

2018



Decatur Diamond



AHB
TOOLING & MACHINERY

COMPLETE METALWORKING SOLUTIONS

(800) 991-4225

ISO Certified

www.ahbinc.com

customerservice@ahbinc.com



Decatur Diamond

First and foremost, we believe that Decatur Diamond currently offers the most complete suite of diamond cutting tools for the industrial market. We can provide both diamond coated and PCD milling cutters through the patented Ultra-Mill line. If your particular machining operation requires diamond coated, or grown on diamond, look no farther than our DIAbide series of solid carbide rounds with diamond coating. We also design, manufacture and sell brazed-on, PCD tooling. Finally, Decatur Diamond can also offer you complex, integrated shank, mono-bloc tooling that incorporates brazed-on, PCD diamond cutting surfaces. We are uniquely positioned to offer customers such a broad range of diamond based cutting tools. Whether it is high silica content aluminum for the automotive industry, multi-layer composites for aerospace, or any other difficult application, we have the diamond tooling solution for your machining challenge.

However, our products are only a portion of the story. Decatur Diamond stands ready to work with you to solve your machining challenges, and provide on-going assistance with best-in-class technical and logistic support. Our field technical sales, our inside tech support and our customer service team stand ready to help our customers select the right diamond tool for the job, apply that tool for maximum productivity, and provide ongoing service and logistics support for our products.

We remain committed to American industry and manufacturing. Please let us show you how we can work with you to help drive productivity and performance.



Table of Contents

Ultra-Mill Patented Milling Cutting System.....	4
Ultra-Mill Index	5
DIAbide Tool Grade and Type Description	30
DIAbide Index	31
PCD Tipped Inserts.....	52
PCD Tipped Inserts Index	53
How to Order	57


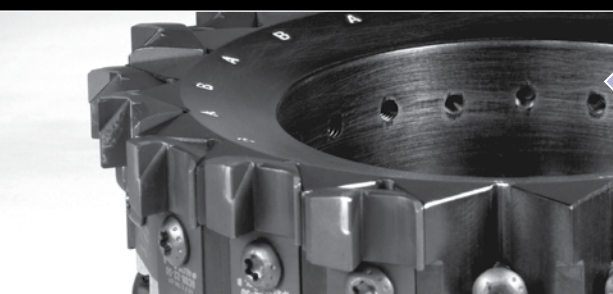
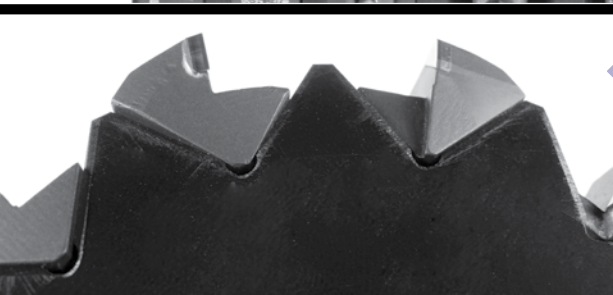

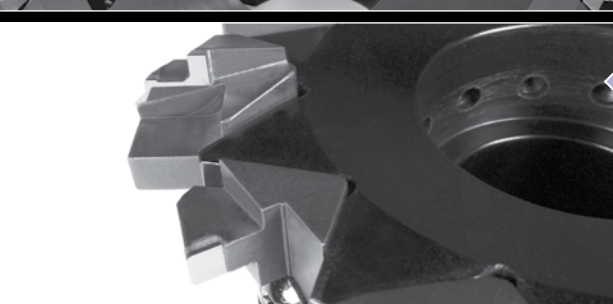
Ultra-Mill Patented Milling Cutting System

Ultra-Mill™

The design of the Ultra-Mill V-style milling cutter allows this system to accommodate a wide range of pitch or rake angle requirements for your particular cutting applications. This common body style allows the user to adapt to different applications simply by changing cartridge styles. For machining ferrous metals, brazed cBN cartridges are available. For non-ferrous materials brazed PCD cartridges are available.

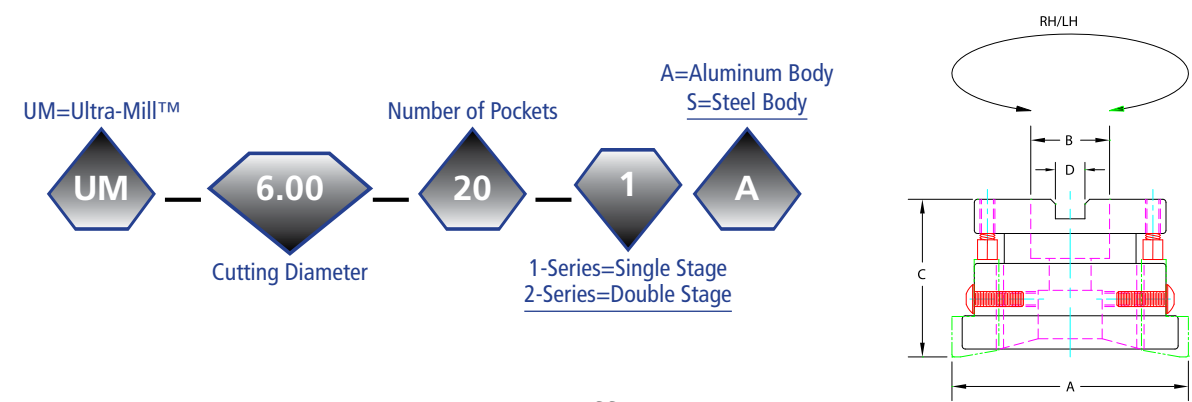


Ultra-Mill Index

Features	Benefits	Advantages
 <p>Higher density than most competitive milling cutters</p>	Higher machining speeds	Faster throughput (increased production) or longer tool life (reduction in tool costs)
 <p>2 Stage design capacity</p>	Rough and Finish in one pass, aids in reducing vibration on difficult to clamp or thin section parts	Faster throughput (increased production) or better asset utilization (increased capacity)
 <p>Symmetrical cutter body</p>	Left hand and right hand mounting with the same body	Reduced cutter body inventory and increased flexibility (reduced tooling costs)
 <p>Open design</p>	Improved chip evacuation – less chip damage	Increased cutter body life (lower tooling costs)
 <p>Geometry in the cartridge, not in the body</p>	Fewer application limitations – PCD and cBN brazed cutting tips, positive or negative rake and lead angles are available	Faster throughput (increased production) or longer tool life (reduction in tool costs)

Standard Shell Mill Cutter Body Offerings–Inch	6
Standard Shell Mill Cutter Body Offerings–Metric	7
Thru Spindle Coolant Attachments for Standard Cutters	8
Cartridge Identification for Standard Cutters.....	9
Intermediate Cutter Body Offerings–Inch	10
Intermediate Cutter Body Offerings–Metric.....	11
Thru Spindle Coolant Attachments for Intermediate Cutters.....	12
Cartridge Identification for Intermediate Cutters	13
Mini Endmill Shank Style Cutter Body Offerings–Inch.....	14
Mini Endmill Shank Style Cutter Body Offerings–Metric.....	15
Ultra Endmill Shank Style Cutter Offerings–Inch	16
Ultra Endmill Shank Style Cutter Offerings–Metric	17
Special Tools	18
Hardware and Adjustment Tools	20
Setup Procedure	21
Formulas, Legend, Milling Theory and Calculations.....	22
Cutting Data	23
Standard and Intermediate Shell Mills Quote Request Form	24
Intermediate and Mini Endmill Shank Style Mills Quote Request Form	25
Ultra Endmill Quote Request Form	26
Quote Request Form	27
PCD Monobloc Tools	28

Ultra-Mill Standard Shell Mill Cutter Body Offerings – Inch

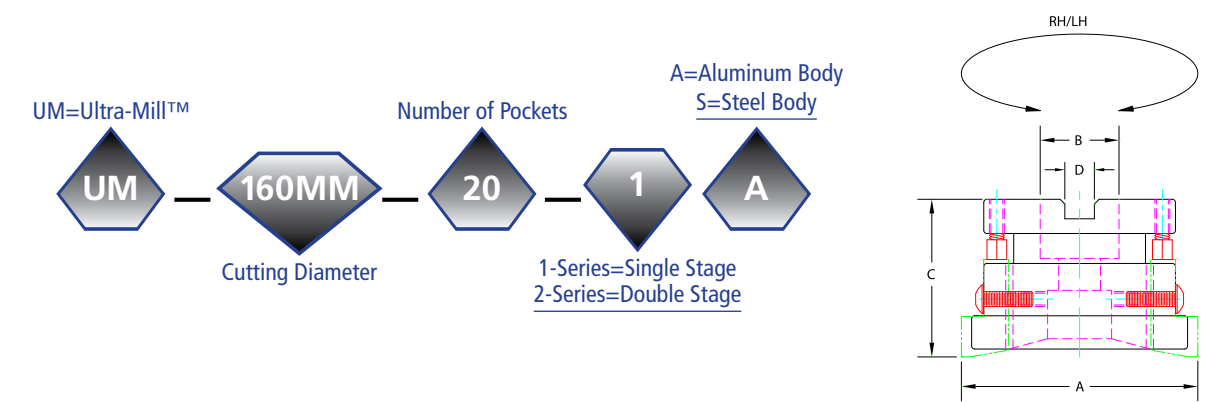


Ultra-Mill Standard Shell Mill Cutter Body Offerings – Inch

Effective Cutting Dia. A (Inches)	Cutter Order Number	Number of Pockets	B Dimension Bore Diameter	C Dimension Set Height	D Dimension Key Size	Max RPM
2.500	UM-2.50-3-1A/S	3	0.750	2.000	0.312	15,500
2.500	UM-2.50-6-1A/S	6	0.750	2.000	0.312	15,500
3.000	UM-3.00-4-1A/S	4	1.000	2.000	0.375	14,200
3.000	UM-3.00-8-1A/S	8	1.000	2.000	0.375	14,200
3.000	UM-3.00-10-1A/S	10	1.000	2.000	0.375	14,200
4.000	UM-4.00-6-1A/S	6	1.250	2.000	0.500	12,250
4.000	UM-4.00-12-1A/S	12	1.250	2.000	0.500	12,250
5.000	UM-5.00-8-1A/S	8	1.500	2.375	0.625	11,000
5.000	UM-5.00-16-1A/S	16	1.500	2.375	0.625	11,000
6.000	UM-6.00-8-1A/S	8	1.500	2.375	0.625	10,000
6.000	UM-6.00-12-1A/S	12	1.500	2.375	0.625	10,000
6.000	UM-6.00-20-1A/S	20	1.500	2.375	0.625	10,000
8.000	UM-8.00-10-1A/S	10	2.500	2.375	1.000	8,600
8.000	UM-8.00-12-1A/S	12	2.500	2.375	1.000	8,600
8.000	UM-8.00-24-1A/S	24	2.500	2.375	1.000	8,600
10.000	UM-10.00-12-1A/S	12	2.500	2.375	1.000	7,750
10.000	UM-10.00-28-1A/S	28	2.500	2.375	1.000	7,750
12.000	UM-12.00-18-1A/S	18	2.500	2.375	1.000	7,250
12.000	UM-12.00-36-1A/S	36	2.500	2.375	1.000	7,250
14.000	UM-14.00-16-1A/S	16	2.500	2.375	1.000	6,750
14.000	UM-14.00-32-1A/S	32	2.500	2.375	1.000	6,750
14.000	UM-14.00-42-1A/S	42	2.500	2.375	1.000	6,750

A = Aluminum Body S = Steel Body

Ultra-Mill Standard Shell Mill Cutter Body Offerings – Metric



Ultra-Mill Standard Shell Mill Cutter Body Offerings – Metric

Effective Cutting Dia. A (mm)	Cutter Order Number	Number of Pockets	B Dimension Bore Diameter	C Dimension Set Height	D Dimension Key Size	Max RPM
63	UM-63MM-3-1A/S	3	22	63	10	15,000
63	UM-63MM-6-1A/S	6	22	63	10	15,000
80	UM-80MM-8-1A/S	8	22	50	10	14,000
80	UM-80MM-10-1A/S	10	22	50	10	14,000
100	UM-100MM-6-1A/S	6	32	50	14	12,250
100	UM-100MM-8-1A/S	8	32	50	14	12,250
100	UM-100MM-12-1A/S	12	32	50	14	12,250
125	UM-125MM-12-1A/S	12	40	63	16	11,000
125	UM-125MM-16-1A/S	16	40	63	16	11,000
160	UM-160MM-10-1A/S	10	40	63	16	10,000
160	UM-160MM-20-1A/S	20	40	63	16	10,000
200	UM-200MM-12-1A/S	12	60	63	25	8,600
200	UM-200MM-24-1A/S	24	60	63	25	8,600
250	UM-250MM-32-1A/S	32	60	63	25	7,750

A = Aluminum Body S = Steel Body

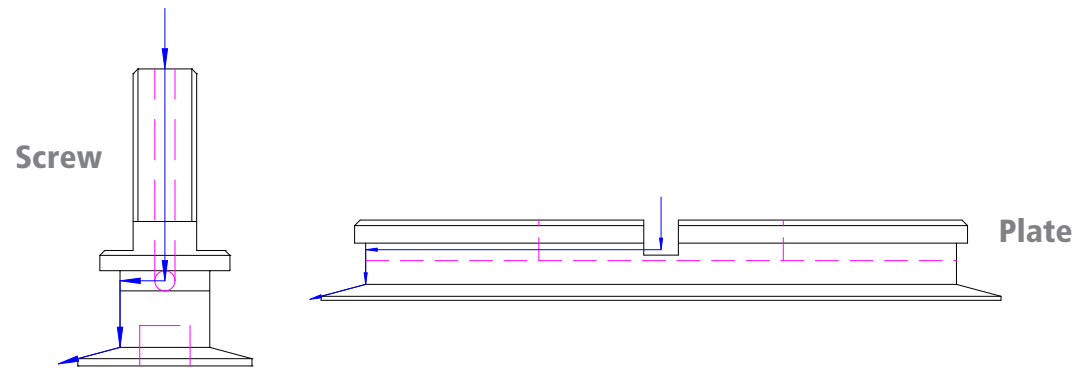
Decatur Diamond will design special cutter bodies to your specifications:

- Special mounts
- Application specific diameters
- Required number of pockets, ect.

Please call to inquire on further details or request a quote.

Ultra-Mill Thru Spindle Coolant Attachments for Standard Cutters

Ultra-Mill Cartridge Identification for Standard Cutters



Inch

Coolant Attachment Order Number	Cutter Diameter	Thread	Torque	Hex Size
UM-SS-2.50	2.50"	3/8-24	35 ft/lbs	3/16
UM-SS-3.00	3.00"	1/2-20	40 ft/lbs	5/16
UM-SS-4.00	4.00"	5/8-18	45 ft/lbs	3/8
UM-SS-5.00	5.00"	3/4-16	55 ft/lbs	3/8
UM-SS-6.00	6.00"	3/4-16	55 ft/lbs	5/8
UM-SS-8.00	8.00"	—	—	—
UM-SS-10.00	10.00"	—	—	—
UM-SS-12.00	12.00"	—	—	—
UM-SS-14.00	14.00"	—	—	—

Metric

Coolant Attachment Order Number	Cutter Diameter	Thread	Torque	Hex Size
UM-SS-63MM	63mm	M10x1.5	45Nm	8mm
UM-SS-80MM-22	80mm	M10x1.5	45Nm	8mm
UM-SS-80MM-27	80mm	M12x1.75	60Nm	8mm
UM-SS-100MM	100mm	M16x2.0	68Nm	10mm
UM-SS-125MM	125mm	M20x2.5	80Nm	14mm
UM-SS-160MM	160mm	M20x2.5	80Nm	14mm
UM-SS-200MM	200mm	—	—	—
UM-SS-250MM	250mm	—	—	—

For operations that require light weight tooling, Decatur Diamond offers our LW-series Coolant Cap Assemblies

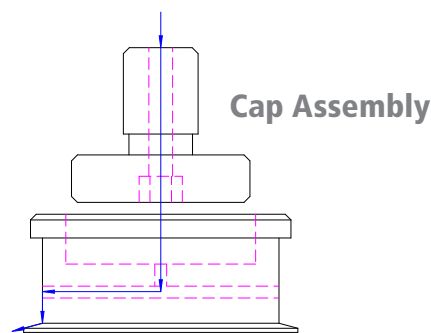
Inch

Coolant Attachment Order Number	Cutter Diameter	Thread*	Torque*	Hex Size*
UM-SS-5.00-LW	5.000	3/4-16	55 ft/lbs	3/8
UM-SS-6.00-LW	6.000	3/4-16	55 ft/lbs	3/8

Metric

Coolant Attachment Order Number	Cutter Diameter	Thread*	Torque*	Hex Size*
UM-SS-125MM-LW	125mm	M20x2.5	80Nm	10mm
UM-SS-160MM-LW	160mm	M20x2.5	80Nm	10mm

* Given values are for the arbor mount bolt



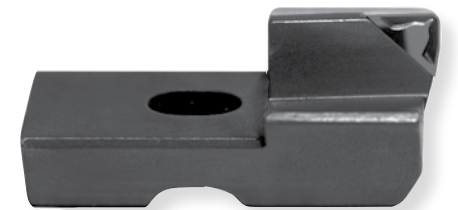
Nose Radius

- 1=.010" (0,25mm)
- 2=.030" (0,76mm)
- 3=.060" (1,52mm)
- 4=.090" (2,28mm)
- 5=.016" (0,40mm)
- 6=.100" (2,54mm)
- 7=1,0mm (.039")
- 8=1,5mm (.059")
- 9=2,0mm (.078")
- 0=2,5mm (.098")

C=Chamfer

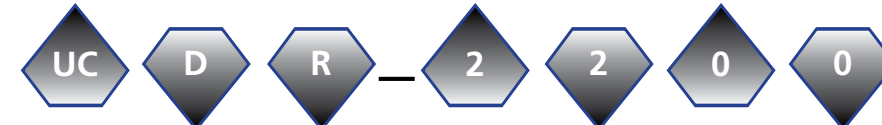
Axial/Radial Rake*

- 0=0/P
- 1=0/N
- 2=0/0
- 3=P/P
- 4=P/N
- 5=P/0
- 6=N/P
- 7=N/N
- 8=N/0



For information on chip control, contact **Decatur Diamond**.

