



Engine run-in at idle

An open invitation to component damage

Situation

Garages and repair shops in a lot of countries tend to employ a procedure for running-in engines which is both totally superfluous and harmful. Following installation, the engine is left idling for several hours or often even days. This is commonly believed to be a gentle method of running-in the engine without subjecting it to load and thus reducing any risk of damage.

- ! Hour-long operation at idle is extremely harmful for the engine.
- Engine run-in at idle is not possible. This method can lead to severe wear or damage.

Problems associated with run-in at idle:

- The inadequate engine speed means that the oil pump generates too little pressure and does not supply enough oil to the lubrication points.
- The engine bearings are not properly lubricated and cooled. Dirt and run-in abrasion are not flushed out of the bearings.
- Not enough oil emerges from the engine bearings, with the result that too little oil is sprayed onto the cylinder wall. Dirt and abrasion are not washed off, which causes considerable premature wear or even damage (Fig. 1).
- The pressure valve (arrow in Fig. 1) for the piston cooling spray does not open at idle. The piston is not cooled and a lack of oil droplets leads to poor lubrication at the gudgeon pin and the small end bush.

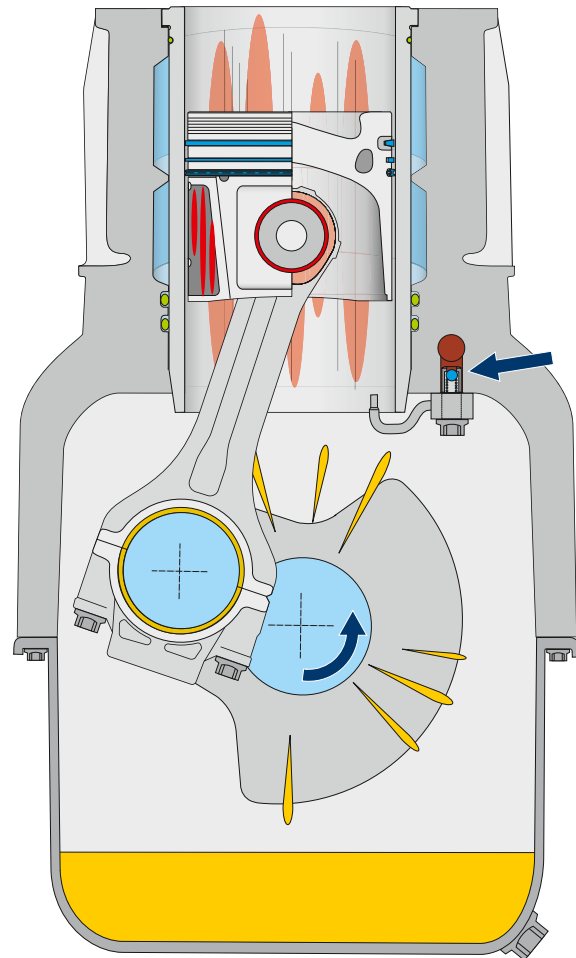


Fig. 1: poor lubrication with excessive idle operation

Turbochargers are poorly lubricated and cooled. Idling for just 20 minutes is sufficient to damage a turbocharger – not only on run-in but also in the course of normal operation.

- Only an insufficient quantity or no pressurised oil at all may be supplied to other remote components such as valves, camshaft or rocker arms.

- Piston rings cannot provide a perfect seal at idle. Hot combustion gases leak past, heat up the cylinder wall and damage the oil film. Under unfavourable conditions oil may even get into the combustion chamber and cause the emergence of blue smoke and oil from the exhaust.

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Lubrication at higher rpm

Fig. 2 illustrates the engine lubrication situation at medium rpm. Thanks to the higher rpm, sufficient oil pressure is available to open the oil spray jet valves and thus supply the piston cooling oil ducts with fresh oil (1). The piston cooling oil dripping back additionally lubricates and cools the gudgeon pins. The cylinder surfaces beneath the pistons are reliably lubricated with a sufficient quantity of splash oil emerging as intended from the engine bearings of the crankshaft.

Run-in of overhauled engines.

! The engine must be run-in on the road if no test bench is available for implementing a defined run-in routine.

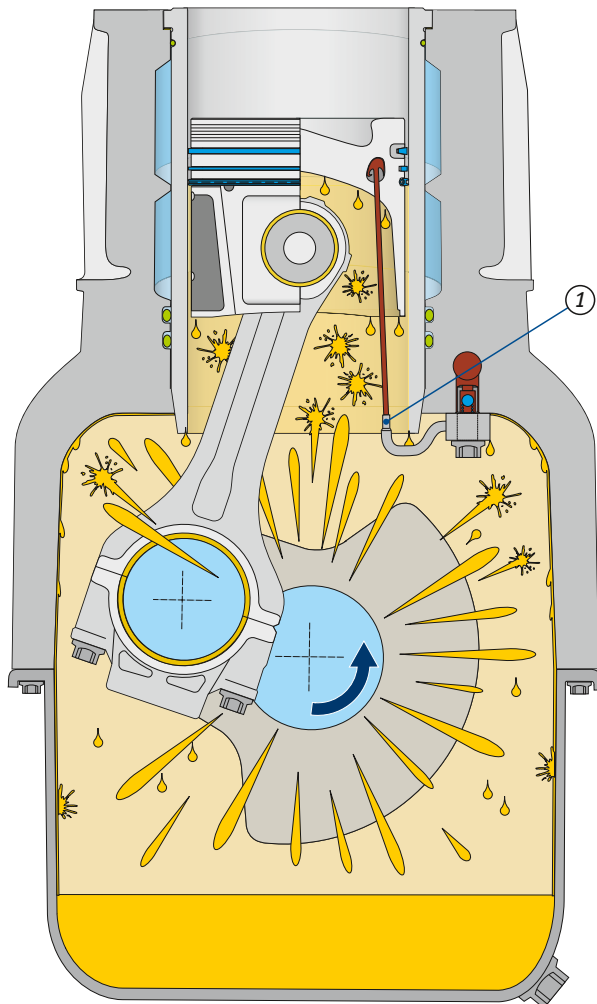


Fig. 2: direct and indirect component lubrication by oil spray and splash oil

Recommendations for run-in on the road

- The vehicle should not be fully laden.
- Run the engine at constantly changing speed levels not exceeding 2/3 of the maximum engine speed.
- Change up briskly whilst driving and avoid underrevving.
- Avoid maximum gear speeds.
- Avoid longer uphill driving (excessive load).
- Avoid longer downhill driving (insufficient load and undesirable overrun).
- Do not use engine braking systems.
- Do not drive on motorways or at top speed.
- Avoid driving in congested traffic. Driving on open roads and in free-flowing urban traffic is best. However avoid driving in towns at extremely high temperatures and in the rush hour with frequent stops at traffic lights and hold-ups.

Further advice

- Keep a constant check on the oil level during the run-in phase, as oil consumption may be higher during this period. It is advisable to check the oil level every 50 to 100 km and top up with oil if necessary. If there is a noticeable drop in the oil level at the dipstick, continue to monitor at shorter intervals.
- Do not overfill the engine with oil.
- Change the oil after 1000 km and – extremely IMPORTANT – replace the oil filter as well. The dirt and abrasion from run-in has to be removed from the engine.