IMCO

Power. Precision. Performance.

MUSCLE TO HUSTLE IN NASTY-HARD METALS.

enDURO®

M525

FRACTIONAL AND METRIC CATALOG

The hard line for hard metals.

Shear power, longer life in titanium and stainless steel.

Finally, a tool tough enough to stand up to the nastiest metals on earth. With the enDURO® M525, virtually any machine shop can work profitably in titanium and stainless steel.

Roughing, slotting, pocketing, even finishing – this is the tool.

IMCO

Power. Precision. Performance.

CONTENTS:

enDURO® M525

Hard core for hard work.

Advanced high-shear cutting edges created specifically for hard-to-machine materials using traditional techniques or high-efficiency machining. All the muscle you could want for aggressive speeds and feeds.

Amazing corner strength =
Longer tool life, more parts per tool in nasty-hard metals.

Fine micrograin tungsten carbide substrate =
Stability and stamina for high-efficiency machining at aggressive speeds and feeds.

Optimized rake and relief angles =
Free cutting action generates better finishes and greatly reduces material warping.

Variable indexing =
Reduced harmonic vibration, higher metal removal rates, longer tool life.

Five flutes, 40° helix =
Maximum cutting edge engagement, higher metal removal rates, excellent finish.

Premium heat-resistant coating =
Excellent hot hardness and wear resistance, longer tool life.

Ready to order in diameters of 1/8" to 1-1/4" =
Exactly the tool you need.

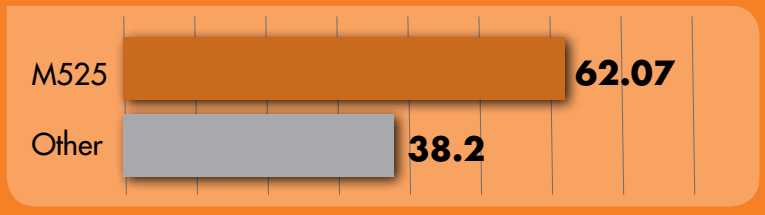
M525: Performance by the Numbers.

IMCO advances in cutting geometries and coatings can make a significant difference in your results, as shown in these graphs. All other variables being equal, IMCO's enDURO M525 ran at a faster speed and feed rate than our competitor and machined more parts per tool. How much valuable time and money would you save?

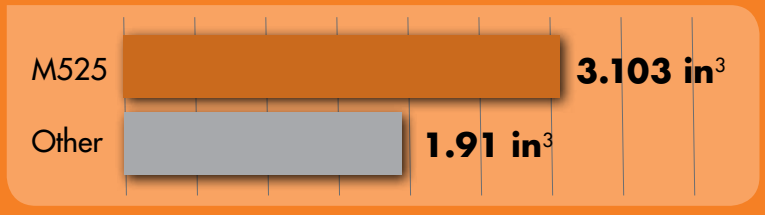
17-4 PH Stainless Steel: Peripheral Milling

(.050" radial depth of cut x 1" axial depth of cut)

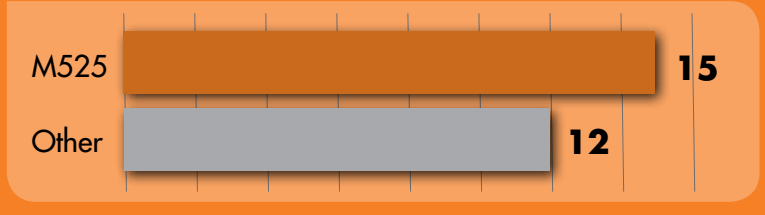
Feed: In./Min.



Metal Removal Rate (MRR)



Number of Parts per Tool



enDURO M525 Features

Amazing corner strength results in longer tool life, more parts per tool in nasty-hard metals.

Special flute design on the CMS tools to control long, stringy chips when maching titanium and stainless steels

Premium heat-resistant coating for excellent hot hardness and wear resistance, longer tool life.

M525C M525 M525N

Five flutes, 40° helix means maximum cutting edge engagement, higher metal removal rates, excellent finish.

Neck relief and short flute length mean increased stability of the end mill in the cut for more precise tolerances.

Fine micrograin tungsten carbide substrate provides stability and stamina for high-efficiency machining at aggressive speeds and feeds.

Options

End designs

Corner radii – a wide variety available to meet your part's specific requirements. Helps prevent corner chipping.

Square end – for general machining and finishing.

Ball end – for precision contouring.

Shank designs

h6 tolerance shanks – fit all collets and conform to shrink-fit requirements.

Weldon flats can be added for use in Weldon-style holders.

Choose the length for the job.

Extra rigidity – choose stub length.

Medium to deep cuts – order standard or long length.

Advanced tooling for aerospace and medical parts manufacturing.

Your first choice of tooling in these materials:

S **Titanium alloys**
Titanium and titanium alloys.

M **Stainless steels**
Austinitic, martensitic, and perciptiation hardening stainless steels.

Also muscle to hustle in these materials:

P **Carbon and tool steels**
All tool steels and carbon steels under 50 HRC.

K **Cast iron**
Malleable and gray cast irons.

enDURO® Application Guide (inch) • Speed & Feed

ISO Classification	Work Material	Type of Cut	Axial DOC	Radial DOC	No. of Flutes	Speed (SFM)	Feed (Inches per Tooth) 1/8	1/4	3/8	1/2	5/8	3/4	1
S	Titanium Alloys	Slotting	.5 x D	1 x D	5	250	.0005	.0009	.0014	.0018	.0023	.0028	.0037
	6Al-4V, 6-2-4	Peripheral - Rough	1 x D	.3 x D	5	300	.0006	.0013	.0019	.0025	.0031	.0038	.0050
		Peripheral - HEM*	1.5 x D	.1 x D	5	425	.0012	.0024	.0036	.0048	.0060	.0072	.0096
		Finish	1.5 x D	.01 x D	5	300	.0012	.0023	.0035	.0046	.0058	.0069	.0092
	Difficult-to-Machine Titanium Alloys	Slotting	.25 x D	1 x D	5	200	.0003	.0007	.0010	.0014	.0017	.0020	.0027
	10-2-3	Peripheral - Rough	1 x D	.25 x D	5	250	.0005	.0010	.0015	.0020	.0025	.0029	.0039
		Peripheral - HEM*	1.5 x D	.1 x D	5	300	.0009	.0018	.0027	.0035	.0044	.0053	.0071
		Finish	1.5 x D	.01 x D	5	250	.0009	.0017	.0026	.0034	.0043	.0051	.0068
	Hi-temp Alloys	Slotting	.25 x D	1 x D	5	70	.0002	.0005	.0007	.001	.0012	.0015	.0020
	Inconel, Hastalloy, Waspalloy	Peripheral - Rough	1 x D	.2 x D	5	80	.0004	.0008	.0012	.0016	.0020	.0024	.0032
		Finish	1.5 x D	.01 x D	5	100	.0003	.0007	.0011	.0015	.0021	.0028	.0028
M	Austenitic Stainless Steels, FeNi Alloys	Slotting	.5 x D	1 x D	5	275	.0010	.0012	.0018	.0024	.0030	.0036	.0048
	303, 304, 316, Invar, Kovar	Peripheral - Rough	1.25 x D	.3 x D	5	350	.0012	.0016	.0025	.0033	.0041	.0049	.0065
		Peripheral - HEM*	2 x D	.1 x D	5	475	.0015	.0031	.0047	.0063	.0078	.0094	.0125
		Finish	2 x D	.01 x D	5	350	.0020	.0030	.0045	.0060	.0075	.0090	.0121
	Precipitation Hardening Stainless Steels	Slotting	.5 x D	1 x D	5	250	.0005	.0010	.0015	.0020	.0025	.0030	.0040
	17-4, 15-5, 13-8	Peripheral - Rough	1.25 x D	.3 x D	5	325	.0007	.0014	.0020	.0027	.0034	.0041	.0055
		Peripheral - HEM*	1.5 x D	.1 x D	5	450	.0013	.0026	.0039	.0052	.0065	.0078	.0104
		Finish	1.5 x D	.01 x D	5	325	.0013	.0025	.0038	.0050	.0063	.0075	.0101
P	Martensitic & Ferritic Stainless Steels	Slotting	.5 x D	1 x D	5	300	.0006	.0013	.0019	.0026	.0032	.0038	.0051
	410, 416, 440	Peripheral - Rough	1.25 x D	.3 x D	5	375	.0009	.0017	.0026	.0035	.0044	.0052	.0070
		Peripheral - HEM*	2 x D	.15 x D	5	500	.0014	.0028	.0042	.0056	.0070	.0084	.0112
		Finish	2 x D	.01 x D	5	375	.0016	.0032	.0048	.0064	.0080	.0096	.0129
	Low Carbon Steels	Slotting	.5 x D	1 x D	5	325	.0007	.0014	.0021	.0028	.0035	.0042	.0056
	1018, 1020, 12L14, 5120, 8620	Peripheral - Rough	1.25 x D	.3 x D	5	400	.0010	.0019	.0029	.0038	.0048	.0057	.0076
		Peripheral - HEM*	2 x	.15 x D	5	525	.0015	.0031	.0046	.0061	.0077	.0092	.0123
		Finish	2 x	.01 x D	5	400	.0018	.0035	.0053	.0070	.0088	.0106	.0141
	Medium Carbon Steels ≤ 48 HRC	Slotting	.5 x D	1 x D	5	300	.0006	.0013	.0019	.0026	.0032	.0038	.0051
	1045, 4140, 4340, 5140	Peripheral - Rough	1.25 x D	.3 x D	5	375	.0009	.0017	.0026	.0035	.0044	.0052	.0070
		Peripheral - HEM*	2 x D	.15 x D	5	500	.0014	.0028	.0042	.0056	.0070	.0084	.0112
		Finish	2 x D	.01 x D	5	375	.0016	.0032	.0048	.0064	.0080	.0096	.0129
	Tool and Die Steels ≤ 48 Rc	Slotting	.5 x D	1 x D	5	275	.0005	.0011	.0016	.0022	.0027	.0032	.0043
	A2, D2, O1, S7, P20, H13	Peripheral - Rough	1.25 x D	.3 x D	5	350	.0007	.0015	.0022	.0029	.0037	.0044	.0059
		Peripheral - HEM*	2 x D	.15 x D	5	475	.0012	.0024	.0035	.0047	.0059	.0071	.0095
		Finish	2 x D	.01 x D	5	350	.0014	.0027	.0041	.0054	.0068	.0081	.0109
K	Cast Iron	Slotting	.5 x D	1 x D	5	300	.0006	.0012	.0018	.0024	.0030	.0036	.0048
	Gray	Peripheral - Rough	1.25 x D	.3 x D	5	375	.0008	.0016	.0025	.0033	.0041	.0049	.0065
	ASTM-A48 Class 20, 25, 30, 35 & 40	Peripheral - HEM*	2 x D	.15 x D	5	500	.0013	.0026	.0039	.0053	.0066	.0079	.0105
		Finish	2 x D	.01 x D	5	375	.0015	.0030	.0045	.0060	.0075	.0090	.0121
	Cast Iron	Slotting	.5 x D	1 x D	5	275	.0005	.0010	.0015	.0020	.0025	.0030	.0040
	Malleable	Peripheral - Rough	1.25 x D	.3 x D	5	350	.0007	.0014	.0020	.0027	.0034	.0041	.0055
		Peripheral - HEM*	2 x D	.15 x D	5	475	.0011	.0022	.0033	.0044	.0055	.0066	.0088
		Finish	2 x D	.01 x D	5	350	.0013	.0025	.0038	.0050	.0063	.0075	.0101

D = Tool Diameter ***HEM= High-efficiency machining** (chip thinning calculations have already been applied to HEM parameters shown)

Adjustments – Apply these adjustments when programming a light radial stepover.

When using a light radial stepover, the chipload-per-tooth thickness (CLPT) becomes thinner when radial depth (RDOC) is less than half the diameter (D) of the end mill (see illustration).

