

Patented
DIXI COOL+[®] concept

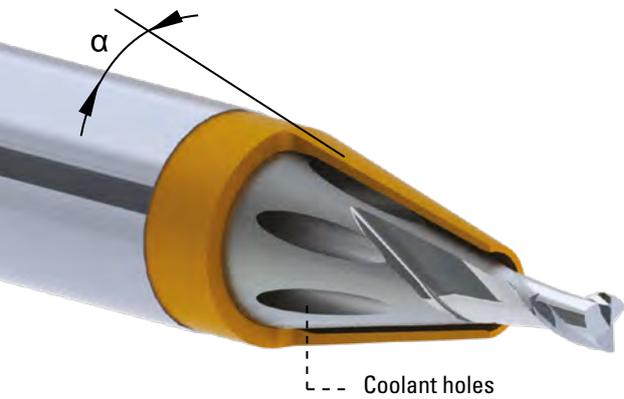
DIXI
COOL+

The secret to exceptional
productivity

End mills and micro end mills
with oriented and accelerated lubrication



MAKE THE MOST OF YOUR INTERNAL LUBRICATION FOR INCREASED PRODUCTIVITY

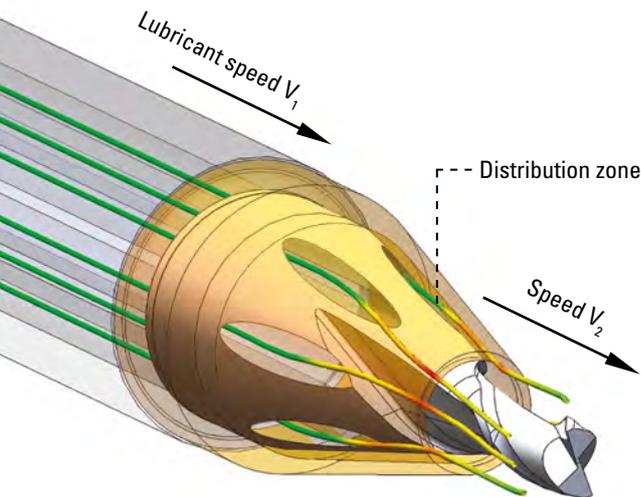


1 LUBRICANT IS ORIENTED

The lubricant crosses the tool in 2 steps :

- Through the multiple coolant holes integrated in the body of tool.
- Through the division zone of lubricant distribution between the directional ring and the tool.

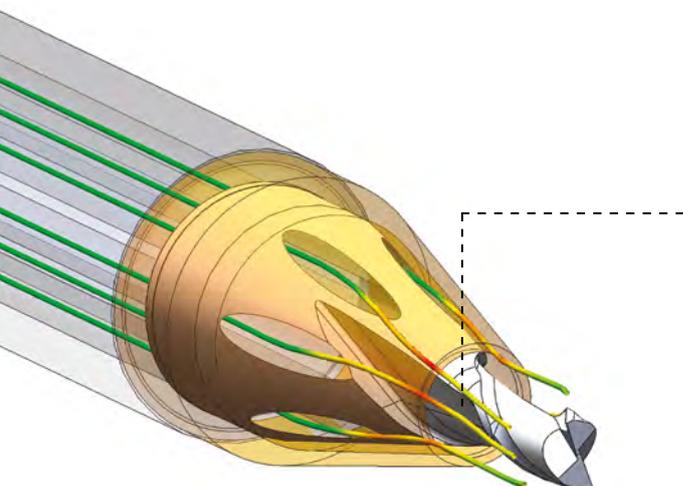
The α angle of the cone orients the lubricant closest to the cutting zone end restrains inertia effect at the tip of the tool even with high rotation



2 LUBRICANT IS ACCELERATED, ACCORDING TO VENTURI EFFECT - FLUID DYNAMICS

Under constant rate of flow, the exit speed V_2 of the lubricant is increased due to the difference of section between the 6 exiting coolant holes and the circular exit ring.

