



M-2

PRODUCT INFORMATION

TYPICAL PARTS

M-2 is a widely used type of high-speed steel. Its a higher carbon content and balanced analysis produce properties applicable to all general purpose high speed uses.

ADVANTAGES

Balanced abrasion and shock resistance with good red-hardness. Weighs less and can be hardened at less temperature than other high speed steels.

FORGING/ROLLING

Forge M-2 by heating uniformly between 2050°F and 2100° F. Large pieces should be preheated at 1300° F to 1500° F before heating more rapidly to the forging temperature. Forging should be discontinued at 1800° F and the piece reheated. Soaking too long at the forging temperature should be avoided to minimize decarburization. Decarburization may be slowed by sprinkling borax on the steel when it is at a temperature of approximately 800° F. The use of a steel plate to protect the furnace from the corrosive actions of the borax is recommended. Controlled atmosphere in the heating furnace will help prevent decarburization. The forged pieces must be slow cooled.

ANNEALING

Annealing should always follow forging, preferably in controlled atmosphere furnaces. If these are not available, pack anneal sealed containers using the protective material of your choice. Heat to 1600° F. thoroughly soak, then cool in the furnace at about 30 degrees per hour to 900° F and air cool. Proper annealing should result in the hardness of Brinell 241 Max.

HARDENING

Harden M-2 by preheating slowly to 1500° F and holding until thoroughly soaked . Heat rapidly to 2250° F to 2275° F. Generally, total heating time in the furnace varies from a few minutes to a maximum of 15 minutes, depending on the size of the tool. Oil quenching from the hardening temperature is preferred for developing full hardness, although air quenching or quenching in hot salt or lead may be done. When the tools have reached a temperature of 150° F to 200° F in the quench, temper immediately. Precautions should be taken to prevent decarburization on tools which cannot be ground after harding. For this purpose non-oxidizing furnace atmospheres or salt baths may be used.

TEMPERING

The best tempering range for M-2 is 1000° F to 1050°F. This results in the best combination of cutting ability, hardness, strength, and toughness.

Chemical Analysis	
Carbon	.78/88
Phosphorus	.030 Max.
Manganese	.15/.40
Sulfur	.030 Max
Silicon	.20/.45
Chromium	3.75/4.00
Vanadium	1.75/2.20
Tungsten	5.50/6.75
Molybdenum	4.50/5.50
Cobalt	_____

Tempering Temperature °f	
As-quenched	65
400	63
500	62.5
600	62.5
700	62.5
800	63.5
900	64
1000	65.5
1050	63.5
1100	61.5

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