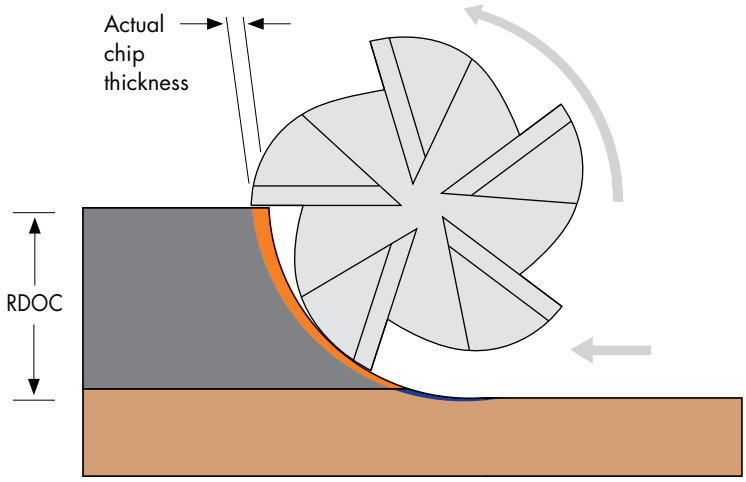
Use this **radial chip thinning formula** to calculate the adjusted feed per tooth (FPT) necessary to maintain the optimal chip thickness.

$$FPT_{adj} = \frac{CLPT \times (D/2)}{\sqrt{(D \times RDOC) - RDOC^2}}$$

TRADITIONAL MACHINING

Deeper cut – Up to 1/2 the diameter of the end mill

Shallow cut – Chip is much thinner



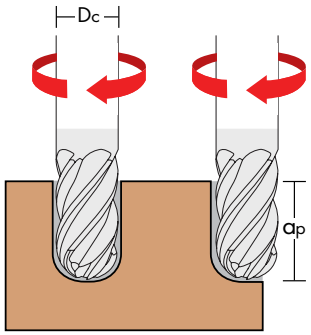
Apply formula when taking shallow cuts to reach optimum chipload

enDURO® Application Guide (metric) • Speed & Feed

ISO Classification	Work Material	Type of Cut	Axial DOC	Radial DOC	No. of Flutes	Speed (M/min)	Feed (MM per Tooth) 6,0	10,0	12,0	16,0	20,0	25,0
S	Titanium Alloys	Slotting	.5 x D	1 x D	5	76	0.0234	0.0388	0.0467	0.0622	0.0776	0.0935
	6Al-4V, 6-2-4	Peripheral - Rough	1 x D	.3 x D	5	91	0.0319	0.0529	0.0637	0.0848	0.1058	0.1275
		Peripheral - HEM*	1.5 x D	.1 x D	5	130	0.0609	0.1010	0.1217	0.1619	0.2020	0.2434
		Finish	1.5 x D	.01 x D	5	91	0.0587	0.0975	0.1174	0.1562	0.1949	0.2349
	Difficult-to-Machine Titanium Alloys	Slotting	.25 x D	1 x D	5	61	0.0173	0.0287	0.0345	0.0459	0.0573	0.0691
	10-2-3	Peripheral - Rough	1 x D	.25 x D	5	76	0.0249	0.0414	0.0499	0.0663	0.0828	0.0997
		Peripheral - HEM*	1.5 x D	.1 x D	5	91	0.0450	0.0747	0.0900	0.1196	0.1493	0.1799
		Finish	1.5 x D	.01 x D	5	76	0.0434	0.0720	0.0868	0.1154	0.1441	0.1736
	Hi-temp Alloys	Slotting	.25 x D	1 x D	5	21	0.0127	0.0203	0.0250	0.0318	0.0381	0.0507
	Inconel, Hastalloy, Waspalloy	Peripheral - Rough	1 x D	.2 x D	5	24	0.0203	0.0305	0.0405	0.0508	0.0610	0.0812
		Finish	1.5 x D	.01 x D	5	30	0.0178	0.0280	0.0380	0.0533	0.0711	0.0710
M	Austenitic Stainless Steels, FeNi Alloys	Slotting	.5 x D	1 x D	5	84	0.0305	0.0506	0.0610	0.0811	0.1012	0.1219
	303, 304, 316, Invar, Kovar	Peripheral - Rough	1.25 x D	.3 x D	5	107	0.0416	0.0690	0.0831	0.1106	0.1380	0.1663
		Peripheral - HEM*	2 x D	.1 x D	5	145	0.0794	0.1318	0.1588	0.2111	0.2635	0.3175
		Finish	2 x D	.01 x D	5	107	0.0766	0.1271	0.1532	0.2037	0.2543	0.3063
	Precipitation Hardening Stainless Steels	Slotting	.5 x D	1 x D	5	76	0.0254	0.0422	0.0508	0.0676	0.0843	0.1016
	17-4, 15-5, 13-8	Peripheral - Rough	1.25 x D	.3 x D	5	99	0.0346	0.0575	0.0693	0.0921	0.1150	0.1386
		Peripheral - HEM*	1.5 x D	.1 x D	5	137	0.0661	0.1098	0.1323	0.1759	0.2196	0.2646
		Finish	1.5 x D	.01 x D	5	99	0.0638	0.1059	0.1276	0.1698	0.2119	0.2553
P	Martensitic & Ferritic Stainless Steels	Slotting	.5 x D	1 x D	5	99	0.0356	0.0590	0.0711	0.0946	0.1181	0.1422
	410, 416, 440	Peripheral - Rough	1.25 x D	.3 x D	5	122	0.0485	0.0805	0.0970	0.1290	0.1610	0.1940
		Peripheral - HEM*	2 x D	.15 x D	5	160	0.0778	0.1292	0.1556	0.2070	0.2583	0.3112
		Finish	2 x D	.01 x D	5	122	0.0893	0.1483	0.1787	0.2377	0.2966	0.3574
	Low Carbon Steels	Slotting	.5 x D	1 x D	5	91	0.0325	0.0540	0.0650	0.0865	0.1079	0.1300
	1018, 1020, 12L14, 5120, 8620	Peripheral - Rough	1.25 x D	.3 x D	5	114	0.0443	0.0736	0.0887	0.1179	0.1472	0.1774
		Peripheral - HEM*	2 x	.15 x D	5	152	0.0711	0.1181	0.1423	0.1892	0.2362	0.2845
		Finish	2 x	.01 x D	5	114	0.0817	0.1356	0.1634	0.2173	0.2712	0.3268
	Medium Carbon Steels ≤ 48 HRC	Slotting	.5 x D	1 x D	5	84	0.0274	0.0455	0.0549	0.0730	0.0911	0.1097
	1045, 4140, 4340, 5140	Peripheral - Rough	1.25 x D	.3 x D	5	107	0.0374	0.0621	0.0748	0.0995	0.1242	0.1497
		Peripheral - HEM*	2 x D	.15 x D	5	145	0.0600	0.0996	0.1200	0.1597	0.1993	0.2401
		Finish	2 x D	.01 x D	5	107	0.0689	0.1144	0.1379	0.1833	0.2288	0.2757
	Tool and Die Steels ≤ 48 Rc	Slotting	.5 x D	1 x D	5	91	0.0325	0.0540	0.0650	0.0865	0.1079	0.1300
	A2, D2, O1, S7, P20, H13	Peripheral - Rough	1.25 x D	.3 x D	5	114	0.0443	0.0736	0.0887	0.1179	0.1472	0.1774
		Peripheral - HEM*	2 x D	.15 x D	5	152	0.0711	0.1181	0.1423	0.1892	0.2362	0.2845
		Finish	2 x D	.01 x D	5	114	0.0817	0.1356	0.1634	0.2173	0.2712	0.3268
K	Cast Iron	Slotting	.5 x D	1 x D	5	91	0.0305	0.0506	0.0610	0.0811	0.1012	0.1219
	Gray	Peripheral - Rough	1.25 x D	.3 x D	5	114	0.0416	0.0690	0.0831	0.1106	0.1380	0.1663
	ASTM-A48 Class 20, 25, 30, 35 & 40	Peripheral - HEM*	2 x D	.15 x D	5	152	0.0667	0.1107	0.1334	0.1774	0.2214	0.2668
		Finish	2 x D	.01 x D	5	114	0.0766	0.1271	0.1532	0.2037	0.2543	0.3063
	Cast Iron	Slotting	.5 x D	1 x D	5	84	0.0254	0.0422	0.0508	0.0676	0.0843	0.1016
	Malleable	Peripheral - Rough	1.25 x D	.3 x D	5	107	0.0346	0.0575	0.0693	0.0921	0.1150	0.1386
		Peripheral - HEM*	2 x D	.15 x D	5	145	0.0556	0.0923	0.1111	0.1478	0.1845	0.2223
		Finish	2 x D	.01 x D	5	107	0.0638	0.1059	0.1276	0.1698	0.2119	0.2553

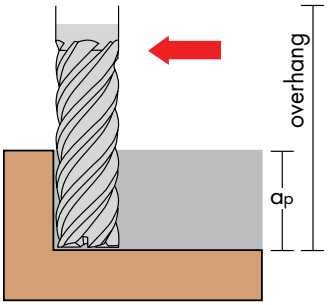
D = Tool Diameter ***HEM = High-efficiency machining** (chip thinning calculations have already been applied to HEM parameters shown)

Adjustments – Apply these adjustments when programming the following applications.



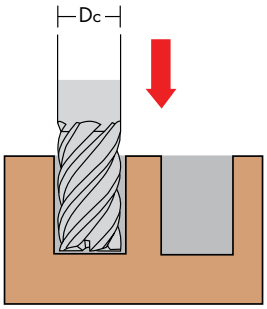
1. Ball end mills

- Reduce chipload by 25% from roughing/ slotting recommendation when axial DOC (ap) exceeds 75% of Dc



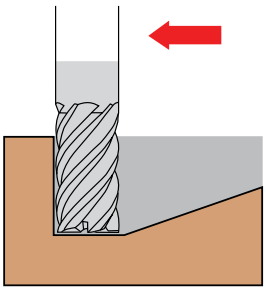
2. Long reach mills with large overhang

- Reduce speed rate and chipload by 10%



3. Plunge entry into work piece

- Reduce chipload by 80% of recommended slotting rate
- Peck mill if axial DOC (ap) exceeds 50% of Dc



4. Ramp entry into work piece

- Ramp at 1.5°–2.5° angle
- Reduce chipload by 20% of recommended slotting rate

High-efficiency machining + enDURO® = win-win.

The numbers prove it: high-efficiency machining saves time and extends tool life. And high-efficiency machining with enDURO end mills is a winning combination. The M525 series is designed from the ground up for constant radial engagement machining, a revolutionary technique that maximizes metal removal rates.

What is high-efficiency machining?

Traditional machining techniques often generate high cutting forces and exert stress on the tool, causing premature tool wear and limited speeds and feeds. Result: you get shorter tool life and longer cycle time.

High-efficiency machining uses constant radial engagement tool paths, so cutting forces are reduced, tool output is increased and metal removal rates are maximized. These tool paths employ light stepovers, deep axial cuts, rolling entries and exits from the material and "driving" the corners to form internal radii.

You'll find several software products for optimizing tool paths on the market. M525 enDURO mills achieve amazing metal removal rates when used in conjuction with HSMWorks, VoluMill™, TrueMill® or MasterCam Dynamic Milling® software.

Maximizing tool performance.

Removes more material – The tool can cut deeper with lighter stepovers, allowing higher speed rates and heavier chiploads for higher metal removal rates.

Improve surface finish – Continuous toolpaths engage more of the cutting edges in the work material at all times, yielding a better surface finish.

Reduce deflection – Lighter stepovers generate less cutting pressure and reduce tool deflection, resulting in straighter walls.

Better tool life – Uniform chipload reduces stress on the tool, resulting in longer life.

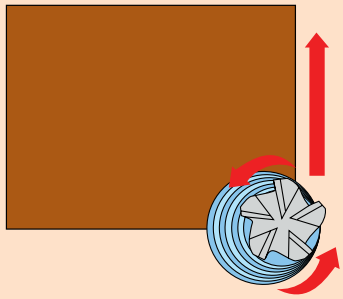
Put it to work and watch the chips fly!

Superior surface finishes, straighter walls, higher metal removal rates and longer tool life. The reasons are clear: combined with high-efficiency machining, the enDURO mill is the tool of choice.

How it works.

