

## High Speed Steel for gear cutting tools

Nowadays it's possible to find in the market very sophisticated HSS with a very high percentage of components.

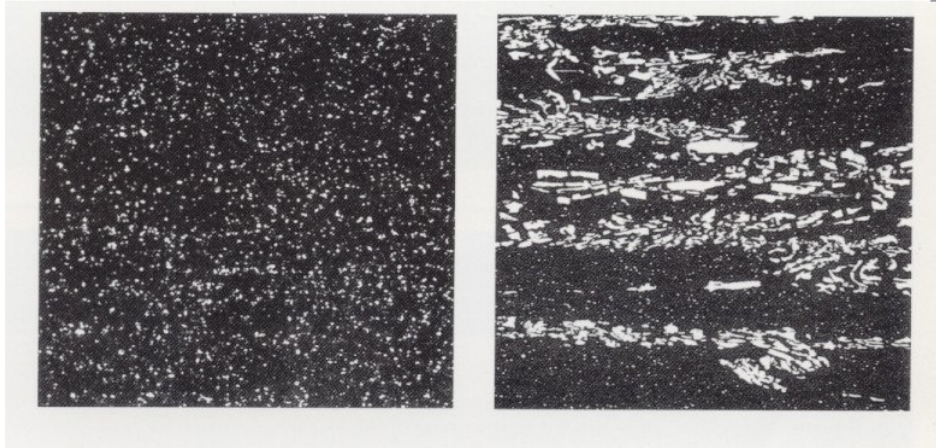
It's very common also to use steels obtained by **Powder Metallurgy** (Steels of group PM).

Tab.N°1 – Composition of main High Speed Steel

Name AISI and (HRC obtainable)	Commercial name	Chemical composition							
		C	Si	Mn	Cr	W	Mo	V	Co
M2 (63,5 – 65)	WD50	0,85	-	-	4,15	6,30	5,05	1,85	-
same	S600	0,90	-	-	4,10	6,40	5,00	1,80	-
same	EM25	0,90	-	-	4,20	6,40	5,00	1,80	-
same	ISORAPID 2000	0,89	-	-	4,30	6,40	5,00	1,90	-
same	THYRAPID 3343	0,90	-	-	4,1	6,40	5,00	1,90	-
same	DMO5	0,90	-	-	4,00	6,50	5,00	2,00	-
M2 PM (63,5 – 65)	CPMREX M2	0,85	0,30	0,30	4,15	6,40	5,00	1,95	-
M35 (64 – 65,5)	S705	0,92	-	-	4,10	6,40	5,00	1,90	4,80
same	EM35	0,93	-	-	4,20	6,40	5,00	1,80	4,80
same	VD55	0,85	-	-	3,75	6,10	5,00	2,50	5,00
same	THYRAPID 3243	0,92	-	-	4,10	6,40	5,00	1,90	4,80
same	VASCO Commentry M35	0,84	0,30	0,30	4,20	6,35	5,00	1,90	4,75
same	EMO5CO5	0,92	-	-	4,10	6,40	5,00	1,90	4,80
M35 PM (64 – 65,5)	CPMREX M35	0,85	0,30	0,30	4,15	6,00	5,00	2,00	5,00
M3-2 PM (64 – 65,5)	ASP 23	1,28	0,30	0,30	4,10	6,40	5,00	3,10	-
same	APM 23	1,28	-	-	4,20	6,30	5,00	3,10	-
same	S790	1,28	-	-	4,20	6,30	5,00	3,00	-
Group F-PM (65-66,5)	ASP 30	1,28	-	-	4,20	6,40	5,00	3,10	8,50
same	HS 30	1,27	0,60	0,30	4,20	6,25	5,00	3,10	8,50
same	CPMREX 45	1,30	0,50	0,40	4,05	6,25	5,00	3,05	8,25
same	APM 30	1,29	-	-	4,20	6,30	5,00	3,10	8,40
same	S590	1,30	-	-	4,20	6,30	5,00	3,00	8,40
Group G PM (64,5 – 66,5)	ASP 20 52	1,60	-	-	4,80	10,5	2,00	5,00	8,00
Group H PM (64,5 – 66,5)	CPMREX 76	1,50	0,30	0,30	3,75	10,0	5,23	3,10	9,00
Group I PM (65,0 - 67,0)	ASP 60	2,30	-	-	4,20	6,50	7,00	6,50	10,5
Group L PM (65,0 – 67,0)	CPMREX T15	1,55	0,30	0,30	4,00	12,25	-	5,00	5,00
M4 PM	CPMREX M4	1,35	0,30	0,30	4,00	5,75	4,50	4,00	-
same	S690	1,33	-	-	4,30	5,90	4,90	4,10	-
Group N (65,5-69,5)	CPMREX 121	3,40	-	-	4,00	10,0	5,00	9,50	9,00
M42 (66,5 – 69,0)	MO 88	1,08	-	-	3,90	1,50	9,40	1,20	8,00
same	EM 42	1,08	-	-	3,80	1,50	9,40	1,20	8,00
same	S 500	1,10	-	-	3,90	1,40	9,20	1,20	8,40
same	WD 98	1,08	-	-	3,75	1,50	9,50	1,10	8,00
M34 (64,5 - 66,5)	EMO 9 CO	0,92	-	-	4,00	2,00	8,00	2,00	8,00

The PM type steel has a more regularly distribution of carbides, how it's shown in the figure N°1.

This characteristic reduces the probability of breakage of tools and reduce also the wear of the cutting edges.



**Figure N°1**- Comparison of distribution of carbides (Left: Powder steel – Right: Forged steel)

The most common steel used for gear cutting tools are the followings:

**Hobs:** M2 -- M35 -- Powder steel Group F-PM – Super alloyed steels (M4 – M42 – M34 – T15 – CPMREX76)

**Shaper Cutters:** M2 -- Group F-PM -- M35 -- Group I-PM

**Shaving cutters:** M2 -- M3-2 PM