

••• M-42 High Speed Steel

(AISI M42)

WM M-42 is a molybdenum cobalt high speed steel capable of being hardened to 70 Rockwell C. The carbon content is higher than in most high speed steels, and with this balanced composition, contributes to wear resistance and hot hardness as well as the high hardness capability. **WM M-42** exhibits good grindability and relatively good toughness at high hardness levels.

WM-42 is being used for the machining of heat treated materials (high hardness) and high temperature alloys.



Chemical Composition

Carbon	1.10
Manganese	0.25
Silicon	0.25
Molybdenum	9.50
Tungsten	1.50
Chromium	3.75
Vanadium	1.20
Cobalt	8.00

Typical Applications

Broaches, drills, end mills, circular and dovetail form tools, lathe tools, milling cutters, slitting saws, punches

••• M-42 High Speed Steel (AISI M2)

Forging

Heating for forging must be done slowly and uniformly, with care being taken not to put cold steel into a hot furnace. Soak through at 1700-1800°F and then heat to 1900-2050°F for initial forging. Do not forge below 1650-1700°F, and when forging is completed, cool slowly in lime, mica, dry ashes or furnace.

Annealing

Heat slowly to 1525-1550°F, hold until the entire mass is heated through, and cool slowly in the furnace (30°F per hour) to about 1000°F, after which the cooling rate may be increased. Suitable precautions must be taken to prevent excessive carburization or decarburization.

Strain Relieving

When desirable to relieve the strains of machining, heat slowly to 1150-1250°F, allow to equalize, and then cool in still air.

Preheat for Hardening

Warm slightly before charging into the preheat furnace, which should be operating at about 1450-1550°F.

Hardening

After thorough preheating, transfer to the hardening furnace, (salt bath or controlled atmosphere furnace recommended) operating at 2150-2200°F, depending on the degree of hardening required for application, and the size of the tool. It is important that the temperature be accurately controlled to avoid overheating.

Quenching

Quench in oil or a molten salt bath operating at 1000-1075°F. In the case of oil quenching, it is usually good practice to interrupt the quench by removing the tool after it has cooled to 900-1000°F, and continue the cooling in still air. Where a salt quench is employed, the tool should be held only long enough to equalize at the bath temperature, and then should be removed and cooled in air. Any necessary straightening should be done while cooling in the range of 850-450°F. Tools should be allowed to cool to 150°F, or to where they can be held in the bare hand, and then tempered immediately.

Tempering

Multiple tempering is absolutely necessary with **WM M-42**. Triple tempering will generally suffice, but if the hardening temperature has been on the high side, a fourth temper should be used to insure transformation of retained austenite and to achieve maximum toughness. The typical response to tempering is shown in the following chart.

Triple Temper, °F	Rockwell C Hardness
700	63.0
800	63.7
900	67.7
950	69.5
1000	68.2
1050	66.5
1100	64.8
1150	59.2

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