DIXI polytool

Patented DIXI COOL+® concept

DIXI COOL+

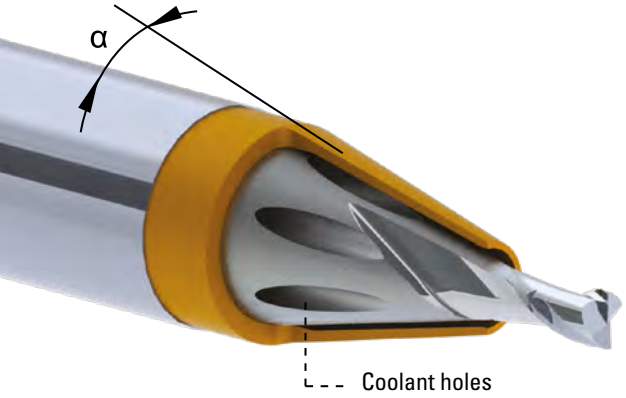
The secret to exceptional productivity

End mills and micro end mills
with oriented and accelerated lubrication

European patent no. and Madrid protocol no : 4230332
U.S. patent no : # US 11.590.591.B2

swiss made since 1946 SWISS

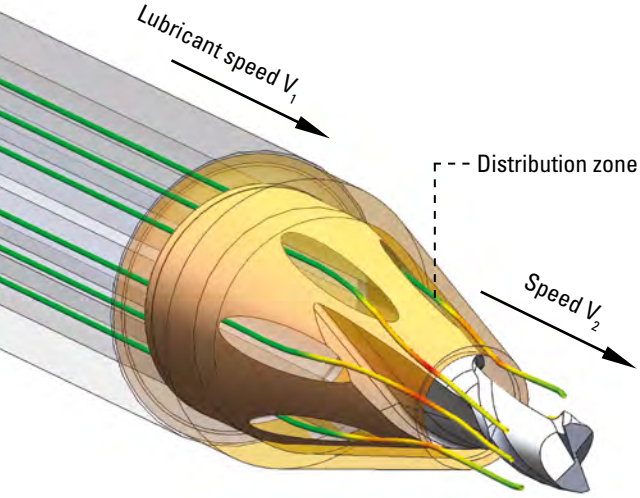
MAKE THE MOST OF YOUR INTERNAL LUBRICATION FOR INCREASED PRODUCTIVITY



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.

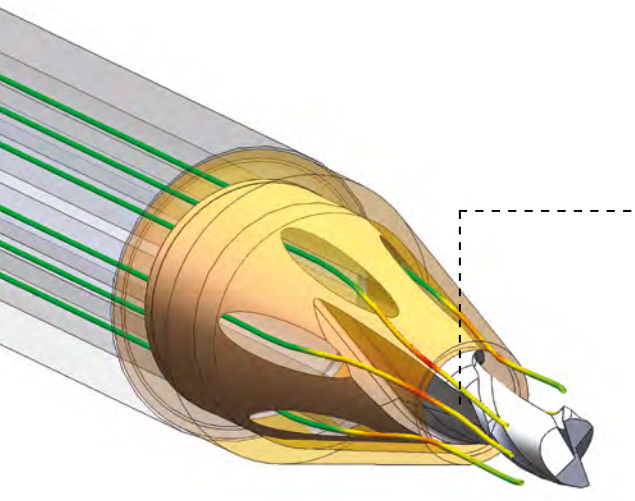
The α angle of the cone orients the lubricant closest to the cutting zone end restrains inertia effect at the tip of the tool even with high rotation



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.

