NEW

new products

Ingersoll MAX line

SMAX™

18MM INSERT FACE MILL

MATERIAL
Cast Iron, Stainless Steel, Carbon Steel, Hi-Temp Alloys, Titanium, Inconel

DIAMETER RANGE
3.00" - 12.00"

LEAD ANGLES
0° and 45°

CUTTING EDGES PER INSERT
4

INSERT GRADES
IN2015, IN2040, IN2005, IN1530

INSERT CORNER CONFIGURATIONS
.031R, .062R, .125" x 45°

EFFECTIVE GEOMETRY
Positive Radial/Positive Axial

FEATURES AND BENEFITS:

The new SMAX face mill line featuring the DPM434R (18 MM long) insert series is now available in both 0° and 45° lead angle versions. The 0° lead angle face mills generate true square shoulders to allow shoulder cutting and multiple Z-Axis depth milling passes. The 45° lead angle provides the necessary chip thinning, heat dissipation, and "softened" work piece entry to allow for higher chip loads and feedrates. The effective diameter range for both lead angles is from 3.00" – 12.00". Both lead angle series also bring the 18 MM SMAX insert family to the market for the first time. The insert part number series for these face mills is DPM434R... The insert dimensionally is .709" long X .300" thick, so it is well suited for heavy duty milling applications. The inserts for this family of cutters have positive geometry rake faces specifically developed to enhance chip formation and improve overall efficiency. Precision ground wiper flats on each of the inserts also provides the potential for superior surface finishes and dimensional repeatability. All of the 18 MM long inserts are used with an M5 thread insert screw to further add to the durability of the cutter family.

Both cutter families are intended for roughing and one-cut applications. Standard cutters are available for RH spindle rotation.

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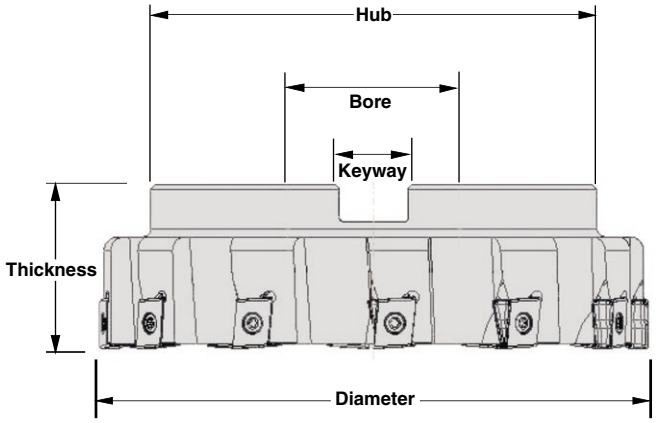
0° Lead Angle Face Mill



STANDARD INSERTS

DPM434R001 (.031R)
DPM434R002 (.062R)

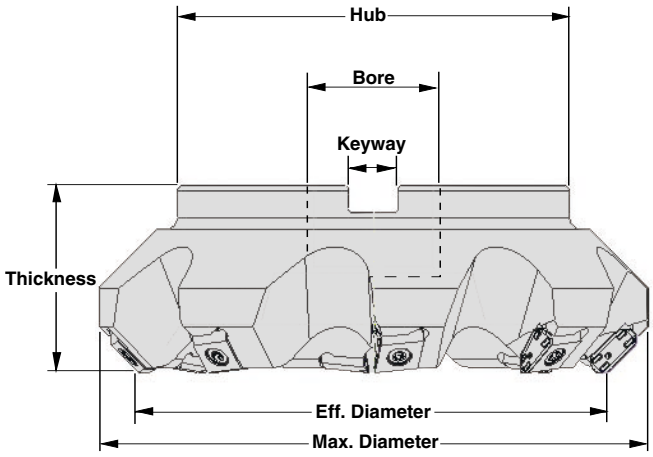
MAX. AXIAL DOC

.680"

