INCH METRIC

Mirror Ball

Recommended Cutting Data for Mirror Ball

Material	Insert Style	Grade	SFM		6mm 1/4"	8mm 5/16"	10mm 3/8"	12mm 1/2"	16mm 5/8"	20mm 3/4"	25mm 1"	30mm 32mm 1-1/4"
Gray Cast Iron (200-250 HB)	BNM/BME BNM/BME-TG BNM/BME-TS	DH103 DH102 DH202	1200	RPM	18,000	15,000	12,000	9,000	7,400	6,000	4,500	3,600
				IPM	360	300	280	220	220	180	180	140
				DOC	.006"	.008"	.010"	.010"	.012"	.012"	.015"	.015"
				WOC	.006"	.008"	.010"	.010"	.012"	.012"	.015"	.015"
Nodular Cast Iron (180-250 HB)	BNM/BME BNM/BME-TG BNM/BME-TS	DH103 DH102 DH202	1100	RPM	16,500	13,500	11,000	8,500	6,500	5,500	4,200	3,300
				IPM	330	270	260	200	200	165	170	130
				DOC	.006"	.008"	.010"	.010"	.012"	.012"	.015"	.015"
				WOC	.006"	.008"	.010"	.010"	.012"	.012"	.015"	.015"
Carbon Steel (up to 50 HRC)	BNM/BME BME-S BNM-SS	DH103 JC8008 DH108	1000	RPM	15,000	12,000	10,000	7,600	6,000	5,000	3,800	3,000
				IPM	300	240	240	180	180	150	150	120
				DOC	.006"	.006"	.008"	.008"	.010"	.010"	.012"	.012"
				WOC	.006"	.006"	.008"	.008"	.010"	.010"	.012"	.012"
Low Alloy Steel (up to 50 HRC)	BNM/BME BME-S BNM-SS	DH103 JC8008 DH108	800	RPM	12,500	9,800	8,000	6,000	5,000	4,000	3,000	2,500
				IPM	250	200	190	150	150	120	120	100
				DOC	.006"	.006"	.008"	.008"	.010"	.010"	.010"	.010"
				WOC	.006"	.006"	.008"	.008"	.010"	.010"	.012"	.012"
Mold Steel (30-40 HRC)	BNM/BME BME-S BNM-SS	DH103 JC8008 DH108	900	RPM	14,000	11,000	9,000	7,000	5,500	4,500	3,500	2,750
				IPM	170	175	150	140	130	135	100	100
				DOC	.006"	.006"	.008"	.008"	.010"	.010"	.012"	.012"
				WOC	.006"	.008"	.008"	.010"	.010"	.012"	.012"	.015"
Tool & Die Steel (40-50 HRC)	BNM/BME BME-S BNM-SS	DH103 JC8008 DH108	750	RPM	11,500	9,000	7,600	5,700	4,600	3,800	2,800	2,300
				IPM	140	125	120	115	100	100	90	70
				DOC	.005"	.006"	.008"	.008"	.010"	.010"	.012"	.012"
				WOC	.005"	.006"	.008"	.008"	.010"	.010"	.012"	.012"
Hardened Die Steel (50-60 HRC)	BNM/BME-TG BME-S BNM-SS BNM-TS	DH102 JC8008 DH108 DH202	600	RPM	9,000	7,300	6,000	4,600	3,700	3,000	2,300	1,800
				IPM	90	80	75	70	65	60	50	45
				DOC	.005"	.006"	.007"	.008"	.009"	.010"	.010"	.010"
				WOC	.005"	.006"	.007"	.008"	.009"	.010"	.010"	.010"
Stainless Steel (45 HRC)	BME-S BNM-SS	JC8008 DH108	650	RPM	10,000	8,000	6,600	5,000	4,000	3,300	2,500	2,000
				IPM	100	100	90	100	80	80	75	60
				DOC	.006"	.006"	.008"	.008"	.010"	.010"	.012"	.012"
				WOC	.006"	.006"	.008"	.008"	.010"	.010"	.012"	.012"
Titanium	BME-S BNM-SS	JC8008 DH108	300	RPM	4,600	3,700	3,000	2,300	1,800	1,500	1,150	900
				IPM	18	15	18	14	14	12	12	9
				DOC	.004"	.004"	.006"	.006"	.008"	.008"	.010"	.010"
				WOC	.004"	.004"	.006"	.006"	.008"	.008"	.010"	.010"
Copper Alloys	BNM BME/BNM-S	KT9 FZ05 JC20003	500	RPM	7,600	6,000	5,000	3,800	3,000	2,500	1,900	1,500
				IPM	150	120	150	120	120	100	100	75
				DOC	.006"	.006"	.008"	.008"	.010"	.010"	.012"	.012"
				WOC	.008"	.008"	.010"	.010"	.012"	.012"	.015"	.015"
Aluminum	BNM BME/BNM-SS	KT9 FZ05 JC20003	2000	RPM	30,000	25,000	20,000	15,000	12,500	10,000	7,600	6,000
				IPM	600	500	400	300	300	250	225	180
				DOC	.008"	.010"	.012"	.015"	.015"	.020"	.020"	.025"
				WOC	.008"	.010"	.012"	.015"	.015"	.020"	.020"	.025"
Graphite	BNM BNM-S	JC10000 JC20003	2500	RPM	38,000	30,000	25,000	19,000	15,000	12,500	9,500	7,600
				IPM	600	700	600	550	480	400	320	260
				DOC	.006"	.008"	.010"	.012"	.015"	.015"	.020"	.020"
				WOC	.008"	.008"	.010"	.012"	.012"	.012"	.015"	.015"

