

Nissan ZD30: MAF Sensor Causes Piston Seizure

AHS recently rebuilt a Nissan ZD30 3.0L, Non-Common Rail Diesel long motor out of a 2007 Nissan Patrol. Nothing out of the ordinary, however, an often overlooked part meant that this engine had a very short lifespan.

The customer had removed the engine and sent in the long engine for reconditioning. The engine was fully reconditioned with new pistons, re-bored, new cylinder head, new injector pump and injectors. The engine was fitted to the vehicle by the customer with a new turbo, and returned to the owner.

After 600 km the engine had seized. The customer stated that the coolant temperate gauge did not go over a ¼, and did not show any issues prior to stopping. The engine was removed and returned to AHS for inspection.

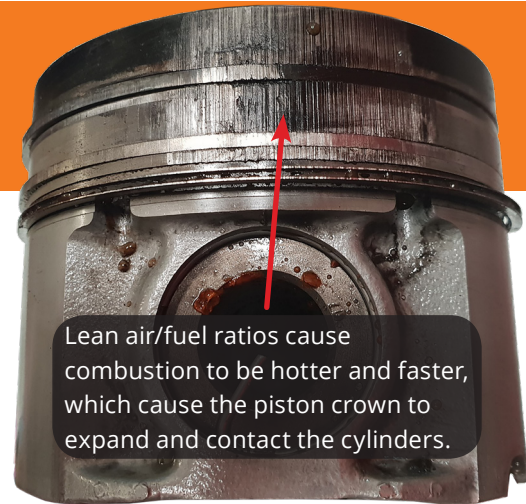
It was found that the pistons had grabbed on the ring land area (see picture above), and the bores were blue and cracked through the centre of the bores. The injector pump and injectors were tested independently and were both within specifications. The customer had the radiator and cooling system checked and the water pump and thermostat had been replaced when the reconditioned engine was fitted. All good so far.

AHS then had the Mass Air Flow (MAF) sensor removed from the vehicle and sent away for independent testing. The test report showed that the MAF sensor failed on all but 2 steps of the 10-step test, with only the idle and just above idle tests passing. The analysis showed that the higher the airflow, the leaner the engine got. This explains why the vehicle ran fine on relatively flat going and part throttle and failed under load

on a high throttle percentage while climbing a slight hill.


This engine uses the hot wire type of MAF sensor. The ECU heats the wire with a current it supplies. As the intake air flows past this wire, it will cool down, so more current is required to maintain the temperature. The ECU senses the change in current, which relates to the volume of air entering the engine. For this the ECU can then work out the amount of fuel to inject for the optimum air-fuel ratio.

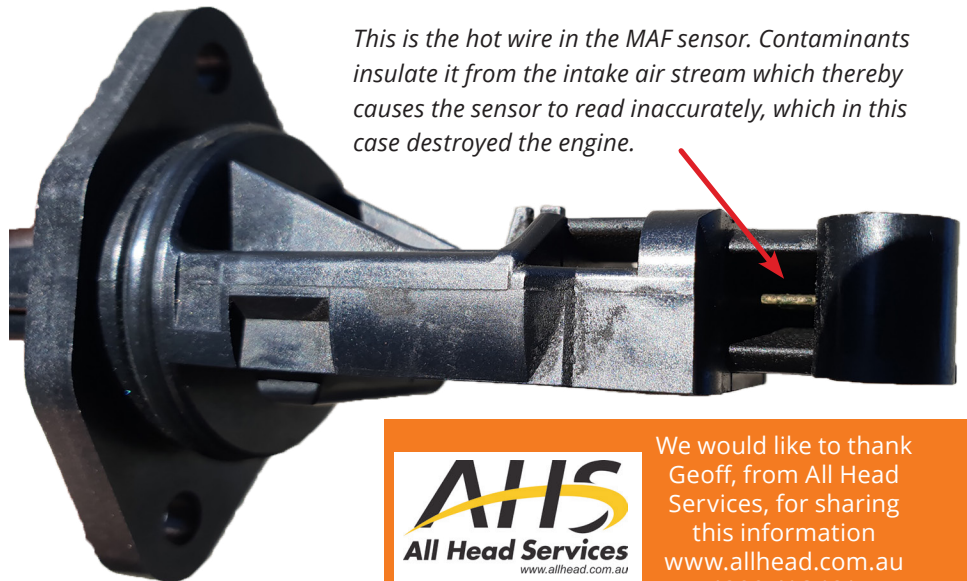
As these sensors age, some contaminants get burnt onto the hot wire and insulate it. This gives the ECU the impression that there is less air entering the engine than the actual volume. So running at full turbo boost, with not enough fuel delivery causes excessive combustion chamber and piston temperatures, which caused the ring lands to grab on the cylinders. The airflow meter in the ZD30 can also be attributed to the cracked pistons that these engines suffer from.



Lean air/fuel ratios cause combustion to be hotter and faster, which cause the piston crown to expand and contact the cylinders.

Contaminated MAF sensors often do not log fault codes, even though they are not sending an accurate signal. It is common in the trade to clean MAF sensors, however, cleaning rarely brings the sensor back to 100% accuracy. It is recommended that a new sensor be fitted.

This example shows that it is not just the major components that need replacing when fitting a reconditioned engine, but all sensors must be inspected for the correct engine operation. In this case, a relatively inexpensive part caused a very expensive rebuild. 



This is the hot wire in the MAF sensor. Contaminants insulate it from the intake air stream which thereby causes the sensor to read inaccurately, which in this case destroyed the engine.

AHS
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We would like to thank Geoff, from All Head Services, for sharing this information
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