

# **Bruce & Sean Buchanan Buchanan Automotive Independent Porsche Repairer**

Working on Porsche Cars since 1977 and in the last 11 years, 12 hours a day, 6 days a week as an Independent.

**Here are some interesting observations we have seen in the last 12 months with 928 and 944 models, particularly the Twin Cam Engines, showing signs of unusual engine wear.**

In the last 3-4 years we have been reading reports in the American, but mainly the English Porsche magazines (Independent), about excessive wear of the camshaft lobes and the sprockets which are part of the camshafts where the single row cam chain runs. If the sprockets wear out then its new camshafts etc and if the lobes are worn too then a complete set of lifters is required as well. Plus they mention the hydraulic tensioner slippers and at times excessive wear of the V8 engines thrust bearings.

We too have seen a small amount of unusual wear on the top ends, but in all cases the engine oil that was drained was very thin and when asked, the owners confirmed in each case that the engine oil used was a viscosity of less than 10w-50.

By comparison we have seen and inspected hundreds of 944 single and twin cam, 928 single and quad cam engines top ends, over many years and in cases where after 15-20 years of heavy high temp city work the engines have been removed and dismantled to replace all seals and gaskets, they have been running on a 15w-50, 20w-50 or 25w-50 oils, there is no wear at all, and at worst a couple of worn valve guides at 200,000 km+.

## **Crankshaft Thrust Bearings**

We have been checking flywheel/or drive plate end float and have yet to see any that are worn at all, and I am talking 150,000 km, 250,000 km and in 2 cases 275,000km plus. So far we have checked over 57 different 928 models for excessive end float in the last 18 months and have seen none worn (using normal oil). Of the 57 all have been running on either a 20w-50 or a 25w-50 engine oil or a 15w-50 semi synthetic.

3 others (60 in total) inspected have slight to moderate wear, and all 3 are the 3 which have been running thin engine oils for over 60,000 kms.

## **Killing urban myth No.1**

When I was working at a Porsche Authorised Dealer, we were using in 911, 928, 944 models Valvoline (Turbo V) now called Formula GP50. In my opinion this oil is extremely good in the 911 3.3 turbo, 928, 944 & 951 944 turbo vehicles. It is a high performance oil that does not leave behind burnt residue or varnish and when I left the Porsche dealer in 1994 to start my own Porsche Repair business they were still using it. This oil is appropriate for engines of that era.

So to recap, on all Porsche models we only use at the Authorised Dealer 25w-50 oil and it gives excellent result for our high temp summers and moderate winters here in Sydney Australia up to year models 1991 911 928 & 944 and in particular the Turbos.

1992 models onwards were using a semi synthetic 15w-50 which works well, but with the concern about thrust bearings running on thin oils now better understood.

## **Killing of urban myth No. 2**

Thrust bearing wear on crankshaft main bearings (1 pair). The Automatic Torque Converter can not push the Torque tube drive shaft forward, because if you dismantle one like I have many times you will see the 928 3 & 4 speed auto have 2 flex plates, one at the rear with the auto and one at the front with the drive plate.

The one at the rear (on auto) is in its own bell housing and is mounted on a large diameter shaft that is mounted on bearings and within the bell housing the shaft and bearings are all mounted and secured with large circlips. The bearings, shaft or anything for that matter cannot move forward or back, only its flex plate can move slightly 'as it was meant to'.

What does happen is that the single hex bolt that tightens the coupling at the point where the torque tube meets the auto, stretches over time and must be tightened regularly, which we still see can be overlooked where the vehicle been maintained by the owner only.

If it becomes even slightly loose the drive shaft within the torque tube always moves forward over time, it can not get up enough tension to damage the thrust bearings in the engine if the viscosity is 15w- 50 or above at an average ambient temp of 22° C + or - 10°C. Remember the thrust bearings which is a pair of main bearings where the oil is coming out of the main bearing to go back into the sump, there are huge grooves cut into it to get the oil out. This means there is little or no engine oil pressure being exerted onto the very bearing face that has on some engines worn out (thrust bearing surface not main bearing surface). So with little oil pressure in this region the oil must have a viscosity above a certain level to give long life. This wear does not happen overnight it takes time. (The thickness of the oil is the bearing so to speak!) The manual version should be the one with thrust bearing wear problems, because with a 1.3 tonne pressure plate pushing the flywheel in and with the clutch depressed, the pressure against the thrust bearings is considerable. One customer 's car springs to mind and its been running GP50 all its life. A 1990 928GT with at present 261,000 km and with 90% of it's working life in and around the city and suburbs and how many operations of the clutch over all those kms and years of operation? This car is a prime target for checking thrust bearing wear and guess what = NO WEAR AT ALL. Just ask the owner.

