

**TYPICAL CHEMICAL ANALYSIS OF HIGH SPEED STEELS**

Our Tool Grade	Material Grade	Approx % of					
		C	Cr	Mo	W	Co	V
ZEDD	M2	0.90	4.1	5.0	6.4	-	1.8
S100 S400E	M35	1.2	4.4	5.0	6.4	4.8	1.9
S 200	M42	1.10	3.9	9.2	1.4	7.8	1.2
S 400 S 500	T42	1.26	4.0	3.6	9.3	10.0	3.2

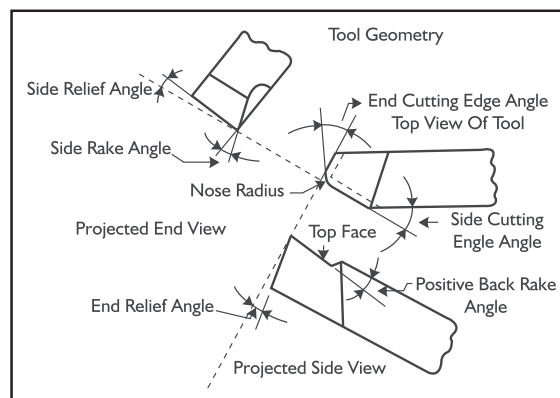
**QUALITATIVE COMPARISON OF MAJOR STEEL PROPERTIES**

Our Tool Grade	Material Grade	Red Hardness	Wear Resistance	Toughness	Grindability	Comp. Strength	Hardness Range-HRc
ZEDD	M2						1.8
S100 S400E	M35						1.9
S 200	M42						1.2
S 400 S 500	T42						3.2

This table is intended to facilitate the steel choice. It does not take into account the various stress condition imposed by different types of applications.

**GUIDELINES FOR SELECTION OF TOOLGRADE FOR VARIOUS APPLICATIONS**

- ZEDD (M2)** - General purpose Tool for machining Mild Steel for various operations like Turning, Shaping, Slotting etc.
- S100 & S400E (M35)** - Has excellent toughness and wear resistance properties. Ideal for general purpose machining using conventional speeds & feeds. Most suitable grade for machining S.S. and Brass.
- S200 (M42)** - Has higher toughness than S400 & S500 grades and excellent wear resistance properties. Ideal for applications where toughness as well as wear resistance properties are needed. i.e. shaping, planer operation.
- S400 & S500 (T42)** - Has excellent red hardness properties and hence can be used at high speeds. This can withstand high temperatures. Ideal for use in modern workshops for heavy turning, parting and threading operations. Recommended for continuous production work and on automats

**TOOLBIT TERMS - GENERAL FEATURES**


Chemical analysis given above is only representative and varies from one manufacturer to another.

### Recommended Tool Geometry For Different Operation With Single Point Cutting Tool

 PLANING TOOL	Non Ferrous	12	10	4.0	 EXTERNAL THREADING TOOL	Non Ferrous	55	0.30	5	 SLOTING TOOL					
	Cast Iron	10	8	6.0		To 0.20		4							
	Alloys Carbon Steel	8	8	10.0		Width of Tool		5							
	Stainless Steel	6	4	8.0				3							
	Type of Material	8	C	R		Type of Material	A	B	C						
 TURNING TOOL	Non Ferrous	0.30	10	12	0.2	Non Ferrous	10	10	12	10	10	Non Ferrous	12	8	2
	Cast Iron	To 0.20	8	10	0.3	Cast Iron	8	8	10	8	8	Cast Iron	6	10	2
	Alloys Carbon Steel	Width of Tool	8	8	0.3	Alloys Carbon Steel	8	8	8	8	8	Alloys Carbon Steel	6	8	2
	Stainless Steel		5	5	0.4	Stainless Steel	6	6	6	6	6	Stainless Steel	5	5	2
	Type of Material	A	3	C	R	Type of Material	A	B	C	D	E	Type of Material	C	D	B
 PART OFF TOOL	Non Ferrous	1	12	8	2	Non Ferrous	12	10	4.0	 SHAPING TOOL					
	Cast Iron	1	6	10	2	Cast Iron	10	8	6.0						
	Alloys Carbon Steel	1	6	8	2	Alloys Carbon Steel	8	8	10.0						
	Stainless Steel	1	5	5	2	Stainless Steel	6	6	8.0						
	Type of Material	B	C	D	E	Type of Material	B	C	R						

