

High-Performance Toroid Cutters and Inserts



RHINO-CARB™
EXTREME PERFORMANCE
CNC-Pressed Inserts



TOURBOR®

DAPRA CORPORATION
www.dapra.com

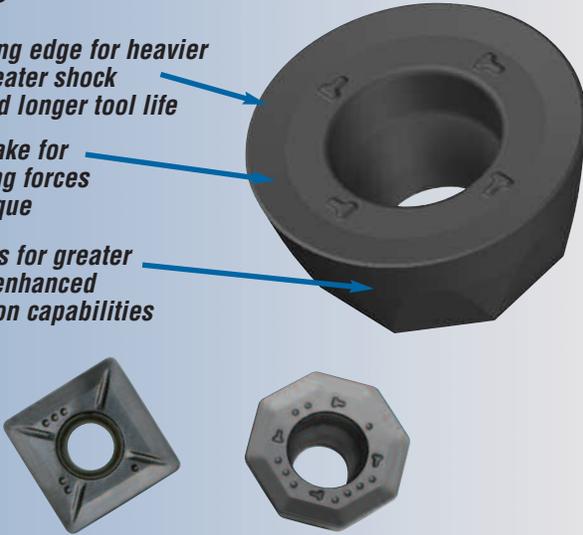
RHINO-CARB™ *Pressed Toroid Inserts*

Dapra's RHINO-CARB™ high-performance inserts are designed for very aggressive metal cutting and long tool life.

Stronger cutting edge for heavier chiploads, greater shock absorption and longer tool life

Positive top rake for reduced cutting forces and lower torque

Thicker inserts for greater strength and enhanced heat-absorption capabilities



"T" inserts have a strong, negative reinforced cutting edge for steels, irons and hard milling.



"D" inserts have a high-positive cutting edge for stainless steels, high-temperature alloys and gummy materials.



"N" inserts (round and octagonal only) are more positive than the "T" edge, but stronger than "D." The "N" should be your go-to geometry for most steels, cast irons and 400-series stainless applications.

Dapra's Toroid Line includes three high-performance inserts, including our **RHINO-CARB line**, to maximize the versatility of our Toroid cutting tools:

Match the insert **(R)** value to the designation on your cutter body.

Button Inserts

R3

R4

R5

R6



RPMH **RDCH & RXCH** (ground)

Square Inserts

R4*



SXEH **SX**

Octagonal Inserts

R4

R5

R6



OPMH **OXCH** (ground)

* Fits 1 1/4" diameter and above only.

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1

Button Inserts

R3 R4 R5 R6

Round inserts have a strong cutting edge, making them an excellent choice for many applications, including:

- Mold cavity and core roughing
- Roughing of complex part contours
- Helical interpolation (larger diameter hole making)
- Pocketing
- Semifinishing
- Face milling

See chart on page 15 for technical help on optimum feeds for button inserts.

**2**

Square Inserts

R4 (1/4" diameter and above only)

Your Toroid cutter can now be used for the most common applications involving 90° milling. Utilize the more economical 4-sided inserts for:

- Profiling
- Step milling
- Face milling
- Slotting
- Helical interpolation (cored holes only)
- Plunge milling

**3**

Octagonal Inserts

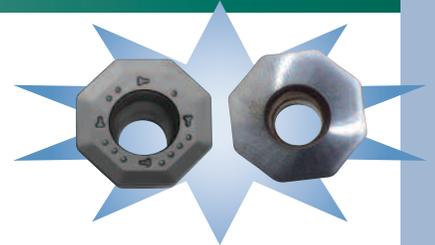
R4* R5 R6

8-sided geometry is excellent for general face milling. 45° lead angle provides increased feed capacity for:

- Face milling
- Profiling
- Helical interpolation
- Chamfering

Each of the 8 usable edges comes with an integral wiper flat for outstanding surface finishes (RHINO-CARB only).

See information on page 15 regarding 45° lead angle compensation for octagonal inserts.

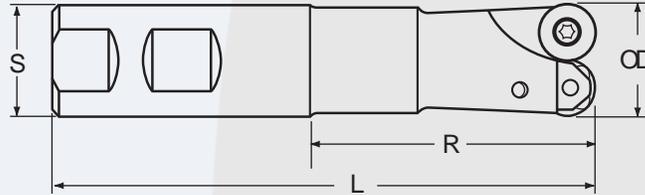


* R4 Octagonal available in RHINO-CARB style only.



R3: 3/8" Insert Cutting Tools

1.250" shank dia. cutters and smaller are available in limited supply without Weldon Flats.
Add WOF to the end of the part number when ordering.



End Mills

OD Diameter	Holder	R Effective Length	L Overall Length	S Shank Dia.	Flutes	Insert <i>Match color to inserts on opposite page</i>	Insert Dia.
.750"	TREM075-200-R3-2C [†]	2.000"	4.030"	.750"	2		.375"
.750"	TREM075-300-R3-2C [†]	3.000"	5.030"	.750"	2		.375"
1.000"	TREM100-250-R3-2C [†]	2.500"	4.750"	1.000"	2		.375"
1.000"	TREM100-250-R3-3C [†]	2.500"	4.750"	1.000"	3		.375"

[†]"C" denotes coolant-thru tool.

Carbide Core End Mills

OD Diameter	Holder	R Effective Length	L Overall Length	S Shank Dia.	Flutes	Insert <i>Match color to inserts on opposite page</i>	Insert Dia.
.750"	CC-TREM075-300-R3-2 [†]	3.000"	5.030"	.750"	2		.375"
1.000"	CC-TREM100-450-R3-2 [†]	4.500"	6.750"	1.000"	2		.375"
1.000"	CC-TREM100-450-R3-3 [†]	4.500"	6.750"	1.000"	3		.375"

[†] Does not come with top clamp.

R3: 3/8" IC Inserts

- Stocked standard
- Available upon request
- ◐ Call for availability



"T" inserts have a reinforced cutting edge for steels, irons and hard milling



"N" inserts are for typical cutting applications where high-performance milling of steels, irons and 400-series stainless is desired



"D" inserts have a high-positive cutting edge for stainless steels, high-temperature alloys and gummy materials



Button Inserts



	IC	Thick-ness	Radius	Uncoated		Coated	
				DMK30 DMK25† DMP25 DMK15	DMK30-HP DMK25-HP† DMP25-HP DMK15-HP	DMK30-TCI DMK25-TCI† DMP25-TCI DMK15-TCI	DMK30-GLH DMK25-GLH† DMP25-GLH DMK15-GLH
RPMH-33-T	.375"	.157"	.187"	●	●	◐	●
RPMH-33-N	.375"	.157"	.187"	●	●	◐	●
RPMH-33-D	.375"	.157"	.187"	●	●	◐	●
Ground							
RDCH-32-T‡	.375"	.125"	.187"	◐	◐		◐
RDCH-32-D*	.375"	.125"	.187"	◐	◐		◐

PVD TiCN and PVD AlTiN coatings available on request.

