DATA SHEET

CPM®3V®

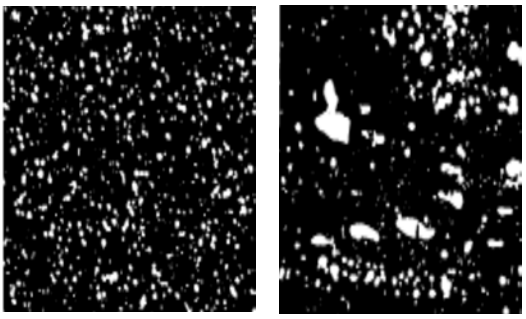
Typical Composition

C	Mn	Si	Cr	Mo	V
0.80	0.30	1.00	7.50	1.30	2.75

CPM ®3V®, made by the Crucible® Particle Metallurgy process, is designed to provide maximum resistance to breakage and chipping in a highly wear-resistant tool steel. CPM® 3V® offers impact toughness greater than A2, D2, Cru-Wear® or CPM® M4, approaching the levels of S7 and other shock resistant grades, yet it provides excellent wear resistance, high hardness and thermal stability for coatings. Intended to be used at HRC 58-60, CPM® 3V® can replace high alloy tool steels in wear applications where chronic tool breakage and chipping problems are encountered.

The CPM® process produces very homogeneous, high quality steel characterized by superior dimensional stability, grindability, and toughness compared to steels produced by conventional processes.

The *typical applications* of CPM® 3V® are stamping or forming tools, punches and dies, powder compaction tooling, blanking dies, industrial knives and slitters, shear blades, fine blanking tools, scrap choppers, cold heading tooling, rolls, and plastic injection feeder screws and tips.



Conventional Steel CPM® Steel

Mechanical Properties

Impact Toughness

The CPM® microstructure gives 3V® its high impact toughness which approaches that of the shock-resistant tool steels.

Wear Resistance

Due to the Vanadium carbides in it microstructure, CPM® 3V® has excellent wear resistance, like D2

Relative Mechanical Properties

The combination of wear resistance and toughness of CPM® 3V® makes it an excellent alternative to some other tool steel due to its high impact toughness and high range of wear resistance.

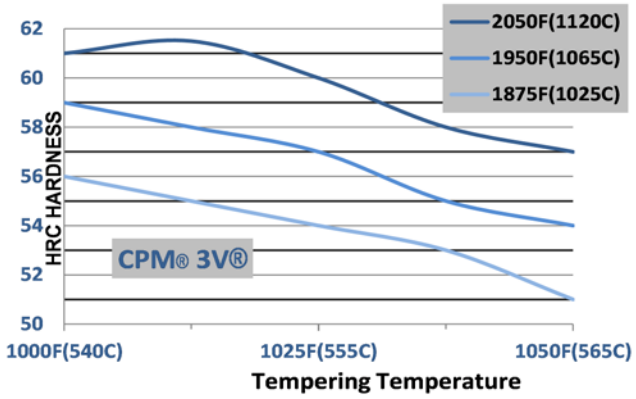
NIAGARA SPECIALTY METALS

Crucible Industries®

DATA SHEET

Heat Treatment Austenitizing Temp	HRC	Impact Toughness Ft.-lb	(J)
CPM® 3V®	58	85	(113)
CPM® 3V®	60	70	(95)
CPM® 3V®	61	40	(53)
S7	57	125	(165)
A2	60	40	(53)
D2	60	21	(28)
CRU-WEAR®	62	30	(40)
M2	62	20	(27)
CPM® M4	62	32	(43)

Heat Treat Response HRC Hardness			
Austenitizing Temperaure			
Tempering Temp	1875°F(1025C)	1950°F(1065C)	2050°F(1120C)
Minimum Time	45 Min	30 Min	20 Min
As Quenched	58	62	63
1000°F(540°C)	56	59	61
1025°F(555°C)	54	57	60
1050°F(565°C)	61	54	57
Minimum Tempers	2	3	3



Surface Treatments

Because of its high tempering temperatures (>1000°F) CPM® 3V® is suitable for nitriding, PVD coating or similar surface treatments. CVD coating processes generally exceed the critical temperature and may result in non-predictable dimensional changes.

Thermal Treatments

Annealing: Heat to 1650°F(900°C), hold 2 hours, slow cool no faster than 25°F (15°C) per hour to 1100°F (595°C), then furnace cool or cool in still air to room temperature.
Annealed Hardness: About BHN 241

Stress Relieving
Annealed Parts: Heat to 1100-1300°F (595-705°C), hold 2 hours, then furnace cool or cool in still air.
Hardened Parts: Heat to 25-50°F (15-30°C) below original tempering temperature, hold 2 hours, then furnace cool or cool in still air.

Hardening
Preheat: Heat to 1500-1550°F (815-845°C), Equalize.
Austenitize: 1875-2050°F (1025-1120°C), hold time at temperature 20-45 minutes.
Quench: Air or positive pressure quench (2 bar minimum) to below 125°F (50°C), or salt or interrupted oil quench to about 1000°F (540°C), then air cool to below 125°F (50°C). Salt bath treatment, if practical, will ensure the maximum attainable toughness for a given hardening treatment.
Temper: Three times at 1000-1050°F (540-565°C), 2 hours minimum each time. **Size Change: +0.03/0.05%**

Recommended Heat Treatment: For the best combination of toughness and wear resistance, austenitize at 1950°F(1065°C), hold 30-45 minutes, and quench. Temper 3 times at 1000°F (540°C).

Aim hardness: HRC 58-60 higher austenitizing temperatures can be used to obtain higher hardness, at a slight decrease in impact resistance. The lower austenitizing temperatures provide the best impact toughness.

Machinability and Grindability

Machinability in the annealed condition is similar to D2 and CRU-WEAR®, but grindability will be slightly better. Similar grinding equipment and practices are acceptable. “SG” type alumina wheels or CBN wheels have generally given the best performance with CPM® steels.