Mirror Ball

High Precision Indexable Ball Nose End Mill

High Precision: Insert radius form accuracy is below ± .0004” when fixed to the holder (accuracy below ± .00024” on insert alone), increasing the possibility of equal or higher precision machining when comparing solid ball nose end mill machining.

Cost Performance: Finishing with Mirror Ball can replace the conventional solid carbide ball nose end mill. By adopting economical indexable insert, tool costs of finishing process can be reduced greatly.

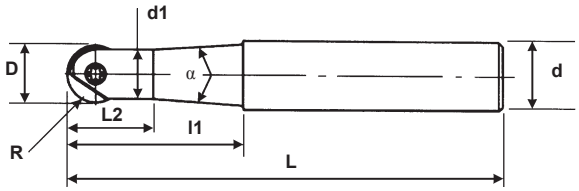
- ***Round shape insert with improved edge sharpness***
  Adopting the round shape insert can reduce the risk of vibration even in perpendicular wall milling and cut smoothly for intricate from in high speed copy milling.
- ***Mirror-S Insert***
  “S” shape makes it suitable for high hardened material in high speed cutting. The positive geometry enables it to cut more smoothly.
- ***Precision clamp screw mounting***
  Strong clamping and accurate location mechanism by using the single precision clamp screw gives high repeatability and rigidity.
- ***DZ coating***
  The DZ coating (TiAlN coated by PVD process) achieves maximum tool life for finishing operation in high speed cutting.
- ***Carbide shank***
  Using the carbide shank or carbide holder with modular head achieves maximum tool life and highest precision machining for finishing operation in high speed cutting.

Mirror Ball

INCH

STEEL SHANK

BNM Type - Taper Style



Specifications

CATALOG NUMBER	STK	DIMENSIONS								INSERT INCH (METRIC)	PARTS	
		D	R	L	d1	l1	L2	d	*a*		Screw	Wrench
BNMS-060035T-S037	•	.250	.125	3.62	.212	1.37	.590	.375	12°	BME-0250 (BNM-060)	FSW-2005H	T-06
BNMS-080035T-S050	•	.312	.156	3.62	.283	1.37	.728	.500	21°17’	BME-0312 (BNM-080)	FSW-2506H	T-07
BNMM-080053T-S050	•	.312	.156	4.33	.283	2.08	.728	.500	8°			
BNML-080075T-S050	•	.312	.156	5.19	.283	2.95	.728	.500	3°40’			
BNMS-100035T-S050	•	.375	.187	3.62	.355	1.37	.827	.500	19°3’	BME-0375 (BNM-100)	FSW-3007H	T-08
BNMM-100053T-S050	•	.375	.187	4.33	.355	2.08	.827	.500	7°			
BNML-100075T-S050	•	.375	.187	5.19	.355	2.95	.827	.500	3°40’			
BNMM-120053T-S050	•	.500	.250	4.33	.393	2.08	.866	.500	3°	BME-0500 (BNM-120)	FSW-3509	T-10
BNML-120085T-S062	•	.500	.250	5.70	.393	3.34	.866	.625	3°			
BNMM-160063T-S062	•	.625	.312	4.84	.551	2.48	1.10	.625	2°48’	BME-0625 (BNM-160)	FSW-4013	T-15
BNML-160100T-S075	•	.625	.312	6.53	.551	3.93	1.10	.750	3°			
BNMM-200075T-S075	•	.750	.375	5.55	.669	2.95	1.34	.750	2°	BME-0750 (BNM-200)	FSW-5016	A-20
BNML-200115T-S100	•	.750	.375	7.51	.669	4.52	1.34	1.00	4°			
BNMM-250090T-S100	•	1.00	.500	6.53	.826	3.54	1.61	1.00	4°40’	BME-1000 (BNM-250)	FSW-6020	T-30
BNML-250135T-S125	•	1.00	.500	8.46	.826	5.31	1.61	1.25	3°			
BNMM-300106T-S125	•	1.25	.625	7.32	1.02	4.17	1.93	1.25	5°30’	BME-1250 (BNM-300) (BNM-320)	FSW-8025	A-40
BNML-300160T-S125	•	1.25	.625	9.44	1.02	6.29	1.93	1.25	2°20’			

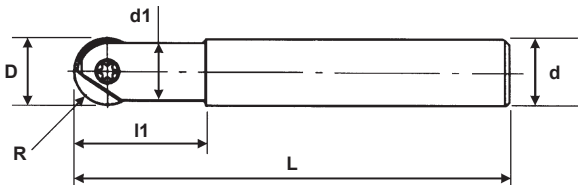
Note: All cutters are supplied without inserts.

INCH

Mirror Ball

STEEL SHANK

BNM Type - Straight Style



Specifications

CATALOG NUMBER	STK	DIMENSIONS							INSERT INCH (METRIC)	PARTS	
		D	R	L	d1	l1	d	a		Screw	Wrench
BNMS-120026S-S050	•	.500	.250	3.26	.393	1.02	.500	-	BME-0500 (BNM-120)	FSW-3509	T-10
BNMM-120032S-S050	•	.500	.250	5.13	.393	1.26	.500	-			
BNMM-120053S-S050	•	.500	.250	4.33	.393	2.08	.500	-			
BNML-120046S-S050	•	.500	.250	5.88	.393	1.81	.500	-			
BNMS-160032S-S062	•	.625	.312	3.62	.551	1.26	.625	-	BME-0625 (BNM-160)	FSW-4013	T-15
BNMM-160063S-S062	•	.625	.312	4.84	.551	2.48	.625	-			
BNMS-200038S-S075	•	.750	.375	4.09	.669	1.49	.750	-	BME-0750 (BNM-200)	FSW-5016	A-20
BNMM-200044S-S075	•	.750	.375	6.28	.669	1.73	.750	-			
BNMM-200075S-S075	•	.750	.375	5.55	.669	2.95	.750	-			
BNML-200060S-S075	•	.750	.375	6.88	.669	2.36	.750	-			
BNMS-250045S-S100	•	1.00	.500	4.76	.826	1.77	1.00	-	BME-1000 (BNM-250)	FSW-6020	T-30
BNMM-250070S-S100	•	1.00	.500	7.50	.826	2.76	1.00	-			
BNMM-250090S-S100	•	1.00	.500	6.53	.826	3.54	1.00	-			
BNML-250080S-S100	•	1.00	.500	9.06	.826	3.15	1.00	-			
BNMS-300053S-S125	•	1.25	.625	5.23	1.02	2.08	1.25	-	BME-1250 (BNM-300 or BNM-320)	FSW-8025	A-40
BNMM-300106S-S125	•	1.25	.625	7.32	1.02	4.17	1.25	-			

Note: All cutters are supplied without inserts.

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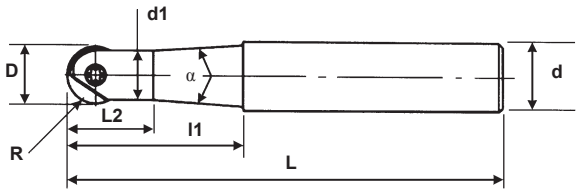
Mirror Ball

METRIC

STEEL SHANK

BNM Type - Taper Style



Specifications

CATALOG NUMBER	STK	DIMENSIONS								INSERT (METRIC) INCH	PARTS	
		D	R	L	d1	l1	L2	d	*a*		Screw	Wrench
BNMS-060030T-S10	•	6	3	80	5.4	30	15	10	8°15'	BNM-060 (BME-0250)	FSW-2005H	T-06
BNMS-080035T-S12	•	8	4	92	7.2	35	19	12	7°45'	BNM-080 (BME-0312)	FSW-2506H	T-07
BNMM-080053T-S12	•	8	4	110	7.2	53	19	12	3°30'			
BNML-080075T-S12	•	8	4	132	7.2	75	19	12	1°30'			
BNMS-100035T-S12	•	10	5	92	9	35	21	12	5°45'	BNM-100 (BME-0375)	FSW-3007H	T-08
BNMM-100053T-S12	•	10	5	110	9	53	21	12	2°30'			
BNML-100075T-S12	•	10	5	132	9	75	21	12	1°			
BNMM-120053T-S12	•	12	6	110	10	53	22	12	1°30'	BNM-120 (BME-0500)	FSW-3509	T-10
BNML-120085T-S16	•	12	6	145	10	85	22	16	1°30'			
BNMM-160063T-S16	•	16	8	123	14	63	28	16	1°30'	BNM-160 (BME-0625)	FSW-4013	T-15
BNML-160100T-S20	•	16	8	166	14	100	28	20	1°30'			
BNM-200050T-S25LS	•	20	10	170	17	50	34	25	12°	BNM-200 (BME-0750)	FSW-5016	A-20
BNMM-200075T-S20	•	20	10	141	17	75	34	20	2°			
BNML-200115T-S25	•	20	10	191	17	115	34	25	1°50'			
BNM-250060T-S32LS	•	25	12.5	200	21	60	41	32	14°	BNM-250 (BME-1000)	FSW-6020	T-30
BNMM-250090T-S25	•	25	12.5	166	21	90	41	25	2°20'			
BNML-250135T-S32	•	25	12.5	215	21	135	41	32	1°30'			
BNM-300080T-S32LS	•	30	15	220	26	80	49	32	4°	BNM-300 or BNM-320 (BME-1250)	FSW-8025	A-40
BNMM-300106T-S32	•	30	15	186	26	106	49	32	3°			
BNML-300160T-S32	•	30	15	240	26	160	49	32	1°10'			
BNMM-320106T-S32	•	32	16	186	26	106	49	32	3°	BNM-320 (BME-1250)	FSW-8025	A-40
BNML-320160T-S32	•	32	16	240	26	160	49	32	1°10'			

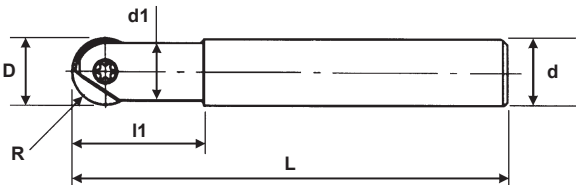
Note: All cutters are supplied without inserts.