† DMK25 substrate is available for RHINO-CARB D and N geometries only.

‡ Closeout item. Available while supplies last.

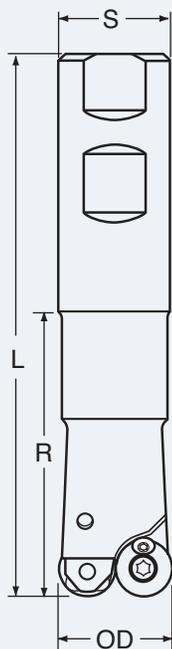
* RDCH-32-D is available in DMP25 and DMK15 (uncoated and coated) only, while supplies last. DMK30 is not available for this insert.



See chart on page 15 for technical help on optimum feeds for button inserts.
See page 19 for insert grade descriptions.
See page 20 for recommended speeds/feeds.

R4: 1/2" Insert Cutting Tools

1.250" shank dia. cutters and smaller are available in limited supply without Weldon Flats.
Add WOF to the end of the part number when ordering.



End Mills

OD Diameter	Holder	R Effective Length	L Overall Length	S Shank Dia.	Flutes	Insert <small>Match color to inserts on opposite page</small>	Insert Dia.
1.000"	TREM100-125-R4-2C [‡]	1.250"	3.530"	1.000"	2		.500"
1.000"	TREM100-250-R4-2C [‡]	2.500"	4.750"	1.000"	2		.500"
1.000"	TREM100-450-R4-2C [‡]	4.500"	6.750"	1.000"	2		.500"
1.250"	TREM125-300-R4-3 [‡]	3.000"	5.280"	1.250"	3		.500"
1.500"	TREM150-350-R4-3 [‡]	3.500"	5.780"	1.250"	3		.500"

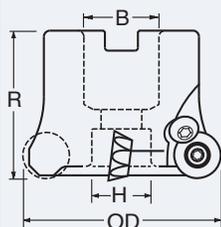
[‡]"C" denotes coolant-thru tool.

* Does not have thru-tool coolant.

Carbide Core End Mills

OD Diameter	Holder	R Effective Length	L Overall Length	S Shank Dia.	Flutes	Insert <small>Match color to inserts on opposite page</small>	Insert Dia.
1.000"	CC-TREM100-450-R4-2 [‡]	4.500"	6.750"	1.000"	2		.500"
1.250"	CC-TREM125-500-R4-3	5.000"	7.280"	1.250"	3		.500"

[‡] Uses RDCH-43 / RPMH-44 / OPMH-442 Inserts only.



Shell Mills

OD Diameter	Holder	R Overall Length	B Arbor Dia.	H Counter Bore Dia.	Flutes	Insert <small>Match color to inserts on opposite page</small>	Insert Dia.
2.000"	TRSM200-075-R4-4C	1.500"	.750"	.590"	4		.500"
2.000"	TRSM200-075-R4-5C	1.500"	.750"	.590"	5		.500"
2.500"	TRSM250-100-R4-6C	2.000"	1.000"	.790"	6		.500"
3.000"	TRSM300-100-R4-6C	2.000"	1.000"	.790"	6		.500"
3.320"	TRSM332-100-R4-6	2.000"	1.000"	.790"	6		.500"
4.000"	TRSM400-150-R4-7	2.000"	1.500"	2.050"	7		.500"
4.320"	TRSM432-150-R4-7	2.000"	1.500"	2.050"	7		.500"
5.000"	TRSM500-150-R4-9	2.000"	1.500"	2.060"	9		.500"
6.000"	TRSM600-200-R4-9	2.000"	2.000"	2.875"	9		.500"
6.320"	TRSM632-200-R4-9	2.000"	2.000"	2.875"	9		.500"

[‡]"C" denotes coolant-thru tool.

See chart on page 15 for technical help on optimum feeds for button inserts.
See page 19 for insert grade descriptions.
See page 20 for recommended speeds/feeds.

R4: 1/2" IC Inserts

- Stocked standard
- Available upon request
- ◐ Call for availability



"T" inserts have a reinforced cutting edge for steels, irons and hard milling



"N" inserts are for typical cutting applications where high-performance milling of steels, irons and 400-series stainless is desired



"D" inserts have a high-positive cutting edge for stainless steels, high-temperature alloys and gummy materials



Button Inserts

	IC	Thick-ness	Radius	Uncoated		Coated	
				DMK30 DMK25 [†] DMP25 DMK15	DMK30-HP DMK25-HP [†] DMP25-HP DMK15-HP	DMK30-TCI DMK25-TCI [‡] DMP25-TCI DMK15-TCI	DMK30-GLH DMK25-GLH [‡] DMP25-GLH DMK15-GLH
RHINO-CARB^{RP}							
RPMH-44-T	.500"	.220"	.250"	●	●	◐	●
RPMH-44-N	.500"	.220"	.250"	●	●	◐	●
RPMH-44-D	.500"	.220"	.250"	●	●	◐	●
Ground							
RDCH-43-T [‡]	.500"	.187"	.250"	◐	◐	◐	◐
RDCH-43-D*	.500"	.187"	.250"	◐	◐	◐	◐

PVD TiCN and PVD AlTiN coatings available on request.

[†] DMK25 substrate is available for RHINO-CARB D and N geometries only.

[‡] Closeout item. Available while supplies last. DMK30 and DMK15 are out of stock.

* RDCH-43-D is available in DMK30 and DMK15 (uncoated and coated) only. DMP25 available while supplies last.



Square Inserts

	IC	Thickness	Corner Radius	Coated		
				DMK30-HP DMP25-HP DMK15-HP	DMK30-TCI DMP25-TCI DMK15-TCI	DMK30-GLH DMP25-GLH DMK15-GLH
RHINO-CARB^{SX}						
SXEH-432-T	.500"	.200"	.031"	●	◐	●
SXEH-432-D	.500"	.200"	.031"	●	◐	●

PVD TiCN and PVD AlTiN coatings available on request.