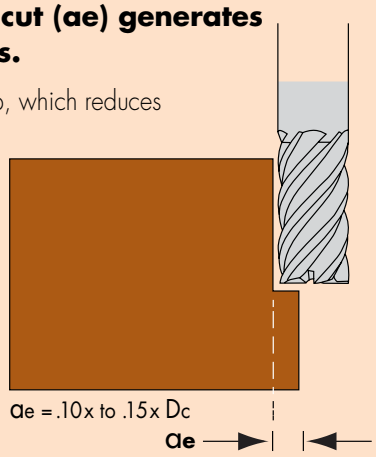
1. Arcing the mill counter-clockwise into the cut (instead of a straight entry) improves tool life.

- Reduces chip thickness as each cutting edge exits the material.
- Reduces cutter vibration during entry into the work material.



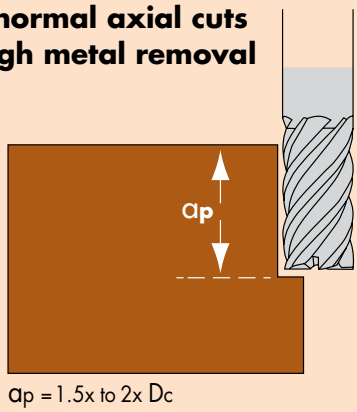
2. A light radial cut (ae) generates higher feed rates.

- Creates a thinner chip, which reduces the heat at the cutting zone.
- Improves cutter stability by reducing radial cutting forces.



3. Deeper-than-normal axial cuts (ap) generate high metal removal rates.

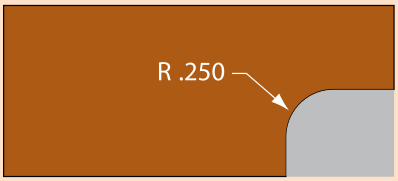
- Increases tool engagement and stability.
- Program axial depth of cut at 1.5x to 2x the cutter diameter.



PROFILE:

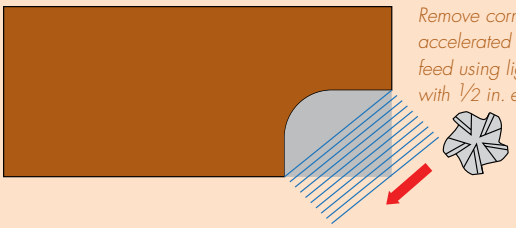
High-efficiency machining and internal corners.

Maximize tool life and productivity by "slicing," then "driving" internal corners.



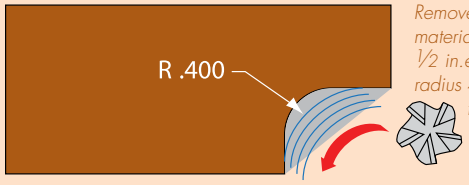
This example shows a part profile with a .250 radius.

Step 1 "Slice" the material away from the corners using a straight line toolpath and a radial stepover of 10% of the cutter diameter. Speeds can be programmed at 1.5x to 2x normal slotting speeds (see HEM recommendations on page 8). This method reduces stress on the part and the tool.



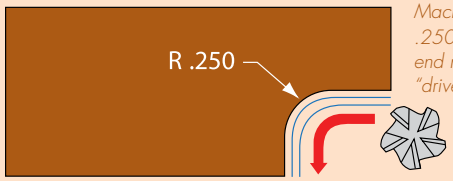
Remove corners at accelerated speed and feed using light stepovers with ½ in. end mill.

Step 2 "Drive" the mill into the corner to remove most of the remaining material. Program a radius that is 40% larger than the final radius. Continue to use light radial stepovers to maintain maximum feed rates.



Remove remaining material in corner with ½ in.end mill, driving a radius 40% larger than the final radius.

Step 3 "Drive" a smaller mill into the corner to achieve the desired radius.



Machine the finished .250 radius with a ⅜ in. end mill, allowing you to "drive" the corner.

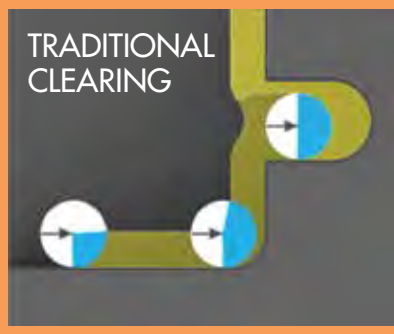
Autodesk:
Integrated CAM Solutions

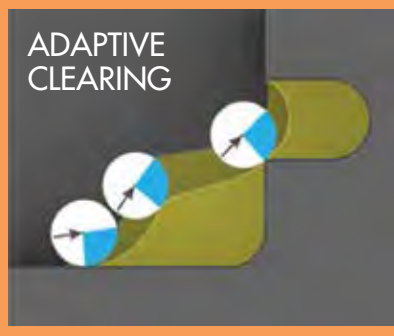
Adaptive clearing saves time and money.

Traditional roughing tool paths call for wide cuts - up to 100% of the end mill diameter. This heavy tool engagement creates a lot of cutting pressure, requiring slower-than-optimum feed rates and depths of cut that are less than or equal to the mill diameter - leaving much of the flute length cutting nothing but air. Even slower speeds are required as cutting pressure increases when milling inside radii in pockets.

Tool paths generated using Adaptive Clearing techniques from HSMWorks and Autodesk reduce chatter by engaging more of the flute length, and reduce cutting pressures by maintaining a smaller but constant step-over, regardless of the feature being milled. The result is longer tool life, better finishes, and much higher metal removal rates!

As seen here, with traditional roughing programs, the amount of mill diameter engaged in cutting changes as it moves along the tool path. The changing cutting pressures require "programming for worst-case conditions" and don't optimize the tool or the machine. Note that Adaptive Clearing keeps the mill diameter engagement constant – reducing cutting pressure and increasing metal removal rates up to 3x that of traditional paths.



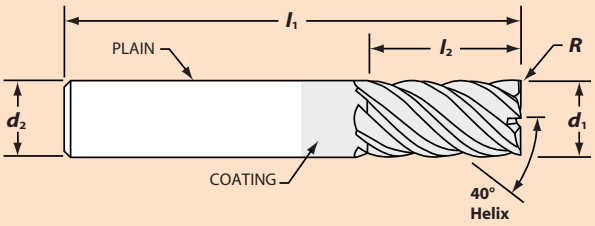


Pick the right tool and the right program for the job and see better cycle times, better tool life and lots of cost savings. Learn more about HSMWorks – pioneers of modern high-speed machining – and Adaptive Clearing at **cam.autodesk.com.**

M525

Square End and Corner Radius

For high-performance and high-efficiency machining in materials ranging from titanium to low carbon steels. Large selection of corner radii to meet the demands of today's aerospace industry. Square corner available for general finishing operations and for finishing to a 90° angle.

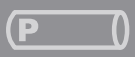


Use M525 plain shank with milling chuck, collet or shrink-fit tool holders to minimize total indicator runout (TIR) when performing high-efficiency machining or finishing operations.

Model Code: M525
w/Square End and Plain Shank

Cutter Dia d1	Shank Dia d2	Length of Cut l2	Overall Length l1	Order Code	EZ-ID Number M525 - xxxx - xxxx - SQ-Lxx d1 l2 l1
1/8	1/8	1/4	1-1/2	65001	M525-0125-0250-SQ
		1/2	1-1/2	65005	M525-0125-0500-SQ
		3/4	2-1/2	65009	M525-0125-0750-SQ
3/16	3/16	5/16	2	65013	M525-0187-0312-SQ
		9/16	2	65017	M525-0187-0562-SQ
		3/4	2-1/2	65021	M525-0187-0750-SQ
1/4	1/4	3/8	2	65025	M525-0250-0375-SQ
		3/4	2-1/2	65049	M525-0250-0750-SQ
		1-1/8	3	65055	M525-0250-1125-SQ
5/16	5/16	7/16	2	65061	M525-0312-0437-SQ
		13/16	2-1/2	65067	M525-0312-0812-SQ
		1-1/4	3	65073	M525-0312-1250-SQ
		2-1/8	4	65079	M525-0312-2125-SQ
3/8	3/8	1/2	2	65085	M525-0375-0500-SQ
		1	2-1/2	65133	M525-0375-1000-SQ
		1-1/4	3	65141	M525-0375-1250-SQ
		1-5/8	3-1/2	65149	M525-0375-1625-SQ
		1-5/8	4	65157	M525-0375-1625-SQ-L4
		1-5/8	6	65165	M525-0375-1625-SQ-L6
		2	4	65173	M525-0375-2000-SQ
		2-1/2	6	65181	M525-0375-2500-SQ-L6
7/16	7/16	5/8	2-1/2	65189	M525-0437-0625-SQ
		1	2-3/4	65197	M525-0437-1000-SQ
		2	4	65205	M525-0437-2000-SQ
1/2	1/2	5/8	2-1/2	65213	M525-0500-0625-SQ
		1	3	65258	M525-0500-1000-SQ
		1-1/4	3	65267	M525-0500-1250-SQ
		1-5/8	4	65276	M525-0500-1625-SQ
		1-5/8	6	65285	M525-0500-1625-SQ-L6
		2-1/8	4	65294	M525-0500-2125-SQ
		2-5/8	5	65303	M525-0500-2625-SQ
		3-1/4	6	65312	M525-0500-3250-SQ
5/8	5/8	3/4	3	65321	M525-0625-0750-SQ
		1-5/8	3-1/2	65361	M525-0625-1625-SQ
		2-1/8	4	65371	M525-0625-2125-SQ
		2-1/8	6	65381	M525-0625-2125-SQ-L6
		2-5/8	5	65391	M525-0625-2625-SQ
		3-1/4	6	65401	M525-0625-3250-SQ
		4	6	65411	M525-0625-4000-SQ-L6
3/4	3/4	1	3	65421	M525-0750-1000-SQ
		1-5/8	4	65461	M525-0750-1625-SQ
		2-3/8	5	65471	M525-0750-2375-SQ
		2-3/8	6	65481	M525-0750-2375-SQ-L6
		3-1/4	6	65491	M525-0750-3250-SQ
		4-1/8	7	65501	M525-0750-4125-SQ
1	1	1-3/4	4	65555	M525-1000-1750-SQ
		2-5/8	5	65566	M525-1000-2625-SQ
		3-1/4	6	65588	M525-1000-3250-SQ
		4-1/4	7	65599	M525-1000-4250-SQ
1-1/4	1-1/4	2	4-1/2	65643	M525-1250-2000-SQ
		3-1/4	6	65654	M525-1250-3250-SQ
		5	8	65665	M525-1250-5000-SQ