Dia	Thickness	Part #	# of Effective Inserts	Bore Dia	K'way Width	Hub Dia	Bolt Circle Dia	Weight (Lbs)
3.000"	2.375"	SJ6N-03R01	5	1.000"	.37"	2.75"	NA	2.8
4.000"	2.375"	SJ6N-04R01	6	1.500"	.63"	3.81"	NA	4.5
6.000"	2.375"	SJ6N-06R01	10	1.500"	.63"	5.00"	NA	9.5
8.000"	2.375"	SJ6N-08R01	12	2.500"	1.00"	6.50"	4.00	14.5
10.000"	2.375"	SJ6N-10R01	14	2.500"	1.00"	8.50"	4.00" / 7.00"	24.0
12.000"	2.375"	SJ6N-12R01	16	2.500"	1.00"	10.50"	4.00" / 7.00"	37.0

The combination of true 0° lead angle and a wiper flat combined on the same insert design is a relatively new feature for Ingersoll's Maxline family of face mills. The only other standard product line that combines these two features today in the Maxline family is the long edged VMAX inserts (NNE324R/L109). Due to their size, these VMAX inserts are not capable of the same axial depth of cut and feedrate as the new 18 MM SMAX inserts. Traditionally, this combination of true 0° lead angle combined with wiper flats has been featured in the Hi-Positive insert lines of Ingersoll and our competition. The new 4 edged 18 MM SMAX insert will allow our Maxline product to offer an alternative for shoulder milling applications where large 2 index Hi-Positive inserts have historically been used.

45° Lead Angle Face Mill



STANDARD INSERTS

DPM434R045 (.125" x 45°)

MAX. AXIAL DOC

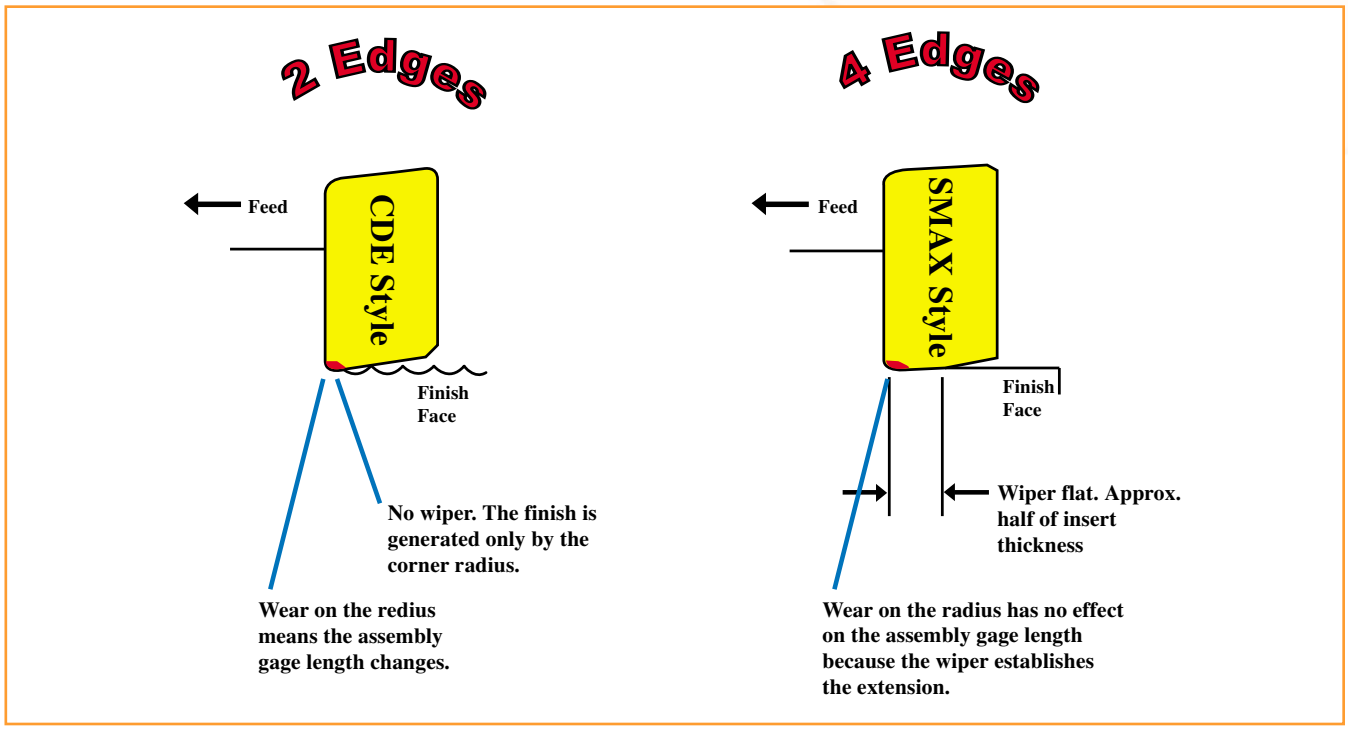
.350"