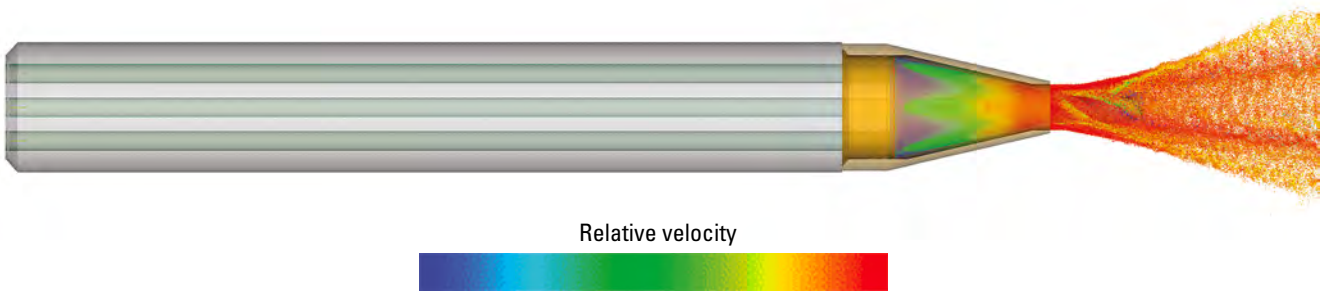
In order to guarantee this $V_2 > V_1$ speed increase, the entering surface of the lubricant is always larger than the one of the exiting circular ring.



3 THE LUBRICANT REACHES THE CUTTING FACES

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

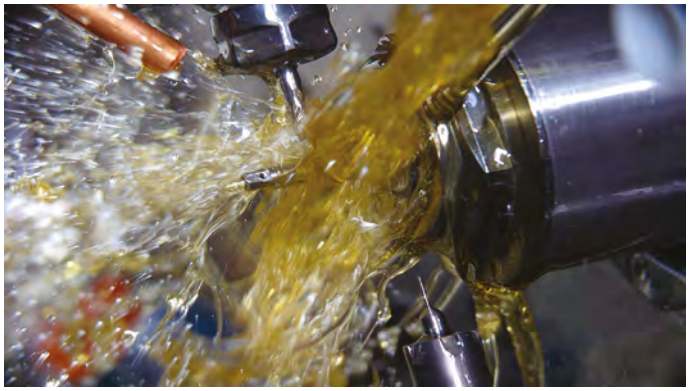
The coolant is directed towards the cutting zone and completely irrigates it, whatever the shape of the tool.
Thanks to fluid acceleration, tool rotation does not influence the shape of the output flow (umbrella effect).



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

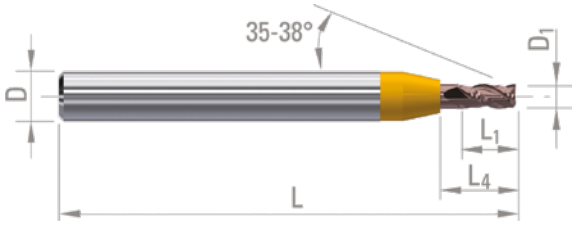
Coolant system

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

DIXI 7443 COOL+®

Z = 3

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						◎	◎	◎	◎				◎	◎	◎	◎	◎				

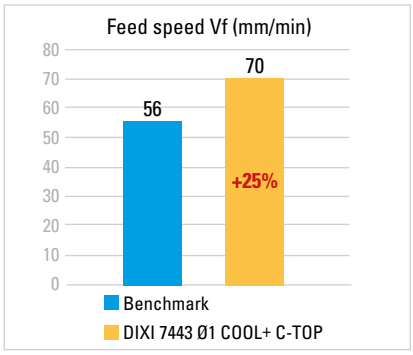
D_1 Ø≤2.00 - 0/-0.01 Ø<6.00 - 0/-0.02 Ø≥6.00 - ø8	L_1	L_4	D_{h5}	L	CARBIDE	C-TOP
0.30	0.70	1.80	4	38	388775	388797
0.40	0.90	1.90	4	38	388776	388798
0.50	1.10	2.80	4	38	388777	388799
0.60	1.40	2.80	4	38	388778	388800
0.70	1.60	2.90	4	38	388779	388801
0.80	1.80	3.00	4	38	388780	388802
0.90	2.00	3.00	4	38	388781	388803
1.00	2.20	3.10	4	38	388782	388804
1.10	2.40	3.20	4	38	388783	388805
1.20	2.60	4.30	4	38	388784	388806
1.30	2.80	4.40	4	38	388785	388807
1.40	3.00	4.40	4	38	388786	388808
1.50	3.20	4.50	4	38	388787	388809
1.60	3.40	5.20	6	55	388788	388810
1.70	3.60	5.20	6	55	388789	388811
1.80	3.80	5.30	6	55	388790	388812
1.90	4.00	6.70	6	55	388791	388813
2.00	4.30	6.70	6	55	388792	388814
2.50	5.30	7.10	6	55	388793	388815
3.00	6.30	9.20	6	55	388794	388816
4.00	8.30	12.00	8	55	425015	413887
				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