SXEH inserts are suitable for 1 1/4" diameter and above only.



Octagonal Inserts

	IC	Thick-ness	Radius	Uncoated		Coated	
				DMK30 DMK25 [†] DMP25 DMK15	DMK30-HP DMK25-HP [†] DMP25-HP DMK15-HP	DMK30-TCI DMK25-TCI [‡] DMP25-TCI DMK15-TCI	DMK30-GLH DMK25-GLH [‡] DMP25-GLH DMK15-GLH
RHINO-CARB^{OP}							
OPMH-442-T	.500"	.220"	.031"	●	●	◐	●
OPMH-442-N	.500"	.220"	.031"	●	●	◐	●
OPMH-442-D	.500"	.220"	.031"	●	●	◐	●

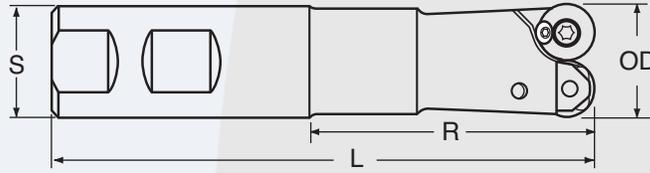
PVD TiCN and PVD AlTiN coatings available on request.

[†] DMK25 substrate is available for RHINO-CARB D and N geometries only.

[‡] OPMH-442 inserts have a maximum DOC of .135".

R5: 5/8" Insert Cutting Tools

1.250" shank dia. cutters and smaller are available in limited supply without Weldon Flats. Add WOF to the end of the part number when ordering.



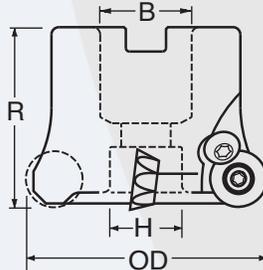
End Mills

OD Diameter	Holder	R Effective Length	L Overall Length	S Shank Dia.	Flutes	Insert <i>Match color to inserts on opposite page</i>	Insert Dia.
1.250"	TREM125-300-R5-2C	3.000"	5.250"	1.250"	2		.625"

"C" denotes coolant-thru tool.

Carbide Core End Mills

OD Diameter	Holder	R Effective Length	L Overall Length	S Shank Dia.	Flutes	Insert <i>Match color to inserts on opposite page</i>	Insert Dia.
1.250"	CC-TREM125-500-R5-2	5.000"	7.250"	1.250"	2		.625"



Shell Mills

OD Diameter	Holder	R Overall Length	B Arbor Dia.	H Counter Bore Dia.	Flutes	Insert <i>Match color to inserts on opposite page</i>	Insert Dia.
2.000"	TRSM200-075-R5-3C	1.500"	.750"	.590"	3		.625"
2.500"	TRSM250-100-R5-4C	2.000"	1.000"	.790"	4		.625"
3.000"	TRSM300-100-R5-5C	2.000"	1.000"	.790"	5		.625"
3.430"	TRSM343-100-R5-5	2.000"	1.000"	.790"	5		.625"
4.000"	TRSM400-150-R5-6	2.000"	1.500"	2.060"	6		.625"
4.430"	TRSM443-150-R5-6	2.000"	1.500"	2.060"	6		.625"
5.000"	TRSM500-150-R5-8	2.000"	1.500"	2.060"	8		.625"
5.430"	TRSM543-150-R5-8	2.000"	1.500"	2.060"	8		.625"
6.000"	TRSM600-200-R5-10	2.000"	2.000"	2.875"	10		.625"
6.430"	TRSM643-200-R5-10	2.000"	2.000"	2.875"	10		.625"

"C" denotes coolant-thru tool.

R5: 5/8" IC Inserts

- Stocked standard
- Available upon request
- ◐ Call for availability



"T" inserts have a reinforced cutting edge for steels, irons and hard milling



"N" inserts are for typical cutting applications where high-performance milling of steels, irons and 400-series stainless is desired



"D" inserts have a high-positive cutting edge for stainless steels, high-temperature alloys and gummy materials



Button Inserts

	IC	Thick-ness	Radius	Coated			
				Uncoated	DMK30-HP DMK25-HP† DMP25-HP DMK15-HP	DMK30-TCI DMK25-TCI† DMP25-TCI DMK15-TCI	DMK30-GLH DMK25-GLH† DMP25-GLH DMK15-GLH
RHINO-CARB^{RP}							
RPMH-54-T	.625"	.220"	.312"	●	●	◐	●
RPMH-54-N	.625"	.220"	.312"	●	●	◐	●
RPMH-54-D	.625"	.220"	.312"	●	●	◐	●
Ground							
RXCH-53-T†	.625"	.187"	.312"	◐	◐	◐	◐
RXCH-53-D*	.625"	.187"	.312"	◐	◐	◐	◐

PVD TiCN and PVD AlTiN coatings available on request.

† DMK25 substrate is available for RHINO-CARB D and N geometries only.

‡ Closeout item. Available while supplies last.

* RXCH-53-D is available in DMK30 and DMK15 (uncoated and coated) only. DMP25 available while supplies last.



Octagonal Inserts

	IC	Thick-ness	Radius	Coated			
				Uncoated	DMK30-HP DMK25-HP† DMP25-HP DMK15-HP	DMK30-TCI DMK25-TCI† DMP25-TCI DMK15-TCI	DMK30-GLH DMK25-GLH† DMP25-GLH DMK15-GLH
RHINO-CARB^{OP}							
OPMH-544-T	.625"	.220"	.062"	●	●	◐	●
OPMH-544-N	.625"	.220"	.062"	●	●	◐	●
OPMH-544-D	.625"	.220"	.062"	●	●	◐	●
Ground							
OXCH-534-D*	.625"	.187"	.062"	◐	◐	◐	◐

PVD TiCN and PVD AlTiN coatings available on request.

† DMK25 substrate is available for RHINO-CARB D and N geometries only.

* OXCH-534-D is available in DMK30 and DMK15 (uncoated and coated) only. DMP25 available while supplies last.

** OPMH-544 inserts have a maximum DOC of .165".

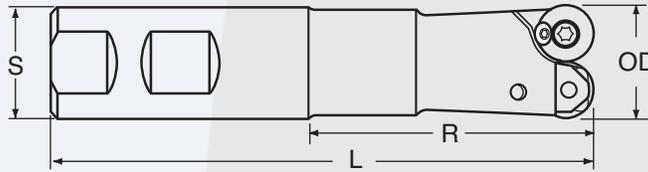


See chart on page 15 for technical help on optimum feeds for button inserts.