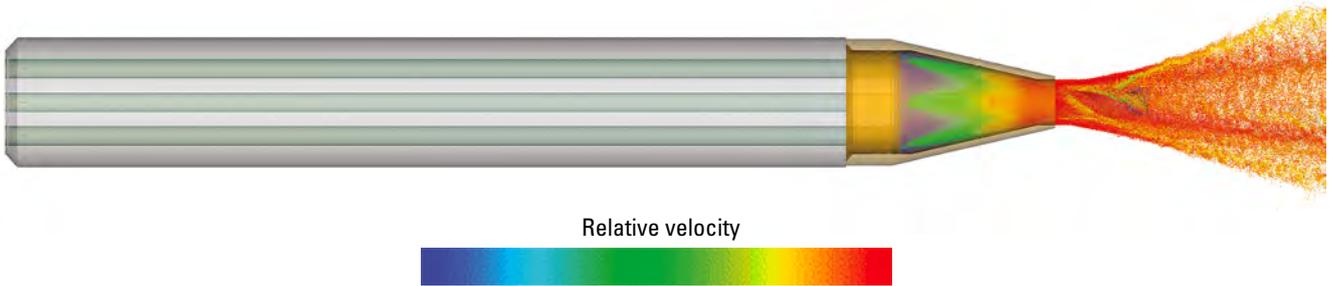
In order to guarantee this $V_2 > V_1$ speed increase, the entering surface of the lubricant is always larger than the one of the exiting circular ring.



3 THE LUBRICANT REACHES THE CUTTING FACES

Part of the lubricant is guided in the flutes of the tool on the cutting faces.

The coolant is directed towards the cutting zone and completely irrigates it, whatever the shape of the tool. Thanks to fluid acceleration, tool rotation does not influence the shape of the output flow (umbrella effect).

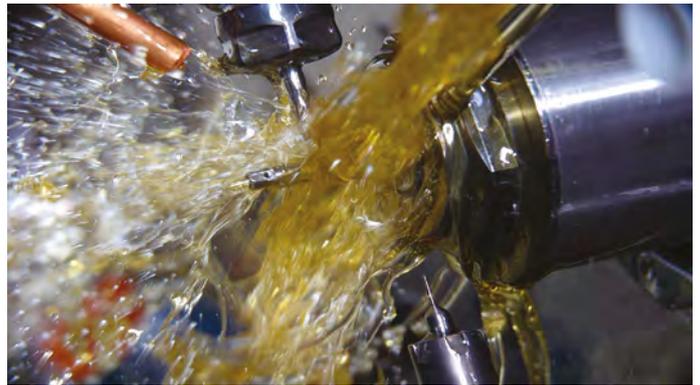


The DIXI COOL+® system's large cross-section spray channels make it compatible with all cutting fluids (emulsion or oil), even for the smallest tools (>Ø0.30). No need for excessive pressure, the system is operational from 20 bar. No need for costly filtration systems.

Emulsion



Oil



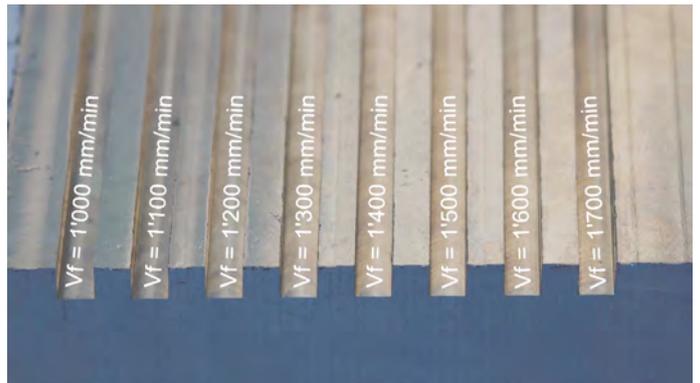
The very large quantity of cutting fluid promotes chip cooling and evacuation. Cutting conditions can be drastically improved. Productivity is considerably increased.

