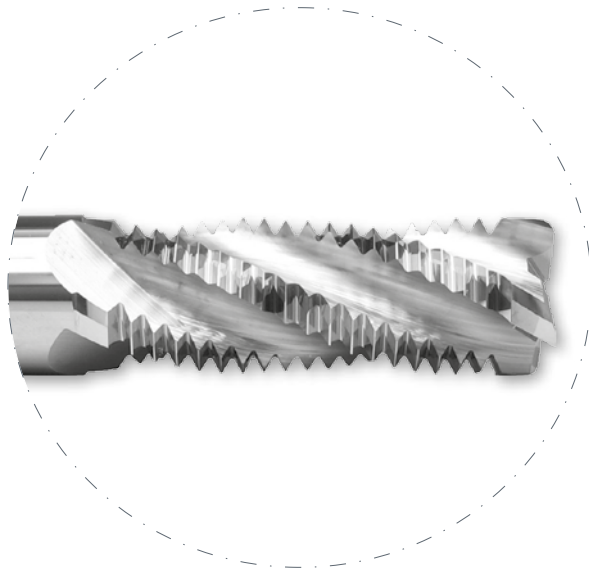


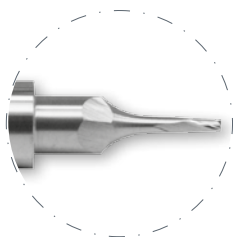
2. Special tools



Index - Special tools

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2. Special tools



701S tools
page 17



**Turning tool with
profiled insert**
page 30



**Special T-slot cutters and
end mills**
page 25



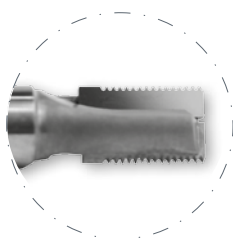
**Offset whirl thread
cutters**
page 31



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page 26



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page 32



**Form Cutters in PCD /
CVD / CBN**
page 28



Snailing tools
page 33

Tools for the machine 701S from Willemin-Macodel

SPECIAL

Louis Bélet has developed an assortment of tools for the machine 701S from Willemin-Macodel.

These mills and drills have been specifically designed to take advantage of the potentials of this machine.

They allow a precise and fast machining, with an excellent surface quality



Tools tested and validated on the 701S machine :

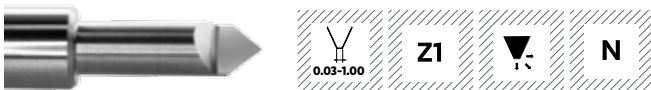
REF. 7010 End mill for 701S machine



REF. 7102 Micro end mill 2 teeth for 701S machine



REF. 7119 Engraving mill for 701S machine



REF. 7111-1 Straight cut end mill Z1 for 701S machine



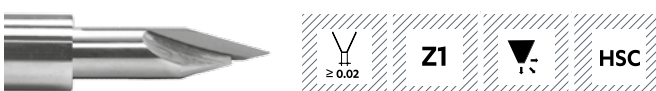
REF. 7339 Twist drill helix 24° for 701S machine



REF. 7111-3 Straight cut end mill Z3 for 701S machine

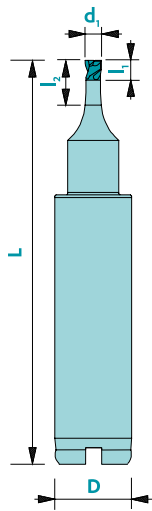
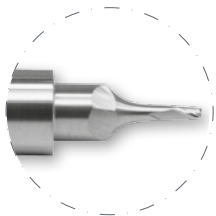


REF. 74119-3 Engraving mill in PCD for 701S machine



Any other geometry upon request





Material	Vc uncoated	Vc coated	Uncoated	Coated	Rec. Coating
Steel < 700 N/mm ²	100	130	☐	☐	Trio
Steel > 700 N/mm ²	80	100	☐	☐	Trio
Stainless steel	50	70	☐	☐	Trio
Cast iron	60	100	☐	☐	Trio
Copper	150	180	☐	☐	Solo
Brass - Bronze	150	180	■	■	Solo
Aluminium	200	350	☐	☐	Rico/Solo
Gold - Silver	140	180	☐	☐	Solo
Platinum - Palladium	-	35	-	☐	Solo
Superalloys	-	40	-	☐	Trio
Titanium	40	60	☐	☐	Rico/Trio