See page 19 for insert grade descriptions.

See page 20 for recommended speeds/feeds.

R6: 3/4" Insert Cutting Tools



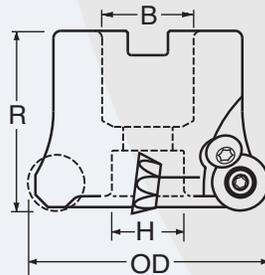
End Mills

OD Diameter	Holder	R Effective Length	L Overall Length	S Shank Dia.	Flutes	Insert <i>Match color to inserts on opposite page</i>	Insert Dia.
1.500"	TREM150-350-R6-2C	3.500"	6.190"	1.500"	2		.750"

"C" denotes coolant-thru tool.

Carbide Core End Mills

OD Diameter	Holder	R Effective Length	L Overall Length	S Shank Dia.	Flutes	Insert <i>Match color to inserts on opposite page</i>	Insert Dia.
1.500"	CC-TREM150-550-R6-2	5.500"	8.190"	1.500"	2		.750"



Shell Mills

OD Diameter	Holder	R Overall Length	B Arbor Dia.	H Counter Bore Dia.	Flutes	Insert <i>Match color to inserts on opposite page</i>	Insert Dia.
3.000"	TRSM300-100-R6-4	2.000"	1.000"	.790"	4		.750"
3.500"	TRSM350-100-R6-4	2.000"	1.000"	.790"	4		.750"
4.000"	TRSM400-150-R6-6	2.000"	1.500"	2.060"	6		.750"
4.500"	TRSM450-150-R6-6	2.000"	1.500"	2.060"	6		.750"
6.000"	TRSM600-200-R6-8	2.000"	2.000"	2.875"	8		.750"
6.500"	TRSM650-200-R6-8	2.000"	2.000"	2.875"	8		.750"
8.440"	TRSM850-FM-R6-10 FLANGE MOUNTED	2.380"	2.500"	4.0" B/C	10		.750"

R6: 3/4" IC Inserts

- Stocked standard
- Available upon request
- ◐ Call for availability



"T" inserts have a reinforced cutting edge for steels, irons and hard milling



"N" inserts are for typical cutting applications where high-performance milling of steels, irons and 400-series stainless is desired



"D" inserts have a high-positive cutting edge for stainless steels, high-temperature alloys and gummy materials



Button Inserts

	IC	Thick-ness	Radius	Uncoated		Coated		
				DMK30 DMK25 [†] DMP25 DMK15	DMK30-HP DMK25-HP [†] DMP25-HP DMK15-HP	DMK30-TCI DMK25-TCI [†] DMP25-TCI DMK15-TCI	DMK30-GLH DMK25-GLH [†] DMP25-GLH DMK15-GLH	
RHINO-CARB^{RP}								
RPMH-64-T	.750"	.220"	.375"	●	●	◐	●	
RPMH-64-N	.750"	.220"	.375"	◐	◐	◐	◐	
RPMH-64-D	.750"	.220"	.375"	●	●	◐	●	
Ground								
RXCH-63-T [‡]	.750"	.187"	.375"	◐	◐	◐	◐	
RXCH-63-D*	.750"	.187"	.375"	◐	◐	◐	◐	

PVD TiCN and PVD AlTiN coatings available on request.

[†] DMK25 substrate is available for RHINO-CARB D and N geometries only.

[‡] Closeout item. Available while supplies last.

* RXCH-63-D is available in DMK30 and DMK15 (uncoated and coated) only. DMP25 is not available for this insert.



Octagonal Inserts

	IC	Thick-ness	Radius	Uncoated		Coated		
				DMK30 DMK25 [†] DMP25 DMK15	DMK30-HP DMK25-HP [†] DMP25-HP DMK15-HP	DMK30-TCI DMK25-TCI [†] DMP25-TCI DMK15-TCI	DMK30-GLH DMK25-GLH [†] DMP25-GLH DMK15-GLH	
RHINO-CARB^{OP}								
OPMH-644-T	.750"	.220"	.062"	●	●	◐	●	
OPMH-644-N	.750"	.220"	.062"	●	●	◐	●	
OPMH-644-D	.750"	.220"	.062"	●	●	◐	●	
Ground								
OXCH-634-T [‡]	.750"	.187"	.062"	◐	◐	◐	◐	
OXCH-634-D*	.750"	.187"	.062"	◐	◐	◐	◐	

PVD TiCN and PVD AlTiN coatings available on request.

[†] DMK25 substrate is available for RHINO-CARB D and N geometries only.

[‡] Closeout item. Available while supplies last. DMK30 and DMP25 are out of stock.

* OXCH-634-D is available in DMK30 and DMK15 (uncoated and coated) only. DMP25 available while supplies last.

** OPMH-644 inserts have a maximum DOC of .200".



See chart on page 15 for technical help on optimum feeds for button inserts.
See page 19 for insert grade descriptions.
See page 20 for recommended speeds/feeds.

Carbide Core Modular Extensions

Dapra's Carbide Core Modular Extensions Are Ideal for Standard Inch End Mill Holders

- Cylindrical inch shanks, providing adaptation for end mill holders, milling chucks and heat-shrink holders
- 3 sizes to accommodate modular head sizes from 3/4" to 1 1/2"
- Carbide core for enhanced vibration dampening capability; reduced deflection and improved rigidity
- Optional add-on extensions for additional 2" reach – screw on to base extensions (for 3/4" to 1 1/2" modular heads)
- Thru-coolant for delivery of air or coolant right at the cutting edge



Carbide Core Modular Extensions

For Head Dia.	Extension Part No.	Shank Dia.	Effective Length	OAL	Thread	CC	A
.750"/20mm	CC-ME-0750-3500C-SS	.750"	3.7"	5.77"	M10	3/8" x 4.0"	.660"
.750"/20mm	CC-ME-0750-3500C	1.000"	3.7"	6.0"	M10	7/16" x 4.0"	.660"
1.000"/25mm	CC-ME-1000-4500C	1.000"	4.7"	7.0"	M12	7/16" x 5.0"	.935"
1.250"/1.500"	CC-ME-1250-5500C	1.250"	5.7"	8.0"	M16	1/2" x 6.0"	1.175"

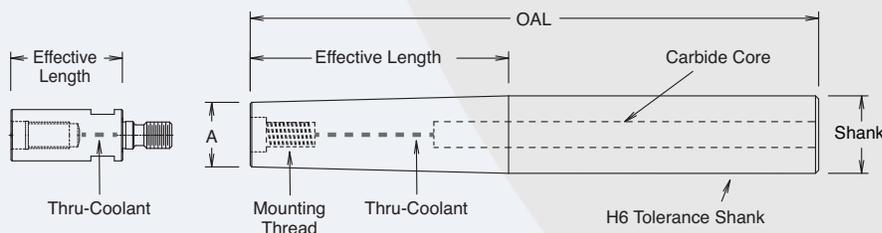
Extensions feature a cylindrical shank, with no Weldon Flats. Hold with high-performance milling chucks or heat/mechanical shrink holders, or mill Weldon Flats and use a short-length solid end mill holder.