METRIC

Mirror Ball

STEEL SHANK

BNM Type - Straight Style



Specifications

CATALOG NUMBER	STK	DIMENSIONS								INSERT METRIC (INCH)	PARTS	
		D	R	L	d1	l1	L2	d	a		Screw	Wrench
BNMS-120026S-S12	•	12	6	83	10	26	-	12	-	BNM-120 (BME-0500)	FSW-3509	T-10
BNMM-120053S-S12	•	12	6	110	10	53	-	12	-			
BNMM-160032S-S16	•	16	8	92	14	32	-	16	-	BNM-160 (BME-0625)	FSW-4013	T-15
BNMM-160063S-S16	•	16	8	123	14	63	-	16	-			
BNMS-200038S-S20	•	20	10	104	17	38	-	20	-	BNM-200 (BME-0750)	FSW-5016	A-20
BNMM-200075S-S20	•	20	10	141	17	75	-	20	-			
BNMS-250045S-S25	•	25	12.5	121	21	45	-	25	-	BNM-250 (BME-1000)	FSW-6020	T-30
BNMM-250090S-S25	•	25	12.5	166	21	90	-	25	-			
BNMS-300053S-S32	•	30	15	133	26	53	-	32	-	BNM-300 or BNM-320 (BME-1250)	FSW-8025	A-40
BNMM-300106S-S32	•	30	15	186	26	106	-	32	-			
BNMS-320053S-S32	•	32	16	133	26	53	-	32	-	BNM-320 (BME-1250)	FSW-8025	A-40
BNMM-320106S-S32	•	32	16	186	26	106	-	32	-			

Note: All cutters are supplied without inserts.

STEEL SHANK

BNM Type - Morse Taper Shank

Fig. 1

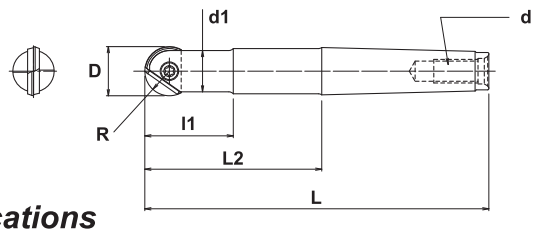
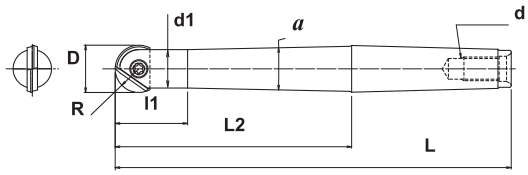


Fig. 2



Specifications

CATALOG NUMBER	STK	DIMENSIONS								FIG.	INSERT METRIC (INCH)	PARTS	
		D	R	L	d1	l1	L2	d	a			Screw	Wrench
BNMS-200038S-MT2	•	20	10	106	17	38	-	MT2	-	1	BNM-200 (BME-0750)	FSW-5016	A-20
BNMM-200075S-MT2	•	20	10	143	17	35	-	MT2	-	1			
BNML-200115T-MT3	•	20	10	200	17	34	115	MT3	1°7’	2			
BNMS-250045S-MT3	•	25	12.5	130	21	45	-	MT3	-	1	BNM-250 (BME-1000)	FSW-6020	T-30
BNMM-250060S-MT3	•	25	12.5	145	21	45	60	MT3	-	1			
BNMM-250090S-MT3	•	25	12.5	175	21	45	90	MT3	-	1			
BNML-250135T-MT4	•	25	12.5	243	21	41	135	MT4	1°33’	2			
BNMS-320053S-MT4	•	32	16	161	26	53	-	MT4	-	1	BNM-320 (BME-1250)	FSW-8025	A-40
BNML-320160T-MT4	•	32	16	268	26	49	160	MT4	2°20’	2			

Note: All cutters are supplied without inserts.

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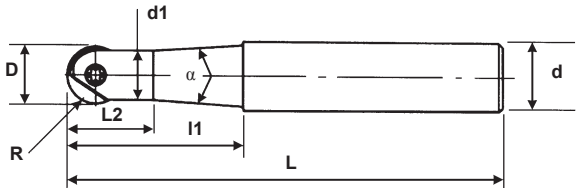
Mirror Ball

INCH

CARBIDE SHANK

BNM-C Type - Taper Style



Specifications

CATALOG NUMBER	STK	DIMENSIONS								INSERT INCH (METRIC)	PARTS	
		D	R	L	d1	l1	L2	d	a		Screw	Wrench
BNMS-060032T-S037C	•	.250	.125	3.50	.212	1.26	.492	.375	10°	BME-0250 (BNM-060)	FSW-2005H	T-06
BNMM-060050T-S037C	•	.250	.125	4.21	.212	1.96	.492	.375	5°			
BNML-060072T-S037C	•	.250	.125	5.07	.212	2.83	.492	.375	3°			
BNMXL-060092T-S037C	•	.250	.125	5.86	.228	3.62	.492	.375	2°			
BNMS-080035T-S050C	•	.312	.156	3.62	.283	1.37	.787	.500	10°	BME-0312 (BNM-080)	FSW-2506H	T-07
BNMM-080053T-S050C	•	.312	.156	4.33	.283	2.08	.787	.500	8°			
BNML-080075T-S050C	•	.312	.156	5.19	.283	2.95	.787	.500	5°			
BNMXL-080095T-S050C	•	.312	.156	6.30	.283	3.74	.787	.500	4°			
BNMS-100035T-S050C	•	.375	.187	3.62	.355	1.37	.886	.500	10°	BME-0375 (BNM-100)	FSW-3007H	T-08
BNMM-100053T-S050C	•	.375	.187	4.33	.355	2.08	.886	.500	6°			
BNML-100075T-S050C	•	.375	.187	5.19	.355	2.95	.886	.500	3°			
BNMXL-100095T-S050C	•	.375	.187	6.30	.355	3.74	.886	.500	3°			
BNMM-120053T-S050C	•	.500	.250	4.33	.393	2.08	1.02	.500	3°	BME-0500 (BNM-120)	FSW-3509	T-10
BNML-120085T-S062C	•	.500	.250	5.70	.393	3.34	1.02	.625	4°			
BNMXL-120130T-S062C	•	.500	.250	8.66	.393	5.11	1.02	.625	2°			
BNML-160100T-S075C	•	.625	.312	6.53	.551	3.93	1.22	.750	2°	BME-0625 (BNM-160)	FSW-4013	T-15
BNML-200115T-S100C	•	.750	.375	7.52	.669	4.52	1.41	1.00	5°	BME-0750 (BNM-200)	FSW-5016	A-20

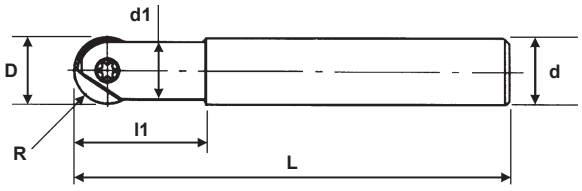
Note: All cutters are supplied without inserts.

INCH

Mirror Ball

CARBIDE SHANK

BNM-C Type - Straight Style



Specifications

CATALOG NUMBER	STK	DIMENSIONS							INSERT INCH (METRIC)	PARTS	
		D	R	L	d1	l1	d	a		Screw	Wrench
BNMS-060038S-S025C	•	.250	.125	3.75	.212	1.50	.250	-	BME-0250 (BNM-060)	FSW-2005H	T-06
BNMM-060050S-S025C	•	.250	.125	4.25	.212	2.00	.250	-			
BNML-060076S-S025C	•	.250	.125	5.25	.212	3.00	.250	-			
BNMS-080038S-S031C	•	.312	.156	3.75	.283	1.50	.312	-	BME-0312 (BNM-080)	FSW-2506H	T-07
BNMM-080057S-S031C	•	.312	.156	4.50	.283	2.25	.312	-			
BNML-080089S-S031C	•	.312	.156	5.75	.283	3.50	.312	-			
BNMS-100038S-S037C	•	.375	.187	3.75	.354	1.50	.375	-	BME-0375 (BNM-100)	FSW-3007H	T-08
BNMM-100057S-S037C	•	.375	.187	4.50	.354	2.25	.375	-			
BNML-100089S-S037C	•	.375	.187	5.75	.354	3.50	.375	-			
BNMS-120029S-S050C	•	.500	.250	3.38	.393	1.14	.500	-	BME-0500 (BNM-120)	FSW-3509	T-10
BNMM-120063S-S050C	•	.500	.250	4.75	.393	2.50	.500	-			
BNML-120101S-S050C	•	.500	.250	6.35	.393	4.00	.500	-			
BNMS-160034S-S062C	•	.625	.312	3.70	.551	1.33	.625	-	BME-0625 (BNM-160)	FSW-4013	T-15
BNMM-160063S-S062C	•	.625	.312	4.84	.551	2.48	.625	-			
BNML-160114S-S062C	•	.625	.312	7.10	.551	4.50	.625	-			
BNMS-200038S-S075C	•	.750	.375	4.09	.669	1.49	.750	-	BME-0750 (BNM-200)	FSW-5016	A-20
BNMM-200075S-S075C	•	.750	.375	5.55	.669	2.95	.750	-			
BNML-200127S-S075C	•	.750	.375	8.00	.669	5.00	.750	-			
BNMM-250114S-S100C	•	1.00	.500	7.50	.826	4.50	1.00	-	BME-1000 (BNM-250)	FSW-6020	T-30
BNML-250152S-S100C	•	1.00	.500	10.00	.826	6.00	1.00	-			

Note: All cutters are supplied without inserts.

