

HARMONY AI

ALUMINIUM

MACHINING



***sutton*tools**



Traditional

Trochoidal

Dynamic & Trochoidal Milling

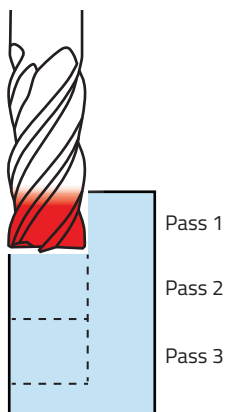
Dynamic/Trochoidal Milling strategies provide a tool engagement angle with the workpiece that utilises more of the cutting edge of the tool, ensuring a stable process, shorter machining times & longer tool life.

Dynamic & Trochoidal method - Applies a lower radial step-over (ae) & a higher depth of cut (ap), spreading the wear, loads & heat across the entire cutting edge.

Dynamic & Trochoidal milling, adjusts the parameters to maintain a constant load on the tool, providing more aggressive metal material rates (MRR).

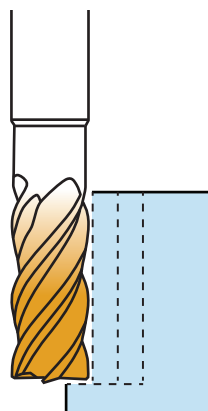
Dynamic & Trochoidal milling, requires a CAM package to generate the tool path & virtually any CNC machine.

Traditional



Traditional methods are typically higher step-over & lower depth of cut.

Trochoidal



Dynamic & Trochoidal is mostly based on the theory of radial chip thinning that occurs with varying ae which relates to chip thickness and feed per tooth.

Advantages of Dynamic & Trochoidal Milling

- Decreased cutting forces
- Reduced heat
- Reduced tool wear
- Suitable for lower power machines
- Greater machining accuracy
- Spindle & machine friendly
- Improved tool life
- Faster cycle time
- One tool for multiple slot sizes (trochoidal)
- Thin wall applications

Page	Item Code	Tool	Diameter range	Type	DIN6535		No. of Flutes	Geometry	Surface Finish	Standard	Non-Ferrous Metals		
4	E400		6mm to 25mm	Square End	HA	HB	3	R45/46/44	CrN	DIN6527 L	●		
	E401				HA	HB	3			Sutton Std	●		
5	E402				HA	HB	3			R45/46/44	CrN	Sutton Std	●
	E403												
6	E408			HA	HB	3	R45/46/44	CrN	Sutton Std	●			
	E409												
7	E310		2mm to 20mm	Square End	HA		2	R40		DIN6527 L	●		
8	E480		12mm to 20mm	Square/Corner Radius	HA		3	R45/46/44	Vn Coated (Polished)	DIN6527 L	●		
9	E478		3mm to 20mm	Square/Corner Radius	HA		3			DIN6527 L	●		

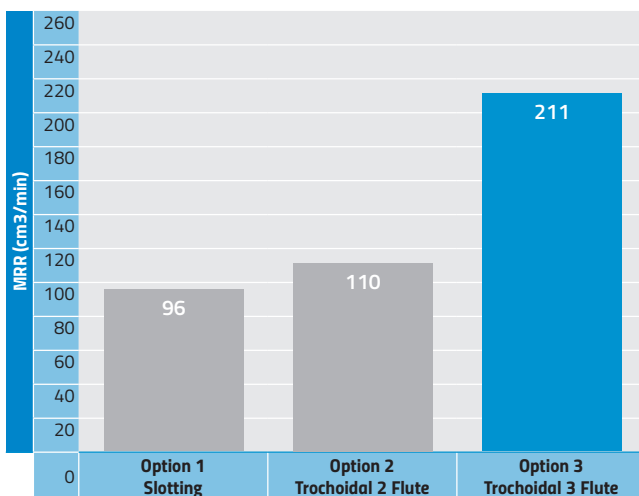
Producing 20mm Slots in Aluminium

Option 1 Using a 20mm 2-flute endmill results in high vibration with an under-utilised cutting edge with two passes to get to the full depth. It is a more expensive option due to the larger tool size

Option 2 Using a 12mm 2-flute endmill in trochoidal milling provides a much higher metal removal rate with smoother cut, resulting an all-round stable cutting environment as well as a lower tool cost.

Option 3 Using a 12mm 3-flute endmill in trochoidal milling similar to Option 2. The design of this tool has a variable helix and when used with trochoidal methods, at least two of the cutting edges are always engaged in the depth of cut (in this case ap=24mm). The variable helix design also suppresses the vibration caused from the interrupted cutting action of milling. This means that greater speeds are possible, increasing the volume of material removed (MRR) dramatically.