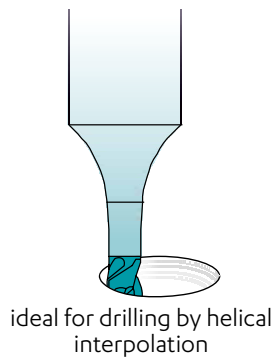
not adapted - adapted ☐ highly adapted ■

Tolerances $d_1 \leq 1 \text{ mm: } +0/-0.01$ $D: h5$
 $d_1 > 1 \text{ mm: } +0/-0.02$

Z2

MG10

N



Art. n°	d_1	l_1	l_2	D	L
7010d0.10	0.10	0.05	0.40	6	33
7010d0.20	0.20	0.10	0.80	6	33
7010d0.32	0.32	0.16	1.28	6	33
7010d0.50	0.50	0.25	2.00	6	33
7010d0.63	0.63	0.32	2.52	6	33
7010d0.80	0.80	0.40	3.20	6	33
7010d1.25	1.25	0.63	5.00	6	33
7010d2.00	2.00	1.00	-	6	33
7010d3.20	3.20	1.60	-	6	33

$ap=0.24x d_1$

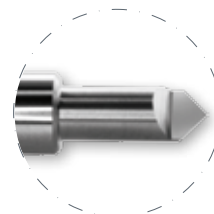
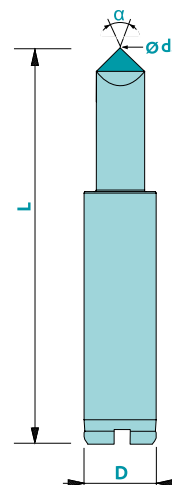
$ae=0.8x d_1$
 $ap=0.3x d_1$

Engraving mill for 701S machine

Material	n [rpm]	Ap	Uncoated	Coated	Rec. Coating
Steel < 700 N/mm ²	25 - 40'000	0.05 - 0.40	☐	■	Nemo
Steel > 700 N/mm ²	20 - 40'000	0.05 - 0.30	-	■	Nemo
Stainless steel	20 - 30'000	0.05 - 0.30	-	☐	Nemo
Cast iron	25 - 40'000	0.05 - 0.40	☐	■	Trio
Copper	20 - 40'000	0.05 - 0.40	☐	■	Solo
Brass - Bronze	25 - 40'000	0.05 - 0.40	☐	■	Solo
Aluminium	-	-	☐	■	-
Gold - Silver	20 - 40'000	0.05 - 0.40	■	☐	Solo
Platinum - Palladium	-	-	-	-	-
Superalloys	-	-	☐	■	-
Titanium	25 - 40'000	0.05 - 0.40	☐	■	Rico

not adapted - adapted ☐ highly adapted ■

Tolerances a: +/- 0.01
D: h5



Article number: 7119a##d#.#

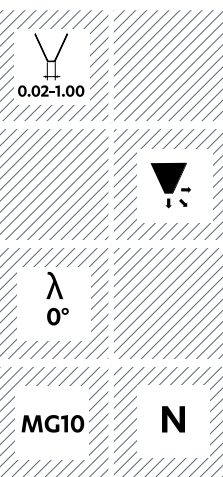
Example: End mill ref. 7119 with 25° angle and tip diameter 0.05 mm: 7119a25d0.05

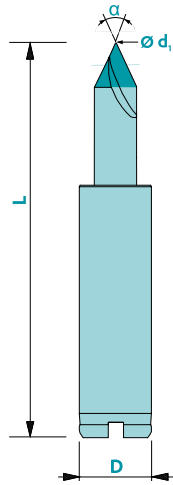
α^*	d_1^{**}	D	L
15°-45°	0.02-0.09	6	33
15°-45°	0.10-0.30	6	33
50°-140°	0.02-0.09	6	33
50°-140°	0.10-0.30	6	33