UC=Ultra-Mill™



C=Carbide
D=PCD
B=cBN

R=Right Hand
L=Left Hand

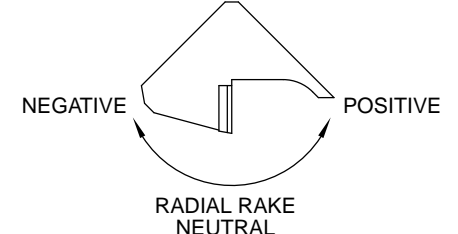
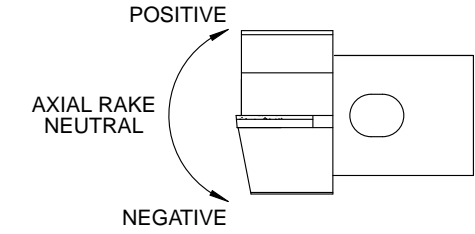
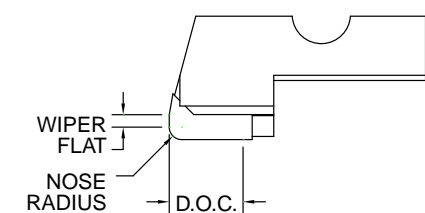
Wiper Flat

- 0=No Wiper
- 1=.060" (1,52mm)
- 2=.080" (2,03mm)
- 3=.100" (2,54mm)
- 4=.120" (3,05mm)

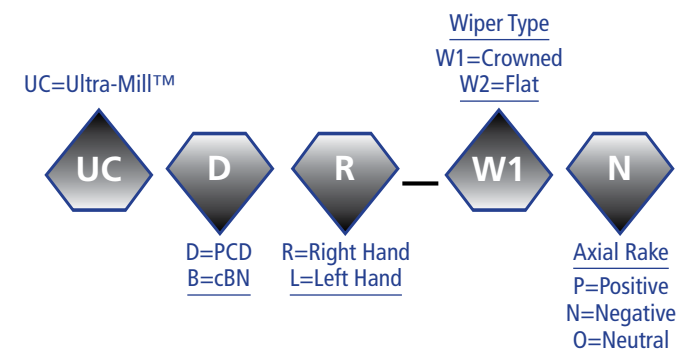
Maximum Depth of Cut

- 0=.200" (5,0mm) Standard
- 1=.250" (6,3mm)
- 2=.375" (9,5mm)
- 3=.500" (12,7mm)
- 4=.625" (15,8mm)
- 5=.750" (19,0mm)

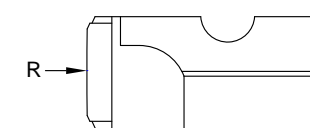
* 0= Neutral P= Positive N= Negative



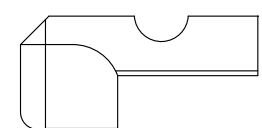
Wiper Cartridge Identification For Standard Cutters



Crowned Wiper

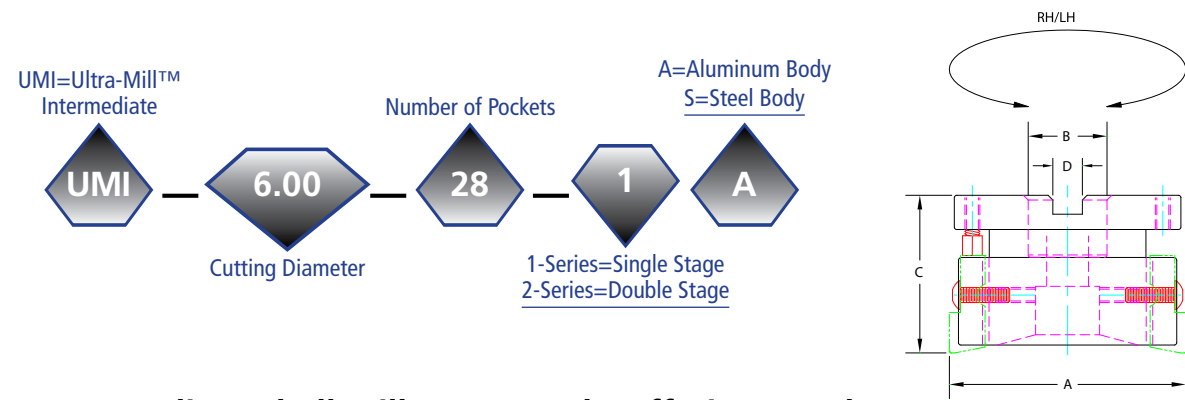


Flat Wiper



For recommendation on selecting the proper cartridge for your application please visit www.decaturdiamond.com or call the number on the bottom of this page.

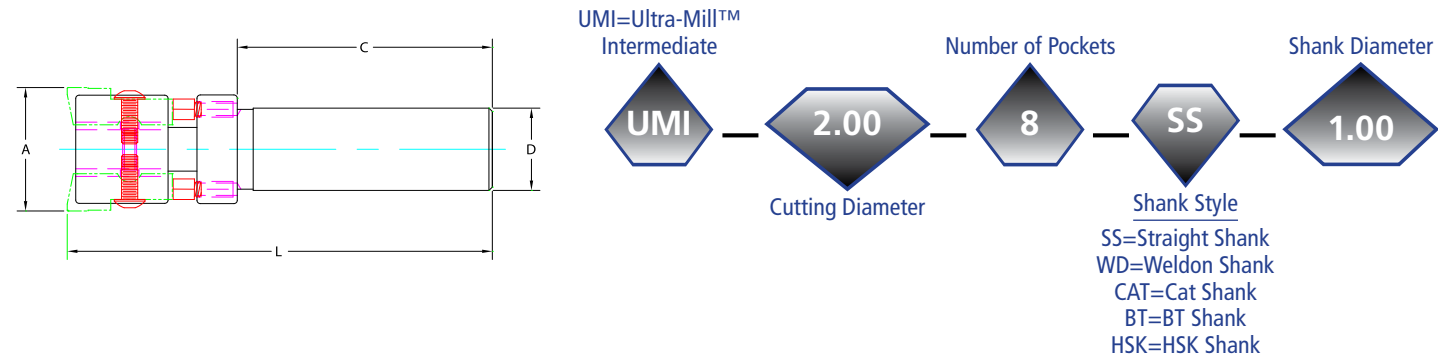
Ultra-Mill Intermediate Cutter Body Offerings – Inch



Ultra-Mill Intermediate Shell Mill Cutter Body Offerings – Inch

Effective Cutting Dia. A (Inch)	Cutter Order Number	Number of Pockets	B Dimension Bore Diameter	C Dimension Set Height	D Dimension Key Size	Max RPM
2.000	UMI-2.00-8-1A/S	8	0.750	2.375	0.312	17,000
2.500	UMI-2.50-10-1A/S	10	0.750	2.375	0.312	15,500
3.000	UMI-3.00-12-1A/S	12	1.000	2.375	0.375	14,200
4.000	UMI-4.00-18-1A/S	18	1.125	2.375	0.500	12,250
5.000	UMI-5.00-22-1A/S	22	1.500	2.375	0.625	11,000
6.000	UMI-6.00-28-1A/S	28	1.500	2.375	0.625	10,000
8.000	UMI-8.00-38-1A/S	38	2.500	2.375	1.000	8,600
10.000	UMI-10.00-48-1A/S	48	2.500	2.375	1.000	7,750

A = Aluminum Body S = Steel

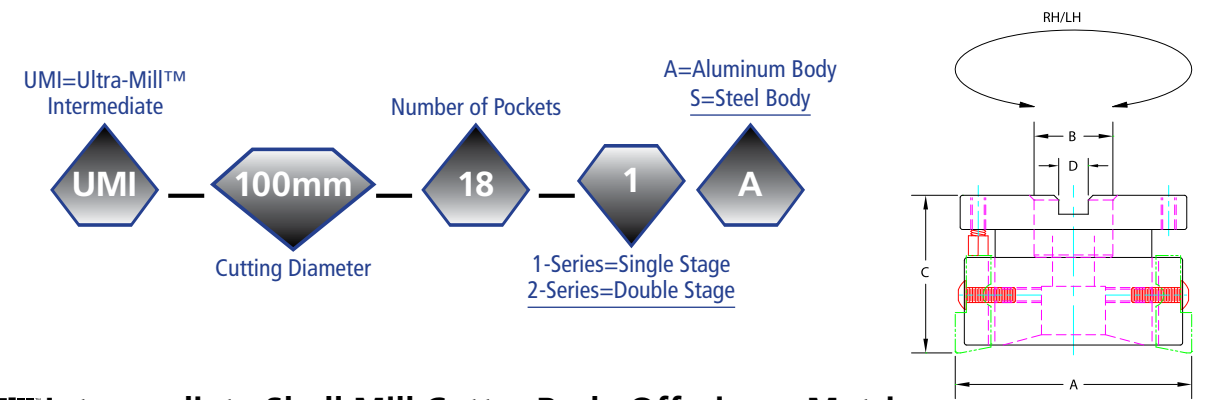


Ultra-Mill Intermediate Shank Style Cutter Body Offerings – Inch

Effective Cutting Dia. A (Inch)	Cutter Order Number	Number of Pockets	L Dimension Overall Length	C Dimension Shank Length	D Dimension Shank Diameter	Max RPM
1.500	UMI-1.50-4-SS-1.00	4	5.000	3.000	1.000	20,000
1.500	UMI-1.50-4-SS-1.50	4	5.750	3.750	1.500	20,000
2.000	UMI-2.00-8-SS-1.00	8	5.000	3.000	1.000	15,500
2.000	UMI-2.00-8-SS-1.50	8	5.750	3.750	1.500	15,500

Note: These cutter shanks are manufactured to H6 tolerance in order to maximize tool life, thus we discourage the use of standard endmill holders. We recommend hydraulic chucks or Shrink-fit adapters for these tools. Alternately, these tools can also be made with integral shanks such as HSK, CAT, ANSI, etc. Upon request, we can supply these cutters with a Weldon flat but tool life will suffer due to excessive runout.

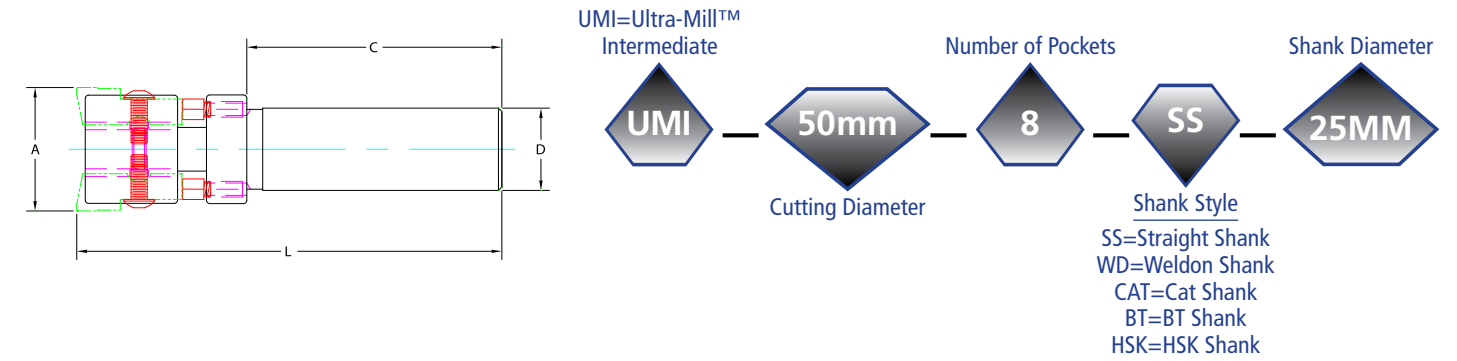
Ultra-Mill Intermediate Cutter Body Offerings – Metric



Ultra-Mill Intermediate Shell Mill Cutter Body Offerings – Metric

Effective Cutting Dia. A (mm)	Cutter Order Number	Number of Pockets	B Dimension Bore Diameter	C Dimension Set Height	D Dimension Key Size	Max RPM
50	UMI-50MM-8-1A/S	8	16	60	8	17,000
63	UMI-63MM-10-1A/S	10	22	60	10	15,500
75	UMI-75MM-12-1A/S	12	22	60	14	14,200
100	UMI-100MM-18-1A/S	18	32	60	14	12,250
125	UMI-125MM-22-1A/S	22	40	60	16	11,000
150	UMI-150MM-26-1A/S	26	40	60	16	10,000
200	UMI-200MM-36-1A/S	36	60	60	25	8,600
250	UMI-250MM-46-1A/S	46	60	60	25	7,750

A = Aluminum Body S = Steel



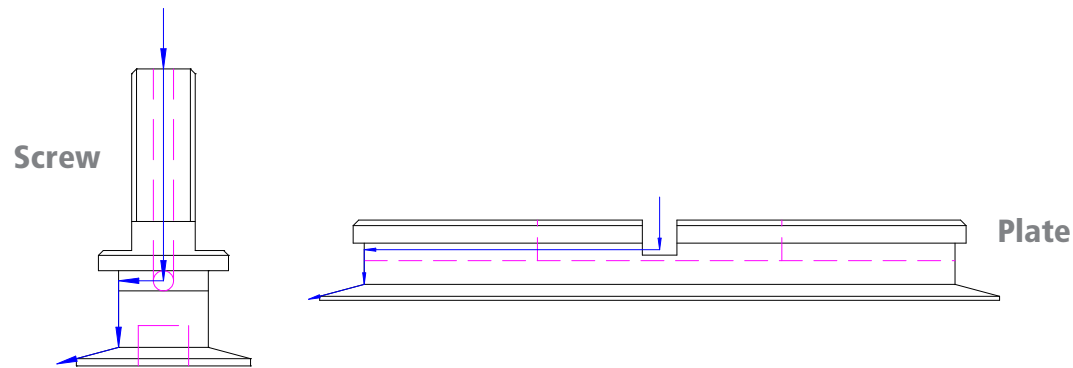
Ultra-Mill Intermediate Shank Style Cutter Body Offerings – Metric

Effective Cutting Dia. A (mm)	Cutter Order Number	Number of Pockets	L Dimension Overall Length	C Dimension Shank Length	D Dimension Shank Diameter	Max RPM
38	UMI-38MM-4-SS-25MM	4	126	76	25	20,000
38	UMI-38MM-4-SS-32MM	4	130	80	32	20,000
50	UMI-50MM-8-SS-25MM	8	126	76	25	15,500
50	UMI-50MM-8-SS-32MM	8	130	80	32	15,500

Note: These cutter shanks are manufactured to H6 tolerance in order to maximize tool life, thus we discourage the use of standard endmill holders. We recommend hydraulic chucks or Shrink-fit adapters for these tools. Alternately, these tools can also be made with integral shanks such as HSK, CAT, ANSI, etc. Upon request, we can supply these cutters with a Weldon flat but tool life will suffer due to excessive runout.

Ultra-Mill Thru Spindle Coolant Attachments for Intermediate Cutters

Ultra-Mill Cartridge Identification for Intermediate Cutters



Inch

Coolant Attachment Order Number	Cutter Diameter	Thread	Torque	Hex Size
UI-SS-2.00	2.000	3/8-24	35 ft/lbs	3/16
UI-SS-2.50	2.500	3/8-24	35 ft/lbs	3/16
UI-SS-3.00	3.000	1/2-20	40 ft/lbs	5/16
UI-SS-4.00	4.000	5/8-18	45 ft/lbs	3/8
UI-SS-5.00	5.000	3/4-16	55 ft/lbs	3/8
UI-SS-6.00	6.000	3/4-16	55 ft/lbs	5/8
UI-SS-8.00	8.000	—	—	—
UI-SS-10.00	10.000	—	—	—
UI-SS-12.00	12.000	—	—	—
UI-SS-14.00	14.000	—	—	—

Metric

Coolant Attachment Order Number	Cutter Diameter	Thread	Torque	Hex Size
UI-SS-50MM	50mm	M8x1.25	50Nm	5mm
UI-SS-63MM	63mm	M10x1.5	45Nm	8mm
UI-SS-75MM	75mm	M10x1.5	45Nm	8mm
UI-SS-80MM-22	80mm	M10x1.5	45Nm	8mm
UI-SS-80MM-27	80mm	M12x1.75	60Nm	8mm
UI-SS-100MM	100mm	M16x2.0	68Nm	10mm
UI-SS-125MM	125mm	M20x2.5	80Nm	14mm
UI-SS-150MM	150mm	M20x2.5	80Nm	14mm
UI-SS-200MM	200mm	—	—	—
UI-SS-250MM	250mm	—	—	—

For operations that require light weight tooling, Decatur Diamond offers our LW-series Coolant Cap Assemblies

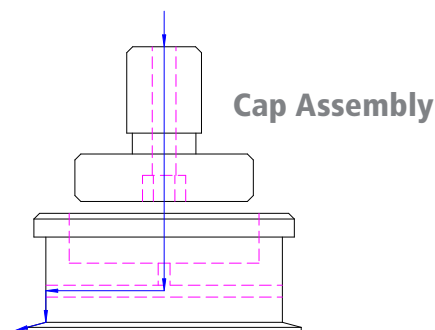
Inch

Coolant Attachment Order Number	Cutter Diameter	Thread*	Torque*	Hex Size*
UI-SS-5.00-LW	5.000	3/4-16	55 ft/lbs	3/8
UI-SS-6.00-LW	6.000	3/4-16	55 ft/lbs	3/8

* Given values are for the arbor mount bolt

Metric

Coolant Attachment Order Number	Cutter Diameter	Thread*	Torque*	Hex Size*
UI-SS-125MM-LW	125mm	M20x2.5	80Nm	10mm
UI-SS-150MM-LW	150mm	M20x2.5	80Nm	10mm



Axial/Radial Rake*

UI=Ultra-Mill™ Intermediate
D = Carbide
R = Right Hand
L = Left Hand
2 = Nose Radius
2 = Wiper Flat
0 = Maximum Depth of Cut
0 = Axial/Radial Rake

Nose Radius
 1=.010" (0,25mm)
 2=.030" (0,76mm)
 3=.060" (0,52mm)
 7=1,0mm (.039")
 8=1,5mm (.059")
 C=Chamfer

Axial/Radial Rake*
 0=0/P
 1=0/N
 2=0/O
 3=P/P
 4=P/N
 5=P/O
 6=N/P
 7=N/N
 8=N/O

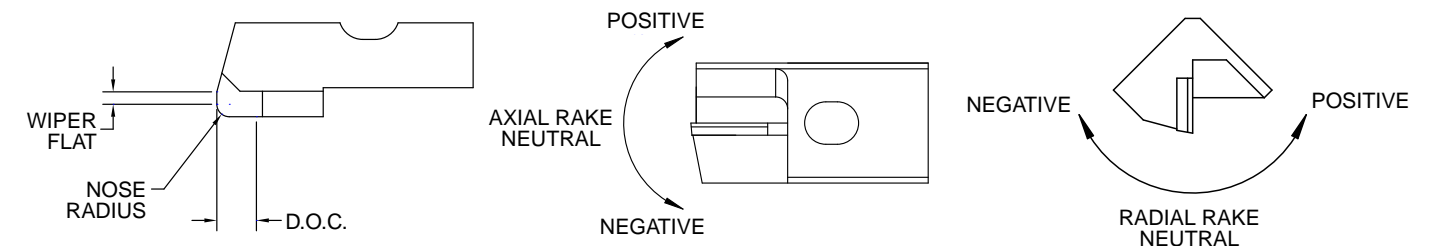
Wiper Flat
 0=No Wiper
 1=.060" (1,52mm)
 2=.080" (2,03mm)
 3=.100" (2,54mm)

Maximum Depth of Cut
 0=.200" (5,0mm) Standard
 1=.250" (6,3mm)
 2=.375" (9,5mm)

* 0= Neutral P= Positive N= Negative



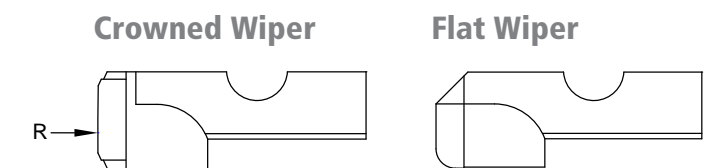
For information on chip control, contact **Decatur Diamond**.



