Solid Carbide Orbital Thread Former J500

DORMER

Patent pending

Introduction

The very latest innovation in threading

The new Orbital Thread Former is a unique tool, developed by Dormer, combining the key benefits of thread milling cutters and thread forming taps to allow a stable and efficient process for producing threads in aluminium and its alloys, AMG 7.1 - 7.4.

→ Faster than thread cutting taps

→ No chips

→ Strong threads

→ Highly precise operation

→ Left and right hand threads

→ Full thread to bottom of hole

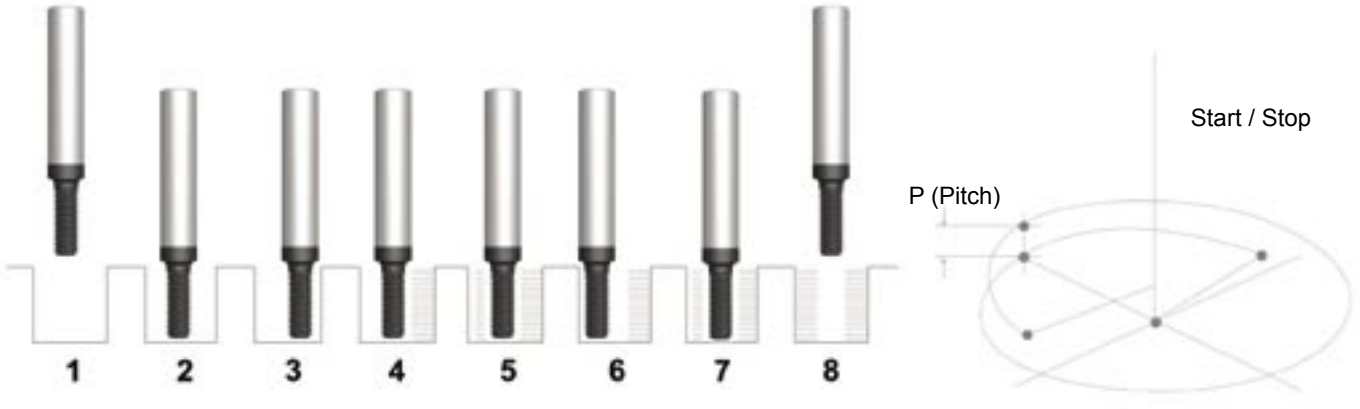
The orbital thread former from Dormer offers the benefits of :

- High speed threading.
- No chips.
- Safety and reliability when machining expensive components.
- Significant power savings on machine - only one third of cutting speed required to achieve the same or higher productivity as a thread milling cutter.
- High number of lobes on orbital thread former allows extremely high productivity.
- Flexibility - can operate in a wide speed range of 8000 - 18000 rpm on aluminium.
- Longer tool life than conventional thread cutting taps.
- Reliable, accurate.

Using the orbital thread former

Orbital Thread forming is a procedure for producing a thread.

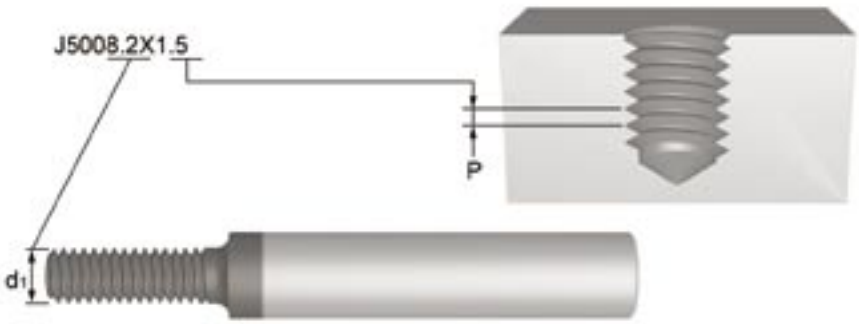
To make this possible you need a CNC-machine which can make helical paths, (run in 3 directions). Consult your manual or contact your machine supplier for information. You can also write your own sub-programme for the thread forming operation.



- Use recommended drill sizes for the thread diameter, as for conventional forming taps.
- For easy adjustments of the thread tolerance, always program with radius correction. Start value Rprg is printed on the orbital thread former.
- Use a gauge to check the tolerance on the first thread and then regularly to get a fast indication if the radius needs to be corrected. The radius can normally be corrected 2-3 times before the orbital thread former is worn out.

