

H.O.T. PRODUCT MEMO # 037-W

# EXP High Feed Milling Cutters



**Product category:** H.O.T. product

**Application Area:**

Very High Feed rate milling and pocket milling in steels and cast irons.

**Features and Benefits:**

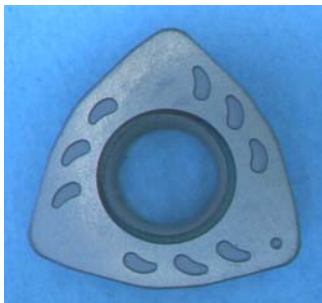
- **FEED RATE.** The EXP cutters are capable of very high feed rates in steels and cast irons . Thus, the major impact that an EXP cutter can have on a customer's operation is by reducing the overall cycle time.
- **Multi-functional.** Because of the design, the EXP cutter can ramp, circular and helically interpolate mill. Providing reduced cycle time. By using a ramping cut there is no lost time as the mill never leaves the cut or by using a ramp feed the user can generate a pocket without having to first drill a starter hole.
- **3 insert styles/4 carbide grades.** No competitor can match Tungaloy in application specific inserts. Along with the std insert we can now offer the –ML breaker for reduced cutting force or the –MH for increased toughness in interrupted applications.

MILLING

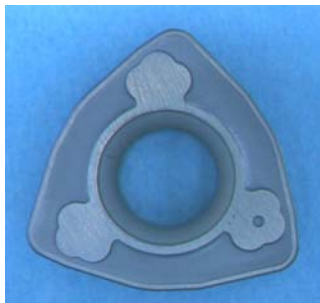
**Product Strengths:**

- **Thick Inserts.** Inserts for the EXP cutter are .250" thick to withstand the high cutting forces developed in high feed milling.
- **Grade Selection**-4 grade choices (AH120/AH140/T3030/T1015) provide opportunity to machine any of the various carbon steels, alloy steels, mold steels and both cast and nodular iron.
- **Short & Long styles**-EXP end mills are offered in two lengths to help maintain reduced tool extensions to ensure maximum cutting tool performance from this milling process. Long style tools are shipped with cylindrical shanks that can be cut to length for maximum versatility during setup.
- **Double Clamping.** We use both an insert screw and a top clamp to position and hold the trigon inserts in their pockets. ISCAR uses only a single screw.
- **Large radius:** The leading edge of the cutter blends to a generous radius that generates the surface of the parts.
- **Size range:** Various end mills, .75"-1.50" & 20mm-40mm end mills allow this kind of technology to be applied to most modern milling machines.
- **Unique insert design:** Vectors forces back into the spindle increasing rigidity and high feed capabilities..

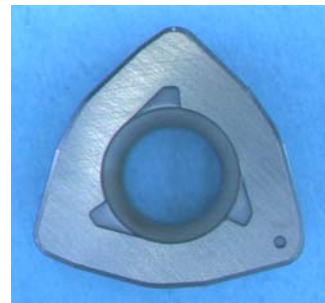
Std



-ML



-MH

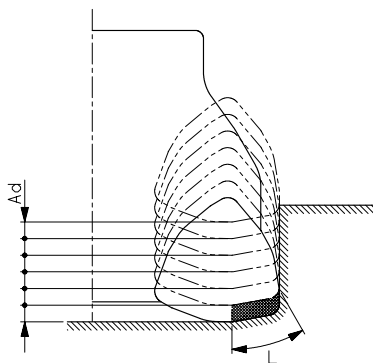


- EXP cutters are competitively priced with conventional end mills but please notice the **cost per feed** information (cutter cost /IPM). By this calculation you can easily see the value of this cutter series. In fact, by removing metal twice as fast as conventional cutters an EXP can pay for itself on the first shift. (See Cost Example)

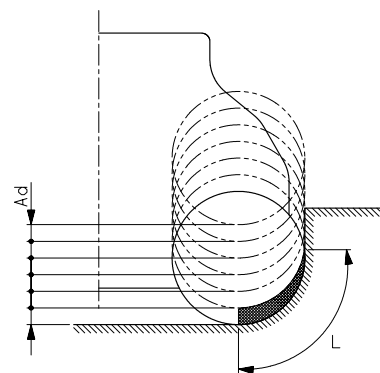
## Technical Information:

- The EXP cutter should be run at very close to normal speeds for a given material. It is the **feed rate** that you can increase, not the RPM.
- **The EXP is a STOCK REMOVAL tool.** The finish generated by its cutting edges will appear to be quite rough. This is normal and to be expected. In fact, if the finish is good it is likely the tool is being fed too slow.
- For all applications we recommend to run the EXP cutter DRY and if possible use a air blast to remove chips.
- -ML Breaker is designed to require less horsepower than the standard insert.
- -MH Breaker is designed for applications that require increased toughness, but will pull more horsepower than the other types.
- EXP concept works so well because the insert has less contact area with the work piece than a comparable button cutter.