Wiper Cartridge Identification For Intermediate Cutters

UI=Ultra-Mill™ Intermediate
D = PCD
B = cBN
R = Right Hand
L = Left Hand
W1 = Wiper Type
N = Axial Rake
 P=Positive
 N=Negative
 O=Neutral

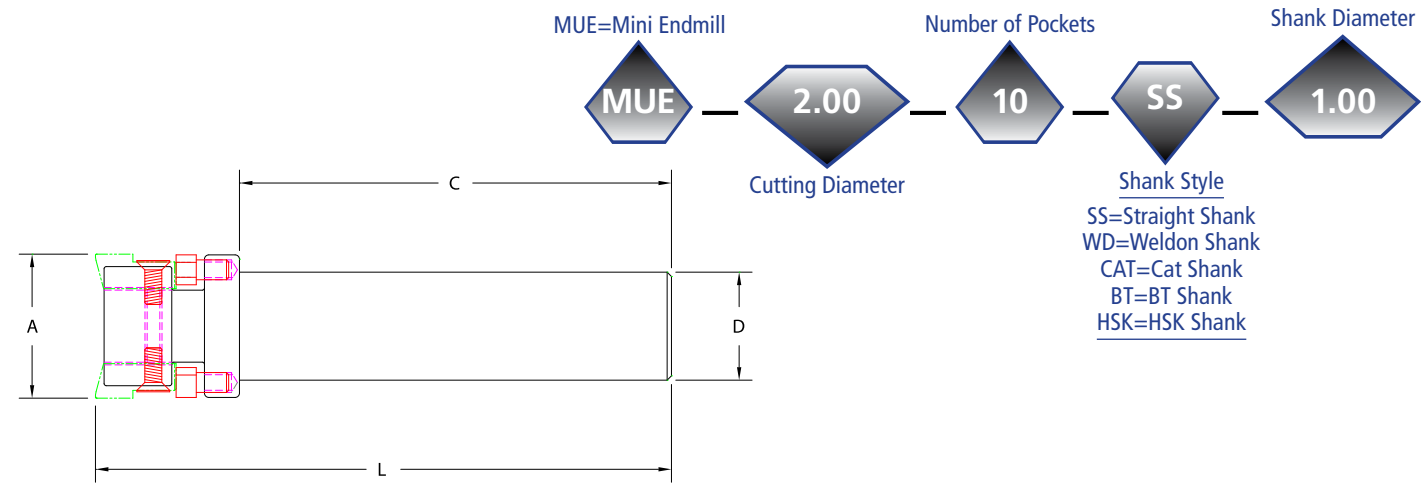
Wiper Type
 W1=Crowned
 W2=Flat



For recommendation on selecting the proper cartridge for your application please visit www.decaturdiamond.com or call the number on the bottom of this page.

Ultra-Mill Mini Endmill Shank Style Cutter Body Offerings – Inch

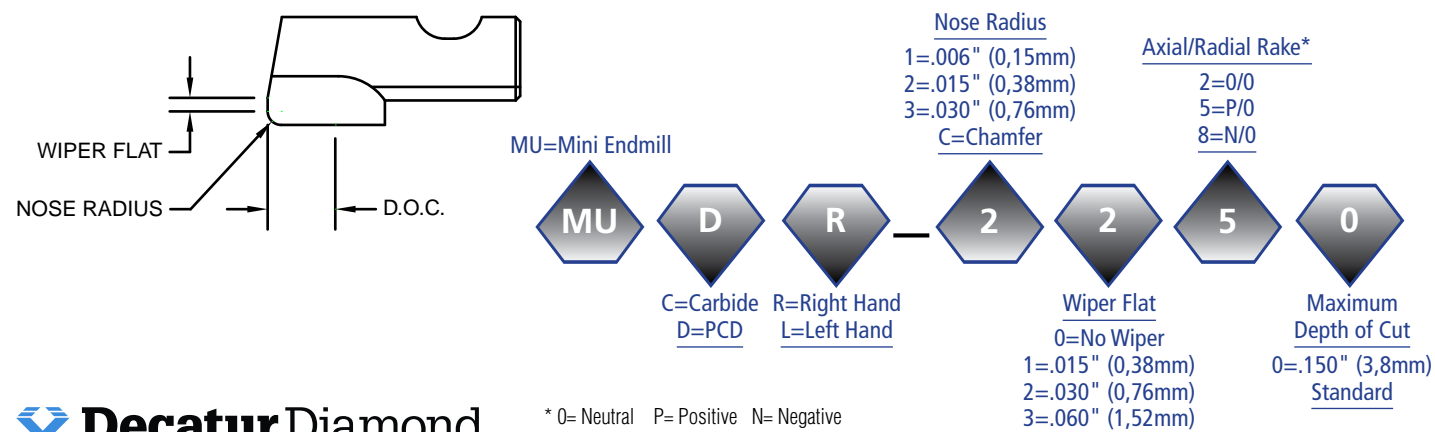
Decatur Diamond offers the Ultra-Mill Mini Endmill when machining small areas as well. What separates the Mini Endmill from its Ultra Endmill counterpart is that it has more cartridges per cutting diameter, which allows the user to increase the feed rate and hence increase throughput and production.



Effective Cutting Dia. A (Inch)	Cutter Order Number	Number of Pockets	L Dimension Overall Length	C Dimension Shank Length	D Dimension Shank Diameter	D.O.C. Max
1.00	MUE-1.00-6-SS-.75	6	3.75	2.75	0.750	0.150
1.00	MUE-1.00-6-SS-1.00	6	4.00	3.00	1.000	0.150
1.25	MUE-1.25-6-SS-.625	6	3.50	2.50	0.625	0.150
1.25	MUE-1.25-6-SS-.75	6	3.75	2.75	0.750	0.150
1.25	MUE-1.25-6-SS-1.00	6	4.00	3.00	1.000	0.150
1.50	MUE-1.50-6-SS-.625	6	3.50	2.50	0.625	0.150
1.50	MUE-1.50-6-SS-.75	6	3.75	2.75	0.750	0.150
1.75	MUE-1.75-8-SS-1.00	8	4.00	3.00	1.000	0.150
1.75	MUE-1.75-8-SS-1.25	8	4.25	3.25	1.250	0.150
2.00	MUE-2.00-10-SS-1.25	10	4.25	3.25	1.250	0.150

Note: These cutter shanks are manufactured to H6 tolerance in order to maximize tool life, thus we discourage the use of standard endmill holders. We recommend hydraulic chucks or Shrink-fit adapters for these tools. Alternately, these tools can also be made with integral shanks such as HSK, CAT, ANSI, etc. Upon request, we can supply these cutters with a Weldon flat but tool life will suffer due to excessive runout.

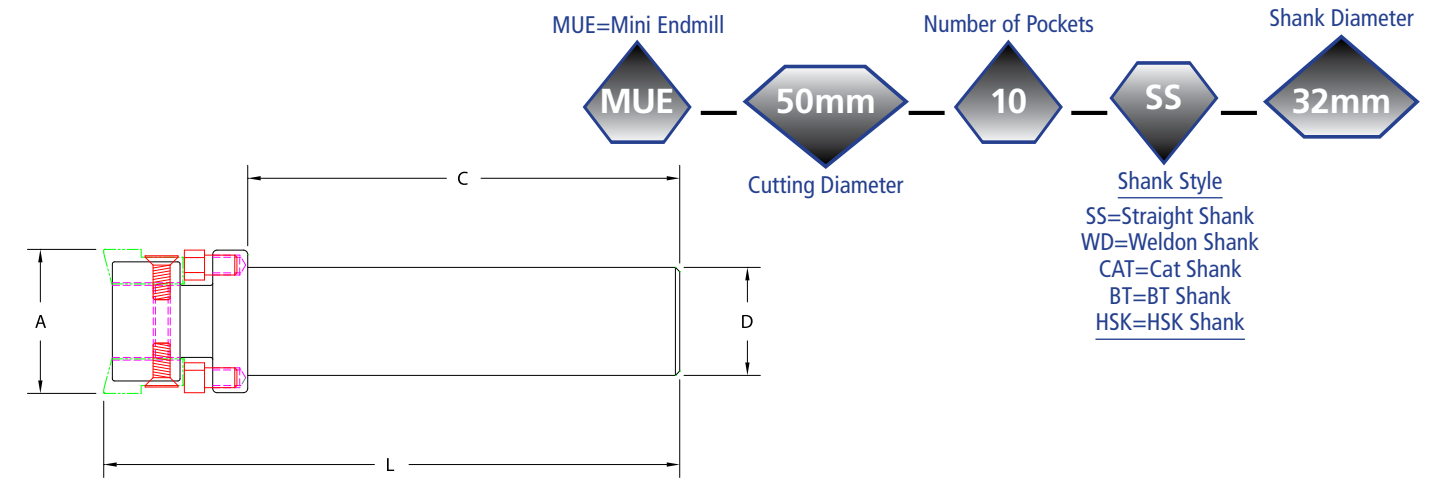
Cartridge Identification For Mini Endmills – Inch



* 0= Neutral P= Positive N= Negative

Ultra-Mill Mini Endmill Shank Style Cutter Body Offerings – Metric

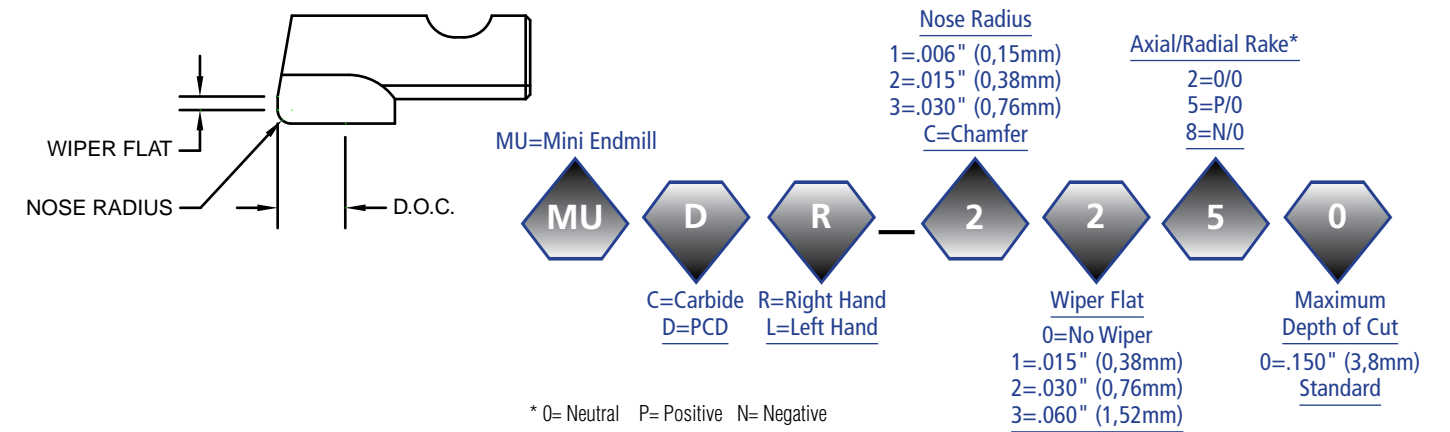
Decatur Diamond offers the Ultra-Mill Mini Endmill when machining small areas as well. What separates the Mini Endmill from its Ultra Endmill counterpart is that it has more cartridges per cutting diameter, which allows the user to increase the feed rate and hence increase throughput and production.



Effective Cutting Dia. A (mm)	Cutter Order Number	Number of Pockets	L Dimension Overall Length	C Dimension Shank Length	D Dimension Shank Diameter	D.O.C. Max
25	MUE-25MM-6-SS-20MM	6	104	74	20	3,8
25	MUE-25MM-6-SS-25MM	6	121	91	25	3,8
32	MUE-32MM-6-SS-20MM	6	104	74	20	3,8
32	MUE-32MM-6-SS-25MM	6	121	91	25	3,8
38	MUE-38MM-6-SS-20MM	6	104	74	20	3,8
38	MUE-38MM-6-SS-25MM	6	121	91	25	3,8
45	MUE-45MM-8-SS-20MM	8	104	74	20	3,8
45	MUE-45MM-8-SS-32MM	8	133	103	32	3,8
50	MUE-50MM-10-SS-32MM	10	133	103	32	3,8

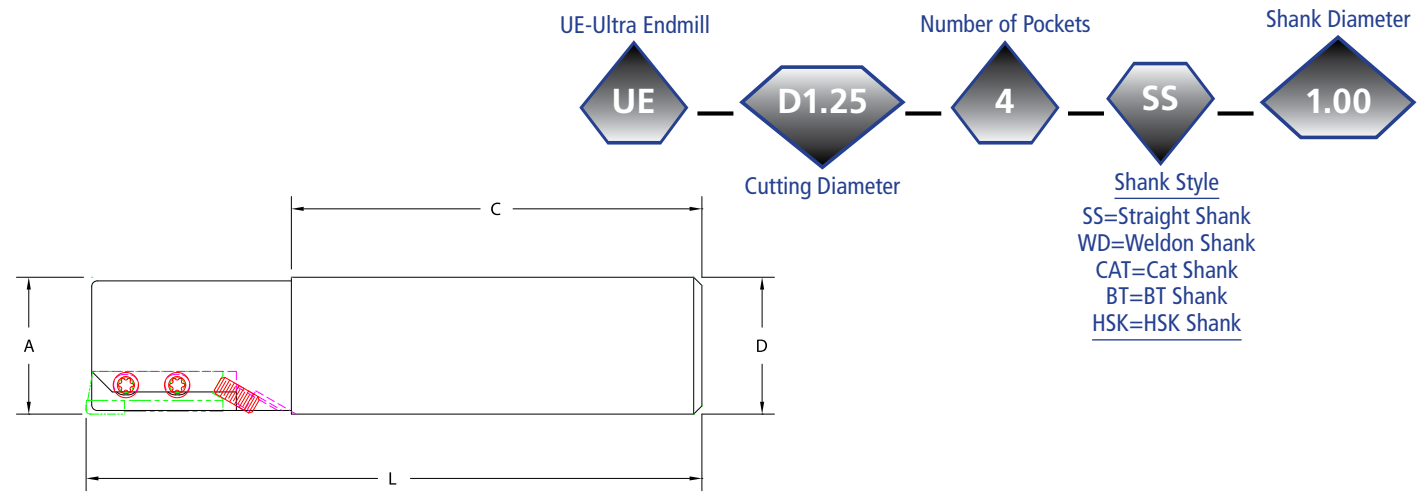
Note: These cutter shanks are manufactured to H6 tolerance in order to maximize tool life, thus we discourage the use of standard endmill holders. We recommend hydraulic chucks or Shrink-fit adapters for these tools. Alternately, these tools can also be made with integral shanks such as HSK, CAT, ANSI, etc. Upon request, we can supply these cutters with a Weldon flat but tool life will suffer due to excessive runout.

Cartridge Identification For Mini Endmills – Metric



* 0= Neutral P= Positive N= Negative

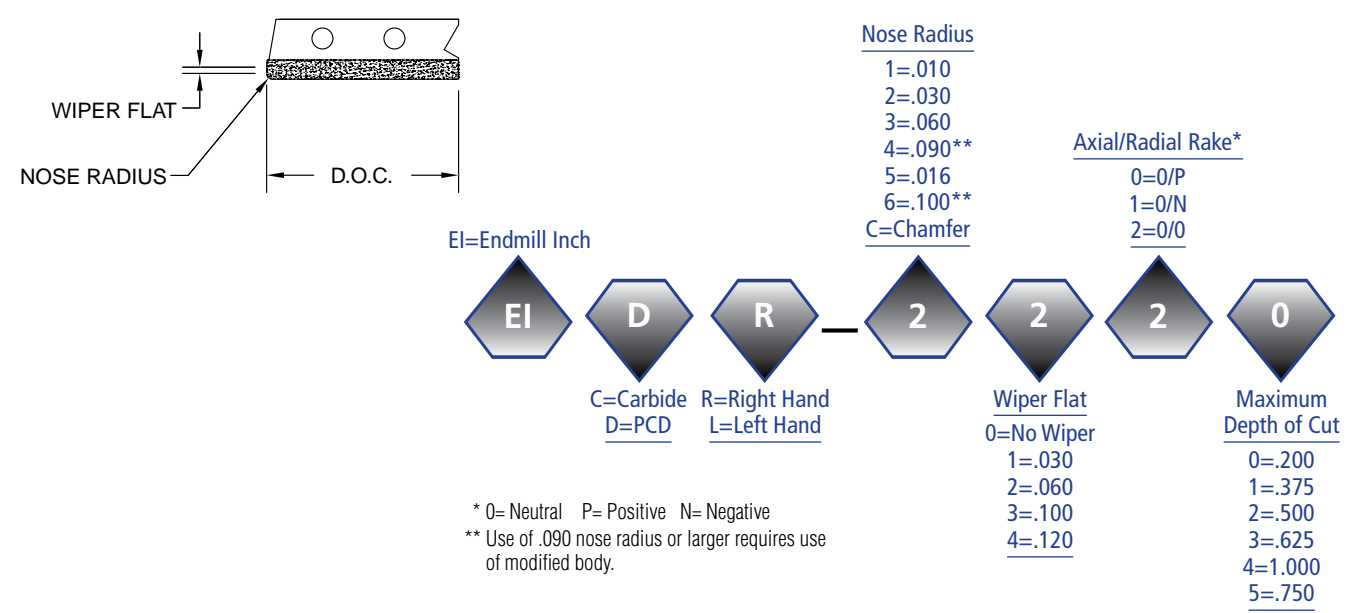
Ultra-Mill Ultra Endmill Shank Style Cutter Offerings–Inch



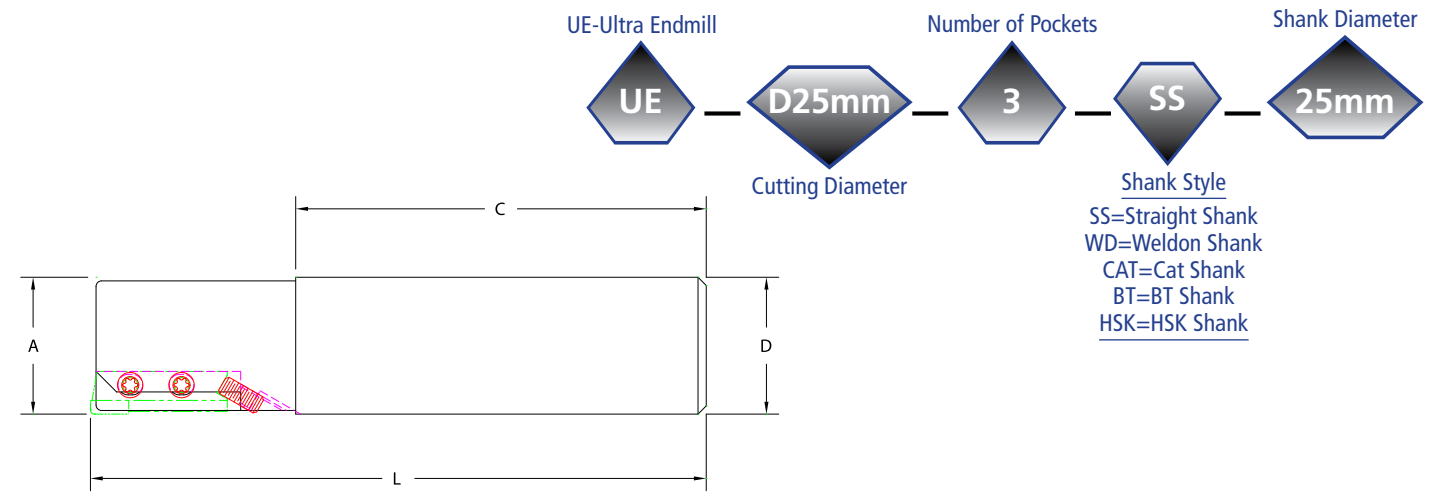
Effective Cutting Dia. A (Inch)	Cutter Order Number	Number of Pockets	L Dimension Overall Length	C Dimension Shank Length	D Dimension Shank Diameter	D.O.C. Max	Max RPM
0.75	UE-D0.75-3-SS-0.75	3	4.250	2.750	0.750	1.00	25,000
1.00	UE-D1.00-3-SS-1.00	3	4.500	3.000	1.000	1.00	25,000
1.25	UE-D1.25-4-SS-1.00	4	4.350	3.000	1.000	1.00	25,000
1.50	UE-D1.50-4-SS-1.00	4	4.500	3.000	1.000	1.00	25,000
1.75	UE-D1.75-4-SS-1.25	4	4.750	3.250	1.250	1.00	25,000
2.00	UE-D2.00-4-SS-1.25	4	4.750	3.250	1.250	1.00	19,000

Note: These cutter shanks are manufactured to H6 tolerance in order to maximize tool life, thus we discourage the use of standard endmill holders. We recommend hydraulic chucks or Shrink-fit adapters for these tools. Alternately, these tools can also be made with integral shanks such as HSK, CAT, ANSI, etc. Upon request, we can supply these cutters with a Weldon flat but tool life will suffer due to excessive runout.

