Black smoke heralds a change at Le Mans

Taurus Sports, a Norfolk based team, ran the first diesel at Le Mans for 50 years.

Its sound was hardly war-like and it did belch out the occasional black smoke but it may well have been the future of endurance racing. The first diesel to enter the Le Mans 24-hour race for a half century was not the trumpeted Ricardo design, nor one of the rumoured projects from Audi and GM but a "shoe string" entry from Taurus Sports, a Norfolk based team run by long distance stalwart, Ian Dawson.

Volkswagen V10 TDI PD

With current Le Mans regulations allowing greater restrictor area and greater boost pressure for compression ignition (CI) engines, Taurus removed a 5.0-litre TDI PD V10 from a Volkswagen Touareg, liased with another British firm, Mountune, now part of the Roush empire, as its engine partner and married it to a Lola B2K/10 chassis. Mountune had already carried out design studies on racing diesels.

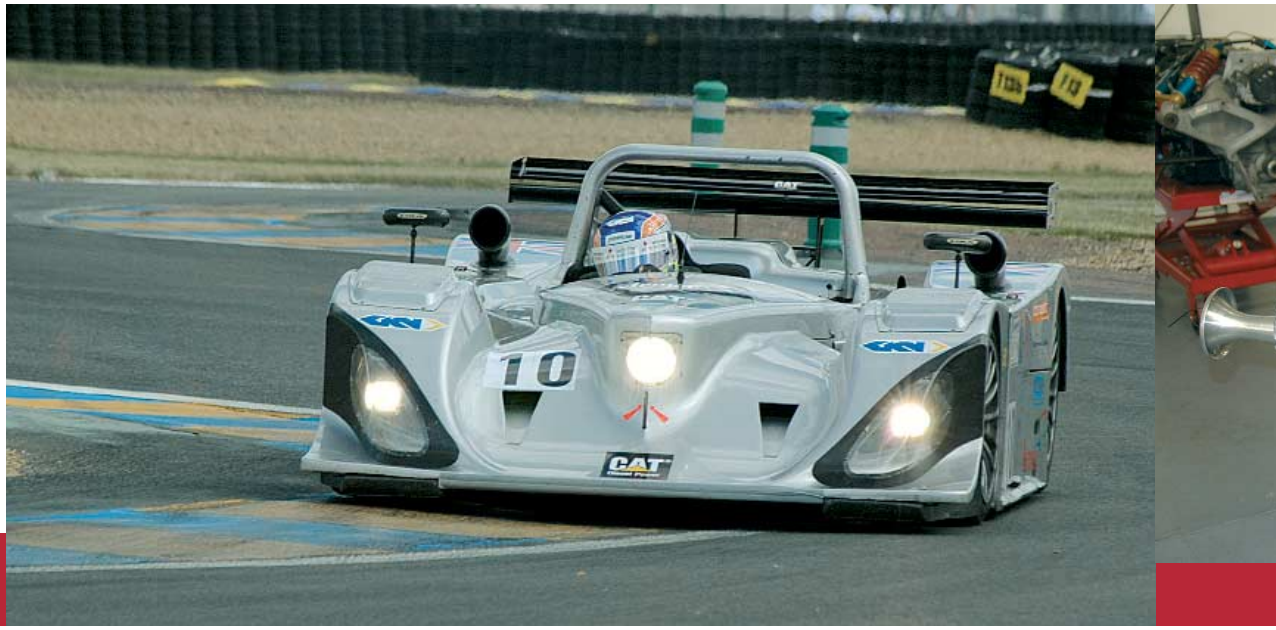
The basic engine was considered fine for the task, given the limited time available. However, a new dry sump installation was designed, one-eighth the dept of the original dry sump.

While the car only managed just short of three hours at this year's Le Mans, Dawson is upbeat about its future. Throughout the whole of the week the engine ran trouble free and it was only the demands it placed on the clutch that caused it problems. The Lola eventually managed to run 16 laps without a pit stop; Dawson believes it could have gone 17. Compare this to the 11 of the front running Audis.