### EXP



### Button Cutter



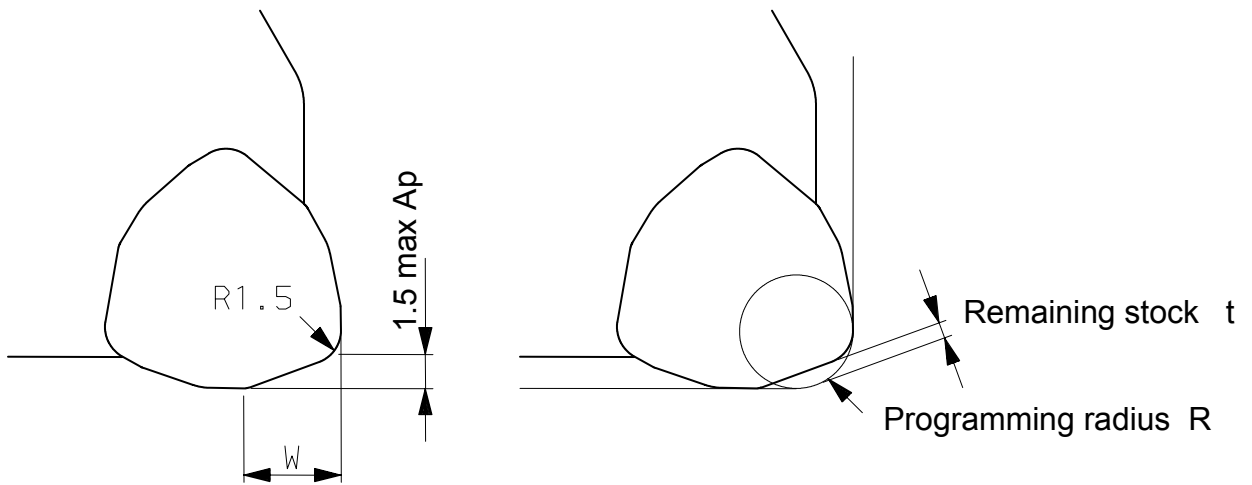
## Cost Example

### Customer Application Example Compared to Conventional

#### Milling:


- Milling Finkl FX Die block 45Rc
- Using conventional milling tools and practices, a 1.25-inch, 3 tooth end mill would be run at 350 SFM, and .022 IPT, 30 IPM. Radial width of cut was .800" and axial depth of cut was .050". At these conditions the metal removal rate is **1.20 in<sup>3</sup> /min.**
- Using the EXP milling process we would run at the same 350 SFM and .800 inches width of cut, but at .040 deep and as much as .030-inch per tooth or **96 IPM on a 40 taper machine.** At these conditions the metal removal rate would be **3.07 in<sup>3</sup>/min. That's two and half times faster!**
- A job that might take 2.5 hours could be done in one hour, a savings of 1.5 hours. At a burden rate of \$120 per hour (not unusual on today's CNC machining centers) 1.5 hours saved equals \$240. A 1.25-inch EXP is only \$250 List.

**Programming information:**

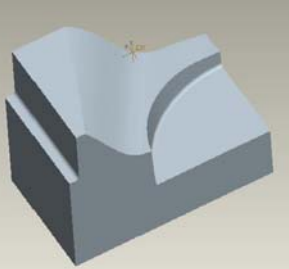


Insert	W	t	R
05	3.8	0.5	R2
06	4.3	0.7	R2.5
08	5.7	0.7	R2

**If you have specific questions or need more info please contact your Tungaloy Sales Engineer or our Engineering Hotline @ 888-542-8391**

	<b>TUNGALOY TEST TOOL EVALUATION REPORT</b> <b>ML Breaker</b>	DATE:	4/16/2004
		REPORT # :	

COMPANY:	Tungaloy	SALESMAN:	
CONTACT:		PART DESCRIPTION:	Test Program
TEL:	630-227-3721	WORK MATERIAL:	4140 HRA
FAX:	630-227-0690	MTL HARDNESS:	18-22 Rc

TYPE OF OPERATION	Constant z-level profiling	<b>MACHINING OPERATION (SKETCH)</b> 
MACHINE TOOL & TYPE	Whacheon 3 axis machining center-15 hp	
RIGIDITY	good	
COOLANT TYPE	dry	
COOLANT METHOD		

TOOLING REQUIRED	COMPANY / COMPETITOR	TUNGALOY	TUNGALOY 2	TUNGALOY 3	COMPETITOR
		TOOL DESCRIPTION	EXP06032RS	EXP06032RS	EXP06032RS
	HOLDER/BODY TYPE	End Mill	End Mill	End Mill	End Mill
	INSERT	WPMT06X415ZPR-ML	WPMT06X415ZPR-ML	WPMW06X415ZPR	
	INSERT GRADE	AH120	AH120	AH120	COMP
CUTTING PARAMETERS	WORKPIECE/CUTTER DIAMETER	32mm	32mm	32mm	1.25"
	FEED RATE (IPR = f or IPM = F)	137 ipm	164 ipm	137 ipm	125 ipm
	CUTTING SPEED (RPM=R or SFM=V)	600 sfm	600 sfm	600 sfm	600 sfm
	H.P. REQUIRED (% or ACTUAL)	45%	60%	60%	80%
	DEPTH OF CUT (INCHES)	0.06	0.06	0.06	0.06
TOOL PERFORMANCE	CUTTING TIME PER PIECE	7 mins/part	7 mins/part	7 mins/part	7 mins/part
	PIECES PER EDGE				
	TOOL LIFE (MINS. PER EDGE)				
	EDGES USED PER INSERT				
	PIECES PER INSERT				
	SURFACE FINISH (RMS)				
	REASON FOR INDEXING				
COST EVALUATION	INSERT COST				
	INSERT COST PER PIECE				
	HOURLY MACHINE DEPT. COST				
	MACHINING COST PER PIECE				
	TOTAL COST PER MACHINED EDGE				

**COMMENTS**  
 Testing of the new -ML breaker. Results show that this breaker requires less horsepower at a given feed rate, as a result you can machine at a higher feed rate and keep the spindle load meter in a favorable range. I was also able to run a Competitor hi-feed mill using the same parameters. The Competitor cutter required more horsepower to perform the cut, and the part was hot to the touch when machining was completed.