Cartridge Identification For Ultra Endmills–Inch



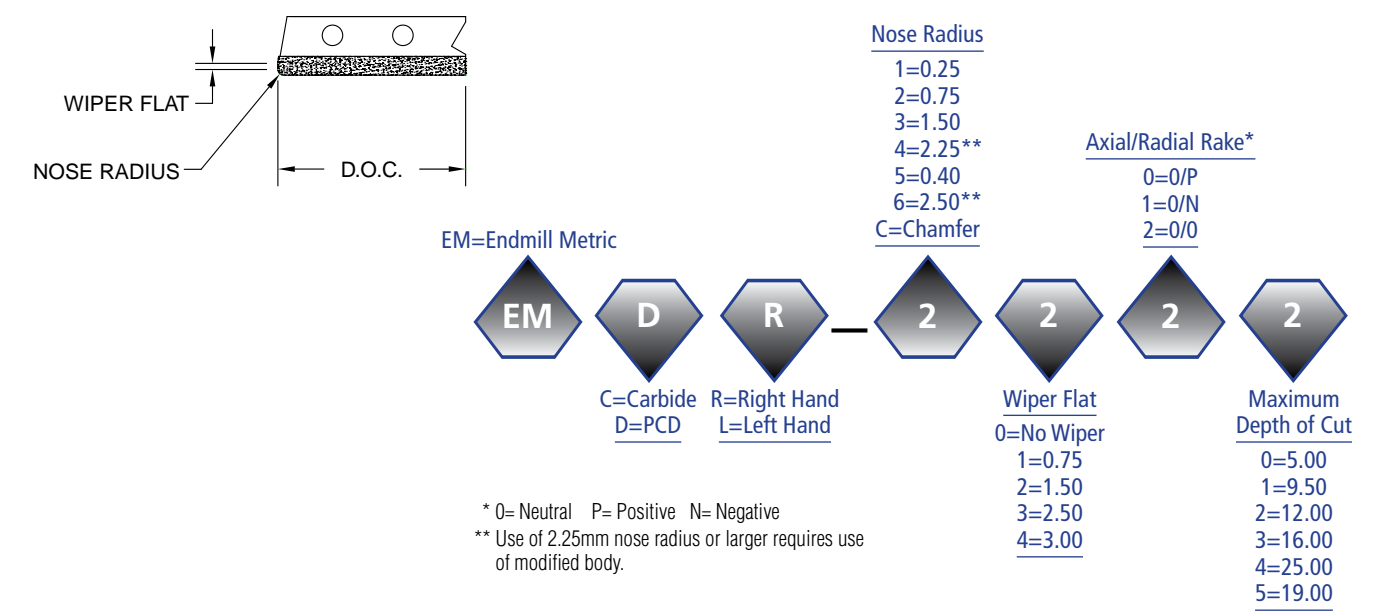
Ultra-Mill Ultra Endmill Shank Style Cutter Offerings–Metric



Effective Cutting Dia. A (mm)	Cutter Order Number	Number of Pockets	L Dimension Overall Length	C Dimension Shank Length	D Dimension Shank Diameter	D.O.C. Max	Max RPM
20	UE-D20MM-3-SS-20MM	3	106	66	20	25,0	25,000
25	UE-D25MM-3-SS-25MM	3	116	76	25	25,0	25,000
32	UE-D32MM-3-SS-32MM	3	120	80	32	25,0	25,000
40	UE-D40MM-4-SS-32MM	4	120	80	32	25,0	25,000
50	UE-D50MM-4-SS-32MM	4	120	80	32	25,0	19,000

Note: These cutter shanks are manufactured to H6 tolerance in order to maximize tool life, thus we discourage the use of standard endmill holders. We recommend hydraulic chucks or Shrink-fit adapters for these tools. Alternately, these tools can also be made with integral shanks such as HSK, CAT, ANSI, etc. Upon request, we can supply these cutters with a Weldon flat but tool life will suffer due to excessive runout.

Cartridge Identification For Ultra Endmills–Metric



Ultra-Mill Special Tools

In addition to our standard line of milling cutters, Decatur Diamond specializes in custom engineered solutions for your non-ferrous machining needs. Our staff of engineers develop solutions on a daily basis to solve customers' challenges around the world. The uniqueness of the Ultra-Mill system allows us to utilize its' basic components reconfigured into a multitude of application specific special tools. We are a leading manufacturer of PCD solutions and welcome the opportunity to work with you to improve your machining throughput and reduce costs at the same time.



Ultra-Mill™ Multi-Step Boring Bar

Tool Function: Drills thru from a blind hole, creates 3 diameters, a chamfer and 2 shoulders for a differential carrier housing.

Benefits: The Ultra-Mill Boring Bar features replaceable and axially adjustable cartridges. The adjustable cartridges vs. a fixed pocket insert provide a more uniform cut and load sharing which provides more even wear. Their replaceable trait reduces cost compared to a fixed pocket PCD tool. This boring bar also features coolant thru which removes the chips from the cutting edge.

Advantages: The Ultra-Mill Multi-Step Boring Bar replaced a core drill and a fixed pocket boring bar. It provides reduced tooling costs. In addition, the cost to refurbish the diamond components in the bar is much less than retipping a fixed pocket boring bar.



Ultra-Mill™ Core Drill and Facing Tool

Tool Function: Drills through for a pipe thread, chamfers and faces the holes and faces the outer seal surface for an oil filter housing.

Benefits: The replaceable core drill that threads into the tool body allows for easy maintenance and replacement. Axially and radially adjustable cartridges allow for more uniform wear, which enhances tool life and provides improved part finish.

Advantages: This tool configuration replaced 3 tools – therefore reducing cycle time and lowering overall tooling cost.



Ultra-Mill™ OD Form Trepanning Tool

Tool Function: Boring and chamfering 2 diameters and facing one surface.

Benefits: The full form is in each cartridge and each cartridge is radially adjustable for ease of setting.

Advantages: The Ultra-Mill Form Boring Tool replaced 2 tools that interpolated the form. Therefore, this tool has reduced cycle time and has provided a reduction in tool inventory, reducing tool costs.

Ultra-Mill Special Tools

Ultra-Mill™ Fin Mill

Tool Function: Removing casting flash and temporary reinforcements used to equalize cooling rates on die cast cylinder housings.

Benefits: We designed this mill to replace the additional handling and band saw labor used previously to allow the task to be completed within the machining center used to process the part from as-cast to finish machined part.

Advantages: A classic example of using the Ultra Mill base to design a special purpose cutter with special form cartridges allows for standardization of spare parts and hardware, as well as reduction of previously required operations.



Ultra-Mill™ Cubing Mill

Tool Function: Quickly and efficiently removing excess casting stock and establishing locating surfaces prior to loading the casting into a machining center for complete processing.

Benefits: This special Ultra-Mill Cubing Mill allows for higher metal removal rates, reducing machining time and longer tool life than the previous indexable carbide mill.

Advantages: The UltraMill provides almost unlimited freedom to create special tools for specific applications often replacing multiple tools in the process with one tool.



Ultra-Mill Hardware and Adjustment Tools

Decatur Diamond is not responsible for any defects caused by improper use or setting of its milling cutters. Care should be taken and exercised when handling aluminum cutter bodies. Although the outside surface is hard, aluminum will dent or nick from improper handling. Extreme caution should be taken when handling and setting to ensure maximum cutter performance.

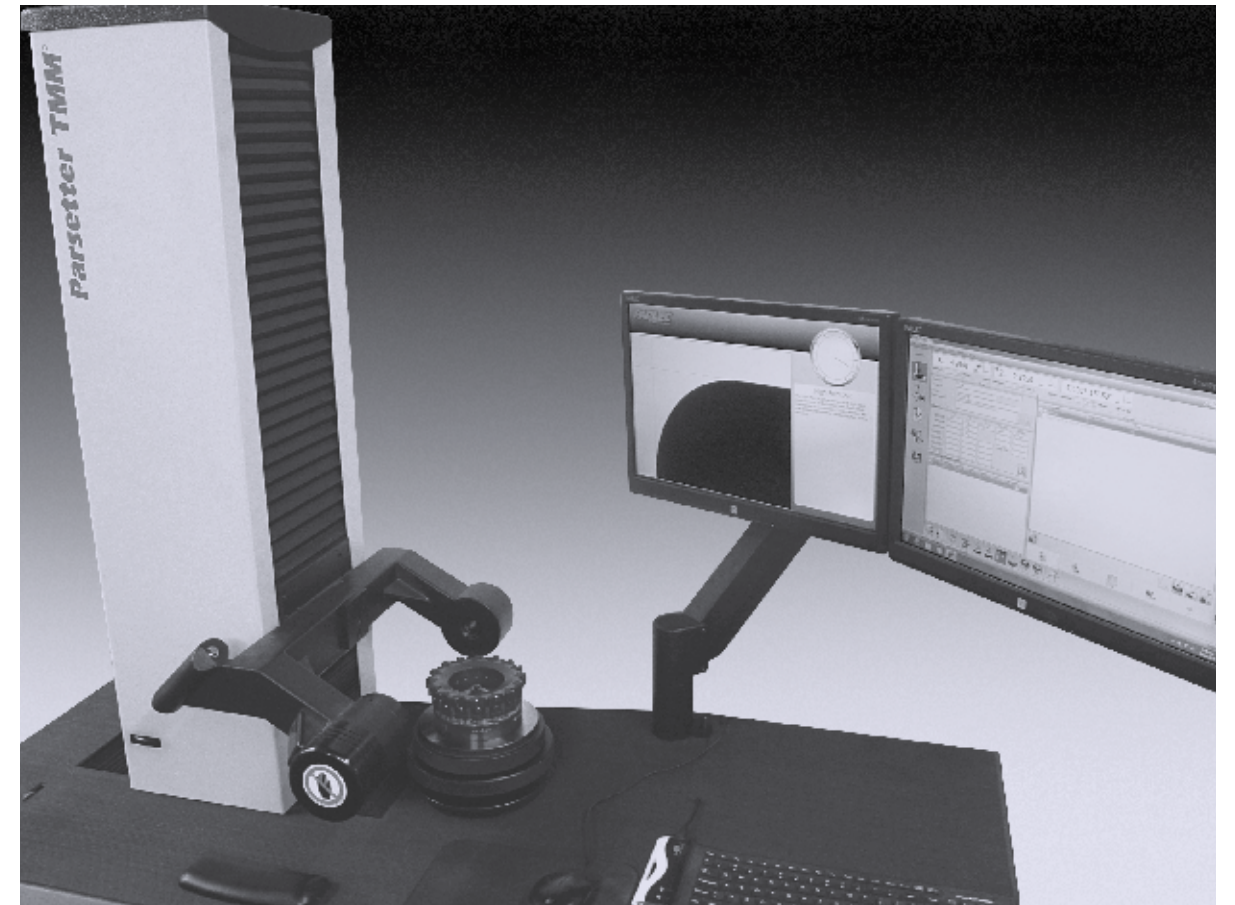
Miscellaneous Adjustment Tools

Part No.	Description	Cutter Family
63600	3/16" & 1/4" Cartridge Adjustment Wrench	Ultra-Mills Standard and Intermediate - INCH
63601	Pre-set 45 in/lbs Torque Wrench	Ultra-Mills Standard and Intermediate - INCH
63615	Replacement T-25+ 1/4" Drive Socket	Ultra-Mills Standard and Intermediate - INCH
63602	Torx T-25+ T-Handle Wrench	Ultra-Mills Standard and Intermediate - INCH
63605	6mm & 7mm Cartridge Adjustment Wrench	Ultra-Mills Standard and Intermediate - METRIC
63606	Pre-set 50 in/lbs Torque Wrench	Ultra-Mills Standard and Intermediate - METRIC
63616	Replacement T-25 1/4" Drive Socket	Ultra-Mills Standard and Intermediate - METRIC
63611	Torx T-25 T-Handle Wrench	Ultra-Mills Standard and Intermediate - METRIC
63603	Pre-set 14.5 in/lbs Torque Wrench	Mini Ultra-Mills - INCH and METRIC
63619	Replacement T-9 1/4" Drive Socket	Mini Ultra-Mills - INCH and METRIC
63604	Torx T-9 T-handle Wrench	Mini Ultra-Mills - INCH and METRIC
63600	3/16" & 1/4" Cartridge Adjustment Wrench	Mini Ultra-Mills - INCH
63624	5mm Cartridge Adjustment Wrench	Mini Ultra-Mills - METRIC
63607	Torx T-15 Wing Style Handle Wrench	Ultra-Endmills - INCH and METRIC
63609	Pre-set 19 in/lbs Torque Wrench	Ultra-Endmills - INCH and METRIC
63627	1/16" Allen Cartridge Adjustment Wrench	Ultra-Endmills - INCH
63626	1.5mm Allen Cartridge Adjustment Wrench	Ultra-Endmills - METRIC
63350	UMPP - Pocket Protector	Ultra-Mill - INCH and METRIC
63351	UMIPP - Pocket Protector	Ultra-Mill Intermediate - INCH and METRIC

Hardware

Description	Cartridge Mount Screw	Cartridge Adjustment Nut	Stud for Adjustment Nut	Cartridge Adjustment Screw
Ultra-Mill 2-1/2" Diameter thru 4.0" using UCxx style cartridges	63501	63500	63502	
Ultra-Mill 4-1/2" Diameter or larger using UCxx style cartridges	63503	63500	63504	
Ultra-Mill 63.5mm Diameter thru 76.2mm using UCxx style cartridges	63521	63520	63522	
Ultra-Mill 76.3mm Diameter or larger using UCxx style cartridges	63523	63520	63524	
Ultra-Mill Intermediate 2" Diameter thru 4.0" using Ulxx cartridges	63501	63500	63502	
Ultra-Mill Intermediate 4-1/2" Diameter or larger using Ulxx cartridges	63503	63500	63504	
Ultra-Mill Intermediate 50.0mm using Ulxx cartridges	63529	63520	63522	
Ultra-Mill Intermediate 63.0mm using Ulxx cartridges	63536	63520	63522	
Ultra-Mill Intermediate 75.0mm using Ulxx cartridges	63521	63520	63522	
Ultra-Mill Intermediate 80.0mm Diameter or larger using Ulxx cartridges	63523	63520	63524	
Mini Ultra Endmill 1.0" Diameter Only using MUxx cartridges	63540			63541
Mini Ultra Endmill 1.25" Diameter and Larger using MUxx cartridges	63542			63541
Mini Ultra Endmill 25mm Diameter Only using MUXx cartridges	63540			63568
Mini Ultra Endmill 32mm Diameter and Larger using MUXx cartridges	63542			63568
Ultra Endmill .75" Diameter thru 1.25" using Elxx cartridges	63300			63547
Ultra Endmill 1.50" and larger using Elxx cartridges	63302			63547
Ultra Endmill 20mm Diameter thru 32mm using EMxx cartridges	63527			63528
Ultra Endmill 40mm Diameter and larger using EMxx cartridges	63549			63528

Ultra-Mill Setup Procedure



Note:

Decatur Diamond recommends that any tool running at 10,000 rpm or greater be balanced as an assembly G2.5 or better.

- 1.) When installing new cartridges, ensure pockets are clean and free of burrs.
- 2.) Clean bottom of cutter to ensure it is free of burrs and dirt. Cutter must sit flat on surface or setting fixture.
- 3.) Turn axial adjusting nuts or screws down one turn.
- 4.) Install cartridges in body and tighten mounting screw to:
 - a.) Ultra-Mill and Ultra-Mill Intermediate - 15-20 in/lbs or 1.7-2.3 Nm
 - b.) Ultra-Mill Mini Endmill - 8-10 in/lbs or .9-1.2 Nm
 - c.) Ultra Endmill - 10-12 in/lbs or 1-1.5 Nm
- 5.) Set indicator to desired height.
- 6.) Using the proper wrench, adjust cartridges to within .001" or .03mm from setting height.
- 7.) Tighten mounting screws to:
 - a.) Ultra-Mill and Ultra-Mill Intermediate - INCH - 45 in/lbs or 5.1 Nm
 - b.) Ultra-Mill and Ultra-Mill Intermediate - METRIC - 50 in/lbs or 5.7 Nm
 - c.) Ultra-Mill Mini Endmill - 14.5 in/lbs or 1.8 Nm
 - d.) Ultra Endmill - 19 in/lbs or 2.1 Nm
 - i.) Make sure screws are securely tightened
- 8.) Using the proper wrench, adjust cartridges to finished setting height. To achieve the best surface finishes, all cartridges need to be within +/- .0001" or .0025mm.

Ultra-Mill Formulas, Legend, Milling Theory and Calculations

Ultra-Mill Cutting Data

Note:
The equations and quick-reference charts below do not take into account the condition of the machine or spindle, fixture design or condition, part configuration, size/condition of taper or any other application specific data. Before relying on data gathered from any calculations, please make an assessment of your specific machining conditions and adjust feeds, speeds and depths of cut accordingly. Please do not adjust feed-per-tooth to a value greater than your wiper flat.

Formulas and Legend

D =	Cutting Diameter
D _w =	Working Diameter
R =	Cutter Radius
z =	Number of Teeth
z _c =	Effective Number of Teeth
n =	RPM
V _c =	Surface Feet/Meters per Minute
v _f =	Cutter Feed-Inches/mm per Minute
f =	Feed per Revolution
f _z =	Feed per Tooth
h _m =	Average Chip Thickness
a _e =	Width of Cut-Radial Depth of Cut
a _p =	Depth of Cut-Axial Depth of Cut
Q =	Metal Removal Rate-in ³ /min or mm ³ /min
K =	Lead Angle
π =	Pi (3.1415)

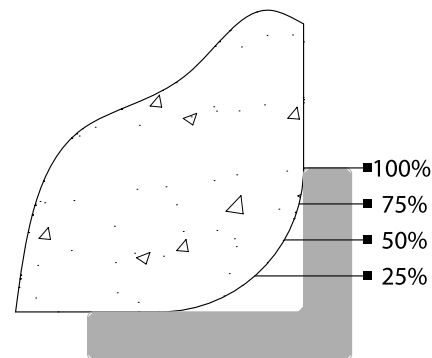
Note:
If using a two- or three- stage Ultramill, use the effective (z_c) number of teeth to calculate feed rate.

Feed Rates:
V_f = n • z • f_z or V_f = n • z_c • f_z
f = z • f_z or f = z_c • f_z

Note:
Use to calculate when width of cut (a_e) is less than 50% of D.

Quick Reference:

a _e =	increase feed by:
35%	1.20
25%	1.45
10%	2.05
5%	3.00



Axial chip thinning requires increase in feed rate to maintain proper chip thickness.