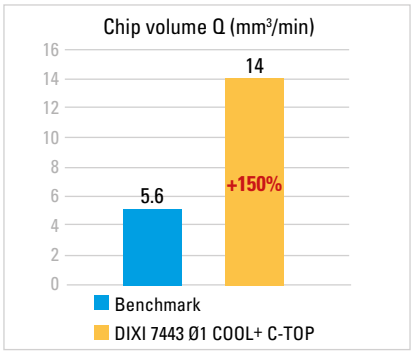
AEROSPACE APPLICATION

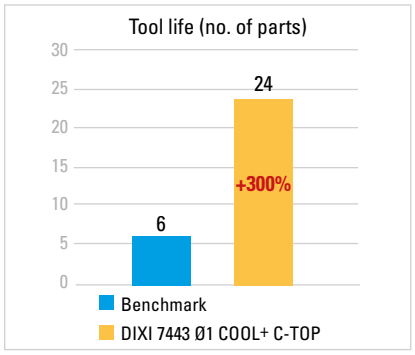
Machine : 3-axis machining center
Lubrication : Soluble oil - Pressure 15 bars
Component : Circlips
Material : Inconel 718
Operation : External contouring and groove machining

Benchmark : End mill Ø1 Z=3 coated
External lubrication
ap = 0.10 mm
ae = 1 mm
n = 7'000 rpm (Vc = 21 m/min)
Vf = 56 mm/min
Chip volume Q = 5.6 mm^3/min
Tool life = 6 parts

DIXI 7443 Ø1 COOL+ C-TOP
Internal lubrication
ap = **0.20** mm
ae = 1 mm
n = 10'000 rpm (Vc = **31** m/min)
Vf = 70 mm/min
Chip volume Q = **14** mm^3/min
Tool life = **24** parts



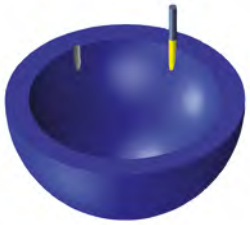




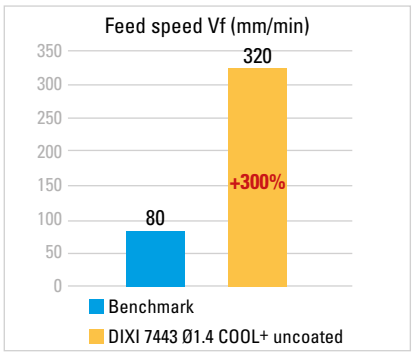
MEDICAL APPLICATION

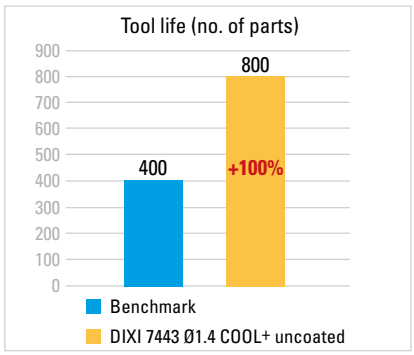
Machine : 3-axis machining center
Lubrication : Internal - Soluble oil
Component : Shoulder prosthesis socket
Material : Titanium
Operation : Drilling on uneven surfaces

Benchmark : End mill Ø1.5 Z=2
External lubrication
Drilling along the axis
n = 9'500 rpm (Vc = 45 m/min)
Vf = 80 mm/min
Tool life = 400 parts



