WHY HAS MY TURBO FAILED?

Before blaming the turbo, be aware that the majority of turbo problems are caused by engine related problems.

A thorough inspection of the turbos damaged parts will enable the possible cause to be accurately identified, before the fitting of a replacement.

The following guide of component damage can be used to assist in the correct reason for its failure.

It is essential to note that should you require an inspection by Owen Developments for a failure report or warranty issue, the turbo must not be dismantled in any way, as vital evidence can be lost. Please see our "Useful Downloads" section for the correct forms to be completed and included in the box when sending your turbo to us.

OIL SUPPLY

The serviceable lifespan of all oil lubricated turbochargers are dependent upon an adequate and clean oil supply. Oil flow at given pressures are controlled in the turbocharger design and in conjunction with the engine manufacturer. It is important to maintain this function as blocked oil feed pipes and/or low engine oil pressure will result in turbo failure.

Journal bearing type turbos are critical to the above as they operate on a thin film of oil under pressure, this in turn centralises the rotating mass and reduces surface friction.

Ball bearing type turbos require lower pressures and a far less volume; they are spray fed as not to over-heat the bearing. It is therefore important to ensure the correct oil feed adaptor is used.

As a guide, oil pressure to a ball bearing turbocharger should be 45psi when under load and for a journal bearing turbo, 60psi. Lower pressures are acceptable at engine idle speed.

See key points about **oil contamination**.

OIL CONTAMINATION

Clean filtered engine oil is a major requirement and necessity for all turbochargers. Contamination by carbon particles, dirt ingress, silicone gasket sealer and high fuel dilution will cause rapid wear to bearings, thrust faces and seals.

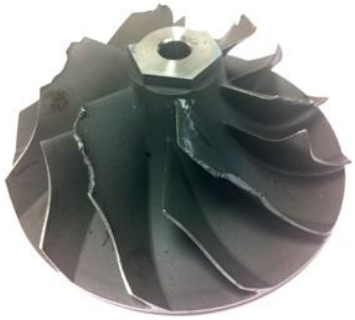
It is important therefore, to change the engine oil exactly to the manufacturer's specification and is also essential when replacing a turbo after a failure. The effect of worn bearings and seals can be identified by the vehicle smoking, making metallic noises and general lack of performance.

When replacing a turbocharger, **always** flush oil feed pipes and the oil drain pipe, preferably fit new, if the pipes have had blockages.

Always replace the engine oil filter and fill with new oil.

Should a major failure of the turbo have occurred, remove the engine sump pan and clean to collect any turbo debris that may have found its way down the turbo oil drain pipe.

COMPRESSOR WHEEL DAMAGE



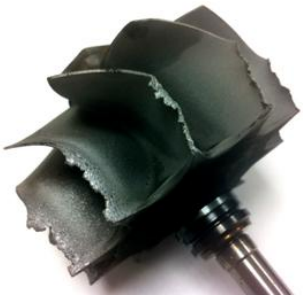
Most compressor wheel failures are visible through the air intake hose. Damaged blades and worn and bent blade tips are signs of foreign particles entering the compressor. Pitted blade edges indicate fine particle damage due to poor air filtration. In cases where all the blades are missing, foreign objects such as screws and washers may have accidently been allowed to be drawn into the compressor housing, particularly after vehicle servicing. These parts must be found, as they can enter the inlet system of the engine. Further damage is possible to the exducer part of the compressor wheel blades and their tip heights as a direct result of over-boosting, thrust bearing wear or over-speeding. These faults can't be seen without removal of the compressor cover.

PERFORMANCE LOSS

In addition to component damage or failure, turbochargers can lack in performance due to the build-up of surface contamination within compressor and turbine housings. Carbon deposits and excessive oil on the volute surfaces of turbine and compressor, will affect wheel efficiency. A common example of performance loss due to carbon build up can be found with the vain assembly of VNT turbocharger. Compressor contamination with oil from the engines breather system can reduce efficiency and therefore reduce boost pressure.

TURBINE WHEEL FAILURE

There are a number of causes where wheel failure can be experienced. The most common of these are as follows; overheating due to incorrect fuel supply giving rise to high exhaust gas temperatures, broken engine parts entering the turbine, over-speeding due to poor wastegate control, and incorrect sizing of turbine housing or restricted air supply to the compressor. Bearing seizure at high speed and the inertia contained in the rotating mass can also cause the turbine shaft to bend or shear.



BOOST PRESSURE

A low boost pressure has many causes, some of which are referred to in the previous paragraphs. However the boost pressure must have a method of control, otherwise engines can easily be destroyed by excessive cylinder pressures. The wastegate actuator is the means by which this important safety factor is achieved. This component is, in the majority of cases, an integral valve assembly operated by a diaphragm and spring, which is built into a capsule and bolted directly to the turbocharger. Higher specification vehicles have their boost level controlled by a separate remotely mounted wastegate. Failure of either of these i.e. split diaphragm, will effect boost and automatically instigate the vehicles safety system incorporated within the ECU. With stand-alone ECU's, they must have a boost cut installed to protect the engine from over-boosting.

TURBOCHARGER OVERHEATING

Cracks and distortion of the turbine housing are the first signs of excessive localised heat build-up. The causes are incorrect turbine housing volute size, high exhaust back pressure, and air to fuel ratio being set too weak or over fuelling causing additional combustion in the turbine. Also, too high a boost level with the incorrect ignition timing is another cause. Wastegates not opening fully can also create localised overheating.

Centre bearing housings can also become subjected to overheating. There are two types of cooling method adopted by the turbocharger manufacturers - oil cooled or water cooled. Both systems must have a positive and uninterrupted supply of coolant. It is not recommended to use a bearing housing designed with a water jacket in a non-water cooled installation oil overheating in the housing can be the result.