

High Performance Solid Carbide End Mills

Millstar offers a wide variety of Solid Carbide End Mills that are designed for high performance machining. Our impressive lineup features a large selection of High Feed Solid Carbide End Mills that achieve the highest performance in the industry. Our End Mills can be used in a broad spectrum of materials such as hardened steels, soft steels, titanium, cobalt chrome and many more.



Solid Carbide End Mill Program Tool Contents

High Feed

HF14	High Feed Four Flute Solid Carbide	42	
HF16	High Feed with Coolant Through 6 Flute	42	
Cutting Conditions		42	
Quad Force		43	


Square

EIS	Square	44	
EIS2	2 Flute – Square	44	
EIS2...LL	2 Flute Long Series – Square	44	
EIS4	4 Flute – Square	45	
EIS4...LL	4 Flute Long Series – Square	45	
EISA	3 Flute – 45°	45	
EIV4	4 Flute Variable – Square, 45° Chamfer	45	
EIV5	5 Flute Variable Square End	46	
EIV5	5 Flute Variable With Corner Radius	46	


Ball Nose

BI	Ball	47	
BI4T	Ball	47	
BI220	220° 2 Flute – Ball	47	
BI2	2 Flute – Long Series – Ball	48	
BI4	4 Flute – Long Series – Ball	48	
BIA	3 Flute – Ball 45°	48	

Bull Nose

EIB	Square–Bullnose	49	
------------	-----------------	----	---

Toroid

TO1	Toroid	49	
------------	--------	----	---

NA

Non-coated grade.

HSN

Millstar's new coating is a multi-layer hybrid Nano coating. This new coating has very good heat resistance and high hardness. The HSN coating is designed for use in HSM of Heat Treated materials up to 72 HRC.

**ALTiN-EXALON
(TLN) (EX)**

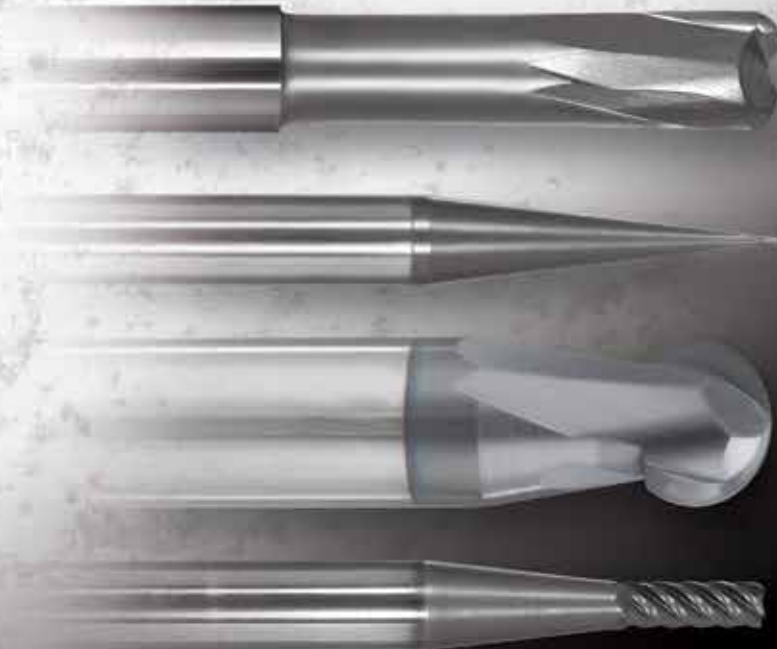
Titanium Aluminum Nitride advanced PVD coating. A special, improved ALTiN coating approaching surface hardness of CBN on a tough substrate. Recommended for tough and hard metal machining applications.

Custom tool coatings for specific applications are available by request.

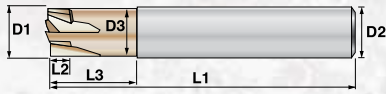
Solid Carbide End Mills

Millstar's new High Performance and ultra-precise solid carbide end mills were designed for high speed, high velocity and hard steel milling. Designed with specially selected premium sub-micron carbide substrate, special tool geometry and proprietary heat-defying EXALON tool coating, these tools made in the United States, and are competitively priced. Ideal choices for accurately and aggressively machining products in:

- **Mold and die making:** injection molds, glass molds, forging dies, extrusion dies.
- **Aerospace:** engine, landing gear and tail hook components, structural components, blisks, airfoil machining and forging dies, helicopter rotor components.
- **Power generating:** turbine blades and other components.
- **Medical:** hip and knee replacement joints, surgical instruments, medical device molds.
- **Automotive:** stamping dies, wheel and tire molds, ball joints, cam shaft machining, racing engine details, bumper and other injection molds, die cast dies, forging dies for crank and cam shafts, connecting rods, steering knuckles and yokes.
- **Consumer products:** molds for cake forms and baking dishes, cell phones, lawn chairs, trash cans, toys, bottles, recyclable cutlery and dishes, jewelry, golf clubs, safety helmets, computer and accessory housings.

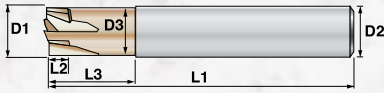


Solid Carbide End Mill Program - High Feed



HFI4 - High Feed Four Flute Solid Carbide

Tool Ordering No.	Diameter (D1)	Programmable Radius	Shank Diameter (D2)	Neck Diameter (D3)	Length of Cut (L2)	Neck Length (L3)	Overall Length (L1)	Step Over Ae	Depth of Cut Ap	Feed per Tooth Fz
HFI4-0125	0.125	0.015	0.250	0.115	0.0938	0.650	3	0.094	0.005	0.003 - 0.006
HFI4-0187	0.187	0.022	0.250	0.170	0.1250	0.750	3	0.135	0.007	0.004 - 0.009
HFI4-0250	0.250	0.031	0.250	0.235	0.1500	1.000	3	0.187	0.009	0.006 - 0.011
HFI4-0375	0.375	0.046	0.375	0.360	0.1700	1.250	4	0.280	0.014	0.009 - 0.016
HFI4-0500	0.500	0.061	0.500	0.485	0.1800	1.500	4	0.375	0.019	0.012 - 0.022



HFI6 - High Feed Six Flute Solid Carbide with Coolant Through

Tool Ordering No.	Diameter (D1)	Programmable Radius	Shank Diameter (D2)	Neck Diameter (D3)	Length of Cut (L2)	Neck Length (L3)	Overall Length (L1)	Step Over Ae	Depth of Cut Ap	Feed per Tooth Fz
HFI6-0250-3.0-CH	0.250	0.026	0.250	0.235	0.1560	0.5000	3	0.187	0.009	.006-.011
HFI6-0312-3.0-CH	0.312	0.036	0.312	0.290	0.1560	0.5000	3	0.230	0.012	.007-.014
HFI6-0375-3.0-CH	0.375	0.040	0.375	0.360	0.1875	0.5625	3	0.280	0.014	.009-.016
HFI6-0500-4.0-CH	0.500	0.056	0.500	0.485	0.1875	0.5625	4	0.375	0.019	.012-.022
HFI6-0625-4.0-CH	0.625	0.070	0.625	0.615	0.2180	0.6250	4	0.450	0.021	.015-.025

HFI Cutting Conditions

Work Material	Material Hardness	Cutting Depth at Diameter ap max				Cutting Width Ae max	Coating type Recom. Coating	Cut speed at D SFM	Max Feed per Tooth Fz at cutting insert diameter D			
		0.125	0.250	0.375	0.500				0.125	0.250	0.375	0.500
USA/W.-Nr./JIS	Hrc											
H13/1.2344/SKD61	<41	0.006	0.010	0.016	0.020	75%	HSN	800-1200	.003-.006	.006-.011	.009-.016	.012-.022
H13/1.2344/SKD61	41-50	0.006	0.010	0.016	0.020	75%	HSN	600-800	.003-.006	.006-.011	.009-.016	.012-.022
H13/1.2344/SKD61	51+	0.005	0.008	0.012	0.016	75%	HSN	300-600	.003-.006	.006-.011	.009-.016	.012-.022
A2/1,2363/SKD12	<41	0.006	0.010	0.016	0.020	75%	HSN	800-1200	.003-.006	.006-.011	.009-.016	.012-.022
A2/1,2363/SKD12	41-50	0.006	0.010	0.016	0.020	75%	HSN	800-1200	.003-.006	.006-.011	.009-.016	.012-.022
A2/1,2363/SKD12	51+	0.005	0.008	0.012	0.016	75%	HSN	300-600	.003-.006	.006-.011	.009-.016	.012-.022
P20/1,2330	<41	0.006	0.010	0.016	0.020	75%	HSN	800-1200	.003-.006	.006-.011	.009-.016	.012-.022
P20/1,2330	41-50	0.006	0.010	0.016	0.020	75%	HSN	800-1200	.003-.006	.006-.011	.009-.016	.012-.022
D2/1,2379/SKD11	<41	0.006	0.010	0.016	0.020	75%	HSN	800-1200	.003-.006	.006-.011	.009-.016	.012-.022
D2/1,2379/SKD11	41-50	0.006	0.010	0.016	0.020	75%	HSN	300-600	.003-.006	.006-.011	.009-.016	.012-.022
D2/1,2379/SKD11	51+	0.005	0.010	0.012	0.016	75%	HSN	250-500	.003-.006	.006-.011	.009-.016	.012-.022
Grey Cast Iron/GG	<41	0.006	0.010	0.016	0.020	75%	HSN	1000-3000	.003-.006	.006-.011	.009-.016	.012-.022
Cast Iron/GGG	41+	0.006	0.010	0.016	0.020	75%	HSN	800-1200	.003-.006	.006-.011	.009-.016	.012-.022
Titanium (6AL 4V)		0.006	0.010	0.016	0.020	75%	HSN	400-600	.003-.006	.006-.011	.009-.016	.012-.022

Solid Carbide End Mill Program - High Feed continued



Quad Force

Tool Ordering No.	Cutter Diameter (D1) Tol. +0/-0.0006	Programmable Radius (R1)	Shank Diameter (D2)	Cutting Length (L1)	Total Length (L2)
QFM-0125-HSN	1/8"	0.018"	0.125	0.500	1.500
QFM-0187-HSN	3/16"	0.021"	0.187	0.625	2.000
QFM-0250-HSN	1/4"	0.032"	0.250	0.750	2.500
QFM-0375-HSN	3/8"	0.140"	0.375	1.000	2.500
QFM-0500-HSN	1/2"	0.170"	0.500	1.200	3.000
QFM-0625-HSN	5/8"	0.200"	0.625	1.450	3.500
QFM-0750-HSN	3/4"	0.250"	0.750	1.700	4.000
QFM-1000-HSN	1"	0.310"	1.000	2.200	4.000

Quad Force
M A C H I N I N G

Quad Force Application Data

Side/Slot Milling		High Feed Machining		Trochoidal		Plunge Milling	
Tool	QFM-0375-HSN	Tool	QFM-0375-HSN	Tool	QFM-0375-HSN	Tool	QFM-0375-HSN
Tool Diameter	0.375"	Tool Diameter	0.375"	Tool Diameter	0.375"	Tool Diameter	0.375"
Spindle Speed	6265 RPM	Spindle Speed	6265 RPM	Spindle Speed	6265 RPM	Spindle Speed	6265 RPM
Feed Rate	225 IPM	Feed Rate	225 IPM	Feed Rate	225 IPM	Feed Rate	225 IPM
Depth of Cut	0.750"	Depth of Cut	0.012"	Depth of Cut	0.750"	Depth of Cut	0 - 0.750"
Width of Cut	0.012"	Width of Cut	0.225"	Width of Cut	0.012"	Width of Cut	0.012"
Metal Removal Rate	2.03	Metal Removal Rate	1.12	Metal Removal Rate	2.03	Metal Removal Rate	2.03
Material	P20	Material	P20	Material	P20	Material	P20



Side or Slot Milling

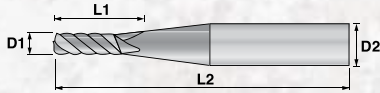
High Feed Machining

Trochoidal Milling

Plunge Milling

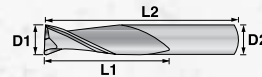
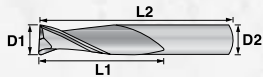
Solid Carbide End Mill Program - Square Nose

Square nose tools Series EMS / EIS with sharp corner or square nose tools Series EIB / EMB with corner radius, all with medium-high helix and strong cutting edges and tool body, work extremely well in materials up to 65HRc as well as in softer materials.