Eff. Dia	Max. Dia	Thickness	Part #	# of Effective Inserts	Bore Dia	K'way Width	Hub Dia	Bolt Circle Dia	Weight (Lbs)
3.000"	4.00"	2.375"	SN6N-03R01	5	1.000"	.37"	2.75"	NA	4.0
4.000"	5.00"	2.375"	SN6N-04R01	6	1.500"	.63"	3.81"	NA	6.5
6.000"	7.00"	2.375"	SN6N-06R01	8	1.500"	.63"	5.00"	NA	12.0
8.000"	9.00"	2.375"	SN6N-08R01	10	2.500"	1.00"	6.50"	4.00	18.2
10.000"	11.00"	2.375"	SN6N-10R01	12	2.500"	1.00"	8.50"	4.00" / 7.00"	28.5
12.000"	13.00"	2.375"	SN6N-12R01	14	2.500"	1.00"	10.50"	4.00" / 7.00"	42.0

The 45° lead angle face mill provides potential for even higher chip thicknesses than the 0° lead angle series. As with any 45° face mill the effective chip thickness is only 71% (chip thinning) of the calculated chip thickness at the centerline of the tool. The potential for higher feedrates and reduced radial cutting pressures result. Lead angle face mills also improve heat dissipation and reduce the rate of tool wear, both by spreading the work of chip creation along a longer section of carbide when compared to 0° lead face mills at the same axial depth of cut. Another advantage of lead angle face mills is that entering and exiting of the work piece is "softened" because the entire leading edge of the insert does not contact the work piece simultaneously, as the top of the insert enters the cut first.

ADVANTAGES:

The figures below further explain some of the technical advantages of the new SMAX face mill product compared to older Maxline product; as well as much of our competition. For the purposes of this comparison we will compare the new SMAX 18 MM face milling insert to CDE style inserts that Ingersoll Cutting Tools originally developed, and are an industry standard today.



It is clear from the above figures that the wiper flat on the end of the SMAX 18 MM insert is a significant design enhancement for the Maxline product line. This new face mill series allows us to give our customers the combination of "tangential" insert orientation strength, true square shoulders when necessary, and the consistent finishes that result from a ground wiper flat on the inserts.

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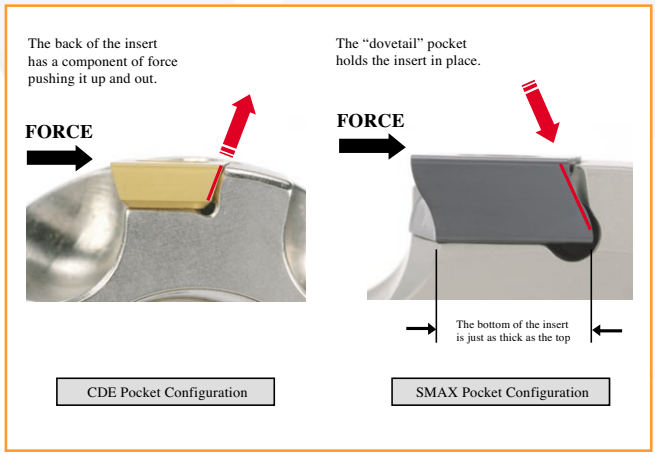
ADVANTAGES, CONT.