* Available angles: every 5° between 15° and 45°; every 10° between 50° and 140°

** Available diameters: every 0.01 mm between 0.02 and 0.09 mm; every 0.05 mm between 0.10 and 0.30 mm

Other dimensions (angle, tip diameter, shank) upon request





Material	n [rpm]	Ap	Perf.
Steel < 700 N/mm²	-	-	-
Steel > 700 N/mm²	-	-	-
Stainless steel	-	-	-
Cast iron	-	-	-
Copper	≥ 40'000	0.05 - 0.40	□
Brass - Bronze	≥ 40'000	0.05 - 0.40	□
Aluminium	≥ 40'000	0.05 - 0.40	■
Gold - Silver	≥ 40'000	0.05 - 0.40	■
Platinum - Palladium	≥ 40'000	0.05 - 0.40	■
Superalloys	-	-	-
Titanium	-	-	-

not adapted - adapted □ highly adapted ■

Tolerances d₁: +/- 0.01
D: h5

Z1

≥ 0.02

PCD **HSC**

Art. n°	α	d ₁	D	L
74119-3a40d0.05	40	0.05	6	33
74119-3a40d0.08	40	0.08	6	33
74119-3a40d0.10	40	0.10	6	33
74119-3a50d0.05	50	0.05	6	33
74119-3a50d0.08	50	0.08	6	33
74119-3a50d0.10	50	0.10	6	33
74119-3a60d0.05	60	0.05	6	33
74119-3a60d0.08	60	0.08	6	33

Art. n°	α	d ₁	D	L
74119-3a60d0.10	60	0.10	6	33
74119-3a70d0.05	70	0.05	6	33
74119-3a70d0.08	70	0.08	6	33
74119-3a70d0.10	70	0.10	6	33
74119-3a90d0.05	90	0.05	6	33
74119-3a90d0.08	90	0.08	6	33
74119-3a90d0.10	90	0.10	6	33

Order Quotation request

Angle (α): <input type="checkbox"/> By default : 60° <input type="checkbox"/> 30° <input type="checkbox"/> 35° <input type="checkbox"/> 45° <input type="checkbox"/> Other : _____ <input type="checkbox"/> 50° <input type="checkbox"/> 55° <input type="checkbox"/> 90°		Shank Ø : <input type="checkbox"/> By default : D=3 <input type="checkbox"/> Other : D= _____		Order No : _____	
Machined material : _____		Quantity : _____		d₁ (from 0.02 mm) : _____	
Contact person : _____			Company's stamp & date : _____		

Standard dimensions of the bars : Ø 3x L 38, Ø 4x L 38, Ø 6x L 38, Ø 6x L 51, Ø 8x L 61, Ø 10x L 72, Ø 12x L 83, Ø 16x L 92, Ø 20x L 104

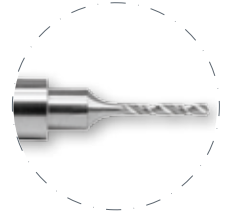
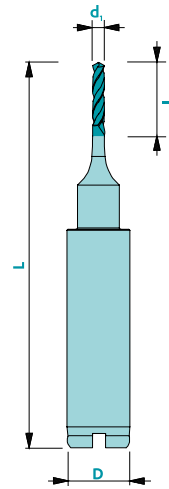
Other dimensions, CVD/CBN available upon request.

Twist drill helix 24° for 701S machine

Material	Vc uncoated	Vc coated	Uncoated	Coated	Rec. Coating
Steel < 700 N/mm ²	60	70	□	■	Trio
Steel > 700 N/mm ²	50	60	□	■	Trio
Stainless steel	40	50	□	■	Trio
Cast iron	30	40	□	■	Solo
Copper	50	60	□	■	Solo
Brass - Bronze	120	130	■	□	Solo
Aluminium	130	140	□	■	Nemo
Gold - Silver	80	90	■	□	Solo
Platinum - Palladium	-	18	-	■	Solo
Superalloys	-	20	-	■	Trio
Titanium	30	40	□	■	Nemo

not adapted - adapted □ highly adapted ■

Tolerances d_1 : -0.002/-0.004
D: h5



Art. n°	d_1	l_1	D	L
7339d0.230	0.230	1.0	6	33
7339d0.275	0.275	1.0	6	33
7339d0.320	0.320	1.5	6	33
7339d0.400	0.400	2.0	6	33
7339d0.480	0.480	3.0	6	33
7339d0.560	0.560	4.0	6	33
7339d0.640	0.640	4.0	6	33
7339d0.720	0.720	4.0	6	33
7339d0.800	0.800	4.0	6	33
7339d1.000	1.000	4.0	6	33
7339d1.150	1.150	4.0	6	33