Model Code: M525
w/Corner Radius and Plain Shank



Cutter Dia d1	Shank Dia d2	Length of Cut l2	Overall Length l1	Order Code by Corner Radius (R) (replace -xxx in EZ-ID number with decimal size shown below) .015 CR	.030 CR	.060 CR	.090 CR	.120 CR	.156 CR	.190 CR	.250 CR	.375 CR	EZ-ID Number M525 - xxxx - xxxx - xxx - Lxx d1 l2 R l1
1/8	1/8	1/4	1-1/2	65002	65003								M525-0125-0250-xxx
		1/2	1-1/2	65006	65007								M525-0125-0500-xxx
		3/4	2-1/2	65010	65011								M525-0125-0750-xxx
3/16	3/16	5/16	2	65014	65015								M525-0187-0312-xxx
		9/16	2	65018	65019								M525-0187-0562-xxx
		3/4	2-1/2	65022	65023								M525-0187-0750-xxx
1/4	1/4	3/8	2	65026	65027	65028	65029						M525-0250-0375-xxx
		3/4	2-1/2	65050	65051	65052	65053						M525-0250-0750-xxx
		1-1/8	3	65056	65057	65058	65059						M525-0250-1125-xxx
5/16	5/16	7/16	2	65062	65063	65064	65065						M525-0312-0437-xxx
		13/16	2-1/2	65068	65069	65070	65071						M525-0312-0812-xxx
		1-1/4	3	65074	65075	65076	65077						M525-0312-1250-xxx
		2-1/8	4	65080	65081	65082	65083						M525-0312-2125-xxx
3/8	3/8	1/2	2	65086	65087	65088	65089	65090	65091				M525-0375-0500-xxx
		1	2-1/2	65134	65135	65136	65137	65138	65139				M525-0375-1000-xxx
		1-1/4	3	65142	65143	65144	65145	65146	65147				M525-0375-1250-xxx
		1-5/8	3-1/2	65150	65151	65152	65153	65154	65155				M525-0375-1625-xxx
		1-5/8	4	65158	65159	65160	65161	65162	65163				M525-0375-1625-xxx-L4
		1-5/8	6	65166	65167	65168	65169	65170	65171				M525-0375-1625-xxx-L6
		2	4	65174	65175	65176	65177	65178	65179				M525-0375-2000-xxx
		2-1/2	6	65182	65183	65184	65185	65186	65187				M525-0375-2500-xxx-L6
7/16	7/16	5/8	2-1/2	65190	65191	65192	65193	65194	65195				M525-0437-0625-xxx
		1	2-3/4	65198	65199	65200	65201	65202	65203				M525-0437-1000-xxx
		2	4	65206	65207	65208	65209	65210	65211				M525-0437-2000-xxx
1/2	1/2	5/8	2-1/2	65214	65215	65216	65217	65218	65219	65220			M525-0500-0625-xxx
		1	3	65259	65260	65261	65262	65263	65264	65265			M525-0500-1000-xxx
		1-1/4	3	65268	65269	65270	65271	65272	65273	65274			M525-0500-1250-xxx
		1-5/8	4	65277	65278	65279	65280	65281	65282	65283			M525-0500-1625-xxx
		1-5/8	6	65286	65287	65288	65289	65290	65291	65292			M525-0500-1625-xxx-L6
		2-1/8	4	65295	65296	65297	65298	65299	65300	65301			M525-0500-2125-xxx
		2-5/8	5	65304	65305	65306	65307	65308	65309	65310			M525-0500-2625-xxx
		3-1/4	6	65313	65314	65315	65316	65317	65318	65319			M525-0500-3250-xxx
5/8	5/8	3/4	3	65322	65323	65324	65325	65326	65327	65328	65329		M525-0625-0750-xxx
		1-5/8	3-1/2	65362	65363	65364	65365	65366	65367	65368	65369		M525-0625-1625-xxx
		2-1/8	4	65372	65373	65374	65375	65376	65377	65378	65379		M525-0625-2125-xxx
		2-1/8	6	65382	65383	65384	65385	65386	65387	65388	65389		M525-0625-2125-xxx-L6
		2-5/8	5	65392	65393	65394	65395	65396	65397	65398	65399		M525-0625-2625-xxx
		3-1/4	6	65402	65403	65404	65405	65406	65407	65408	65409		M525-0625-3250-xxx
		4	6	65412	65413	65414	65415	65416	65417	65418	65419		M525-0625-4000-xxx-L6
3/4	3/4	1	3	65422	65423	65424	65425	65426	65427	65428	65429		M525-0750-1000-xxx
		1-5/8	4	65462	65463	65464	65465	65466	65467	65468	65469		M525-0750-1625-xxx
		2-3/8	5	65472	65473	65474	65475	65476	65477	65478	65479		M525-0750-2375-xxx
		2-3/8	6	65482	65483	65484	65485	65486	65487	65488	65489		M525-0750-2375-xxx-L6
		3-1/4	6	65492	65493	65494	65495	65496	65497	65498	65499		M525-0750-3250-xxx
		4-1/8	7	65502	65503	65504	65505	65506	65507	65508	65509		M525-0750-4125-xxx
1	1	1-3/4	4	65556	65557	65558	65559	65560	65561	65562	65563	65564	M525-1000-1750-xxx
		2-5/8	5	65567	65568	65569	65570	65571	65572	65573	65574	65575	M525-1000-2625-xxx
		3-1/4	6	65589	65590	65591	65592	65593	65594	65595	65596	65597	M525-1000-3250-xxx
		4-1/4	7	65600	65601	65602	65603	65604	65605	65606	65607	65608	M525-1000-4250-xxx
1-1/4	1-1/4	2	4-1/2	65644	65645	65646	65647	65648	65649	65650	65651	65652	M525-1250-2000-xxx
		3-1/4	6	65655	65656	65657	65658	65659	65660	65661	65662	65663	M525-1250-3250-xxx
		5	8	65666	65667	65668	65669	65670	65671	65672	65673	65674	M525-1250-5000-xxx

Model Code: M525 w/Square End and Plain Shank

Cutter Dia d1	Shank Dia d2	Length of Cut l2	Overall Length l1	Order Code	EZ-ID Number M525 - xxx - xxx - SQ d1 l2
6	6	13	57	66655	M525-060-013-SQ
8	8	19	63	66660	M525-080-019-SQ
10	10	22	72	66665	M525-100-022-SQ
12	12	26	83	66671	M525-120-026-SQ
		50	100	66870	M525-120-050-SQ
		75	150	66874	M525-120-075-SQ
16	16	32	92	66678	M525-160-032-SQ
		55	110	66878	M525-160-055-SQ
		75	150	66882	M525-160-075-SQ
20	20	38	104	66685	M525-200-038-SQ
		65	125	66886	M525-200-065-SQ
		85	150	66890	M525-200-085-SQ
25	25	45	120	66693	M525-250-045-SQ
		85	150	66894	M525-250-085-SQ

Model Code: M525 w/Corner Radius and Plain Shank

Cutter Dia d1	Shank Dia d2	Length of Cut l2	Overall Length l1	Order Code by Corner Radius (R) (replace -xxx in EZ-ID number with mm size shown below) 0,5 CR	0,75 CR	1,0 CR	1,5 CR	2,0 CR	3,0 CR	4,0 CR	5,0 CR	EZ-ID Number M525 - xxx - xxx - xxx d1 l2 R
6	6	13	57	66656	66657	66658	66659					M525-060-013-xxx
8	8	19	63	66661	66662	66663	66664					M525-080-019-xxx
10	10	22	72	66666	66667	66668	66669	66670				M525-100-022-xxx
12	12	26	83	66672	66673	66674	66675	66676	66677			M525-120-026-xxx
		50	100		66871	66872	66873					M525-120-050-xxx
		75	150		66875	66876	66877					M525-120-075-xxx
16	16	32	92		66679	66680	66681	66682	66683	66684		M525-160-032-xxx
		55	110		66879	66880	66881					M525-160-055-xxx
		75	150		66883	66884	66885					M525-160-075-xxx
20	20	38	104		66686	66687	66688	66689	66690	66691	66692	M525-200-038-xxx
		65	125		66887	66888	66889					M525-200-065-xxx
		85	150		66891	66892	66893					M525-200-085-xxx
25	25	45	120		66694	66695	66696	66697	66698	66699	66700	M525-250-045-xxx
		85	150		66895	66896	66897					M525-250-085-xxx

PROFILE:

Patrick Clewis & Mark Smith

When **JAMCO America** got a new project making thin-walled parts in titanium (a material they had never worked with), they gave IMCO Representative Mark Smith and Patrick Clewis a call.

Mark and Patrick were getting great results with enDURO® M525s in heat-treated 15-5 stainless. So they tested the M525s at the same speeds and feeds in titanium that JAMCO was running in aluminum.

The results

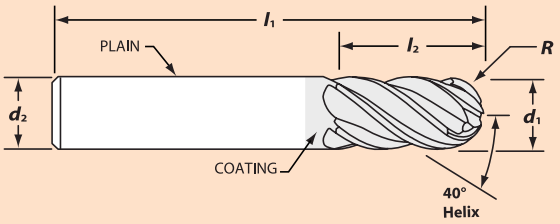
- **No warping, no scrap, great tool life.**
  "They even bumped it up to 400 surface feet and 80 ipm, and the tool still ran smoothly."

JAMCO America's Production Supervisor Cory Dennis (front left), CNC Programmer Bill Aldrich (center) and Head Machinist Art Ostrum have full production underway, with the support of IMCO Representative Mark Smith (back, left) and Patrick Clewis (back, right).

M525

Ball End

The M525 ball end is excellent for contouring applications in a variety of materials. Based on the same high-performance design but with a ball end.



As a general rule, when using the M525 ball end mill, reduce feed rates by 25% when the axial DOC exceeds 75% of the mill diameter. Refer to speed and feed information on pages 6 & 7 for more detail.

Model Code: M525
w/Ball End and Plain Shank

P

Cutter Dia d1	Shank Dia d2	Length of Cut l2	Overall Length l1	Order Code	EZ-ID Number M525 - xxxx - xxxx - BN -Lxx d1 l2 l1
1/8	1/8	1/4	1-1/2	65004	M525-0125-0250-BN
		1/2	1-1/2	65008	M525-0125-0500-BN
		3/4	2-1/2	65012	M525-0125-0750-BN
3/16	3/16	5/16	2	65016	M525-0187-0312-BN
		9/16	2	65020	M525-0187-0562-BN
		3/4	2-1/2	65024	M525-0187-0750-BN
1/4	1/4	3/8	2	65030	M525-0250-0375-BN
		3/4	2-1/2	65054	M525-0250-0750-BN
		1-1/8	3	65060	M525-0250-1125-BN
5/16	5/16	7/16	2	65066	M525-0312-0437-BN
		13/16	2-1/2	65072	M525-0312-0812-BN
		1-1/4	3	65078	M525-0312-1250-BN
		2-1/8	4	65084	M525-0312-2125-BN
3/8	3/8	1/2	2	65092	M525-0375-0500-BN
		1	2-1/2	65140	M525-0375-1000-BN
		1-1/4	3	65148	M525-0375-1250-BN
		1-5/8	3-1/2	65156	M525-0375-1625-BN
		1-5/8	4	65164	M525-0375-1625-BN-L4
		1-5/8	6	65172	M525-0375-1625-BN-L6
		2	4	65180	M525-0375-2000-BN
		2-1/2	6	65188	M525-0375-2500-BN-L6
7/16	7/16	5/8	2-1/2	65196	M525-0437-0625-BN
		1	2-3/4	65204	M525-0437-1000-BN
		2	4	65212	M525-0437-2000-BN
1/2	1/2	5/8	2-1/2	65221	M525-0500-0625-BN
		1	3	65266	M525-0500-1000-BN
		1-1/4	3	65275	M525-0500-1250-BN
		1-5/8	4	65284	M525-0500-1625-BN
		1-5/8	6	65293	M525-0500-1625-BN-L6
		2-1/8	4	65302	M525-0500-2125-BN
		2-5/8	5	65311	M525-0500-2625-BN
		3-1/4	6	65320	M525-0500-3250-BN
5/8	5/8	3/4	3	65330	M525-0625-0750-BN
		1-5/8	3-1/2	65370	M525-0625-1625-BN
		2-1/8	4	65380	M525-0625-2125-BN
		2-1/8	6	65390	M525-0625-2125-BN-L6
		2-5/8	5	65400	M525-0625-2625-BN
		3-1/4	6	65410	M525-0625-3250-BN
		4	6	65420	M525-0625-4000-BN-L6
3/4	3/4	1	3	65430	M525-0750-1000-BN
		1-5/8	4	65470	M525-0750-1625-BN
		2-3/8	5	65480	M525-0750-2375-BN
		2-3/8	6	65490	M525-0750-2375-BN-L6
		3-1/4	6	65500	M525-0750-3250-BN
		4-1/8	7	65510	M525-0750-4125-BN
1	1	1-3/4	4	65565	M525-1000-1750-BN
		2-5/8	5	65576	M525-1000-2625-BN
		3-1/4	6	65598	M525-1000-3250-BN
		4-1/4	7	65609	M525-1000-4250-BN
1-1/4	1-1/4	2	4-1/2	65653	M525-1250-2000-BN
		3-1/4	6	65664	M525-1250-3250-BN
		5	8	65675	M525-1250-5000-BN

NEW TOOL M525C

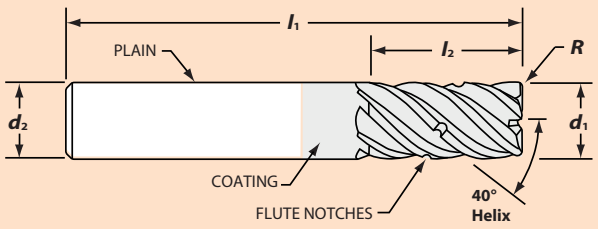
enDURO M525C with CHIP MANAGEMENT SYSTEM:

Shear Power.

IMCO's advanced technology brings you a new, distinctive flute pattern designed to save you time and money. Our unique flute design breaks the material into smaller chips to prevent machine clogging and chip recutting in the work piece. The smaller chips also helps prevent clogging in the machine auger that can lead to chip disposal problems.