2" Add-On Extensions

For Head Dia.	Extension Part No.	Effective Length	Thread
.750"/20mm	ME-0750-2"C EXTENSION ADAPTER	2.0"	M10
1.000"/25mm	ME-1000-2"C EXTENSION ADAPTER	2.0"	M12
1.250"/1.500"	ME-1250-2"C EXTENSION ADAPTER	2.0"	M16

See next page for standard line of Modular Heads and Extensions.



NEW

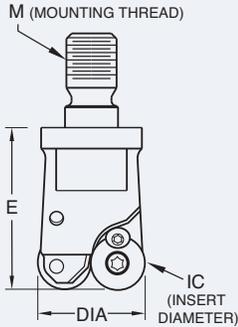
Solid Carbide Modular Extensions

- Optimum rigidity reduces deflection and chatter
- No braze joints
- Best option for finishing with modular heads
- Thru-coolant for delivery of air or coolant right at the cutting edge

For Head Dia.	Extension Part No.	Shank Dia.	Effective Length	OAL	Thread	A
.500"	SC-ME-0500-6500-C	.500"	1.500"	6.5"	M8	.460"
.750"	SC-ME-0750-7700-C	.750"	2.250"	7.7"	M10	.709"
1.000"	SC-ME-1000-8300-C	1.000"	5.000"	8.3"	M12	.890"/.950"



Screw-On Modular Heads



Screw-On Heads Fit Industry Standard Cutting Systems

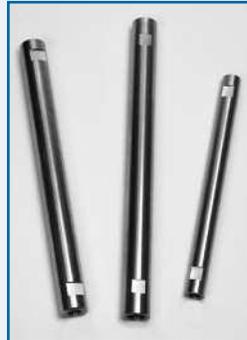
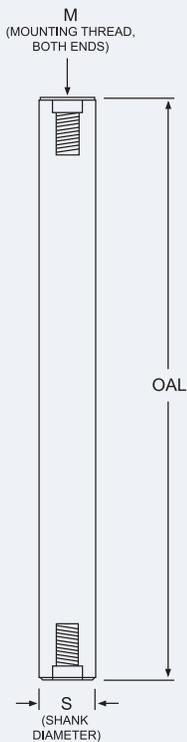
- Compatible with ISO standard modular systems
- Greater effective reach than solid end mills
- Close-tolerance mounting minimizes runout
- Standard inch wrench flats – no special metric wrenches needed



"R" Value	Dia.	Holder	M	E	IC	Flutes	Wrench	Insert	
Toroid Screw-On Heads									
R3	.750"	TREM075-MOD-R3-2C†	M10	1.50"	.375"	2	9/16"		See pg. 5
R4	1.000"	TREM100-MOD-R4-2C‡	M12	1.50"	.500"	2	11/16"		See pg. 7
R4	1.250"	TREM125-MOD-R4-3	M16	1.75"	.500"	3	15/16"		See pg. 7
R4	1.500"	TREM150-MOD-R4-3	M16	1.75"	.500"	3	15/16"		See pg. 7
R6	1.500"	TREM150-MOD-R6-2	M16	1.75"	.750"	2	15/16"		See pg. 11

† TREM075-MOD-R3-2 does not come with top clamp.

‡ Uses RDCH-43 / RPMH-44 / OPMH-442 Inserts only.



Heavy Metal Modular Extensions Provide Even More Cutting Options

- Made of high-density tungsten, providing extra resistance to vibration and deflection
- Machined on both ends; can be cut in half and used with two different modular heads
- Metric shank diameter provides clearance for each inch size modular head



Modular Extensions

Modular Head Dia.	Part No.	OAL	M	Shank Dia.
.750" / 20mm	ME-0750-18MM-900-C	9"	M10	18mm
1.000" / 25mm	ME-1000-25MM-1100-C	11"	M12	25mm
1.250"	ME-125/150-25MM-1200-C	12"	M16	25mm
1.500"	ME-125/150-25MM-1200-C	12"	M16	25mm

Recommendations

- Tool is most appropriate for "Z-level" roughing; ramp to Depth of Cut (DOC) and clear entire level.
- Plunging is not recommended with Toroid cutters when using RHINO-CARB inserts. Ramping (up to 5° max.) is recommended.
- Minimum diametric plunging engagement is 75% of cutter diameter (RDCH inserts only).
- Try to maintain at least 75% of the cutter diameter on the workpiece whenever possible. Hanging a cutter off to the side of your work is detrimental to tool life and performance.
- Width of Cut (WOC) should be 60-75% of cutter diameter whenever possible, creating a "scallop" effect (end mills only) between passes, especially with longer-length tools.
- Plunging creates a long, continuous chip; use a peck cycle with full withdrawal to break and evacuate this chip when plunging to depths greater than .075" (RDCH inserts only).
- Round inserts provide a very strong cutting edge and the ability to machine much closer to finish size. Utilize high speeds and feeds with light DOC to take advantage of these benefits. High metal removal rates will be achieved without high horsepower consumption.
- Use the Feed Rate Compensation charts on pages 15 to compensate for chip thinning that occurs with Toroid inserts. This will provide for optimum metal removal rates and tool life; the lighter the DOC, the more critical feed compensation becomes.



Technical Considerations

- Always use anti-seize compound on screws.
- Change insert screw every 10 inserts.
- Use the shortest-length tool holder (end mill holder) for maximum rigidity; the shank of the cutting tool should be up inside the machine spindle taper whenever possible.
- Thoroughly clean pocket and screw at each insert change.
- Use tool holders appropriate for roughing operations: end mill holders and power chucks *are* recommended; collets *are not* recommended.