Choosing your tool

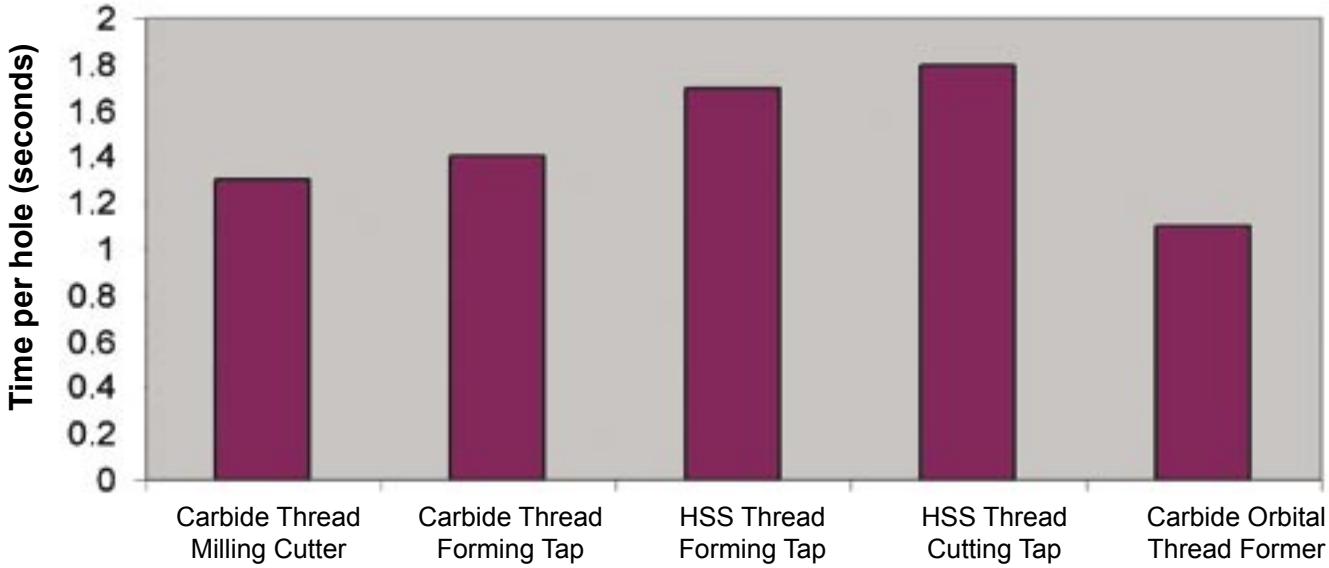
All orbital thread formers have an Item Code based on the type, diameter (d_1) and the pitch (P). The item code is the number to use when ordering your tool. Always check in the catalogue which item code your thread dimension has.



Test results

Tests against thread-producing tools, both HSS and Solid Carbide, have been carried out to ascertain the comparative time taken to thread a hole in Aluminium 7.2. The orbital thread former from Dormer proved to be the fastest, threading a pre-drilled hole in 1.1 seconds.

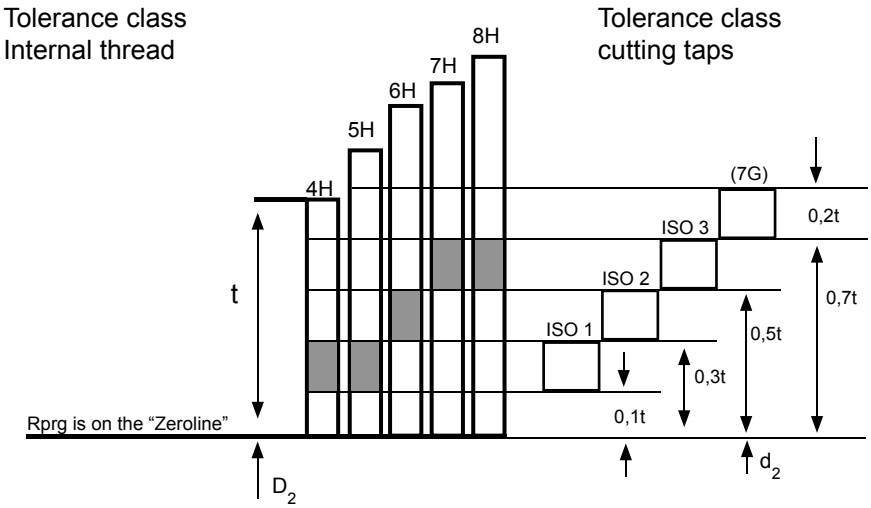
Orbital Threading compared to other threading processes in Aluminium with 0.5% Si (AMG 7.2)



Programming with Rprg

For easy adjustment of the thread tolerance, always programme with radius correction. The Rprg value is printed on the orbital thread former and it is normally entered in the tool memory offset. The Rprg is a start value for new thread formers.