External coolant



Chip adhesion due to heat

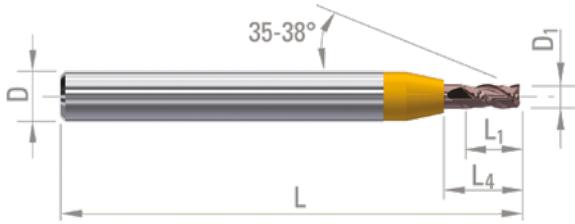
Coolant system



No chips stuck in grooves, even at 2x feed speed



END MILLS, REINFORCED SHANK
WITH ACCELERATED LUBRICATION



- High performance end mills with reinforced shank and variable helix developed for the machining of tough materials.
- The patented COOL+ coolant concept allows higher productivity.
- The extra smooth C-TOP coating improves tool life even at high temperatures in difficult to machine materials.

Roughing ●●●●● Finishing ●●●●● ○ good ⊙ excellent

ISO	P													M				K					
Materials description	Unalloyed steel					Low alloyed steel				High alloyed steel	Martensitic stainless steel	Austenitic stainless steel (DUPLEX/PH)				Grey cast iron	Nodular cast iron	Malleable cast iron					
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14.1	14.2	14.3	14.4	15	16	17	18	19	20
Recommendations	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	○	○

ISO	N											S					H					
Materials description	Wrought aluminium alloy		Cast aluminium alloy			Cu + Pb alloy	Cu alloy difficult	Gold, Silver	Graphite	Plastic	Wood	Special alloy Ni / Co			Titanium, titanium alloy		Hardened steel	Hard cast iron				
VDI 3323	21	22	23	24	25	26	27	28	-	-	29	30	31	32	33-35	36	37	38	39	40	41	
Recommendations						⊙	⊙	⊙	⊙					⊙	⊙	⊙	⊙	⊙				

D₁ L₁ L₄ D_{h5} L CARBIDE C-TOP
 Ø ≤ 2.00 - 0/-0.01
 Ø < 6.00 - 0/-0.02
 Ø ≥ 6.00 - e8

0.30	0.70	1.80	4	38	388775	388797
0.40	0.90	1.90	4	38	388776	388798
0.50	1.10	2.80	4	38	388777	388799
0.60	1.40	2.80	4	38	388778	388800
0.70	1.60	2.90	4	38	388779	388801
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1.90	4.00	6.70	6	55	388791	388813
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2.50	5.30	7.10	6	55	388793	388815
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				64	388795	388817
5.00	10.30	15.10	8	55	425016	413888
				64	388796	388818
6.00	13.00	16.90	8	60	423532	423535
8.00	18.00	21.90	10	70	423533	423536
10.00	22.00	26.90	12	79	423534	423537

AEROSPACE APPLICATION



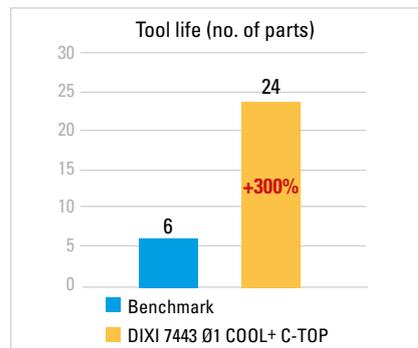
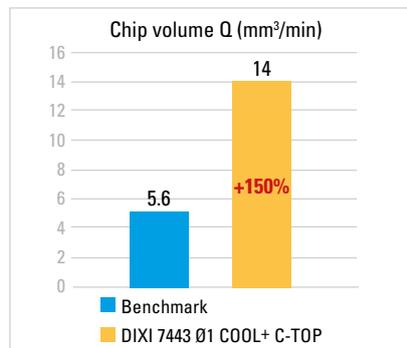
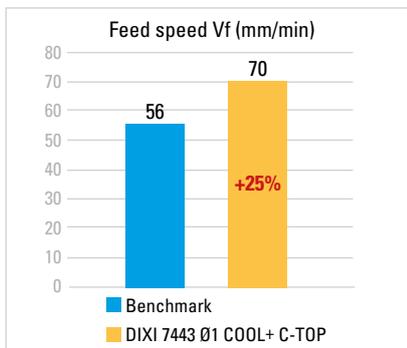
Machine: 3-axis machining center
 Lubrication: Soluble oil - Pressure 15 bars
 Component: Circlips
 Material: Inconel 718
 Operation: External contouring and groove machining

