

## For high performance gears

A case-hardened gear steel with ultra-high strength core

Increased engine power transmission demands high-performance gears.

The design objective was to develop a secondary-hardening gear and bearing steel with superior core and surface properties to current gear steels. **Ferrium C64** is a member of a new class of martensitic secondary-hardening gear and bearing steels that utilize an efficient M2C precipitate strengthening dispersion. Because of the efficiency of this strengthening dispersion, **Ferrium C64** achieves carburized surface hardness (62-64 HRC) superior to current gear steels with the added benefit of increased core properties.



### Advantages

Surface-wear properties and fatigue properties are superior to those found in current commercial alloys.

### Fatigue

Demonstrated increase in rolling sliding fatigue over conventional gear steels. Single tooth bending fatigue data is currently being generated.

Ferrium® C64™ Chemical Composition (nominal wt. %)

Fe	C	Co	Cr	Ni	Mo	W	V
Bal	0.11	16.3	3.5	7.5	1.75	0.2	0.02

Overview of Ferrium® C64 Properties (typical)

YS	UTS	EI	RA	Core Hardness	K <sub>IC</sub>
(ksi)	(ksi)	(%)	(%)	(HRC)	(ksi√in)
199	229	18	75	48 -50	85

### Processing

Designed for high-temperature carburizing and allowing solution heat and carburizing treatment to be combined, the steel is quenched directly from the carburizing temperature. After quenching to room temperature, it is subjected to cryogenic treatment to assure a complete martensitic transformation. It is tempered at 925°F (496°C) with excellent thermal resistance approaching this temperature. Case carburizing produces a gradient in the volume fraction of the M2C carbides and results in an increase in hardness and surface residual compressive stress. The efficiency of the M2C strengthening response allows the steel to achieve very high surface hardness with very low carbon content. It can achieve very high surface hardness without the formation of detrimental primary carbides. Final shot peening is recommended for superior fatigue performance.