DIXI 7443 Ø1.40 COOL+ Z=3
Internal lubrication
Helical interpolation
n = 11'800 rpm (Vc = **52** m/min)
Vf = **320** mm/min
Tool life = **800** parts

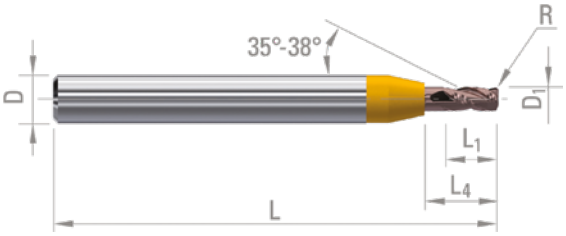




DIXI 7453 COOL+®

Z = 3

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
Ø >0.40 - 0/-0.01 Ø <2.00 - 0/-0.02 Ø ≥6.00 - e8					R ≤ 0.10 ± 0.01 R <0.30 ± 0.015 R ≥ 0.30 ± 0.02	
0.40	0.90	1.90	4	38	0.05 0.10	413162 413163
0.50	1.10	2.80	4	38	0.05 0.10	413164 413165
0.60	1.40	2.80	4	38	0.05 0.10	413166 413167
0.70	1.60	2.90	4	38	0.05 0.10	413168 413169
0.80	1.80	2.97	4	38	0.05 0.10	413170 413171
0.90	2.00	3.03	4	38	0.05 0.10	413172 413173
1.00	2.20	3.10	4	38	0.10 0.20	413174 413175
1.50	3.20	4.50	4	38	0.10 0.20	413176 413177
2.00	4.50	6.70	6	55	0.20 0.30	413179 413180
2.50	5.50	7.10	6	55	0.20 0.30	413181 413182
3.00	6.50	9.20	6	55	0.20 0.30 0.50	413183 413184 413185
4.00	8.50	12.00	8	55	0.30 0.50 1.00	425017 425018 425019
4.00	8.50	12.00	8	64	0.30 0.50 1.00	413186 413187 413188
5.00	10.60	15.10	8	55	0.30 0.50 1.00	425020 425021 425022
5.00	10.60	15.10	8	64	0.30 0.50 1.00	413189 413190 413191

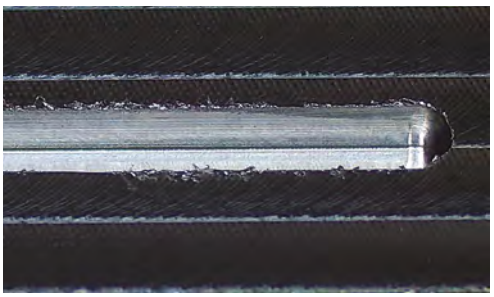
D_1	L_1	L_4	D_{h5}	L	R	C-TOP
Ø >0.40 - 0/-0.01 Ø <2.00 - 0/-0.02 Ø ≥6.00 - e8					R ≤ 0.10 ± 0.01 R <0.30 ± 0.015 R ≥ 0.30 ± 0.02	
6.00	13.30	16.90	8	60	0.30 0.50 1.00 1.50	425664 425665 425666 425667
8.00	18.30	21.90	10	70	0.50 1.00 1.50 2.00	425668 425669 425670 425671
10.00	22.50	26.90	12	79	0.50 1.00 1.50 2.00	425672 425673 425674 425675

APPLICATION GENERAL MECHANICS

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

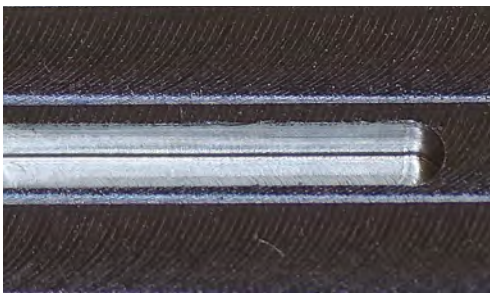
Benchmark : End mill Ø1 Z=3 R0.10
External lubrication
n = 15'000 rpm (Vc = 47 m/min)
Vf = 170 mm/min
ramp angle = 5°
Cycle time = 40 minutes