EIS - Square End

Tool Ordering No.	Cutter Diameter (D1) tol. +0 / -0.0004	Corner Radius	Shank Diameter (D2)	No. of Flutes	Neck Diameter	Cutting Length (L1)	Nose Taper	Overall Length (L2)
EIS-.020-	0.020	-	0.250 / (1/4)	3	0.020	0.060	7.500° / side	2.500
EIS-.031-	0.031 / (1/32)	-	0.250 / (1/4)	3	0.031	0.100	7.500° / side	2.500
EIS-.062-	0.062 / (1/16)	-	0.250 / (1/4)	4	0.062	0.200	7.500° / side	2.500
EIS-.093-	0.093 / (3/32)	-	0.250 / (1/4)	4	0.093	0.300	7.500° / side	2.500
EIS-.125-	0.125 / (1/8)	-	0.250 / (1/4)	5	0.125	0.375	7.500° / side	3.000
EIS-.187-	0.187 / (3/16)	-	0.250 / (1/4)	6	0.187	0.600	7.500° / side	3.000
EIS-.250-	0.250 / (1/4)	-	0.250 / (1/4)	6	0.250	0.750	-	3.000
EIS-.312-	0.312 / (5/16)	-	0.312 / (5/16)	6	0.312	1.000	-	3.500
EIS-.375-	0.375 / (3/8)	-	0.375 / (3/8)	6	0.375	1.125	-	3.500
EIS-.437-	0.437 / (7/16)	-	0.437 / (7/16)	6	0.437	1.315	-	4.000
EIS-.500-	0.500 / (1/2)	-	0.500 / (1/2)	6	0.500	1.500	-	4.000



EIS2 - 2 Flute Endmill, Square End

Tool Ordering No.	Cutter Diameter (D1) tol. +0 / -0.0006	Corner Radius (R1)	Shank Dia. (D2)	Cutting Length (L1)	Total Length (L2)	Nose Taper Per Side
EIS2-031-	1/32"	XX	0.125	0.094	1.500	7.5 Deg
EIS2-062-	1/16"	XX	0.125	0.250	1.500	7.5 Deg
EIS2-093-	3/32"	XX	0.125	0.375	1.500	7.5 Deg
EIS2-0125-	1/8"	XX	0.125	0.500	1.500	-
EIS2-0187-	3/16"	XX	0.187	0.625	2.000	-
EIS2-0250-	1/4"	XX	0.250	0.750	2.500	-
EIS2-0312-	5/16"	XX	0.312	0.750	2.500	-
EIS2-0375-	3/8"	XX	0.375	0.875	2.500	-
EIS2-0437-	7/16"	XX	0.437	0.875	2.500	-
EIS2-0500-	1/2"	XX	0.500	1.250	3.000	-
EIS2-0625-	5/8"	XX	0.625	1.250	3.500	-
EIS2-0750-	3/4"	XX	0.750	1.500	4.000	-
EIS2-0875-	7/8"	XX	0.875	1.500	4.000	-
EIS2-1000-	1"	XX	1.000	1.500	4.000	-

EIS2...LL - 2 Flute Long Series Endmill, Sq. End

Tool Ordering No.	Cutter Diameter (D1) tol. +0 / -0.0006	Corner Radius (R1)	Shank Diameter (D1)	Cutting Length (L1)	Total Length (L2)
EIS2-0125-LL	1/8"	XX	0.125	0.625	2.000
EIS2-0187-LL	3/16"	XX	0.187	1.000	3.000
EIS2-0250-LL	1/4"	XX	0.250	1.000	3.000
EIS2-0312-LL	5/16"	XX	0.312	1.000	3.000
EIS2-0375-LL	3/8"	XX	0.375	1.000	4.000
EIS2-0437-LL	7/16"	XX	0.437	1.000	4.000
EIS2-0500-LL	1/2"	XX	0.500	1.500	4.000
EIS2-0625-LL	5/8"	XX	0.625	2.000	6.000
EIS2-0750-LL	3/4"	XX	0.750	2.000	6.000
EIS2-1000-LL	1"	XX	1.000	2.000	6.000

All products on this page come in both TLN and HSN coatings.

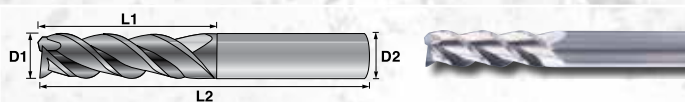
Example: EIS-.020-TLN

Solid Carbide End Mill Program - Square Nose continued



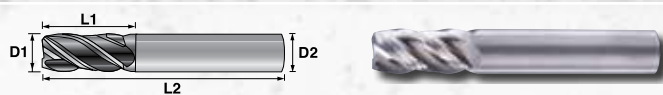
EIS4 - 4 Flute Endmill, Square End

Tool Ordering No.	Cutter Diameter (D1) tol. +0 / -0.0006	Corner Radius (R1)	Shank Dia. (D1)	Cutting Length (L1)	Total Length (L2)	Nose Taper Per Side
EIS4-031-	1/32"	XX	0.125	0.094	1.500	7.5 Deg
EIS4-062-	1/16"	XX	0.125	0.250	1.500	7.5 Deg
EIS4-093-	3/32"	XX	0.125	0.375	1.500	7.5 Deg
EIS4-0125-	1/8"	XX	0.125	0.500	1.500	-
EIS4-0187-	3/16"	XX	0.187	0.625	2.000	-
EIS4-0250-	1/4"	XX	0.250	0.750	2.500	-
EIS4-0312-	5/16"	XX	0.312	0.750	2.500	-
EIS4-0375-	3/8"	XX	0.375	0.875	2.500	-
EIS4-0437-	7/16"	XX	0.437	0.875	2.500	-
EIS4-0500-	1/2"	XX	0.500	1.250	3.000	-
EIS4-0625-	5/8"	XX	0.625	1.250	3.500	-
EIS4-0750-	3/4"	XX	0.750	1.500	4.000	-
EIS4-0875-	7/8"	XX	0.875	1.500	4.000	-



AlumiSTAR EISA - 3 Flute Endmill 45° - Aluminum

Tool Ordering No.	Cutter Diameter (D1) tol. +0 / -0.0006	Corner Radius (R1)	Shank Diameter (D2)	Cutting Length (L1)	Total Length (L2)
EISA-0125-	1/8"	XX	0.125	0.500	1.500
EISA-0187-	3/16"	XX	0.187	0.625	2.000
EISA-0250-	1/4"	XX	0.250	0.750	2.500
EISA-0312-	5/16"	XX	0.312	0.750	2.500
EISA-0375-	3/8"	XX	0.375	0.875	2.500
EISA-0437-	7/16"	XX	0.437	0.875	2.500
EISA-0500-	1/2"	XX	0.500	1.250	3.000
EISA-0625-	5/8"	XX	0.625	1.250	3.500
EISA-0750-	3/4"	XX	0.750	1.500	4.000
EISA-1000-	1"	XX	1.000	1.500	4.000



EIS4...LL - 4 Flute Long Series Endmill, Sq. End

Tool Ordering No.	Cutter Diameter (D1) tol. +0 / -0.0006	Corner Radius (R1)	Shank Diameter (D2)	Cutting Length (L1)	Total Length (L2)
EIS4-0125-LL-	1/8"	XX	0.125	0.625	2.000
EIS4-0187-LL-	3/16"	XX	0.187	1.000	3.000
EIS4-0250-LL-	1/4"	XX	0.250	1.000	3.000
EIS4-0312-LL-	5/16"	XX	0.312	1.000	3.000
EIS4-0375-LL-	3/8"	XX	0.375	1.000	4.000
EIS4-0437-LL-	7/16"	XX	0.437	1.000	4.000
EIS4-0500-LL-	1/2"	XX	0.500	1.500	4.000
EIS4-0625-LL-	5/8"	XX	0.625	2.000	6.000
EIS4-0750-LL-	3/4"	XX	0.750	2.000	6.000
EIS4-1000-LL-	1"	XX	1.000	2.000	6.000



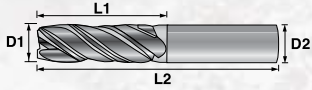
EIV4 - 4 Flute Variable Fluted Endmill, Square End w/45° Chamfer

Tool Ordering No.	Cutter Diameter (D1) tol. +0 / -0.0006	Corner Radius (R1)	Shank Diameter (D2)	Cutting Length (L1)	Total Length (L2)
EIV4-0125-	1/8"	XX	0.125	0.500	1.500
EIV4-0187-	3/16"	XX	0.187	0.625	2.00
EIV4-0250-	1/4"	XX	0.250	0.750	2.500
EIV4-0312-	5/16"	XX	0.312	0.750	2.500
EIV4-0375-	3/8"	XX	0.375	0.875	2.500
EIV4-0437-	7/16"	XX	0.437	0.875	2.500
EIV4-0500-	1/2"	XX	0.500	1.250	3.000
EIV4-0625-	5/8"	XX	0.625	1.250	3.500
EIV4-0750-	3/4"	XX	0.750	1.500	4.000
EIV4-1000-	1"	XX	1.000	1.500	4.000

All products on this page come in both TLN and HSN coatings.

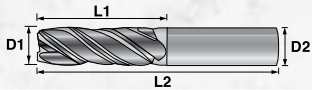
Example: **EISA-.0125-TLN**

Solid Carbide End Mill Program - Square Nose continued



EIV5 - 5 Flute Variable Flute, Variable Helix Endmill, Square End

Tool Ordering No.	Cutter Dia. (D1) tol. +0/-0.001	Corner Radius (R1)	No. of Flutes	Shank Dia. (D2)	Cutting Length (L1)	Total Length (L2)
EIV5-.125-HSN	0.125	XX	5	0.125	0.313	1.500
EIV5-.125-.250-HSN	0.125	XX	5	0.250	0.313	3.000
EIV5-.250-HSN	0.250	XX	5	0.250	0.625	2.500
EIV5-.375-HSN	0.375	XX	5	0.375	0.938	2.500
EIV5-.500-HSN	0.500	XX	5	0.500	1.250	3.000
EIV5-.625-HSN	0.625	XX	5	0.625	1.563	3.500

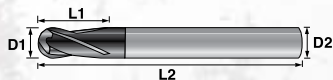


EIV5 - 5 Flute Variable Flute, Variable Helix Endmill, With Corner Radius

Tool Ordering No.	Cutter Dia. (D1) tol. +0/-0.001	Corner Radius (R1)	No. of Flutes	Shank Dia. (D2)	Cutting Length (L1)	Total Length (L2)
EIV5-.125-.015-HSN	0.125	0.015	5	0.125	0.313	1.500
EIV5-.250-.015-HSN	0.250	0.015	5	0.250	0.625	2.500
EIV5-.250-.030-HSN	0.250	0.030	5	0.250	0.625	2.500
EIV5-.375-.015-HSN	0.375	0.015	5	0.375	0.938	2.500
EIV5-.375-.030-HSN	0.375	0.030	5	0.375	0.938	2.500
EIV5-.500-.015-HSN	0.500	0.015	5	0.500	1.250	3.000
EIV5-.500-.030-HSN	0.500	0.030	5	0.500	1.250	3.000
EIV5-.500-.060-HSN	0.500	0.060	5	0.500	1.250	3.000
EIV5-.625-.015-HSN	0.625	0.015	5	0.625	1.563	3.500
EIV5-.625-.030-HSN	0.625	0.030	5	0.625	1.563	3.500
EIV5-.625-.060-HSN	0.625	0.060	5	0.625	1.563	3.500

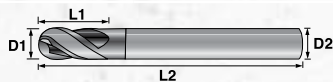
Solid Carbide End Mill Program - Ball Nose

Ball nose tools Series BI / BM are designed with two flutes and special nose geometry for true High Speed and Hard Material milling up to 68 HRC. Ball nose tools are the most aggressive tools for these applications. We will be glad to share our proven approach to improving your machining results.



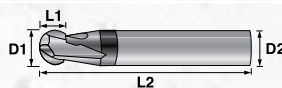
BI - Ball Nose

Tool Ordering No.	Cutter Diameter (D1) tol. +0 / -0.0004	Ball Radius	Shank Diameter (D2)	No. of Flutes	Neck Diameter	Cutting Length (L1)	Nose Taper	Overall Length (L2)
BI-.020	0.020	0.010	0.250 / (1/4)	2	-	0.020	7.500° / side	2.500
BI-.031	0.031 / (1/32)	0.015	0.250 / (1/4)	2	-	0.070	7.500° / side	2.500
BI-.062	0.062 / (1/16)	0.031	0.250 / (1/4)	2	-	0.062	7.500° / side	2.500
BI-.090	0.090	0.045	0.250 / (1/4)	2	-	0.090	7.500° / side	2.500
BI-.093	0.093 / (3/32)	0.046	0.250 / (1/4)	2	-	0.093	7.500° / side	2.500
BI-.125	0.125 / (1/8)	0.062	0.250 / (1/4)	2	-	0.125	7.500° / side	3.000
BI-.125-2.5-.125	0.125 / (1/8)	0.062	0.125 / (1/8)	2	-	0.125	NA	2.500
BI-.187	0.187 / (3/16)	0.093	0.250 / (1/4)	2	-	0.187	7.500° / side	3.000
BI-.187-2.5-.187	0.187 / (3/16)	0.093	0.187 / (3/16)	2	-	0.187	NA	2.500
BI-.250	0.250 / (1/4)	0.125	0.250 / (1/4)	2	-	0.250	-	3.000
BI-.312	0.312 / (5/16)	0.156	0.312 / (5/16)	2	-	0.312	-	3.500
BI-.375	0.375 / (3/8)	0.187	0.375 / (3/8)	2	-	0.375	-	3.500
BI-.375-LL	0.375 / (3/8)	0.187	0.375 / (3/8)	2	-	0.375	-	4.000
BI-.437	0.437 / (7/16)	0.218	0.437 / (7/16)	2	-	0.437	-	4.000
BI-.500	0.500 / (1/2)	0.250	0.500 / (1/2)	2	-	0.500	-	4.000



BI4T - Ball Nose, Special Tip Design for HSM

Tool Ordering No.	Cutter Diameter (D1) tol. +0 / -0.0004	Shank Diameter (D2)	Cutting Length (L1)	Overall Length (L2)
BI4T-.062	0.062	0.125	0.125	2.000
BI4T-.125	0.125	0.125	0.250	2.000
BI4T-.187	0.187	0.250	0.375	3.000
BI4T-.250	0.250	0.250	0.500	3.000
BI4T-.375	0.375	0.375	0.750	3.500
BI4T-.500	0.500	0.500	1.000	4.000



BI220 - 220° 2 Flute Endmill, Ball Nose

Tool Ordering No.	Cutter Diameter (D1) tol. +0 / -0.0006	Corner Radius (R1)	Shank Diameter (D2)	Cutting Length (L1)	Total Length (L2)
BI220-0125-	1/8	0.125	0.125	0.0938	1.500
BI220-0187-	3/16	0.093	0.187	0.141	2.000
BI220-0250-	1/4	0.125	0.250	0.188	2.500
BI220-0312-	5/16	0.156	0.312	0.234	2.500
BI220-0375-	3/8	0.187	0.375	0.281	2.500
BI220-0437-	7/16	0.218	0.437	0.328	2.500
BI220-0500-	1/2	0.250	0.500	0.375	3.000

All products on these pages come in both TLN and HSN coatings.