Square End and Corner Radius with Chip Management System (CMS)

IMCO's Chip Management System (CMS) helps to eliminate the long, stringy chips that can occur when taking deep cuts in titanium and stainless steels. The CMS saves you time and money by breaking the chips to prevent "bird-nesting" and also by aiding the flow of coolant to the cutting zone, which helps wash away the chips.



Model Code: M525C w/Square End and Plain Shank

P

Cutter Dia d1	Shank Dia d2	Length of Cut l2	Overall Length l1	Order Code	EZ-ID Number M525C - xxxx - xxxx - SQ d1 l2
1/2	1/2	2-1/8	4	68250	M525C-0500-2125-SQ
		2-5/8	5	68255	M525C-0500-2625-SQ
		3-1/4	6	68260	M525C-0500-3250-SQ
5/8	5/8	2-1/8	4	68265	M525C-0625-2125-SQ
		2-5/8	5	68270	M525C-0625-2625-SQ
		3-1/4	6	68275	M525C-0625-3250-SQ
3/4	3/4	2-3/8	5	68280	M525C-0750-2375-SQ
		3-1/4	6	68285	M525C-0750-3250-SQ
		4-1/8	7	68290	M525C-0750-4125-SQ
1	1	2-5/8	5	68295	M525C-1000-2625-SQ
		3-1/4	6	68300	M525C-1000-3250-SQ
		4-1/4	7	68305	M525C-1000-4250-SQ

Model Code: M525C w/Square End and Plain Shank

P

Cutter Dia d1	Shank Dia d2	Length of Cut l2	Overall Length l1	Order Code	EZ-ID Number M525C - xxxx - xxxx - SQ d1 l2
12	12	50	100	66900	M525C-120-050-SQ
		75	150	66904	M525C-120-075-SQ
16	16	55	110	66908	M525C-160-055-SQ
		75	150	66912	M525C-160-075-SQ
20	20	65	125	66916	M525C-200-065-SQ
		85	150	66920	M525C-200-085-SQ
25	25	55	120	66924	M525C-250-055-SQ
		85	150	66928	M525C-250-085-SQ

Model Code: M525C w/Corner Radius and Plain Shank

P

Cutter Dia d1	Shank Dia d2	Length of Cut l2	Overall Length l1	Order Code by Corner Radius (R) .015 CR	.030 CR	.060 CR	.120 CR	EZ-ID Number M525C - xxxx - xxxx - xxx d1 l2 R
1/2	1/2	2-1/8	4	68251	68252	68253	68254	M525C-0500-2125-xxx
		2-5/8	5	68256	68257	68258	68259	M525C-0500-2625-xxx
		3-1/4	6	68261	68262	68263	68264	M525C-0500-3250-xxx
5/8	5/8	2-1/8	4	68266	68267	68268	68269	M525C-0625-2125-xxx
		2-5/8	5	68271	68272	68273	68274	M525C-0625-2625-xxx
		3-1/4	6	68276	68277	68278	68279	M525C-0625-3250-xxx
3/4	3/4	2-3/8	5	68281	68282	68283	68284	M525C-0750-2375-xxx
		3-1/4	6	68286	68287	68288	68289	M525C-0750-3250-xxx
		4-1/8	7	68291	68292	68293	68294	M525C-0750-4125-xxx
1	1	2-5/8	5	68296	68297	68298	68299	M525C-1000-2625-xxx
		3-1/4	6	68301	68302	68303	68304	M525C-1000-3250-xxx
		4-1/4	7	68306	68307	68308	68309	M525C-1000-4250-xxx

Model Code: M525C w/Corner Radius and Plain Shank

P

Cutter Dia d1	Shank Dia d2	Length of Cut l2	Overall Length l1	Order Code by Corner Radius (R) 0,75 CR	1,0 CR	1,5 CR	EZ-ID Number M525C - xxxx - xxxx - xxx d1 l2 R
12	12	50	100	66901	66902	66903	M525C-120-050-xxx
		75	150	66905	66906	66907	M525C-120-075-xxx
16	16	55	110	66909	66910	66911	M525C-160-055-xxx
		75	150	66913	66914	66915	M525C-160-075-xxx
20	20	65	125	66917	66918	66919	M525C-200-065-xxx
		85	150	66921	66922	66923	M525C-200-085-xxx
25	25	55	120	66925	66926	66927	M525C-250-055-xxx
		85	150	66929	66930	66931	M525C-250-085-xxx

TOOL TIP:

CMS: No More Cutting Zone Meltdowns

Taking deep axial cuts and light step-overs with constant tool engagement is a great technique to achieve high MMRs and tool life. However, this type of tool path can lead to long, stringy chips. The M525C with CMS breaks up these chips, preventing issues with chip evacuation and re-cutting, and allows you to speed through the cuts – all without reducing your tool life.

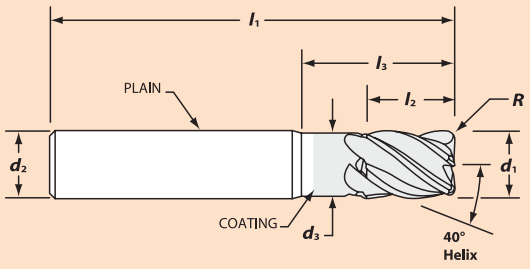
Short chips created with the M525C tool.

Long chips made when using a normal tool.

M525

Square End and Corner Radius with Neck Relief

M525N permits clearance in deeper cavities and easier machining tight against walls. Neck relief and short flute length mean increased end mill stability in the cut for more precise tolerances.



Model Code: M525 w/Square End and Neck Relief

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Cutter Dia d1	Shank Dia d2	Length of Cut l2	Overall Length l1	Reach/ LBS l3	Neck Style	Order Code	EZ-ID Number M525 - xxxx - xxxx - Nxxxx - SQ -Lxx d1 l2 l3 l1
1/4	1/4	3/8	2-1/2	5/8	Short	65031	M525-0250-0375-N0625-SQ
				1-1/8	Long	65680	M525-0250-0375-N1125-SQ
			3	5/8	Short	65037	M525-0250-0375-N0625-SQ-L3
				1-3/8	Long	65686	M525-0250-0375-N1375-SQ-L3
			4	5/8	Short	65043	M525-0250-0375-N0625-SQ-L4
				2-3/8	Long	65692	M525-0250-0375-N2375-SQ-L4
3/8	3/8	1/2	3	3/4	Short	65101	M525-0375-0500-N0750-SQ
				1-3/8	Long	65706	M525-0375-0500-N1375-SQ
			4	3/4	Short	65109	M525-0375-0500-N0750-SQ-L4
				2-3/8	Long	65714	M525-0375-0500-N2375-SQ-L4
			5	3/4	Short	65117	M525-0375-0500-N0750-SQ-L5
				3-3/8	Long	65722	M525-0375-0500-N3375-SQ-L5
			6	3/4	Short	65125	M525-0375-0500-N0750-SQ-L6
				4-3/8	Long	65730	M525-0375-0500-N4375-SQ-L6
1/2	1/2	5/8	3	7/8	Short	65222	M525-0500-0625-N0875-SQ
				1-3/8	Long	65738	M525-0500-0625-N1375-SQ
			4	7/8	Short	65231	M525-0500-0625-N0875-SQ-L4
				2-1/4	Long	65747	M525-0500-0625-N2250-SQ-L4
			5	7/8	Short	65240	M525-0500-0625-N0875-SQ-L5
				3-1/4	Long	65756	M525-0500-0625-N3250-SQ-L5
			6	7/8	Short	65249	M525-0500-0625-N0875-SQ-L6
				4-1/4	Long	65765	M525-0500-0625-N4250-SQ-L6
5/8	5/8	3/4	4	1	Short	65331	M525-0625-0750-N1000-SQ
				2-1/8	Long	65774	M525-0625-0750-N2125-SQ
			5	1	Short	65341	M525-0625-0750-N1000-SQ-L5
				3-1/8	Long	65784	M525-0625-0750-N3125-SQ-L5
			6	1	Short	65351	M525-0625-0750-N1000-SQ-L6
				4-1/8	Long	65794	M525-0625-0750-N4125-SQ-L6
3/4	3/4	1	4	1-1/4	Short	65431	M525-0750-1000-N1250-SQ
				2	Long	65804	M525-0750-1000-N2000-SQ
			5	1-1/4	Short	65441	M525-0750-1000-N1250-SQ-L5
				2-7/8	Long	65814	M525-0750-1000-N2875-SQ-L5
			6	1-1/4	Short	65451	M525-0750-1000-N1250-SQ-L6
				3-7/8	Long	65824	M525-0750-1000-N3875-SQ-L6
			7	1-1/4	Short	67051	M525-0750-1000-N1250-SQ-L7
				4-7/8	Long	67061	M525-0750-1000-N4875-SQ-L7
1	1	1-1/4	4	1-1/2	Short	65511	M525-1000-1250-N1500-SQ
				2-1/4	Long	65834	M525-1000-1250-N2250-SQ
			5	1-1/2	Short	65522	M525-1000-1250-N1500-SQ-L5
				2-5/8	Long	65845	M525-1000-1250-N2625-SQ-L5
			6	1-1/2	Short	65533	M525-1000-1250-N1500-SQ-L6
				3-5/8	Long	65856	M525-1000-1250-N3625-SQ-L6
			7	1-1/2	Short	65544	M525-1000-1250-N1500-SQ-L7
				4-5/8	Long	65867	M525-1000-1250-N4625-SQ-L7
1-1/4	1-1/4	1-1/2	4-1/2	1-3/4	Short	65610	M525-1250-1500-N1750-SQ
				2-1/2	Long	65878	M525-1250-1500-N2500-SQ
			6	1-3/4	Short	65621	M525-1250-1500-N1750-SQ-L6
				3-5/8	Long	65889	M525-1250-1500-N3625-SQ-L6
			8	1-3/4	Short	65632	M525-1250-1500-N1750-SQ-L8
				5-5/8	Long	65900	M525-1250-1500-N5625-SQ-L8

Model Code: M525 w/Square End and Neck Relief

P

Cutter Dia d1	Shank Dia d2	Length of Cut l2	Overall Length l1	Reach/ LBS l3	Neck Style	Order Code	EZ-ID Number M525 - xxx - xxx - Nxxx - SQ - Lxxx d1 l2 l3 l1
6	6	8	63	14	Short	68407	M525-060-008-N014-SQ
				27	Long	66701	M525-060-008-N027-SQ
			75	14	Short	68408	M525-060-008-N014-SQ-L075
				39	Long	66706	M525-060-008-N039-SQ-L075
			100	14	Short	68409	M525-060-008-N014-SQ-L100
				64	Long	66711	M525-060-008-N064-SQ-L100
8	8	10	63	16	Short	68410	M525-080-010-N016-SQ
				27	Long	66716	M525-080-010-N027-SQ
			75	16	Short	68411	M525-080-010-N016-SQ-L075
				39	Long	66721	M525-080-010-N039-SQ-L075
			100	16	Short	68412	M525-080-010-N016-SQ-L100
				64	Long	66727	M525-080-010-N064-SQ-L100
10	10	12	72	18	Short	68413	M525-100-012-N018-SQ
				32	Long	66733	M525-100-012-N032-SQ
			100	18	Short	68414	M525-100-012-N018-SQ-L100
				60	Long	66740	M525-100-012-N060-SQ-L100
			150	18	Short	68415	M525-100-012-N018-SQ-L150
				110	Long	66747	M525-100-012-N110-SQ-L150
12	12	15	83	21	Short	68416	M525-120-015-N021-SQ
				38	Long	66754	M525-120-015-N038-SQ
			100	21	Short	68417	M525-120-015-N021-SQ-L100
				55	Long	66761	M525-120-015-N055-SQ-L100
			125	21	Short	68418	M525-120-015-N021-SQ-L125
				80	Long	66768	M525-120-015-N080-SQ-L125
			150	21	Short	68419	M525-120-015-N021-SQ-L150
				105	Long	66775	M525-120-015-N105-SQ-L150
16	16	20	110	26	Short	68420	M525-160-020-N026-SQ
				62	Long	66782	M525-160-020-N062-SQ
			150	26	Short	68421	M525-160-020-N026-SQ-L150
				102	Long	66789	M525-160-020-N102-SQ-L150
20	20	25	100	31	Short	68422	M525-200-025-N031-SQ
				50	Long	66796	M525-200-025-N050-SQ
			125	31	Short	68423	M525-200-025-N031-SQ-L125
				75	Long	66803	M525-200-025-N075-SQ-L125
			150	31	Short	68424	M525-200-025-N031-SQ-L150
				100	Long	66811	M525-200-025-N100-SQ-L150
25	25	32	120	38	Short	68425	M525-250-032-N038-SQ
				64	Long	66819	M525-250-032-N064-SQ
			150	38	Short	68426	M525-250-032-N038-SQ-L150
				94	Long	66827	M525-250-032-N094-SQ-L150

GOT LBS?