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

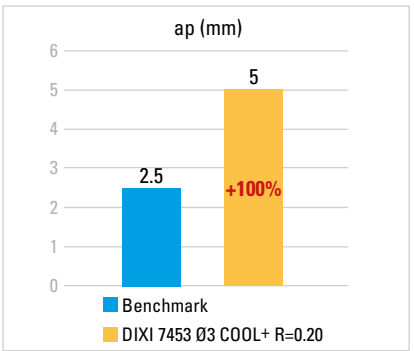


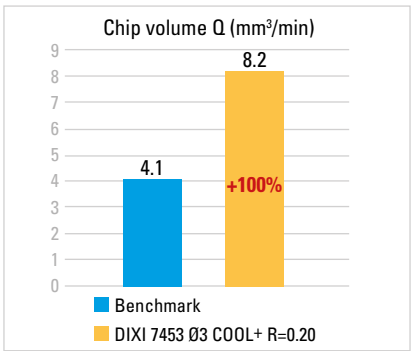
AEROSPACE APPLICATION

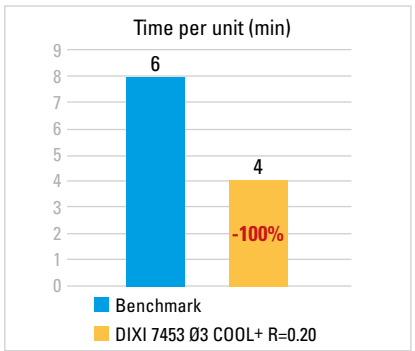
Machine : 5-axis machining center
Lubrication : Soluble oil - Pressure 60 bar
Component : Ventilation part
Material : Titanium grade 5
Operation : Full-diameter milling

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 = 4.10mm³/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



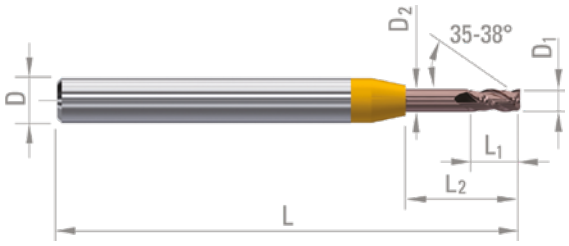




DIXI 7443-5D COOL+®

Z = 3

5XD$_1$ NECKED DOWN END MILLS WITH ACCELERATED LUBRICATION



- High performance end mills with reinforced shank with variable helix and 5xD$_1$ 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

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Recommendations	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◯	◯	◯	◯	◯	◯

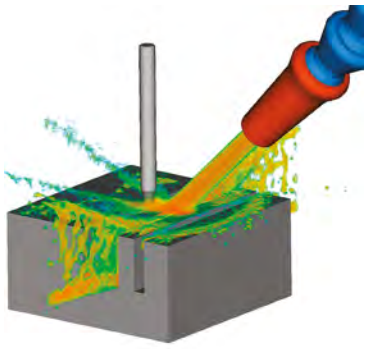
ISO	N												S					H			
Materials description	Wrought aluminium alloy		Cast aluminium alloy			Cu + Pb alloy	Cu alloy difficult		Gold, Silver	Graphite	Plastic	Wood	Special alloy Ni / Co			Titanium, titanium alloy		Hardened steel		Hard cast iron	
VDI 3323	21	22	23	24	25	26	27	28	-	-	29	30	31	32	33-35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

