

Journal Bearings vs. Ball Bearings

The journal bearing has long been the brawn of the turbocharger, however a ball-bearing cartridge is now an affordable technology advancement that provides significant performance improvements to the turbocharger.

Ball bearing innovation began as a result of work with the Garrett Motorsports group for several racing series where it received the term the 'cartridge ball bearing'. The cartridge is a single sleeve system that contains a set of angular contact ball bearings on either end, whereas the traditional bearing system contains a set of journal bearings and a thrust bearing.



Journal bearings



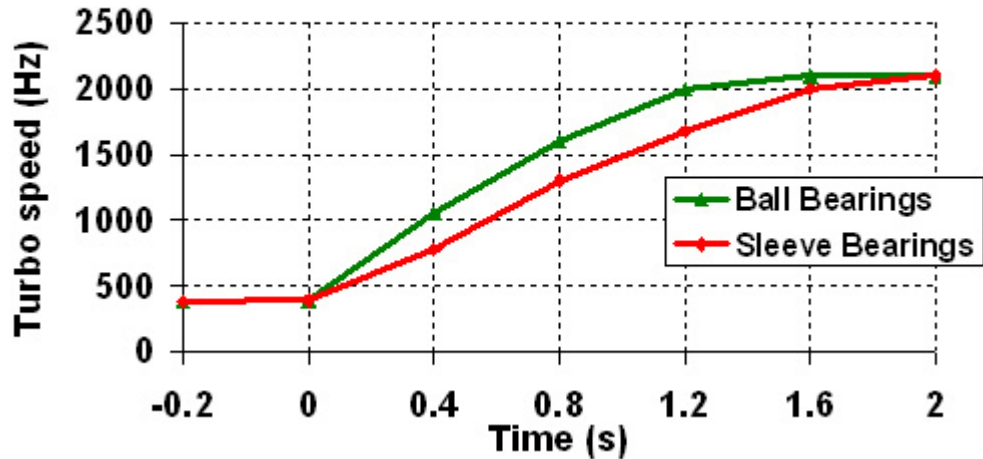
Ball bearing

Turbo Response – When driving a vehicle with the cartridge ball bearing turbocharger, you will find exceptionally crisp and strong throttle response. Garrett Ball Bearing turbochargers spool up 15% faster than traditional journal bearings. This produces an improved response that can be converted to quicker 0-60 mph speed. In fact, some professional drivers of Garrett ball-bearing turbocharged engines report that they feel like they are driving a big, normally aspirated engine.

Tests run on CART turbos have shown that ball-bearings have up to half of the power consumption of traditional bearings. The result is faster time to boost which translates into better drivability and acceleration.

On-engine performance is also better in the steady-state for the Garrett Cartridge Ball Bearing.

Speed response when throttle is suddenly opened
at 2000 rpm (2 litre S.I engine)



Reduced Oil Flow – The ball bearing design reduces the required amount of oil required to provide adequate lubrication. This lower oil volume reduces the chance for seal leakage. Also, the ball bearing is more tolerant of marginal lube conditions, and diminishes the possibility of turbocharger failure on engine shut down.

Improved Rotordynamics and Durability – The ball bearing cartridge gives better damping and control over shaft motion, allowing enhanced reliability for both everyday and extreme driving conditions. In addition, the opposed angular contact bearing cartridge eliminates the need for the thrust bearing commonly a weak link in the turbo bearing system.

Competitor Ball Bearing Options – Another option one will find is a hybrid ball bearing. This consists of replacing only the compressor side journal bearing with a single angular contact ball bearing. Since the single bearing can only take thrust in one direction, a thrust bearing is still necessary and drag in the turbine side journal bearing is unchanged. With the Garrett ball bearing cartridge the rotor-group is entirely supported by the ball bearings, maximizing efficiency, performance, and durability.

Ball Bearings in Original Equipment – Pumping up the MAZDASPEED Protegé’s heart rate is a Garrett T25 turbocharger system. With Garrett technology on board, the vehicle gains increased acceleration without sacrificing overall efficiency and it has received many rave reviews from the world’s top automotive press for it’s unprecedented performance.