



MOTORSPORT ENGINES

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Nickel-based alloys offer engine designers the opportunity to operate at higher temperatures and improve efficiency and titanium and titanium-based alloys can offer significant weight savings – critical when pushing the boundaries of performance. In general they are used for highly loaded components such as connecting rods, turbocharger wheels and shafts, pistons and intake valves.

Engine valves are subjected to high cyclic stresses and the mechanical properties of the titanium alloy **Ti-6Al-4V** are sufficient for the intake valves of automobile engines. Valve springs and retainers made of a titanium alloy would reduce the weight of the valve construction by up to 70%.

The materials in the turbocharger are exposed to hot exhaust gases at 750-860°C so materials that retain their mechanical properties at elevated temperatures and can resist corrosion by the exhaust gases are required. **Ti-6Al-4V** finds application for turbo charger wheels in diesel engines. In advanced gasoline engines the operating temperatures are higher and a move to nickel-based alloys is necessary. **Alloy 718** is often selected due to its oxidation resistance

and creep strength. The shaft connecting the turbine and compressor in a turbo charger also requires a material with excellent high temperature mechanical properties and **Alloy 80A** is often selected for this application.

Due to its high stress rupture strength **Alloy 80A** is also used for high temperature fasteners and for exhaust valves where good hot corrosion resistance is necessary to resist the hot exhaust gases.

Titanium connecting rods can offer weight savings of ~ 30% when compared to their conventional steel counterparts. Forged from **Ti-6Al-4V** bar stock titanium connecting rods not only weigh considerably less they also have reduced rotating and reciprocating weight.

Commercially pure **Titanium Grade 2** and **Ti-6Al-4V** can also be used for heat shields both for the engine and brake heat shields.

For more information please contact us via info@sd-metals.com

ALLOY PROPERTIES



	Composition (%)	Key attributes	Application
Ti Gr 2 R50400 3.7035	Commercially pure Ti	Outstanding corrosion resistance, moderate strength combined with excellent formability	Heat shields
Ti-6-4 / Ti Gr 5 R56400 3.7165	Ti – 6Al – 4V	High strength-to-weight ratio, good fatigue properties	Intake valves, turbo charger wheels (diesel), connecting rods, heat shields
Alloy 718 N07718 2.4668	54Ni – 18Cr – 18.5Co – 3Mo – 5Nb	Combines high strength at temperatures up to 700°C with excellent corrosion resistance	Turbo charger wheels and shafts, connecting rod bolts, engine valves
Alloy 80 A N07080 2.4952	76Ni – 19.5Cr – 1.4Al – 2.4Ti	Highly alloyed, age hardenable alloy with excellent high temperature strength	High temperature fasteners, turbo charger shafts and exhaust valves