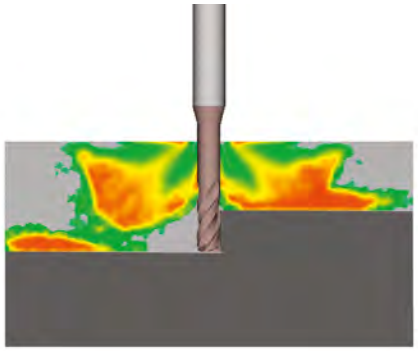
D_1 Ø ≤ 2.00 - 0/-0.01 Ø < 6.00 - 0/-0.02 Ø ≥ 6.00 - e8	L_1	D_2	L_2	D_{h5}	L	C-TOP
0.30	0.70	0.27	1.60	4	38	412150
0.40	0.90	0.36	2.20	4	38	412151
0.50	1.10	0.45	2.70	4	38	412152
0.60	1.40	0.54	3.20	4	38	412153
0.70	1.60	0.63	3.80	4	38	412154
0.80	1.80	0.72	4.30	4	38	412155
0.90	2.00	0.81	4.80	4	38	412156
1.00	2.20	0.90	5.20	4	38	412157
1.10	2.40	0.99	5.80	4	38	412158
1.20	2.60	1.08	6.30	4	38	412159
1.30	2.80	1.17	6.70	4	38	412160
1.40	3.00	1.26	7.30	4	38	412161
1.50	3.20	1.39	7.80	4	38	412162
1.60	3.40	1.48	8.30	6	55	412163
1.70	3.60	1.58	8.70	6	55	412164
1.80	3.80	1.67	9.20	6	55	412165
1.90	4.00	1.76	9.70	6	55	412166
2.00	4.50	1.85	10.30	6	55	412167
2.50	5.50	2.32	12.80	6	55	412168
3.00	6.50	2.78	15.30	6	55	412169
4.00	8.50	3.72	20.40	8	64	412170
5.00	10.60	4.65	25.40	8	80	412171
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

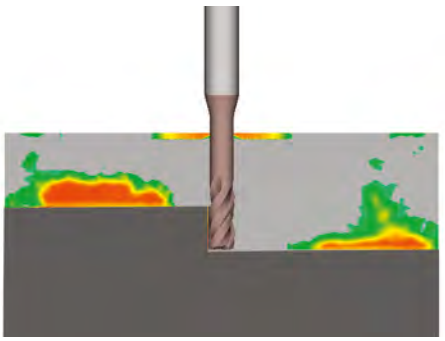
DEEP GROOVING APPLICATION

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.



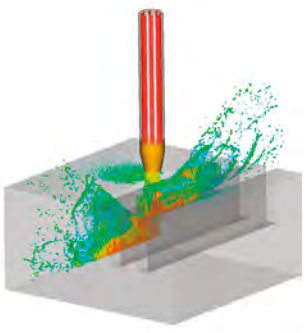


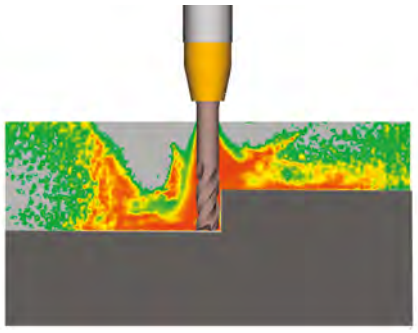


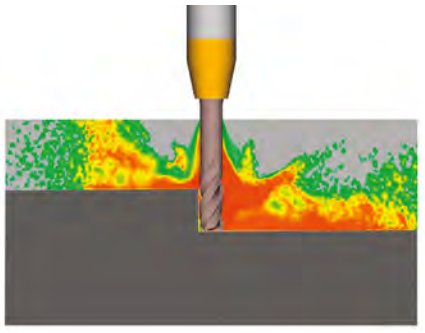
The DIXI COOL+® system offers the following benefits:

