DATA SHEET

LATROBE SPECIALTY STEEL COMPANY
Latrobe, PA 15650-0031 USA

Preliminary

DuraTech™ 420 PM Powder Metal Tool Steel

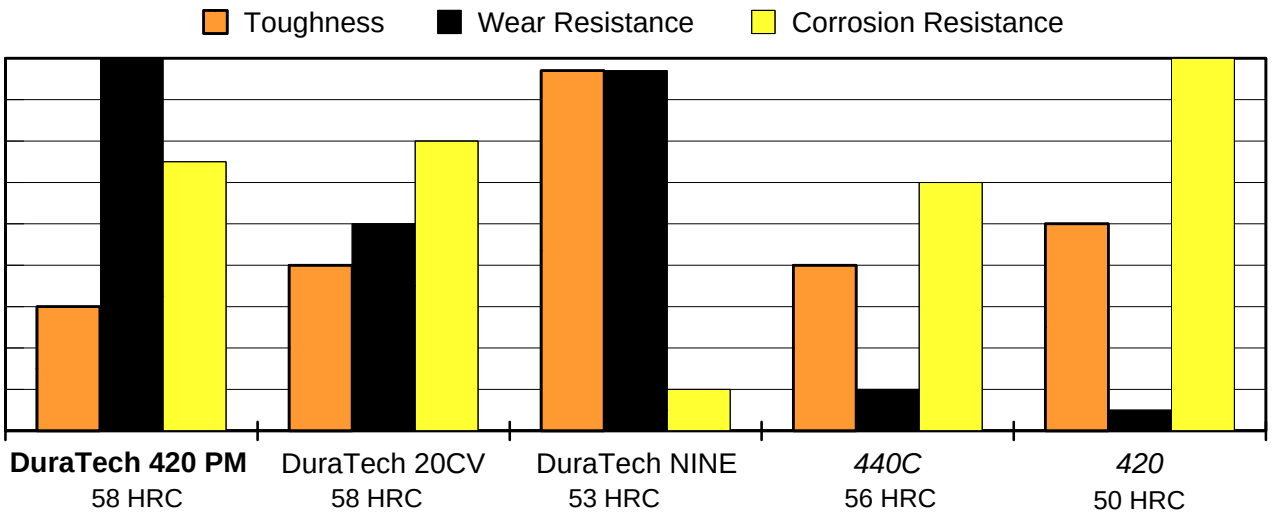
Typical Composition

C	Mn	Si	Cr	Mo	V
2.25	0.50	0.90	12.75	1.35	9.25

DuraTech 420 PM powder metal tool steel is a high vanadium, wear resistant, martensitic stainless steel. DuraTech 420PM contains a high volume of hard vanadium carbides to provide the highest level of wear resistance, in combination with good corrosion resistance. DuraTech 420PM's high vanadium content actually improves its corrosion resistance over type 440C stainless by allowing more chromium to remain in the steel's matrix structure. In type 440C stainless, much of the chromium is tied up as chromium carbides which do not improve corrosion resistance.

DuraTech 420PM should be considered for tool requiring the highest levels of wear resistance in conjunction with good corrosion resistance. These applications would include plastic injection feedscrews, screw tips, extrusion feedscrews, pelletizer and other industrial knives, food processing equipment, other components requiring this combination of properties.

Relative Properties



Physical Properties

Density: 0.27 lb/in^3 (7400 kg/m^3)
Specific Gravity: 7.40
Modulus of Elasticity: 31x10^6 psi (215 GPa)

Machinability: 35-40% of a 1% carbon steel

Coefficient of Thermal Expansion:

Temperature °F	in/in/ °F x 10^{-6}	Temperature °C	mm/mm/ °C x 10^{-6}
70 - 400	6.13	21 - 204	11.0
70 - 600	6.48	21 - 316	11.7

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DuraTech™ 420 PM
HEAT TREATING INSTRUCTIONS

(See Tech-Topics Bulletin 102 for a more thorough explanation of heat treating.)

HARDENING:

Preheating: 1500-1550°F (816-845°C), equalize.

Austenitizing (High Heat): Heat rapidly from the preheat, typically by transferring to a second furnace.

Furnace or Salt Bath: 1950-2150°F (1066-1177°C)

For maximum toughness, use 1950°F (1066°C)

For maximum wear resistance, use 2150°F (1177°C)

For a balance of properties, use 2050°F (1121°C)

Soak at temperature for 20 to 30 minutes.

Quenching: Air, pressurized gas, warm oil, or salt. Sections less than 3" thick may be air cooled to maximum hardness. Sections 3" thick or more must be quenched at a faster rate, using one of the methods below, to attain maximum hardness.

For pressurized gas, the furnace should have a minimum quench pressure of 4 bars. *The quench rate to below 1000°F (538°C) is critical to obtain the desired properties.*

For oil, quench until black, about 900°F (482°C), then cool in still air to 150-125°F (66-51°C).

For salt maintained at 1000-1100°F (538-593°C), equalize in the salt, then cool in still air to 150-125°F (66-51°C).

Tempering: *Temper immediately after quenching*. The recommended temperature range for best corrosion and wear resistance is 400-750°F (204-399°C). Hold at temperature for 1 hour per inch (25.4mm) of thickness, 2 hours minimum, then air cool to ambient temperature. Double tempering is required. Typical hardness will be 56-60 HRC. *Tempering between 800 and 1100°F (427 to 583°C) will decrease corrosion resistance and toughness.* Double tempering at 1025°F can be employed for maximum stress relieving and dimensional stability, but a reduction in corrosion resistance may result.

ANNEALING: Annealing must be performed after hot working and before rehardening. Heat at a rate not exceeding 400°F per hour (222°C per hour) to 1600 - 1650°F (871 - 899°C), and hold at temperature for 1 hour per inch of maximum thickness; 2 hours minimum. Then cool slowly with the furnace at a rate not exceeding 30°F per hour (17°C per hour) to 1000°F (538°C). Continue cooling to ambient temperature in the furnace or in air. The resultant hardness should be approximately 277 HBW.

HEAT TREATMENT RESPONSE

As Salt Quenched from	HRC
1950°F (1066°C), 30 minutes	60
2050°F (1121°C), 30 minutes	62
2150°F (1177°C), 30 minutes	63

Tempering Temperature	Austenitizing Temperature		
	1950°F 1066°C	2050°F 1121°C	2150°F 1177°C
500°F/ 538°C	56	59	60
550°F/ 551°C	57	59	60

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The data presented herein are typical values, and do not warrant suitability for any specific application or use of this material. Normal variations in the chemical composition, the size of the product, and heat treatment parameters may result in different values for the various physical and mechanical properties.

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