Benchmark: End mill Ø1 Z=3 coated

External lubrication
 $a_p = 0.10$ mm
 $a_e = 1$ mm
 $n = 7'000$ rpm ($V_c = 21$ m/min)
 $V_f = 56$ mm/min
 Chip volume $Q = 5.6$ mm³/min
 Tool life = 6 parts

DIXI 7443 Ø1 COOL+ C-TOP

Internal lubrication
 $a_p = 0.20$ mm
 $a_e = 1$ mm
 $n = 10'000$ rpm ($V_c = 31$ m/min)
 $V_f = 70$ mm/min
 Chip volume $Q = 14$ mm³/min
 Tool life = 24 parts



MEDICAL APPLICATION



Machine: 3-axis machining center
 Lubrication: Internal - Soluble oil
 Component: Shoulder prosthesis socket
 Material: Titanium
 Operation: Drilling on uneven surfaces

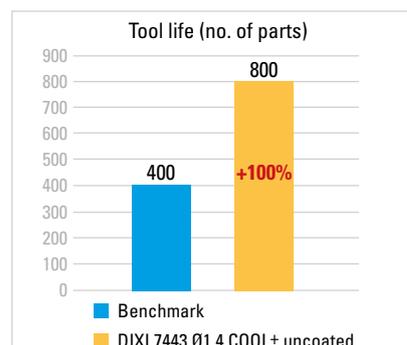
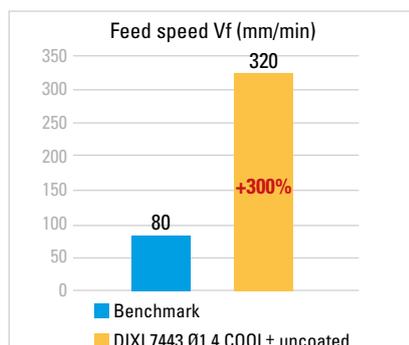
Benchmark: End mill Ø1.5 Z=2

External lubrication
 Drilling along the axis
 $n = 9'500$ rpm ($V_c = 45$ m/min)
 $V_f = 80$ mm/min
 Tool life = 400 parts



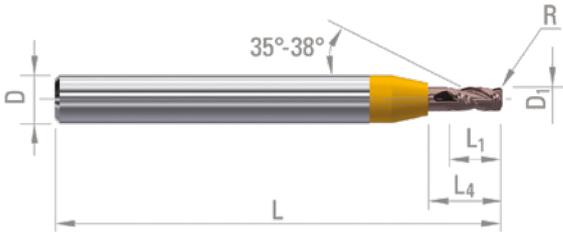
DIXI 7443 Ø1.40 COOL+ Z=3

Internal lubrication
 Helical interpolation
 $n = 11'800$ rpm ($V_c = 52$ m/min)
 $V_f = 320$ mm/min
 Tool life = 800 parts





CORNER RADIUS END MILLS WITH ACCELERATED LUBRICATION



- Corner radius end mills with reinforced shank and symmetrical front grinding developed for the machining of tough materials.
- The patented COOL+ coolant concept allows higher productivity.
- The extra smooth C-TOP coating improves tool life, even at high temperatures, in difficult to machine materials.

Roughing ●●●●● Finishing ●●●●● ○ good ⊙ excellent

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Recommendations	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	○	○

ISO	N											S					H					
Materials description	Wrought aluminium alloy		Cast aluminium alloy			Cu + Pb alloy	Cu alloy difficult	Gold, Silver	Graphite	Plastic	Wood	Special alloy Ni / Co			Titanium, titanium alloy		Hardened steel	Hard cast iron				
VDI 3323	21	22	23	24	25	26	27	28	-	-	29	30	31	32	33-35	36	37	38	39	40	41	
Recommendations						⊙	⊙	⊙	⊙					⊙	⊙	⊙	⊙	⊙				

D ₁	L ₁	L ₄	D _{h5}	L	R	C-TOP
∅ >0.40 - 0/-0.01					R ≤ 0.10 ± 0.01	
∅ <2.00 - 0/-0.02					R < 0.30 ± 0.015	
∅ ≥6.00 - e8					R ≥ 0.30 ± 0.02	