118°

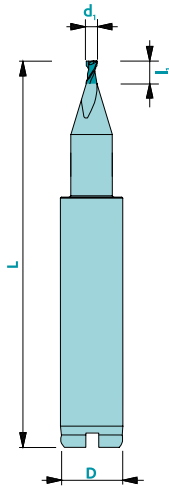
Z2



λ
24°

MG10

N



Material	Vc uncoated	Vc coated	Uncoated	Coated	Rec. Coating
Steel < 700 N/mm ²	100	130	□	□	Trio
Steel > 700 N/mm ²	80	100	□	□	Trio
Stainless steel	50	70	□	□	Trio
Cast iron	60	100	□	□	Trio
Copper	150	180	□	□	Solo
Brass - Bronze	150	180	■	■	Solo
Aluminium	200	350	□	□	Rico/Solo
Gold - Silver	140	180	□	□	Solo
Platinum - Palladium	-	35	-	□	Trio
Superalloys	-	40	-	□	Trio
Titanium	40	60	□	□	Rico/Trio

not adapted - adapted □ highly adapted ■

Tolerances $d_1 \leq 1 \text{ mm: } +0/-0.01$ $D: h5$
 $d_1 > 1 \text{ mm: } +0/-0.02$

	Z2
λ 35°	γ 8-10°
MG10	N
$ap=0.25d_1$	$ae=0.5d_1$ $ap=0.5d_1$

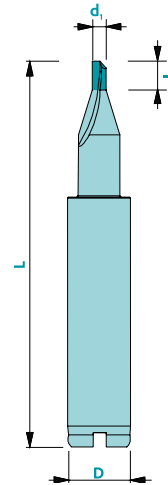
Art. n°	d_1	l_1	D	L
7102d0.10l0.10	0.10	0.10	6	33
7102d0.20l0.30	0.20	0.30	6	33
7102d0.25l0.75	0.25	0.75	6	33
7102d0.32l0.48	0.32	0.48	6	33
7102d0.40l0.80	0.40	0.80	6	33
7102d0.40l1.60	0.40	1.60	6	33
7102d0.50l0.75	0.50	0.75	6	33
7102d0.63l1.89	0.63	1.89	6	33
7102d0.80l1.60	0.80	1.60	6	33
7102d0.80l3.20	0.80	3.20	6	33
7102d1.25l2.50	1.25	2.50	6	33
7102d1.60l4.00	1.60	4.00	6	33
7102d2.00l2.50	2.00	2.50	6	33
7102d2.50l3.00	2.50	3.00	6	33
7102d3.20l3.20	3.20	3.20	6	33

Straight cut end mill Z1 for 701S machine

Material	Vc uncoated	Vc coated	Uncoated	Coated	Rec. Coating
Steel < 700 N/mm ²	-	60	-	□	Trio
Steel > 700 N/mm ²	-	-	-	-	-
Stainless steel	-	-	-	-	-
Cast iron	-	-	-	-	-
Copper	-	-	-	-	-
Brass - Bronze	80	110	■	□	Solo
Aluminium	-	-	-	-	-
Gold - Silver	50	60	■	■	Solo
Platinum - Palladium	-	-	-	-	-
Superalloys	-	-	-	-	-
Titanium	20	30	□	■	Rico

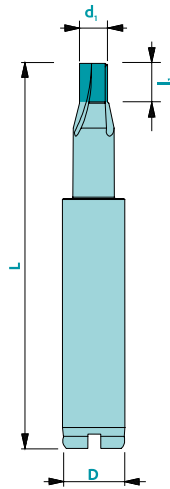
not adapted - adapted □ highly adapted ■

Tolerances $d_1 \leq 1 \text{ mm}$: +0/-0.01 D : h5
 $d_1 > 1 \text{ mm}$: +0/-0.02



Art. n°	d_1	l_1	D	L
7111-1d0.63	0.63	1.89	6	33
7111-1d0.80	0.80	3.20	6	33
7111-1d1.25	1.25	2.50	6	33
7111-1d1.60	1.60	4.00	6	33
7111-1d2.00	2.00	2.50	6	33
7111-1d2.50	2.50	3.00	6	33
7111-1d3.20	3.20	3.20	6	33