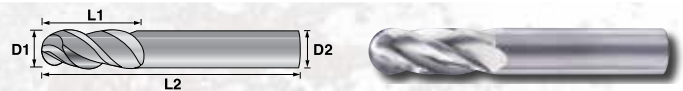
Example: BI4T-.062-HSN

Solid Carbide End Mill Program - Ball Nose continued



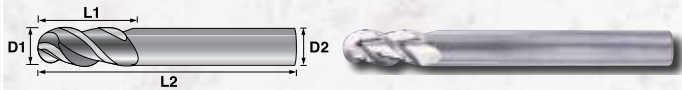
BI2 - 2 Flute Long Series Endmill, Ball Nose

Tool Ordering No.	Cutter Diameter (D1) tol. +0 / -0.0006	Corner Radius (R1)	Shank Diameter (D2)	Cutting Length (L1)	Total Length (L2)
BI2-0125-LL-	1/8"	0.063"	0.125	0.625	2.000
BI2-0187-LL-	3/16"	0.094"	0.187	1.000	3.000
BI2-0250-LL-	1/4"	0.125"	0.250	1.000	3.000
BI2-0312-LL-	5/16"	0.156"	0.312	1.000	3.000
BI2-0375-LL-	3/8"	0.188"	0.375	1.000	4.000
BI2-0437-LL-	7/16"	0.219"	0.437	1.000	4.000
BI2-0500-LL-	1/2"	0.250"	0.500	1.000	4.000
BI2-0625-LL-	5/8"	0.313"	0.625	2.000	6.000
BI2-0750-LL-	3/4"	0.375"	0.750	2.000	6.000
BI2-1000-LL-	1"	0.500"	1.000	2.000	6.000



BI4 - 4 Flute Endmill Long Series, Ballnose

Tool Ordering No.	Cutter Diameter (D1) tol. +0 / -0.0006	Corner Radius (R1)	Shank Diameter (D2)	Cutting Length (L1)	Total Length (L2)
BI4-0125-LL-	1/8"	0.063"	0.125	0.625	2.000
BI4-0187-LL-	3/16"	0.094"	0.187	1.000	3.000
BI4-0250-LL-	1/4"	0.125"	0.250	1.000	3.000
BI4-0312-LL-	5/16"	0.156"	0.312	1.000	3.000
BI4-0375-LL-	3/8"	0.188"	0.375	1.000	4.000
BI4-0437-LL-	7/16"	0.219"	0.437	1.000	4.000
BI4-0500-LL-	1/2"	0.250"	0.500	1.000	4.000
BI4-0625-LL-	5/8"	0.313"	0.625	2.000	6.000
BI4-0750-LL-	3/4"	0.375"	0.750	2.000	6.000
BI4-1000-LL-	1"	0.500"	1.000	2.000	6.000



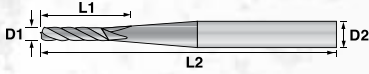
AlumiSTAR BIA - 3 Flute Endmill, Ball Nose 45° - Aluminum

Tool Ordering No.	Cutter Diameter (D1) tol. +0 / -0.0006	Corner Radius (R1)	Shank Diameter (D2)	Cutting Length (L1)	Total Length (L2)
BIA-0125-	1/8"	0.063"	0.125	0.500	1.500
BIA-0187-	3/16"	0.094"	0.187	0.625	2.000
BIA-0250-	1/4"	0.125"	0.250	0.750	2.500
BIA-0312-	5/16"	0.156"	0.312	0.750	2.500
BIA-0375-	3/8"	0.188"	0.375	0.875	2.500
BIA-0437-	7/16"	0.219"	0.437	0.875	2.500
BIA-0500-	1/2"	0.250"	0.500	1.250	3.000
BIA-0625-	5/8"	0.313"	0.625	1.250	3.500
BIA-0750-	3/4"	0.375"	0.750	1.500	4.000
BIA-1000-	1"	0.500"	1.000	1.500	4.000

All products on these pages come in both TLN and HSN coatings.

Example: BI2-0125-LL-TLN

Solid Carbide End Mill Program - Bull Nose

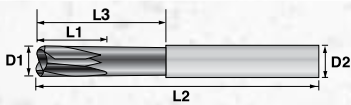


EIB - Square End Bull Nose w/Corner Radius

Tool Ordering No.	Cutter Diameter (D1) tol. +0 / -0.0004	Corner Radius	Shank Diameter (D2)	No. of Flutes	Neck Diameter	Cutting Length (L1)	Nose Taper	Overall Length (L2)
EIB-.062-015	0.062 / (1/16)	0.015	0.250 / (1/4)	4	0.062	0.200	7.500° / side	2.500
EIB-.093-015	0.093 / (3/32)	0.015	0.250 / (1/4)	4	0.093	0.300	7.500° / side	2.500
EIB-.125-015	0.125 / (1/8)	0.015	0.250 / (1/4)	5	0.125	0.375	7.500° / side	3.000
EIB-.125-030	0.125 / (1/8)	0.030	0.250 / (1/4)	5	0.125	0.375	7.500° / side	3.000
EIB-.187-030	0.187 / (3/16)	0.030	0.250 / (1/4)	6	0.187	0.600	7.500° / side	3.000
EIB-.250-015	0.250 / (1/4)	0.015	0.250 / (1/4)	6	0.250	0.750	-	3.000
EIB-.250-030	0.250 / (1/4)	0.030	0.250 / (1/4)	6	0.250	0.750	-	3.000
EIB-.312-030	0.312 / (5/16)	0.030	0.312 / (5/16)	6	0.312	1.000	-	3.500
EIB-.375-030	0.375 / (3/8)	0.030	0.375 / (3/8)	6	0.375	1.125	-	3.500
EIB-.437-030	0.437 / (7/16)	0.030	0.437 / (7/16)	6	0.437	1.315	-	4.000
EIB-.500-030	0.500 / (1/2)	0.030	0.500 / (1/2)	6	0.500	1.500	-	4.000
EIB-.500-060	0.500 / (1/2)	0.060	0.500 / (1/2)	6	0.500	1.500	-	4.000

Solid Carbide End Mill Program - Toroid

The Toroid Series TOI with large corner radius and slight back taper is a Millstar innovative addition. It is very useful in I.D. and O.D. Z-level and spiral milling at constant tool pressure, pocket milling, and milling of pre-hard and hardened flat surfaces at higher speeds than tools with smaller or sharp corner radii.



TOI - Toroid

Tool Ordering No.	Cutter Diameter (D1) tol. +0 / -0.0004	Corner Radius	Shank Diameter (D2)	No. of Flutes	Neck Diameter	Cutting Length (L1)	Nose Taper	Overall Length (L2)	Neck Length (L3)
TOI-125	0.125 / (1/8)	0.030	0.250 / (1/4)	2	0.115	0.125	0.375 / 7.500°	2.500	
TOI-250	0.250 / (1/4)	0.062	0.250 / (1/4)	2	0.230	0.250	0.750 / -	2.500	
TOI-375	0.375 / (3/8)	0.093	0.375 / (3/8)	2	0.345	0.375	1.125 / -	3.000	
TOI-500	0.500 / (1/2)	0.125	0.500 / (1/2)	2	0.460	0.500	1.500 / -	3.500	

All tools backdraft 3° per side


All products on these pages come in both TLN and HSN coatings.

Example: TOI-.125-TLN

High Performance Solid Carbide End Mills

Millstar offers a wide variety of Solid Carbide End Mills that are designed for high performance machining. Our impressive lineup features a large selection of High Feed Solid Carbide End Mills that achieve the highest performance in the industry. Our End Mills can be used in a broad spectrum of materials such as hardened steels, soft steels, titanium, cobalt chrome and many more.

Solid Carbide End Mill Program Tool Contents

HFM4	High Feed Four Flute Solid Carbide	101		BMT		107-109	
HFM6	High Feed with Coolant Through 6 Flute	101		BMNL	Ball Nose Taper Neck	110	
HFM True Radius	High Feed Bullnose Series	101		BMNL	Ball-Extended Reach, Taper Nose	110	
Cutting Conditions		102		BMA	3 Flute – Ball 45°	110	
Quad Force		103		BM2	2 Flute – Long Series – Ball	110	
EMS	Square	104		BM4	4 Flute – Long Series – Ball	111	
EMS2	2 Flute – Square	104		BM220	220° 2 Flute – Ball	111	
EMS4	4 Flute – Square	104		BM4T	Ball	111	
EMS2...LL	2 Flute Long Series – Square	104		EMB	Square-Bullnose	112	
EMS4...LL	4 Flute Long Series – Square	104		EMBT		113-115	
EMSA	3 Flute – 45°	105		EMR	Square End Bull Nose with Corner Radius, Extended Reach Taper Nose	116	
EMV4	4 Flute Variable – Square, 45° Chamfer	105		IMB-2-LL	Bull Nose Long Length 2 Flute	116	
EMV5	5 Flute Variable Square End	105		IMB-4-LL	Bull Nose Long Length 4 Flute NEW TOOL	117	
EMV5	5 Flute Variable With Corner Radius	105		TOM	Toroid	117	
BM	Ball	106					
BMS	72 Angle 30°	106					

Solid Carbide End Mills

Millstar's new High Performance and ultra-precise solid carbide end mills were designed for high speed, high velocity and hard steel milling. Designed with specially selected premium sub-micron carbide substrate, special tool geometry and proprietary heat-defying EXALON tool coating, these tools made in the United States, and are competitively priced. Ideal choices for accurately and aggressively machining products in:

- **Mold and die making:** injection molds, glass molds, forging dies, extrusion dies.
- **Aerospace:** engine, landing gear and tail hook components, structural components, blisks, airfoil machining and forging dies, helicopter rotor components.
- **Power generating:** turbine blades and other components.
- **Medical:** hip and knee replacement joints, surgical instruments, medical device molds.
- **Automotive:** stamping dies, wheel and tire molds, ball joints, cam shaft machining, racing engine details, bumper and other injection molds, die cast dies, forging dies for crank and cam shafts, connecting rods, steering knuckles and yokes.
- **Consumer products:** molds for cake forms and baking dishes, cell phones, lawn chairs, trash cans, toys, bottles, recyclable cutlery and dishes, jewelry, golf clubs, safety helmets, computer and accessory housings.

NA

Non-coated grade.

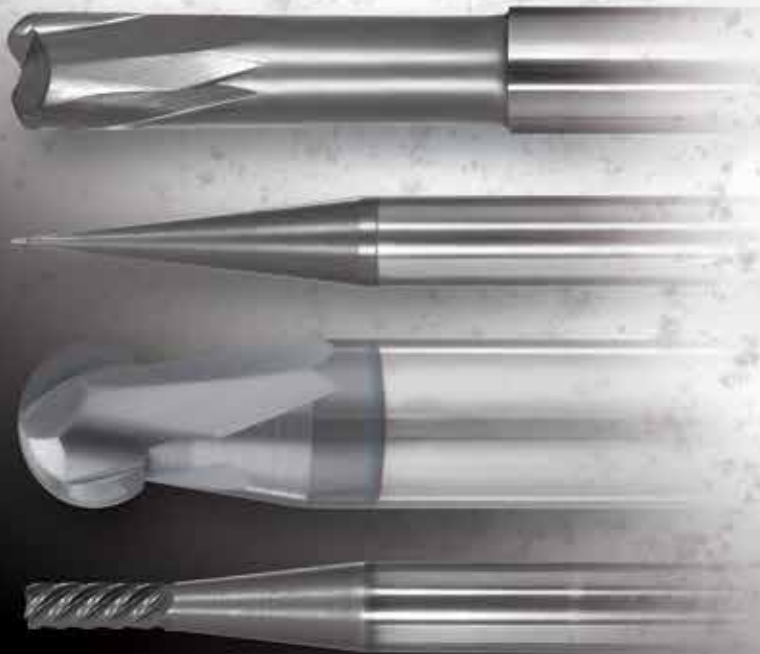
HSN

Millstar's new coating is a multi-layer hybrid Nano coating. This new coating has very good heat resistance and high hardness. The HSN coating is designed for use in HSM of Heat Treated materials up to 72 HRC.

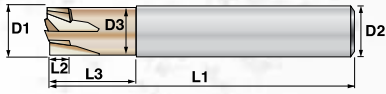
ALTiN-EXALON (TLN) (EX)

Titanium Aluminum Nitride advanced PVD coating. A special, improved ALTiN coating approaching surface hardness of CBN on a tough substrate. Recommended for tough and hard metal machining applications.

Custom tool coatings for specific applications are available by request.