D ₁	L ₁	L ₄	D _{h5}	L	R	C-TOP
∅ >0.40 - 0/-0.01					R ≤ 0.10 ± 0.01	
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∅ ≥6.00 - e8					R ≥ 0.30 ± 0.02	

0.40	0.90	1.90	4	38	0.05 0.10	413162 413163
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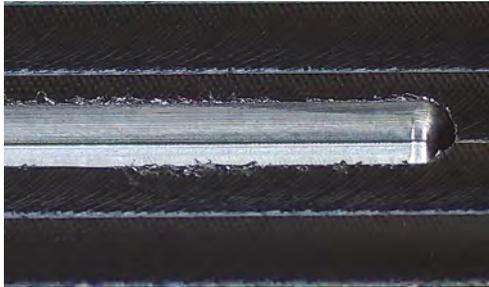
APPLICATION GENERAL MECHANICS

Machine: 3-axis machining center
 Lubrication: Full oil - Pressure 60 bars
 Material: Stainless steel 1.4441
 Operation: Ramp milling

Benchmark: End mill Ø1 Z=3 R0.10

External lubrication
 n = 15'000 rpm (Vc = 47 m/min)
 Vf = 170 mm/min
 ramp angle = 5°
 Cycle time = 40 minutes

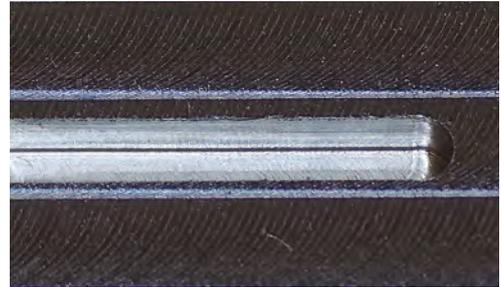
Lot of burrs



DIXI 7453 Ø1 COOL+ Z=3 R0.10

Internal lubrication
 n = 15'000 rpm (Vc = 47 m/min)
 Vf = 240 mm/min
 Ramp angle = 20°
 Cycle time = 17 minutes

Fewer burrs
 despite high parameters



AEROSPACE APPLICATION



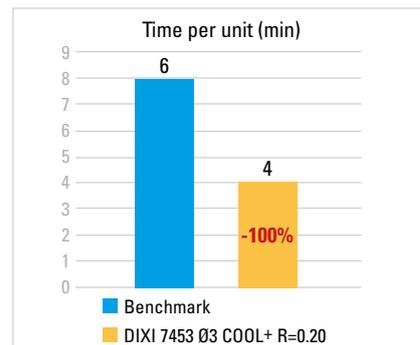
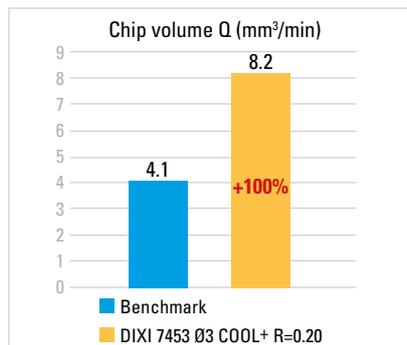
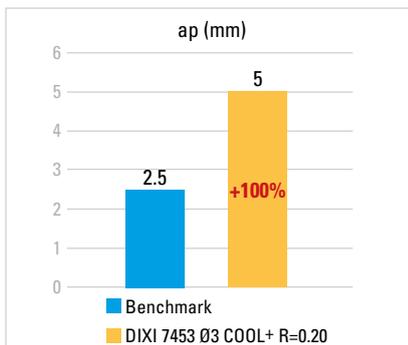
Machine: 5-axis machining center
 Lubrication: Soluble oil - Pressure 60 bar
 Component: Ventilation part
 Material: Titanium grade 5
 Operation: Full-diameter milling

Benchmark: End mill Ø3 Z=3 R0.20

External lubrication
 ap = 2.5 mm
 Vc = 75 m/min (n = 7'900 rpm)
 Vf = 458 mm/min
 Q = 4.10 mm³/min
 Time per unit = 8 minutes