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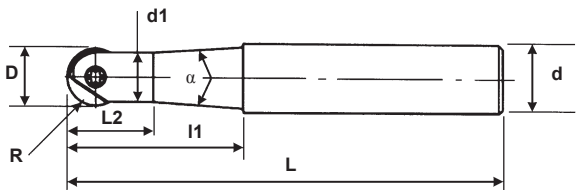
Mirror Ball

METRIC

CARBIDE SHANK

BNM-C Type - Taper Style



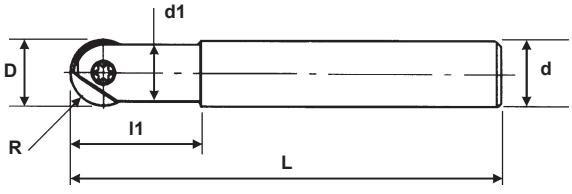
Specifications

CATALOG NUMBER	STK	DIMENSIONS								INSERT METRIC (INCH)	PARTS	
		D	R	L	d1	l1	L2	d	α		Screw	Wrench
BNMS-060030T-S10C	•	6	3	80	5.4	30	15	10	6°	BNM-060 (BME-0250)	FSW-2005H	T-06
BNML-080075T-S12C	•	8	4	132	7.2	75	20	12	2°	BNM-080 (BME-0312)	FSW-2506H	T-07
BNML-100075T-S12C	•	10	5	132	9	75	23	12	1°30’	BNM-100 (BME-0375)	FSW-3007H	T-08
BNML-120085T-S16C	•	12	6	145	10	85	27	16	2°30’	BNM-120 (BME-0500)	FSW-3509	T-10
BNMM-160063T-S20C	•	16	8	123	14	63	30.5	20	4°	BNM-160 (BME-0625)	FSW-4013	T-15
BNML-160100T-S20C	•	16	8	166	14	100	30.5	20	1°15’	BNM-160 (BME-0625)	FSW-4013	T-15
BNML-200115T-S25C	•	20	10	191	17	115	36	25	2°	BNM-200 (BME-0750)	FSW-5016	A-20
BNML-250135T-S32C	•	25	12.5	215	21	135	43	32	3°	BNM-250 (BME-1000)	FSW-6020	T-30
BNML-300160T-S32C	•	30	15	240	26	160	48	32	1°	BNM-300 or BNM-320 (BME-1250)	FSW-8025	A-40

Note: All cutters are supplied without inserts.

CARBIDE SHANK

BNM-C Type - Straight Style



Specifications

CATALOG NUMBER	STK	DIMENSIONS								INSERT METRIC (INCH)	PARTS	
		D	R	L	d1	l1	L2	d	α		Screw	Wrench
BNMS-060017S-S06C	•	6	3	60	5.4	17	-	6	-	BNM-060 (BME-0250)	FSW-2005H	T-06
BNMM-060035S-S06C	•	6	3	92	5.4	35	-	6	-			
BNML-060017S-S06C	•	6	3	120	5.4	17	-	6	-			
BNMS-080025S-S08C	•	8	4	90	7.2	25	-	8	-	BNM-080 (BME-0312)	FSW-2506H	T-07
BNMM-080035S-S08C	•	8	4	92	7.2	35	-	8	-			
BNML-080075S-S08C	•	8	4	140	7.2	75	-	8	-			
BNML-080095S-S08C	•	8	4	160	7.2	95	-	8	-			
BNMS-100030S-S10C	•	10	5	100	9	30	-	10	-	BNM-100 (BME-0375)	FSW-3007H	T-08
BNMM-100043S-S10C	•	10	5	100	9	43	-	10	-			
BNML-100075S-S10C	•	10	5	140	9	75	-	10	-			
BNML-100080S-S10C	•	10	5	220	9	80	-	10	-			
BNML-100095S-S10C	•	10	5	160	9	95	-	10	-			
BNML-100140S-S10C	•	10	5	220	9	140	-	10	-			
BNMS-120028S-S12C	•	12	6	83	11	28	-	12	-	BNM-120 (BME-0500)	FSW-3509	T-10
BNMM-120053S-S12C	•	12	6	110	11	53	-	12	-			
BNML-120095S-S12C	•	12	6	160	11	95	-	12	-			
BNML-120100S-S12C	•	12	6	220	11	100	-	12	-			

Note: All cutters are supplied without inserts.

METRIC

Mirror Ball

CARBIDE SHANK

BNM-C Type - Straight Style

Fig. 1

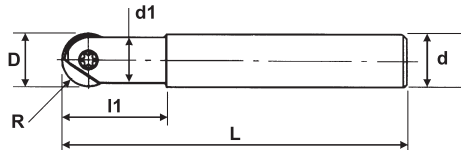
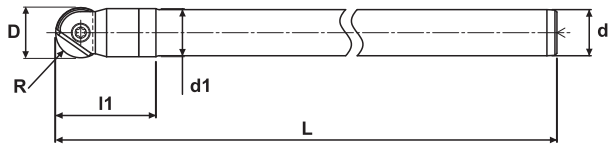


Fig. 2



Specifications

CATALOG NUMBER	STK	DIMENSIONS						FIG.	INSERT METRIC (INCH)	PARTS	
		D	R	L	d1	l1	d			Screw	Wrench
BNMS-160033S-S16C	•	16	8	92	15	33	16	1	BNM-160 (BME-0625)	FSW-4013	T-15
BNML-160070S-S16C	•	16	8	140	15	70	16	1			
BNML-160090S-S16C	•	16	8	160	15	90	16	1			
BNML-160100S-S16C	•	16	8	220	15	100	16	1			
BNML-160110S-S16C	•	16	8	180	15	110	16	1			
BNML-160150S-S16C	•	16	8	220	15	150	16	1			
BNMU-160220-S15C	•	16	8	220	15	-	15	2			
BNMS-200039S-S20C	•	20	10	104	19	39	20	1	BNM-200 (BME-0750)	FSW-5016	A-20
BNMM-200075S-S20C	•	20	10	141	19	75	20	1			
BNML-200100S-S20C	•	20	10	220	19	100	20	1			
BNML-200105S-S20C	•	20	10	180	19	105	20	1			
BNML-200125S-S20C	•	20	10	200	19	125	20	1			
BNML-200170S-S20C	•	20	10	250	19	170	20	1			
BNML-200220S-S20C	•	20	10	300	19	220	20	1			
BNMU-200270-S18C	•	20	10	270	19	40	18	2			
BNMS-250045S-S25C	•	25	12.5	121	24	45	25	1	BNM-250 (BME-1000)	FSW-6020	T-30
BNMM-250090S-S25C	•	25	12.5	166	24	90	25	1			
BNML-250100S-S25C	•	25	12.5	220	24	100	25	1			
BNML-250140S-S25C	•	25	12.5	220	24	140	25	1			
BNML-250170S-S25C	•	25	12.5	250	24	170	25	1			
BNML-250220S-S25C	•	25	12.5	300	24	220	25	1			
BNMU-250300-S23C	•	25	12.5	300	24	50	23	2			
BNMS-300053S-S32C	•	30	15	133	29	53	32	1	BNM-300 or BNM-320 (BME-1250)	FSW-8025	A-40
BNMM-300120S-S32C	•	30	15	200	29	120	32	1			
BNML-300100S-S32C	•	30	15	220	29	100	32	1			
BNML-300140S-S32C	•	30	15	220	29	140	32	1			
BNML-300170S-S32C	•	30	15	250	29	170	32	1			
BNML-300220S-S32C	•	30	15	300	29	220	32	1			
BNML-300250S-S32C	•	32	16	350	29	250	32	1			
BNMU-300300-S28C	•	30	15	300	29	60	28	2			
BNMS-320053S-S32C	•	32	16	133	31	53	32	1	BNM-320 (BME-1250)	FSW-8025	A-40
BNMM-320120S-S32C	•	32	16	200	31	120	32	1			
BNML-320170S-S32C	•	32	16	250	31	170	32	1			
BNML-320220S-S32C	•	32	16	300	31	220	32	1			

Note: All cutters are supplied without inserts.

