M42 – Technical Data

General Descriptions:

M42 is a super cobalt high speed steel which may be heat treated to HRC 68. This makes M42 outstanding for special purpose cutting tools.

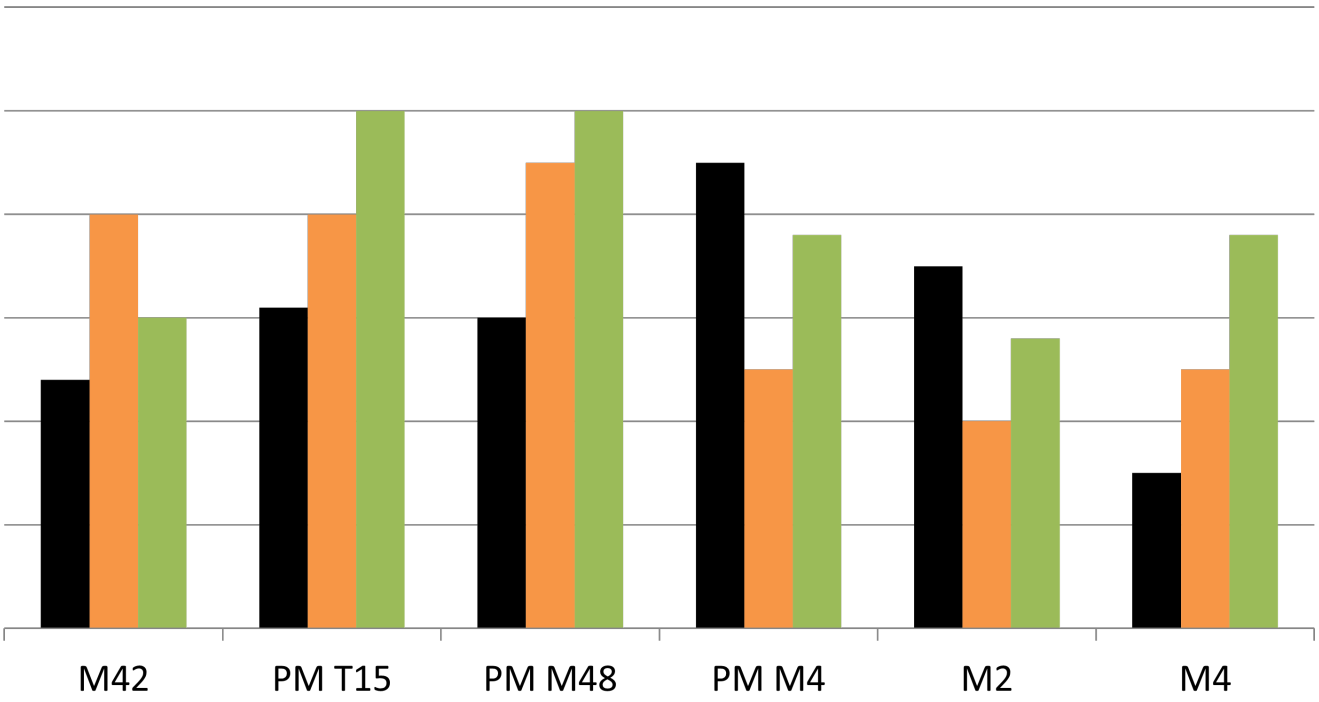
Examples of applications:

Broaches, drills, end mills, form tools, gear hobs, milling cutters, reamers, shaper cutters.

Chemical Composition

Carbon	Manganese	Silicon	Chromium	Vanadium	Tungsten	Molybdenum	Cobalt
1.05-1.15%	0.15-0.40%	0.15-0.65%	3.50-4.25%	0.95-1.35%	1.15-1.85%	7.50-8.50%	7.75-8.75%

Comparison Chart



Typical Heat Treat Response

Tempering Temp °F	Hardening Temp °F / HRC					
	2050	2075	2100	2125	2150	2175
As Quenched	66	66	66	66	65	63.5
1000	64.5	65	66	67	67.5	68
1025	63	64	65.5	66.5	67	67.5
1050	60	62	63.5	64.5	65	66
1100	54	57	59	60	61	63
1150	50	53	55	56	57	59

Size Changes During Hardening

Hardening Temp °F	Tempering Temp	HRC	Longitudinal Size Change %
2175	1025	67	+0.25

Surface Treatment

M42 can be nitrided or titanium-nitride coated ifdesired.
If the CVD TiN treatment is used, care is required in vacuum hardening

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Heat Treatment

Forging

2025-2075 °F. Do not forge below 1700 °F

Annealing

1600 °F, hold 2 hours, slow cool (30 °F / hour maximum) to 1000 °F, then air or furnace cool.
Annealed hardness is 235-255 BHN.

Stress Relieving

(After Machiinig): 1100-1300 °F, hold two hours, then air or furnace cool.
(Hardened Parts): Temper 30 °F below original tempering temperature or 1000 °F minimum.

Hardening

Preheat to 1500-1550 °F, equalize.
A second preheat stage at 1850-1900 °F suggested for vacuum or atmosphere hardening.

High Heat (Austenitizing)

2075-2175 °F. Standard recommendation to achieve HRC66/68 is to use 2150-2175 °F.

Quench

Atmosphere quench to 1000-1100 °F, equalize, then air cool to room temperature.
Vacuum or atmosphere quench rate through 1850-1300 °F range is critical to achieve optimum heat treat response.

Tempering

1000 °F minimum recommended.
Triple tempering required.

Physical Properties

Modules of Elasticity	30 x 10^6 psi (207 GPa)	**Density**	0.289 lb/in^3
Annealed Hardness	235-255 BHN	**Machinability**	45% of O1