



## Technical Information: M50

**M50 IS A GENERAL PURPOSE HIGH SPEED STEEL**  
**M50 HAS A GOOD BALANCE OF TOUGHNESS, WEAR RESISTANCE, AND RED HARDNESS**  
**M50 IS USED FOR METAL CUTTING, WOOD AND PLASTICS CUTTING AND COLD WORK TOOLING**

**TYPICAL CHEMICAL COMPOSITION**

CARBON	0.80%	CHROMIUM	4.00%
MOLYBDENUM	4.25%	SILICON	0.20%
VANADIUM	1.00%	MANGANESE	0.30%

### TOOL STEEL PROPERTIES COMPARISON



### PHYSICAL PROPERTIES

**MODULUS OF ELASTICITY**.....29.5 PSI X 10<sup>6</sup> .....(207 GPa)  
**DENSITY**..... 0.283 LB/IN<sup>3</sup>  
**ANNEALED HARDNESS**.....215-255 BRINELL HARDNESS (BHN)  
**MACHINABILITY**.....SIMILAR TO M2 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)

2025/2075°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 2075°F
As QUENCHED	58
1000	64
1025	64
1050	63
1075	63
1100	62

#### LONGITUDINAL SIZE CHANGE

APPROXIMATELY: PLUS 0.22%