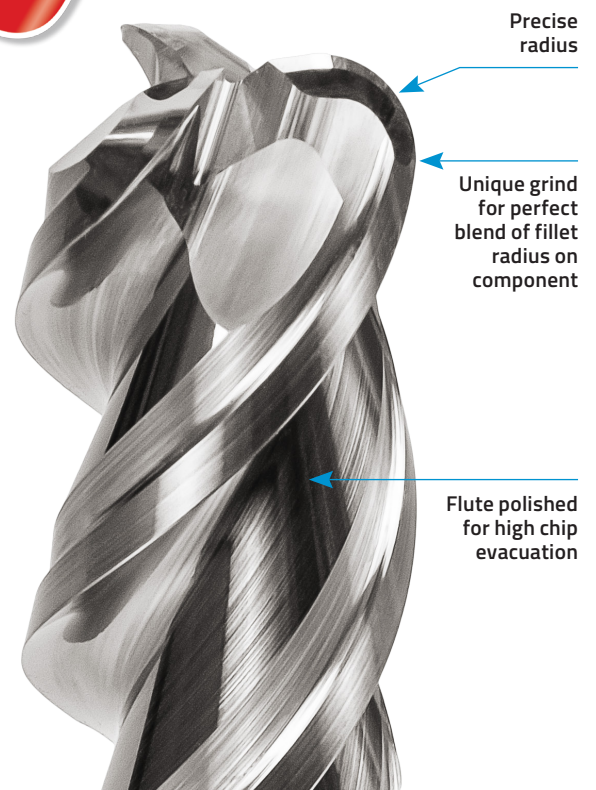
Test Data	Option 1 Slotting	Option 2 Trochoidal 2 Flute	Option 3 Trochoidal 3 Flute
Tool	R40 AI	R40 AI	R42/43/44 HARMONY AI
Part No. / Reference	E3102000	E3101200	E4001200
Tool Diameter (mm)	20	12	12
Z (teeth number)	2	2	3
ae (mm)	20	2	2
ap (mm) / depth	12 + 12 (2 passes)	24 (single pass)	24 (single pass)
RPM	1600	5300	6600
Feed Rate (mm/min)	200	2300	4400



At Sutton Tools, we often talk about 'Good, Better, Best' when diagnosing the right cutting tool for an application. The above example illustrates this concept well. Our R&D Team are continuously running similar tests to determine the Good, Better or Best tooling solution for our customers' unique requirements.



E478 Corner Radius Series





- VHM-ULTRA grade of carbide for high performance
- Variable flute helix for chatter free milling
- Optimised geometry for soft materials



Fraise 3 dents carbure, R45/46/44 AI, Longue Harmony

- Carbure VHM-ULTRA pour une meilleure performance
- Hélice variable pour la suppression des vibrations
- Géométrie optimisée les non-ferreux et cuivres



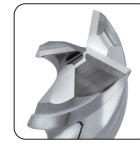
Fresa metallo duro, 3 Taglienti, R45/46/44 AI, Lunga Portata, Harmony

- VHM-ULTRA, grado di metallo duro per alte prestazione
- Elica tagliente variabile per lavorazioni senza vibrazioni
- Geometria ottimizzata per materiali morbidi

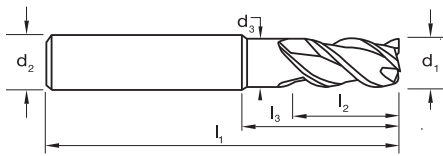


Fresas de MD, 3 ranuras, R45/46/44 AI, Larga, Harmony

- Grado de MD, VHM-ULTRA para alto rendimiento
- Hélice de ranura variable para fresado sin vibraciones
- Geometría optimizada para materiales blandos



Catalogue Code	E480
Discount Group	B0210
Material	VHM-ULTRA
Surface Finish	Brt
Sutton Designation	AI
Geometry	R45/46/44
Shank Form (DIN 6535)	HA
Shank Tolerance	h5



Size Ref.	d ₁ (e8)	l ₁	l ₂	l ₃	d ₂	d ₃	Chamfer	Item #
0300	3.0	57	8	19	6	2.8	0.08/0.12 x 45°	E480 0300
0400	4.0	57	11	19	6	3.7	0.08/0.12 x 45°	E480 0400
0500	5.0	57	13	20	6	4.6	0.08/0.12 x 45°	E480 0500
0600	6.0	57	13	21	6	5.1	0.08/0.12 x 45°	E480 0600
0800	8.0	63	19	27	8	7.1	0.08/0.12 x 45°	E480 0800
1000	10.0	72	22	32	10	9.1	0.15/0.25 x 45°	E480 1000
1200	12.0	83	26	40	12	11.1	0.15/0.25 x 45°	E480 1200
1600	16.0	92	32	50	16	14.8	0.25/0.35 x 45°	E480 1600
2000	20.0	104	38	60	20	18.5	0.25/0.35 x 45°	E480 2000

