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QUALITY REPLACEMENT TURBOCHARGER PARTS

COMPONENT VARIATIONS ①

SHAFT & WHEEL DEVELOPMENT

Common turbo failures such as overspeeding can cause severe fatigue to the shaft and wheel. Signs of fatigue include partial loss of blades caused by the constant flexing of blades beyond the designed parameters. *Fatigue is a mode of failure not the cause.*

Traditionally, a shaft and wheel has an open back with a slender or straight shaft. To strengthen the turbine wheel, Melett has developed a **full back** shaft and wheel solution that reduces the risk of fatigue on the inducer diameter.

Original GT15 Shaft and Wheels

Melett Variation: GT15-25 Straight shaft - increased radius to reduce stress.

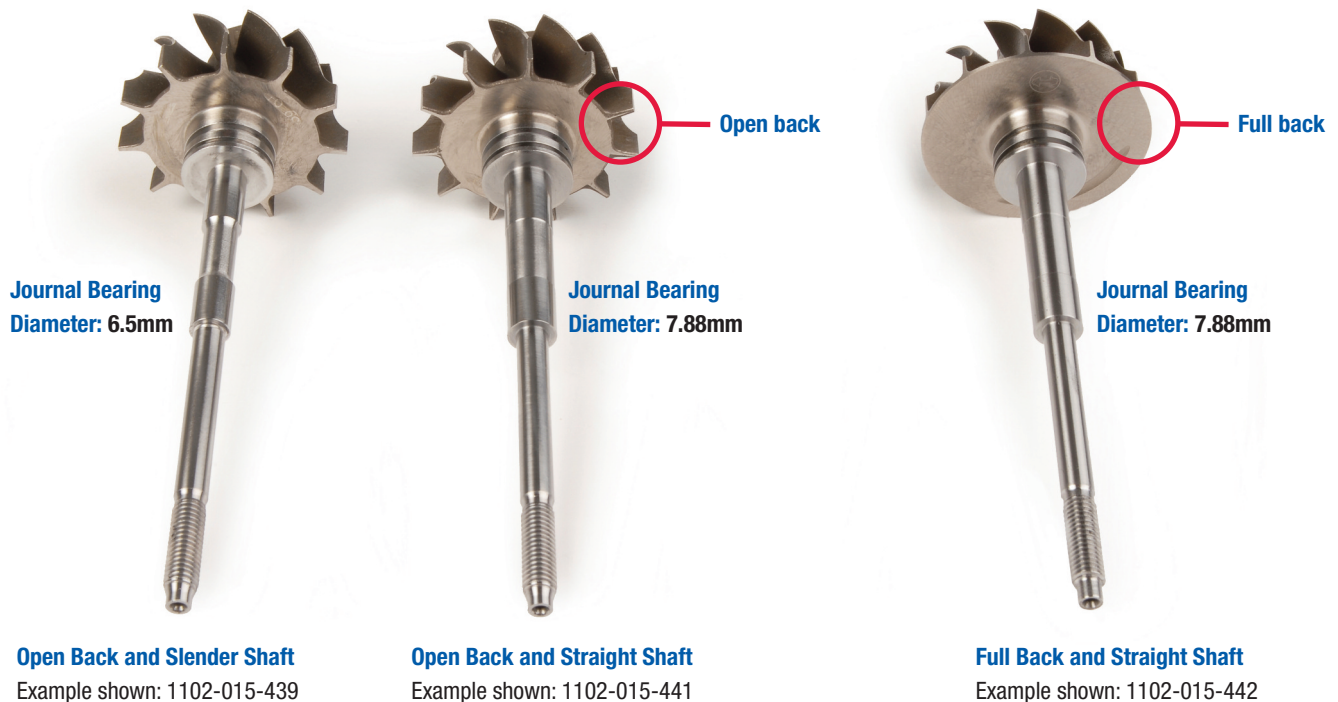


Figure 1: Illustrations of a typical slender shaft and straight shaft.



Why two different types? Early turbochargers incorporated a slender shaft in their design. This shaft was perceived to be lighter and provide less resistance, increasing performance. However, with advancements in turbocharger technology, a straight shaft was developed which provides extra strength and rigidity, and in theory makes the turbocharger easier to balance. The slender shaft is currently being phased out by the turbocharger OE's, and all GT15 applications, and upwards, will incorporate a straight shaft.