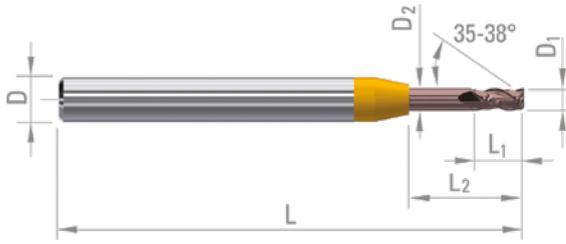
DIXI 7453 Ø3 COOL+ Z=3 R0.20

External lubrication
 ap = 5 mm
 Vc = 120 m/min (n = 12'700 rpm)
 Vf = 458 mm/min
 Q = 8.20 mm³/min
 Time per unit = 4 minutes





5XD₁ NECKED DOWN END MILLS WITH ACCELERATED LUBRICATION



- High performance end mills with reinforced shank with variable helix and 5xD₁ necked down developed for the machining of tough materials.
- The patented COOL+ coolant concept allows higher productivity.
- The extra smooth C-TOP coating improves tool life, even at high temperatures, in difficult to machine materials.

Roughing ●●●●● Finishing ●●●●● ○ good ⊙ excellent

ISO	P													M				K					
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Recommendations	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	○	○

ISO	N										S						H				
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Recommendations						⊙	⊙	⊙	⊙				⊙	⊙	⊙	⊙	⊙				

D₁ L₁ D₂ L₂ D_{h5} L C-TOP
 Ø ≤ 2.00 - 0/-0.01
 Ø < 6.00 - 0/-0.02
 Ø ≥ 6.00 - e8

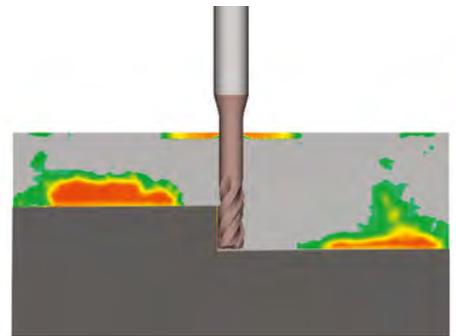
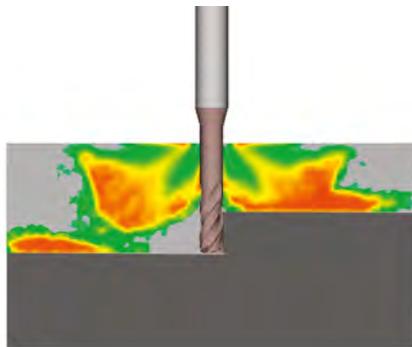
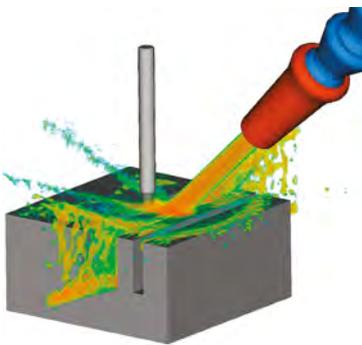
0.30	0.70	0.27	1.60	4	38	412150
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4.00	8.50	3.72	20.40	8	64	412170
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6.00	13.30	5.55	30.70	8	74	423538
8.00	18.30	7.40	42.30	10	90	423539
10.00	22.50	9.25	51.90	12	105	423540

DEEP GROOVING APPLICATION



Material : Titanium Grade 5
 Tool : Ø3 End milling cutter
 Depth : 12 mm (4xD)
 Lubrication : Emulsion
 Problematic : Cycle time too long