Getting the right flute and neck length is easy with IMCO's M525N end mills.

Use M525N with short neck relief to get the length of cut (LOC) and overall length (OAL) you need when long reach is critical, but a necked shank is not.

Use M525N with long neck relief to get the clearance to machine parts in deep cavities and a necked shank is critical.

Model Code: M525
w/Corner Radius and Neck Relief

Cutter Dia d1	Shank Dia d2	Length of Cut l2	Overall Length l1	Reach/ LBS l3	Neck Style	Order Code by Corner Radius (R) (replace -xxx in EZ-ID number with decimal size shown below) .015 CR	.030 CR	.060 CR	.090 CR	.120 CR	.156 CR	.190 CR	.250 CR	.375 CR	EZ-ID Number M525-xxxx-xxxx-Nxxxx-xxx-Lx d1 l2 l3 R l1
1/4	1/4	3/8	2-1/2	5/8	Short	65032	65033	65034	65035						-0250-0375-N0625-xxx
				1-1/8	Long	65681	65682	65683	65684						-0250-0375-N1125-xxx
			3	5/8	Short	65038	65039	65040	65041						-0250-0375-N0625-xxx-L3
				1-3/8	Long	65687	65688	65689	65690						-0250-0375-N1375-xxx-L3
			4	5/8	Short	65044	65045	65046	65047						-0250-0375-N0625-xxx-L4
				2-3/8	Long	65693	65694	65695	65696						-0250-0375-N2375-xxx-L4
3/8	3/8	1/2	3	3/4	Short	65102	65103	65104	65105	65106	65107				-0375-0500-N0750-xxx
				1-3/8	Long	65707	65708	65709	65710	65711	65712				-0375-0500-N1375-xxx
			4	3/4	Short	65110	65111	65112	65113	65114	65115				-0375-0500-N0750-xxx-L4
				2-3/8	Long	65715	65716	65717	65718	65719	65720				-0375-0500-N2375-xxx-L4
			5	3/4	Short	65118	65119	65120	65121	65122	65123				-0375-0500-N0750-xxx-L5
				3-3/8	Long	65723	65724	65725	65726	65727	65728				-0375-0500-N3375-xxx-L5
			6	3/4	Short	65126	65127	65128	65129	65130	65131				-0375-0500-N0750-xxx-L6
				4-3/8	Long	65731	65732	65733	65734	65735	65736				-0375-0500-N4375-xxx-L6
1/2	1/2	5/8	3	7/8	Short	65223	65224	65225	65226	65227	65228	65229			-0500-0625-N0875-xxx
				1-3/8	Long	65739	65740	65741	65742	65743	65744	65745			-0500-0625-N1375-xxx
			4	7/8	Short	65232	65233	65234	65235	65236	65237	65238			-0500-0625-N0875-xxx-L4
				2-1/4	Long	65748	65749	65750	65751	65752	65753	65754			-0500-0625-N2250-xxx-L4
			5	7/8	Short	65241	65242	65243	65244	65245	65246	65247			-0500-0625-N0875-xxx-L5
				3-1/4	Long	65757	65758	65759	65760	65761	65762	65763			-0500-0625-N3250-xxx-L5
			6	7/8	Short	65250	65251	65252	65253	65254	65255	65256			-0500-0625-N0875-xxx-L6
				4-1/4	Long	65766	65767	65768	65769	65770	65771	65772			-0500-0625-N4250-xxx-L6
5/8	5/8	3/4	4	1	Short	65332	65333	65334	65335	65336	65337	65338	65339		-0625-0750-N1000-xxx
				2-1/8	Long	65775	65776	65777	65778	65779	65780	65781	65782		-0625-0750-N2125-xxx
			5	1	Short	65342	65343	65344	65345	65346	65347	65348	65349		-0625-0750-N1000-xxx-L5
				3-1/8	Long	65785	65786	65787	65788	65789	65790	65791	65792		-0625-0750-N3125-xxx-L5
			6	1	Short	65352	65353	65354	65355	65356	65357	65358	65359		-0625-0750-N1000-xxx-L6
				4-1/8	Long	65795	65796	65797	65798	65799	65800	65801	65802		-0625-0750-N4125-xxx-L6
3/4	3/4	1	4	1-1/4	Short	65432	65433	65434	65435	65436	65437	65438	65439		-0750-1000-N1250-xxx
				2	Long	65805	65806	65807	65808	65809	65810	65811	65812		-0750-1000-N2000-xxx
			5	1-1/4	Short	65442	65443	65444	65445	65446	65447	65448	65449		-0750-1000-N1250-xxx-L5
				2-7/8	Long	65815	65816	65817	65818	65819	65820	65821	65822		-0750-1000-N2875-xxx-L5
			6	1-1/4	Short	65452	65453	65454	65455	65456	65457	65458	65459		-0750-1000-N1250-xxx-L6
				3-7/8	Long	65825	65826	65827	65828	65829	65830	65831	65832		-0750-1000-N3875-xxx-L6
			7	1-1/4	Short	67052	67053	67054	67055	67056	67057	67058	67059		-0750-1000-N1250-xxx-L7
				4-7/8	Long	67062	67063	67064	67065	67066	67067	67068	67069		-0750-1000-N48750-xxx-L7
1	1	1-1/4	4	1-1/2	Short	65512	65513	65514	65515	65516	65517	65518	65519	65520	-1000-1250-N1500-xxx
				2-1/4	Long	65835	65836	65837	65838	65839	65840	65841	65842	65843	-1000-1250-N2250-xxx
			5	1-1/2	Short	65523	65524	65525	65526	65527	65528	65529	65530	65531	-1000-1250-N1500-xxx-L5
				2-5/8	Long	65846	65847	65848	65849	65850	65851	65852	65853	65854	-1000-1250-N2625-xxx-L5
			6	1-1/2	Short	65534	65535	65536	65537	65538	65539	65540	65541	65542	-1000-1250-N1500-xxx-L6
				3-5/8	Long	65857	65858	65859	65860	65861	65862	65863	65864	65865	-1000-1250-N3625-xxx-L6
			7	1-1/2	Short	65545	65546	65547	65548	65549	65550	65551	65552	65553	-1000-1250-N1500-xxx-L7
				4-5/8	Long	65868	65869	65870	65871	65872	65873	65874	65875	65876	-1000-1250-N4625-xxx-L7
1-1/4	1-1/4	1-1/2	4-1/2	1-3/4	Short	65611	65612	65613	65614	65615	65616	65617	65618	65619	-1250-1500-N1750-xxx
				2-1/2	Long	65879	65880	65881	65882	65883	65884	65885	65886	65887	-1250-1500-N2500-xxx
			6	1-3/4	Short	65622	65623	65624	65625	65626	65627	65628	65629	65630	-1250-1500-N1750-xxx-L6
				3-5/8	Long	65890	65891	65892	65893	65894	65895	65896	65897	65898	-1250-1500-N3625-xxx-L6
			8	1-3/4	Short	65633	65634	65635	65636	65637	65638	65639	65640	65641	-1250-1500-N1750-xxx-L8
				5-5/8	Long	65901	65902	65903	65904	65905	65906	65907	65908	65909	-1250-1500-N5625-xxx-L8

= M525 (to complete the EZ-ID number)

Model Code: M525
w/Corner Radius and Neck Relief

P

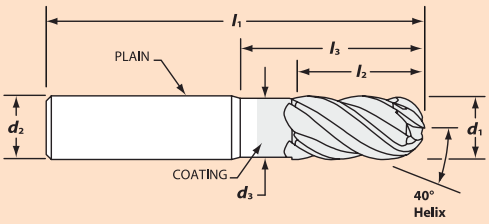
Cutter Dia d1	Shank Dia d2	Length of Cut l2	Overall Length l1	Reach/ LBS l3	Neck Style	Order Code by Corner Radius (R) (replace -xxx in EZ-ID number with mm size shown below) 0,5 CR	1,0 CR	1,5 CR	2,0 CR	3,0 CR	4,0 CR	5,0 CR	EZ-ID Number M525 - xxx (d1) - xxx (l2) - Nxxx (l3) - xxx (R) - Lxxx (l1)
6	6	8	63	14	Short	68427	68428	68429					M525-060-008-N014-xxx
				27	Long	66835	66843	66851					M525-060-008-N027-xxx
			75	14	Short	68430	68431	68432					M525-060-008-N014-xxx-L075
				39	Long	66859	66867	66702					M525-060-008-N039-xxx-L075
			100	14	Short	68433	68434	68435					M525-060-008-N014-xxx-L100
				64	Long	66703	66704	66705					M525-060-008-N064-xxx-L100
8	8	10	63	16	Short	68436	68437	68438					M525-080-010-N016-xxx
				27	Long	66707	66708	66709					M525-080-010-N027-xxx
			75	16	Short	68439	68440	68441					M525-080-010-N016-xxx-L075
				39	Long	66710	66712	66713					M525-080-010-N039-xxx-L075
			100	16	Short	68442	68443	68444					M525-080-010-N016-xxx-L100
				64	Long	66714	66715	66717					M525-080-010-N064-xxx-L100
10	10	12	72	18	Short	68445	68446	68447	68448				M525-100-012-N018-xxx
				32	Long	66718	66719	66720	66722				M525-100-012-N032-xxx
			100	18	Short	68449	68450	68451	68452				M525-100-012-N018-xxx-L100
				60	Long	66723	66724	66725	66726				M525-100-012-N060-xxx-L100
			150	18	Short	68453	68454	68455	68456				M525-100-012-N018-xxx-L150
				110	Long	66728	66729	66730	66731				M525-100-012-N110-xxx-L150
12	12	15	83	21	Short	68457	68458	68459	68460	68461			M525-120-015-N021-xxx
				38	Long	66732	66734	66735	66736	66737			M525-120-015-N038-xxx
			100	21	Short	68462	68463	68464	68465	68466			M525-120-015-N021-xxx-L100
				55	Long	66738	66739	66741	66742	66743			M525-120-015-N055-xxx-L100
			125	21	Short	68467	68468	68469	68470	68471			M525-120-015-N021-xxx-L125
				80	Long	66744	66745	66746	66748	66749			M525-120-015-N080-xxx-L125
			150	21	Short	68472	68473	68474	68475	68476			M525-120-015-N021-xxx-L150
				105	Long	66750	66751	66752	66753	66755			M525-120-015-N105-xxx-L150
16	16	20	110	26	Short		68477	68478	68479	68480	68481		M525-160-020-N026-xxx
				62	Long		66756	66757	66758	66759	66760		M525-160-020-N062-xxx
			150	26	Short		68482	68483	68484	68485	68486		M525-160-020-N026-xxx-L150
				102	Long		66762	66763	66764	66765	66766		M525-160-020-N102-xxx-L150
20	20	25	100	31	Short		68487	68488	68489	68490	68491	68492	M525-200-025-N031-xxx
				50	Long		66767	66769	66770	66771	66772	66773	M525-200-025-N050-xxx
			125	31	Short		68493	68494	68495	68496	68497	68498	M525-200-025-N031-xxx-L125
				75	Long		66774	66776	66777	66778	66779	66780	M525-200-025-N075-xxx-L125
			150	31	Short		68499	68500	68501	68502	68503	68504	M525-200-025-N031-xxx-L150
				100	Long		66781	66783	66784	66785	66786	66787	M525-200-025-N100-xxx-L150
25	25	32	120	38	Short		68505	68506	68507	68508	68509	68510	M525-250-032-N038-xxx
				64	Long		66788	66790	66791	66792	66793	66794	M525-250-032-N064-xxx
			150	38	Short		68511	68512	68513	68514	68515	68516	M525-250-032-N038-xxx-L150
				94	Long		66795	66797	66798	66799	66800	66801	M525-250-032-N094-xxx-L150

Model Code: M525 w/Ball End and Neck Relief

P

Ball End with Neck Relief

M525N permits clearance in deeper cavities and easier machining against tight walls. Neck relief and short flute length mean increased end mill stability in the cut for more precise tolerances.