ISO	P													M			K							N							S							H																
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14.1	14.2	14.3	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37.1	37.2	37.3	37.4	37.5	38.1	38.2	39.1	39.2	40	41					
E480																							●	●	●	●	●	●	●	●	●	●																						

P Steel M Stainless Steel K Cast Iron N Non-Ferrous Metals S Titanium & Super Alloys H Hard Materials

● Optimal ○ Effective

Regrinding and Recoating Services

Regrinding

The relationship with you does not end after the delivery of our products. Sutton Tools supports you by reducing your production costs through our regrinding service of carbide tools available at our state-of-the-art facility.

Using our regrinding service means:

- ✓ Reground with original geometry
- ✓ Quality assured
- ✓ Handled by highly experienced personnel
- ✓ Lower tooling cost

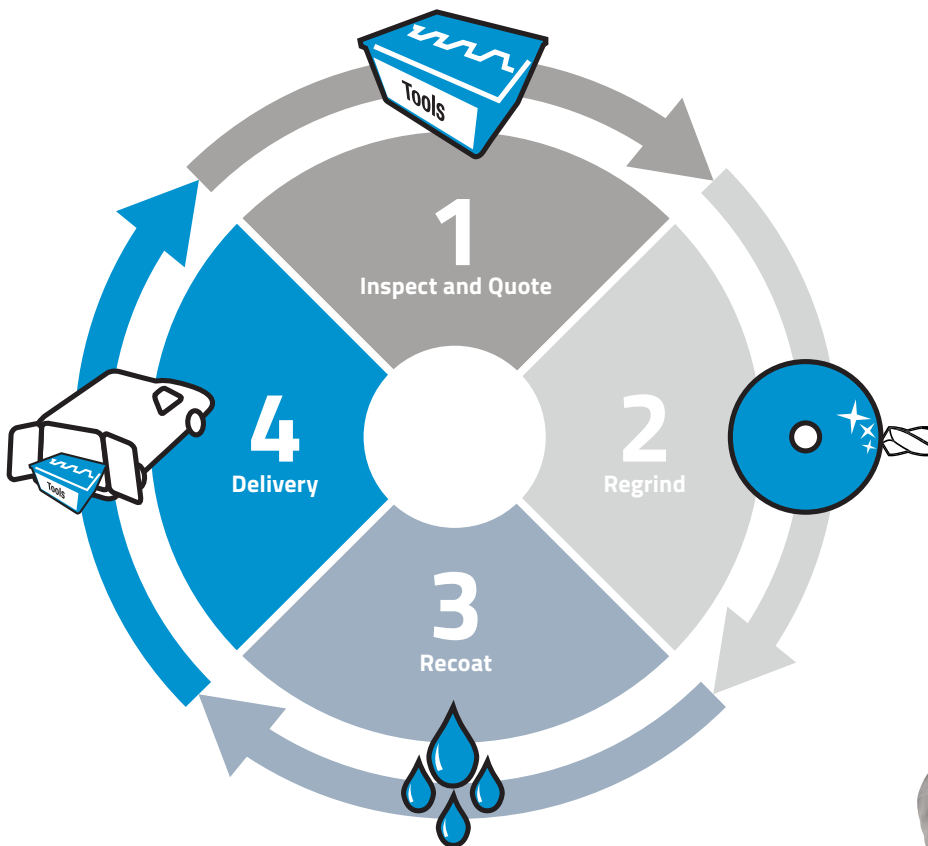
Recoating

As a total solution provider, Sutton Tools uses world leading heat treatment PVD coating (Physical Vapour Deposition) based on Oerlikon Balzers technology on their latest INNOVA coating machine to add life to our products.

The benefits of PVD coatings include:

- ✓ 300%–1000% increase in tool life
- ✓ Increased productivity
- ✓ Uniform thickness
- ✓ Corrosion resistant
- ✓ Less tool changes due to less wear
- ✓ Better wear condition for regrinds

Tool Regrinding and Recoating Process



Custom Tools and Modifications

With the synergy of facility and services, Sutton Tools are able to manufacture custom tools to your exact requirements. Simply provide your details via our enquiry form and our team of engineers will be able to design a custom solution for your tooling needs in no time.



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