Specialty Metals LLC

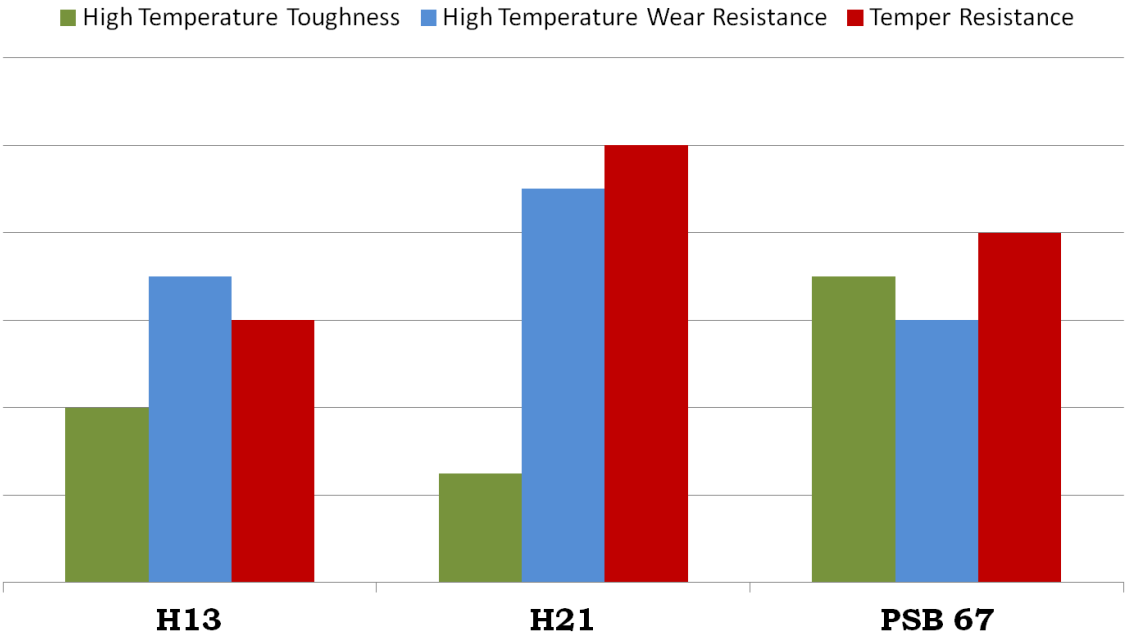
Technical Information: H21

H21 is a hot work tool steel with a good combination of hot hardness, temper resistance and moderate toughness
H21 is used as an upgrade to standard H13 for high heat applications where toughness is not as critical

Typical Chemical Composition

Carbon	0.30%	Chromium	3.30%
Molybdenum	1.40%	Silicon	0.35%
Tungsten	9.00%	Manganese	0.30%

SBSM Tool Steel Properties Comparison



Physical Properties

Modulus of Elasticity. . . . . 30 psi x 10^6 . . . . . (207 GPa)
Density. . . . . 0.298 lb/in^3
Annealed Hardness. . . . . 209-241 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 to 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)

2050°F-2250° for 5-10 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

Hardening Temp °F	Hardening Temp °C	Tempering Temp °F	Tempering Temp °C	Hardness HRC
2150	1175	1000	555	50
		1050	570	51
		1100	595	52
		1150	620	45

Thermal Conductivity	Room T	200 F 350 C	600 F 700 C
W/m*K	26	27	29

Thermal Expansion	Room T-200C	Room T-400C	Room T-800C	Room T-1200C
10-6 m/m*K	10.25	11	12.25	13

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