DIJET®

Copy Milling | Pocket Milling | Slotting

Mirror Ball

INCH METRIC

MODULAR HEAD

MBN Type

Fig. 1

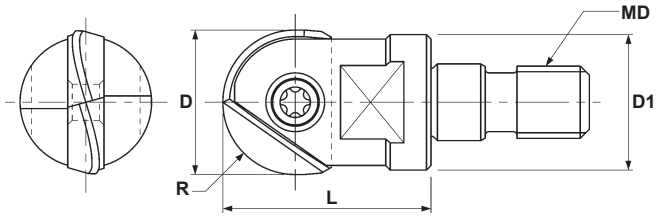
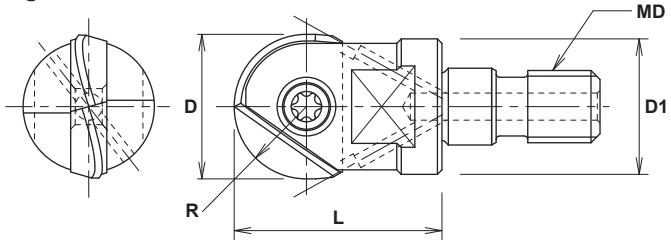


Fig. 2



Specifications

CATALOG NUMBER	STK	DIMENSIONS					FIG.	HEAD TORQUE		INSERT		PARTS	
		D	R	L	D1	MD		lbs./ft	Nm	Inch	Metric	Screw	Wrench
MBN-100-M6	•	10mm	5mm	18mm	9.7mm	M6	1	5.90	8	-	BNM-100	FSW-3007H	T-08
MBN-100-M6-H	•	10mm	5mm	18mm	9.7mm	M6	2						
MBN-120-M6	•	.500”/12mm	.250	.787	.452	M6	1	5.90	8	BME-0500	BNM-120	FSW-3509	T-10
MBN-120-M6-H	•	.500”/12mm	.250	.787	.452	M6	2						
MBN-160-M8	•	.625”/16mm	.312	.903	.591	M8	1	16.9	23	BME-0625	BNM-160	FSW-4013	T-15
MBN-160-M8-H	•	.625”/16mm	.312	.903	.591	M8	2						
MBN-200-M10	•	.750”/20mm	.375	1.16	.728	M10	1	33.9	46	BME-0750	BNM-200	FSW-5016	A-20
MBN-200-M10-H	•	.750”/20mm	.375	1.16	.728	M10	2						
MBN-250-M12	•	1.00”/25mm	.500	1.38	.945	M12	1	59	80	BME-1000	BNM-250	FSW-6020	T-30
MBN-250-M12-H	•	1.00”/25mm	.500	1.38	.945	M12	2						
MBN-300-M16	•	1.25”/30mm or 32mm	.625	1.72	1.14	M16	1	66.3	90	BME-1250	BNM-300 or BNM-320	FSW-8025	A-40
MBN-300-M16-H	•	1.25”/30mm or 32mm	.625	1.72	1.14	M16	2						
MBN-320-M16	•	32mm	16mm	43mm	29mm	M16	1	66.3	90	BME-1250	BNM-320	FSW-8025	A-40
MBN-320-M16-H	•	32mm	16mm	43mm	29mm	M16	2						

Note: All cutters are supplied without inserts.

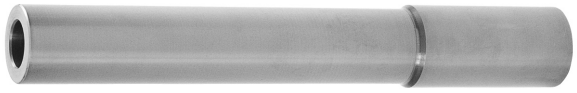
INCH METRIC

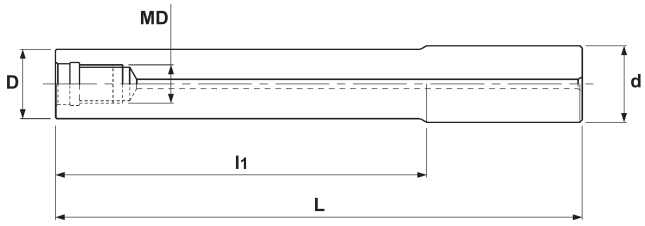
Mirror Ball

MODULAR HEAD HOLDER

(carbide with coolant hole)

MSN Type





Specifications - Inch

CATALOG NUMBER	STK	DIMENSIONS					APPLICABLE HOLDERS
		D	l1	L	d	MD	
MSN-M6-1.0-S050C	•	.452	1.00	3.15	.500	M6	MBN-120-M6, MRN-120-M6
MSN-M6-2.0-S050C	•	.452	2.00	3.93	.500	M6	
MSN-M6-3.0-S050C	•	.452	3.00	5.12	.500	M6	
MSN-M8-2.0-S062C	•	.591	2.00	5.00	.625	M8	MBN-160-M8, MRN-160-M8
MSN-M8-4.0-S062C	•	.591	4.00	7.00	.625	M8	
MSN-M8-6.0-S062C	•	.591	6.00	9.00	.625	M8	
MSN-M10-2.0-S075C	•	.728	2.00	5.00	.750	M10	MBN-200-M10, MRN-2075-M10, MRN-200-M10
MSN-M10-4.0-S075C	•	.728	4.00	7.00	.750	M10	
MSN-M10-6.0-S075C	•	.728	6.00	9.00	.750	M10	
MSN-M12-2.0-S100C	•	.945	2.00	5.00	1.00	M12	MBN-250-M12, MRN-250-M12
MSN-M12-4.0-S100C	•	.945	4.00	7.00	1.00	M12	
MSN-M12-6.0-S100C	•	.945	6.00	9.00	1.00	M12	
MSN-M12-8.0-S100C	•	.945	8.00	11.00	1.00	M12	
MSN-M16-2.0-S125C	•	1.14	2.00	5.00	1.25	M16	MBN-300-M16, MBN-320-M16, MRN-300-M16, MRN-320-M16
MSN-M16-4.0-S125C	•	1.14	4.00	7.00	1.25	M16	
MSN-M16-6.0-S125C	•	1.14	6.00	9.00	1.25	M16	
MSN-M16-8.0-S125C	•	1.14	8.00	11.00	1.25	M16	

Specifications - Metric

CATALOG NUMBER	STK	DIMENSIONS					APPLICABLE HOLDERS
		D	l1	L	d	MD	
MSN-M6-12-S10C	•	9.7	12	60	10	M6	MBN-100-M6, MRN-100-M6
MSN-M6-30-S10C	•	9.7	30	80	10	M6	
MSN-M6-50-S10C	•	9.7	50	100	10	M6	
MSN-M6-80-S10C	•	9.7	80	130	10	M6	
MSN-M6-15-S12C	•	11.5	15	60	12	M6	MBN-120-M6, MRN-120-M6
MSN-M6-30-S12C	•	11.5	30	80	12	M6	
MSN-M6-50-S12C	•	11.5	50	100	12	M6	
MSN-M6-80-S12C	•	11.5	80	130	12	M6	
MSN-M8-20-S16C	•	15.5	20	75	16	M8	MBN-160-M8, MRN-160-M8
MSN-M8-40-S16C	•	15.5	40	95	16	M8	
MSN-M8-80-S16C	•	15.5	80	135	16	M8	
MSN-M8-120-S16C	•	15.5	120	175	16	M8	
MSN-M10-20-S20C	•	19.5	20	80	20	M10	MBN-200-M10, MRN-2075-M10, MRN-200-M10
MSN-M10-40-S20C	•	19.5	40	100	20	M10	
MSN-M10-90-S20C	•	19.5	90	150	20	M10	
MSN-M10-140-S20C	•	19.5	140	200	20	M10	
MSN-M12-25-S25C	•	24	25	90	25	M12	MBN-250-M12, MRN-250-M12
MSN-M12-55-S25C	•	24	55	120	25	M12	
MSN-M12-105-S25C	•	24	105	170	25	M12	
MSN-M12-155-S25C	•	24	155	220	25	M12	
MSN-M16-25-S32C	•	29	25	90	32	M16	MBN-300-M16, MBN-320-M16, MRN-300-M16, MRN-320-M16
MSN-M16-55-S32C	•	29	55	120	32	M16	
MSN-M16-105-S32C	•	29	105	170	32	M16	
MSN-M16-155-S32C	•	29	155	220	32	M16	
MSN-M16-195-S32C	•	29	195	260	32	M16	

DIJET®

Copy Milling | Pocket Milling | Slotting

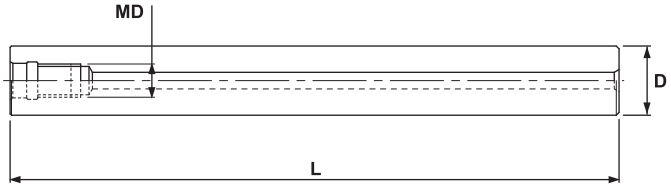
Mirror Ball

METRIC

MODULAR HEAD HOLDER

(carbide with coolant hole)

MSN Type - Straight



Specifications

CATALOG NUMBER	STK	DIMENSIONS			APPLICABLE HOLDERS
		D	L	MD	
MSN-M6-67S-S9.8C	•	9.8	67	M6	MBN-100-M6, MRN-100-M6
MSN-M6-107S-S9.8C	•	9.8	107	M6	
MSN-M6-82S-S10C	•	10	82	M6	
MSN-M6-122S-S10C	•	10	122	M6	
MSN-M6-80S-S11.8C	•	11.8	80	M6	MBN-120-M6, MRN-120-M6
MSN-M6-120S-S11.8C	•	11.8	120	M6	
MSN-M6-90S-S12C	•	12	90	M6	
MSN-M6-130S-S12C	•	12	130	M6	
MSN-M8-97S-S15C	•	15	97	M8	MBN-160-M8, MRN-160-M8
MSN-M8-147S-S15C	•	15	147	M8	
MSN-M8-107S-S16C	•	16	107	M8	
MNS-M8-157S-S16C	•	16	157	M8	
MSN-M10-130S-S18C	•	18	130	M10	MBN-200-M10, MRN-2075-M10, MRN-200-M10
MSN-M10-190S-S18C	•	18	190	M10	
MSN-M10-130S-S20C	•	20	130	M10	
MSN-M10-190S-S20C	•	20	190	M10	
MSN-M10-250S-S20C	•	20	250	M10	
MSN-M12-185S-S23C	•	23	185	M12	MBN-250-M12, MRN-250-M12
MSN-M12-265S-S23C	•	23	265	M12	
MSN-M12-145S-S25C	•	25	145	M12	
MSN-M12-215S-S25C	•	25	215	M12	
MSN-M12-285S-S25C	•	25	285	M12	
MSN-M16-160S-S28C	•	28	160	M16	MBN-300-M16, MRN-300-M16, MRN-320-M16
MSN-M16-230S-S28C	•	28	230	M16	
MSN-M16-310S-S28C	•	28	310	M16	
MSN-M16-157S-S32C	•	32	157	M16	
MSN-M16-217S-S32C	•	32	217	M16	
MSN-M16-287S-S32C	•	32	287	M16	
MSN-M16-357S-S32C	•	32	357	M16	