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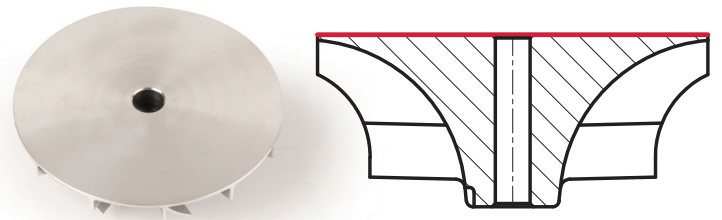
COMPONENT VARIATIONS ②

COMPRESSOR WHEEL VARIATIONS

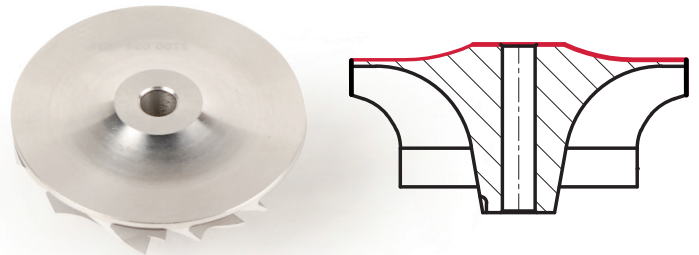
As turbochargers develop, operating conditions have altered significantly. Turbochargers are spinning faster than ever before and subjected to higher temperatures.

As a result, this has led to significant development in compressor wheel design to cope with ever changing conditions.

Flatback: Earliest design of compressor wheel and still used by some manufacturers.



Superback: This design was introduced due to the increased speeds which the turbochargers rotate, because of the speed increase the force on the compressor wheel increases significantly, in particular the exducer diameter of the compressor wheel suffered the most. This is the point which rotates the fastest and is therefore under the most stress. The Superback reinforces the back face of the compressor wheel preventing the compressor wheel tearing from the bottom up.



Deep Superback: An exaggerated design of the Superback, generally used on more recent applications. Again, one theory is due to the increasing rotation speeds of the turbo.



Deep Superback - Extended tip: This design promotes greater airflow providing a faster boost response at lower engine speeds. The extended tip design increases the efficiency of the Superback compressor wheel at higher boost pressures.



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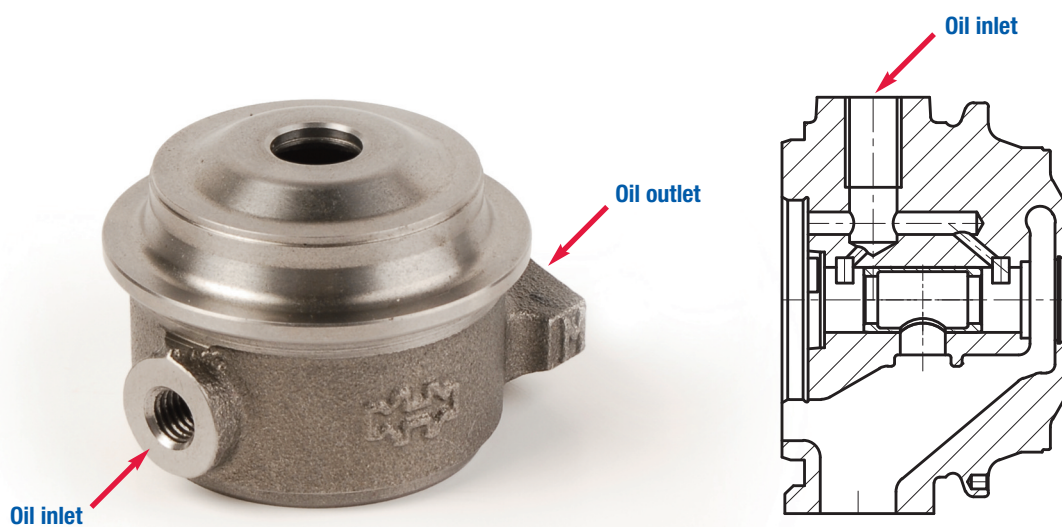
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COMPONENT VARIATIONS ③