Minimizes tool deflection and increases productivity when contouring deep cavities.

Cutter Dia d1	Shank Dia d2	Length of Cut l2	Overall Length l1	Reach/ LBS l3	Neck Style	Order Code	EZ-ID Number M525 - xxxx - xxxx - Nxxxx - BN - Lxx d1 l2 l3 l1
1/4	1/4	3/8	2-1/2	5/8	Short	65036	M525-0250-0375-N0625-BN
				1-1/8	Long	65685	M525-0250-0375-N1125-BN
			3	5/8	Short	65042	M525-0250-0375-N0625-BN-L3
				1-3/8	Long	65691	M525-0250-0375-N1375-BN-L3
			4	5/8	Short	65048	M525-0250-0375-N0625-BN-L4
				2-3/8	Long	65697	M525-0250-0375-N2375-BN-L4
3/8	3/8	1/2	3	3/4	Short	65108	M525-0375-0500-N0750-BN
				1-3/8	Long	65713	M525-0375-0500-N1375-BN
			4	3/4	Short	65116	M525-0375-0500-N0750-BN-L4
				2-3/8	Long	65721	M525-0375-0500-N2375-BN-L4
			5	3/4	Short	65124	M525-0375-0500-N0750-BN-L5
				3-3/8	Long	65729	M525-0375-0500-N3375-BN-L5
			6	3/4	Short	65132	M525-0375-0500-N0750-BN-L6
				4-3/8	Long	65737	M525-0375-0500-N4375-BN-L6
1/2	1/2	5/8	3	7/8	Short	65230	M525-0500-0625-N0875-BN
				1-3/8	Long	65746	M525-0500-0625-N1375-BN
			4	7/8	Short	65239	M525-0500-0625-N0875-BN-L4
				2-1/4	Long	65755	M525-0500-0625-N2250-BN-L4
			5	7/8	Short	65248	M525-0500-0625-N0875-BN-L5
				3-1/4	Long	65764	M525-0500-0625-N3250-BN-L5
			6	7/8	Short	65257	M525-0500-0625-N0875-BN-L6
				4-1/4	Long	65773	M525-0500-0625-N4250-BN-L6
5/8	5/8	3/4	4	1	Short	65340	M525-0625-0750-N1000-BN
				2-1/8	Long	65783	M525-0625-0750-N2125-BN
			5	1	Short	65350	M525-0625-0750-N1000-BN-L5
				3-1/8	Long	65793	M525-0625-0750-N3125-BN-L5
			6	1	Short	65360	M525-0625-0750-N1000-BN-L6
				4-1/8	Long	65803	M525-0625-0750-N4125-BN-L6
3/4	3/4	1	4	1-1/4	Short	65440	M525-0750-1000-N1250-BN
				2	Long	65813	M525-0750-1000-N2000-BN
			5	1-1/4	Short	65450	M525-0750-1000-N1250-BN-L5
				2-7/8	Long	65823	M525-0750-1000-N2875-BN-L5
			6	1-1/4	Short	65460	M525-0750-1000-N1250-BN-L6
				3-7/8	Long	65833	M525-0750-1000-N3875-BN-L6
			7	1-1/4	Short	67060	M525-0750-1000-N1250-BN-L7
				4-7/8	Long	67070	M525-0750-1000-N4875-BN-L7
1	1	1-1/4	4	1-1/2	Short	65521	M525-1000-1250-N1500-BN
				2-1/4	Long	65844	M525-1000-1250-N2250-BN
			5	1-1/2	Short	65532	M525-1000-1250-N1500-BN-L5
				2-5/8	Long	65855	M525-1000-1250-N2625-BN-L5
			6	1-1/2	Short	65543	M525-1000-1250-N1500-BN-L6
				3-5/8	Long	65866	M525-1000-1250-N3625-BN-L6
			7	1-1/2	Short	65554	M525-1000-1250-N1500-BN-L7
				4-5/8	Long	65877	M525-1000-1250-N4625-BN-L7
1-1/4	1-1/4	1-1/2	4-1/2	1-3/4	Short	65620	M525-1250-1500-N1750-BN
				2-1/2	Long	65888	M525-1250-1500-N2500-BN
			6	1-3/4	Short	65631	M525-1250-1500-N1750-BN-L6
				3-5/8	Long	65899	M525-1250-1500-N3625-BN-L6
			8	1-3/4	Short	65642	M525-1250-1500-N1750-BN-L8
				5-5/8	Long	65910	M525-1250-1500-N5625-BN-L8

Model Code: M525
w/Ball End and Neck Relief

P

Cutter Dia d1	Shank Dia d2	Length of Cut l2	Overall Length l1	Reach/ LBS l3	Neck Style	Order Code	EZ-ID Number M525 - xxx - xxx - Nxxx - BN - Lxxx d1 l2 l3 l1
6	6	8	63	14	Short	68517	M525-060-008-N014-BN
				27	Long	66802	M525-060-008-N027-BN
			75	14	Short	68518	M525-060-008-N014-BN-L075
				39	Long	66804	M525-060-008-N039-BN-L075
			100	14	Short	68519	M525-060-008-N014-BN-L100
				64	Long	66805	M525-060-008-N064-BN-L100
8	8	10	63	16	Short	68520	M525-080-010-N016-BN
				27	Long	66806	M525-080-010-N027-BN
			75	16	Short	68521	M525-080-010-N016-BN-L075
				39	Long	66807	M525-080-010-N039-BN-L075
			100	16	Short	68522	M525-080-010-N016-BN-L100
				64	Long	66808	M525-080-010-N064-BN-L100
10	10	12	72	18	Short	68523	M525-100-012-N018-BN
				32	Long	66809	M525-100-012-N032-BN
			100	18	Short	68524	M525-100-012-N018-BN-L100
				60	Long	66810	M525-100-012-N060-BN-L100
			150	18	Short	68525	M525-100-012-N018-BN-L150
				110	Long	66812	M525-100-012-N110-BN-L150
12	12	15	83	21	Short	68526	M525-120-015-N021-BN
				38	Long	66813	M525-120-015-N038-BN
			100	21	Short	68527	M525-120-015-N021-BN-L100
				55	Long	66814	M525-120-015-N055-BN-L100
			125	21	Short	68528	M525-120-015-N021-BN-L125
				80	Long	66815	M525-120-015-N080-BN-L125
			150	21	Short	68529	M525-120-015-N021-BN-L150
				105	Long	66816	M525-120-015-N105-BN-L150
16	16	20	110	26	Short	68530	M525-160-020-N026-BN
				62	Long	66817	M525-160-020-N062-BN
			150	26	Short	68531	M525-160-020-N026-BN-L150
				102	Long	66818	M525-160-020-N102-BN-L150
20	20	25	100	31	Short	68532	M525-200-025-N031-BN
				50	Long	66820	M525-200-025-N050-BN
			125	31	Short	68533	M525-200-025-N031-BN-L125
				75	Long	66821	M525-200-025-N075-BN-L125
			150	31	Short	68534	M525-200-025-N031-BN-L150
				100	Long	66822	M525-200-025-N100-BN-L150
25	25	32	120	38	Short	68535	M525-250-032-N038-BN
				64	Long	66823	M525-250-032-N064-BN
			150	38	Short	68536	M525-250-032-N038-BN-L150
				94	Long	66824	M525-250-032-N094-BN-L150

BLENDER™ MILL

Eliminate witness marks and deflection issues.

Finishing fillets in titanium and stainless steel is a breeze – even in thin-walled parts – using the unique Blender™ mill from IMCO.

The Blender mill is specifically designed for finishing fillets and floors, and it's available with several corner radius options. After roughing with the enDURO® M525 using high-efficiency machining, finish the fillet and the floor with just one tool – the Blender mill. With minimal passes you'll have the fillet blended to the finished wall and a great floor finish.

Eliminate witness lines – The Blender mill's unique flute and radius designs finish the fillet and wipe out witness marks above the radius.

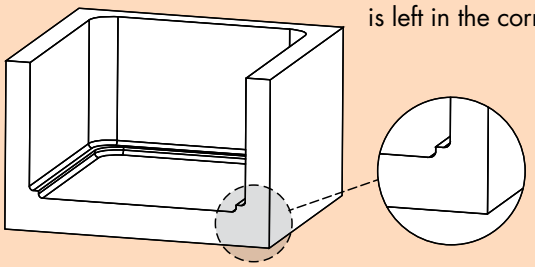
Blend fillets and finish floors faster, easier – Finish the floor and the fillets at the same Z level with the Blender mill's special end geometry.

Increase productivity and reduce deflection – The Blender mill's variably spaced flute design and low flute-to-overall length ratio reduce harmonics and increase rigidity, improving tool life and productivity even in deep pockets and thin-walled parts.

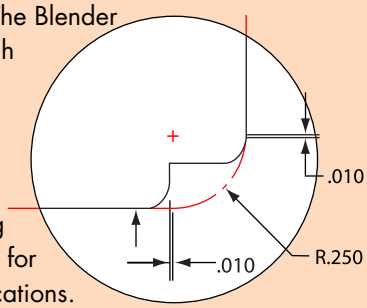
Cut costs – The Blender mill isolates and controls the machining of fillets, eliminating the need for expensive, customized roughing tools with special corner radii.

How to Finish a Fillet Radius with the Blender™ Mill

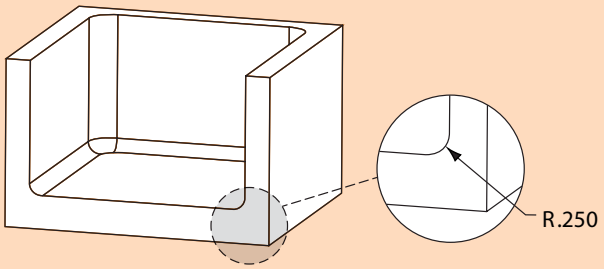
Step 1 In this example, the part requires a pocket with a .250 fillet radius. Using constant radial engagement, the pocket is roughed out, and the walls and floors are finished using a series of M525 enDURO® end mills. Note that a controlled amount of material is left in the corner.



Step 2 Finishing passes on the walls and floors are stopped .010 in. from the tangent points of the .250 in. radius. The Blender mill will be used to rough and finish the fillet. Its exclusive design eliminates unnecessary flute length, increasing core strength and giving the tool superior rigidity for these deep reach applications.



Step 3 Starting at the floor depth, the stepover on the first pass is set at 25% of the mill diameter. The stepover on the second pass is made at the final fillet dimension.The Blender mill leaves no witness marks on the floor or walls.



FLOOR FINISHING OPTION: The unique geometry of the Blender mill gives you the option of finishing the floor as well as the fillet radius. Leave .005 in.–.015 in. of stock on the floor depending on the material (see chart below) and step over 25% of the mill's diameter per pass. Use the same speed and feed rates to finish both floor and fillet radius.