Rprg is based on the theoretical Zero-line of the thread. This means that when you work with Rprg the thread is never too large but very tight, normally too tight. You have to add a small amount afterwards in order to find out the correct tolerance for your Nominal Thread Diameter. Check with a gauge. If you use the Product Selector to generate the CNC-programme, you will get a recommendation of how much to adjust the Rprg value to get the selected tolerance. Remember a smaller Rprg value gives a bigger nominal thread diameter.



$t = T_{D2}$ = Tolerance class DIN 13 Part 15
$D_2 = d_2$ = Basic pitch diameter

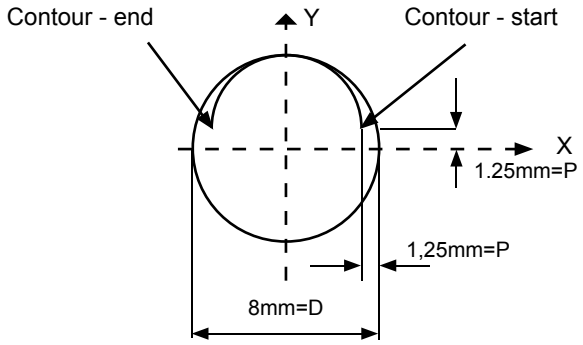
Programming Example

The orbital thread former normally needs to be programmed with two radial passes to make a full thread down to the required thread depth. Even with two passes, the increased feed makes this one of the fastest methods available.

Use the Dormer Product Selector to generate the CNC programme.

The example below is for an M8 thread with thread depth of 12 mm using J5006.5X1.25 in Aluminium, Dormer sub-group AMG 7.2 in a pre-drilled hole with diameter 7.4mm.

The programme is the same as for cylindrical thread millling cutters and is written to use the Rprg value in the tool memory offset. This makes it easy to adjust the tolerance. A smaller Rprg value gives a larger thread.



D = Nominal Diameter of thread (mm)
Vf = Feed rate (mm/min)
Fz = Feed (mm/tooth) – chart on page 6
N = Spindle speed (1/min)
Vc = Cutting speed (m/min) – chart on page 6
P = Pitch on thread (mm)
d_1 = Outside diameter of cutter (mm)

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(M6) T
G90 G17

  S13222 M3

        G00 X0.000 Y0.000 Z2.000
G91
  G00 Z-12.125

G42 G01 X0.000 Y3.250 F4337

   G02 X0.000 Y-7.094 Z-0.625 I0.000 J-3.547 F381

G02 X0.000 Y0.000 Z-1.250 I0.000 J3.844 F813

 G02 X0.000 Y7.094 Z-0.625 I0.000 J3.547

G40 G01 X0.000 Y-3.250
G41 G01 X0.000 Y3.250 F4337
 G03 X0.000 Y-7.250 Z0.625 I0.000 J-3.625 F381
 G03 X0.000 Y0.000 Z1.250 I0.000 J4.000 F813
 G03 X0.000 Y7.250 Z0.625 I0.000 J3.625

G40 G01 X0.000 Y-3.250
  G00 Z12.125

G90
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$$S \rightarrow n = \frac{Vc \cdot 1000}{\pi \cdot d_1}$$

$$F \rightarrow \frac{Vf \cdot (D - d_1)}{D + d_1}$$

$$F \rightarrow \frac{Vf \cdot (D - d_1)}{D}$$

Corrected feed rate for orbital thread forming

Application Material Groups (AMG)

DORMER

■ Excellent for Application

● Good for Application

Example
200 = Peripheral speed in metres/minute mid range +/- 10%
H = Feed range - see feed chart

d_1	P	Feed Code H	
	mm	ap= 1 x d_1	ap= 2 x d_1
4.1	0.8	0.035	0.031
4.8	1	0.035	0.032
6.5	1	0.045	0.040
6.5	1.25	0.045	0.040
8.2	1	0.056	0.045
8.2	1.5	0.056	0.045
9.9	1.5	0.067	0.062
9.9	1.75	0.067	0.062
13.6	1.5	0.170	0.157
13.6	2	0.170	0.157

