



TOOLING ALLOYS  
SPECIAL STEELS EUROPE

New since 1701  
Zapp Precision Metals GmbH

ZAPP



# MATURE SOLUTIONS FOR COLD WORKING APPLICATIONS

Zapp Precision Metals GmbH is the worldwide leading distributor of powder metallurgical tool steels for cold working applications. An intelligent material selection can result in considerable productivity improvements. Especially the use of powder metallurgical tool steels lead due to their special properties such as wear resistance, toughness and compression strength to a reduction of production costs.

Zapp special steels comprise several conventional and powder metallurgical tool steels for demanding cold working applications. If high toughness, high wear resistance and/or high compression strength is required, Zapp special steels deliver unbeatable results.

All here presented steels can be PVD coated with reducing the hardness after tempering.

## US 2000

Heavy-duty, conventional 8% Chromium steel with a very good cost-performance ratio

- \_ typical hardness of 60 to 62 HRc
- \_ maximum hardness up to 63 HRc
- \_ higher toughness than 1.2379 and 1.3343

## Z-TUFF PM

Highly-ductile, low-alloyed PM steel for demanding applications

- \_ typical hardness of 60 to 62 HRc
- \_ maximum hardness up to 62 HRc

## Z-WEAR PM

Wear and compression resistant PM steel

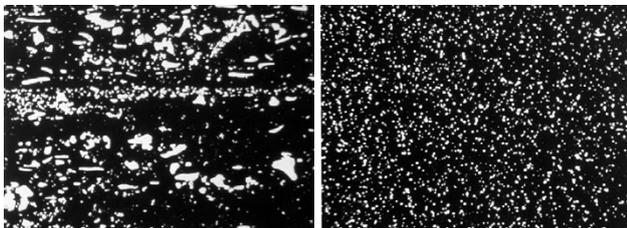
- \_ typical hardness of 60 to 62 HRc
- \_ improved compression strength up to 64 HRc
- \_ well balanced wear/toughness combination

## Z-MAX PM

Cobalt-alloyed, highly wear resistant and compression strength resistant PM steel

- \_ typical hardness of 64 to 66 HRc
- \_ excellent wear resistance due to more than 20% carbide fraction in hardened state

## MICROSTRUCTURE COMPARISON OF CONVENTIONAL AND POWDER METALLURGICAL STEELS



Conventional steel

Powder metallurgical steel

## CONVENTIONAL STEEL

Carbide bands and carbide clusters lead to inhomogeneous tool properties and reduced tool life.

## POWDER METALLURGICAL STEEL

Homogeneous carbide distribution leads to isotropic tool properties and minimizing of distortions and increased tool life.

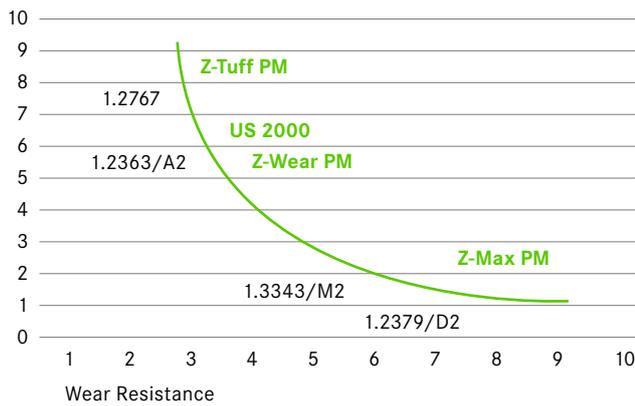
# ALLOY DESIGN AND PROPERTY COMPARISON

Typical analysis (standard values in mass-%)

Grade	C	Si	Mn	Cr	Mo	W	V	Co	Others
US 2000	1,1	1,2	0,3	7,8	1,6	1,1	2,4	-	-
Z-Tuff PM	0,7	-	-	7,5	2,0	-	1,0	-	1,5 Ni
Z-Wear PM	1,1	1,2	0,3	7,8	1,6	1,1	2,4	-	-
Z-Max PM	2,0	-	-	4,0	5,0	10,0	5,0	9,0	-
ASP® 2023	1,3	0,6	0,3	4,2	5,0	6,4	3,1	-	-
ASP® 2030	1,3	0,6	0,3	4,2	5,0	6,4	3,1	8,5	-
CPM® RexM4	1,4	0,5	0,3	4,2	5,3	5,5	4,0	-	-
CPM® RexT15	1,6	0,3	0,3	4,0	-	12,0	5,0	5,0	-

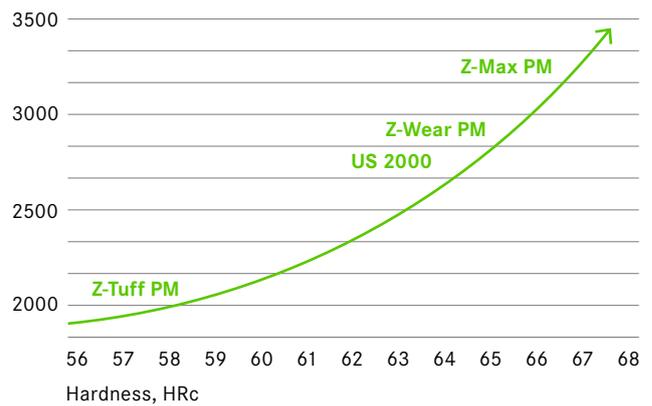
## WEAR RESISTANCE-TOUGHNESS COMPROMISE

Toughness



## HARDNESS-COMPRESSION STRENGTH RATIO

Compression strength, MPa



## MECHANICAL PROPERTIES OF ZAPP SPECIAL STEELS COMPARED TO CONVENTIONAL AND POWDER METALLURGICAL GRADES

Relative values



® CPM is a registered trademark of Crucible Industries, USA  
 ® ASP is a registered trademark of Erasteel, France



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