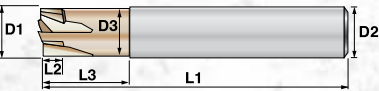


Solid Carbide End Mill Program - High Feed



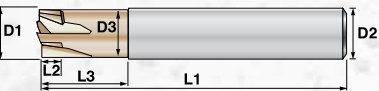
HMF4 - High Feed Four Flute Solid Carbide

Tool Ordering No.	Diameter (D1)	Programmable Radius	Shank Diameter (D2)	Neck Diameter (D3)	Length of Cut (L2)	Neck Length (L3)	Overall Length (L1)	Step Over Ae	Depth of Cut Ap	Feed per Tooth Fz
HFM4-02	2	0,234	6	1,85	2,2	12,0	76,0	1,50	0,09	0,03 - 0,05
HFM4-03	3	0,365	6	2,74	2,8	16,0	76,0	2,25	0,12	0,07 - 0,14
HFM4-04	4	0,465	6	3,60	3,5	20,0	76,0	3,00	0,15	0,10 - 0,20
HFM4-05	5	0,597	6	4,75	3,5	20,0	76,0	3,75	0,20	0,12 - 0,24
HFM4-06	6	0,731	6	5,61	3,8	25,0	76,0	4,50	0,24	0,14 - 0,28
HFM4-08	8	0,977	8	7,62	4,0	30,0	76,0	6,00	0,32	0,18 - 0,36
HFM4-10	10	1,226	10	9,60	4,3	33,0	100,0	7,50	0,40	0,22 - 0,44
HFM4-12	12	1,651	12	11,61	4,6	38,0	101,0	9,09	0,48	0,27 - 0,54



HFM6 - High Feed Six Flute Solid Carbide w/Coolant Through

Tool Ordering No.	Diameter (D1)	Programmable Radius	Shank Diameter (D2)	Neck Diameter (D3)	Length of Cut (L2)	Neck Length (L3)	Overall Length (L1)	Step Over Ae	Depth of Cut Ap	Feed per Tooth Fz
HFM6-06-76-CH	6	0,57	6	5,59	4	12	76	4,5	0,24	0,14-0,28
HFM6-08-76-CH	8	0,94	8	7,49	4	12	76	6,0	0,32	0,18-0,36
HFM6-10-76-CH	10	1,10	10	9,53	4,5	14	76	7,5	0,40	0,22-0,44
HFM6-12-100-CH	12	1,32	12	11,61	4,5	14	100	9,0	0,48	0,27-0,54
HFM6-16-100-CH	16	1,80	16	15,49	5	15	100	12,0	0,52	0,30-0,60



HFM True Radius

Tool Ordering No.	Diameter (D1)	Programmable Radius	Shank Diameter (D2)	Neck Diameter (D3)	Length of Cut (L2)	Neck Length (L3)	Overall Length (L1)	Step Over Ae	Depth of Cut Ap	Feed per Tooth Fz
HFM4-04-0.5R-50	4	0,5	4	3,6	3	6	50	3,0	0,16	0,08-0,14
HFM4-06-0.5R-70	6	0,5	6	5,61	3,5	9	70	4,5	0,24	0,14-0,28
HFM4-06-1.5R	6	1,5	6	5,61	3,5	9	76	4,5	0,24	0,14-0,28
HFM4-08-0,5R-70	8	0,5	8	7,6	4	12	70	6,0	0,32	0,18-0,36
HFM4-08-2R	8	2	8	7,61	4	12	76	6,0	0,32	0,18-0,36
HFM5-10-2R	10	2	10	9,61	4,3	15	100	7,5	0,4	0,22-0,44
HFM5-12-2R	12	2	12	11,61	4,6	18	100	9,0	0,48	0,27-0,54
HFM5-16-2R	16	2	16	15	5	18	100	12,0	0,52	0,30-0,60

Solid Carbide End Mill Program - High Feed continued

HFM Cutting Conditions											
Work Material USA/W.-Nr./JIS	Material Hardness Hrc	Cutting Depth at Diameter ap max								Cutting Width Ae max	Coating type recommended
		2	3	4	5	6	8	10	12		
H13/1.2344/SKD61	<41	0,09	0,12	0,15	0,2	0,24	0,32	0,4	0,48	75%	HSN
H13/1.2344/SKD61	41-50	0,09	0,12	0,15	0,2	0,24	0,32	0,4	0,48	75%	HSN
H13/1.2344/SKD61	51+	0,08	0,1	0,12	0,18	0,2	0,3	0,3	0,4	75%	HSN
A2/1,2363/SKD12	<41	0,09	0,12	0,15	0,2	0,24	0,32	0,4	0,48	75%	HSN
A2/1,2363/SKD12	41-50	0,09	0,12	0,15	0,2	0,24	0,32	0,4	0,48	75%	HSN
A2/1,2363/SKD12	51+	0,08	0,1	0,12	0,18	0,2	0,3	0,3	0,4	75%	HSN
P20/1,2330	<41	0,09	0,12	0,15	0,2	0,24	0,32	0,4	0,48	75%	HSN
P20/1,2330	41-50	0,09	0,12	0,15	0,2	0,24	0,32	0,4	0,48	75%	HSN
D2/1,2379/SKD11	<41	0,09	0,12	0,15	0,2	0,24	0,32	0,4	0,48	75%	HSN
D2/1,2379/SKD11	41-50	0,09	0,12	0,15	0,2	0,24	0,32	0,4	0,48	75%	HSN
D2/1,2379/SKD11	51+	0,08	0,1	0,12	0,2	0,24	0,32	0,3	0,4	75%	HSN
Grey Cast Iron/GG	<41	0,09	0,12	0,15	0,2	0,24	0,32	0,4	0,48	75%	HSN
Cast Iron/GGG	41+	0,09	0,12	0,15	0,2	0,24	0,32	0,4	0,48	75%	HSN
Titanium (6AL 4V)		0,09	0,12	0,15	0,2	0,24	0,32	0,4	0,48	75%	HSN

Work Material USA/W.-Nr./JIS	Cut speed at D m/minute	Max feed per tooth fz at cutting insert dia D							
		2	3	4	5	6	8	10	12
H13/1,2344/SKD61	244-365	0,03-0,05	0,07-0,14	0,10-0,2	0,12-0,24	0,14-0,28	0,18-0,36	0,22-0,44	0,27-0,54
H13/1.2344/SKD61	183-244	0,03-0,05	0,07-0,14	0,10-0,2	0,12-0,24	0,14-0,28	0,18-0,36	0,22-0,44	0,27-0,54
H13/1.2344/SKD61	90-150	0,03-0,05	0,07-0,14	0,10-0,2	0,12-0,24	0,14-0,28	0,18-0,36	0,22-0,44	0,27-0,54
A2/1,2363/SKD12	244-365	0,03-0,05	0,07-0,14	0,10-0,2	0,12-0,24	0,14-0,28	0,18-0,36	0,22-0,44	0,27-0,54
A2/1,2363/SKD12	183-244	0,03-0,05	0,07-0,14	0,10-0,2	0,12-0,24	0,14-0,28	0,18-0,36	0,22-0,44	0,27-0,54
A2/1,2363/SKD12	90-150	0,03-0,05	0,07-0,14	0,10-0,2	0,12-0,24	0,14-0,28	0,18-0,36	0,22-0,44	0,27-0,54
P20/1,2330	244-365	0,03-0,05	0,07-0,14	0,10-0,2	0,12-0,24	0,14-0,28	0,18-0,36	0,22-0,44	0,27-0,54
P20/1,2330	183-244	0,03-0,05	0,07-0,14	0,10-0,2	0,12-0,24	0,14-0,28	0,18-0,36	0,22-0,44	0,27-0,54
D2/1,2379/SKD11	183-244	0,03-0,05	0,07-0,14	0,10-0,2	0,12-0,24	0,14-0,28	0,18-0,36	0,22-0,44	0,27-0,54
D2/1,2379/SKD11	105-140	0,03-0,05	0,07-0,14	0,10-0,2	0,12-0,24	0,14-0,28	0,18-0,36	0,22-0,44	0,27-0,54
D2/1,2379/SKD11	80-140	0,03-0,05	0,07-0,14	0,10-0,2	0,12-0,24	0,14-0,28	0,18-0,36	0,22-0,44	0,27-0,54
Grey Cast Iron/GG	350-900	0,03-0,05	0,07-0,14	0,10-0,2	0,12-0,24	0,14-0,28	0,18-0,36	0,22-0,44	0,27-0,54
Cast Iron/GGG	250-400	0,03-0,05	0,07-0,14	0,10-0,2	0,12-0,24	0,14-0,28	0,18-0,36	0,22-0,44	0,27-0,54
Titanium (6AL 4V)	120-180	0,03-0,05	0,07-0,14	0,10-0,2	0,12-0,24	0,14-0,28	0,18-0,36	0,22-0,44	0,27-0,54

Solid Carbide End Mill Program - High Feed continued



Quad Force

Tool Ordering No.	Cutter Diameter (D1) Tol. +0/-0.0006	Programmable Radius (R1)	Shank Diameter (D2)	Cutting Length (L1)	Total Length (L2)
QFM-04-HSN	4mm	0,57	4mm	14mm	51mm
QFM-06-HSN	6mm	0,80	6mm	20mm	63mm
QFM-08-HSN	8mm	1,10	8mm	20mm	63mm
QFM-10-HSN	10mm	3,30	10mm	25mm	70mm
QFM-12-HSN	12mm	4,20	12mm	29mm	76mm
QFM-16-HSN	16mm	5	16mm	37mm	89mm

Quad Force

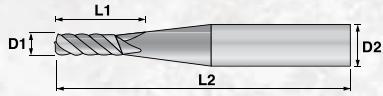
M A C H I N I N G

Quad Force Application Data

Side/Slot Milling		High Feed Machining		Trochoidal		Plunge Milling	
Tool	QFM-10-HSN	Tool	QFM-10-HSN	Tool	QFM-10-HSN	Tool	QFM-10-HSN
Tool Diameter	10mm	Tool Diameter	10mm	Tool Diameter	10mm	Tool Diameter	10mm
Spindle Speed	6265 RPM	Spindle Speed	6265 RPM	Spindle Speed	6265 RPM	Spindle Speed	6265 RPM
Feed Rate	5700	Feed Rate	5700	Feed Rate	5700	Feed Rate	5700
Depth of Cut	20mm	Depth of Cut	0.3mm	Depth of Cut	20mm	Depth of Cut	0 - 20mm
Width of Cut	0.3mm	Width of Cut	6mm	Width of Cut	0.3mm	Width of Cut	0.3mm
Metal Removal Rate	34.2	Metal Removal Rate	10.26	Metal Removal Rate	34.2	Metal Removal Rate	34.2
Material	P20	Material	P20	Material	P20	Material	P20

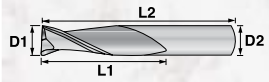


Solid Carbide End Mill Program - Square Nose



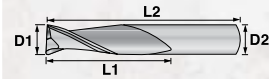
EMS - Square End

Tool Ordering No.	Cutter Diameter (D1) tol. +0/-0.01	Corner Radius	Shank Diameter (D2)	No. of Flutes	Neck Diameter	Cutting Length (L1)	Nose Taper	Overall Length (L2)
EMS-0.5	0,5	-	6	3	0,5	1,5	7.5° / side	63
EMS-1.0	1	-	6	4	1	3	7.5° / side	63
EMS-1.5	1,5	-	6	4	1,5	4,5	7.5° / side	63
EMS-2.0	2	-	6	4	2,0	6	7.5° / side	63
EMS-3.0	3	-	6	5	3,0	9	7.5° / side	75
EMS-4.0	4	-	6	6	4,0	12	7.5° / side	75
EMS-5.0	5	-	6	6	5	15	-	75
EMS-6.0	6	-	6	6	6	18	-	75
EMS-8.0	8	-	8	6	8	24	-	90
EMS-10.0	10	-	10	6	10	30	-	100
EMS-12.0	12	-	12	6	12	36	-	100
EMS-16.0	16	-	16	6	16	48	-	100



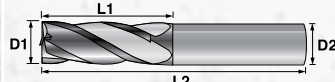
EMS2 - 2 Flute Endmill, Square End

Tool Ordering No.	Cutter Diameter (D1) tol. +0/-0.015	Corner Radius (R1)	Shank Diameter (D1)	Cutting Length (L1)	Total Length (L2)
EMS2-01-	1*	XX	3,000	4	38
EMS2-02-	2*	XX	3,000	8	38
EMS2-03-	3	XX	3,000	12	38
EMS2-04-	4	XX	4,000	14	50
EMS2-06-	6	XX	6,000	19	63
EMS2-08-	8	XX	8,000	22	63
EMS2-10-	10	XX	10,000	25	63
EMS2-12-	12	XX	12,000	25	76
EMS2-16-	16	XX	16,000	38	92
EMS2-20-	20	XX	20,000	38	101



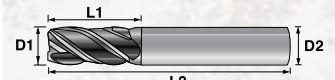
EMS2...LL - 2 Flute Long Series Endmill, Sq. End

Tool Ordering No.	Cutter Diameter (D1) tol. +0/-0.015	Corner Radius (R1)	Shank Diameter (D2)	Cutting Length (L1)	Total Length (L2)
EMS2-03-LL-	3	XX	3	16	50
EMS2-04-LL-	4	XX	4	20	76
EMS2-06-LL-	6	XX	6	25	76
EMS2-08-LL-	8	XX	8	25	76
EMS2-10-LL-	10	XX	10	25	101
EMS2-12-LL-	12	XX	12	25	101
EMS2-16-LL-	16	XX	16	50	152
EMS2-20-LL-	20	XX	20	50	152



EMS4 - 4 Flute Endmill, Square End

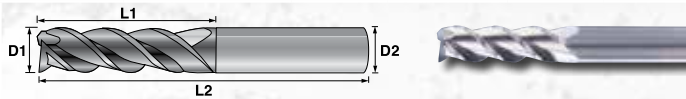
Tool Ordering No.	Cutter Diameter (D1) tol. +0/-0.015	Corner Radius (R1)	Shank Diameter (D2)	Cutting Length (L1)	Total Length (L2)
EMS4-03-	3	XX	3,000	12	38
EMS4-04-	4	XX	4,000	14	50
EMS4-06-	6	XX	6,000	19	63
EMS4-08-	8	XX	8,000	22	63
EMS4-10-	10	XX	10,000	25	63
EMS4-12-	12	XX	12,000	25	76
EMS4-16-	16	XX	16,000	38	92
EMS4-20-	20	XX	20,000	38	101



EMS4...LL - 4 Flute Long Series Endmill, Sq. End

Tool Ordering No.	Cutter Diameter (D1) tol. +0/-0.015	Corner Radius (R1)	Shank Diameter (D2)	Cutting Length (L1)	Total Length (L2)
EMS4-03-LL-	3	XX	3	16	50
EMS4-04-LL-	4	XX	4	20	76
EMS4-06-LL-	6	XX	6	25	76
EMS4-08-LL-	8	XX	8	25	76
EMS4-10-LL-	10	XX	10	25	101
EMS4-12-LL-	12	XX	12	25	101
EMS4-16-LL-	16	XX	16	50	152
EMS4-20-LL-	20	XX	20	50	152

