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# TECHNICAL REPORT

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| **VEHICLE MAKE:** | Mercedes Benz | **REPORT DATE:** | 12th December 2011 |
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| **REG No:** | XXXXXXX | **LOCATION:** | XXXXXXX |
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| **INSURED:** | XXXXXXX | **CLAIM No:** | XXXXXXX |
| | | | |
| **INSURER:** | XXXXXXX | **CONTACT** | XXXXXXX |

Dear Paulo,

As per your instruction, I inspected the above vehicle at the premises of XXXXXXX to ascertain the cause and extent of the damage caused to the engine of the vehicle.

**General:**

The vehicle has covered 42,000 kms and apart from the damage sustained was in very good condition.

The vehicle had been towed to XXXXXXX from the Eastern Cape where the incident took place as there were better facilities in Johannesburg to deal with the serious damage that the engine has suffered.

**Accident damage:**

As can be seen from the picture on the right above, the vehicle has collision damage to the front right hand side which includes the front bumper, supports, trims and stiffeners, the radiator, the oil cooler, the air conditioning evaporator, front right fog lamp and various ancillaries relating to these components.

The damage seen is consistent with a collision as described by the Insured, which is that he claims to have hit a truck tyre carcass that was in the road. The quotation from XXXXXXX for the repairs to

the damage described above is in the region of R230k, which seems in order for a vehicle of this nature.
The most relevant damage to the front end of the vehicle as far as engine damage is concerned is that of the engine oil cooler and its related pipe work.

**Diagnostics:**

Your instruction remarked on the data stored in the vehicle's on board diagnostic system. The vehicle arrived at XXXXXXX with a flat battery and very obvious damage, so the technicians there had not deemed it necessary to run a diagnostic check until the engine damage had been attended to.

The type of information stored in the XXXXXXX diagnostics system in a passenger vehicle like this differs from information usually obtainable from many commercial vehicles in as much as commercial vehicles diagnostics are more designed for driver monitoring and include trip data as well as information that would assist in engine / transmission fault diagnostics.

The workshop foremen XXXXXXX, was extremely helpful and was happy to arrange an external power supply in order for us to carry out a XXXXXXX diagnostic check on the vehicle.

As the engine had been removed, it was to be expected that many errors would appear as "current" i.e. that the diagnostic system would determine that components were disconnected.

The relevance of the test for our purposes was to determine if the warning systems on the vehicle were working prior to the failure of the engine.

The test revealed that all systems on the vehicle were operating normally and it is safe to assume that as there were no erratic faults stored, that the vehicle's on board systems were functioning correctly prior to and following the collision.

**Engine damage:**

Upon arrival of the vehicle at XXXXXXX, the technicians attempted to start the engine. XXXXXXX who was present at that time, informed me that although the engine fired on some cylinders, it would not start and in his opinion exhibited symptoms of having low or no compression in the majority of its 12 cylinders which lead to the decision to remove the engine for further examination.

The engine had been removed from the vehicle and partially stripped when I arrived at the Cargo workshop.

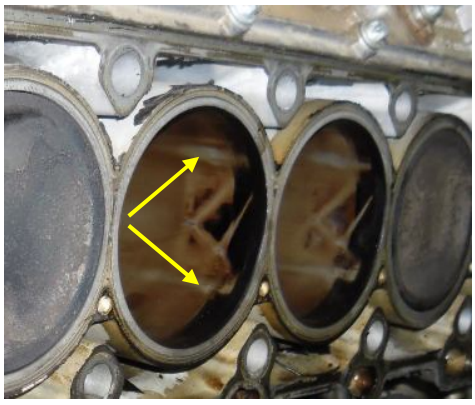
The first sign that the engine had experienced a catastrophic failure was the discolouration of the exhaust manifolds.

The straw / blue heat discolouration evident here is typical of a component having been exposed to extreme temperatures.

This was an indication of what was to be found on almost every component within the engine.

It is clear that the engine has suffered an enduring overheating and lubrication failure.