Note : Most suitable grade recommended for special steel are S400E, S200 & S500

### Toolbits Application Guide

### RECOMMENDED CUTTING SPEED - METER PER MINUTE

Material	10% Cobalt T42 S400/S500	8% Cobalt M42 S200	8% Cobalt M35 S100/S400E	M2 ZEDD
Mild Steel, Wrought Iron, Soft Brass, Copper, Bronze and Aluminium with tensile strength of less than 25 tons per square inch.	79-50	70-45	60-40	59-36
Steel & Steel Castings such as slightly hard Mild Steel, Soft Cast Iron & other metals like hard Brass, Copper & Aluminium with tensile strength upto 38 tons per square inch	39-26	36-24	33-32	30-21
Steel & Steel Castings such as Carbon Steel, medium hard cast Iron & other metals like hard Brass, Copper, Bronze & Aluminium with tensile strength upto 45 tons per square inch	29-21	21-15	20-14	18-23
Steel & Steel Castings such as Oil Hardened Steel, Chrome Steel, Hard Cast Iron, etc. With a tensile strength upto 50 tons per square inch.	22-16	21-15	20-14	18-23
Steel & Steel Castings including annealed High Speed Steel, with a tensile strength upto 65 tons per square inch.	15-13	15-12	14-11	12-10

### RECOMMENDED DEPTH OF CUT

OPERATION	DEPTH OF CUT mm
Rough turning	Depth of cut = machining allowance
Semi finish turning	0.50 to 0.20mm
Finish turning	0.40 to 0.10mm

### RECOMMENDED FEED

Surface Finish μ	Work Material	Range of cutting speed m/min.	Nose Radius in mm		
			0.5	1.0	2.0
Feed in mm/rev.					
10	Carbon steel & Alloy steel	<50	0.3 - 0.5	0.45 - 0.60	0.55 - 0.7
		>50	0.4 - 0.55	0.55 - 0.65	0.65 - 0.7
	Cast Iron Bronze & Aluminium Alloys	All Range	0.25 - 0.4	0.40 - 0.5	0.5 - 0.6
5	Carbon steel & Alloy steels	<50	0.18 - 0.25	0.25 - 0.3	0.3 - 0.4
		>50	0.25 - 0.3	0.3 - 0.35	0.35 - 0.5
	Cast Iron, Bronze & Aluminium Alloys	All Range	0.15 - 0.25	0.25 - 0.4	0.4 - 0.6
2.5	Carbon steel & Alloy steel	< 50	0.10	0.11 - 0.15	0.15 - 0.22
		50 - 100	0.11 - 0.16	0.16 - 0.25	0.25 - 0.35
		> 100.	0.16 - 0.20	0.20 - 0.25	0.25 - 0.35
	Cast Iron, Bronze & Aluminium Alloys	All Range	0.1 - 0.15	0.15 - 0.2	0.2 - 0.35

**RECOMMENDED ANGLES FOR HIGH SPEED STEEL SINGLE POINT TOOLS**

Material	Side Relied angle degrees	End Relied angle degrees	Black Rake angle degrees	Side Rake angle degrees
High Speed, Alloy & High Carbon Tool Steels and Stainless steel	7 to 9	6 to 8	5 to 7	8 to 10
<b>SAE Steel</b>				
1020, 1035, 1040	8 to 10	8 to 10	10 to 12	10 to 12
1045, 1095	7 to 9	8 to 10	10 to 12	10 to 12
1112, 1120	7 to 9	7 to 9	12 to 14	12 to 14
1314, 1315	7 to 9	7 to 9	12 to 14	14 to 16
1335	7 to 9	7 to 9	12 to 14	14 to 16
2315, 2320	7 to 9	7 to 9	8 to 10	10 to 12
2330, 2335, 2340	7 to 9	7 to 9	8 to 10	10 to 12
2345, 2350	7 to 9	7 to 9	6 to 8	8 to 10
3115, 3120, 3130	7 to 9	7 to 9	8 to 10	10 to 12
3135, 3140	7 to 9	7 to 9	8 to 10	8 to 10
3250, 4140, 4340	7 to 9	7 to 9	6 to 8	8 to 10
6140, 6145	7 to 9	7 to 9	6 to 8	8 to 10
Aluminum	12 to 14	8 to 10	30 to 35	14 to 16
Brass, Free Cutting	10 to 12	8 to 10	0	0
Red, Yellow, Bronze Cast & Bronze Commercial	10 to 12	8 to 10	0	1 to 3
Bronze Free Cutting	8 to 10	8 to 10	0	-2 to -4
	8 to 10	8 to 10	0	2 to 4
Copper	12 to 14	12 to 14	14 to 16	18 to 20
<b>Copper Alloys :</b>				
Hard	8 to 10	6 to 8	0	0
Fibre	14 to 16	12 to 14	0 to 2	0
Formica	14 to 16	10 to 12	14 to 16	10 to 12
Nickel Iron	14 to 16	10 to 12	6 to 8	12 to 14
Monel & Nickel	14 to 16	12 to 14	8 to 10	12 to 14
Nickel, Silver	10 to 12	10 to 12	8 to 10	0 to -2
Rubber, Hard	18 to 20	14 to 16	0 to -2	0 to -2