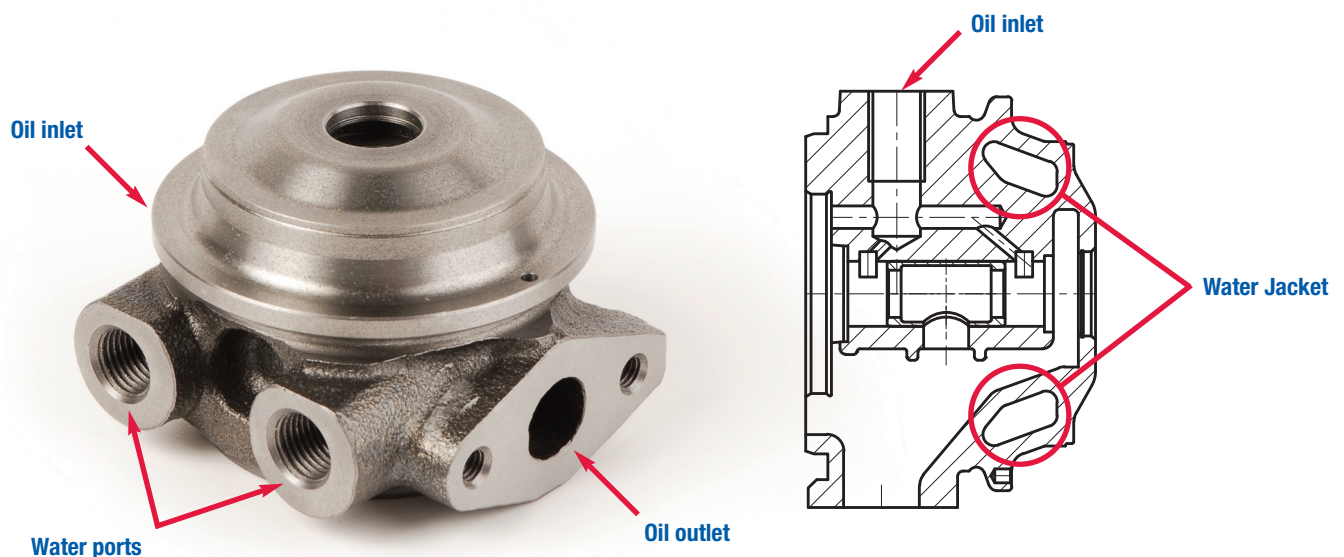
AIR COOLED & WATER COOLED BEARING HOUSE VARIATIONS

Melett Example: IHI – RHF4 / RHV4 / RHF4V / RHF5 / RHV5 / RHF5V

Air Cooled: Ambient air and oil act as a cooling mechanism.



Water Cooled: High temperature applications need extra cooling to perform efficiently.



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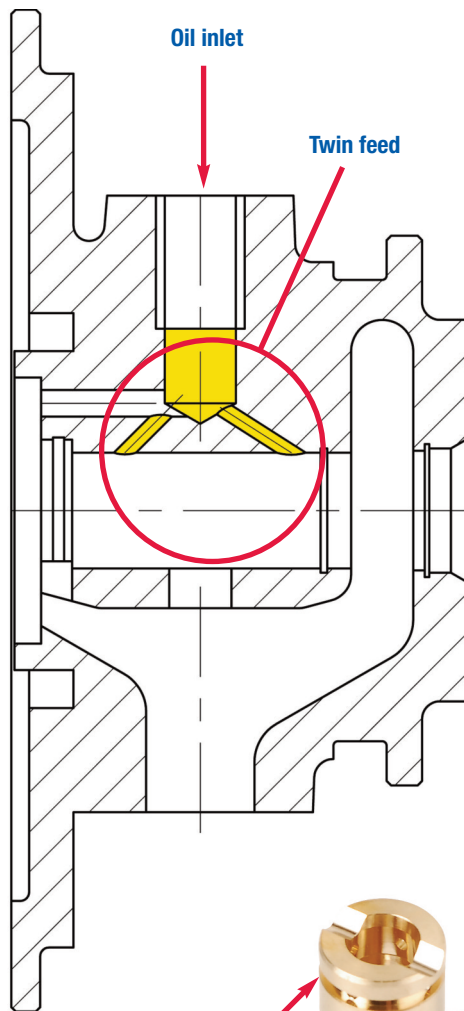
QUALITY REPLACEMENT TURBOCHARGER PARTS

COMPONENT VARIATIONS ④

TWIN FEED & SINGLE FEED BEARING HOUSING VARIATIONS

Melett Example: Borg Warner – K03-04 / BV43/50

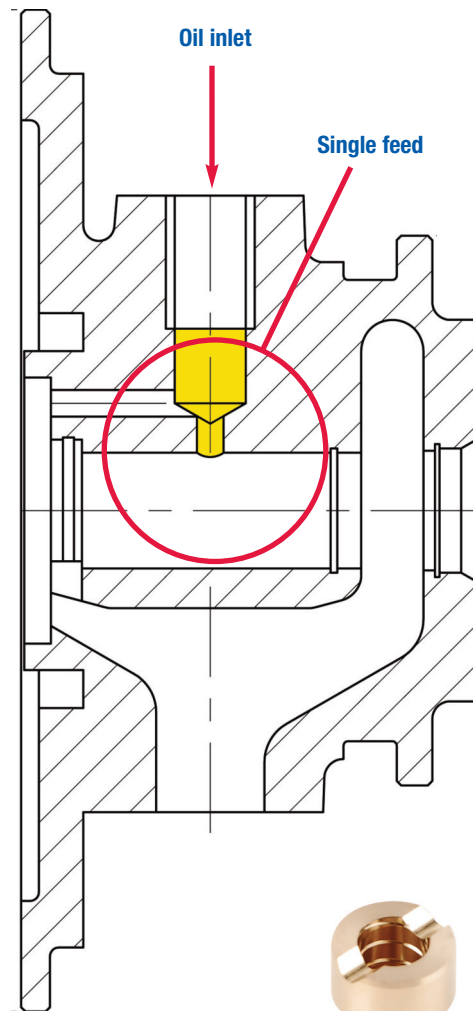
Twin Feed



Oil grooves

1302-003-100

Single Feed



Oil hole

1302-004-100

Please note: Before repair please ensure you have the right journal bearing for the bearing housing - failure will occur if they are mixed.

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