	Z1
λ 0°	γ 0°
MG10	N
$ap=0.5d_1$	$ae=0.5d_1$ $ap=0.5d_1$



Material	Vc uncoated	Vc coated	Uncoated	Coated	Rec. Coating
Steel < 700 N/mm ²	-	60	-	□	Trio
Steel > 700 N/mm ²	-	-	-	-	-
Stainless steel	-	-	-	-	-
Cast iron	-	-	-	-	-
Copper	-	-	-	-	-
Brass - Bronze	80	110	■	□	Solo
Aluminium	-	-	-	-	-
Gold - Silver	50	60	■	■	Solo
Platinum - Palladium	-	-	-	-	-
Superalloys	-	-	-	-	-
Titanium	20	30	□	■	Rico

not adapted - adapted □ highly adapted ■

Tolerances $d_1 \leq 1 \text{ mm: } +0/-0.01$ $D: h5$
 $d_1 > 1 \text{ mm: } +0/-0.02$

Z3

λ
0°
 γ
0°

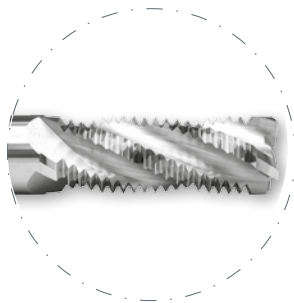
MG10
N

$ap=0.25d_1$ $ae=0.5d_1$
 $ap=0.5d_1$

Art. n°	d_1	l_1	D	L
7111-3d0.63	0.63	1.89	6	33
7111-3d0.80	0.80	3.20	6	33
7111-3d1.25	1.25	2.50	6	33
7111-3d1.60	1.60	4.00	6	33
7111-3d2.00	2.00	2.50	6	33
7111-3d2.50	2.50	3.00	6	33
7111-3d3.20	3.20	3.20	6	33

- ▶ Form cutters in tungsten carbide
- ▶ Manufactured according to specific tool drawing or finished product drawing
- ▶ Regrinding possible
- ▶ Choice of external diameter and teeth number upon request
- ▶ Straight, spiral or staggered teeth
- ▶ Logarithmical relief upon request

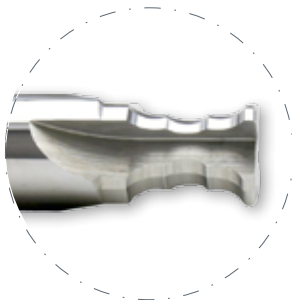
Finishing end mill with "hedgehog profile"



Thread mill



Straight cut end mill for jewellery parts



Helicoid multi-function end mill



Profiled T-slot end mill with staggered teeth for medical piece



Milling cutter with logarithmical relief



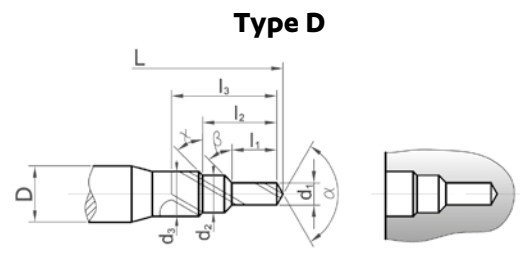
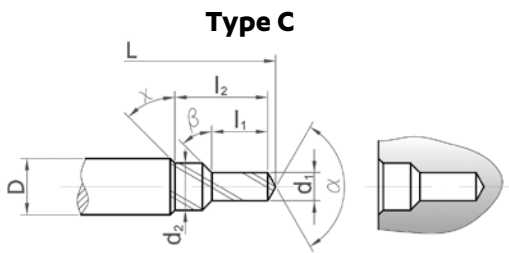
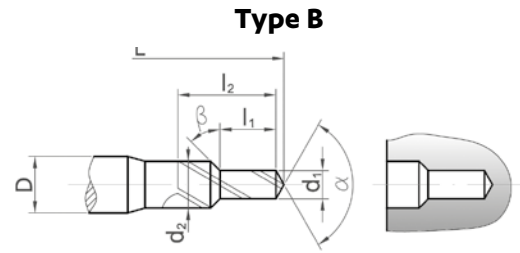
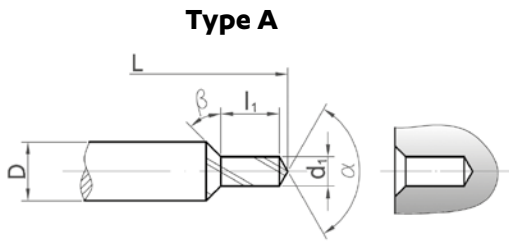
Step drills - Ref. 335