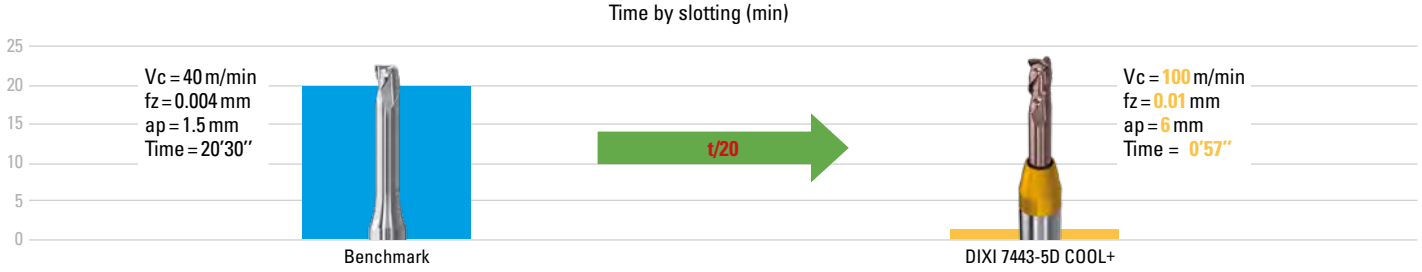
- Abundant watering thanks to multiple, large-section watering channels
- Irrigation constantly directed towards the cutting area
- Uniform watering at all working depths
- Maximized chip evacuation

Irrigation and cutting performance are maintained whatever the working depth.





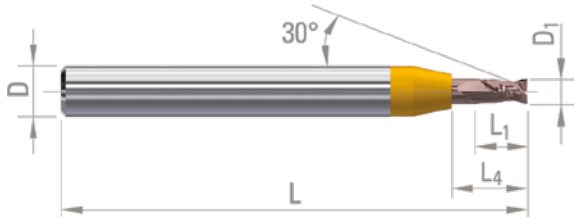




DIXI 7442 COOL+®

Z = 2

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

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	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◯	◯	◯	◯	◯	◯

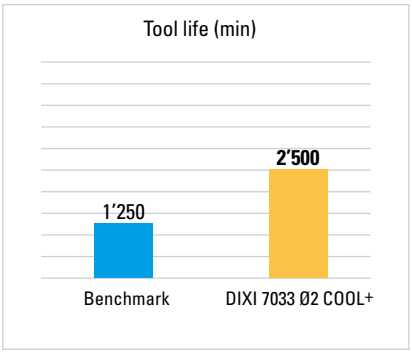
ISO	N												S					H			
Materials description	Wrought aluminium alloy		Cast aluminium alloy			Cu + Pb alloy	Cu alloy difficult		Gold, Silver	Graphite	Plastic	Wood	Special alloy Ni / Co			Titanium, titanium alloy		Hardened steel		Hard cast iron	
VDI 3323	21	22	23	24	25	26	27	28	-	-	29	30	31	32	33-35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

D_1 Ø≤2.00 - 0/-0.01 Ø>6.00 - 0/-0.02	L_1	D_{h5}	L	L_4	CARBIDE	C-TOP
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.

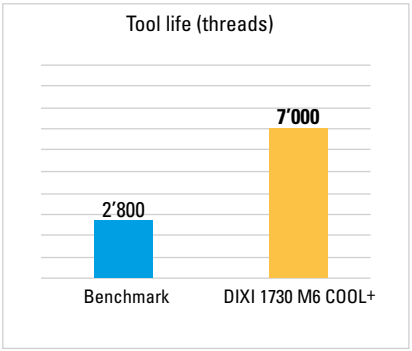
HEMISPHERICAL MILLING CUTTER - ORTHOPEDIC PLATE

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

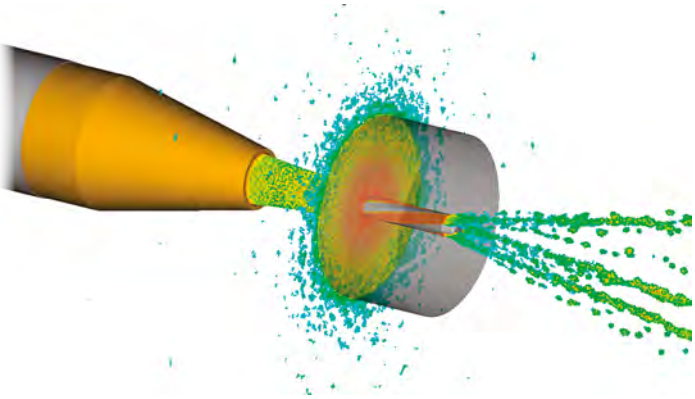


WHIRLING MILLS - SHOULDER PROSTHESIS

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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