Solid Carbide End Mill Program - Square Nose continued



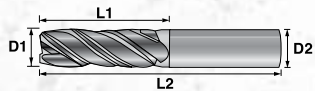
AlumiSTAR EMSA - 3 Flute Endmill, 45° - Aluminum

Tool Ordering No.	Cutter Diameter (D1) tol. +0/-0.015	Corner Radius (R1)	Shank Diameter (D2)	Cutting Length (L1)	Total Length (L2)
EMSA-04-	4	XX	4,000	14	50
EMSA-06-	6	XX	6,000	19	63
EMSA-08-	8	XX	8,000	22	63
EMSA-10-	10	XX	10,000	25	63
EMSA-12-	12	XX	12,000	25	76
EMSA-16-	16	XX	16,000	38	92
EMSA-20-	20	XX	20,000	38	101



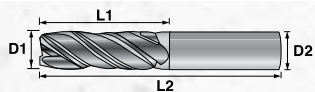
EMV4 - 4 Flute Variable Fluted Endmill, Square End w/45° Chamfer

Tool Ordering No.	Cutter Diameter (D1) tol. +0/-0.015	Corner Radius (R1)	Shank Diameter (D2)	Cutting Length (L1)	Total Length (L2)
EMV4-03-	3	XX	3	16	38
EMV4-04-	4	XX	4	20	50
EMV4-06-	6	XX	6	25	63
EMV4-08-	8	XX	8	25	63
EMV4-10-	10	XX	10	25	63
EMV4-12-	12	XX	12	25	76
EMV4-16-	16	XX	16	50	92
EMV4-20-	20	XX	20	50	101



EMV5 - 5 Flute Variable Flute, Variable Helix Endmill, Square End

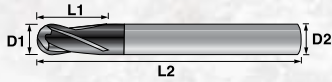
Tool Ordering No.	Cutter Dia. (D1) tol. +0/-0.001	Corner Radius (R1)	No. of Flutes	Shank Dia. (D2)	Cutting Length (L1)	Total Length (L2)
EMV5-3.0-HSN	3,0	XX	5	3,0	7,5	38
EMV5-4.0-HSN	4,0	XX	5	4,0	10,0	50
EMV5-6.0-HSN	6,0	XX	5	6,0	15,0	63
EMV5-8.0-HSN	8,0	XX	5	8,0	20,0	63
EMV5-10.0-HSN	10,0	XX	5	10,0	25,0	63
EMV5-12.0-HSN	12,0	XX	5	12,0	30,0	76
EMV5-16.0-HSN	16,0	XX	5	16,0	40,0	100



EMV5 - 5 Flute Variable Flute, Variable Helix Endmill, With Corner Radius

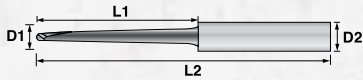
Tool Ordering No.	Cutter Dia. (D1) tol. +0/-0.001	Corner Radius (R1)	No. of Flutes	Shank Dia. (D2)	Cutting Length (L1)	Total Length (L2)
EMV5-3.0-0.5-HSN	3,0	0,5	5	3,0	7,5	38
EMV5-4.0-0.5-HSN	4,0	0,5	5	4,0	10,0	50
EMV5-6.0-0.5-HSN	6,0	0,5	5	6,0	15,0	63
EMV5-6.0-1.0-HSN	6,0	1,0	5	6,0	15,0	63
EMV5-8.0-0.5-HSN	8,0	0,5	5	8,0	20,0	63
EMV5-8.0-1.0-HSN	8,0	1,0	5	8,0	20,0	63
EMV5-10.0-0.5-HSN	10,0	0,5	5	10,0	25,0	63
EMV5-10.0-1.0-HSN	10,0	1,0	5	10,0	25,0	63
EMV5-12.0-0.5-HSN	12,0	0,5	5	12,0	30,0	76
EMV5-12.0-1.0-HSN	12,0	1,0	5	12,0	30,0	76
EMV5-16.0-0.5-HSN	16,0	0,5	5	16,0	40,0	100
EMV5-16.0-1.0-HSN	16,0	1,0	5	16,0	40,0	100

Solid Carbide End Mill Program - Ball Nose



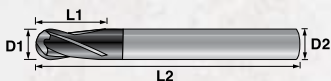
BM - Ball Nose

Tool Ordering No.	Cutter Diameter (D1) tol. +0 / -0.01	Ball Radius	Shank Diameter (D2)	No. of Flutes	Neck Diameter	Cutting Length (L1)	Nose Taper	Overall Length (L2)
BM-0.5	0,5	0,25	6	2	-	0,5	7,5° / side	63
BM-0.6	0,6	0,30	6	2	-	0,6	7,5° / side	63
BM-0.8	0,8	0,40	6	2	-	0,8	7,5° / side	63
BM-1.0	1	0,50	6	2	-	1,0	7,5° / side	63
BM-1.5	1,5	0,75	6	2	-	1,5	7,5° / side	63
BM-2.0	2	1,00	6	2	-	2,0	7,5° / side	63
BM-3.0	3	1,50	6	2	-	3,0	7,5° / side	75
BM-4.0	4	2,00	6	2	-	4,0	7,5° / side	75
BM-5.0	5	2,50	6	2	-	5,0	7,5° / side	75
BM-6.0	6	3,00	6	2	-	6,0	-	75
BM-6.0-LL	6	3,00	6	2	-	6,0	-	100
BM-8.0	8	4,00	8	2	-	8,0	-	90
BM-8.0-LL	8	4,00	8	2	-	8,0	-	110
BM-10.0	10	5,00	10	2	-	10,0	-	100
BM-10.0-LL	10	5,00	10	2	-	10,0	-	120
BM-12.0	12	6,00	12	2	-	12,0	-	100
BM-12.0-LL	12	6,00	12	2	-	12,0	-	120
BM-16.0	16	8,00	16	2	-	16,0	-	100
BM-16.0-LL	16	8,00	16	2	-	16,0	-	150



BM - Ball Nose w/.75° Taper Neck HSN Coated

Tool Ordering No.	Cutter Diameter (D1) tol. +0 / -0.01	Corner Radius	Shank Diameter (D2)	No. of Flutes	Neck Taper Angle per Side	Cutting Length (L1)	Neck Taper Length	Overall Length (L2)
BM-2.0-HSN-16NL	2	1	6	2	0,75°	2	16	50
BM-2.0-HSN-21NL	2	1	6	2	0,75°	2	21	50
BM-2.0-HSN-26NL	2	1	6	2	0,75°	2	26	50
BM-2.0-HSN-31.75NL	2	1	6	2	0,75°	2	31,75	50
BM-2.4-HSN-16NL	2,4	1,2	6	2	0,75°	2,4	16	50
BM-2.4-HSN-21NL	2,4	1,2	6	2	0,75°	2,4	21	50
BM-2.4-HSN-26NL	2,4	1,2	6	2	0,75°	2,4	26	50
BM-2.4-HSN-31.75NL	2,4	1,2	6	2	0,75°	2,4	31,75	60



BMS-LL - Z2 Angle 30°

Tool Ordering No.	Cutter Diameter (D1) tol. +0 / -0.01	Corner Radius	Shank Diameter (D2)	No. of Flutes	Cutting Length (L1)	Overall Length (L2)
BMS-2.0-LL	2,0	1,0	6	2	4,0	75
BMS-3.0-LL	3,0	1,5	6	2	5,0	75
BMS-4.0-LL	4,0	2,0	6	2	6,0	75
BMS-5.0-LL	5,0	2,5	6	2	8,0	75
BMS-6.0-LL	6,0	3,0	6	2	10,0	75
BMS-8.0-LL	8,0	4,0	8	2	12,0	90
BMS-10.0-LL	10,0	5,0	10	2	16,0	120
BMS-12.0-LL	12,0	6,0	12	2	18,0	120

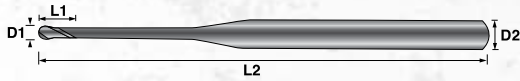
All products on these pages come in both TLN and HSN coatings.

Examples:

BM-0.5-TLN

BMS-12.0-LL-HSN

Solid Carbide End Mill Program - Ball Nose continued



BMT

Tool Ordering No.	Cutter Diameter (D1) tol. +0 / -0.0004	Effective Length	Shank Diameter (D2)	Neck Diameter	Cutting Length (L1)	Overall Length (L2)
BMT-0,5-HSN-3NL	0,5	3	4	0,47	0,4	50
BMT-0,5-HSN-6NL	0,5	6	4	0,47	0,4	50
BMT-0,5-HSN-8NL	0,5	8	4	0,47	0,4	50
BMT-1,0-HSN-4NL	1	4	4	0,95	0,8	50
BMT-1,0-HSN-6NL	1	6	4	0,95	0,8	50
BMT-1,0-HSN-8NL	1	8	4	0,95	0,8	50
BMT-1,0-HSN-10NL	1	10	4	0,95	0,8	50
BMT-1,0-HSN-12NL	1	12	4	0,95	0,8	50
BMT-1,0-HSN-16NL	1	16	4	0,95	0,8	50
BMT-1,5-HSN-4NL	1,5	4	4	1,44	1,2	50
BMT-1,5-HSN-6NL	1,5	6	4	1,44	1,2	50
BMT-1,5-HSN-8NL	1,5	8	4	1,44	1,2	50
BMT-1,5-HSN-10NL	1,5	10	4	1,44	1,2	50
BMT-1,5-HSN-12NL	1,5	12	4	1,44	1,2	50
BMT-1,5-HSN-16NL	1,5	16	4	1,44	1,2	50
BMT-1,5-HSN-20NL	1,5	20	4	1,44	1,2	50
BMT-2,0-HSN-8NL	2	8	4	1,94	1,6	50
BMT-2,0-HSN-10NL	2	10	4	1,94	1,6	50
BMT-2,0-HSN-12NL	2	12	4	1,94	1,6	50
BMT-2,0-HSN-16NL	2	16	4	1,94	1,6	50
BMT-2,0-HSN-20NL	2	20	4	1,94	1,6	50
BMT-2,0-HSN-25NL	2	25	4	1,94	1,6	50
BMT-2,5-HSN-8NL	2,5	8	4	2,41	2	50
BMT-2,5-HSN-10NL	2,5	10	4	2,41	2	50
BMT-2,5-HSN-12NL	2,5	12	4	2,41	2	50
BMT-2,5-HSN-16NL	2,5	16	4	2,41	2	50
BMT-2,5-HSN-20NL	2,5	20	4	2,41	2	50
BMT-2,5-HSN-25NL	2,5	25	4	2,41	2	50
BMT-2,5-HSN-30NL	2,5	30	4	2,41	2	50
BMT-3,0-HSN-8NL	3	8	6	2,91	2,4	60
BMT-3,0-HSN-10NL	3	10	6	2,91	2,4	60
BMT-3,0-HSN-12NL	3	12	6	2,91	2,4	60
BMT-3,0-HSN-16NL	3	16	6	2,91	2,4	60
BMT-3,0-HSN-20NL	3	20	6	2,91	2,4	75
BMT-3,0-HSN-25NL	3	25	6	2,91	2,4	75
BMT-3,0-HSN-30NL	3	30	6	2,91	2,4	75
BMT-4,0-HSN-16NL	4	15	6	3,91	3,0	75
BMT-4,0-HSN-20NL	4	20	6	3,91	3,0	75
BMT-4,0-HSN-25NL	4	25	6	3,91	3,0	75
BMT-4,0-HSN-30NL	4	30	6	3,91	3,0	75
BMT-4,0-HSN-35NL	4	35	6	3,91	3,0	80

Solid Carbide End Mill Program - Ball Nose continued

Cutting Conditions Data - BMT

Work Piece Material			Carbon Steels, Alloy Steels, (180-250HB) Copper(Cu): N+20% / fz+20%					Tool Steels (25-35HRC)				
Mill Dia. mm	Radius	Neck Length	doc mm	woc mm	N rpm	fz mm/tooth	Vf mm/min	doc mm	woc mm	N rpm	fz mm/tooth	Vf mm/min
0,5	0,25	4	0,02	0,06	50,000	0,011	1,100	0,018	0,054	50,000	0,001	990
0,5	0,25	6	0,013	0,039	50,000	0,011	1,100	0,012	0,035	40,000	0,001	790
1	0,5	3	0,1	0,3	38,000	0,022	1,670	0,09	0,27	29,000	0,02	1,150
1	0,5	4	0,07	0,21	38,000	0,022	1,670	0,063	0,189	29,000	0,02	1,150
1	0,5	6	0,04	0,12	34,000	0,022	1,500	0,036	0,108	29,000	0,02	1,150
1	0,5	8	0,04	0,12	34,000	0,022	1,500	0,036	0,108	29,000	0,02	1,150
1	0,5	10	0,025	0,075	27,000	0,022	1,190	0,023	0,068	20,000	0,02	790
1	0,5	12	0,025	0,075	27,000	0,022	1,190	0,023	0,068	20,000	0,02	790
1	0,5	16	0,015	0,045	19,000	0,022	840	0,014	0,041	17,000	0,02	680
1	0,5	20	0,01	0,03	19,000	0,022	840	0,009	0,027	17,000	0,02	680
1,2	0,6	8	0,04	0,12	29,000	0,026	1,510	0,036	0,108	21,000	0,023	980
1,2	0,6	12	0,03	0,09	22,000	0,026	1,140	0,027	0,081	17,000	0,023	790
1,4	0,7	8	0,055	0,165	25,000	0,03	1,500	0,05	0,149	18,000	0,027	970
1,4	0,7	16	0,035	0,105	19,000	0,03	1,140	0,032	0,095	14,000	0,027	760
1,5	0,75	8	0,06	0,18	23,000	0,033	1,520	0,054	0,162	17,000	0,03	1,010
1,5	0,75	12	0,06	0,18	23,000	0,033	1,520	0,054	0,162	17,000	0,03	1,010
1,5	0,75	20	0,038	0,114	13,000	0,033	860	0,034	0,103	11,500	0,03	680
1,6	0,8	12	0,065	0,195	21,000	0,035	1,470	0,059	0,176	16,000	0,032	1,010
1,6	0,8	20	0,04	0,12	12,000	0,035	840	0,036	0,108	11,000	0,032	690
1,8	0,9	12	0,07	0,21	19,000	0,039	1,480	0,063	0,189	14,000	0,035	980
1,8	0,9	20	0,045	0,135	15,000	0,039	1,170	0,041	0,122	11,000	0,035	770
2	1	6	0,2	0,6	19,000	0,043	1,630	0,18	0,54	14,000	0,039	1,080
2	1	8	0,14	0,42	19,000	0,043	1,630	0,126	0,378	14,000	0,039	1,080
2	1	10	0,14	0,42	19,000	0,043	1,630	0,126	0,378	14,000	0,039	1,080
2	1	12	0,08	0,24	17,000	0,043	1,460	0,072	0,216	13,000	0,039	1,000
2	1	16	0,08	0,24	17,000	0,043	1,460	0,072	0,216	13,000	0,039	1,000
2	1	20	0,05	0,15	13,000	0,043	1,120	0,045	0,135	10,000	0,039	780
2	1	25	0,05	0,15	9,600	0,043	830	0,045	0,135	8,600	0,039	670
2	1	30	0,03	0,09	9,600	0,043	830	0,027	0,081	8,600	0,039	670
3	1,5	10	0,21	0,63	13,000	0,08	2,080	0,189	0,567	9,600	0,072	1,380
3	1,5	25	0,08	0,24	8,900	0,08	1,420	0,072	0,216	6,700	0,072	960
3	1,5	35	0,08	0,24	8,900	0,08	1,420	0,072	0,216	6,700	0,072	960
4	2	16	0,28	0,84	9,600	0,1	1,920	0,252	0,756	7,200	0,09	1,300
4	2	35	0,1	0,3	6,700	0,1	1,340	0,09	0,27	5,000	0,09	900
4	2	50	0,1	0,3	4,800	0,1	960	0,09	0,27	4,300	0,09	770
5	2,5	25	0,35	1,05	7,600	0,12	1,820	0,315	0,945	5,700	0,108	1,230
5	2,5	40	0,2	0,6	7,000	0,12	1,680	0,18	0,54	5,200	0,108	1,120
6	3	30	0,42	1,26	6,400	0,14	1,790	0,378	1,134	4,800	0,126	1,210
6	3	50	0,15	0,45	4,500	0,14	1,260	0,135	0,405	3,300	0,126	830