There is a plan, money permitting, to convert the car to comply with the new LMP1 specifications, which will enable the team to replace its 80-litre tank with a 90-litre version. "If the car could run for 20 laps with sub-four minute laps then we begin to make sense of what diesel can do," says Dawson. However, there is more to it. "You can build a vehicle that can go a long way between stops but you need a tyre that can still double stint and disciplined and fit drivers who can run more than two and half hours at a certain pace."

Caterpillar to code the engine management

Last year, two months into the project, assistance was sought from Perkins, now part of Caterpillar. The result was that the latter, the world's largest manufacturer of diesel engines, agreed to provide technical support in return for the badging



The Lola-Caterpillar ran 35 laps prior to clutch failure.

rights to the engine. “We wanted a diesel partner to cast its eyes over what we were doing,” recalls Dawson. “All credit to them, they’ve done a lot more than that. Electronically and fuel management-wise it was all Caterpillar controlled. They’ve got some very sophisticated knowledge.” The Touareg’s Bosch ECU is rights protected and so Pectel hardware was used enabling Caterpillar to code the engine management strategies.

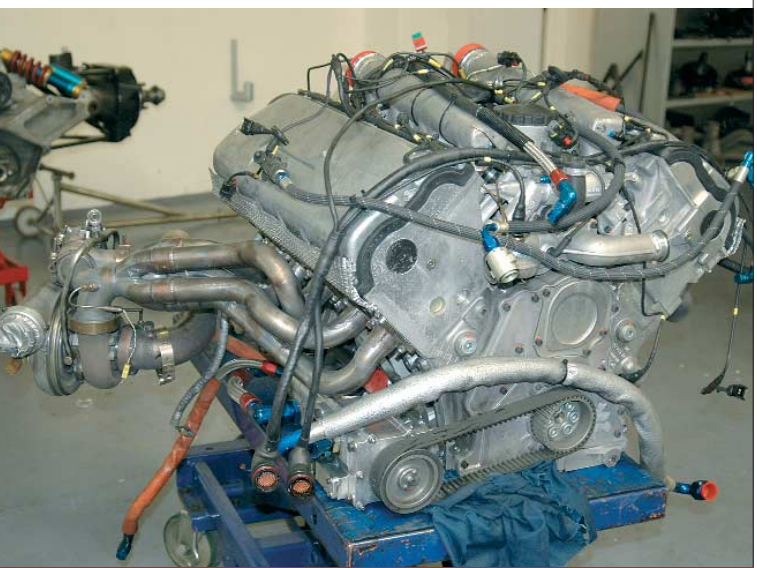
Caterpillar additionally advised that the original pistons had the dome in the centre of the combustion chamber machined to reduce the compression ratio. Working with Caterpillar also meant a closer relationship with Garrett who supplied the twin turbocharger.

The Touareg engine was immensely strong and used no oil. The limit, states Dawson, is what type of transmission can handle the torque and how much of that can be put to the ground through the tyre. Thus the engine was been limited for the race to a maximum torque output of 800 Nm.

And the black smoke? When the driver comes off the throttle and then back on again some is certainly emitted. Dawson points out that the team is running with normal diesel fuel with no additives. There are areas where diesel road car development could benefit from the project. He points to the use of the filters that are used to collect particulates at low rpm.

Endurance racing is about finishing and that means compromise. For example, during flat shifting through the gearbox severe torque spikes are experienced. To overcome this the power had to be reduced. Following a clutch problem in practice the engine was also re-mapped to a much lower power figure nearer to 400bhp than the 520bhp previously seen. This resulted in an improvement in throttle response and in getting the car out of the slower corners. However, this again increased stress on the clutch.

Had the team been able to use a carbon clutch – with a theoretical torque capacity of 1,300 Nm - as originally envisaged, Dawson feels that it could have run “a lot longer.” However, the team’s only carbon clutch failed during practice; a mystery “even to (supplier) AP.” (iw)



Post-Le Mans and the diesel engine is being prepared for its next race.