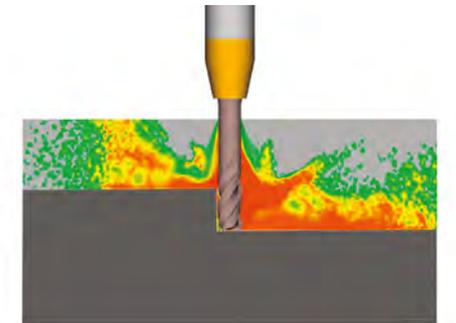
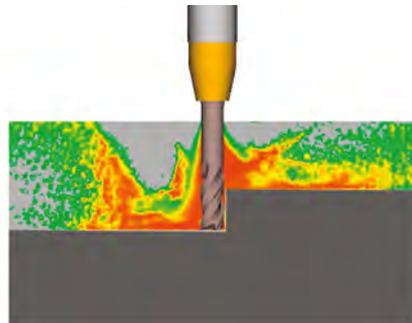
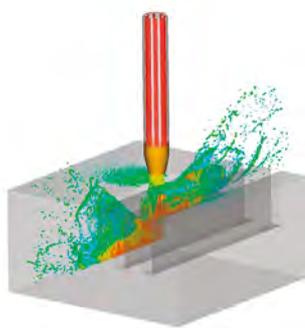
A sprinkler system does not provide a sufficient quantity of fluid. In some regions, machining is dry.



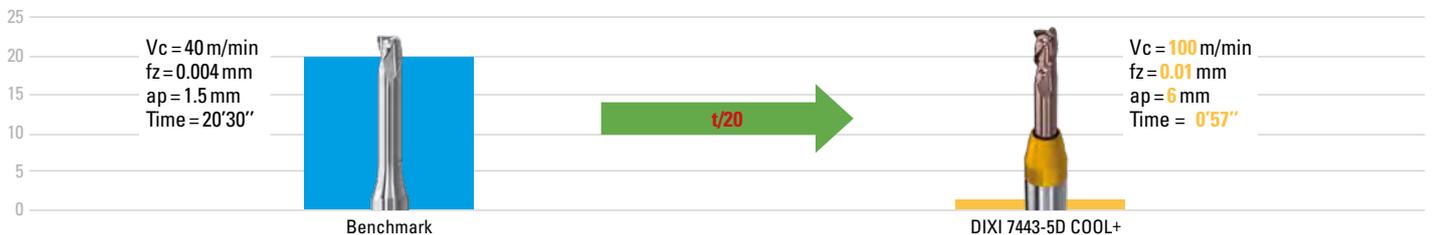
The DIXI COOL+® system offers the following benefits:

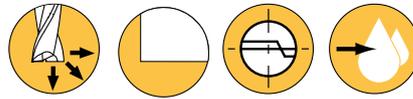
- Abundant watering thanks to multiple, large-section watering channels
- Irrigation constantly directed towards the cutting area
- Uniform watering at all working depths
- Maximized chip evacuation

Irrigation and cutting performance are maintained whatever the working depth.

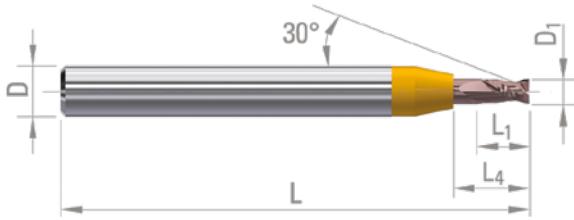


Time by slotting (min)





END MILLS, REINFORCED SHANK WITH ACCELERATED LUBRICATION



- High performance slot drills with reinforced shank developed for the machining of tough materials.
- The patented COOL+ coolant concept allows higher productivity.
- The extra smooth C-TOP coating improves tool life even at high temperatures in difficult to machine materials.

Roughing ●●●●● Finishing ●●●●● ○ good ⊙ excellent

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ISO	N												S					H			
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VDI 3323	21	22	23	24	25	26	27	28	-	-	29	30	31	32	33-35	36	37	38	39	40	41
Recommendations						⊙	⊙	⊙	⊙				⊙	⊙	⊙	⊙	⊙				