- ▶ Step drills in tungsten carbide
- ▶ Helix angle according to the machined material
- ▶ Right or left cut
- ▶ Four types of standard step drills are available (A, B, C and D type).
Other types upon request
- ▶ Custom drills made to order
- ▶ With or without coolant holes

Step drills - Ref. 335

SPECIAL



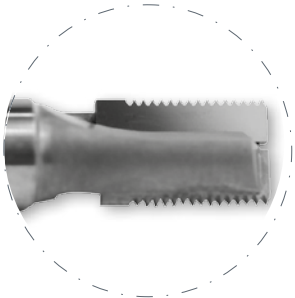
Order Quotation request

<input type="checkbox"/> Type A	<input type="checkbox"/> Type B	<input type="checkbox"/> Type C	<input type="checkbox"/> Type D
Dimensions : D : _____ L : _____ α : _____ d ₁ : _____ l ₁ : _____ β : _____ d ₂ : _____ l ₂ : _____ χ : _____ d ₃ : _____ l ₃ : _____ Z : <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3		Helix angle : <input type="checkbox"/> 24° for brass <input type="checkbox"/> 34° for stainless steel Coating : <input type="checkbox"/> Coated * : _____ <input type="checkbox"/> Uncoated	
		With coolant holes ? <input type="checkbox"/> No <input type="checkbox"/> Yes	
		Quantity : _____	
Machined material : _____		Order No : _____	
Company's stamp & date : _____		Contact person : _____	

Standard dimensions of the bars : \emptyset 3x L 38, \emptyset 4x L 38, \emptyset 6x L 38, \emptyset 6x L 51, \emptyset 8x L 61, \emptyset 10x L 72, \emptyset 12x L 83, \emptyset 16x L 92, \emptyset 20x L 104

* Without information, the most suitable Coating will be applied.

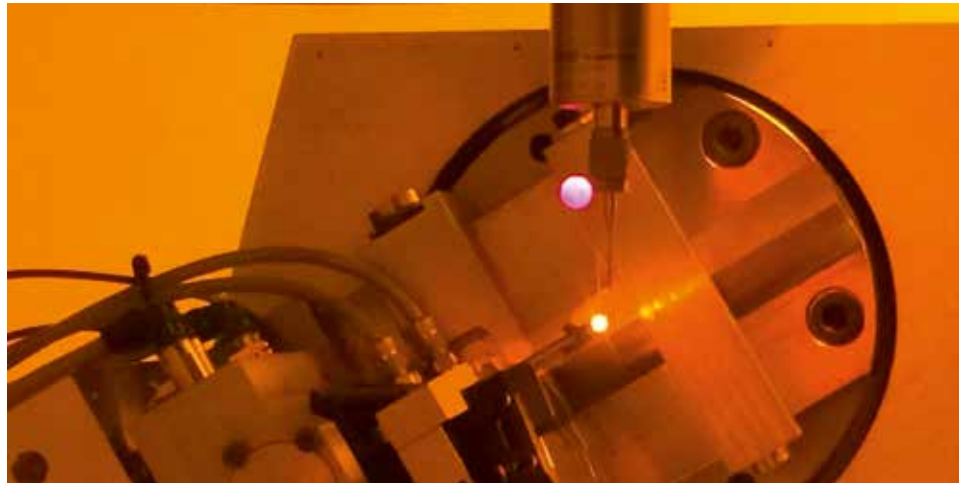
Form cutters in PCD/CVD/CBN Laser machining



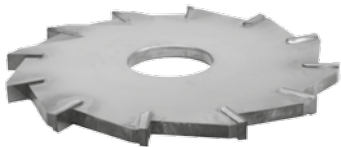
**Profiled
cutters**



Form cutters

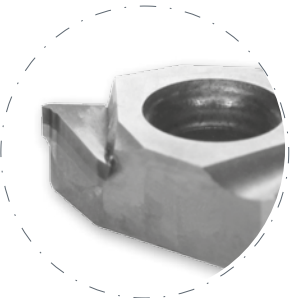


The production of PCD cutting tools by laser machining is highly complex, requiring ultra-precise and sophisticated machines.



Slitting saws

Laser sharpening generating no efforts on the tool, the mass and the kinetic of the machine have been developed specifically to ensure very fast and precise movements.

