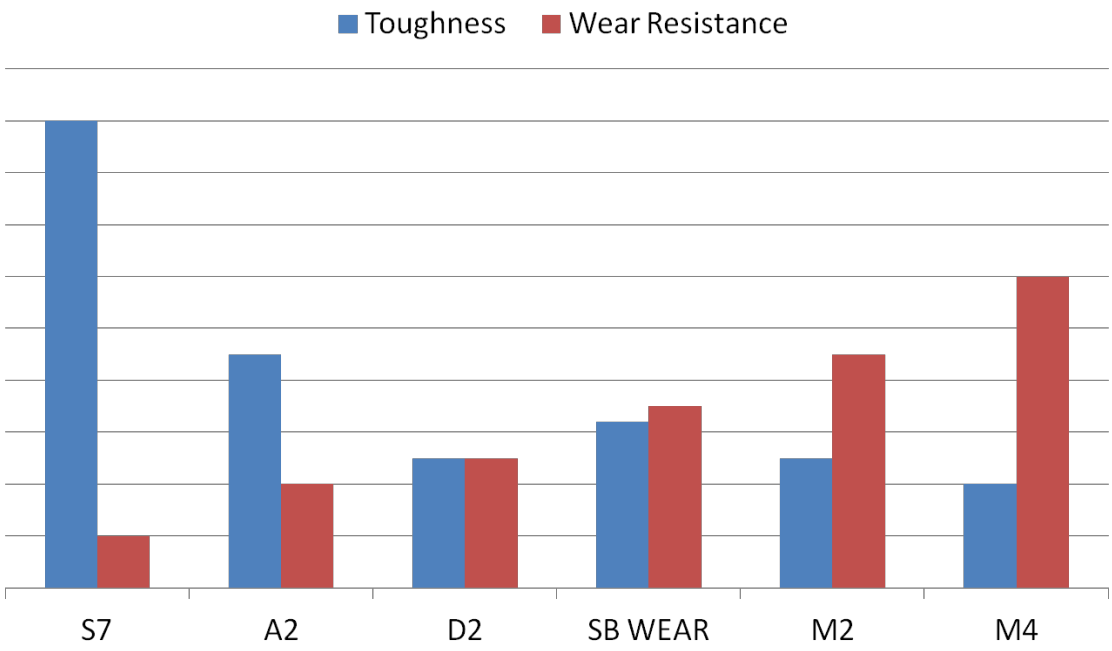
Métaux Solutions

Technical Information: M4

M4 is a general purpose high speed steel
M4 has a good balance of toughness, wear resistance, and red hardness
M4 is used as an upgrade to M2 for wear resistance.

Typical Chemical Composition			
Carbon	1.35%	Chromium	4.15%
Molybdenum	5.00%	Silicon	0.30%
Vanadium	4.15%	Manganese	0.30%
Tungsten	6.00%	Sulfur	0.03% Max

Tool Steel Properties Comparison



Physical Properties

Modulus of Elasticity. . . . . 30 psi x 10^6 . . . . . (207 GPa)
Density. . . . . 0.294 lb/in^3
Annealed Hardness. . . . . 215-255 Brinell Hardness (BHN)
Machinability. . . . . Similar to D2 Tool Steel

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Heat Treatment

Annealing

Heat to 1600°F, hold two hours
Slow cool 20°F/hour to 600°F
Then air or furnace cool to room temperature

Stress Relieving

Performed prior or after machining to minimize distortion in heat treating
1100/1200°F, hold two hours
then air cool to room temperature

Hardening

Salt bath, protective atmosphere, or vacuum furnace equipment preferred.

High Heat (Austenitizing)

2150/2250°F for 10-15 minutes at heat.

Quench

Salt bath quench to 1000-1100°F, equalize, then air cool to 150°F.
Vacuum or atmosphere quench rate of a minimum 50 degrees F per minute down to 1200F is critical to achieve best heat treat response.
Temper immediately following quench

Tempering

Minimum 1000°F tempering temperature required.
Double tempering is required, triple tempering recommended.
Air cool to room temperature between tempers.

Typical Heat Treat Response

Tempering Temp °F	Hardening Temp 2150°F	Hardening Temp 2250°F
As Quenched	65	65
1000	65	65
1025	64	65
1050	63	64
1075	62	63
1100	60	62

Longitudinal Size Change

Approximately: plus 0.22%