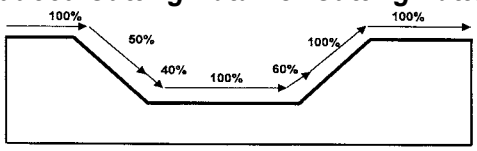
NOTE: 1. These parameters represent stable machining with a steel body at lengths 4XD. See table below for longer applications.
2. Parameters for carbide bodies please refer to effective diameter chart on A-19.
3. For best performance use carbide bodies on tools 5/8" diameter and smaller over 3XD.
4. IPT = IPM / RPM / # of teeth

Additional Cutting Data For Longer Tools

Reach/Dia.	~4.0	4.1~4.5	4.6~5.3	5.4~5.7	5.8~6.2	6.3~6.8	6.9~
rpm %	100	90	80	80	75	70	65
Feed %	100	90	90	80	75	70	65

NOTE: The above percentages should be applied, according to tool ratio.

Reduced Cutting Data For Cutting Pattern



NOTE: Feed should be reduced when cutting the above pattern

DIJET®

Mirror Ball

METRIC

Recommended Cutting Data for Mirror Ball with CBN

Material	Grade	SFM		16mm	20mm	25mm	30mm
Gray Cast Iron (200-250 HB)	JBN245	4500	RPM	27,000	22,000	17,500	15,000
			IPM	450	350	280	240
			DOC	.004”	.006”	.008”	.010”
			WOC	.006”	.008”	.010”	.012”
Nodular Cast Iron (180-250 HB)	JBN245	4000	RPM	24,000	19,500	15,500	13,000
			IPM	380	300	250	200
			DOC	.004”	.006”	.008”	.010”
			WOC	.006”	.008”	.010”	.012”
Hardened Die Steel (50-60 HRC)	JBN245	3000	RPM	18,000	14,500	11,500	9,700
			IPM	290	230	180	160
			DOC	.003”	.004”	.005”	.006”
			WOC	.004”	.005”	.006”	.008”

NOTE: 1. These parameters represent stable machining with a steel body at lengths 4XD. See table below for longer applications.
2. Parameters for carbide bodies please refer to effective diameter chart on A-19.
3. For best performance use carbide bodies on tools 5/8” diameter and smaller over 3XD.
4. IPT = IPM / RPM / # of teeth