If a_p ≤ 25% of cartridge radius, increase feed by 4x
 If a_p = 26-50% of cartridge radius, increase feed by 2x
 If a_p = 51-75% of cartridge radius, increase feed by 25%
 If a_p = 100% or more of cartridge radius, do not increase feed

Milling Theory and Calculations

Metal Removal Rates:

$$Q = a_e \cdot a_p \cdot v_f$$

Cutting Speed and RPM-Inch:

$$V_c = \frac{n \cdot \pi \cdot D}{12} \quad \left| \quad V_c = n \div 3.82 \cdot D \right.$$

$$n = \frac{V_c \cdot 12}{\pi \cdot D} \quad \left| \quad n = V_c \cdot 3.82 \div D \right.$$

Cutting Speed and RPM-Metric:

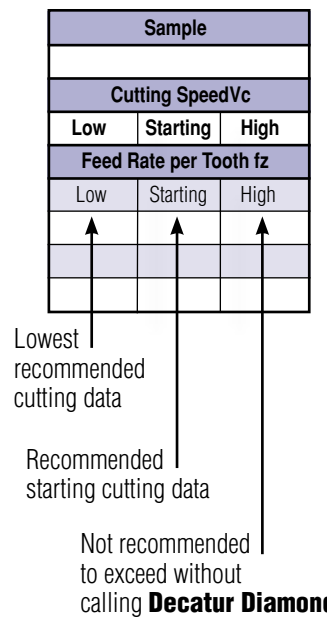
$$V_c = \frac{n \cdot \pi \cdot D}{1000} \quad \left| \quad V_c = n \cdot .00314 \cdot D \right.$$

$$n = \frac{V_c \cdot 1000}{\pi \cdot D} \quad \left| \quad n = V_c \cdot 318.057 \div D \right.$$

Average Chip Thickness:

$$h_m = f_z \cdot \sqrt{\frac{a_e}{D}} \quad \left| \quad f_z = h_m \cdot \sqrt{\frac{D}{a_e}} \right.$$

Cutter Family	Low Silicon Aluminums <8% Silicon			Medium Silicon Aluminums 8-10% Silicon			High Silicon Aluminums >10% Silicon		
	Cutting Speed Vc			Cutting Speed Vc			Cutting Speed Vc		
	2000	4000	10,000	2000	3000	6000	1000	1500	2000
Ultramill	0.001	0.004	0.008	0.001	0.004	0.008	0.001	0.004	0.008
Ultramill Intermediate	0.001	0.004	0.006	0.001	0.004	0.006	0.001	0.004	0.006
Ultramill Mini	0.001	0.003	0.004	0.001	0.003	0.004	0.001	0.003	0.004
Ultra Endmill	0.001	0.003	0.004	0.001	0.003	0.004	0.001	0.003	0.004
Cutter Family	Copper - Bronze - Zinc			Free Machining Alloys ie: Gold, Platinum, Lead			Carbide and Ceramic (Green)		
	Cutting Speed Vc			Cutting Speed Vc			Cutting Speed Vc		
	1000	1500	2500	500	1000	1500	500	1000	1500
Ultramill	0.001	0.003	0.006	0.003	0.004	0.007	0.002	0.004	0.008
Ultramill Intermediate	0.001	0.003	0.005	0.003	0.004	0.006	0.002	0.004	0.006
Ultramill Mini	0.001	0.002	0.005	0.002	0.003	0.005	0.001	0.003	0.004
Ultra Endmill	0.001	0.002	0.005	0.002	0.003	0.005	0.001	0.003	0.004
Cutter Family	Unfilled Plastics			Reinforced Plastics ie: Carbon Fiber Composites			Manufactured Wood		
	Cutting Speed Vc			Cutting Speed Vc			Cutting Speed Vc		
	1500	2500	5000	1500	2500	5000	3000	6000	8000
Ultramill	0.001	0.003	0.006	0.002	0.003	0.005	0.004	0.006	0.010
Ultramill Intermediate	0.001	0.003	0.005	0.002	0.003	0.004	0.004	0.006	0.008
Ultramill Mini	0.001	0.002	0.005	0.001	0.002	0.004	0.003	0.005	0.008
Ultra Endmill	0.001	0.002	0.005	0.001	0.002	0.004	0.003	0.005	0.008
Cutter Family	Low Silicon Aluminums <8% Silicon			Medium Silicon Aluminums 8-10% Silicon			High Silicon Aluminums >10% Silicon		
	Cutting Speed Vc			Cutting Speed Vc			Cutting Speed Vc		
	610	1220	3050	610	915	1830	305	460	610
Ultramill	0.025	0.100	0.200	0.025	0.100	0.200	0.025	0.100	0.200
Ultramill Intermediate	0.025	0.100	0.150	0.025	0.100	0.150	0.025	0.100	0.150
Ultramill Mini	0.025	0.075	0.100	0.025	0.075	0.100	0.025	0.075	0.100
Ultra Endmill	0.025	0.075	0.100	0.025	0.075	0.100	0.025	0.075	0.100
Cutter Family	Copper - Bronze - Zinc			Free Machining Alloys ie: Gold, Platinum, Lead			Carbide and Ceramic (Green)		
	Cutting Speed Vc			Cutting Speed Vc			Cutting Speed Vc		
	305	460	760	150	305	460	150	305	460
Ultramill	0.025	0.075	0.150	0.075	0.100	0.180	0.050	0.100	0.200
Ultramill Intermediate	0.025	0.075	0.120	0.075	0.100	0.150	0.050	0.100	0.150
Ultramill Mini	0.025	0.050	0.120	0.050	0.080	0.120	0.025	0.075	0.100
Ultra Endmill	0.025	0.050	0.120	0.050	0.080	0.120	0.025	0.075	0.100
Cutter Family	Unfilled Plastics			Reinforced Plastics ie: Carbon Fiber Composites			Manufactured Wood		
	Cutting Speed Vc			Cutting Speed Vc			Cutting Speed Vc		
	460	760	1525	460	760	1525	915	1830	2440
Ultramill	0.025	0.075	0.150	0.050	0.075	0.120	0.100	0.150	0.250
Ultramill Intermediate	0.025	0.075	0.150	0.050	0.075	0.100	0.100	0.150	0.200
Ultramill Mini	0.025	0.050	0.150	0.025	0.050	0.100	0.075	0.120	0.200
Ultra Endmill	0.025	0.050	0.120	0.025	0.050	0.100	0.075	0.120	0.200



Note:
Do not exceed maximum RPM listed on product pages.

CUTTER TYPE:
STANDARD _____ INTERMEDIATE _____

A: Cutter Diameter _____
B: Set Height _____
C: Pilot Diameter _____
D: Pilot Depth _____
E: Key Way Width _____
F: Key Way Depth _____
G: Number of Teeth _____
H: Mat'l Being Cut _____
I: Shower Screw Needed? _____
J: Shower Screw Thread _____
K: Cutter Body Material _____

CARTRIDGE:
L: Depth of Cut _____
M: Nose Radius _____
N: Width of Wiper Flat _____
O: Tip Material: PCD _____ CBN _____

Axial Rake: _____ NEUTRAL 0
POSITIVE P
NEGATIVE N
Radial Rake: _____

DRAWN BY: _____

DISTRIBUTOR: Decatur Diamond
1411 WEST WASHINGTON STREET
DECATUR, GA 30033
PHONE: 888-547-4156
FAX: 770-514-2424

CUSTOMER: _____

DATE	DATE	DATE	DATE
DRAWN	CHECKED	APPROVED	DATE

NOT OTHERWISE SPECIFIED: ANGLE: 25°
FIN: ✓
DEC: 3-1-03 X2: 1: 25: 1: 005: 00000:0005

DATE	DATE	DATE	DATE
DRAWN	CHECKED	APPROVED	DATE

NOT OTHERWISE SPECIFIED: ANGLE: 25°
FIN: ✓
DEC: 3-1-03 X2: 1: 25: 1: 005: 00000:0005

DATE	DATE	DATE	DATE
DRAWN	CHECKED	APPROVED	DATE

CUTTER
A: Cutter Diameter _____
B: Overall Length _____
C: Set Height _____
D: Shank Diameter _____
E: Shank Tolerance _____
F: Flat Width _____
G: Number of Teeth _____
H: Mat'l Being Cut _____
I: Through Coolant? _____

CARTRIDGE :
J: Depth of Cut _____
K: Nose Radius _____
L: Width of Wiper Flat _____
Axial Rake: _____ NEUTRAL 0
POSITIVE P
NEGATIVE N
Radial Rake: _____

DRAWN BY: _____

DISTRIBUTOR: Decatur Diamond
1411 WEST WASHINGTON STREET
DECATUR, GA 30033
PHONE: 888-547-4156
FAX: 770-514-2424

CUSTOMER: _____

DATE	DATE	DATE	DATE
DRAWN	CHECKED	APPROVED	DATE

NOT OTHERWISE SPECIFIED: ANGLE: 25°
FIN: ✓
DEC: 3-1-03 X2: 1: 25: 1: 005: 00000:0005

DATE	DATE	DATE	DATE
DRAWN	CHECKED	APPROVED	DATE

A: Cutter Diameter _____
 B: Overall Length _____
 C: Set Height _____
 D: Shank Diameter _____
 E: Shank Tolerance _____
 F: Flat Width _____
 G: Number of Teeth _____
 H: Mat'l Being Cut _____
 I: Through Coolant? _____
 J: Proposed Cartridge _____
 K: Depth of Cut _____
 L: Nose Radius _____
 M: Width of Wiper Flat _____

11/11/11
 1111 WEST JEFFERSONWAY 214
 DECATUR GA 30033
 404.285.9141
 404.285.9142

DISTRIBUTOR: _____
 DRAWN BY: _____

NO. OF REVISIONS SPECIFIED: _____ ANGLE: _____ 2°
 DEC. 24.03 30.2 01 XXX 1.000 XXXXX.000

DESIGN	DATE	APPROVED	DATE
CHECKED	DATE	DATE	DATE
CUSTOMER		DRAWING NO.	
DECATUR DIAMOND		B	
UE ENDMILL		A	

Reference Quote # _____
 Sales Person: _____
 Date Entered _____ Date Required: _____

Customer Data

Distributor: _____
 Contact Person: _____
 Phone Number: _____
 Address: _____

End User: _____
 Contact Person: _____
 Phone Number: _____
 Address: _____

Current Process Conditions

Milling: Turning: Boring: Drilling: Other: _____
 Material to Cut: _____ Spindle RPM: _____ Feed Rate RPM: _____ DOC: _____
 Current Tool: Carbide: PCD: Other: _____
 Surface Finish Required: _____ Coolant: _____ Thru Spindle: Shower Screw: Flood:
 Common Failure Mode: Finish: Wear: Chipping: Burr: Other: _____
 Desired Improvement Over Current Tool: Life: Cost: Finish: Other: _____

Proposed Tool

Projected Annual Usage: _____ Catalog: Yes No
 New Tool: _____ Quote Quantity: _____
 Description: _____

Cutter Diameter / IC: _____
 # of Stations / Blades: _____ LH: _____ RH: _____
 Cartridge Style / Insert: (Geometry) _____
 Depth of Cut: _____
 Customer Supplied Insert / Tool: Yes No Grade: _____ Manufacturer: _____

Special Requirements

PCD Monobloc Tools



Monobloc Tool

Tool Design: PCD tipped monobloc tools with multiple steps and cutting edges. All tool bodies are machined from tool steel and are precision ground from the taper to the PCD blades between centers for the best possible TIR. HSK, CAT, BT and tapers for wet and MQL machining are available. All tools are balanced by design as well as mechanically before shipment.

Application: This tool is used in a cylinder head for the cup plug bore. Challenges are machining the feature in one step and not allowing chips/swarf to fall into the water passages.

Advantages: No assembly, no runout adjustment, no setup of cutting edges to size.

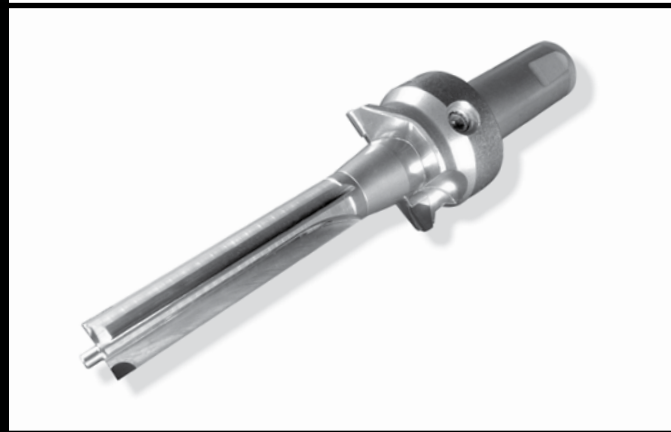


Monobloc Tool

Tool Design: PCD tipped monobloc tools with multiple steps and cutting. All tool bodies are machined from tool steel and are precision ground from the taper to the PCD blades between centers for the best possible TIR. HSK, CAT, BT and tapers for wet and MQL machining are available. All tools are balanced by design as well as mechanically before shipment.

Application: This tool is used in a cylinder head for the springseat face and diameter. Challenges are machining the hole in one step into the casting and not allowing chips in the head nor ring or half ring inside the part.

Advantages: No assembly, no runout adjustment, no setup of cutting edges to size.



Modular Tooling

Tool Design: Built of modular exchangeable components to accommodate exhaust and intake machining of the parent seat and valve guide holes. The body is solid carbide with solid carbide guide pads and PCD blades for precision reaming. Mounted on the reamer is a bushing made from tool steel and PCD tipped. All parts are precision ground between centers for the best possible TIR.

Application: Components are interchangeable to accommodate different exhaust and intake valve seat parent holes. Similar modular solutions are available for engine, transmission, fluid technology, chassis and brake as well as aircraft parts.

Advantages: No assembly, no runout adjustment, no setup of cutting edges to size.



High Precision Reamer

Tool Design: This high precision reaming system is based on using multiple solid carbide guides and PCD inserts to ensure precision hole making with diametric and geometric consistency. For optimal TIR the system is paired with a simple runout adjustment and clamping system designed for this precision reamer system.

Application: For use in all reaming operations requiring precise diameter consistency, straightness and roundness requirements.

Advantages: Precision holes; the operation doesn't follow the pre-bored holes. This system is ideal when more open tolerance requirements exist in situations with low component, fixture or machine spindle rigidity.

*Solutions are available for engine, transmission, fluid technology, chassis and brake as well as aircraft parts.

PCD Monobloc Tools

PCD Contour Milling Cutter

Tool Design: Multiple contoured, precision PCD tips match your required complex contouring operation. The tools are available as steel body monobloc tools, with solid carbide body, and as combination tools.

Application: All axial, radial, circular milling, grooving, and plunging contour operations.

Advantages: No restrictions due to clamping/location of inserts. No difficult set up of multiple inserts to match your contour.



PCD Drills

Tool Design: Our drills are based on solid carbide bodies and either PCD wing tipped, across center or sandwich diamond tipped.

Application: If diametric consistency is needed in your drilled hole or longer life is needed, or you have high silicon content in your material this is the way to go.

Advantages: PCD drills will hold hole size to your specification longer than solid carbide drills can.



Tool Holders for Runout Adjustment

Tool Design: We have multiple precision ground holder solutions with adjustment capabilities for HSK, CAT and BT.

Application: All precision machining operations with weak spindle interface conditions, or high length to diameter ratios.

Advantages: Eliminate runout issues and improve the quality of your machining operation.



Special Tools

Tool Design: If you did not see an obvious solution above, please contact us with your requirements and we will develop one for you.

Application: Solutions are available for engine, transmission, fluid technology, chassis and brake as well as aircraft parts.

Advantages: If you are using multiple tools and cycle time is an issue, let us deal with tooling solutions that work and which will improve your operations, lower your costs, and improve throughput.



*Solutions are available for engine, transmission, fluid technology, chassis and brake as well as aircraft parts.

DIAbide Tool Grade and Type Description

Decatur Diamond offers a variety of coating options that will satisfy most manufacturing needs. We do have other grades and geometries available for those special applications where general tooling may not provide optimal performance. If you are unsure which tool is best for your application, please contact us for guidance in tool coating and geometry. We are confident we can find a solution for your application.

Decatur Diamond has updated our grade designations; the chart below shows a cross reference from our most common grades you are familiar with to the new designations.

Round Tool Grade Designation:

Previous Grade	Current Grade
03	D23
05	D25
07	D27
08	DDC

Insert Grade Designation:

Previous Grade	Current Grade
18	D38

Unlike conventional PCD diamond, DIAbide can be applied to the surfaces of endmills, drills, inserts and other types of carbide fabricated tools. Producing these tools is an exacting process conducted in high tech CVD reactors over an extended period of time. **Decatur Diamond** supplies the most consistent, highest quality tools for machining of difficult, non-metallic, highly abrasive workpieces.

Decatur Diamond offers six varieties of endmills for your application. They are known by the following codes:

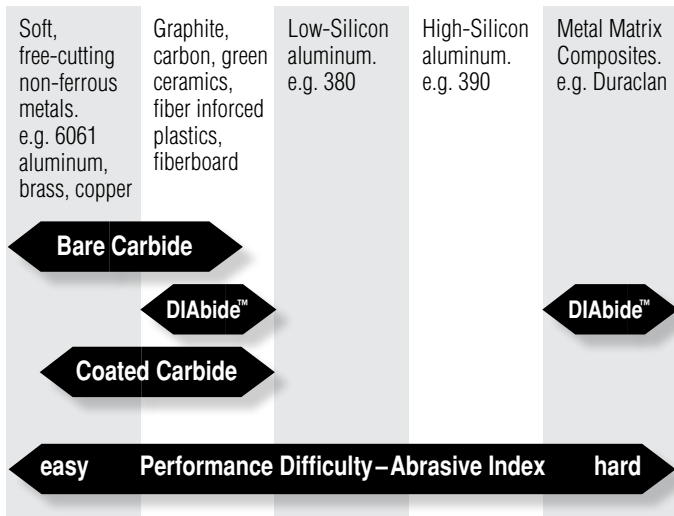
- SEP** – Square End Profiling **SEM** – Square End Mill
- BEP** – Ball End Profiling **BEM** – Ball End Mill
- CRP** – Corner Radius Profiling **CRM** – Corner Radius End Mill

All varieties ending with a “P” are profiling mills that have reduced shanks to allow the user to reach down a vertical wall without interference. All varieties ending with an “M” consist of a non-reduced shank for general purpose milling operations.

All standard endmills are center cutting with a 30 degree right hand spiral flute and can be used for plunge milling.

Complete Diamond Tool Solutions

The world's leading supplier of diamond tooling



DIAbide™

Thin Film Diamond. The Chemical Vapor Deposition, or CVD, coating process of tungsten carbide enables Decatur Diamond to provide diamond coated carbide tools as the ideal solution for many machining operations. The DIAbide material has gained worldwide acceptance as the proven diamond tool solution for high-speed CNC machining applications of graphite, green ceramic, green carbide, carbon fiber, and other highly abrasive materials. We offer a wide array of DIAbide tools including endmills, profiling endmills, drills, indexable inserts, and profiling inserts. The DIAbide process allows much greater freedom of geometry, which PCD tipped tools cannot achieve, so when unique tool geometry is needed, DIAbide is the solution. Beyond our standard tool offering we can develop special tools for your needs; please give Decatur Diamond a call to inquire about your needs.



DIAbide Index

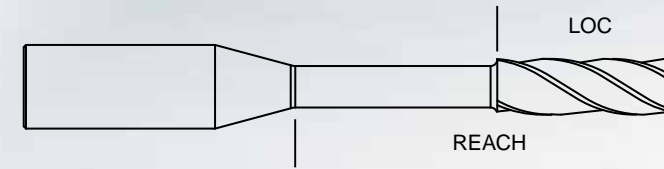
- Grade Recommendation Chart..... 32
- Square End Profiling Endmills (SEP) – Inch/Metric..... 33
- Ball End Profiling Endmills (BEP) – Inch/Metric 34
- Corner Radius Profiling Endmills (CRP) Inch/Metric... 35
- Square Endmills (SEM) – Inch 36
- Square Endmills (SEM) – Metric..... 37
- Ball Endmills (BEM) – Inch..... 38
- Ball Endmills (BEM) – Metric..... 39
- Corner Radius Endmills (CRM) – Inch/Metric 40
- Ultra Premium Endmills – Inch 41
- Jobber Drills,
U.S. Fractional and Wire Sizes – Inch/Metric 42
- Standard ANSI/ISO Inserts 44
- Standard Profiling Inserts (Millstar and Dapra) 45
- Tool Tolerance Specifications 46
- Cutting Data: Milling Parameters 47
- Cutting Data: Turning and Drilling 48
- Square/Corner Radius Endmill
Quote Request Form 49
- Ball Endmill Quote Request Form 50
- Drill Quote Request Form 51

DIAbide Grade Recommendation Chart

Decatur Diamond offers CVD diamond coated tools (DIAbide) in a variety of different grades. While the composition of diamond does not change when selecting a different grade, the thickness of the diamond coating does. The thickness of the coating affects the cutting edge of the tool, therefore different thicknesses are recommended for different applications based on the material to be machined. The thinner the diamond, the sharper the cutting edge. **Decatur Diamond** recommends using the thinnest coating that is suitable for the material you are machining. The grade of the tool is added as a suffix to the Part/EDP number, for example an endmill 12002 will become 12002-D25 or 12002-D27 once the grade number is selected.