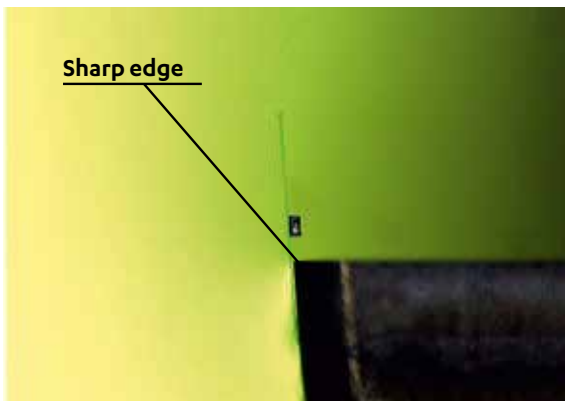


**Turning tool with
profiled insert**

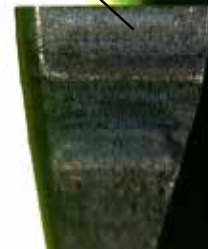
The 3 advantages of laser machining of cutting tools :

1°

Very sharp cutting edges can be achieved. The laser cuts the synthetic diamond.



Excellent surface quality

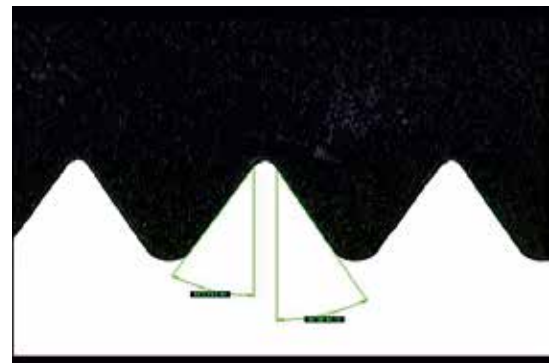


2°

Very long tool life

3°

Allows the production of highly complex shapes from a dxf file provided by the customer.



- ▶ Turning tool with reversible solid tungsten carbide insert
- ▶ Change of insert without adjustment
- ▶ High precision of the insert's position
- ▶ Reduction of the machining time: only one adjustment!
- ▶ Manufactured according to specific tool drawing or finished product drawing
- ▶ Long lifetime due to the coating



Multi function turning tool with profiled insert



Turning tool with profiled insert

Offset whirl thread cutter

Segments: Automotive and medical equipment

SPECIAL



Offset whirl thread cutter for machining deep threads

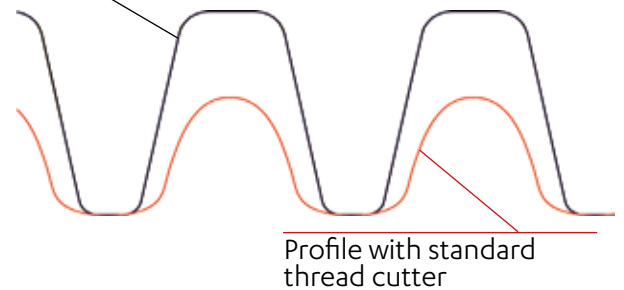
Internal thread whirling is a know and popular method for machining metric ISO threads and for threads with a relatively large opening angle.

For other types of threading operations (e.g. deep trapezoid-shaped) or special threads, internal thread whirling causes problems!

The problem

By milling the thread keeping the tool parallel to the part axis, interferences develop and the shape of the thread is not transferred correctly.

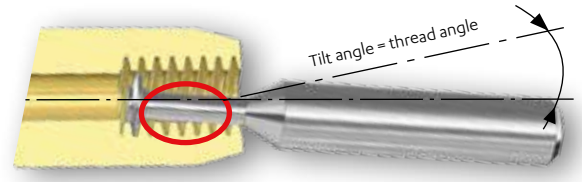
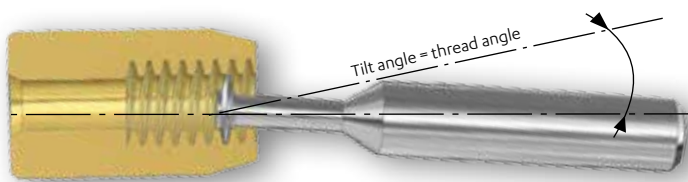
Theoretical profile