D₁ L₁ D_{h5} L L₄ CARBIDE C-TOP
 Ø≤2.00 - 0/-0.01
 Ø>6.00 - 0/-0.02

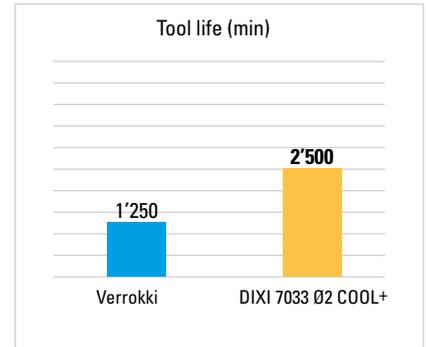
0.30	0.45	4	38	2.10	381928	381944
0.40	0.60	4	38	2.10	381929	381945
0.50	0.80	4	38	2.10	381930	381946
0.60	0.90	4	38	2.90	381931	381947
0.70	1.10	4	38	3.00	381932	381948
0.80	1.20	4	38	3.00	381933	381949
0.90	1.40	4	38	3.00	381934	381950
1.00	1.50	4	38	3.00	381935	381951
1.10	1.70	4	38	3.00	381936	381953
1.20	1.80	4	38	4.10	381937	381954
1.30	2.00	4	38	3.90	381938	381955
1.40	2.10	4	38	3.80	381939	381956
1.50	2.30	4	38	3.90	381940	381957
1.60	2.40	6	55	4.50	383393	384649
1.70	2.60	6	55	3.90	384641	384650
1.80	2.70	6	55	3.90	384642	384651
1.90	2.90	6	55	5.20	384644	384653
2.00	3.00	6	55	5.10	384645	384654
2.50	3.80	6	55	5.00	384646	384655
3.00	4.50	6	55	6.60	383394	384656
4.00	6.00	8	64	8.80	384648	384657
5.00	7.50	8	64	10.60	383396	384658

The DIXI COOL+® concept can be applied to all types of tools according to your needs.

HEMISPHERICAL MILLING CUTTER - ORTHOPEDIC PLATE



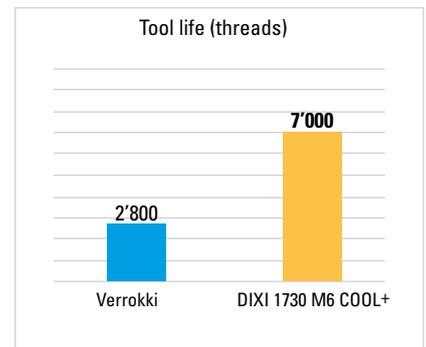
Machine : 5-axis machining center
 Operation : Shape scanning
 Material : Titanium Grade 5
 Tool : Ø2 Ball-nose end mill Z=3
 Lubrication : Emulsion



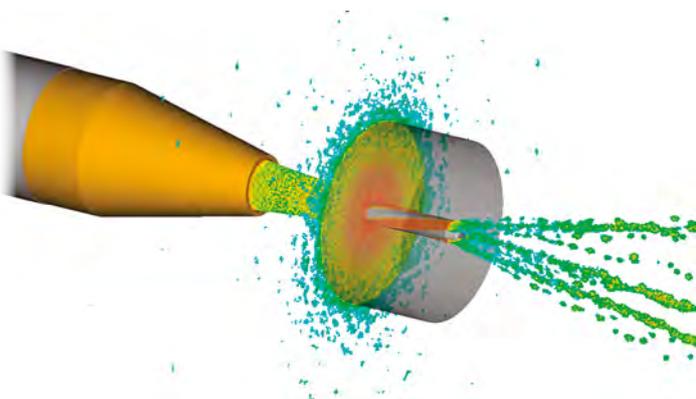
WHIRLING MILLS - SHOULDER PROSTHESIS



Machine : 5-axis machining center
 Operation : Thread M6x1 4H - 2xD
 Material : Titanium Grade 5
 Tool : Whirling tool - full profile
 Lubrication : Emulsion



REAMER Ø0.97 - LEFT HAND HELIX - RIGHT HAND CUT



Advantages:

- No integrated sprinkler solution on the market for this diameter
- The coolant is routed to the cutting zone via the flutes
- Chips are ejected forwards
- Chip pellets are removed from the tool
- Process safety
(night-time production on bar turning machine)

DIXI COOL+®, ONE CONCEPT, SEVERAL POSSIBILITIES

Multi-tooth end mills



Shape mills



Thread whirlers



Thread mills





DIXI
polytool



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