As with any indexable face mill designed specifically for heavy duty applications, the ability of the cutter body to adequately locate and hold the inserts in place is of primary concern. The design of the new SMAX insert allows our pocket to trap the insert in the correct location, and in a secure "dovetail" configuration that eliminates some of the holding stress on the insert screw. Most positive geometry inserts in the market today rely on holding the insert in a pocket with obtuse angles between the bottom of the insert and the rake face or flank face, depending on the insert design. A design with obtuse pocket angles allows a percentage of the cutting force on the leading edge of the insert, to be transferred to lifting the back of the insert out of the pocket. Typically, the insert screw has sufficient axial strength to deep the insert in the correct position, but over time the insert screw can become fatigued and may lead to failure. However, when using the SMAX pocket design, the higher the cutting force on the leading edge of the insert, the more force that is translated into holding the back of the insert down and into the locating corner where it belongs. To explain this SMAX pocket feature see the above figures. Also note that when using the SMAX insert design, the bottom of the insert that sits against the pocket is as wide as the top of the insert. This wide insert bottom provides better stability as a larger bearing surface between cutter and insert is achieved. Most positive geometry inserts in the market do not offer this feature, whether "tangential" (like the CDE example shown), or "conventional" (like a positive square SEKT or similar).

Both the 0° and the 45° lead angle cutter bodies feature differential radial spacing between insert pockets. This variable angle allows unequal insert spacing around the circumference of the cutter. The unequal spacing of insert pockets is helpful in dampening harmonic vibrations that can be otherwise present in the milling system.

Metric face mills using the SMAX 18 MM will also be available from our Ingersoll Germany division in the first half of 2005; for applications where metric diameters or adaptions are necessary.

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COMPETITIVE INFORMATION:

There is significant competition for rough milling and one-cut applications. This type of face milling has been a strength for Ingersoll since the first tangential insert designs were used decades ago. Below is a table, divided by lead angle, showing some of our competitors' cutter series. The table identifies only clear advantages the SMAX product family has over each competitor cutter and does not include an "X" where performance levels are similar and would typically be proven through customer testing.

Ingersoll Major Advantages 0° Lead Angle

Competitor Cutter Series	Higher Chip Loads	Reduced Cost/Edge	Size of Wiper Flat	Less H.P. Used	Depth of Cut
Sandvik Coromill 290 (Screw on Quad)	X		X		X
Iscar F90SD (Screw on Quad)	X		X	X	X
Iscar F90AX (Screw on 20mm HiPos)		X	X		
Walter Xtra-Tec (Screw on Quad or 4 Edge HiPos Style)	X	X	X		X
Valenite Val-U-Mill or Valenite Val-U-Edge (Wedge held Quad)	X		X	X	X
Seco Carboloy 220.30 (Wedge held Quad)	X		X	X	X
Kennametal MCF (Wedge held Quad)	X		X	X	X
Kennametal SSM (Screw on Quad)	X		X	X	X

Ingersoll Major Advantages 45° Lead Angle

Competitor Cutter Series	Higher Chip Loads	Reduced Cost/Edge	Size of Wiper Flat	Less H.P. Used	Depth of Cut
Sandvik Coromill 245 (Screw on Quad)	X		X		X
Sandvik Coromill 260 (Wedge held Quad)	X		X	X	
Seco Carboloy 220.43 (Wedge held Octo)	X		X		X
Seco Carboloy 220.60 (Wedge held Quad)		X	X	X	
Kennametal KSS (Screw on Quad)	X		X		X
Iscar F45AX (Screw held Quad)	X		X		X
Iscar F45AX (Screw held 20mm HiPos)		X	X		
Walter Xtra-Tec (Screw held Quad)	X	X	X		X

In general, the primary performance advantages of the 18 MM SMAX face mill family is the size of the insert (large depths of cut), the surface finishes than can be created, and the free cutting molded rake face of the insert to reduce power comsumption. Use these advantages to your benefit when promoting the SMAX family over our competition, and use the size and strength of the inserts to over power the feedrate capabilities of our competitors smaller inserts when testing on the customers' spindle.

Carbide Grade Information:

The introduction of the 18 MM SMAX face mill line will include four standard insert grades. Grades IN2015, IN2040, IN1530 and IN2005 will be the grade options for standard face mill inserts. The intended applications are as follows: (Also refer to the Maxline catalog)

IN2015: Grey, Ductile, and Nodular Irons.
IN2040: Carbon Steels with good work piece rigidity. Dry only.
IN2005: Hi-Temp Alloys and Inconel
IN1530: Stainless Steel, Titanium, Carbon Steels with poor work piece rigidity. Wet or dry.

Hardware and Components:

All of the standard 18 MM SMAX inserts for the 0° and 45° lead angle face mills use insert screw SE03-70. This insert screw features a strong M5 thread and is tightened with a Torx-20 driver. Spare screwdrivers are available, and can be ordered as part number DS-0034. The insert screws should be torqued to 35-40 inch/lbs. There is no other hardware to replace or maintain in the standard face mills.