The right bank of cylinders has experienced four point thermal seizures in all six cylinders



The left bank also has the marks of similar thermal seizures.

These seizures occur when the coolant temperature is allowed to exceed the operating range of the vehicle or the coolant level becomes lower than is required to allow the cooling system to cool the vehicle.

The piston from number three cylinder on the left bank.

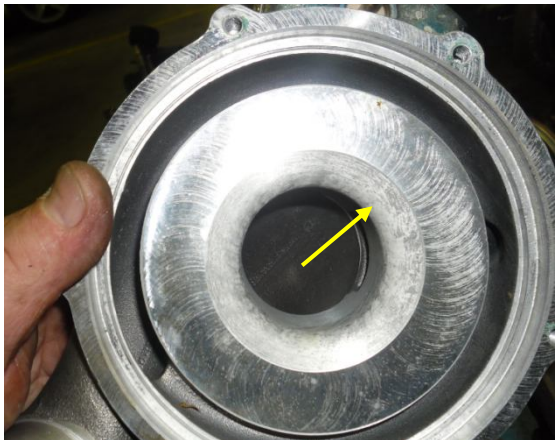
The piston / connecting rod assembly from our engine in comparison with a new similar assembly.

As would be expected in a high performance engine such as this one, the piston skirts are of a low contact design, hence the unusual seizure marks in the cylinder bores. In the picture above on the left, the scoring on the piston skirt edge and more importantly, the seizure marks of the piston crown are clearly visible, confirming a thermal level above designed limits.

The extent of the heat that the piston / connecting rod assemblies had been exposed to can be seen when an assembly from our engine is compared with a new assembly. The arrow indicates the blue thermal oxidization on the side surfaces of our assembly. These colours indicate that the connecting rods in the engine reached temperatures exceeding 600 degrees Celsius. This component would not normally be expected to be exposed to temperatures exceeding 165 degrees Celsius.

This engine is fitted with two waste gate operated turbo chargers. These assemblies are highly stressed under normal operating conditions and usually are the first item to fail in the event of a lubrication failure, complete or partial.

I visually inspected both turbo charger assemblies and found that both of them exhibited symptoms of complete shaft bearing failure and so decided to strip the left bank assembly for further examination.

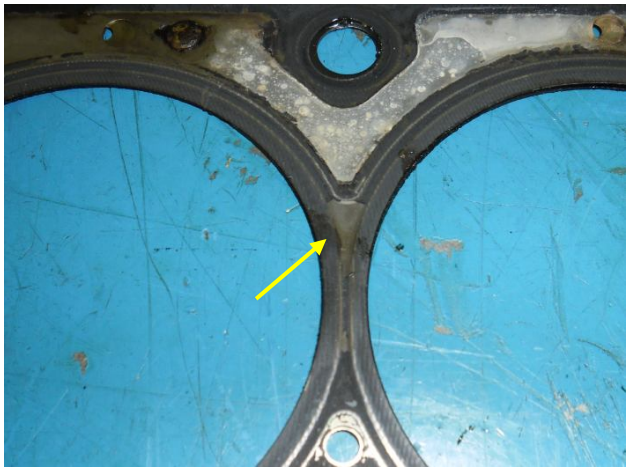


The piston from number three cylinder on the left bank.

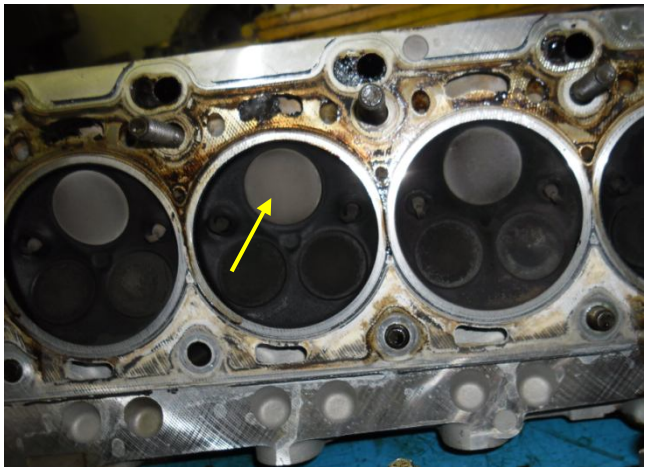
The turbine shaft and bearings of the left bank turbo charger.