ap =

d_1 =

J500

5.0 - 16.0

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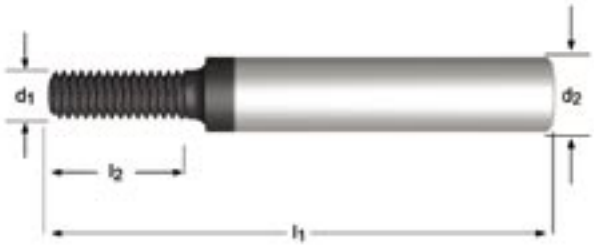
Application Material Groups (AMG)		Hardness HB	Tensile Strength N/mm^2	
1.Steel	1.1 Magnetic soft steel	<120	<400	
	1.2 Structural Steel/ case carburising steel	<200	<700	
	1.3 Plain Carbon steel	<250	<850	
	1.4 Alloy steel	<250	<850	
	1.5 Alloy steel/ Hardened and tempered steel	>250 <350	>850 <1200	
	1.6 Alloy steel/ Hardened and tempered steel	>350	>1200 <1620	
	1.7 Alloy steel Hardened	49-55HRC	>1620	
	1.8 Alloy steel Hardened	55-63HRC	<1960	
2. Stainless Steel	2.1 Free machining Stainless Steel	<250	<850	
	2.2 Austenitic	<320	<1100	
	2.3 Ferritic + Austenitic, Martensitic	<300	<1000	
	2.4 Precipitation Hardened	>320 <410	>1100 <1400	
3. Cast Iron	3.1 Lamellar graphite	<150	<500	
	3.2 Lamellar graphite	>150 <300	>500 <1000	
	3.3 Nodular graphite/ Malleable Cast Iron	<200	<700	
	3.4 Nodular graphite/ Malleable Cast Iron	>200 <300	>700 <1000	
4. Titanium	4.1 Titanium, unalloyed	<200	<700	
	4.2 Titanium, alloyed	<270	<900	
	4.3 Titanium, alloyed	>270 <350	>900 <1250	
5. Nickel	5.1 Nickel, unalloyed	<150	<500	
	5.2 Nickel, alloyed	<270	<900	
	5.3 Nickel, alloyed	>270 <350	>900 <1200	
6. Copper	6.1 Copper	<100	<350	●200H
	6.2 ß-Brass, Bronze	<200	<700	
	6.3 α-Brass	<200	<700	
	6.4 High Strength Bronze	<470	<1500	
7.Aluminium Magnesium	7.1 Al, Mg, unalloyed	<100	<350	■270H
	7.2 Al alloyed, Si<0.5%	<150	<500	■270H
	7.3 Al alloyed, Si>0.5%<10%	<120	<400	■240H
	7.4 Al alloyed, Si>10% Whisker reinforced Al-alloys, Mg alloys	<120	<400	■240H
8.Synthetic Materials	8.1 Thermoplastics	---	---	
	8.2 Thermosetting plastics	---	---	
	8.3 Reinforced plastic materials	---	---	
9. Hard Materials	9.1 Cermets (Metal-ceramics)	<550	<1700	
10.Graphite	10.1 Standard graphite	---	<100	

J500

- Orbital Thread Former
- Orbital-Gewindeformer
- Circulair Draadvormer
- Fraise à fileter orbitale par déformation
- Fresa para Roscar por Deformación
- Fresa de roscar orbital por deformação



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J500

■ 7.1 7.2 7.3 7.4

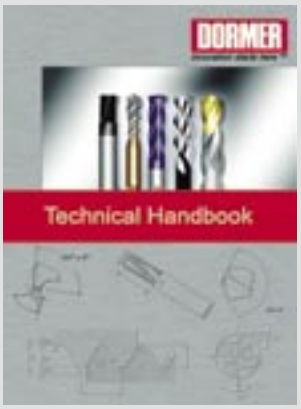
● 6.1

> or =	P mm	d_1 Ø mm	l_2 mm	l_1 mm	d_2 Ø mm	z	e-Code	
M5	0.8	4.1	10	54	6	6	**J5004.1X.8**	
M6	1	4.8	13	54	6	7	**J5004.8X1.0**	
M8	1	6.5	18	58	10	8	**J5006.5X1.0**	1)
M8	1.25	6.5	18	58	10	8	**J5006.5X1.25**	
M10	1	8.2	21	72	12	10	**J5008.2X1**	1)
M10	1.5	8.2	21	72	12	10	**J5008.2X1.5**	
M12	1.5	9.9	24	83	12	10	**J5009.9X1.5**	1)
M12	1.75	9.9	24	83	12	10	**J5009.9X1.75**	
M16	1.5	13.6	33	92	16	12	**J50013.6X1.5**	1)
M16	2	13.6	34	92	16	12	**J50013.6X2.0**	

1) MF

For details on the full Dormer product range, please order a copy of our current tooling catalogue.

For correct tool selection and operation, please also refer to our Product Selector CD.



Further useful technical information can be found in our brand new 2005 Technical Handbook.

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