Material Type	Drilling	Endmilling Roughing	Endmilling Finishing	Turning Roughing	Turning Finishing
Graphite	D25	D25	D23 / D25	D38	D38
Hard Carbon	D27	D27	D25	D38	D38
Green Carbide	D27	D27	D25	D38	D38
Green Ceramic	D25	D25	D23	D38	D38
CMC (Ceramic Matrix Composite)	D27	D27	—	D38	D38
Concrete Materials	—	—	—	—	D38
Plastic (Unfilled)	D25	—	—	D38	—
Filled Plastics	D25 / D27	D25 / D27	D25	D38	—
Thermoset Plastics	D27	D27	D25	D38	—
Carbon Fiber Composites	D27 / DDC	D27 / DDC	D25	D38	—
Glass Fiber Composites	D27 / DDC	D27 / DDC	D25	D38	—
Metal Clad Glass Fiber Composites	D25	D25	—	D38	—
Aramid Fiber Composites	D27 / DDC	D27 / DDC	—	D38	—
Kevlar Composites	DDC	DDC	—	—	—
Free Machining Aluminums	D25	D27 / DDC	—	—	—
Low Silicon Aluminums (<12%)	D27 / DDC	D27 / DDC	—	D38	—
High Silicon Aluminums (>12%)	D27 / DDC	D27 / DDC	—	D38	D38
MMC (Metal Matrix Composites)	D27 / DDC	D27 / DDC	DD07	D38	D38
Copper	D25 / D27	D27	—	—	—
Brass	D25 / D27	D27	—	—	—
Bronze	D25 / D27	D27	—	—	—
Nickel	—	—	—	—	—
Cast Iron	—	—	—	—	—
Steel	—	—	—	—	—
Cobalt	—	—	—	—	—
Chrome	—	—	—	—	—
Molybdenum	—	—	—	—	—
Tungsten	—	—	—	—	—
Titanium	—	—	—	—	—

DIAbide Square End Profiling Endmills (SEP)



When ordering, choose part number from below and include -D25 or -D27, dependent upon material being machined. For grade recommendations, please see page 32 or call the number at the bottom of the page for assistance.

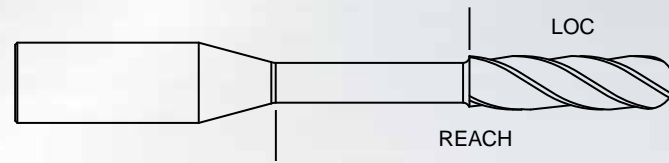
Inch

Diameter	LOC	OAL	No. of Flutes	Type	Reach	Radius	Part/EDP No.
1/64	3/64	1-1/2	2	SEP	1/8	—	12156
1/32	3/32	3	4	SEP	5/16	—	12127
3/64	3/16	3	4	SEP	15/32	—	12128
1/16	3/32	2-1/2	4	SEP	1	—	12866
1/16	3/32	2-1/2	4	SEP	1/2	—	12392
3/32	3/32	3	4	SEP	3/4	—	12851
3/32	3/8	3	4	SEP	1	—	12130
3/32	9/64	2-1/2	4	SEP	1/2	—	12394
3/32	3/32	3	4	SEP	1-1/2	—	12867
1/8	1/8	4	4	SEP	1	—	12854
1/8	1/8	3	4	SEP	1-1/2	—	12852
3/16	3/16	3	4	SEP	1	—	12398
3/16	1	4	4	SEP	1-7/8	—	12133
1/4	1/4	4	4	SEP	1	—	12491
1/4	1/4	4	4	SEP	2	—	12856
5/16	5/16	4	4	SEP	2	—	12747
3/8	3/8	4	4	SEP	2	—	12859
1/2	1/2	4	4	SEP	2	—	12861

Metric

Diameter	LOC	OAL	No. of Flutes	Type	Reach	Radius	Part/EDP No.
1mm	4	75	4	SEP	10mm	—	12135
2mm	10	75	4	SEP	20mm	—	12136
3mm	3	75	4	SEP	20mm	—	12470
3mm	15	75	4	SEP	30mm	—	12137
4mm	25	75	4	SEP	35mm	—	12720
6mm	6	100	4	SEP	38mm	—	12473
8mm	8	100	4	SEP	50mm	—	12476
10mm	10	100	4	SEP	50mm	—	12479
12mm	12	100	4	SEP	50mm	—	12482

DIAbide Ball End Profiling Endmills (BEP)



When ordering, choose part number from below and include -D25 or -D27, dependent upon material being machined. For grade recommendations, please see page 32 or call the number at the bottom of the page for assistance.

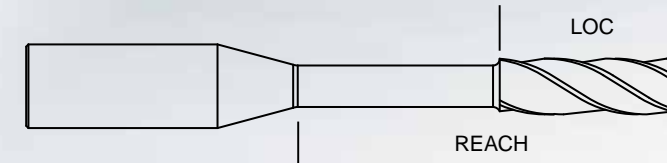
Inch

Diameter	LOC	OAL	No. of Flutes	Type	Reach	Radius	Part/EDP No.
1/64	3/64	1-1/2	4	BEP	5/32	—	12138
1/32	3/32	3	4	BEP	5/16	—	12139
3/64	3/16	3	4	BEP	15/32	—	12140
3/64	3/16	3	4	BEP	3/4	—	12746
1/16	1/16	3	4	BEP	3/4	—	12810
1/16	3/32	2-1/2	4	BEP	1/2	—	12393
1/16	3/16	3	4	BEP	1	—	12721
3/32	9/64	2-1/2	4	BEP	1/2	—	12395
3/32	3/32	3	4	BEP	3/4	—	12811
3/32	3/8	3	4	BEP	1	—	12142
3/32	9/32	3	4	BEP	1-1/2	—	12722
1/8	1/8	3	4	BEP	1-1/2	—	12812
1/8	1/8	4	4	BEP	1	—	12342
1/8	1	3	4	BEP	1-1/2	—	12143
1/8	3/8	3	4	BEP	2	—	12723
3/16	9/32	4	4	BEP	1-7/8	—	12816
3/16	3/16	3	4	BEP	1	—	12399
3/16	1	4	4	BEP	1-7/8	—	12145
1/4	1/4	4	4	BEP	1	—	12492
1/4	1/4	4	4	BEP	2	—	12813
1/4	1-1/2	4	4	BEP	2	—	12146
5/16	5/16	4	4	BEP	2	—	12815
3/8	3/8	4	4	BEP	2	—	12814
1/2	1/2	4	4	BEP	2	—	12819
1/2	1/2	6	4	BEP	1-1/2	—	12724

Metric

Diameter	LOC	OAL	No. of Flutes	Type	Reach	Radius	Part/EDP No.
1mm	4	75	4	BEP	10mm	—	12147
2mm	10	75	4	BEP	20mm	—	12148
3mm	3	75	4	BEP	20mm	—	12472
3mm	15	75	4	BEP	30mm	—	12149
4mm	25	75	4	BEP	35mm	—	12725
6mm	6	100	4	BEP	38mm	—	12475
8mm	8	100	4	BEP	50mm	—	12478
10mm	10	100	4	BEP	50mm	—	12481
12mm	12	100	4	BEP	50mm	—	12484

DIAbide Corner Radius Profiling Endmills (CRP)



When ordering, choose part number from below and include -D25 or -D27, dependent upon material being machined. For grade recommendations, please see page 32 or call the number at the bottom of the page for assistance.

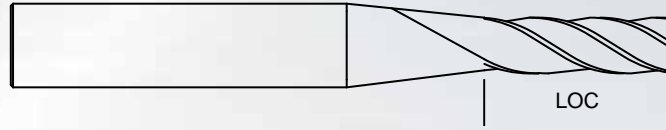
Inch

Diameter	LOC	OAL	No. of Flutes	Type	Reach	Radius	Part/EDP No.
1/32	3/64	2-1/2	4	CRP	1/2	.010	12566
1/32	3/32	3	4	CRP	1/2	.005	12726
3/64	9/64	3	4	CRP	9/16	.010	12727
3/64	3/64	2-1/2	4	CRP	5/8	.010	12567
1/16	3/32	2-1/2	4	CRP	5/8	.010	12568
1/16	3/16	3	4	CRP	1	.010	12728
5/64	5/64	2-1/2	4	CRP	5/8	.010	12569
3/32	9/64	2-1/2	4	CRP	1	.010	12570
3/32	9/32	3	4	CRP	1-1/2	.010	12729
1/8	1/8	4	4	CRP	1	.015	12455
1/8	3/8	3	4	CRP	2	.010	12730
1/8	1/8	3	4	CRP	1-1/2	.015	12853
1/8	3/4	3	4	CRP	1-1/2	.020	12731
1/8	3/4	3	4	CRP	1-1/2	.030	12153
3/16	3/16	4	4	CRP	1-1/2	.020	12581
1/4	1/4	4	4	CRP	1	.015	12864
1/4	1/4	4	4	CRP	2	.062	12458
1/4	1/4	4	4	CRP	2	.030	12574
1/4	1-1/2	4	4	CRP	2-1/2	.030	12155
1/4	1/4	4	4	CRP	2	.020	12463
1/4	1/4	6	4	CRP	3	.020	12577
1/4	1	4	4	CRP	2-1/2	.030	12732
1/4	1	4	4	CRP	2-1/2	.060	12733
3/8	3/8	4	4	CRP	2	.020	12576
3/8	3/8	6	4	CRP	3	.020	12578
1/2	1/2	4	4	CRP	2	.015	12862
1/2	1/2	6	4	CRP	3	.020	12579

Metric

Diameter	LOC	OAL	No. of Flutes	Type	Reach	Radius	Part/EDP No.
1mm	3	75	4	CRP	10mm	.2mm	12734
2mm	3	75	4	CRP	20mm	.2mm	12735
3mm	3	75	4	CRP	20mm	.2mm	12471
4mm	4	75	4	CRP	35mm	.5mm	12736
6mm	6	100	4	CRP	38mm	.5mm	12474
8mm	8	100	4	CRP	50mm	.5mm	12477
10mm	10	100	4	CRP	50mm	.5mm	12480
12mm	12	100	4	CRP	50mm	.5mm	12483

DIAbide Square Endmills (SEM) – Inch



When ordering, choose part number from below and include -D25 or -D27, dependent upon material being machined. For grade recommendations, please see page 32 or call the number at the bottom of the page for assistance.

Inch

Diameter	LOC	OAL	No. of Flutes	Type	Reach	Radius	Part/EDP No.
1/64	3/64	1-1/2	4	SEM	—	—	12121
1/32	3/32	1-1/2	4	SEM	—	—	12103
1/16	1/4	1-1/2	4	SEM	—	—	12092
1/16	1/2	3	4	SEM	—	—	12161
1/16	1/2	2-1/2	4	SEM	—	—	12900
5/64	1/4	1-1/2	4	SEM	—	—	12111
3/32	3/8	1-1/2	4	SEM	—	—	12039
1/8	1/2	1-1/2	4	SEM	—	—	12002
1/8	1	3	4	SEM	—	—	12040
3/16	5/8	2	4	SEM	—	—	12005
3/16	1	4	4	SEM	—	—	12041
1/4	3/4	2-1/2	4	SEM	—	—	12008
1/4	1-1/2	4	4	SEM	—	—	12042
1/4	1-1/2	6	4	SEM	—	—	12043
5/16	7/8	2-1/2	4	SEM	—	—	12011
5/16	1-1/2	4	4	SEM	—	—	12044
3/8	1	2-1/2	4	SEM	—	—	12014
3/8	1-1/2	4	4	SEM	—	—	12045
3/8	1-1/2	6	4	SEM	—	—	12046
1/2	1	3	4	SEM	—	—	12017
1/2	2	4	4	SEM	—	—	12047
1/2	3	6	4	SEM	—	—	12019
3/4	1-1/2	4	4	SEM	—	—	12198
1	1-1/2	4	4	SEM	—	—	12199

DIAbide Square Endmills (SEM) – Metric

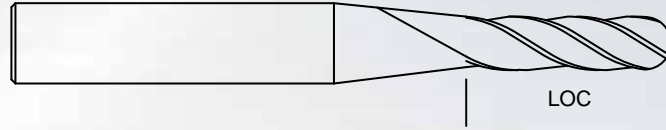


When ordering, choose part number from below and include -D25 or -D27, dependent upon material being machined. For grade recommendations, please see page 32 or call the number at the bottom of the page for assistance.

Metric

Diameter	LOC	OAL	No. of Flutes	Type	Reach	Radius	Part/EDP No.
1mm	4	38	4	SEM	—	—	12115
2mm	10	65	4	SEM	—	—	12058
3mm	15	40	4	SEM	—	—	12059
3mm	25	75	4	SEM	—	—	12060
4mm	15	50	4	SEM	—	—	12061
4mm	25	75	4	SEM	—	—	12062
6mm	20	60	4	SEM	—	—	12063
6mm	40	150	4	SEM	—	—	12065
8mm	20	65	4	SEM	—	—	12066
8mm	40	100	4	SEM	—	—	12067
10mm	26	65	4	SEM	—	—	12068
10mm	40	150	4	SEM	—	—	12070
12mm	30	75	4	SEM	—	—	12071
12mm	50	100	4	SEM	—	—	12072
12mm	75	150	4	SEM	—	—	12073

DIAbide Ball Endmills (BEM) – Inch

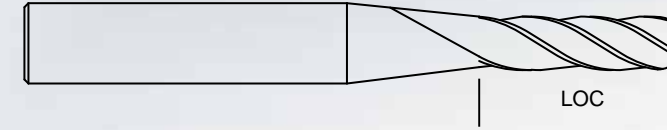


When ordering, choose part number from below and include -D25 or -D27, dependent upon material being machined. For grade recommendations, please see page 32 or call the number at the bottom of the page for assistance.

Inch

Diameter	LOC	OAL	No. of Flutes	Type	Reach	Radius	Part/EDP No.
1/64	3/64	1-1/2	2	BEM	—	—	12179
1/32	1/4	3	4	BEM	—	—	12181
3/64	3/16	1-1/2	4	BEM	—	—	12109
1/16	1/2	3	4	BEM	—	—	12183
1/16	1/4	1-1/2	4	BEM	—	—	12182
5/64	1	3	4	BEM	—	—	12901
3/32	1/2	3	4	BEM	—	—	12185
3/32	1	3	4	BEM	—	—	12902
1/8	1/2	1-1/2	4	BEM	—	—	12021
1/8	1	3	4	BEM	—	—	12049
3/16	5/8	2	4	BEM	—	—	12024
3/16	1	4	4	BEM	—	—	12050
1/4	3/4	2-1/2	4	BEM	—	—	12190
1/4	1-1/2	4	4	BEM	—	—	12191
1/4	2	4	4	BEM	—	—	12905
1/4	1-1/2	6	4	BEM	—	—	12052
5/16	13/16	2-1/2	4	BEM	—	—	12737
5/16	1-1/2	4	4	BEM	—	—	12053
5/16	1-1/2	6	4	BEM	—	—	12371
3/8	1-1/2	6	4	BEM	—	—	12055
3/8	1	2-1/2	4	BEM	—	—	12033
3/8	1-1/2	4	4	BEM	—	—	12054
1/2	1	3	4	BEM	—	—	12036
1/2	2	4	4	BEM	—	—	12195
1/2	3	6	4	BEM	—	—	12038
3/4	1-1/2	4	4	BEM	—	—	12200
1	1-1/2	4	4	BEM	—	—	12201

DIAbide Ball Endmills (BEM) – Metric



When ordering, choose part number from below and include -D25 or -D27, dependent upon material being machined. For grade recommendations, please see page 32 or call the number at the bottom of the page for assistance.

Metric

Diameter	LOC	OAL	No. of Flutes	Type	Reach	Radius	Part/EDP No.
1mm	4	38	4	BEM	—	—	12117
2mm	10	65	4	BEM	—	—	12075
3mm	15	40	4	BEM	—	—	12076
3mm	25	75	4	BEM	—	—	12077
4mm	15	50	4	BEM	—	—	12078
4mm	25	75	4	BEM	—	—	12079
6mm	20	60	4	BEM	—	—	12080
6mm	40	150	4	BEM	—	—	12082
8mm	20	65	4	BEM	—	—	12083
8mm	40	100	4	BEM	—	—	12084
10mm	26	65	4	BEM	—	—	12085
10mm	40	150	4	BEM	—	—	12087
12mm	30	75	4	BEM	—	—	12088
12mm	50	100	4	BEM	—	—	12089
12mm	75	150	4	BEM	—	—	12090

DIAbide Corner Radius Endmills (CRM)



When ordering, choose part number from below and include -D25 or -D27, dependent upon material being machined. For grade recommendations, please see page 32 or call the number at the bottom of the page for assistance.

Inch

Diameter	LOC	OAL	No. of Flutes	Type	Reach	Radius	Part/EDP No.
1/16	1/4	1-1/2	4	CRM	—	.010	12351
1/16	1/4	1-1/2	4	CRM	—	.015	12123
1/8	1/2	1-1/2	4	CRM	—	.015	12095
1/8	1/2	1-1/2	4	CRM	—	.020	12358
1/8	1	3	4	CRM	—	.030	12124
3/16	5/8	2	4	CRM	—	.020	12362
3/16	5/8	2	4	CRM	—	.030	12363
1/4	3/4	2-1/2	4	CRM	—	.020	12365
1/4	3/4	2-1/2	4	CRM	—	.030	12125
1/4	1-1/2	4	4	CRM	—	.030	12099
3/8	1	2-1/2	4	CRM	—	.020	12372
3/8	1	2-1/2	4	CRM	—	.030	12373
1/2	1	3	4	CRM	—	.030	12375
1/2	1	3	4	CRM	—	.062	12376
1/2	1-1/2	4	4	CRM	—	.030	12379
1/2	3	6	4	CRM	—	.030	12101

Metric

Diameter	LOC	OAL	No. of Flutes	Type	Reach	Radius	Part/EDP No.
1mm	3	75	4	CRM	—	.2mm	12738
2mm	3	75	4	CRM	—	.2mm	12739
3mm	3	75	4	CRM	—	.2mm	12740
4mm	4	75	4	CRM	—	.5mm	12741
6mm	6	100	4	CRM	—	.5mm	12742
8mm	8	100	4	CRM	—	.5mm	12743
10mm	10	100	4	CRM	—	.5mm	12744
12mm	12	100	4	CRM	—	.5mm	12745

DIAbide Ultra Premium Endmills



Diabide Ultra Premium Endmills are available only as grade D25. When ordering, choose Part/EDP number from below and include D25. Diabide Ultra Premium Endmills are manufactured to a diameter tolerance of +0.000/-0.0005. All other tolerances are the same as our standard grade D25 endmills as called out on page 46.