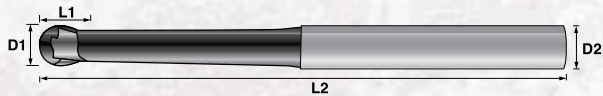
Solid Carbide End Mill Program - Ball Nose continued

Cutting Conditions Data - BMT

Work Piece Material			Tool Steels (35~45HRC)					Hardened Steels (45~55HRC)					Hardened Steels (55~70HRC)				
Mill Dia. mm	Radius	Neck Length	doc mm	woc mm	N rpm	fz mm/tooth	Vf mm/min	doc mm	woc mm	N rpm	fz mm/tooth	Vf mm/min	doc mm	woc mm	N rpm	fz mm/tooth	Vf mm/min
0,5	0,25	4	0,016	0,048	40,000	0,009	700	0,013	0,039	29,000	0,008	450	0,01	0,03	23,200	0,008	360
0,5	0,25	6	0,01	0,031	31,000	0,009	550	0,008	0,025	29,000	0,008	450	0,007	0,02	23,200	0,008	360
1	0,5	3	0,08	0,24	22,000	0,018	770	0,065	0,195	16,000	0,015	490	0,05	0,15	12,800	0,015	390
1	0,5	4	0,056	0,168	22,000	0,018	770	0,046	0,137	16,000	0,015	490	0,035	0,105	12,800	0,015	390
1	0,5	6	0,032	0,096	20,000	0,018	710	0,026	0,078	14,000	0,015	430	0,02	0,06	11,200	0,015	350
1	0,5	8	0,032	0,096	20,000	0,018	710	0,026	0,078	14,000	0,015	430	0,02	0,06	11,200	0,015	350
1	0,5	10	0,02	0,06	16,000	0,018	560	0,016	0,049	14,000	0,015	430	0,013	0,038	11,200	0,015	350
1	0,5	12	0,02	0,06	16,000	0,018	560	0,016	0,049	14,000	0,015	430	0,013	0,038	11,200	0,015	350
1	0,5	16	0,012	0,036	16,000	0,018	570	0,001	0,029	14,000	0,015	430	0,008	0,023	11,200	0,015	350
1	0,5	20	0,008	0,024	16,000	0,018	570	0,007	0,02	14,000	0,015	430	0,005	0,015	11,200	0,015	350
1,2	0,6	8	0,032	0,096	17,000	0,021	710	0,026	0,078	12,000	0,018	440	0,02	0,06	9,600	0,018	350
1,2	0,6	12	0,024	0,072	13,000	0,021	540	0,02	0,059	12,000	0,018	440	0,015	0,045	9,600	0,018	350
1,4	0,7	8	0,044	0,132	14,000	0,024	670	0,036	0,107	10,000	0,021	420	0,028	0,083	8,000	0,021	340
1,4	0,7	16	0,028	0,084	11,000	0,024	530	0,023	0,068	10,000	0,021	420	0,018	0,053	8,000	0,021	340
1,5	0,75	8	0,048	0,144	13,000	0,026	690	0,039	0,117	9,600	0,023	440	0,03	0,09	7,680	0,023	360
1,5	0,75	12	0,048	0,144	13,000	0,026	690	0,039	0,117	9,600	0,023	440	0,03	0,09	7,680	0,023	360
1,5	0,75	20	0,03	0,091	10,000	0,026	530	0,025	0,074	9,600	0,023	440	0,019	0,057	7,680	0,023	360
1,6	0,8	12	0,052	0,156	13,000	0,028	730	0,042	0,127	9,000	0,025	440	0,033	0,098	7,200	0,025	350
1,6	0,8	20	0,032	0,096	10,000	0,028	560	0,026	0,078	9,000	0,025	440	0,02	0,06	7,200	0,025	350
1,8	0,9	12	0,056	0,168	11,000	0,031	690	0,046	0,137	8,000	0,027	440	0,035	0,105	6,400	0,027	350
1,8	0,9	20	0,036	0,108	8,700	0,031	540	0,029	0,088	8,000	0,027	440	0,023	0,068	6,400	0,027	350
2	1	6	0,16	0,48	11,000	0,034	750	0,13	0,39	8,000	0,03	480	0,1	0,3	6,400	0,03	380
2	1	8	0,112	0,336	11,000	0,034	750	0,091	0,273	8,000	0,03	480	0,07	0,21	6,400	0,03	380
2	1	10	0,112	0,336	11,000	0,034	750	0,091	0,273	8,000	0,03	480	0,07	0,21	6,400	0,03	380
2	1	12	0,064	0,192	10,000	0,034	690	0,052	0,156	7,200	0,03	430	0,04	0,12	5,760	0,03	350
2	1	16	0,064	0,192	10,000	0,034	690	0,052	0,156	7,200	0,03	430	0,04	0,12	5,760	0,03	350
2	1	20	0,04	0,12	7,800	0,034	540	0,033	0,098	7,200	0,03	430	0,025	0,075	5,760	0,03	350
2	1	25	0,04	0,12	7,800	0,035	540	0,033	0,098	7,200	0,03	440	0,025	0,075	5,760	0,03	350
2	1	30	0,024	0,072	7,800	0,035	540	0,02	0,059	7,200	0,03	440	0,015	0,045	5,760	0,03	350
3	1,5	10	0,168	0,504	7,400	0,064	950	0,137	0,41	5,300	0,056	590	0,105	0,315	4,240	0,056	470
3	1,5	25	0,064	0,192	5,200	0,064	660	0,052	0,156	4,800	0,056	540	0,04	0,12	3,840	0,056	430
3	1,5	35	0,064	0,192	5,200	0,064	660	0,052	0,156	4,800	0,056	540	0,04	0,12	3,840	0,056	430
4	2	16	0,224	0,672	5,600	0,08	900	0,182	0,546	4,000	0,07	560	0,14	0,42	3,200	0,07	450
4	2	35	0,08	0,24	3,900	0,08	620	0,065	0,195	3,600	0,07	500	0,05	0,15	2,880	0,07	400
4	2	50	0,08	0,24	3,900	0,08	620	0,065	0,195	3,600	0,07	500	0,05	0,15	2,880	0,07	400
5	2,5	25	0,28	0,84	4,500	0,096	860	0,228	0,683	3,200	0,084	540	0,175	0,525	2,560	0,084	430
5	2,5	40	0,16	0,48	4,000	0,096	770	0,13	0,39	2,900	0,084	490	0,1	0,3	2,320	0,084	390
6	3	30	0,336	1,008	3,700	0,112	830	0,273	0,819	2,700	0,098	530	0,21	0,63	2,160	0,098	420
6	3	50	0,12	0,36	2,600	0,112	580	0,098	0,293	2,400	0,098	470	0,075	0,225	1,920	0,098	380

Solid Carbide End Mill Program - Ball Nose continued

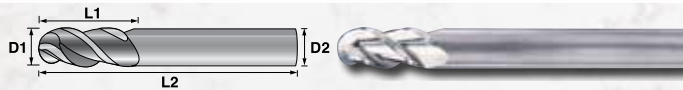
Extended Reach ball nose tools Series BMNL and extended reach square nose tools Series EMR are useful tools specifically designed for long reach milling of extrusion dies, deep cavities and cores, deep rib milling and similar applications. The reduced flute length and neck diameter assure constant cutting pressure and minimal tool deflection.



BMNL - Ball, Extended Reach Tapered Nose*

Tool Ordering No.	Cutter Diameter (D1) tol. +0/-0.01	Corner Radius	Shank Diameter (D2)	No. of Flutes	Neck Diameter	Cutting Length (L1)	Nose Taper	Overall Length (L2)
BM-2.0-1.25NL	2	1	6	2	1,9 / 1,3	2	31,75 / (1,25")	75
BM-2.0-1.80NL	2	1	6	2	1,9 / 1,3	2	45,70 / (1,8")	75
BM-2.5-1.25NL	2,5	1,25	6	2	2,4 / 1,3	2,5	31,75 / (1,25")	75
BM-2.5-1.80NL	2,5	1,25	6	2	2,4 / 1,3	2,5	45,70 / (1,8")	75
BM-3.0-1.25NL	3	1,5	6	2	2,9 / 1,3	3	31,75 / (1,25")	75
BM-3.0-1.50NL	3	1,5	6	2	2,9 / 1,3	3	38,1 / (1,5")	75
BM-3.0-1.80NL	3	1,5	6	2	2,9 / 1,3	3	45,70 / (1,8")	75
BM-3.0-50NL	3	1,5	6	2	2,9 / 1,3	3	50 / (1,95")	75
BM-4.0-1.25NL	4	2	6	2	3,9 / 1,3	4	31,75 / (1,25")	75
BM-4.0-1.80NL	4	2	6	2	3,9 / 1,3	4	45,70 / (1,8")	75
BM-4.0-50NL	4	2	6	2	3,9 / 1,3	4	50 / (1,95")	75
BM-5.0-1.25NL	5	2,5	6	2	4,9 / 1,3	5	31,75 / (1,25")	75
BM-5.0-1.80NL	5	2,5	6	2	4,9 / 1,3	5	45,70 / (1,8")	75
BM-6.0-1.25NL	6	3	6	2	5,9 / -	6	31,75 / (1,25")	75
BM-6.0-1.50NL	6	3	6	2	5,9 / -	6	38,1 / (1,5")	75
BM-6.0-1.80NL	6	3	6	2	5,9 / -	6	45,70 / (1,8")	75
BM-8.0-1.25NL	8	4	8	2	7,9 / -	8	31,75 / (1,25")	75

* 1.3° Neck Taper Per Side



AlumiSTAR BMA - 3 Flute Endmill, Ballnose 45° - Aluminum

Tool Ordering No.	Cutter Diameter (D1) tol. +0/-0.015	Corner Radius (R1)	Shank Diameter (D2)	Cutting Length (L1)	Total Length (L2)
BMA-03-	3	1,5	3,000	12	38
BMA-04-	4	2	4,000	14	50
BMA-06-	6	3	6,000	19	63
BMA-08-	8	4	8,000	22	63
BMA-10-	10	5	10,000	25	63
BMA-12-	12	6	12,000	25	76
BMA-16-	16	8	16,000	38	92
BMA-20-	20	10	20,000	38	101

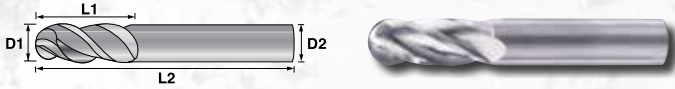


BM2 - 2 Flute Long Series Endmill, Ballnose

Tool Ordering No.	Cutter Diameter (D1) tol. +0/-0.015	Corner Radius (R1)	Shank Diameter (D2)	Cutting Length (L1)	Total Length (L2)
BM2-03-LL-	3	1,5	3	16	50
BM2-04-LL-	4	2	4	20	76
BM2-06-LL-	6	3	6	25	76
BM2-08-LL-	8	4	8	25	76
BM2-10-LL-	10	5	10	25	101
BM2-12-LL-	12	6	12	25	101
BM2-16-LL-	16	8	16	50	152
BM2-20-LL-	20	10	20	50	152

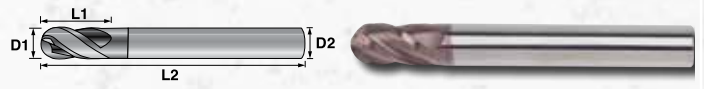
All products on these pages come in both TLN and HSN coatings.

