Ingersoll MAX line Announces...

SMAX™ Finish Face Mills


***CUTTER SERIES NUMBERS:***
SF6H, 3 and 4 inch sizes. Uses YXM324L001
SF6N, 6 and 8 inch sizes. Uses YXM434L001

***MATERIALS:***
Gray Cast, Ductile and Nodular Irons;
Low, Medium Carbon and Alloyed Steels;
Hi-Temp Nickel Alloys; Titanium; Aluminum;
Stainless Steels and Tool Steels

***DIAMETER RANGE:***
3.00 to 8.00 inches

***DEPTH OF CUT RANGE:***
.003 to .005 (.010 maximum)

***ADAPTIONS:***
Radial Drive (right handed)

***CUTTING EDGES PER INSERT:***
4 in the same cutter body

***INSERT GRADES:***
IN1505, IN1540, IN1510 - (listed from tougher, to progressively harder)

***INSERT CORNER RADII:***
.031 with large elliptical grind on the cutting edge

***GEOMETRY:***
Positive Radial / Positive Axial

## FEATURES & BENEFITS:

Ingersoll announces its latest line of “Tangential Tooling” in the form of finish face mills. These S-MAX Finish Face Mills are designed to do finish cuts only and many times can eliminate subsequent grinding operations. The surface should be pre-machined with another face mill before using the S-MAX Finishing Face Mill. This assures the Depth of Cut (DOC) is consistent and controlled.

Surface finishes below 32 microinches are easily obtained. Finishes into the single digits are obtainable also if extra care is taken. The feature that allows us to achieve this finish is the precision elliptical grind on the rake face of the insert. Inserts and cutters are manufactured to a very tight tolerance thickness to drastically reduce face run out. Inserts are available exclusively from Ingersoll.

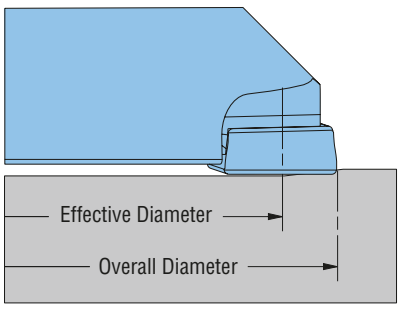
These finish mills are similar to our older line 7F2K tools, however they incorporate the new S-MAX technology to make the most of your machines.

## ADVANTAGES:

This cutter is able to eliminate the need for grinding operations in many cases. Surface finishes of 32 microinches or less are very achievable. The insert has a parallelogram as compared to the former rectangular design. This allows closer cutting to a shoulder when this type of feature exists on the work piece. It is also more positive radially to make the cut more cleanly than before. The highest point of the insert is at the center of the insert. The drop from the highest point of the insert to the lower point on the face of the insert is .0003 inches on both the large and small insert. This acts like an extremely shallow lead angle and allows you to take up to .080 advances per tooth per revolution. The chip load you finally achieve is ultimately a function on what you are trying to achieve for surface finish and flatness.

The OVERALL DIAMETER is .49" larger on the YXM324 inserts and .70" larger on the YXM434 inserts when compared to the effective finishing diameter. This difference is smaller than the older 7F2K series tools.

Surface finish is measured in many ways, either by comparison “scratch pad” specimen standards for rougher finishes, or by profilometers used to measure finely machined surfaces. Surface finishes can be described in terms of Ra, Rq and others, but these are simply different methods used to measure the deviation of the actual surface from the nominal surface. The deviation can be measured in terms of microinches or micrometers. It is important to know which one you are using. Microinches are one millionth of an inch (.000 001 inch) and micrometers are one millionth of a meter (.000 001 meter). Another term for micrometers is microns. One microinch = .0254 micrometer. Profilometers do not measure flatness, they simply look for surface irregularities as compared to the nominal surface. Flatness can be measured with a CMM or a dial indicator once a plane of reference is established.