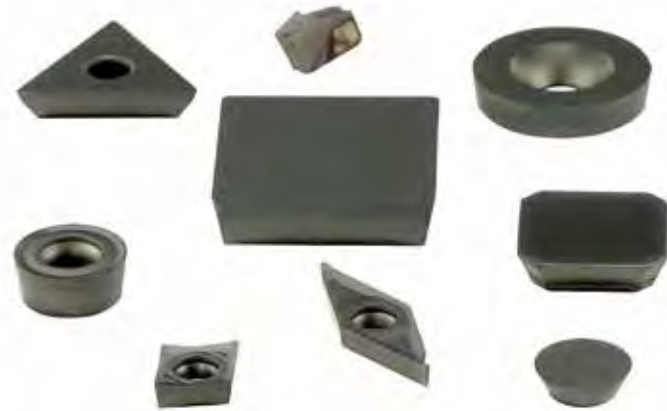
Inch

Diameter	LOC	OAL	No. of Flutes	Type	Reach	Radius	Part/EDP No.
1/16	1/4	1-1/2	4	CRM	—	.010	12409
5/64	1/4	1-1/2	4	BEM	—	—	12417
3/32	3/8	1-1/2	4	CRM	—	.010	12410
3/32	3/8	2	4	CRP	15/16	.010	12448
1/8	1/2	1-1/2	4	SEM	—	—	12404
1/8	1/2	1-1/2	4	CRM	—	.015	12425
1/8	1/2	1-1/2	4	BEM	—	—	12418
1/8	3/4	3	4	SEP	1-1/2	—	12400
1/8	3/4	3	4	CRP	1-1/2	.015	12402
1/8	3/4	3	4	SEP	1-1/2	—	12403
1/8	1	3	4	SEM	—	—	12405
1/8	1	3	4	CRM	—	.015	12411
1/8	1	3	4	BEM	—	—	12419
1/4	3/4	2-1/2	4	SEM	—	—	12406
1/4	3/4	2-1/2	4	BEM	—	—	12420
1/4	3/4	2-1/2	4	CRM	—	.015	12449
1/4	1	4	4	SEP	2-1/2	—	12401
1/4	1-1/2	4	4	CRM	—	.015	12412
3/8	7/8	2-1/2	4	CRM	—	.020	12414
3/8	7/8	2-1/2	4	SEM	—	—	12407
3/8	7/8	2-1/2	4	BEM	—	—	12421
3/8	7/8	2-1/2	4	CRM	—	.015	12426
3/8	1-1/2	4	4	CRM	—	.020	12415
3/8	1-1/2	4	4	BEM	—	—	12422
1/2	1	3	4	SEM	—	—	12408
1/2	1	3	4	CRM	—	.030	12416
1/2	1	3	4	BEM	—	—	12423

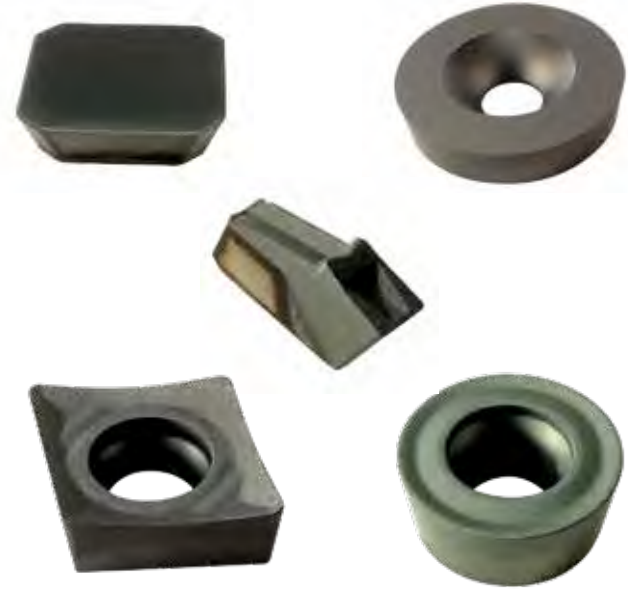
DIAbide Standard ANSI/ISO Inserts

Decatur Diamond offers a selection of standard ANSI/ISO DIAbide coated inserts as listed below. DIAbide inserts are either purchased from traditional insert manufacturers or ground from **Decatur Diamond** specified carbide grades. The industry standard ANSI/ISO tolerance protocols are followed and insert size and tolerance are established before coating is applied. **Decatur Diamond** standard grade for inserts is D38. For information on special grades for your specific application, please call the number at the bottom of the page to speak with the product manager.

ANSI ID	ISO ID	I.C.	Part/EDP No.
CCMT-21.51	CCMT-060204	1/4	16107-D38
CCMT-21.52	CCMT-060208	1/4	16108-D38
CCMT-32.51	CCMT-09T304	3/8	16109-D38
CCMT-32.52	CCMT-09T308	3/8	16110-D38
CNMP-431	CNMP-120404	1/2	16118-D38
CNMP-432	CNMP-120408	1/2	16119-D38
DCMT-21.52	DCMT-070208	1/4	16155-D38
DCMT-32.51	DCMT-11T304	3/8	16156-D38
DCMT-32.52	DCMT-11T308	3/8	16157-D38
DNMP-431	DNMP-150404	1/2	16159-D38
DNMP-432	DNMP-150408	1/2	16160-D38
TCMT-21.51	TCMT-110204	1/4	16274-D38
TCMT-21.52	TCMT-110208	1/4	16275-D38
TCMT-32.51	TCMT-16T304	3/8	16276-D38
TCMT-32.52	TCMT-16T308	3/8	16277-D38
TPG-221	TPG-110304	1/4	16324-D38
TPG-222	TPG-110308	1/4	16326-D38
TPG-321	TPG-160304	3/8	16327-D38
TPG-322	TPG-160308	3/8	16328-D38
TPG-431	TPG-220404	1/2	16331-D38
TPG-432	TPG-220408	1/2	16332-D38
TPGH-221	TPGH-110304	1/4	16336-D38
TPGH-321	TPGH-160304	3/8	16337-D38
TPGH-322	TPGH-160308	3/8	16338-D38
VBMT-331	VBMT-160404	3/8	16366-D38
VBMT-332	VBMT-160408	3/8	16367-D38
VBMW-331	VBMW-160404	3/8	16368-D38
VNMP-331	VNMP-160404	3/8	16381-D38
VNMP-332	VNMP-160408	3/8	16382-D38



Note:
Decatur Diamond will quote other ANSI/ISO standard and special insert geometries upon request. Please contact **Decatur Diamond** with your inquiry at the number at the bottom of the page.



DIAbide Standard Profiling Inserts (Millstar and Dapra)

Profiling inserts from **Millstar** and **Dapra** are patented items and **Decatur Diamond** cannot manufacture the base insert for our DIAbide coating process. These uncoated base inserts must be purchased from the manufacturer and delivery is dependent upon delivery time from the insert manufacturer. Since profiling inserts are used in milling cutter bodies, they are treated as endmills in **Decatur Diamond** coating process and the standard grade is D25. For more information, please call the number at the bottom of the page to speak with the product manager.

Diameter	Ball Nose Description	Part/EDP No.
3/8	BNR 0375 N	16902-D25
1/2	BNR 0500 N	16903-D25
5/8	BNR 0625 N	16904-D25
3/4	BNR 0750 N	16905-D25
1	BNR 1000 N	16906-D25

Diameter	Flat Bottom Description	Part/EDP No.
1/2	FBR 0500 N	16912-D25
5/8	FBR 0625 N	16913-D25
3/4	FBR 0750 N	16914-D25
1	FBR 1000 N	16915-D25

1/2	FBR 0500 N R1/32	16916-D25
5/8	FBR 0625 N R1/32	16917-D25
3/4	FBR 0750 N R1/32	16918-D25
1	FBR 1000 N R1/32	16919-D25
1	FB 1000R 08N	16972-D25

Diameter	Back Draft Description	Part/EDP No.
3/8	BDR 0375 N	16924-D25
1/2	BDR 0500 N	16925-D25
5/8	BDR 0625 N	16926-D25
3/4	BDR 0750 N	16927-D25
1	BDR 1000 N	16928-D25

3/8	BDR 0375 N R1/32	16929-D25
1/2	BDR 0500 N R1/32	16930-D25
5/8	BDR 0625 N R1/32	16931-D25
3/4	BDR 0750 N R1/32	16932-D25
1	BDR 1000 N R1/32	16933-D25

3/8	BD 0375N 02 NA	16945-D25
1/2	BD 0500N 02 NA	16946-D25
5/8	BD 0625N 02 NA	16947-D25
3/4	BD 0750N 04 NA	16948-D25
3/4	BD 0750N 02 NA	16951-D25



DIAbide Tool Tolerance Specifications

DIAbide Endmill Tolerances

All standard grade D25 endmills are produced to +0.000/-0.001 on diameter, -0.0001/-0.0003 on the shank, 0.001 runout, +0.060/-0.000 on flute length and +/-0.060 on OAL.

All standard grade D27 endmills are produced to +0.001/-0.001 on diameter, -0.0000/-0.0003 on the shank, 0.002 runout, +0.060/-0.000 on flute length and +/-0.060 on OAL.

DIAbide Ultra Premium Endmill Tolerances

All Ultra Premium grade D25 endmills are produced to +0.000/-0.0005 on diameter, -0.0001/-0.0003 on the shank, 0.001 runout, +0.060/-0.000 on flute length and +/-0.060 on OAL.

DIAbide Drill Tolerances

All standard grade D25 drills are produced to +0.001/-0.000 on diameter, +0.060/-0.000 on flute length and +/-0.060 on OAL.

All standard grade D27 drills are produced to +0.0025/-0.000 on diameter, +0.060/-0.000 on flute length and +/-0.060 on OAL.

Decatur Diamond drills are industry standard 2 flute spiral jobber drills with a 118 degree four facet point. All drills over .042 diameter are furnished with back taper for clearance.

DIAbide Insert Tolerances

DIAbide inserts are either purchased from traditional insert manufacturers or ground to **Decatur Diamond** specifications. The industry standard ISO and ANSI tolerance protocols are followed and insert size and tolerance are established before coating is applied. The thickness of the diamond coating will affect the insert size. Please contact **Decatur Diamond** for further information.

DIAbide Cutting Data: Milling Parameters

Endmill Diameter	Starting Parameters – Graphite, Hard Carbon			
	RPM n	Cutting Speed Vc	Operation	Feed Rate per Tooth fz
1/64	20,000 - 40,000	80 - 160	Finish	0.0002 - 0.0005
1/32	18,000 - 40,000	150 - 325	Finish	0.0005 - 0.001
1/16	12,000 - 40,000	200 - 650	General	0.001 - 0.002
			Finish	0.0005 - 0.001
1/8	6,000 - 40,000	200 - 1,300	General	0.001 - 0.002
			Finish	0.0005 - 0.001
3/16	4,000 - 40,000	200 - 1,950	General	0.001 - 0.002
			Finish	0.0005 - 0.001
1/4	3,000 - 36,700	200 - 2,450	General	0.002 - 0.004
			Finish	0.001 - 0.002
5/16	2,500 - 31,800	200 - 2,600	General	0.002 - 0.004
			Finish	0.001 - 0.002
3/8	2,000 - 28,500	200 - 2,800	General	0.003 - 0.005
			Finish	0.001 - 0.003
1/2	1,500 - 23,000	200 - 3,000	General	0.003 - 0.005
			Finish	0.001 - 0.003

Endmill Diameter	Starting Parameters – Glass Fiber Filled Plastics			
	RPM n	Cutting Speed Vc	Operation	Feed Rate per Tooth fz
1/64	—	—	—	—
1/32	—	—	—	—
1/16	3,700 - 7,300 5,200 - 10,400	60 - 120 85 - 170	General	0.001 - 0.002
			Finish	0.0005 - 0.001
1/8	3,600 - 7,300 5,200 - 9,200	120 - 240 170 - 300	General	0.0005 - 0.001
			Finish	0.00025 - .0005
3/16	4,100 - 7,100 6,100 - 10,200	200 - 350 300 - 500	General	0.001 - 0.002
			Finish	0.0005 - 0.001
1/4	4,600 - 6,900 5,300 - 8,400	300 - 450 350 - 550	General	0.001 - 0.002
			Finish	0.0005 - 0.001
5/16	4,300 - 6,100 4,300 - 7,300	350 - 500 350 - 600	General	0.001 - 0.002
			Finish	0.0005 - 0.001
3/8	4,100 - 5,600 3,500 - 6,600	400 - 550 350 - 650	General	0.002 - 0.004
			Finish	0.001 - 0.002
1/2	3,400 - 4,600 2,600 - 5,700	450 - 600 350 - 750	General	0.002 - 0.004
			Finish	0.001 - 0.002

Endmill Diameter	Starting Parameters – Green Ceramics, Green Carbide, Powder Filled and Thermoset Plastics			
	RPM n	Cutting Speed Vc	Operation	Feed Rate per Tooth fz
1/64	6,100 - 20,000	25 - 80	Finish	0.0002 - 0.0005
1/32	6,100 - 20,000	50 - 160	Finish	0.0005 - 0.001
1/16	6,100 - 20,000	100 - 325	General	0.001 - 0.002
			Finish	0.0005 - 0.001
1/8	4,600 - 16,000	150 - 500	General	0.001 - 0.002
			Finish	0.0005 - 0.001
3/16	4,100 - 15,000	200 - 750	General	0.001 - 0.002
			Finish	0.0005 - 0.001
1/4	3,050 - 12,000	200 - 750	General	0.002 - 0.004
			Finish	0.001 - 0.002
5/16	2,400 - 11,000	200 - 900	General	0.002 - 0.004
			Finish	0.001 - 0.002
3/8	2,000 - 11,200	200 - 1,000	General	0.003 - 0.005
			Finish	0.001 - 0.003
1/2	1,500 - 10,000	200 - 1,300	General	0.003 - 0.005
			Finish	0.001 - 0.003

Machining Graphite:

DIAbide diamond tools are a perfect match for machining graphite moldforms for EDM. The abrasive nature of EDM graphite grades severely limit the life of carbide tools, and PCD diamond tools are not available in the configurations required for detailed moldmaking. Tools with diamond on the surface wear longer and have a lower coefficient of friction. These characteristics provide substantial benefit to the machining operation.

Because diamond tools last much longer – 15 to 50x the life of carbide – they:

- Easily pay for themselves
- Greatly reduce the number of tool changes, increasing productivity
- Allow for longer periods of unattended machining
- Improve the dimensional consistency of the machined parts
- Eliminate changing tools mid-cut

Turning Data

Unfilled Plastics		
Application	Cutting Speed Vc	Feed Rate per Rev, f
Rough	2000 - 3000	0.010 - 0.020
Finish	—	—

Graphite/Carbon		
Application	Cutting Speed Vc	Feed Rate per Rev, f
Rough	—	—
Finish	3000 - 4000	0.003 - 0.010

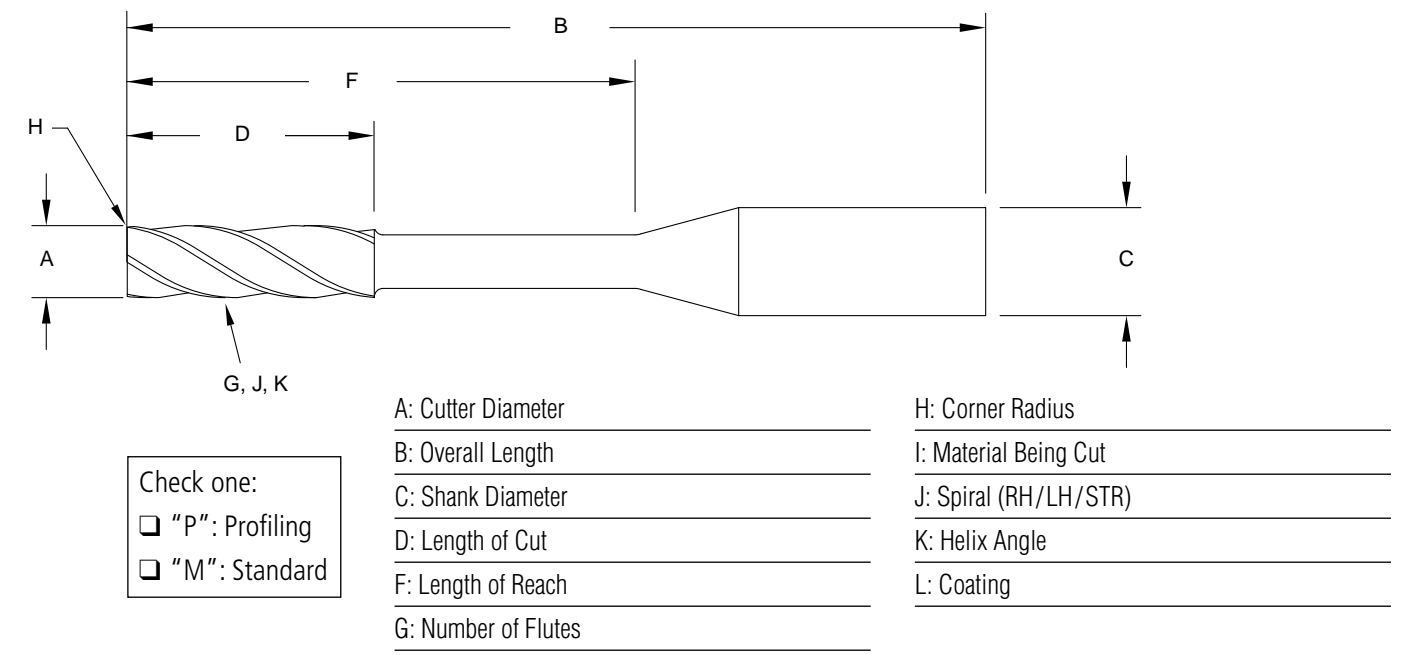
Green-Ceramic/Carbide		
Application	Cutting Speed Vc	Feed Rate per Rev, f
Rough	100 - 500	0.002 - 0.010
Finish	100 - 500	0.002 - 0.010

Reinforced Plastics		
Application	Cutting Speed Vc	Feed Rate per Rev, f
Rough	500 - 1000	0.008 - 0.020
Finish	—	—

Composite Material		
Application	Cutting Speed Vc	Feed Rate per Rev, f
Rough	—	—
Finish	1000 - 1500	0.003 - 0.010

Drilling Data

Drill Diameter	Graphite Hard Carbon	Green Ceramic, Green Carbide, Powder Filled Plastics	Unfilled Plastics	Glass Fiber Reinforced Plastics
	Cutting Speed, Vc	Cutting Speed, Vc	Cutting Speed, Vc	Cutting Speed, Vc
	500 - 2500	200 - 1000	200 - 700	200 - 500
	Feed Rate per Rev, f	Feed Rate per Rev, f	Feed Rate per Rev, f	Feed Rate per Rev, f
1/32 - 1/16	0.00025 - 0.001	0.0002 - 0.00075	0.00025 - 0.001	0.00025 - 0.001
1/16 - 1/8	0.0005 - 0.002	0.0005 - 0.002	0.0005 - 0.002	0.0005 - 0.002
1/8 - 3/16	0.001 - 0.004	0.001 - 0.003	0.001 - 0.004	0.001 - 0.004
3/16 - 1/4	0.002 - 0.005	0.002 - 0.004	0.002 - 0.005	0.002 - 0.005
1/4 - 5/16	0.002 - 0.006	0.002 - 0.005	0.002 - 0.006	0.002 - 0.006
5/16 - 3/8	0.002 - 0.008	0.002 - 0.006	0.002 - 0.008	0.002 - 0.008
3/8 - 1/2	0.002 - 0.010	0.002 - 0.008	0.002 - 0.010	0.002 - 0.010