Safety

Modern metal cutting techniques involve the potential use of very high operating parameters (speeds, feeds, depths of cut, etc.). This creates the potential for flying chips and debris, and can also create tool breakage due to a variety of causes. As such, any metal cutting operation should be executed in a completely enclosed (shielded) environment to protect against injury from flying objects. Dapra does not assume responsibility for any loss, damage or expense incurred in any use or handling of our products after purchase.

Grinding produces hazardous dust. To avoid adverse health effects, use adequate ventilation and read material safety data sheet first.

Troubleshooting

Concern	Possible Cause	Solutions
Insert wear appears high (flank wear)	-Not enough chip load -Surface footage is high -Incorrect grade or coating	-Verify correct speed and feed -Increase feed rate -Decrease RPM -Increase DOC -Use harder grade
Insert chipping	-Surface footage is low -Incorrect grade or coating -Using dished insert incorrectly -Feed too high	-Verify correct speed and feed -Increase spindle speed -Decrease feed rate -Decrease DOC -Use T-Land insert -Use tougher grade

Concern	Possible Cause	Solutions
Built-up edge on insert	-Low surface footage -Light chip load (feed per tooth) -Incorrect coating	-Verify correct speed and feed -Increase cutting speed -Increase feed rate -Select different coating -Use coolant
Poor finish/ chatter	-Cutter hung out too far -Excessive runout -Inadequate tool holding	-Reduce tool gage length -Check tool holder wear -Use high-rigidity tool holder
Tool shank breaks	-Tool pressure too great -Fatigued cutter body	-Decrease DOC -Reduce tool gage length -Decrease feed rate

Feed Rate Compensation (Round Inserts)

After determining the desired chip thickness (FPT – see chart on back cover), find the insert diameter and Depth of Cut intersection in the chart at right. Multiply the desired chip thickness by the factor shown in the chart. This will be the Adjusted Feed per Tooth (AFPT), resulting in a true chip thickness of the desired amount.

Example:

If using a 1" Toroid end mill with the 1/2" inserts @ .03" Depth of Cut (DOC), the factor for the chip thickness = **2.1**.

So, if a chip thickness of .005" is desired, a feed rate of .0105" (.005 x 2.1) needs to be programmed into the machine tool.

or

Adjusted Feed per Tooth (AFPT) = chip thickness x chip thinning factor (from chart)

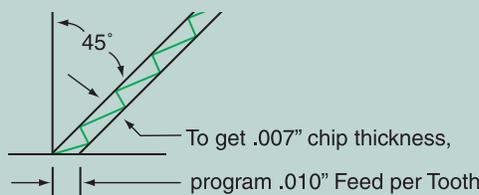
Depth of Cut (DOC)	Insert Diameter			
	3/8"	1/2"	5/8"	3/4"
0.005	4.4	5	5.6	6.1
0.010	3.1	3.6	4	4.4
0.015	2.6	2.9	3.3	3.6
0.020	2.2	2.6	2.8	3.1
0.025	2	2.3	2.6	2.8
0.030	1.8	2.1	2.3	2.6
0.035	1.7	2	2.2	2.4
0.040	1.6	1.8	2	2.2
0.050	1.5	1.7	1.8	2
0.060	1.4	1.5	1.7	1.8
0.075	1.3	1.4	1.5	1.7
0.085	1.2	1.3	1.5	1.6
0.100	1.1	1.3	1.4	1.5
0.125	1.1	1.2	1.3	1.3
0.150	NR	1.1	1.2	1.3
0.180	NR	NR	1.1	1.2
0.200	NR	NR	NR	1.1
>0.20	NR	NR	NR	NR

Compensation for 45° Lead Angle (Octagonal Inserts)

For all Depths of Cut:

Multiply desired chip thickness by 1.4 for Adjusted (programmed) Feed per Tooth (AFPT).

Example: For .007" chip thickness, feed @ .010" (.007 x 1.4 = .010)



Hole Diameter Calculation

Shell Mill Part Number	Minimum Hole Dia.	Maximum Hole Dia.*
TRSM200-075-R4-4C	3.25"	4.00"
TRSM200-075-R4-5C	3.25"	4.00"
TRSM200-075-R5-3C	3.06"	4.00"
TRSM250-100-R5-4C	4.06"	5.00"
TRSM250-100-R4-6C	4.25"	5.00"
TRSM300-100-R4-6C	5.25"	6.00"
TRSM300-100-R5-5C	5.06"	6.00"
TRSM400-150-R4-7	7.25"	8.00"
TRSM400-150-R5-6	7.06"	8.00"

Formulas:

Minimum Hole Dia.:

(Tool Dia. x 2) - (1.5 x Insert Dia.)

Maximum Hole Dia.*:

Tool Dia. x 2

** Not generally recommended. At this diameter, the center tip is at its maximum. It is suggested that you stay slightly under this number.*

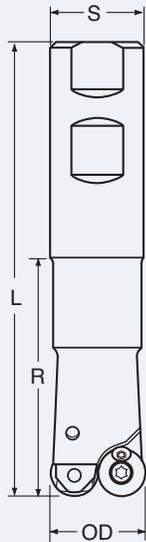
Helical Interpolation for Larger Diameter Hole Making



Larger diameter hole making can be quick and easy when a Toroid Cutter is used in combination with helical interpolation. This technique resembles thread milling in that all three axes (X, Y and Z) are in motion simultaneously. It differs from thread milling in that the tool is introduced into the material without a start hole of any kind. The tool simply is positioned at the inside diameter of the hole

to begin its helix from there, achieving complete material removal from the hole by ramping down to the final depth. This smooth operation tends to avoid the high horsepower consumption characteristic of large diameter hole making. And with the high clearance angles of Toroid cutting tools, ramp angles during helical interpolation can be aggressive, without concern for rubbing the bottom of the cutting edge. This quick and easy process offers the added advantage of allowing many different hole sizes to be generated with the same diameter tool. Hole size variation is all in the programming.

For more information on how helical interpolation can improve your manufacturing efficiency, contact your Dapra Applications Specialist.

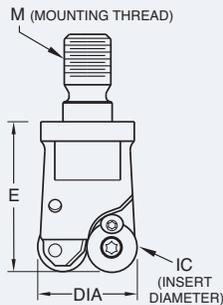


Metric End Mills ("C" designates a thru-coolant tool)

32mm shank dia. cutters and smaller are available in limited supply without Weldon Flats.
Add WOF to the end of the part number when ordering.

