Face Mill Recommendations

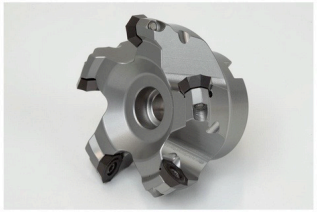
– one user's experience and recommendations

I have been consistently recommending Haas face mills recently. Over the past year, I have purchased five different versions for testing of both their shell/face mill cutters and the inserts that go with them.

I must admit that a year ago, I was a bit skeptical about Haas entering the "razor blade" end of the machining market. But my reservations thus far have been unfounded. The Haas face mills have turned out to be excellent performers and are terrific values.

But to me, perhaps the best contribution Hass is making with their entry into tooling is the clear and transparent articulation about which indexable insert to use with which material. Their inserts may be proprietary, but they are reasonably priced, and not cloaked in "manufacture's grading" obfuscation. "This is for aluminum; this is for hard alloy steels" etc. provides enormous clarity for those of us who are not full-time tooling engineers. While a bit unorthodox in the context of insert naming nomenclature, the Haas approach sure beats trying to decode "VNMG 32.51.5 IC807". Haas has retained some of the industry ISO conventions in their descriptors of their inserts, such as material suitability and toughness-versus-hardness attributes but has done away with the largely misunderstood and complex "manufacturer's grade" alphabet soup. I'll come back to the insert designations a bit further on.

Haas now offers eight different face mill types which can all be seen at **this link**. Four of these cutters are potentially appropriate for manual machining equipment, while four others are clearly oriented to high-speed CNC milling centers. Shown below are the four types most suited for manual milling. The differences between them are all related to the shape and geometry of the insert, and whether the insert is oriented with a positive or negative rake when cutting the material. And of these four, the two that I favor are those with a positive rake insert mounting. Specifically, the "HOP" and the "HRNP". Either of those two face mills are suitable for cutting all metal types from aluminum to alloy steels when outfitted with the correct insert. The other two face mills with negative radial-rake geometry are optimized for aggressive ferrous metal machining exclusively, and are unlikely to perform well on softer metals such as brass, bronze, aluminum, etc.

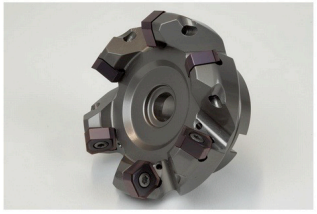


HOP – Haas Octagon Positive

Toolpath Type: Face Milling

45-degree cutting edge | D.O.C. max. .137"
- Positive radial rake, positive axial rake
- 45-degree cutting edge
- Diameter sizes 2.0" 2.5", 3.0", and 4.0"
- For steel, stainless steel, cast iron, and non-ferrous metals
- Inserts have 8 cutting edges
- Screw clamping
- Max depth of cut is .137"

Materials:	Grades
K - Cast Iron	HP30
M - Stainless Steel	HMP20
N - Aluminum*	HN25
P - Steel	HMP35
	HK25



HSNP – Haas Square Negative Positive

Toolpath Type: Face Milling

45-degree cutting edge | D.O.C. max. .271"
- Negative radial rake, positive axial rake
- Diameter sizes 2.0", 2.5", 3.0", and 4.0"
- For steel, stainless steel, and cast iron
- Double-sided, extra-thick insert with 8 cutting edges
- Large rake angle reduces cutting forces.
- More stability for larger cut depths.
- Wiper insert geometry for good surface quality.

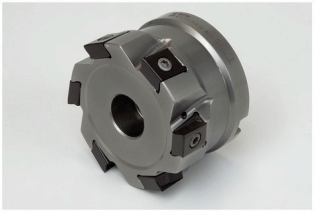
Materials:	Grades
K - Cast Iron	HP30
M - Stainless Steel	HMP20
P - Steel	HMP35
	HK25

HRNP – Haas Rectangle Negative Positive

Toolpath Type: Face Milling, Shoulder Milling

90-degree cutting edge | D.O.C. max. .440"
- 90-degree shoulder mill with rectangle insert
- Negative radial rake, positive axial rake
- Diameter sizes 2.5", 3.0", and 4.0"
- For steel, stainless steel, cast iron, and non-ferrous metals
- Double-sided, thicker inserts for high stability and deeper depths of cut

Materials:	Grades
K - Cast Iron	HP30
M - Stainless Steel	HMP20
N - Aluminum*	HN25
P - Steel	HMP35
	HK25



