MOBILITY

voestalpine RACING SOLUTIONS
GEARS

WHEN PERFORMANCE MATTERS

Racing gearbox materials fail due to a combination of **mechanical overload, wear, fatigue and impact.** Despite advanced engineering, the brutal conditions of racing push every component to its limit. Race gearboxes also need to remain small and compact to retain a competitive advantage.

Selection of the right materials can certainly help solve many problems however, regular maintenance, precise engineering, and good driving technique are also key to preventing failures.

MATERIAL FAILURE & OUR SOLUTION

Material Related Failure	voestalpine Solution	Material Grades
Overloading and Torque Spikes	High tensile strength, high yield strength, high fracture toughness	BÖHLER V135 & E108
Wear of Dog Rings and Engagement Mechanisms	High hardness, harder case depths	BÖHLER V135, M121 and E108
Fatigue and Material Limits	Increased cleanlinesss	BÖHLER V135, M121 and E108
Impact Loads (Crashes, Curbs, etc.)	High fracture toughness	BÖHLER M121

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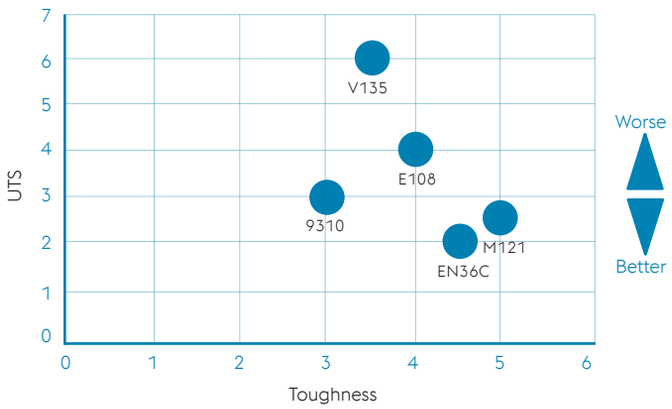
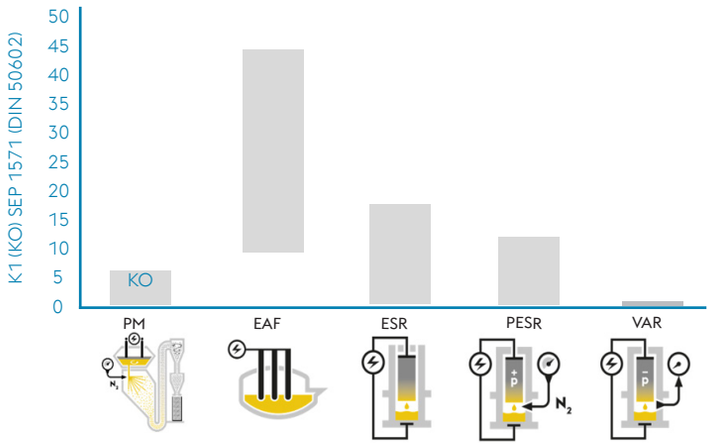
COMPARISON OF PROPERTIES



CLEANLINESS VS. MELTING PROCESS



COMPARISON OF CASE CARBURISING GEAR STEELS

Property	BÖHLER V135	BÖHLER E108	BÖHLER M121	9310	Standard Grade EN36C / 832M13
Case Hardness	60-64 HRC	60-64 HRC	60-64 HRC	60-64 HRC	60-64 HRC
Core Tensile Strength	~1760 - 2010 MPa*	~1320 - 1520 MPa	≥ 1080 MPa	~1,100–1,300 MPa	≥ 1080 MPa
Yield Strength (Core)	≥ 1420 MPa	≥1030 MPa	≥ 820 MPa	~850–1,050 MPa	≥ 820 MPa
Elongation at Break	≥ 6 % (after hardening)	≥ 8 %	≥ 8 %	≥ 8 %	≥ 8 %
Melting Process	VAR	VAR	PESR	Optional ESR	EAF
Fatigue Strength	Excellent	Excellent	Very Good	Good	Good
Shock Resistance	Very Good	Very Good	Excellent	Good	Good
Impact Toughness (Charpy)	High	High	Very High	Moderate	High
Distortion Control	Very Good	Good	Very Good	Moderate	Moderate
Hardening Process	Carburizing + Quench	Carburizing + Quench	Carburizing + Quench	Carburizing + Quench	Carburizing + Quench
Req. for Sub-Zero	Yes	Yes	No	Yes	No

*under hardened, sub-zero and tempered conditions

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