Solid Carbide End Mill Program - Ball Nose continued



BM4 - 4 Flute Endmill Long Series, Ballnose

Tool Ordering No.	Cutter Diameter (D1) tol. +0 / -0.015	Corner Radius (R1)	Shank Diameter (D2)	Cutting Length (L1)	Total Length (L2)
BM4-03-LL-	3	1,5	3	16	50
BM4-04-LL-	4	2	4	20	76
BM4-06-LL-	6	3	6	25	76
BM4-08-LL-	8	4	8	25	76
BM4-10-LL-	10	5	10	25	101
BM4-12-LL-	12	6	12	25	101
BM4-16-LL-	16	8	16	50	152
BM4-20-LL-	20	10	20	50	152



BM4T - Ballnose, Special Tip Design for HSM

Tool Ordering No.	Cutter Diameter (D1) tol. +0 / -0.0004	Shank Diameter (D2)	Cutting Length (L1)	Overall Length (L2)
BM4T-3.0	3	6	6	75
BM4T-4.0	4	6	8	75
BM4T-6.0	6	6	12	75
BM4T-8.0	8	8	16	90
BM4T-10.0	10	10	20	100
BM4T-12.0	12	12	24	100

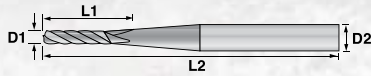


BM220 - 220° 2 Flute Endmill, Ballnose

Tool Ordering No.	Cutter Diameter (D1) tol. +0 / -0.015	Corner Radius (R1)	Shank Diameter (D2)	Cutting Length (L1)	Total Length (L2)
BM220-03-	3	1,5	3	2,25	38
BM220-04-	4	2	4	3,00	50
BM220-06-	6	3	6	4,50	63
BM220-08-	8	4	8	6,00	63
BM220-10-	10	5	10	7,50	63
BM220-12-	12	6	12	9,00	76

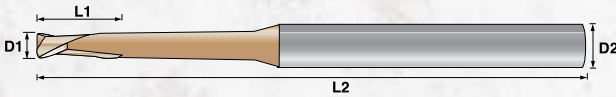
All products on these pages come in both TLN and HSN coatings.

Solid Carbide End Mill Program - Bull Nose



EMB - Bull Nose w/Corner Radius

Tool Ordering No.	Cutter Diameter (D1) tol. +0/-0.01	Corner Radius	Shank Diameter (D2)	No. of Flutes	Neck Diameter	Cutting Length (L1)	Nose Taper	Overall Length (L2)
EMB-1.0-0.2	1	0,2	6	4	1	3	7.5° / side	63
EMB-1.5-0.2	1,5	0,2	6	4	1,5	4,5	7.5° / side	63
EMB-2.0-0.2	2	0,2	6	4	2	6	7.5° / side	63
EMB-3.0-0.3	3	0,3	6	5	3	9	7.5° / side	75
EMB-4.0-0.5	4	0,5	6	6	4	12	7.5° / side	75
EMB-5.0-0.5	5	0,5	6	6	5	15	7.5° / side	75
EMB-6.0-0.5	6	0,5	6	6	6	18	-	75
EMB-6.0-1.0	6	1,0	6	6	6	18	-	75
EMB-8.0-0.5	8	0,5	8	6	8	24	-	90
EMB-8.0-1.0	8	1,0	8	6	8	24	-	90
EMB-10.0-1.0	10	1,0	10	6	10	30	-	100
EMB-12.0-1.0	12	1,08	12	6	12	36	-	100

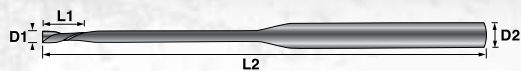


EMB - Bull Nose - End Mill w/.75° Taper Neck HSN Coated

Tool Ordering No.	Cutter Diameter (D1) tol. +0/-0.01	Corner Radius	Shank Diameter (D2)	No. of Flutes	Neck Taper Angle per Side	Cutting Length (L1)	Neck Taper Length	Overall Length (L2)
EMB-2.4-0.5-HSN-12NL	2.4	0.5	4	2	0,75°	2,4	12	50
EMB-2.4-0.5-HSN-16NL	2.4	0.5	4	2	0,75°	2,4	16	50
EMB-2.4-0.5-HSN-20NL	2.4	0.5	4	2	0,75°	2,4	20	50
EMB-2.4-0.5-HSN-25NL	2.4	0.5	6	2	0,75°	2,4	25	50
EMB-3.0-0.5-HSN-12NL	3	0.5	6	2	0,75°	3	12	50
EMB-3.0-0.5-HSN-16NL	3	0.5	6	2	0,75°	3	16	50
EMB-3.0-0.5-HSN-20NL	3	0.5	6	2	0,75°	3	20	50
EMB-3.0-0.5-HSN-25NL	3	0.5	6	2	0,75°	3	25	50
EMB-4.0-0.5-HSN-12NL	4	0.5	6	2	0,75°	4	12	50
EMB-4.0-0.5-HSN-16NL	4	0.5	6	2	0,75°	4	16	50
EMB-4.0-0.5-HSN-20NL	4	0.5	6	2	0,75°	4	20	50
EMB-4.0-0.5-HSN-25NL	4	0.5	6	2	0,75°	4	25	50

All products on these pages come in both TLN and HSN coatings.

Solid Carbide End Mill Program - Bull Nose continued



EMBT

Tool Ordering No.	Cutter Diameter (D1) tol. +0/-0.0004	Effective Length	Shank Diameter (D2)	Neck Diameter	Cutting Length (L1)	Overall Length (L2)
EMBT-1,0-0,1-HSN-4NL	1	4	4	0,95	0,8	50
EMBT-1,0-0,1-HSN-6NL	1	6	4	0,95	0,8	50
EMBT-1,0-0,1-HSN-8NL	1	8	4	0,95	0,8	50
EMBT-1,0-0,1-HSN-10NL	1	10	4	0,95	0,8	50
EMBT-1,0-0,1-HSN-12NL	1	12	4	0,95	0,8	50
EMBT-1,5-0,2-HSN-4NL	1,5	4	4	1,45	1,2	50
EMBT-1,5-0,2-HSN-6NL	1,5	6	4	1,45	1,2	50
EMBT-1,5-0,2-HSN-8NL	1,5	8	4	1,45	1,2	50
EMBT-1,5-0,2-HSN-10NL	1,5	10	4	1,45	1,2	50
EMBT-1,5-0,2-HSN-12NL	1,5	12	4	1,45	1,2	50
EMBT-2,0-0,2-HSN-6NL	2	6	4	1,92	1,6	50
EMBT-2,0-0,2-HSN-8NL	2	8	4	1,92	1,6	50
EMBT-2,0-0,2-HSN-10NL	2	10	4	1,92	1,6	50
EMBT-2,0-0,2-HSN-12NL	2	12	4	1,92	1,6	50
EMBT-2,0-0,2-HSN-16NL	2	16	4	1,92	1,6	50
EMBT-2,0-0,2-HSN-20NL	2	20	4	1,92	1,6	50
EMBT-2,5-0,2-HSN-6NL	2,5	6	4	2,42	2	50
EMBT-2,5-0,2-HSN-8NL	2,5	8	4	2,42	2	50
EMBT-2,5-0,2-HSN-10NL	2,5	10	4	2,42	2	50
EMBT-2,5-0,2-HSN-12NL	2,5	12	4	2,42	2	50
EMBT-2,5-0,2-HSN-16NL	2,5	16	4	2,42	2	50
EMBT-2,5-0,2-HSN-20NL	2,5	20	4	2,42	2	50
EMBT-2,5-0,2-HSN-25NL	2,5	25	4	2,42	2	50
EMBT-3,0-0,2-HSN-6NL	3	6	6	2,92	2,4	55
EMBT-3,0-0,2-HSN-8NL	3	8	6	2,92	2,4	55
EMBT-3,0-0,2-HSN-10NL	3	10	6	2,92	2,4	55
EMBT-3,0-0,2-HSN-12NL	3	12	6	2,92	2,4	55
EMBT-3,0-0,2-HSN-16NL	3	16	6	2,92	2,4	60
EMBT-3,0-0,2-HSN-20NL	3	20	6	2,92	2,4	60
EMBT-3,0-0,2-HSN-25NL	3	25	6	2,92	2,4	60
EMBT-3,0-0,2-HSN-30NL	3	30	6	2,92	2,4	75
EMBT-3,0-0,5-HSN-8NL	3	8	6	2,92	2,4	55
EMBT-3,0-0,5-HSN-10NL	3	10	6	2,92	2,4	55
EMBT-3,0-0,5-HSN-12NL	3	12	6	2,92	2,4	55
EMBT-3,0-0,5-HSN-16NL	3	16	6	2,92	2,4	60
EMBT-3,0-0,5-HSN-20NL	3	20	6	2,92	2,4	60
EMBT-3,0-0,5-HSN-25NL	3	25	6	2,92	2,4	60
EMBT-3,0-0,5-HSN-30NL	3	30	6	2,92	2,4	75
EMBT-4,0-0,5-HSN-8NL	4	8	6	3,82	3,2	70
EMBT-4,0-0,5-HSN-16NL	4	16	6	3,82	3,2	70
EMBT-4,0-0,5-HSN-24NL	4	24	6	3,82	3,2	70
EMBT-4,0-0,5-HSN-32NL	4	32	6	3,82	3,2	80

Solid Carbide End Mill Program - Bull Nose continued

Cutting Conditions Data - EMBT

Work Piece Material				(180-250HB) 100%			Hardness (25-35HRC) 90%			Hardness (35-45HRC) 80%			Hardness (45-55HRC) 65%			Hardness (55-65HRC) 60%		
Mill Dia. mm	Radius	Neck Length	doc mm	woc mm	N rpm	Vf mm	woc mm	N rpm	Vf mm	woc mm	N rpm	Vf mm	woc mm	N rpm	Vf mm	woc mm	N rpm	Vf mm
1,0	0,05	2	0,025	0,45	32,400	1,359	0,45	29,160	1,223	0,45	27,540	1,039	0,45	24,300	815	0,45	22,680	666
1,0	0,05	4	0,020	0,45	32,400	1,359	0,45	29,160	1,223	0,45	27,540	1,039	0,45	24,300	815	0,45	22,680	666
1,0	0,05	6	0,017	0,45	26,244	990	0,45	23,620	891	0,45	22,307	842	0,45	19,683	660	0,45	18,371	539
1,0	0,05	8	0,015	0,45	23,328	880	0,45	20,995	792	0,45	19,829	748	0,45	17,496	587	0,45	16,330	479
1,0	0,10	4	0,038	0,40	32,400	1,359	0,40	29,160	1,223	0,40	27,540	1,039	0,40	24,300	815	0,40	22,680	666
1,0	0,10	6	0,024	0,40	26,244	990	0,40	23,620	891	0,40	22,307	842	0,40	19,683	660	0,40	18,371	539
1,0	0,10	8	0,024	0,40	23,328	880	0,40	20,995	792	0,40	19,829	748	0,40	17,496	587	0,40	16,330	479
1,0	0,10	10	0,015	0,40	20,412	770	0,40	18,371	693	0,40	17,350	655	0,40	15,309	514	0,40	14,288	419
1,0	0,10	12	0,015	0,40	18,144	609	0,40	16,330	548	0,40	15,422	453	0,40	13,608	399	0,40	12,701	320
1,0	0,20	4	0,070	0,30	32,400	1,359	0,30	29,160	1,223	0,30	27,540	1,039	0,30	24,300	815	0,30	22,680	666
1,0	0,20	6	0,040	0,30	26,244	990	0,30	23,620	891	0,30	22,307	842	0,30	19,683	660	0,30	18,371	539
1,0	0,20	8	0,040	0,30	23,328	880	0,30	20,995	792	0,30	19,829	748	0,30	17,496	587	0,30	16,330	479
1,0	0,20	10	0,025	0,30	20,412	770	0,30	18,371	693	0,30	17,350	655	0,30	15,309	514	0,30	14,288	419
1,0	0,20	12	0,025	0,30	18,144	609	0,30	16,330	548	0,30	15,422	453	0,30	13,608	399	0,30	12,701	320
1,0	0,30	6	0,040	0,20	26,244	990	0,20	23,620	891	0,20	22,307	842	0,20	19,683	660	0,20	18,371	539
1,0	0,30	10	0,025	0,20	20,412	770	0,20	18,371	693	0,20	17,350	655	0,20	15,309	514	0,20	14,288	419
1,5	0,1	4	0,042	0,6	24,930	1,130	0,65	22,453	1,017	0,65	20,956	868	0,65	18,711	678	0,65	17,364	556
1,5	0,1	8	0,036	0,65	22,680	1,027	0,65	20,412	924	0,65	19,278	873	0,65	17,010	685	0,65	15,876	559
1,5	0,1	12	0,036	0,65	18,144	822	0,65	16,330	740	0,65	15,422	698	0,65	13,608	548	0,65	12,701	447
1,5	0,1	15	0,023	0,65	14,112	568	0,65	12,701	511	0,65	11,995	423	0,65	10,584	373	0,65	9,878	298
1,5	0,1	20	0,018	0,65	14,112	568	0,65	12,701	511	0,65	11,995	423	0,65	10,584	373	0,65	9,878	298
1,5	0,2	4	0,070	0,55	24,930	1,130	0,55	22,453	1,017	0,55	20,956	868	0,55	18,711	678	0,55	17,364	556
1,5	0,2	8	0,060	0,55	22,680	1,027	0,55	20,412	924	0,55	19,278	873	0,55	17,010	685	0,55	15,876	559
1,5	0,2	12	0,060	0,55	18,144	822	0,55	16,330	740	0,55	15,422	698	0,55	13,608	548	0,55	12,701	447
1,5	0,2	15	0,038	0,55	14,112	568	0,55	12,701	511	0,55	11,995	423	0,55	10,584	373	0,55	9,878	298
1,5	0,2	20	0,030	0,55	14,112	568	0,55	12,701	511	0,55	11,995	423	0,55	10,584	373	0,55	9,878	298
1,5	0,3	8	0,060	0,45	22,680	1,027	0,45	20,412	924	0,45	19,278	873	0,45	17,010	685	0,45	15,876	559
1,5	0,3	15	0,038	0,45	14,112	568	0,45	12,701	511	0,45	11,995	423	0,45	10,584	373	0,45	9,878	298
1,5	0,3	20	0,030	0,45	14,112	568	0,45	12,701	511	0,45	11,995	423	0,45	10,584	373	0,45	9,878	298
2,0	0,2	6	0,080	0,80	20,790	1,635	0,80	18,711	1,471	0,80	17,672	1,389	0,80	15,593	981	0,80	14,553	801
2,0	0,2	8	0,070	0,80	18,900	1,486	0,80	17,010	1,337	0,80	16,065	1,263	0,80	14,175	892	0,80	13,230	728
2,0	0,2	12	0,040	0,80	15,309	1,083	0,80	13,778	975	0,80	13,013	921	0,80	11,482	722	0,80	10,716	590
2,0	0,2	16	0,040	0,80	13,608	963	0,80	12,247	867	0,80	11,567	818	0,80	10,206	642	0,80	9,526	524
2,0	0,2	20	0,035	0,80	11,907	843	0,80	10,716	758	0,80	10,121	716	0,80	8,930	562	0,80	8,335	459
2,0	0,2	25	0,025	0,80	11,907	843	0,80	10,716	758	0,80	10,121	716	0,80	8,930	562	0,80	8,335	459
2,0	0,3	8	0,090	0,70	18,900	1,651	0,70	17,010	1,486	0,70	16,065	1,403	0,70	14,175	991	0,70	13,230	809
2,0	0,3	16	0,060	0,70	13,608	1,070	0,70	12,247	963	0,70	11,567	909	0,70	10,206	713	0,70	9,526	583
2,0	0,3	20	0,037	0,70	11,907	936	0,70	10,716	843	0,70	10,121	796	0,70	8,930	624	0,70	8,335	510
2,0	0,5	6	0,170	0,50	20,790	1,635	0,50	18,711	1,471	0,50	17,672	1,389	0,50	15,593	981	0,50	14,553	801
2,0	0,5	8	0,140	0,50	18,900	1,651	0,50	17,010	1,486	0,50	16,065	1,403	0,50	14,175	991	0,50	13,230	809
2,0	0,5	12	0,080	0,50	15,309	1,204	0,50	13,778	1,083	0,50	13,013	1,023	0,50	11,482	802	0,50	10,716	655
2,0	0,5	16	0,080	0,50	13,608	1,070	0,50	12,247	963	0,50	11,567	909	0,50	10,206	713	0,50	9,526	583