The nominal "finish" diameter is measured to the center of the insert.

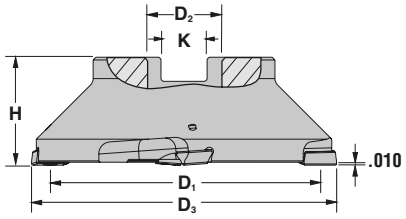
| Microinches | Micrometers |
|---|---|
| 125 | 3.2 |
| 63 | 1.6 |
| 32 | .80 |
| 16 | .40 |
| 8 | .20 |
| 6 | .15 |
| 4 | .10 |

Common Microinch to Micrometer (micron) Comparisons

# FINISHING FACE MILL SERIES SF6H, SF6N

| Diameters | Max. Depth of Cut | Insert Corner |
|---|---|---|
| 3.000" to 8.000" | .01" (.003-.005" Recommended) | .031"R |

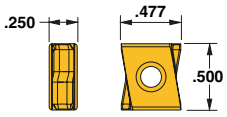
Facing



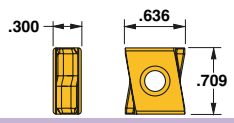

| $D_1$ Effective Diameter | Cutter Number | Item Number (EDP #) | Number of Inserts | H Height | $D_2$ Bore Diameter | $D_3$ Overall Diameter | Bolt Circle | Retention Bolt | K Keyway |
|---|---|---|---|---|---|---|---|---|---|
| 3.000 | **SF6H-03R01** | 3024666 | 3 | 1.750 | 1.250 | 3.49 | - | SD-10-47 | .50 |
| 4.000 | **SF6H-04R01** | 3024667 | 3 | 1.750 | 1.250 | 4.49 | - | SD-10-47 | .50 |
| 6.000 | **SF6N-06R01** | 3024668 | 4 | 2.375 | 2.500 | 6.70 | - | SD-12-01 | 1.00 |
| 8.000 | **SF6N-08R01** | 3024669 | 6 | 2.375 | 2.500 | 8.70 | 4.00 | - | 1.00 |

## INSERTS

YXM324L001




YXM434L001




| Cutter Series | Insert Number | Application | Corner | Grades IN | 1505 | 1540 | 1510 |
|---|---|---|---|---|---|---|---|
| SF6H Series | **YXM324L001** | Finishing | .031R | ■ | ■ | ■ | |
| SF6N Series | **YXM434L001** | Finishing | .031R | ■ | ■ | ■ | |

## HARDWARE

| Cutter Series | Insert Screw | | Driver |
|---|---|---|---|
| | Part No. | Torque | Part No. |
| SF6H | SM40-120-20 | 30-35 in. lbs. | DS-T15T (Tx-15) |
| SF6N | SM50-160-10 | 35-40 in. lbs. | DS-T20T (Tx-20) |

## CARBIDE INSERTS:

There are TWO different sizes of STOCK carbide inserts used in the Ingersoll S-MAX Finish Face Mills.
The larger insert is the YXM434 size which is 18mm (.708") long, fitting into the SF6N series.
The smaller insert is the YXM324 size which is 10.50 mm (.400") long, fitting into the SN6H series.

IN1505: Alloyed, Low and Med Carbon, and Tool Steels, Titanium, Hi-Temp Nickel Alloys, Stainless Steels, Aluminum
IN1540: Alloyed, Low and Med Carbon, and Tool Steels, Stainless Steels
IN1510: Gray Cast, Ductile and Nodular Irons, Aluminum

## CUTTER BODIES & HARDWARE:

There are no pins in this design, or other hardware items to be concerned with, other than the insert screws. There are two different types of screws used in the face mills. The smaller YXM324 insert uses SM40-120-20 (DS-T20T) screws and a T15 Torx bit driver Tx-15 (DS-T15T). These screws should be tightened to 30-35 inch pounds. The larger YXM434 insert uses SM50-160-10 (SE03-70) screws and a T20 Torx bit driver Tx-20 (DS-0034). Screws should be tightened to 35-40 inch pounds.

