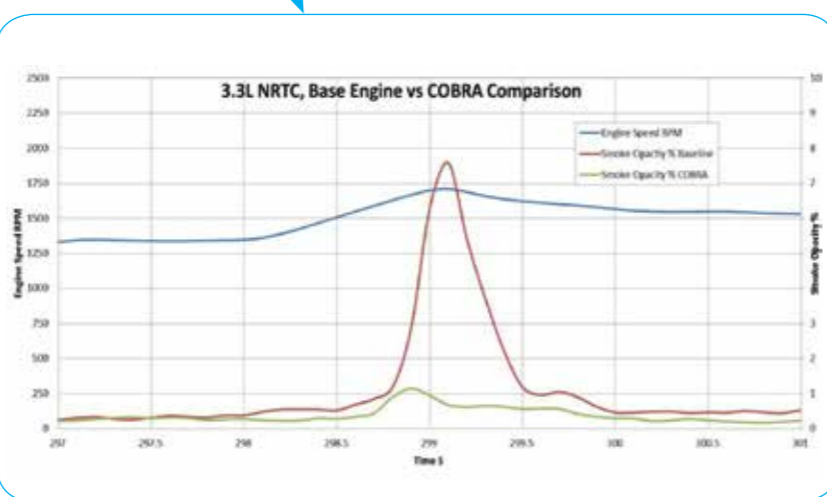
Off Highway application - Tractor

- Example shows partial NRTC.
- Most acceleration generated smoke spikes are virtually eliminated.
- Ability to drive the NRTC cycle is greatly improved due to reduced time spent operating on the smoke limit.



Off Highway application - Tractor

- Highlighted partial NRTC.
- Smoke opacity reduced from 7.5% to 1%, (86% reduction).



CPT COBRA

Water Cooled Electric Supercharger



Based on 3 machine configurations using a 6/4 Switched Reluctance (SR) motor.

- Range of standard compressors and volutes – C70, C80 & C88. (bespoke designs easily catered for).
- Range of voltage – 12/24/48 (alternative configurations can be considered).
- Flexible mounting strategy can be chassis or body mounted.
- Designed to meet relevant ISO test standards.

Liquid-cooled system offers several advantages over a ducted or forced air design.

- Provides a stable environment for power silicon devices.
- Eliminates dirt and water ingress to rotor – unlike traditional air cooled devices.
- Simpler packaging without the need to seek cool air from the front of the vehicle.
- Integrates to main engine coolant circuit – 90 Deg C @ 6 l/min.
- No maintenance sealed for life bearings.

Low inertia and high speed

- Designed for fast transient response.
- Suitable for both NA & TC applications.

Integrated control & power electronics

- All electronics built into a sealed housing on the rear of the machine.
- Significantly reduced electrical losses and improved EMC.
- Monitors and controls against over speed & over temperature operation.
- Communicates with vehicle systems over CAN.

COBRA

Controlled Boosting for Rapid response Applications

A fully integrated electric supercharger including all control and power electronics.

By supplying instantaneous on demand air COBRA is an enabling technology which can support a number of CO₂ and emission reducing solutions.

COBRA compliments engine downsizing by supporting the low end torque gap allowing for the same drivability as a larger powertrain.

COBRA's on demand over boost enables the use of down speeding, longer gearing and a simplified transmission to provide the same fuel cost benefits.

The increased airflow delivered by COBRA not only improves acceleration and response times it also provides the ability to maintain the correct Air-Fuel ratio at key points to avoid transient smoke limit.

Design Specification	COBRA C70-C88
Maximum Speed	70,000 rpm
Power Range	~2-9 kW
Peak Pressure Ratio	1.45
Mass Air Flow Range	150-750 Kg/h
System Voltage	12v, 24v & 48v
Machine Weight	~8 Kg
Machine Length	~192mm
Power Electronics & Control	Integrated



Switched Reluctance (SR) Technology

COBRA was designed to use SR motor technology from the outset. Development work carried out over a period of years has enabled CPT, in conjunction with class leading SR specialists, to develop a very robust, low inertia & thermally stable unit. The switch reluctance technology offers simple motor construction, accurate control and high power density/ efficiency over a wide speed range. This technology is also 'rare earth' metal free which brings reduced costs and is less harmful to the environment.



COBRA Applications and Benefits

Commercial Vehicle > 3.5 Tonne

- Torque increase and transient response equivalent to twin turbo system.
- Greater controllability and reduced complexity when compared to twin stage turbocharging.
- Typically enables 5-10% CO₂ reduction in conjunction with engine down-sizing strategies.
- Designed to achieve IP67 rating.



Emissions Control Application

- Delivers very rapid and precise transient air increase for particulate control.
- Low pressure EGR pump opportunity for part-load NOX control.



Off Highway Applications

- Allows effectively fixed speed machines such as Excavators and Skid Steer loaders to better handle transient loads without resorting to wastegated or variable geometry turbocharging.
- Can give lower rated engines the required torque to displace higher ratings in most applications bringing a cost and CO₂ reduction benefit.



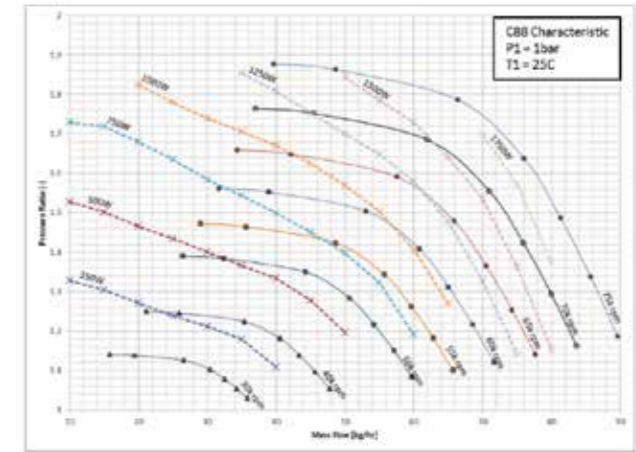
CPT COBRA Water Cooled Electric Supercharger Family



C88 – High pressure ratio low flow Suited to:

- Exhaust after treatment systems – post DPF/ SCR EGR.
- Fuel cells.
- Air pressure up lift.

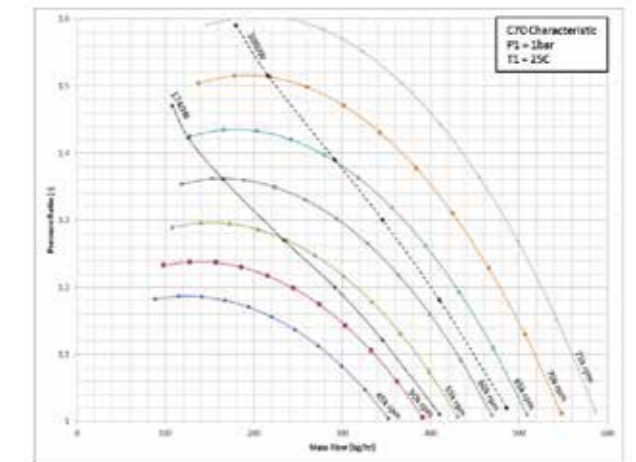
COBRA C88 Characteristics



C70 Suited to:

- TC or NA engines with a displacement of 2L to 7L.
- Mass flow range 100 – 300 Kg/ hr.

COBRA C70 Characteristics



C80 Suited to:

- As C70 but higher mass flow rates.
- Mass flow range 300 – 800 Kg/ hr.

COBRA C80 Characteristics