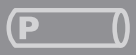
Blender Mill Application Guide • Speed & Feed

ISO Classification	Work Material	Type of Cut	Axial DOC	Radial DOC	No. of Flutes	Speed (SFM)	Feed (In. per Tooth) 3/8	1/2	5/8	3/4	1
S	Titanium Alloys 6Al-4V, 6-2-4	Floor Finishing	.005 - .007	.25 x D	5	250	.0018	.0024	.0030	.0036	.0048
		Fillet Radius Finishing	Final floor depth	See below*	5	250	.0018	.0024	.0030	.0036	.0048
	Hi-Temp Alloys Inconel, Hastelloy	Floor Finishing	.005 - .007	.25 x D	5	150	.0020	.0027	.0033	.0040	.0053
		Fillet Radius Finishing	Final floor depth	See below*	5	150	.0020	.0027	.0033	.0040	.0053
M	Austenitic Stainless Steels, FeNi Alloys 303, 304, 316, Invar, Kovar	Floor Finishing	.005 - .010	.25 x D	5	300	.0018	.0024	.0030	.0036	.0048
		Fillet Radius Finishing	Final floor depth	See below*	5	300	.0018	.0024	.0030	.0036	.0048
	Precipitation Hardening Stainless Steels 17-4, 15-5, 13-8	Floor Finishing	.005 - .010	.25 x D	5	300	.0019	.0025	.0032	.0038	.0051
		Fillet Radius Finishing	Final floor depth	See below*	5	300	.0019	.0025	.0032	.0038	.0051
P	Martensitic & Ferritic Stainless Steels 410, 416, 440	Floor Finishing	.005 - .015	.25 x D	5	300	.0019	.0025	.0032	.0038	.0051
		Fillet Radius Finishing	Final floor depth	See below*	5	300	.0019	.0025	.0032	.0038	.0051
	Tool and Die Steels A2, D2, O1, S7, P20, H13	Floor Finishing	.005 - .015	.25 x D	5	300	.0020	.0027	.0033	.0040	.0053
		Fillet Radius Finishing	Final floor depth	See below*	5	300	.0020	.0027	.0033	.0040	.0053

TOOL TIPS:

* Radial cut guide for finishing fillet radii: **First pass** = Max radial cut of .25 x mill diameter, leaving .010" on wall; **Second pass** = Remove the final .010" of material; **Third pass (if needed)** = Run a "spring" pass to ensure finish and fillet dimensional accuracy.
- Reduce speed and feed rates by 20% when your tool has an overall length greater than 10x the diameter.
- Rough the part to +.010" above and adjacent to the fillet radius.
- Maintain a total indicator runout (TIR) <.0005" for maximum tool life and a superior surface finish.
- Using a tool radius smaller than the fillet radius will require extra passes.

Model Code: M525
Blender Mill with Plain Shank



Cutter Dia d1	Shank Dia d2	Length of Cut l2	Reach/ LBS l3	Overall Length l1	Order Code by Corner Radius (R) (replace -xxx in EZ-ID number with decimal size shown below) .060 CR	.090 CR	.120 CR	.156 CR	.190 CR	.250 CR	.375 CR	EZ-ID Number M525 - xxxx -EB20 -Nxxxx-xxx d1 l2 l3 R
3/8	3/8	2 x R	2-3/8	4	66940	66941	66942	66943				M525-0375-EB20-N2375-xxx
			3-3/8	5	66944	66945	66946	66947				M525-0375-EB20-N3375-xxx
			4-3/8	6	66948	66949	66950	66951				M525-0375-EB20-N4375-xxx
1/2	1/2	2 x R	2-1/8	4	66952	66953	66954	66955	66956			M525-0500-EB20-N2125-xxx
			3-1/8	5	66957	66958	66959	66960	66961			M525-0500-EB20-N3125-xxx
			4-1/8	6	66962	66963	66964	66965	66966			M525-0500-EB20-N4125-xxx
5/8	5/8	2 x R	2-1/8	4	66967	66968	66969	66970	66971	66972		M525-0625-EB20-N2125-xxx
			3-1/8	5	66973	66974	66975	66976	66977	66978		M525-0625-EB20-N3125-xxx
			4-1/8	6	66979	66980	66981	66982	66983	66984		M525-0625-EB20-N4125-xxx
3/4	3/4	2 x R	1-7/8	4	66985	66986	66987	66988	66989	66990		M525-0750-EB20-N1875-xxx
			2-7/8	5	66991	66992	66993	66994	66995	66996		M525-0750-EB20-N2875-xxx
			3-7/8	6	66997	66998	66999	67000	67001	67002		M525-0750-EB20-N3875-xxx
			4-7/8	7	67071	67072	67073	67074	67075	67076		M525-0750-EB20-N4875-xxx
1	1	2 x R	1-3/4	4	67003	67004	67005	67006	67007	67008	67009	M525-1000-EB20-N1750-xxx
			2-3/4	5	67010	67011	67012	67013	67014	67015	67016	M525-1000-EB20-N2750-xxx
			3-3/4	6	67017	67018	67019	67020	67021	67022	67023	M525-1000-EB20-N3750-xxx
			4-3/4	7	67077	67078	67079	67080	67081	67082	67083	M525-1000-EB20-N4750-xxx

Model Code: M525
Blender Mill with Plain Shank

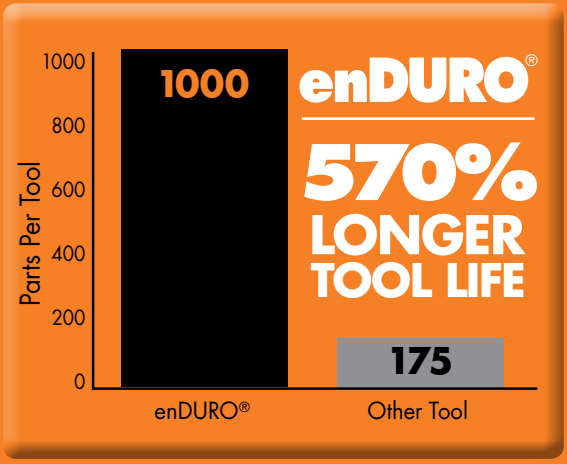
Cutter Dia d1	Shank Dia d2	Length of Cut l2	Reach/ LBS l3	Overall Length l1	Order Code by Corner Radius (R) (replace -xxx in EZ-ID number with mm size shown below) 1,5 CR	2,0 CR	3,0 CR	4,0 CR	5,0 CR	6,0 CR	9,5 CR	EZ-ID Number M525 - xxxx -EB20 -Nxxxx-xxx d1 l2 l3 R
10	10	2 x R	60	100	68900	68901	68902	68903				M525-100-EB20-N060-xxx
			85	125	68904	68905	68906	68907				M525-100-EB20-N085-xxx
			110	150	68908	68909	68910	68911				M525-100-EB20-N110-xxx
12	12	2 x R	55	100	68912	68913	68914	68915	68916			M525-120-EB20-N055-xxx
			80	125	68917	68918	68919	68920	68921			M525-120-EB20-N080-xxx
			105	150	68922	68923	68924	68925	68926			M525-120-EB20-N105-xxx
16	16	2 x R	52	100	68927	68928	68929	68930	68931	68932		M525-160-EB20-N052-xxx
			77	125	68933	68934	68935	68936	68937	68938		M525-160-EB20-N077-xxx
			102	150	68939	68940	68941	68942	68943	68944		M525-160-EB20-N102-xxx
20	20	2 x R	54	104	68945	68946	68947	68948	68949	68950		M525-200-EB20-N054-xxx
			75	125	68951	68952	68953	68954	68955	68956		M525-200-EB20-N075-xxx
			100	150	68957	68958	68959	68960	68961	68962		M525-200-EB20-N100-xxx
25	25	2 x R	64	120	68963	68964	68965	68966	68967	68968	68969	M525-250-EB20-N064-xxx
			94	150	68970	68971	68972	68973	68974	68975	68976	M525-250-EB20-N094-xxx

PROFILE:

Russ Johnson

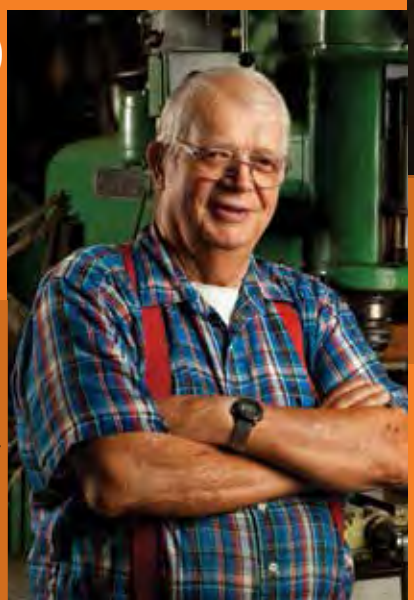
Russ Johnson's 20-year history as a CNC programmer is a benefit to his customers. Jim O'Leary with **Bob's Design Engineering** knows it well. A progressive R&D prototype machine shop, Bob's Design does a lot of high-speed/high-performance tool testing.

When they tested enDURO® tools against two others in 316 stainless steel, *everyone* was astounded.



The results

- **570% longer tool life (175 parts per tool to 1000)**
- **600% increase in cubic inches of material removed**
- **600% higher feed rate (ipm)**
- **Average of 10% to 40% reduction in cycle time**



A jump in parts per tool is enough to make anyone smile, even Bob's Design Engineering founder Bob Hale.

"I've never seen an end mill run in stainless steel like that before," Jim says. "To say we were impressed is putting it mildly."

Working in stainless steel may not typically bring smiles, but it does now for Tool Engineer Jim O'Leary (left), Programmer/machinist Jeremie Groshong (center) and Russ Johnson at Bob's Design Engineering.

New Website

imcousa.com

Point. Click. Game changed.

User-focused navigation – Start with machining type (milling, holemaking, deburring, etc.), then you choose how you want to look further – by tool family, by application or by end type, whatever works best for you.

Complete tool info – Dimensions and drawings, flutes, coatings, end cuts, sizes ... everything you need to know. Downloadable catalogs, too.

Real-time data for distributors – Password-protected access 24/7 for secure online ordering, real-time inventory checks, order tracking and more. With 24/7 access to real-time information, you can respond to customer needs on the spot, anytime. When priorities shift from minute to minute, speed and flexibility are game changers.

"Our information technology should be as advanced, intuitive and productivity-driven as our cutting tool technology. Now, it is."
– IMCO President Perry Osburn

EZ-ID

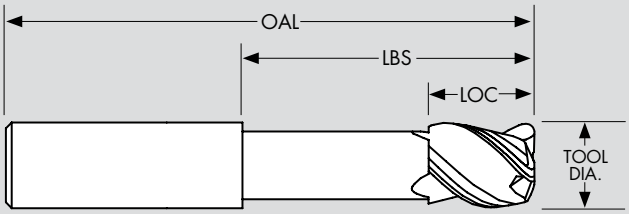
How to build the EZ-ID code.

IMCO's "smart" coding system saves you time locating part numbers. Just use the specifics of the tool you need, "plug" them into the coding system, and you're there!

How EZ-ID works.

Each EZ-ID part number actually describes the tool itself. It starts with general information (type of tool and tool "family") and gets more specific as you go.

SQ = square end, BN = ball nose, CC = corner



Building the EZ-ID code, step by step.

Insert the numbers in the segments as indicated here. If a certain segment doesn't apply (neck dimension, nonstandard length or special shank), just skip it. Separate the segments with hyphens.

1 Enter the model number.

For example, the model number for the new enDURO® M5 with 5 flutes would be M525 (M525C = Chip Management Technology)

2 Enter the **tool diameter** (always to three decimal places). Include the leading zero for diameters less than 1in. or 10mm

3 Enter the **length of cut (LOC).** Include the leading zero for a LOC less than 1in. or 10mm.

4 Enter the **length below shank (LBS) or reach** Include the leading zero for LBS less than 1in. or 100mm. Indicate that this is a neck dimension by placing an N before the number. (If the tool has no neck, you can skip this segment altogether.)

5 Enter the **end/corner** type or size. Include the leading zero for corner radii less than 1in. or 1mm. For any other end/corner type, just indicate the type: SQ = square end, BN = ball nose, CC = corner chamfer.

6 If the **overall length** you need is not the standard length for the combination of tool diameter, LOC and LBS, then enter the overall length (**OAL**) here. Indicate that this is an overall length by placing an L before the number. If you do not specify an overall length, we will assume it is standard length.

7 Enter the code for the **type of shank** you need (W = Weldon flat, WN = whistle notch, P = plain). If you do not specify a shank style, we will assume it is a plain shank.

	1 MODEL	2 TOOL DIAMETER	3 LENGTH OF CUT (LOC)	4 LENGTH BELOW SHANK (LBS)	5 END	6 OVERALL LENGTH	7 SHANK
INCH	M525 –	0750 –	1500 –	N3375 –	060 –	L6 –	W
METRIC	M525 –	120 –	024 –	N055 –	100 –	L100 –	W

Segments highlighted in white may be omitted.

Muscle up for more work.

See a video demonstrating the enDURO® M525 using the high-efficiency/optimized tool path technique and real-world profiles from machine shops like yours at:
www.imcousa.com/content/provenperformance

Test the enDURO® M525 for yourself. To order or for more information:

In USA call **1-800-765-4626**
International **419-661-6313**
Fax **419-661-6314**

Visit **www.imcousa.com**
by scanning this code with a QR code reader.

Power. Precision. Performance.