## OPERATING GUIDELINES:

For this group of cutters, the speed can be higher than you are accustom to for a given material. Generally, a higher speed will yield a shinier, more reflective finish. A slower speed will give a more brushed finish. Although you may be able to accomplish single digit micro-inch finishes with a fully loaded cutter, if an extremely good finish is required, one option you could try is to fly cut. This method uses only one insert in the cutter and thus reduces runout to zero. Also, if there are issues with steps between passes at the same Z depth, a fly cut will reduce the pressures to a minimum. This problem may be more noticeable when the material is softer, and is a function of a machine tool which may be deflecting more than it should. Lighter feed rates generally leave better finishes, but not loading up the cutter properly will create drag and rubbing as opposed to clean cutting. If there is a difference between the larger and smaller inserts, the larger one could a get better finish because it thins the chip over a longer distance, but may result in higher axial pressure.

Coolant may help you get a better finish by providing lubricity to the operation. It is not necessarily recommended in terms of tool life gains, however in trying to gain improved surface finishes, you may find a situation where it gains you just enough improvement to keep this cutter on the spindle.

The following guidelines are correct, but updated from those on page M493 in the Super Catalog. The original guidelines were printed incorrectly.

| Series SF6H, SF6N | | | | | Grades | | | |
|---|---|---|---|---|---|---|---|---|
| Material | | Brinell Hardness | SFM | Feed per Insert | IN1505 | IN1510 | IN1540 | Coolant |
| Aluminum | 7075-T6, 6061-T6, 2024 | - | 1000+ | .020-.050 | 1 | 2 | | Yes |
| Cast Iron | Gray | 150-250 | 1000-1500 | .010-.050 | | 1 | | No |
| | Nodular | | | | | | | |
| Steel | Low Carbon 1018, 8620 | 100-250 | 800-1200 | .010-.050 | 2 | | 1 | Yes |
| | High Carbon F-6180 | 250-400 | 500-800 | | | | | |
| | Alloyed Steel 4140, 4340 | 150-300 | 600-1000 | | | | | |
| | Tool Steel A-6, D-1, D-2 | Up to 300 | | | | | | |
| Stainless Steel | 300 Series, 304, 316 | - | 400-600 | .010-.050 | 1 | | 2 | Yes |
| | 400 Series, 15-5 PH | Up to 320 | 500-800 | | | | | |
| | 13-8 PH | - | 400-600 | | | | | |
| Nickel Alloys | Inconel 600, 706, 718, 903, Hastelloy, Waspalloy | - | 75-150 | .010-.030 | 1 | | | Yes |
| Titanium | 6AL-4V | - | 100-200 | .010-.030 | 1 | | | Yes |

*Preferred for higher SFM.

## MAINTENANCE:

Maintenance is very similar to any indexable milling cutter. Cleanliness is essential to proper function and seating of the insert in the cutter pocket. Wiping, brushing, or compressed air blasts are all proven methods of cleaning the inserts and cutter pockets. Indexing a cutter in a well lit area also helps identify any foreign materials which might interfere with the fit between the insert and the cutter. Using a .001" feeler shim stock between the seating surfaces of the carbide and steel body, help to reassure the user of a properly seated insert.

Insert screws should be replaced periodically. The exact timing depends on what type of cutting is done and how well the screws are consistently torqued during insert indexing. If the countersink under the heads looks worn and smeared, and the screw seems to have less holding power than a new screw, it should be replaced.

## LITERATURE:

SMAX Finishing Face mills are listed in the SuperCatalog on page M260 and M261.
The catalog pages in this announcement are updated with correct information and supercede the data in the SuperCatalog.

## PRICING:

Please refer to GAL system or "Ask Margaret" for individual component prices.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