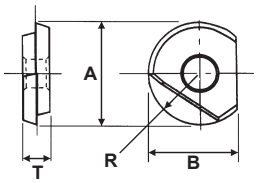
INCH METRIC

Mirror Ball

INSERTS

Mirror Ball

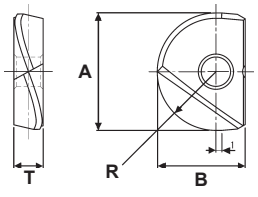
For Finishing



	CATALOG NUMBER	DIMENSIONS				RECOMMENDED TORQUE		STOCK COATED			
		A	R	B	T	lbs./ft	Nm	JC5003	JC8003	JC5010	JC5015
INCH SIZES	BME-0250(A)	.250	.125	.196	.078	.37	.5		•		•
	BME-0312(A)	.312	.156	.275	.094	.66	.9	•		•	•
	BME-0375(A)	.375	.187	.326	.102	.89	1.2		•	•	•
	BME-0500(A)	.500	.250	.409	.118	1.48	2.0		•	•	•
	BME-0625(A)	.625	.312	.472	.157	2.21	3.0		•	•	•
	BME-0750(A)	.750	.375	.570	.196	2.95	4.0		•	•	•
	BME-1000(A)	1.00	.500	.736	.236	3.69	5.0		•	•	•
	BME-1250(A)	1.25	.625	.925	.275	4.43	6.0	•		•	•
METRIC SIZES	BNM-060	6	3	5	2	.37	.5		•		•
	BNM-080	8	4	7	2.4	.66	.9		•		•
	BNM-100	10	5	8.5	2.6	.89	1.2		•		•
	BNM-120	12	6	10	3	1.48	2.0		•		•
	BNM-160	16	8	12	4	2.21	3.0		•		•
	BNM-200	20	10	15	5	2.95	4.0		•		•
	BNM-250	25	12.5	18.5	6	3.69	5.0		•		•
	BNM-300	30	15	22.5	7	4.43	6.0		•		•
	BNM-320	32	16	23.5	7	4.43	6.0	•			•

Mirror Ball "S"

For Finishing & Semi-finishing



	CATALOG NUMBER	DIMENSIONS				RECOMMENDED TORQUE		STOCK COATED		UNCOATED	
		A	R	B	T	lbs./ft	Nm	JC8008	JC8003	FZ05	
INCH SIZES	BME-0250-S	.250	.125	.196	.078	.37	.5	•		•	
	BME-0312-S	.312	.156	.275	.094	.66	.9	•			
	BME-0375-S	.375	.187	.326	.102	.89	1.2	•		•	
	BME-0500-S	.500	.250	.409	.118	1.48	2.0	•		•	
	BME-0625-S	.625	.312	.472	.157	2.21	3.0	•		•	
	BME-0750-S	.750	.375	.570	.196	2.95	4.0	•		•	
	BME-1000-S	1.00	.500	.736	.236	3.69	5.0	•		•	
	BME-1250-S	1.25	.625	.925	.275	4.43	6.0	•			
METRIC SIZES	BNM-060-S	6	3	5	2	.37	.5	•	•	•	
	BNM-080-S	8	4	7	2.4	.66	.9	•	•	•	
	BNM-100-S	10	5	8.5	2.6	.89	1.2	•	•	•	
	BNM-120-S	12	6	10	3	1.48	2.0	•	•	•	
	BNM-160-S	16	8	12	4	2.21	3.0	•	•	•	
	BNM-200-S	20	10	15	5	2.95	4.0	•	•	•	
	BNM-250-S	25	12.5	18.5	6	3.69	5.0	•	•	•	
	BNM-300-S	30	15	22.5	7	4.43	6.0	•	•	•	
	BNM-320-S	32	16	23.5	7	4.43	6.0	•	•		

Note: Use Mirror "S" insert when encountering high hard material, for chatter reduction, semi-finishing (larger d.o.c.), or coolant is being used on the application.

DIJET®

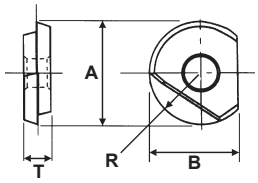
Copy Milling | Pocket Milling | Slotting

Mirror Ball

METRIC

Ultra Precision Inserts

Radius form accuracy below +/- .00008



CATALOG NUMBER	DIMENSIONS				COATED
	A	R	B	T	JC5015
BNM-100-AAA	10	5	8.5	2.6	•
BNM-120-AAA	12	6	10	3	•
BNM-160-AAA	16	8	12	4	•
BNM-200-AAA	20	10	15	5	•
BNM-250-AAA	25	12.5	18.5	6	•
BNM-300-AAA	30	15	22.5	7	•
BNM-320-AAA	32	16	23.5	7	•

Controlled Torque Wrenches

Wrenches are pre-set to protect screws and bodies against damage during both the tightening and loosening process.

Controlled Torque Wrenches (with replaceable blades)

CATALOG NUMBER	TORQUE #	SCREW TORQUE		REPLACEMENT BLADE	APPLICABLE INSERT
		lbs./ft	Nm		
TQC-06	T6	.37	0.5	B-06	BME-0250, BNM-060
TQC-07	T7	.66	0.9	B-07	BME-0312, RME-0312-R.., HRE-0312-R..
					BNM-080, RNM-080-R.., HRM-080-R.., HRM-090-R..
TQC-08	T8	.89	1.2	B-08	BME-0375, RME-0375-R.., HRE-0375-R..
					BNM-100, RNM-100-R.., HRM-100-R.., HRM-110-R..
TQC-10	T10	1.48	2.0	B-10	BME-0500, RME-0500-R.., HRE-0500-R..
					BNM-120, RNM-120-R.., RNM-130-R..
					HRM-120-R.., HRM-130-R..

Insert Mounting Information

1. Make sure the insert seat on body is carefully cleaned.
2. Make sure insert itself is clean, especially the hole and face location.
3. Change insert screw when threads start to wear. (approximately every 10-15 inserts)
4. Do not over tighten screw, see table for torque specifications.

SCREW	RECOMMENDED TORQUE	
	lbs./ft	Nm
FSW-2005H	.37	0.5
FSW-2506H	.66	0.9
FSW-3007H	.89	1.2
FSW-3509	1.48	2.0
FSW-4013	2.21	3.0
FSW-5016	2.95	4.0
FSW-6020	3.69	5.0
FSW-8025	4.43	6.0

Modular Head Mounting Information

1. Make sure the mounting surface of the modular head and the carbide holder are clean.
2. Make sure after tightening there is no gap between the head and the carbide holder.
3. Do not over tighten head, see table for torque specification.

MODULAR HEAD THREAD SIZE	RECOMMENDED TORQUE	
	lbs./ft	Nm
M6	5.90	8
M8	16.9	23
M10	33.9	46
M12	59	80
M16	66.3	90

INCH

Mirror Ball

Recommended Cutting Data for Mirror Ball

Table 1 - High Speed Cutting Data For Steel Shank

Work Materials	Insert Grade	Cutting Speed SFM (ft/min)	RPM IPM	TOOL DIAMETER								Max. DOC & PICK
				.250"	.312"	.375"	.500"	.625"	.750"	1.00"	1.25"	
Gray Cast Iron 200-250HB	JC8003 JC5015	1,600	S (RPM)	16,000	16,000	16,000	12,000	10,000	9,000	6,000	4,800	.012"
			F (IPM)	640	640	640	480	400	360	240	192	
Nodular Cast Iron 180-250HB	JC8003 JC5015	1,440	S (RPM)	16,000	16,000	14,400	10,800	8,800	8,100	5,600	4,400	.012"
			F (IPM)	640	640	576	432	352	324	224	176	
Carbon Steel 55HRC	JC8003 JC5015	1,200	S (RPM)	16,000	14,400	12,000	9,200	7,200	6,750	4,400	3,600	.012"
			F (IPM)	640	576	480	368	288	270	176	144	
Low Alloy Steel 55HRC	JC8003 JC5015	960	S (RPM)	14,400	12,000	9,600	7,200	6,000	5,400	3,600	2,880	.012"
			F (IPM)	576	480	384	288	240	216	144	115	
Tool & Die Steel 45HRC	JC8003 JC5015	1,200	S (RPM)	16,000	14,400	12,000	9,200	7,200	6,750	4,400	3,600	.012"
			F (IPM)	320	288	240	184	144	135	88	72	
Hardened Die Steel 50-60HRC	JC8003 JC5015	960	S (RPM)	14,400	12,000	9,600	7,200	6,000	5,400	3,600	2,880	.008"
			F (IPM)	288	240	192	144	120	108	72	58	
Stainless Steel 45HRC	JC5015	600	S (RPM)	9,200	7,200	6,000	4,400	3,600	3,420	2,240	1,840	.012"
			F (IPM)	184	144	120	88	72	68.4	44.8	37	
Inconel, Titanium 45HRC	JC8003 JC5015	120	S (RPM)	1,840	1,440	1,200	920	720	675	440	360	.006"
			F (IPM)	9.2	7.2	6	4.6	3.6	3.375	2.2	1.8	
Aluminum Alloys 30-100HB	FZ05 JC8003	2,400	S (RPM)	16,000	1,600	16,000	16,000	14,400	13,500	9,200	7,200	.012"
			F (IPM)	640	640	640	640	576	540	368	288	

Note: 1. Data is relevent to short series tools & middle series tools (over 1/2" diameter).
2. See table 3 for additional data e.g. using long series tools & middle series tools (up to1/2" diameter).