## **Top ends of Engines**

As for the wear on cam sprockets and cam lobes, with an oil with viscosity suitable for the vehicles age, we do not see any wear in these engines if for an ambient average temp of 22°C + or - 10°C they use an oil of at least 15w-50. It is now very clear to me after working on more 928 models than just about anyone else I know or heard of, we have seen no wear on engines running max viscosity oil for the given ambient temp or even a bit higher.

But we are seeing, like other repairers around the world, engine wear that when investigated is either associated with extended oil change intervals or using a too thin oil or both. The damage is very expensive to fix and should not happen.

## **More examples**

**1.** A customer from the Northern Beaches Sydney purchased a 1988 928 S4 a couple of years ago from an Auction cheap, or appeared cheap, until he realised it was in need of a lot of work.

He drove his vehicle for at least 3 months with a leaking radiator 'his choice, not mine'. Finally he turned up with steam coming out of the exhaust pipe. I knew then he had cooked it and blown a head gasket or gaskets. He then drove home on 7 cylinders and we found out later he drove it on 7 cylinders on short trips for another 2 weeks.

*Finally we removed the engine and when draining the engine sump only foam and then at least 2 1/2 litres of water came out. I thought then 'well this engine is finished'.*

Sean and I dismantled the engine and cleaned all the parts and inspected. I was amazed that there was no wear evident on the cams or sprockets for the chains (half way down the heads) or cylinders, pistons or crank journals. Even the thrust bearings were OK. The head gasket had blown on Cyl. 5 (he was pouring just water in every day to top up). Water was pouring down into Cyl 5 as he was driving it and into the sump etc and out the exhaust.

The owner wanted to spend the absolute min amount so it got heads every so slightly machined and new gaskets and seals and reassembled - bare min as requested and is running very well to this day.

By the way this engine was running on Valvoline formula GP50, how it survived this punishment is beyond me. Even Cyl. 5 was in good condition. Piston no. 5 and rings were in good condition.

**2.** Seven years ago another customer owned a 1986 944 (single cam). Before I met him or knew his car, he destroyed the bottom end of his engine at Eastern Creek Raceway. He informed me it only took 1 ½ laps and then bang. He then informed me after I asked the question what type of oil was in it and was the level too low. The answer = oil level good, viscosity less than 10w-50.

**3.** Same year model different owner. A customer from Wollongong with a 944. He does heaps of fast hard driving around Wakefield Park Raceway and over the last couple of years well over 200 laps, no engine problems at all. The oil Valvoline Formula GP50

#### **4. Interesting notes made recently:**

- Customer's car 2 weeks ago Engine = 928S4 quad cam 1988 year model. Came in with noisier than normal top end. Oil pressure gauge reading 1.5 bar at idle and in gear (auto trans). 1.5 bar = 21 psi = too low. Ambient temp = 28°C (air temp) Engine temp normal (indicated) Oil temp 101°C. Engine running for over an hour in typical city slow/stopped traffic. Connected external oil pressure gauge to check. External gauge indicated = 20psi = too low. Oil warning light flickered and came on if idle motor - disconnected to bring idle down for a few seconds. Overall not good and this car was using very thin oil.
- Changed oil and filter with Formula GP50 Obtained engine oil temp after road testing and idling as in city traffic.
- Ambient temp now 29°C Oil temp 100-101 °C Engine in gear at idle Oil pressure indicated 2.4 bar = 33.6psi = good Oil pressure on external gauge same Could not get oil light to come on even with low revs for a few seconds (idle motor disconnected) Engine noticeably quieter.

**5.** When I was on a Porsche Factory Training trip to Germany in 1992, I was with other Porsche technicians. On one occasion I discussed successes and failures with Porsche engines over many years with one of the engine training teachers. He stated most failures were usually of a minor nature on either air or water-cooled vehicles. But when the subject of camshaft breakages was discussed due to the lack of tightness of the retaining centre bolt, the trainer mentioned the suspect early signs of thrust bearing wear of some engines along with big end failures of S4 engines used on race tracks. The throw away remark he made was use a thicker oil, 'I thought at the time interesting'.

**6.** Ian Hamilton (Porsche Repair Specialist, now retired) who for many years prepared many modified 911 engines for either street or mainly track work only ever used Valvoline Formula GP50 with good reason.

**I only know what I see and experience from stripping down, rebuilding these engines and getting my hands dirty. There is a lot more that I can write about the subject, but this is enough and the subject is now closed forever from my point of view. Everyone is free to 'choose as you will'. You are all of voting age.**

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**P.S.**

*In the late 1970's I and a friend had a Ducati 900 & 750 SS Bevel drive v twins respectively and we found out quickly that if you ran a multi grade oil even a 20w-50, the top end just goes to scrap in no time at all. Use a straight 50 grade racing oil and those engines of that era ran well. It just occurred to me that these engines and the Porsche water cooled engines were all of the same era.*

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