



M42 High Speed Steel

M42 is a molybdenum series high-speed steel alloy with an additional 8 or 10 percent cobalt. It is widely used in metal manufacturing industries because of its superior red hardness as compared to more conventional high-speed steels. This allows for shorter cycle times in production environments due to its higher cutting speeds and from the increase in time between tool changes. M42 is also less prone to chipping when used for interrupted cuts and costs less when compared to those same tools made of carbide.

Other Known Names: 1.3247, HS 2-10-1-8, S500, E M42, REX M42[®], Dynamax.

Common Usage: End Mills, Blades, Taps, Reamers, Broaches, Form Tools, Thread Roll Dies, Punches, Header Tooling, and Milling Cutters.

Physical Properties

Density

0.282 lb/in³ (7806 kg/m³)

Specific Gravity

7.81

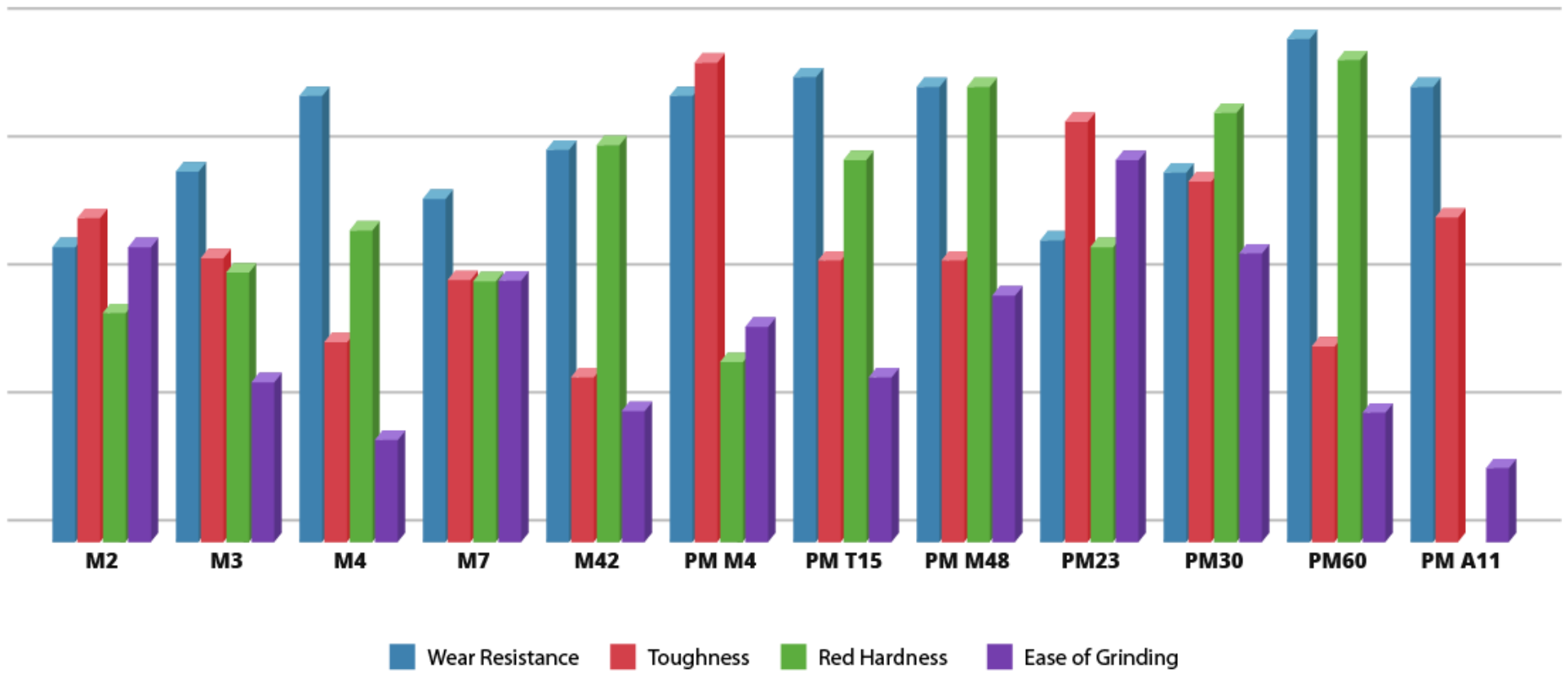
Modulus Of Elasticity 30 x

10⁶ psi (207 GPa)

Machinability

35-40% of a 1% carbon steel

High Speed Steel Properties Comparison



M42 High Speed Steel Chemical Composition

						MAXIMUM	TYPICAL
Carbon	Chromium	Tungsten	Molybdenum	Vanadium	Cobalt	Annealed	Tempered
C	Cr	W	Mo	V	Co	Hb	HrC
1.1	3.9	1.6	9.5	1.2	8.25	277	67

M42 High Speed Steel Heat Treating

ANNEALING	PREHEAT	AUSTENITIZING	QUENCH	TEMPERING
Temp	Temp	Temp	Medium	Temp
°F	°F	°F		°F
1575/1650	1500/1550	2125/2175	Salt/Oil/Atm	1025/1050

M42 High Speed Steel Thermal Treatments

Preheating

Heat at a rate not exceeding 400°F per hour (222°C per hour) to 1500-1600°F (816-871°C, and equalize.

Austenitizing (High Heat)

Heat rapidly from the preheat.

- ◆ Furnace: 2150-2175°F (1177-1191°C) Salt: 2125-2150°F (1163-1177°C)
- ◆

To maximize toughness, use the lowest temperature. To maximize hot hardness, use the highest temperature.

Quenching

Pressurized gas, warm oil, or salt. For pressurized gas, a rapid quench rate to below 1000°F (538°C) is critical to obtain the desired properties. For oil, quench until black, about 900°F (482°C), then cool in still air to 150-125°F (66-51°C). For salt maintained at 1000-1100°F (538-593°C), equalize, then cool in still air to 150-125°F (66-51°C).

Tempering

Temper immediately after quenching. Typical tempering range is 1025-1050°F (551-565°C). Hold at temperature for 2 hours, then air cool to ambient temperature. Triple tempering is required.

Annealing

Annealing must be performed after hot working and before re-hardening

Heat at a rate not exceeding 400°F per hour (222°C per hour) to 1575-1650°F (857-899°C), and hold at temperature for 1 hour per inch (25.4 mm) of thickness, 2 hours minimum. Then cool slowly with the furnace at a rate not exceeding 50°F per hour (28°C per hour) to 1000°F (538°C). Continue cooling to ambient temperature in the furnace or in air.

Information provided by Griggs Steel