Table 2 - High Speed Cutting Data For Carbide Shank

Work Materials	Insert Grade	Cutting Speed SFM (ft/min)	RPM IPM	TOOL DIAMETER								Max. DOC & PICK
				.250"	.312"	.375"	.500"	.625"	.750"	1.00"	1.25"	
Gray Cast Iron 200-250HB	JC8003 JC5015	3,200	S (RPM)	32,000	32,000	32,000	24,000	19,200	18,000	12,000	4,890	.008"
			F (IPM)	1,280	1,280	1,280	960	768	720	480	184	
Nodular Cast Iron 180-250HB	JC8003 JC5015	2,880	S (RPM)	32,000	32,000	28,800	22,000	17,600	16,200	10,800	4,400	.008"
			F (IPM)	1,280	1,280	1,152	880	704	648	432	106	
Carbon Steel 55HRC	JC8003 JC5015	2,400	S (RPM)	32,000	28,800	24,000	18,400	14,400	13,500	9,200	3,667	.010"
			F (IPM)	640	576	480	368	288	270	184	100	
Low Alloy Steel 55HRC	JC8003 JC5015	1,920	S (RPM)	28,800	24,000	19,200	14,400	12,000	10,800	7,200	2,934	.010"
			F (IPM)	1,152	960	768	576	480	432	288	58	
Tool & Die Steel 45HRC	JC8003 JC5015	2,400	S (RPM)	32,000	28,800	24,000	18,400	14,400	13,500	9,200	3,667	.012"
			F (IPM)	1,280	1,152	960	736	576	540	368	124	
Hardened Die Steel 50-60HRC	JC8003 JC5015	1,920	S (RPM)	28,800	24,000	19,200	14,400	12,000	10,800	7,200	2,934	.006"
			F (IPM)	576	480	384	288	240	216	144	58	
Stainless Steel 45HRC	JC5015	1,200	S (RPM)	18,400	14,400	12,000	9,200	7,200	6,750	4,400	1,834	.012"
			F (IPM)	368	298	240	184	144	135	88	70	
Inconel, Titanium 45HRC	JC8003 JC5015	240	S (RPM)	3,600	2,880	2,400	1,840	1,440	1,350	920	846.4	.006"
			F (IPM)	18	14.4	12	9.2	7.2	6.75	4.6	3.76	
Aluminum Alloys 30-100HB	FZ05 JC8003	4,800	S (RPM)	32,000	32,000	32,000	32,000	28,800	27,000	18,400	4,890	.012"
			F (IPM)	640	640	640	640	576	540	368	116	

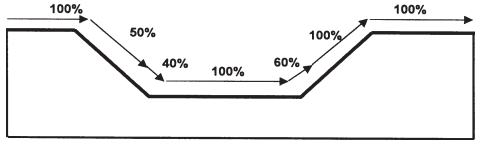
Note: 1. Data is relevent to short series tools & middle series tools (over 1/2" diameter).
2. See table 3 for additional data e.g. using long series tools & middle series tools (up to1/2" diameter).

Table 3 - 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

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Mirror Ball

INCH

Recommended Cutting Data for Mirror Ball

Table 1 - Nominal Cutting Data For Steel Shank

Work Materials	Insert Grade	Cutting Speed SFM (ft/min)	RPM IPM	TOOL DIAMETER								Max. DOC & PICK
				.250"	.312"	.375"	.500"	.625"	.750"	1.00"	1.25"	
Gray Cast Iron 200-250HB	JC8003 JC5015	1,000	S (RPM)	8,000	8,000	8,000	7,500	6,100	5,100	3,850	3,050	.012"
			F (IPM)	256	272	288	285	244	204	154	122	
Nodular Cast Iron 180-250HB	JC8003 JC5015	900	S (RPM)	8,000	8,000	8,000	6,900	5,500	4,600	3,450	2,750	.012"
			F (IPM)	256	272	316.8	262	220	184	138	110	
Carbon Steel 55HRC	JC8003 JC5015	750	S (RPM)	8,000	8,000	7,650	5,570	4,600	3,850	2,850	2,300	.012"
			F (IPM)	256	272	275	219	184	154	114	92	
Low Alloy Steel 55HRC	JC8003 JC5015	600	S (RPM)	8,000	7,350	6,100	4,600	3,700	3,050	2,300	1,850	.012"
			F (IPM)	256	250	220	175	148	122	92	74	
Tool & Die Steel 45HRC	JC8003 JC5015	750	S (RPM)	8,000	8,000	7,650	5,750	4,600	3,850	2,850	2,300	.012"
			F (IPM)	128	136	138	109	92	77	57	46	
Hardened Die Steel 50-60HRC	JC8003 JC5015	600	S (RPM)	8,000	7,350	6,150	4,600	3,700	3,050	2,300	1,850	.008"
			F (IPM)	128	125	111	87	74	61	46	37	
Stainless Steel 45HRC	JC5015	400	S (RPM)	6,150	4,900	4,100	3,050	2,450	2,050	1,550	1,250	.012"
			F (IPM)	98	83	74	58	49	41	31	25	
Inconel, Titanium 45HRC	JC8003 JC5015	150	S (RPM)	2,293	1,834	1,529	1,146	917	764	573	459	.006"
			F (IPM)	9.2	7.8	6.9	5.4	4.6	3.8	2.9	2.3	
Aluminum Alloys 30-100HB	FZ05 JC8003	1,000	S (RPM)	8,000	8,000	8,000	7,650	6,150	5,100	3,850	3,050	.012"
			F (IPM)	256	272	288	291	246	204	154	122	

Note: 1. Data is relevent to short series tools & middle series tools (over 1/2" diameter).
2. See table 3 for additional data e.g. using long series tools & middle series tools (up to1/2" diameter).

Table 2 - Nominal Cutting Data For Carbide Shank

Work Materials	Insert Grade	Cutting Speed SFM (ft/min)	RPM IPM	TOOL DIAMETER								Max. DOC & PICK
				.250"	.312"	.375"	.500"	.625"	.750"	1.00"	1.25"	
Gray Cast Iron 200-250HB	JC8003 JC5015	2,000	S (RPM)	8,000	8,000	8,000	8,000	8,000	8,000	7,650	6,112	.008"
			F (IPM)	256	272	288	304	320	320	306	230	
Nodular Cast Iron 180-250HB	JC8003 JC5015	1,800	S (RPM)	8,000	8,000	8,000	8,000	8,000	8,000	6,900	5,500	.008"
			F (IPM)	256	272	288	304	320	320	276	132	
Carbon Steel 55HRC	JC8003 JC5015	1,500	S (RPM)	8,000	8,000	8,000	8,000	8,000	7,650	5,750	4,584	.010"
			F (IPM)	128	136	144	152	160	153	115	125	
Low Alloy Steel 55HRC	JC8003 JC5015	1,200	S (RPM)	8,000	8,000	8,000	8,000	7,350	6,150	4,600	3,667	.010"
			F (IPM)	256	272	288	304	294	246	184	73	
Tool & Die Steel 45HRC	JC8003 JC5015	1,500	S (RPM)	8,000	8,000	8,000	8,000	8,000	7,650	5,750	4,584	.012"
			F (IPM)	256	272	288	304	320	306	230	155	
Hardened Die Steel 50-60HRC	JC8003 JC5015	1,200	S (RPM)	8,000	8,000	8,000	8,000	350	6,150	4,600	3,667	.006"
			F (IPM)	128	136	144	152	147	123	92	73	
Stainless Steel 45HRC	JC5015	750	S (RPM)	8,000	8,000	7,650	5,750	4,600	3,850	2,850	2,292	.012"
			F (IPM)	128	136	138	109	92	77	57	87	
Inconel, Titanium 45HRC	JC8003 JC5015	300	S (RPM)	4,600	3,700	3,050	2,300	1,850	1,550	1,150	1,058	.006"
			F (IPM)	18.4	15.7	13.7	10.9	9.3	7.8	5.8	4.7	
Aluminum Alloys 30-100HB	FZ05 JC8003	2000	S (RPM)	8,000	8,000	8,000	8,000	8,000	8,000	7,650	6,112	.012"
			F (IPM)	128	136	144	152	160	160	153	145	

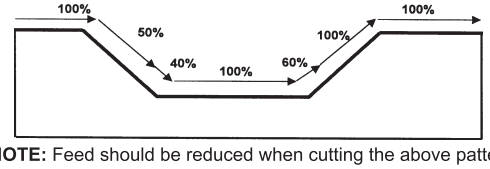
Note: 1. Data is relevent to short series tools & middle series tools (over 1/2" diameter).
2. See table 3 for additional data e.g. using long series tools & middle series tools (up to1/2" diameter).

Table 3 - 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

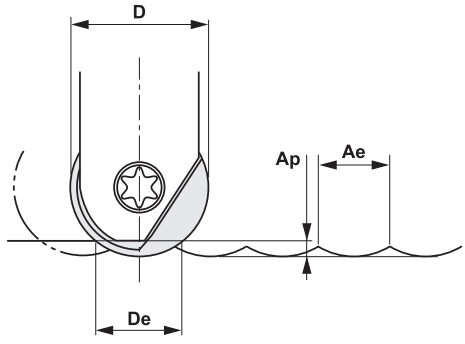
Cutting Data for BNM

Calculation of cutting data

Spindle speed

$$N=\frac{Vc \times 1000}{\pi \times De} \ (min^{-1})$$

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



Feed

$$F=N \times f_R \ (mm/min)$$

$$f_R=h\ max. \times \frac{De}{\sqrt{Ap \times (D-Ap)}} \ (mm/rev)$$

N = Spindle speed (min^{-1})
Vc = Cutting speed (m/min), see table 1.
De = Effective tool diameter (mm), see table 3.
Ap = Axial depth of cut (mm)

Ae = Pick feed, radial depth of cut (mm)
F = Feed speed (mm/min)
f_R = feed / rev (mm), see table 1. & 4.
h max. = Max. chip thickness (mm), see table 4.