Maintenance:

Maintenance of this face mill family is similar to any indexable face mill design. The fixed pocket design and tangential style of insert screw location minimize the necessary spare part inventory and related maintenance.

For repeatable performance, the cutter pockets should be wiped clean during indexing, and the insert screws periodically replaced. Accurate projections of insert screw life are difficult to state, as insert screw life is dependent on consistently applying the recommended torque when indexing, as well as the degree of abuse that the milling system encounters during operation.

Feedback:

Please contact the Maxline product management group with any comments or questions regarding this product line.

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Operating Parameters:

The suggested operating parameters see the table below. The parameters are suggested starting ranges; and the optimum spindle RPM and feedrate will be dependent on the actual milling system rigidity, type of coolant used, depths of cut, etc. Remember to consider radial chip thinning when applying feedrates to the 45º lead face mills. Chip thinning will be compounded when considering applications with low percentages of radial engagement coupled with the 71% thinning factor of the 45º lead angle cutter series. Use these thinning factors to your advantage when feedrates of previously applied tooling have not been properly adjusted.

As with most Maxline cutter designs, the 18MM SMAX face mills have not been designed for helical interpolation or ramping applications. A constant "Z plane" circular interpolation is acceptable.

Material	*Description*	*Brinell Hardness*	*Cutting Speed (SFM)*	*Feed per Insert*	*IN2015 ****	*IN2040 ****	*IN2005 ****	*IN1530 ****	*Coolant*
Cast Irons	Gray	140-190	400-750	.007-.020	1		2		No
	Ductile and Nodular	160-270	300-650	.005-.016					
Steels	Low Carbon 1018, 8620	150-250	250-500	.006-.015		1	2	3	No
	High Carbon F-6180, Nitralloy 52100	250-400	200-350	.006-.013					
	Alloyed Steel 4140, 4340	150-300	240-400	.006-.015					
	Tool Steel A-6, D-1, D-2, P-20	Up to 300							
Stainless Steels	300 Series	-	250-400	.005-.010			2	1	Yes
	400 Series	-	300-600						
	13-8 PH	-	200-250	.006-.012					
Nickel Alloys	Inconel 718, Hastelloy, Waspalloy	-	75-125	.004-.007			1	2	Yes
Titanium	6Al-4V	-	100-150	.004-.007			1	2	Yes

*** In order of preference.

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Literature:

For printed literature regarding the 18 MM SMAX face mill family please see the Maxline product catalog. Cutter specifications, insert grade recommendations, insert screw torque, suggested feeds and speeds, and product worksheets for specials can all be found in this catalog.

Pricing:

US and Canadian list pricing is loaded for cutters and inserts. Please note that each of the standard inserts are priced the same so you may test different grades or corner configurations without concern of changing the insert pricing.

Modified Standards & Specials:

We are anticipating high quantities of modified standard and special cutters to be quoted and manufactured using the 18 MM SMAX inserts. The product worksheets located in the back of the Maxline catalog have been included in that literature for the purposes of making things easier in communicating the necessary design parameters to our quotation department.

Modified standards and specials using the 18 MM SMAX insert should be no smaller than 3.00" in diameter. To qualify as a modified standard, the cutter requested shall be no larger than 14.000" in diameter. Modified standards will also be fixed pocket face mills only. The diameter tolerance will be +/- .010" and the overall extension length tolerance will be +/- .005". Some adjustments to these modified standard rules may be allowed, for example, a cutter with extension length tolerance +/- .003" is possible but the feature will carry additional delivery lead time and pricing adders that will be determined by the quotation department. The expected lead time for modified standard face mills below 5.00" in diameter should be 6 weeks. The expected lead time for modified standard face mills at 5.00"diameter and above should be 8 weeks. Approval drawings will add one week to the expected delivery.

Not only are modified standard and special face mills available for quotation, but special inserts may also be quoted. We have the ability to grind radii or chamfers ranging from .031" to .125" on the 18 MM face mill inserts without effecting the number of insert indexes. The wiper flat on the end of the insert also allows the effective length of the tool to remain constant throughout the entire corner radius range of the insert.

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