Standard solution

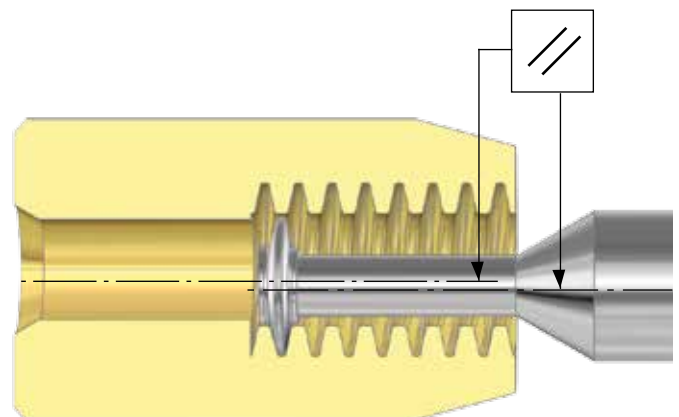
One solution is to tilt the tool in accordance with the helix angle. This solution is effective for short threads, but the spindle must be tilted while interpolating with the whirling cycle.

If the thread is deep, the tool touches the work-piece.



New solution!

With a specific modification to the shape of the thread cutter, the work-piece can be machined while the tool is kept parallel to the work-piece axis, which means that the correct shape is ensured.



Machining an internal profile using a special punch tool

Louis Bélet manufactures also profiled punch tools for the machining of internal NIHS profiles (DIN or ISO). Tight tolerances are applied to these punches, as on all our profiled tools. Rotating punch tools are also available.

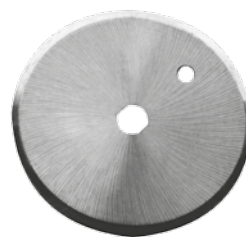


The punch tool may have a partially profiled shape, or a full one



Mills for snailing in solid carbide and PCD

Snailing mills are used to decorate timepieces by means of curved eccentric lines. They advantageously replace the conventional methods ensuring a constant aspect of the first to the last workpiece.



Snailing

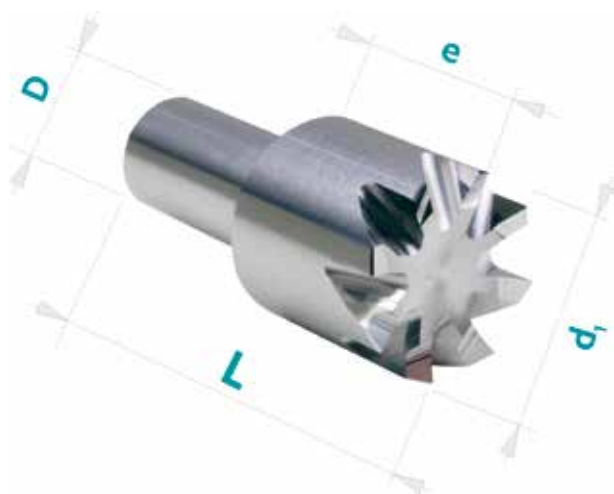


Côte de Genève

Dimensions T-slot cutter

$\varnothing d_1$	e	D	L	Z
10	10	6	22	8
20	10	10	30	20
30	12	10	30	30
40	12	10	39	30
45	12	10	39	55

Snailing mills are available either right handed or left handed. The number of teeth may also be chosen for customized patterns on the workpiece. Available as circular mill or T shape.



End mill for snailing

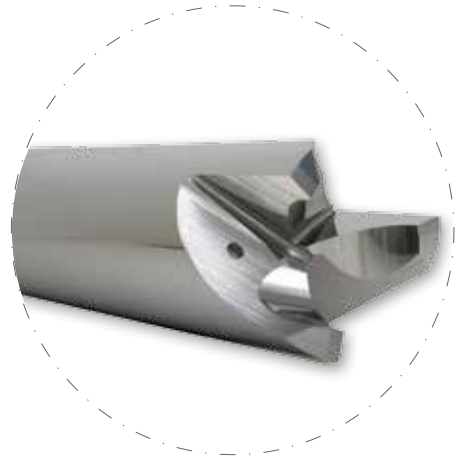


Circular mill for snailing

Tools with coolant holes



Step drills with
coolant holes



Special end mill with
coolant holes

Special tools et step drills can be manufactured with coolant holes. This allows a better chip removal and heat dissipation. Moreover, an increased tool life is generally observed.