Table 1. Nominal cutting data for steel shank

Work Materials	Hardness	Insert Grade	Cutting Speed Vc (m/min)	Nominal Feed : f_R (mm/rev) Cutter Diameter : D (mm) 6	8	10	12	16	20	25	30	32	Max. Depth Ap (mm)	Max. Pick Ae (mm)
Gray Cast Iron (GG25, GG30)	160-260HB	JC8003 JC5003 JC5015	200-400	0.2	0.3	0.4	0.5	0.6	0.6	0.7	0.7	0.7	D/10	D/10
Nodular Cast Iron (GGG60, GGG70)	170-300HB	JC8003 JC5003 JC5015	150-350	0.2	0.3	0.4	0.5	0.6	0.6	0.7	0.7	0.7	D/15	D/15
Carbon Steel (C50, C55)	180-280HB	JC8003 JC5003 JC5015	180-230	0.2	0.3	0.4	0.4	0.5	0.5	0.6	0.6	0.6	D/15	D/15
Low Alloy Steel (1.7225)	180-280HB	JC8003 JC5003 JC5015	150-200	0.2	0.3	0.4	0.4	0.5	0.5	0.6	0.6	0.6	D/15	D/15
Mold Steel (1.2311, P20)	280-400HB	JC8003 JC5003 JC5015	110-170	0.15	0.25	0.3	0.4	0.4	0.4	0.5	0.5	0.5	D/20	D/20
Tool & Die Steel (1.2344, 1.2379)	180-255HB	JC8003 JC5003 JC5015	130-180	0.15	0.25	0.3	0.4	0.5	0.5	0.6	0.6	0.6	D/20	D/20
Hardened Die Steel (1.2344, 1.2379)	40-55HRC	JC8003 JC5003 JC5015	70-90	0.15	0.25	0.3	0.4	0.5	0.5	0.6	0.6	0.6	D/30	D/30
Stainless Steel (1.4301, 1.4401)	150-250HB	JC5015	90-130	0.15	0.25	0.3	0.4	0.4	0.4	0.5	0.5	0.5	D/20	D/20
Copper Alloy	80-150HB	JC8003 JC5003 KT9	150-200	0.25	0.4	0.5	0.6	0.7	0.7	0.8	0.8	0.8	D/10	D/10
Aluminum Alloy	30-100HB	JC8003 JC5003 KT9	200-300	0.25	0.4	0.5	0.6	0.7	0.7	0.8	0.8	0.8	D/6	D/6
Graphite		JC8003 JC5003	200-400	0.3	0.5	0.6	0.7	0.8	0.8	0.9	0.9	0.9	D/5	D/5

Note: Data is relevent to short series tools & middle series tools (over Ø 12mm).
See table 5 (Page A-20) for additional data e.g. using long series tools & middle series tools (up to Ø 12mm).

DIJET®

Mirror Ball

METRIC

Cutting Data for BNM

Table 2. High Speed Cutting Date For Carbide Shank

Work Materials	Hardness	Insert Grade	Cutting Speed Vc (m/min)	Nominal Feed : fR (mm/rev) Cutter Diameter : D (mm) 6	8	10	12	16	20	25	30	32	Max. Depth Ap (mm)	Max. Pick Ae (mm)
Gray Cast Iron (GG25, GG30)	160-260HB	JC5003 JC8008	400-500	0.4	0.5	0.5	0.6	0.8	0.8	1.0	1.0	1.0	0.1-0.3	D/40
Nodular Cast Iron (GGG60, GGG70)	170-300HB	JC5003 JC8008	300-400	0.3	0.4	0.4	0.5	0.6	0.6	0.8	0.8	0.8	0.1-0.3	D/40
Carbon Steel (C50, C55)	180-280HB	JC5003 JC5015	300-400	0.3	0.4	0.4	0.5	0.6	0.6	0.7	0.7	0.7	0.1-0.3	D/50
Low Alloy Steel (1.7225)	180-280HB	JC5003 JC5015	300-400	0.3	0.4	0.4	0.5	0.6	0.6	0.7	0.7	0.7	0.1-0.3	D/50
Mold Steel (1.2311, P20)	280-400HB	JC5003 JC5015	300-350	0.25	0.3	0.3	0.4	0.5	0.5	0.6	0.6	0.6	0.1-0.2	D/50
Tool & Die Steel (1.2344, 1.2379)	180-255HB	JC5003 JC8008	300-350	0.25	0.3	0.3	0.4	0.4	0.4	0.6	0.6	0.6	0.1-0.2	D/50
Hardened Die Steel (1.2344, 1.2379)	40-55HRC	JC5003 JC8008	250-350	0.25	0.3	0.3	0.4	0.5	0.5	0.6	0.6	0.6	0.1-0.2	D/50
Hardened Die Steel (1.2344, 1.2379)	55HRC-	JC5003 JC8008	150-250	0.2	0.25	0.3	0.4	0.5	0.5	0.6	0.6	0.6	0.1-0.2	D/50
Stainless Steel (1.4301, 1.4401)	150-250HB	JC5003 JC5015	200-300	0.25	0.35	0.45	0.6	0.65	0.7	0.8	0.8	0.8	0.1-0.2	D/50
Copper Alloys	80-150HB	JC5003 JC5015	300-400	0.3	0.4	0.4	0.5	0.6	0.6	0.7	0.7	0.7	0.1-0.5	D/40
Aluminum Alloys	30-100HB	JC5003 JC5015	400-500	0.35	0.5	0.5	0.6	0.7	0.7	0.8	0.8	0.8	0.1-0.5	D/40
Graphite		JC8008	600-800	0.4	0.6	0.6	0.7	0.8	0.8	0.9	0.9	0.9	0.1-0.5	D/40

Note: Data is relevent to short series tools & middle series tools (over Ø 12mm).
See table 5 (Page A-20) for additional data e.g. using long series tools & middle series tools (up to Ø 12mm).

Table 3. Effective tool diameter chart

Cutter Dia. D (mm)	Effective Tool Diameter : De (mm) Axial Depth of Cut : Ap (mm) 0.2	0.3	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
8	2.5	3	3.9	5.3	6.2									
10	2.8	3.4	4.4	6	7.1	8								
12	3.1	3.7	4.8	6.6	7.9	8.9	9.7							
16	3.6	4.3	5.6	7.7	9.3	10.6	11.6	12.5						
20	4	4.9	6.2	8.7	10.5	12	13.2	14.3	15.2	16				
25	4.5	5.4	7	9.8	11.9	13.6	15	16.2	17.3	18.3	19.2	20		
30	4.9	6	7.7	10.8	13.1	15	16.6	18	19.3	20.4	21.4	22.4	23.2	24
30	5	6.2	7.9	11.1	13.5	15.5	17.2	18.7	20	21.2	22.2	23.2	24.1	25

Table 4. Maximum chip thickness chart

Work Materials	Hardness	Max. Chip Thickness : h max. (mm) Cutter Diameter : D (mm) 6	8	10	12	16	20	25	30	32
Gray Cast Iron (GG25, GG30)	160-260HB	0.07	0.09	0.12	0.15	0.18	0.18	0.21	0.21	0.21
Nodular Cast Iron (GG60, GGG70)	170-300HB	0.05	0.07	0.10	0.12	0.15	0.15	0.17	0.17	0.17
Carbon Steel (C50, C55)	180-280HB	0.05	0.07	0.10	0.10	0.12	0.12	0.15	0.15	0.15
Low Alloy Steel (1.7225)	180-280HB	0.05	0.07	0.10	0.10	0.12	0.12	0.15	0.15	0.15
Mold Steel (1.2311, P20)	280-400HB	0.03	0.05	0.065	0.09	0.09	0.09	0.11	0.11	0.11
Tool & Die Steel (1.2344, 1.2379)	180-255HB	0.03	0.05	0.065	0.09	0.11	0.11	0.13	0.13	0.13
Hardened Die Steel (1.2344, 1.2379)	40-55HRC	0.02	0.04	0.05	0.07	0.09	0.09	0.11	0.11	0.11
Stainless Steel (1.4301, 1.4401)	150-250HB	0.03	0.05	0.065	0.09	0.09	0.09	0.11	0.11	0.11
Copper Alloys	80-150HB	0.10	0.12	0.15	0.18	0.21	0.21	0.24	0.24	0.24
Aluminum Alloys	30-100HB	0.12	0.15	0.18	0.22	0.26	0.26	0.30	0.30	0.30
Graphite		0.15	0.20	0.24	0.28	0.32	0.32	0.36	0.36	0.36

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Cutting Data for BNM

Table 5. Reduced cutting data for longer series tools.