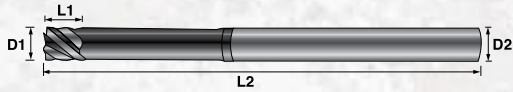
Metric Bull Nose : EMBT Cutting Conditions

Solid Carbide End Mill Program - Bull Nose continued

Cutting Conditions Data - EMBT

Work Piece Material			(180-250HB) 100%			Hardness (25-35HRC) 90%			Hardness (35-45HRC) 80%			Hardness (45-55HRC) 65%			Hardness (55-65HRC) 60%			
Mill Dia. mm	Radius	Neck Length	doc mm	woc mm	N rpm	Vf mm	woc mm	N rpm	Vf mm	woc mm	N rpm	Vf mm	woc mm	N rpm	Vf mm	woc mm	N rpm	Vf mm
2.0	0.5	20	0.050	0.50	11,907	936	0.50	10,716	843	0.50	10,121	796	0.50	8,930	624	0.50	8,335	510
2.0	0.5	25	0.050	0.50	11,907	936	0.50	10,716	843	0.50	10,121	796	0.50	8,930	624	0.50	8,335	510
2.0	0.8	8	0.200	0.20	18,900	1,651	0.20	17,010	1,486	0.20	16,065	1,403	0.20	14,175	991	0.20	13,230	809
2.0	0.8	16	0.100	0.20	13,608	1,070	0.20	12,247	963	0.20	11,567	909	0.20	10,206	713	0.20	9,526	583
2.0	0.8	20	0.060	0.20	11,907	936	0.20	10,716	843	0.20	10,121	796	0.20	8,930	624	0.20	8,335	510
3.0	0.2	8	0.090	1.30	14,400	1,415	1.30	12,960	1,274	1.30	12,240	1,203	1.30	10,800	849	1.30	10,080	693
3.0	0.2	12	0.070	1.30	14,400	1,415	1.30	12,960	1,274	1.30	12,240	1,203	1.30	10,800	849	1.30	10,080	693
3.0	0.2	16	0.050	1.30	14,400	1,415	1.30	12,960	1,274	1.30	12,240	1,203	1.30	10,800	849	1.30	10,080	693
3.0	0.2	20	0.050	1.30	11,664	1,146	1.30	10,498	1,032	1.30	9,914	974	1.30	8,748	764	1.30	8,165	624
3.0	0.2	30	0.040	1.30	9,072	1,146	1.30	8,165	1,032	1.30	7,711	974	1.30	6,804	764	1.30	6,350	624
3.0	0.2	35	0.035	1.30	9,072	1,146	1.30	8,165	1,032	1.30	7,711	974	1.30	6,804	764	1.30	6,350	624
3.0	0.3	8	0.130	1.20	14,400	1,572	1.20	12,960	1,415	1.20	12,240	1,337	1.20	10,800	943	1.20	10,080	771
3.0	0.3	16	0.075	1.20	14,400	1,572	1.20	12,960	1,415	1.20	12,240	1,337	1.20	10,800	943	1.20	10,080	771
3.0	0.3	20	0.075	1.20	11,664	1,274	1.20	10,498	1,146	1.20	9,914	1,083	1.20	8,748	849	1.20	8,165	693
3.0	0.3	30	0.060	1.20	9,072	1,274	1.20	8,165	1,146	1.20	7,711	1,083	1.20	6,804	849	1.20	6,350	693
3.0	0.5	8	0.180	1.00	14,400	1,572	1.00	12,960	1,415	1.00	12,240	1,337	1.00	10,800	943	1.00	10,080	771
3.0	0.5	12	0.130	1.00	14,400	1,572	1.00	12,960	1,415	1.00	12,240	1,337	1.00	10,800	943	1.00	10,080	771
3.0	0.5	16	0.100	1.00	14,400	1,572	1.00	12,960	1,415	1.00	12,240	1,337	1.00	10,800	943	1.00	10,080	771
3.0	0.5	20	0.100	1.00	11,664	1,274	1.00	10,498	1,146	1.00	9,914	1,083	1.00	8,748	849	1.00	8,165	693
3.0	0.5	30	0.080	1.00	9,072	1,274	1.00	8,165	1,146	1.00	7,711	1,083	1.00	6,804	849	1.00	6,350	693
3.0	0.5	35	0.065	1.00	9,072	1,274	1.00	8,165	1,146	1.00	7,711	1,083	1.00	6,804	849	1.00	6,350	693

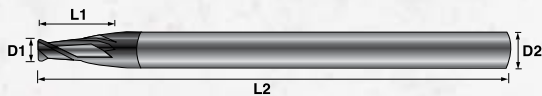
Solid Carbide End Mill Program - Bull Nose continued



EMR - Bull Nose with Corner Radius, Extended Reach Tapered Nose*

Tool Ordering No.	Cutter Diameter (D1) tol. +0/-0.01	Corner Radius	Shank Diameter (D2)	No. of Flutes	Neck Diameter	Cutting Length (L1)	Nose Taper	Overall Length (L2)
EMR-2.0-0.2-1.25NL	2	0,2	6	4	1,9 / 1,3	2	31,75 / (1,25")	75
EMR-2.0-0.2-1.80NL	2	0,2	6	4	1,9 / 1,3	2	45,70 / (1,8")	75
EMR-2.0-0.2-50NL	2	0,2	6	4	1,9 / 1,3	2	50 / (1,95")	75
EMR-2.5-0.2-1.25NL	2,5	0,2	6	4	2,4 / 1,3	2,5	31,75 / (1,25")	75
EMR-2.5-0.2-1.80NL	2,5	0,2	6	4	2,4 / 1,3	2,5	45,70 / (1,8")	75
EMR-3.0-0.2-1.25NL	3	0,2	6	5	2,9 / 1,3	3	31,75 / (1,25")	75
EMR-3.0-0.2-1.80NL	3	0,2	6	5	2,9 / 1,3	3	45,70 / (1,8")	75
EMR-3.0-0.2-50NL	3	0,2	6	5	2,9 / 1,3	3	50 / (1,95")	75
EMR-4.0-0.2-1.25NL	4	0,2	6	6	3,9 / 1,3	4	31,75 / (1,25")	75
EMR-4.0-0.2-1.80NL	4	0,2	6	6	3,9 / 1,3	4	45,70 / (1,8")	75
EMR-4.0-0.2-50NL	4	0,2	6	6	3,9 / 1,3	4	50 / (1,95")	75
EMR-5.0-0.2-1.25NL	5	0,2	6	6	4,9 / 1,3	5	31,75 / (1,25")	75
EMR-5.0-0.2-1.80NL	5	0,2	6	6	4,9 / 1,3	5	45,70 / (1,8")	75
EMR-6.0-0.2-1.25NL	6	0,2	6	6	5,9 / -	6	31,75 / (1,25")	75
EMR-6.0-0.2-1.80NL	6	0,2	6	6	5,9 / -	6	45,70 / (1,8")	75
EMR-12.0-0.2-1.25NL	12	0,2	12	6	11,9 / -	12	31,75 / (1,25")	75
EMR-12.0-0.2-1.80NL	12	0,2	12	6	11,9 / -	12	45,70 / (1,8")	75

* 1.3° Neck Taper Per Side



IMB-2.0 - Z2 Angle 30°

Tool Ordering No.	Cutter Diameter (D1) tol. +0/-0.01	Corner Radius	Shank Diameter (D2)	No. of Flutes	Cutting Length (L1)	Overall Length (L2)
IMB-2.0-0.5-EX2-LL	2,0	0,5	4	2	3,0	75
IMB-3.0-0.5-EX2-LL	3,0	0,5	6	2	4,5	75
IMB-3.0-1.0-EX2-LL	3,0	1,0	6	2	4,5	75
IMB-4.0-0.5-EX2-LL	4,0	0,5	6	2	6,0	75
IMB-4.0-1.0-EX2-LL	4,0	1,0	6	2	6,0	75
IMB-5.0-0.5-EX2-LL	5,0	0,5	6	2	7,5	75
IMB-5.0-1.0-EX2-LL	5,0	1,0	6	2	7,5	75
IMB-6.0-0.5-EX2-LL	6,0	0,5	6	2	9,0	90
IMB-6.0-1.0-EX2-LL	6,0	1,0	6	2	9,0	90
IMB-8.0-0.5-EX2-LL	8,0	0,5	8	2	12,0	100
IMB-8.0-1.0-EX2-LL	8,0	1,0	8	2	12,0	100
IMB-10.0-0.5-EX2-LL	10,0	0,5	10	2	15,0	100
IMB-10.0-1.0-EX2-LL	10,0	1,0	10	2	15,0	100
IMB-6.0-1.0-EX2	6,0	1,0	6	2	9,0	63
IMB-8.0-0.5-EX2	8,0	0,5	8	2	12,0	73
IMB-8.0-1.0-EX2	8,0	1,0	8	2	12,0	73
IMB-10.0-0.5-EX2	10,0	0,5	10	2	15,0	73
IMB-10.0-1.0-EX2	10,0	1,0	10	2	15,0	73

All products on these pages come in both TLN and HSN coatings.

Solid Carbide End Mill Program - Bull Nose continued

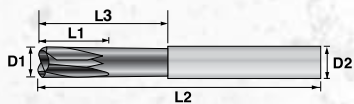


IMB-4-LL – Z4 Angle 30°

Tool Ordering No.	Cutter Diameter (D1) tol. +0 / -0.01	Corner Radius	Shank Diameter (D2)	No. of Flutes	Cutting Length (L1)	Overall Length (L2)
IMB-2.0-0.5-EX4-LL	2,0	0,5	4	4	3,0	75
IMB-3.0-0.5-EX4-LL	3,0	0,5	6	4	4,5	75
IMB-4.0-0.5-EX4-LL	4,0	0,5	6	4	6,0	75
IMB-5.0-0.5-EX4-LL	5,0	0,5	6	4	7,5	75
IMB-6.0-0.5-EX4-LL	6,0	0,5	6	4	9,0	90
IMB-8.0-0.5-EX4-LL	8,0	0,5	8	4	12,0	100
IMB-10.0-0.5-EX4-LL	10,0	0,5	10	4	15,0	100

Solid Carbide End Mill Program - Toroid

The Toroid Series TOM with large corner radius and slight back taper is a Millstar innovative addition. It is very useful in I.D. and O.D. Z-level and spiral milling at constant tool pressure, pocket milling, and milling of pre-hard and hardened flat surfaces at higher speeds than tools with smaller or sharp corner radii.



TOM- Toroid

Tool Ordering No.	Cutter Diameter (D1) tol. +0 / -0.01	Corner Radius	Shank Diameter (D2)	No. of Flutes	Neck Diameter	Cutting Length (L1)	Nose Taper	Overall Length (L2)
TOM-2.0	2	0,5	6,0	2	1,84	2,0	6 / 0,75°	63
TOM-3.0	3	0,75	6,0	2	2,76	3,0	9 / 0,75°	63
TOM-4.0	4	1,0	6	2	3,68	4,0	12 / 0,75°	63
TOM-6.0	6	1,5	6	2	5,52	6,0	18 / -	63
TOM-8.0	8	2,0	8	2	7,37	8,0	24 / -	75
TOM-10.0	10	2,5	10	2	9,21	10,0	30 / -	75
TOM-12.0	12	3,0	12	2	11,05	12,0	36 / -	90

All tools backdraft 3° per side

All products on these pages come in both TLN and HSN coatings.

Example: TOM-2.0-TLN