Reference Quote # _____

Sales Person: _____

Date Entered _____ Date Required: _____

Customer Data

Distributor: _____ End User: _____

Contact Person: _____ Contact Person: _____

Phone Number: _____ Phone Number: _____

Address: _____ Address: _____

Current Process Conditions

Slot Milling: Side Milling: Cavity Milling: Other: _____

Material to Cut: _____ Spindle RPM: _____ Feed Rate RPM: _____ DOC: _____

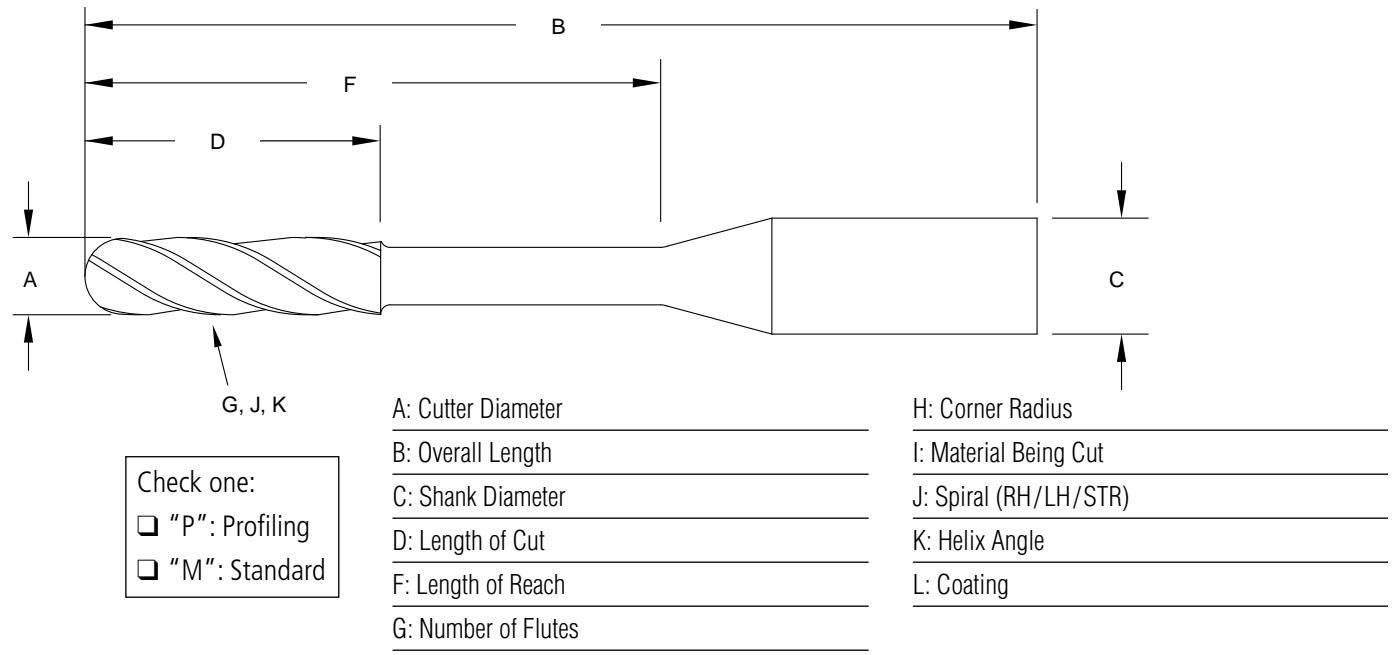
Current Tool: Carbide: PCD: Other: _____

Surface Finish Required: _____ Coolant: _____ Thru Spindle: Shower Screw: Flood:

Common Failure Mode: Finish: Wear: Chipping: Burr: Other: _____

Desired Improvement Over Current Tool: Life: Cost: Finish: Other: _____

DIAbide Ball Endmill Quote Request Form



Reference Quote # _____
 Sales Person: _____
 Date Entered _____ Date Required: _____

Customer Data

Distributor: _____ End User: _____
 Contact Person: _____ Contact Person: _____
 Phone Number: _____ Phone Number: _____
 Address: _____ Address: _____

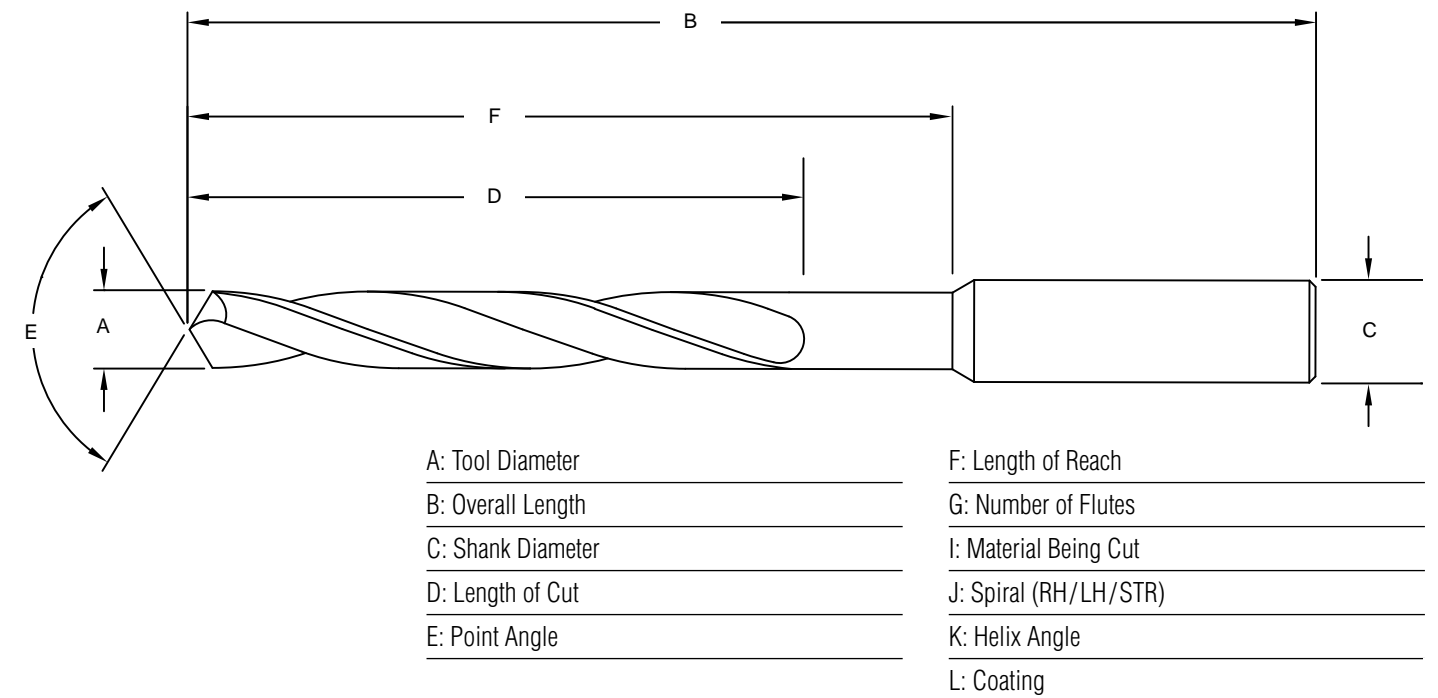
Current Process Conditions

Slot Milling: Side Milling: Cavity Milling: Other: _____
 Material to Cut: _____ Spindle RPM: _____ Feed Rate RPM: _____ DOC: _____
 Current Tool: Carbide: PCD: Other: _____
 Surface Finish Required: _____ Coolant: _____ Thru Spindle: Shower Screw: Flood:
 Common Failure Mode: Finish: Wear: Chipping: Burr: Other: _____
 Desired Improvement Over Current Tool: Life: Cost: Finish: Other: _____



For additional support and for maximum optimization of your tools, call us toll free at: Decatur Diamond 888.547.4156, and ask to speak to our Technical Support Department.

DIAbide Drill Quote Request Form



Reference Quote # _____
 Sales Person: _____
 Date Entered _____ Date Required: _____

Customer Data

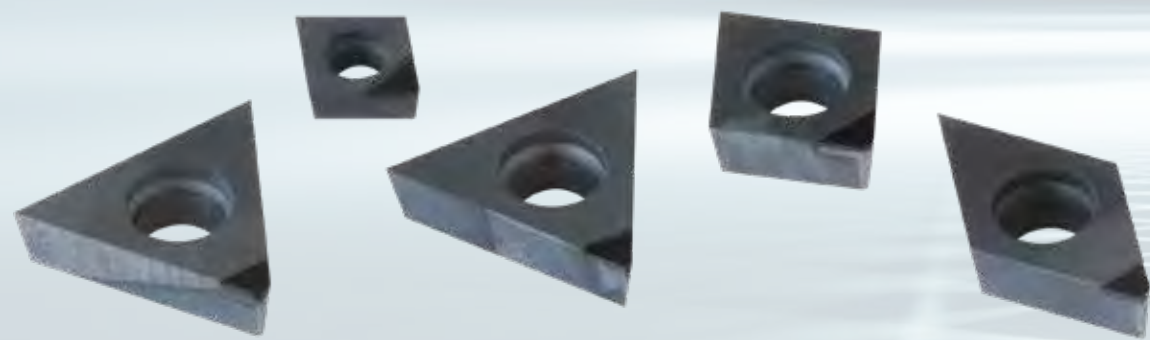
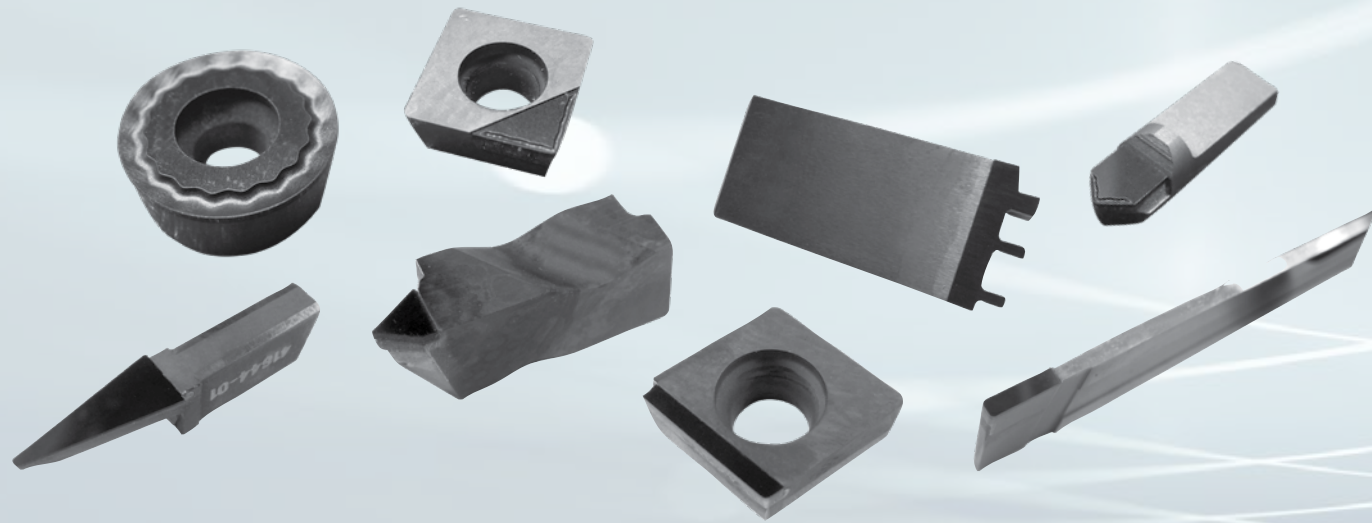
Distributor: _____ End User: _____
 Contact Person: _____ Contact Person: _____
 Phone Number: _____ Phone Number: _____
 Address: _____ Address: _____

Current Process Conditions

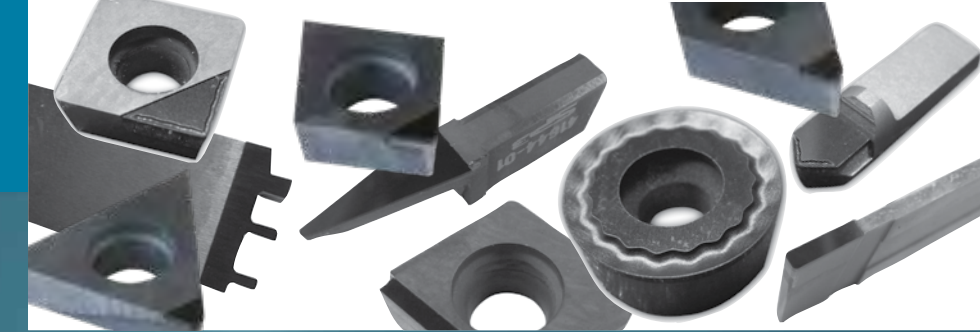
Blind Hole: Through Hole: From Solid: From Cored: Other: _____
 Material to Cut: _____ Spindle RPM: _____ Feed Rate RPM: _____ DOC: _____
 Current Tool: Carbide: PCD: Other: _____
 Surface Finish Required: _____ Coolant: _____ Thru Spindle: Shower Screw: Flood:
 Common Failure Mode: Finish: Wear: Chipping: Burr: Other: _____
 Desired Improvement Over Current Tool: Life: Cost: Finish: Other: _____

PCD Tipped Inserts

Decatur Diamond also offers a PCD tipped line of common ANSI/ISO inserts for your turning and boring needs. The following pages list our quick delivery offering and we can also create PCD tipped inserts in other geometries not found in the catalog. Below are some photos of special inserts we have created for customers upon request over the years. You no longer need a separate supplier for your milling and turning needs. Give us a call and let us help improve any of your machining applications.



41990-03 / 41992-01 / 41994-04 / 41984-04 / 41986-04



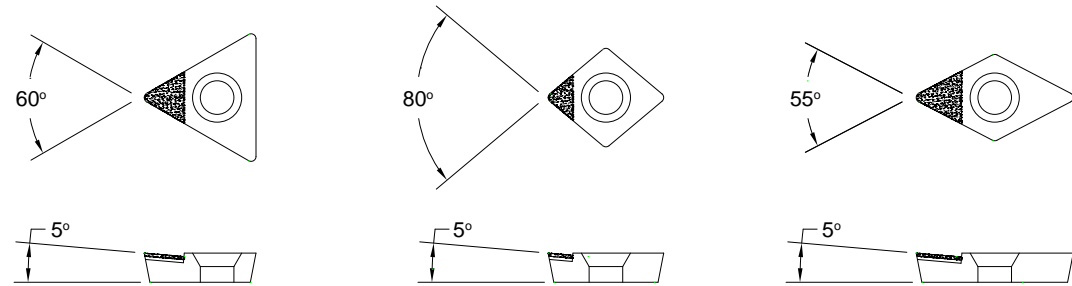
PCD Inserts Index

PCD Tipped ANSI/ISO Screwdown Inserts	
5° Positive Rake	54
Neutral Rake	55

PCD Tipped ANSI/ISO Screwdown Inserts

5° Positive Rake

Decatur Diamond offers a standard family of Positive Rake PCD tipped ANSI/ISO inserts for your turning and boring needs. Utilizing a premium grade of PCD, our inserts offer excellent tool life and performance to suit your application. Please contact your local **Decatur Diamond** sales representative for assistance in selecting the proper insert for your requirements.

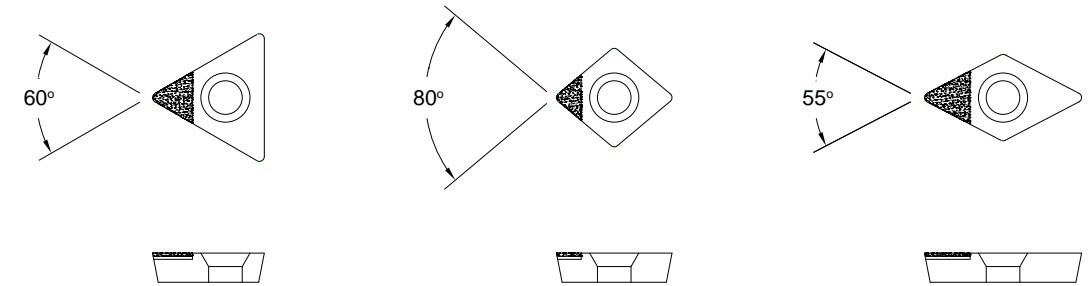


Part/EDP No.	ANSI Description	ISO Description	Tip Size	Top Rake
41990-01	TCGX-21.51 4mm PCD	TCGX-110204	4.0MM	5°
41990-02	TCGX-21.52 4mm PCD	TCGX-110208	4.0MM	5°
41990-03	TCGX-32.51 4mm PCD	TCGX-16T304	4.0MM	5°
41990-04	TCGX-32.52 4mm PCD	TCGX-16T308	4.0MM	5°
41991-01	TPGX-21.51 4mm PCD	TPGX-110204	4.0MM	5°
41991-02	TPGX-21.52 4mm PCD	TPGX-110208	4.0MM	5°
41991-03	TPGX-32.51 4mm PCD	TPGX-16T304	4.0MM	5°
41991-04	TPGX-32.52 4mm PCD	TPGX-16T308	4.0MM	5°
41992-01	CCGX-21.51 4mm PCD	CCGX-060204	4.0MM	5°
41992-02	CCGX-21.52 4mm PCD	CCGX-060208	4.0MM	5°
41992-03	CCGX-32.51 4mm PCD	CCGX-09T304	4.0MM	5°
41992-04	CCGX-32.52 4mm PCD	CCGX-09T308	4.0MM	5°
41993-01	CPGX-21.51 4mm PCD	CPGX-060204	4.0MM	5°
41993-02	CPGX-21.52 4mm PCD	CPGX-060208	4.0MM	5°
41993-03	CPGX-32.51 4mm PCD	CPGX-09T304	4.0MM	5°
41993-04	CPGX-32.52 4mm PCD	CPGX-09T308	4.0MM	5°
41994-01	DCGX-21.51 4mm PCD	DCGX-070204	4.0MM	5°
41994-02	DCGX-21.52 4mm PCD	DCGX-070208	4.0MM	5°
41994-03	DCGX-32.51 4mm PCD	DCGX-11T304	4.0MM	5°
41994-04	DCGX-32.52 4mm PCD	DCGX-11T308	4.0MM	5°
41995-01	DPGX-21.51 4mm PCD	DPGX-070204	4.0MM	5°
41995-02	DPGX-21.52 4mm PCD	DPGX-070208	4.0MM	5°
41995-03	DPGX-32.51 4mm PCD	DPGX-11T304	4.0MM	5°
41995-04	DPGX-32.52 4mm PCD	DPGX-11T308	4.0MM	5°

PCD Tipped ANSI/ISO Screwdown Inserts

Neutral Rake

Decatur Diamond offers a standard family of Neutral Rake PCD tipped ANSI/ISO inserts for your turning and boring needs. Utilizing a premium grade of PCD, our inserts offer excellent tool life and performance to suit your application. Please contact your local **Decatur Diamond** sales representative for assistance in selecting the proper insert for your requirements.



Part/EDP No.	ANSI Description	ISO Description	Tip Size	Top Rake
41984-01	TCGW-21.51 4mm PCD	TCGW-110204	4.0MM	0°
41984-02	TCGW-21.52 4mm PCD	TCGW-110208	4.0MM	0°
41984-03	TCGW-32.51 4mm PCD	TCGW-16T304	4.0MM	0°
41984-04	TCGW-32.52 4mm PCD	TCGW-16T308	4.0MM	0°
41985-01	TPGW-21.51 4mm PCD	TPGW-110204	4.0MM	0°
41985-02	TPGW-21.52 4mm PCD	TPGW-110208	4.0MM	0°
41985-03	TPGW-32.51 4mm PCD	TPGW-16T304	4.0MM	0°
41985-04	TPGW-32.52 4mm PCD	TPGW-16T308	4.0MM	0°
41986-01	CCGW-21.51 4mm PCD	CCGW-060204	4.0MM	0°
41986-02	CCGW-21.52 4mm PCD	CCGW-060208	4.0MM	0°
41986-03	CCGW-32.51 4mm PCD	CCGW-09T304	4.0MM	0°
41986-04	CCGW-32.52 4mm PCD	CCGW-09T308	4.0MM	0°
41987-01	CPGW-21.51 4mm PCD	CPGW-060204	4.0MM	0°
41987-02	CPGW-21.52 4mm PCD	CPGW-060208	4.0MM	0°
41987-03	CPGW-32.51 4mm PCD	CPGW-09T304	4.0MM	0°
41987-04	CPGW-32.52 4mm PCD	CPGW-09T308	4.0MM	0°
41988-01	DCGW-21.51 4mm PCD	DCGW-070204	4.0MM	0°
41988-02	DCGW-21.52 4mm PCD	DCGW-070208	4.0MM	0°
41988-03	DCGW-32.51 4mm PCD	DCGW-11T304	4.0MM	0°
41988-04	DCGW-32.52 4mm PCD	DCGW-11T308	4.0MM	0°
41989-01	DPGW-21.51 4mm PCD	DPGW-070204	4.0MM	0°
41989-02	DPGW-21.52 4mm PCD	DPGW-070208	4.0MM	0°
41989-03	DPGW-32.51 4mm PCD	DPGW-11T304	4.0MM	0°
41989-04	DPGW-32.52 4mm PCD	DPGW-11T308	4.0MM	0°

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