Recommended Cutting Data for Mirror Ball with GRM insert in CBN

Material	Grade	SFM		16mm	20mm	25mm	30mm
Gray Cast Iron (200-250 HB)	JBN245	4500	RPM	27,000	22,000	17,500	15,000
			IPM	450	350	280	240
			DOC	.004”	.006”	.008”	.010”
			WOC	.012”	.015”	.018”	.020”
Nodular Cast Iron (180-250 HB)	JBN245	4000	RPM	24,000	19,500	15,500	13,000
			IPM	380	300	250	200
			DOC	.004”	.006”	.008”	.010”
			WOC	.012”	.015”	.018”	.020”
Hardened Die Steel (50-60 HRC)	JBN245	3000	RPM	18,000	14,500	11,500	9,700
			IPM	290	230	180	160
			DOC	.003”	.004”	.005”	.006”
			WOC	.010”	.012”	.015”	.020”

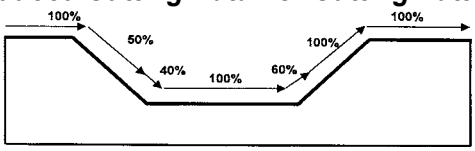
NOTE: 1. These parameters represent stable machining with a steel body at lengths 4XD. See table below for longer applications.
2. Parameters for carbide bodies please refer to effective diameter chart on A-19.
3. For best performance use carbide bodies on tools 5/8” diameter and smaller over 3XD.
4. IPT = IPM / RPM / # of teeth

Additional Cutting Data For Longer Tools

Reach/Dia.	~4.0	4.1~4.5	4.6~5.3	5.4~5.7	5.8~6.2	6.3~6.8	6.9~
rpm %	100	90	80	80	75	70	65
Feed %	100	90	90	80	75	70	65

NOTE: The above percentages should be applied, according to tool ratio.

Reduced Cutting Data For Cutting Pattern



NOTE: Feed should be reduced when cutting the above pattern

METRIC

Mirror Ball

Recommended Cutting Data for Mirror Ball with GRM Insert

Material	Grade	SFM		16mm	20mm	25mm	30mm
Gray Cast Iron (200-250 HB)	DH102 JC8015	1200	RPM	7,400	6,000	4,500	3,600
			IPM	220	180	180	140
			DOC	.012”	.012”	.015”	.015”
			WOC	.015”	.020”	.025”	.030”
Nodular Cast Iron (180-250 HB)	DH102 JC8015	1000	RPM	6,500	5,500	4,200	3,300
			IPM	200	165	170	130
			DOC	.012”	.012”	.015”	.015”
			WOC	.015”	.020”	.025”	.030”
Carbon Steel	JC8015	900	RPM	6,000	5,000	3,800	3,000
			IPM	180	150	150	120
			DOC	.010”	.010”	.012”	.012”
			WOC	.015”	.020”	.025”	.030”
Low Alloy Steel	JC8015	800	RPM	5,000	4,000	3,000	2,500
			IPM	150	120	120	100
			DOC	.010”	.010”	.010”	.010”
			WOC	.015”	.020”	.025”	.030”
Mold Steel (30-40 HRC)	DH102 JC8015	800	RPM	5,500	4,500	3,500	2,750
			IPM	130	135	100	100
			DOC	.010”	.010”	.012”	.012”
			WOC	.015”	.020”	.025”	.030”
Tool & Die Steel (40-50 HRC)	DH102	550	RPM	4,600	3,800	2,800	2,300
			IPM	100	100	90	70
			DOC	.010”	.010”	.012”	.012”
			WOC	.015”	.020”	.025”	.030”
Hardened Die Steel (50-60 HRC)	DH102	450	RPM	3,700	3,000	2,300	1,800
			IPM	65	60	50	45
			DOC	.009”	.010”	.010”	.010”
			WOC	.012”	.015”	.020”	.025”
Stainless Steel (45 HRC)	JC8015	650	RPM	4,000	3,300	2,500	2,000
			IPM	80	80	75	60
			DOC	.010”	.010”	.012”	.012”
			WOC	.015”	.020”	.025”	.030”
Titanium	JC8015	300	RPM	1,800	1,500	1,150	900
			IPM	14	12	12	9
			DOC	.008”	.008”	.010”	.010”
			WOC	.010”	.012”	.015”	.020”
Copper Alloys	JC8015	700	RPM	3,000	2,500	1,900	1,500
			IPM	120	100	100	75
			DOC	.010”	.010”	.012”	.012”
			WOC	.020”	.025”	.030’	.035”