CUTTER DIA. ØD (mm)	SHORT SERIES				MIDDLE SERIES				LONG SERIES			
	l1	l1/D	min^{-1} %	Feed %	l1	l1/D	min^{-1} %	Feed %	l1	l1/D	min^{-1} %	Feed %
6	30	5.0	100	100	35	5.8	100	100				
8	35	4.4	100	100	53	6.6	60	65	75	9.4	50	50
10	35	3.5	100	100	53	5.3	70	80	75	7.5	60	65
12	26	2.2	100	100	53	4.4	90	90	85	7.1	65	65
16	32	2.0	100	100	63	3.9	100	100	100	6.3	70	70
20	38	1.9	100	100	75	3.8	100	100	115	5.8	75	75
25	45	1.8	100	100	90	3.6	100	100	135	5.4	80	80
30	53	1.8	100	100	106	3.5	100	100	160	5.3	80	90
32	53	1.7	100	100	106	3.3	100	100	160	5.0	80	90

Cutting Data for Mirror S Insert

Work Materials	Hardness	Insert Grade	Cutting Speed Vc (m/min)	Nominal Feed: f (mm/rev) Cutter Diameter: D (mm)									Max. D.O.C. Ap (mm)	Max. Pick Ae (mm)
				6	8	10	12	16	20	25	30	32		
Gray Cast Iron (GG25, GG30)	160-260HB	**JC8008 JC8003**	400-500	0.2-0.35	0.25-0.4	0.3-0.5	0.4-0.6	0.5-0.7	0.6-0.8	0.6-0.8	0.8-1.0	0.8-1.0	0.02D	0.025D
Nodular Cast Iron (GG60, GGG70)	170-300HB	**JC8008 JC8003**	300-400	0.2-0.3	0.25-0.35	0.3-0.4	0.4-0.5	0.5-0.6	0.5-0.7	0.5-0.7	0.6-0.8	0.6-0.8	0.02D	0.025D
Carbon Steel (C50, C55)	180-280HB	**JC8008 JC8003**	300-400	0.2-0.3	0.25-0.35	0.3-0.4	0.4-0.5	0.5-0.6	0.5-0.7	0.5-0.7	0.6-0.8	0.6-0.8	0.02D	0.02D
Low Alloy Steel (1.7225)	180-280HB	**JC8008 JC8003**	300-400	0.2-0.3	0.25-0.35	0.3-0.4	0.4-0.5	0.5-0.6	0.5-0.7	0.5-0.7	0.6-0.8	0.6-0.8	0.02D	0.02D
Mold Steel (1.2311, P20)	280-400HB	**JC8008 JC8003**	300-400	0.2-0.3	0.25-0.35	0.3-0.4	0.4-0.5	0.5-0.6	0.5-0.7	0.5-0.7	0.6-0.8	0.6-0.8	0.02D	0.02D
Tool & Die Steel (1.2344, 1.2379)	180-255HB	**JC8008 JC8003**	300-400	0.2-0.3	0.25-0.35	0.3-0.4	0.4-0.5	0.5-0.6	0.5-0.7	0.5-0.7	0.6-0.8	0.6-0.8	0.02D	0.02D
Hardened Die Steel (1.2344, 1.2379)	40-55HRC	**JC8008 JC8003**	200-300	0.15-0.25	0.2-0.3	0.25-0.3	0.3-0.4	0.4-0.5	0.4-0.5	0.4-0.6	0.4-0.7	0.4-0.7	0.015D	0.02D
Hardened Die Steel (1.2344, 1.2379)	55HRC-	**JC8008 JC8003**	150-250	0.15-0.25	0.2-0.3	0.25-0.3	0.3-0.4	0.4-0.5	0.4-0.5	0.4-0.6	0.4-0.7	0.4-0.7	0.01D	0.02D
Stainless Steel (1.4301, 1.4401)	150-250HB	**JC8008 JC8003**	250-350	0.2-0.3	0.25-0.35	0.3-0.4	0.3-0.5	0.4-0.5	0.4-0.6	0.4-0.7	0.5-0.8	0.5-0.8	0.02D	0.02D
Copper Alloys	80-150HB	**FZ05**	300-400	0.2-0.35	.25-0.4	0.3-0.5	0.4-0.6	0.5-0.7	0.6-0.8	0.6-0.8	0.8-1.0	0.8-1.0	0.02D	0.025D
Aluminum Alloys	30-100HB	**FZ05**	400-500	0.2-0.35	.25-0.4	0.3-0.5	0.4-0.6	0.5-0.7	0.6-0.8	0.6-0.8	0.8-1.0	0.8-1.0	0.03D	0.03D
Graphite		**JC8003**	600-800	0.2-0.35	.25-0.4	0.3-0.5	0.4-0.6	0.5-0.7	0.6-0.8	0.6-0.8	0.8-1.0	0.8-1.0	0.03D	0.03D

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H.S.C. Cutting Data for MBN and Carbide MSN

Work Materials	Insert Grade	Cutting Speed Vc (m/min)	Tool Diameter (mm)												Max. D.O.C. Ap (mm)	Max. Pick Ae (mm)
			10		12		16		20		25		30/32			
			N (min⁻¹)	F (mm/min)	N (min⁻¹)	F (mm/min)	N (min⁻¹)	F (mm/min)	N (min⁻¹)	F (mm/min)	N (min⁻¹)	F (mm/min)	N (min⁻¹)	F (mm/min)		
Gray Cast Iron (160-260HB)	JC8008 JC5003	750	24,000	9,600	20,000	10,000	15,000	10,000	12,000	9,000	9,600	8,000	8,000	8,000	0.1-0.3	0.02D
Nodular Cast Iron (170-300HB)	JC8008 JC5003	600	19,000	7,000	16,000	7,000	12,000	7,000	9,600	6,700	7,700	6,000	6,500	6,000	0.1-0.3	0.02D
Carbon Steel (180-280HB)	JC8008 JC5003	600	19,000	7,000	16,000	7,000	12,000	7,000	9,600	6,700	7,700	6,000	6,500	6,000	0.1-0.3	0.02D
Low Alloy Steel (180-280HB)	JC8008 JC5003	600	19,000	7,000	16,000	7,000	12,000	7,000	9,600	6,700	7,700	6,000	6,500	6,000	0.1-0.2	0.015D
Tool & Die Steel (180-255HB)	JC8008 JC5003	600	19,000	7,000	16,000	7,000	12,000	7,000	9,600	6,700	7,700	6,000	6,500	6,000	0.1-0.2	0.015D
Hardened Die Steel (40-55HRC)	JC8008 JC5003	450	14,500	4,300	12,000	4,800	9,000	4,500	7,200	3,600	5,750	3,450	4,800	3,360	0.1-0.2	0.015D
Hardened Die Steel (56-63HRC)	JC8008 JC5003	300	9,500	2,800	8,000	3,200	6,000	3,000	4,800	2,400	3,850	2,300	3,200	2,200	0.05-0.01	0.015D
Stainless Steel (150-250HB)	JC8008 JC5015	500	16,000	6,000	13,500	6,000	10,000	6,000	8,000	4,800	6,400	4,500	5,300	4,200	0.1-0.2	0.015D
Copper Alloy (150-250HB)	JC8008 JC5003	600	19,000	9,000	16,000	9,600	12,000	8,400	9,600	7,600	7,700	6,200	6,500	6,500	0.1-0.3	0.02D
Aluminum Alloy (30-100HB)	JC8008 JC5003	800	25,000	12,500	21,000	12,600	16,000	11,200	12,700	10,000	10,200	8,200	8,500	8,500	0.1-0.5	0.02D

N: Spindle Speed, F: Feed Speed

Nominal Cutting Data for MBN and Carbide MSN

Work Materials	Insert Grade	Cutting Speed Vc (m/min)	Tool Diameter (mm)												Max. D.O.C. Ap (mm)	Max. Pick Ae (mm)
			10		12		16		20		25		30/32			
			N (min⁻¹)	F (mm/min)	N (min⁻¹)	F (mm/min)	N (min⁻¹)	F (mm/min)	N (min⁻¹)	F (mm/min)	N (min⁻¹)	F (mm/min)	N (min⁻¹)	F (mm/min)		
Gray Cast Iron (160-260HB)	JC8008 JC5003	450	14,500	4,400	12,000	4,800	9,000	4,500	7,200	4,300	6,000	4,000	5,000	4,000	0.02D	0.025D
Nodular Cast Iron (170-300HB)	JC8008 JC5003	350	11,000	3,300	9,200	3,700	7,000	3,500	5,600	3,000	4,500	2,700	4,000	2,800	0.02D	0.025D
Carbon Steel (180-280HB)	JC8008 JC5003	350	11,000	3,300	9,200	3,700	7,000	3,500	5,600	3,000	4,500	2,700	4,000	2,800	0.02D	0.02D
Low Alloy Steel (180-280HB)	JC8008 JC5003	350	11,000	3,300	9,200	3,700	7,000	3,500	5,600	3,000	4,500	2,700	4,000	2,800	0.02D	0.02D
Tool & Die Steel (180-255HB)	JC8008 JC5003	350	11,000	3,300	9,200	3,700	7,000	3,500	5,600	3,000	4,500	2,700	4,000	2,800	0.02D	0.02D
Hardened Die Steel (40-55HRC)	JC8008 JC5003	250	8,000	2,000	6,700	2,000	5,000	2,000	4,000	1,800	3,200	1,600	2,700	1,400	0.015D	0.02D
Hardened Die Steel (56-63HRC)	JC8008 JC5003	200	6,400	1,300	5,300	1,500	4,000	1,400	3,200	1,300	2,600	1,300	2,000	1,000	0.01D	0.02D
Stainless Steel (150-250HB)	JC8008 JC5015	300	9,600	3,000	8,000	3,200	6,000	3,000	4,800	2,400	3,850	2,100	3,200	2,000	0.02D	0.02D
Copper Alloy (150-250HB)	JC8008 JC5003	350	11,000	3,800	9,200	4,000	7,000	3,850	5,600	3,400	4,500	3,150	4,000	3,200	0.02D	0.025D
Aluminum Alloy (30-100HB)	JC8008 JC5003	500	16,000	6,400	13,500	6,800	10,000	6,000	8,000	5,600	6,400	4,500	5,300	4,800	0.03D	0.03D

N: Spindle Speed, F: Feed Speed