OD Diameter	Holder	R Effective Length	L Overall Length	S Shank Dia.	Flutes	Insert
20mm	TREM20-50-R5-2†	50mm	103mm	20mm	2	RDCH10
20mm	TREM20-75-R5-2C-WOF†	75mm	128mm	20mm	2	RDCH10
25mm	TREM25-65-R5-2C-WOF†	65mm	121mm	25mm	2	RDCH10
25mm	TREM25-65-R5-3†	65mm	121mm	25mm	3	RDCH10
25mm	TREM25-115-R5-3†	115mm	171mm	25mm	3	RDCH10
25mm	TREM25-65-R6-2	65mm	121mm	25mm	2	RDCH12
25mm	TREM25-115-R6-2	115mm	171mm	25mm	2	RDCH12
32mm	TREM32-75-R6-2	75mm	133mm	32mm	2	RDCH12
32mm	TREM32-130-R6-2-WOF	130mm	184mm	32mm	2	RDCH12

† Does not come with top clamps.

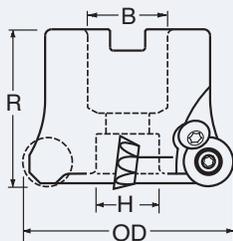


Metric Screw-On Modular Heads

Dia.	Holder	M	E	IC	Flutes	Insert
20mm	TREM20-MOD-R5-2C†	M10	38mm	10mm	2	RDCH10
25mm	TREM25-MOD-R5-2C†	M12	38mm	10mm	2	RDCH10

Modular Extensions also available - see page 13 for available sizes.

† Does not come with top clamps.



Metric Shell Mills

OD Diameter	Holder	R Effective Length	B Arbor Dia.	H Counter Bore Dia.	Flutes	Mounting Screw	Insert
50mm	TRSM50-22-R6-4	38mm	22mm	10.4mm	4	M10	RDCH12
63mm	TRSM63-27-R6-5	50mm	27mm	12.4mm	5	M12	RDCH12



"T" inserts have a reinforced cutting edge for steels, irons and hard milling



"D" inserts have a high-positive cutting edge for stainless steels, high-temperature alloys and gummy materials



● Stocked standard

Metric Inserts

	Insert Diameter	Uncoated		Coated	
		DMK30 DMP25 DMK15	DMK30-HP DMP25-HP DMK15-HP	DMK30-TCI DMP25-TCI DMK15-TCI	DMK30-GLH DMP25-GLH DMK15-GLH
Pressed					
RDCH-10-T	10mm	●	●	○	●
RDCH-10-D	10mm	●	●	○	●
RDCH-12-T	12mm	●	●	○	●
RDCH-12-D	12mm	●	●	○	●

Torque Wrenches

Dapra's new torque system offers users the following benefits:

- Accurate application of torque to insert screws
- No over-tightening, stripping or binding of screws
- Accurate, repeatable insert loading and clamping
- More secure grip and leverage when compared to typical flag-style wrenches
- Two handle styles for user preference



Complete Set Part Numbers		
T10 Straight Handle: TW-SS-10 T-Handle: TW-TS-10	T15 Straight Handle: TW-SS-15 T-Handle: TW-TS-15	T20 Straight Handle: TW-SS-20 T-Handle: TW-TS-20
Individual Pieces		
Torque Driver Handle: Straight Handle – TW-SH-L T-Handle – TW-TH Adapter: TW-AD-10 TORX® Bits: TW-BT-10	Torque Driver Handle: Straight Handle – TW-SH-L T-Handle – TW-TH Adapter: TW-AD-15 TORX® Bits: TW-BT-15	Torque Driver Handle: Straight Handle – TW-SH-L T-Handle – TW-TH Adapter: TW-AD-20 TORX® Bits: TW-BT-20

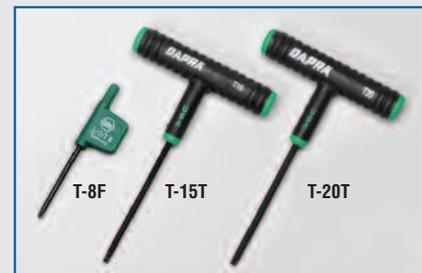
TORX® is a registered trademark of Camcar/Textron.



Spare Parts & Tools

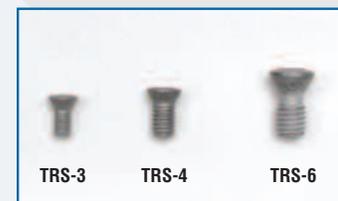
For Inch Product

R3	R4	R5 R6
Insert Screw: TRS-3 Top Clamp Screw: N/A Top Clamps: N/A Wrench: T-8F Torque: 12-15 in-lbs	Clamp Screw: TRS-4CL Insert Screw: TRS-4 Wrench: T-15T Torque: 30-35 in-lbs	Clamp Screw: TRS-5CL Insert Screw: TRS-6 Wrench: T-20T Torque: 40-50 in-lbs



For Metric Product

R5	R6
Insert Screw: TRS-3 Top Clamp Screw: N/A Top Clamps: N/A Wrench: T-8F Torque: 1.5-1.7 nM	Clamp Screw: TRS-4CL Insert Screw: TRS-4 Wrench: T-15T Torque: 3.5-4.0 nM



All listed tools use Anti-Seize Grease ASG-120

New cutter bodies may require additional torque to fully seat the inserts. Once the new cutter's pockets are "broken in," the recommended torque specs in the chart can be followed regularly.