The bearing failure is indicated externally by the presence of excessive play at the compressor wheel end of the shaft, the resulting excessive play allows contact between the compressor wheel and the compressor housing. This causes the damage that can be seen on the housing in the photo on the left above.

The photo on the right above shows the now common “blue-ing” of the steel shaft and the complete disintegration of the compressor side radial / thrust bearing. The two items within the yellow circle are actually supposed to be one part.



Evidence of inter cylinder leakage.



Typical view of the combustion chambers.

The cylinder heads exhibit signs of overheating in the form clear signs of cylinder head gasket failure causing inter cylinder leakage of compression – hence the inability of the vehicle to start for the XXXXXXX technicians. The formation of a white-ish grey deposit on the intake valves of each of the inner cylinders indicates that the vehicle was driven whilst inducting engine coolant from the leaking head gaskets.

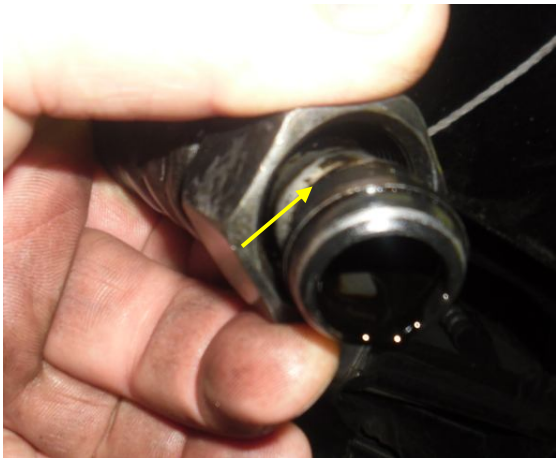
Both cylinder heads are badly warped and are most likely scrap.

Big end bearings have lubrication failure damage .

The bearings on the big end of the connecting rods have failed and were about to seize. This engine was driven long after every limit of temperature and lubrication had been exceeded.

**Cause of failure.**

There is damage to both the coolant system as well as to the integrity of the oil supply system.



Oil leakage occurred from this joint This sealing surface is damaged.

The connecting pipe at the front of the engine oil cooler had suffered impact damage causing an oil leak in that area. The oil pipe was leaking both at the swaged joint as well as the seal between the pipe connector and the cooler inlet have been compromised.

Oil in the right hand wheel arch.

The front wheel inner cover has been worn away.

The oil leaking from the oil cooler was dropped / sprayed right on to the front left wheel and was dispersed around the wheel arch and along the right underside of the car.

The car had been driven for a considerable time following the collision; witness to this is the extent of the wear to the right front inner wheel cover, which has worn away against the tyre.

**Conclusion:**

There is no doubt that the engine damage occurred after the actual collision. There is no impact damage to the engine whatsoever.

The wear to the inner wheel cover along with the extent of the damage to the various normally robust components within the engine lead me to form the opinion based on my experience in this field that the damage to the engine caused by the Insured driving the vehicle for a considerable period of time following the incident in which the oil and cooling system was damaged.

Bearing in mind that all tests carried out by myself and the technicians of XXXXXXX indicate that the warning systems of the vehicle were operational and still are operational, it is my opinion that this case falls clearly into the category of consequential damage and therefore falls outside the events that the Insurer indemnifies the Insured against in terms of the policy. Any payment in part or full for these damages, in my opinion will be solely at the digression of the Insurer.

I hope that this has satisfied your requirements, should you wish to discuss this report or require any further information, please do not hesitate to call me.

Kind regards,

Peter Banbury
082 883 5016