HPP – Haas Positive Positive

Toolpath Type: Shoulder Milling

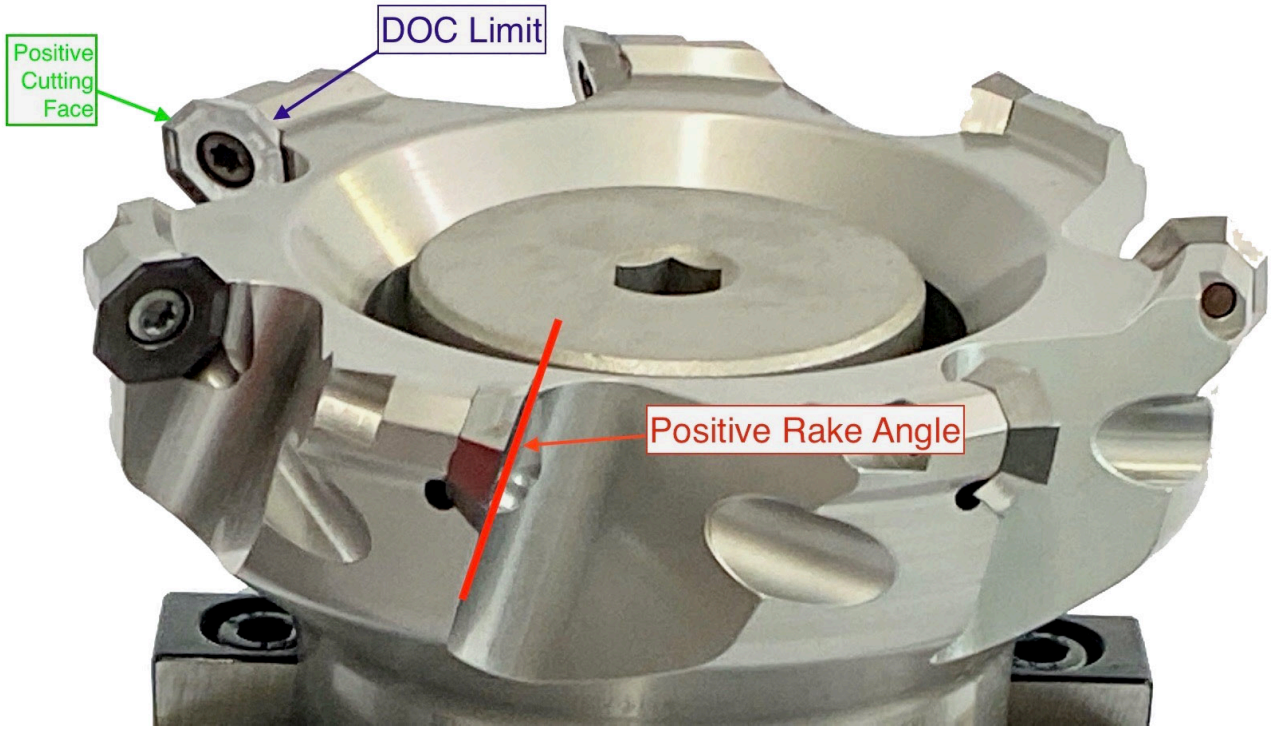
90-degree cutting edge | D.O.C. max. .590"
- 90-degree shoulder mill with tangential inserts
- Positive radial rake, positive axial rake
- Diameter sizes 2.0", 2.5", 3.0" and 4.0"
- Sharp cutting edge geometry, with robust inserts
- First choice for large cutting depths with high feedrates
- Specially designed cutting edge, with high-precision control for high-quality 90- degree square shoulder milling

Materials:	Grades
K - Cast Iron	HP30
M - Stainless Steel	HMP20
P - Steel	HMP35
	HK25

Let's look at the differences between the two types I recommend for manual machining operations.

HOP Style

The HOP style face mill employs an octagon-shaped insert with 8 cutting edges. The insert is single sided, and has a distinct positive rake as shown below. With 8 possible cutting edges, this is perhaps the most economical choice if the cost per insert is the critical factor. However, the depth of cut is limited to 0.137" (3.47mm), and because of the octagon shape of the insert, this face mill will not machine to a square corner – it leaves a 45° chamfer along the un-cut edge of the material.