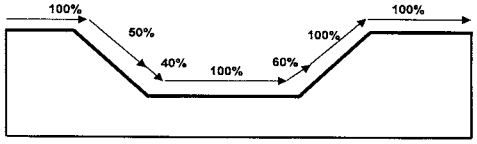
NOTE: 1. These parameters represent stable machining with a steel body at lengths 4XD. See table below for longer applications.
2. Parameters for carbide bodies please refer to effective diameter chart on A-19.
3. For best performance use carbide bodies on tools 5/8” diameter and smaller over 3XD.
4. IPT = IPM / RPM / # of teeth

Additional Cutting Data For Longer Tools

Reach/Dia.	~4.0	4.1~4.5	4.6~5.3	5.4~5.7	5.8~6.2	6.3~6.8	6.9~
rpm %	100	90	80	80	75	70	65
Feed %	100	90	90	80	75	70	65

NOTE: The above percentages should be applied, according to tool ratio.

Reduced Cutting Data For Cutting Pattern



NOTE: Feed should be reduced when cutting the above pattern

DIJET®

Copy Milling | Pocket Milling | Slotting

Mirror Ball

INCH

Cutting Data for BNM

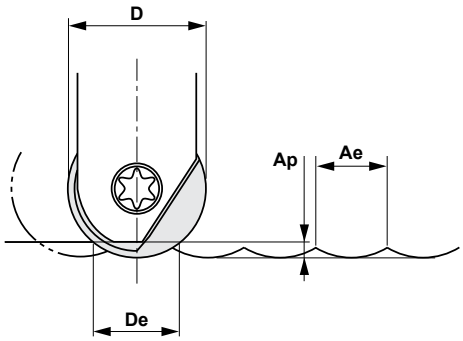
Calculation of cutting data

Spindle speed

RPM = 3.82 x SFM ÷ D

SFM = .262 x RPM x D

$De=2 \times \sqrt{Ap \times (D-Ap)}$



Feed

IPM = RPM x IPT x # of teeth

IPT = IPM ÷ RPM ÷ # of teeth

RPM = Rotations per min (spindle speed)

SFM = Surface footage per minute

IPM = Inches per minute (feed)

IPT = Inches per tooth (chip load)

De = Effective diameter (for carbide shank tools use table below)

D = Diameter of tool

Ap = Axial depth of cut (step down)

Ae = Radial depth of cut (step over)

1 inch = 25.4 mm 1 mm = 0.03937”

Effective tool diameter chart for carbide shank tools

Cutter Dia. D (inch)	Effective Tool Diameter : De (inch)													
	Axial Depth of Cut : Ap (inch)													
	.005”	.010”	.015”	.025”	.035”	.050”	.100”	.125”	.150”	.200”	.250”	.300”	.350”	.400’
1/4”	0.070	0.098	0.119	0.150	0.173	0.200	0.245	0.250						
5/16”	0.078	0.110	0.133	0.169	0.197	0.229	0.291	0.306	0.312					
3/8”	0.086	0.121	0.147	0.187	0.218	0.255	0.332	0.354	0.367	0.374				
1/2”	0.099	0.140	0.171	0.218	0.255	0.300	0.400	0.433	0.458	0.490	0.500			
5/8’	0.111	0.157	0.191	0.245	0.287	0.339	0.458	0.500	0.534	0.583	0.612	0.624		
3/4”	0.122	0.172	0.210	0.269	0.316	0.374	0.510	0.559	0.600	0.663	0.707	0.734	0.748	
1”	0.141	0.199	0.243	0.312	0.368	0.436	0.600	0.661	0.714	0.800	0.866	0.917	0.954	0.980
1 1/4”	0.158	0.223	0.272	0.350	0.412	0.490	0.678	0.750	0.812	0.917	1.000	1.070	1.122	1.116

NOTE: When calculating SFM/RPM use De in place of D