Shock & Wear Resistance	Uncoated (Base Grade)	with Coating	Description	Specifications
TOUGHEST Shock Resistance	DMK30		Moderate wear resistance/high shock resistance. Recommended for interrupted or unstable steel, most stainless steel, high-temperature alloys and cast iron applications.	ANSI C1-C2 ISO K25-K40, M25-M35
		DMK30-HP	High-performance medium-temperature grade. Optimum performance and wear resistance in most soft steels, soft stainless steels and cast irons.	
		DMK30-TCI	High-performance medium- to high-temperature grade. Outstanding shock and wear resistance in steels, irons and stainless steels. Best suited for materials < 44 Rc.	
		DMK30-GLH	Premium high-temperature coating. Best resistance to heat for high-shock applications. Excellent for tough stainless steels, high-temperature alloys and many tool steels.	
MEDIUM Shock and Wear	DMK25†		Micro-grain carbide providing higher wear resistance and good shock resistance for applications in tough stainless steels, high-temperature alloys, irons and many tool steels.	ANSI C2-C3 ISO K15-K30, M15-M30
		DMK25-HP	High-performance medium-temperature grade. Optimum performance and wear resistance in most soft steels, soft stainless steels and cast irons.	
		DMK25-GLH	Premium high-temperature coating. Outstanding performance and wear resistance in high-heat applications involving tough stainless steels, high-temperature alloys and many tool steels.	
MEDIUM Shock and Wear	DMP25		High wear resistance/moderate shock resistance. Recommended for most steel and many ductile iron applications.	ANSI C5-C6 ISO P25-P40
		DMP25-HP	High-performance medium-temperature grade. Optimum performance and wear resistance in most soft steels and cast irons.	
		DMP25-TCI	High-performance medium- to high-temperature grade. Outstanding wear resistance in steels and ductile. Best suited for materials < 44 Rc.	
		DMP25-GLH	Premium high-temperature grade. Unbeatable performance and wear resistance in high-heat applications such as higher speed machining in steels (< 44 Rc) and ductile irons.	
HARDEST Wear Resistance	DMK15		Highest wear resistance with reduced shock absorption capabilities. Micro-grain carbide provides excellent edge strength. Suitable for all materials under stable conditions. Optimum cast iron substrate.	ANSI C2-C3 ISO K15-K25, M15-M25
		DMK15-HP	High-performance medium-temperature grade. Optimum performance and wear resistance in most soft steels, soft stainless steels and cast irons.	
		DMK15-TCI	High-performance medium- to high-temperature grade. Great for higher-speed gray iron applications and lighter cuts in steels <52 Rc or ductile iron.	
		DMK15-GLH	Premium high-temperature grade. Unbeatable performance and wear resistance in high-heat applications such as harder steels, tough stainless steels and high-temperature alloys.	

The older "3" coating has been replaced by the new "TCI" grade. "3" is available upon request, but will typically have a 1-2 week delivery time.

The older "7" coating has been replaced by the new "GLH" grade. "7" is available upon request, but will typically have a 1-2 week delivery time.

**DMK30-GLH is a good first choice for most applications.
Additional coatings available on request. Contact Dapra for details.**

† DMK25 substrate is available for RHINO-CARB D and N geometries only.

Recommended Cutting Speeds

Speeds and Feeds for Dapra Toroid Cutters

		1018, 12L14, 1041, 1045	4140, 4150, 4340, H13, P20, A2, D2	4140, 4150, 4340, H13, P20, A2, D2	STAINLESS STEEL – 300, 400 and PH SERIES	STAINLESS STEEL – 300, 400 and PH SERIES	GRAY, MALLEABLE, DUCTILE	6061, 7075	AMPCO, WEARITE	INCONEL, WASPALOY, MONEL	
		LOW-TO-MEDIUM CARBON STEELS	TOOL STEELS, HIGH-ALLOY STEELS (SOFT)	TOOL STEELS, HIGH-ALLOY STEELS (HARDENED)	DRY MACHINING	WITH COOLANT	CAST IRONS	ALUMINUM ALLOYS	COPPER ALLOYS	HIGH-TEMP. ALLOYS/TITANIUM	PLASTICS, NON-FERROUS
TOUGHEST Shock Resistance	▲ LOWER TEMPS	DMK30	225-340	190-300	115-225	95-190	300-450	1000+	200-600	50-150 ROUGHING	1000+
	▼ HIGHER TEMPS	DMK30-HP	375-600	300-525	375-600	190-375	500-800		400-1200		1000+
		DMK30-TCI	350-550	300-500	250-500	250-450	350-600		300-800	50-200	
		DMK30-GLH	525-750	375-675	450-825	225-600	600-1200			50-250 ROUGHING	1000+
MEDIUM Shock & Wear	▲ LOWER TEMPS	DMK25 [†]	340-600	280-525	190-300	105-210	350-550			55-165	
	▼ HIGHER TEMPS	DMK25-HP	450-750	375-675	375-675	205-415	500-765				
		DMK25-GLH	600-1200	450-900	145-395	450-900	250-660	500-1100		60-250	
MEDIUM Shock & Wear	▲ LOWER TEMPS	DMP25	340-600	280-525			350-550 DUCTILE	1000+	200-600		1000+
	▼ HIGHER TEMPS	DMP25-HP	450-750	375-675			500-765 DUCTILE			50-150 FINISHING	1000+
		DMP25-TCI	400-700	350-600			300-650 DUCTILE				
		DMP25-GLH	600-1200	450-900	145-395		500-1100 DUCTILE			50-250 FINISHING	1000+
HARDEST Wear Resistance	▲ LOWER TEMPS	DMK15			190-300	95-190 FINISHING	350-600 GRAY	1000+	200-600	50-150 FINISHING	1000+
	▼ HIGHER TEMPS	DMK15-HP	450-750	375-675	375-675	190-375 FINISHING	600-765 GRAY		400-800	50-250 FINISHING	1000+
		DMK15-TCI	500-800	450-750	<52 Rc 250-450	300-600	250-650	300-750 GRAY		400-850	50-200
		DMK15-GLH	600-1200	450-900	170-450	450-900	225-600 FINISHING	800-1100 GRAY		400-1200	75-350 FINISHING
1 st CHOICE GEOMETRY		N/D	N/T	T	D/N	D/N	T/N	D (Ground)	D/N	D/N	D (Ground)
RECOMMENDED IPT		.006-.015	.006-.012	.003-.008	.004-.012	.003-.010	.006-.015	.005-.030	.005-.020	.003-.007	.005-.030

** Best choice for material shown in bold text.

The parameters provided are suggested operating parameters. Actual speeds and feeds will depend on many variables, such as rigidity, workpiece hardness, tool extension, machine accuracy, Depth of Cut, etc. Start at the middle of the SFM range and the low end of the FPT range. Next, increase FPT to optimize productivity and tool life. Higher SFM will provide higher output but may reduce tool life. Try different combinations to find the parameters that best suit your needs.

- The -HP and -TCI coatings are best suited for low to medium operating speeds (temperatures) and softer materials.
- The -GLH coatings are best suited for high operating speeds (temperatures) and harder materials.

† DMK25 substrate is available for RHINO-CARB D and N geometries only.



Dapra Toroid products are made in the USA.

DAPRA CORPORATION

Bringing Better Ideas to the Cutting Edge™

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