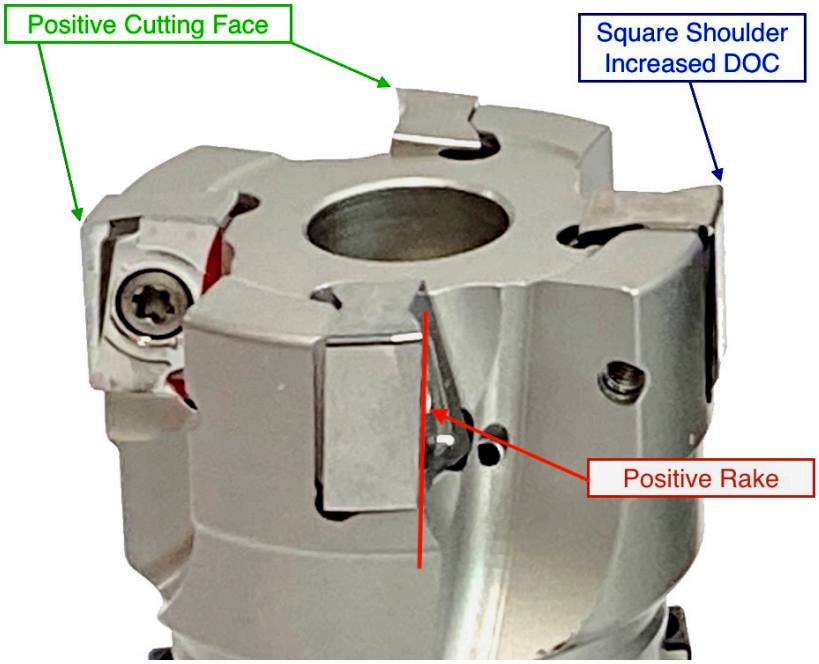
This HOP style face mill is available in four diameters as shown below. I have 4" and 2" versions of this face mill and find the 2" has the most utility due to the size of my XY table travels. You can view a video of the 4" version facing 7075 aluminum at 0.011" DOC at **this link**. All except the 4" version require a custom sized arbor bolt available from Haas (shown with hot-link in the table below).

Face Mill Type	Diameter (inches) with hot-link to Haas web site for purchase	Number of Inserts	Shell Mill Arbor Size (inches)	SOWA R8 Arbor Part Number with hot-link to purchase	Required Arbor Bolt
HOP	**2.00**	5.00	0.75	**534-156**	**06-0310**
HOP	**2.50**	5.00	0.75	**534-156**	**06-0310**
HOP	**3.00**	6.00	1.00	**534-158**	**06-0311**
HOP	**4.00**	7.00	1.50	**534-162**	N/A

This face mill accepts Haas proprietary inserts designated "HOP" sold in packs of 10 inserts. Several grades of inserts are available, each specifically formulated for a particular material as can be seen at **this link**. In my shop, I use the **HN25 grade** for aluminum, and the **HMP20 grade** for ferrous materials. Feeds & Speeds information is **located here**.

The HRNP Style

The HRPN style face mill employs a rectangular-shaped insert with 4 cutting edges. The insert is double-sided, and has a distinct positive rake as shown below. This face mill will machine to a square corner, and the potential depth of cut is significantly greater than the HOP style shown previously. Although the potential depth of cut is specified as 0.571", on typical manual mills like a Bridgeport, the width of cut at those depths will be limited by the rigidity of the machine.



This HRPN style face mill is available in four diameters as shown below. I have three of the 2" sized versions of this face mill, each equipped with different inserts for different materials. At **this link** you can view a video of this cutter machining 1/4" depth of cut into 304 stainless. All except the 4" version require a custom sized arbor bolt available from Haas (shown with hot-link in the table below).

Face Mill Type	Diameter (inches) with hot-link to Haas web site for purchase	Number of Inserts	Shell Mill Arbor Size (inches)	SOWA R8 Arbor Part Number with hot-link to purchase	Required Arbor Bolt
HRPN	**2.00**	4.00	0.75	**534-156**	**06-0310**
HRPN	**2.50**	5.00	0.75	**534-156**	**06-0310**
HRPN	**3.00**	6.00	1.00	**534-158**	**06-0311**
HRPN	**4.00**	8.00	1.50	**534-162**	N/A

This face mill accepts Haas proprietary inserts designated "HRPN" sold in packs of 10 inserts. The insert is similar in geometry to the APKT insert types, but significantly thicker. Several grades of inserts are available, each specifically formulated for a particular material as can be seen at **this link**. In my shop, I use the **HN25 grade** for aluminum, and the **HMP20 grade** for ferrous materials. Feeds & Speeds information is **located here**.

More information on both types and the SOWA recommended R8 arbors can be seen at **this link**.