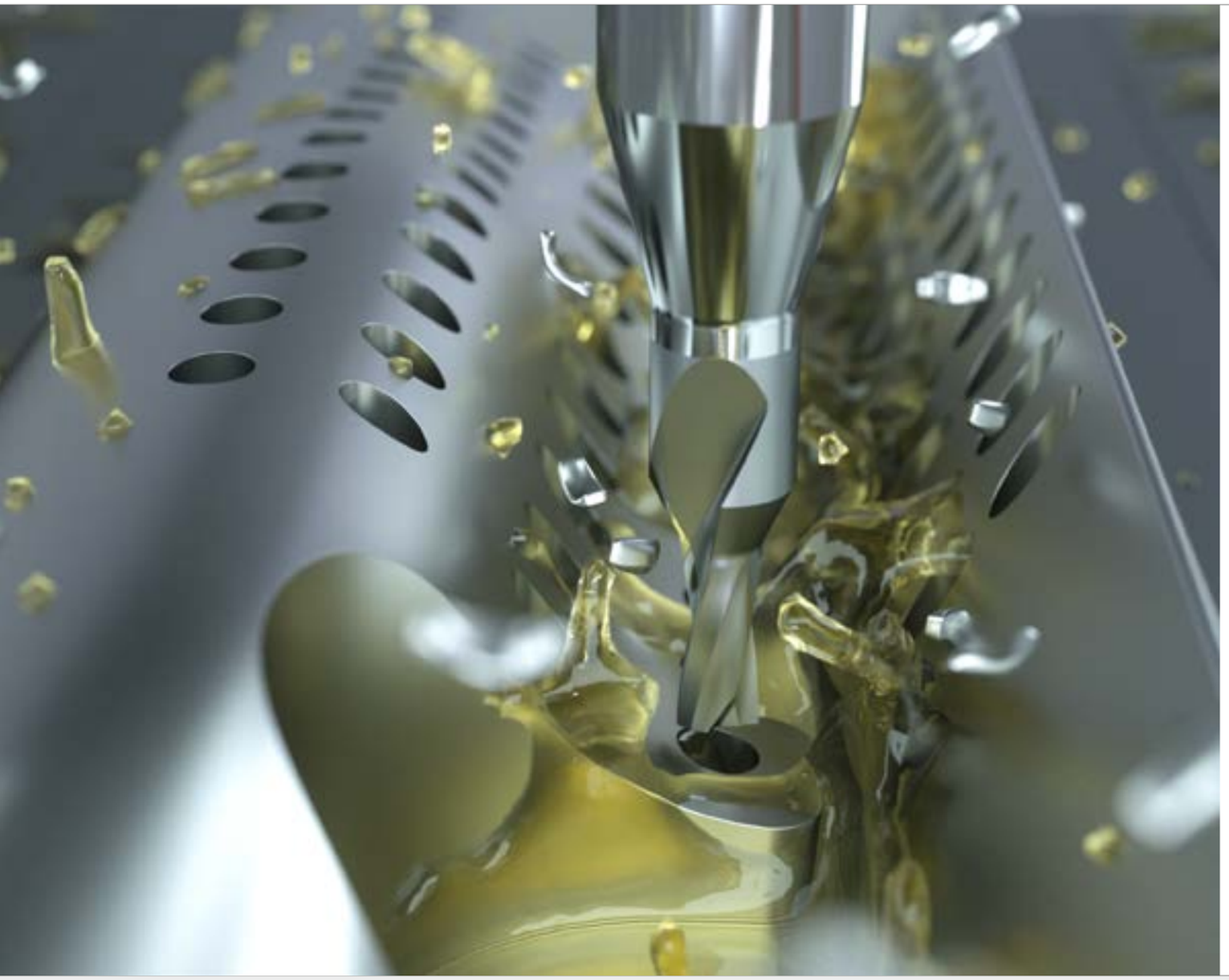
PILOT DRILLING AND SHORT DRILLING TOOLS
CRAZYDRILL CROSSPILOT

CrazyDrill Crosspilot



CRAZYDRILL Crosspilot

A PILOT DRILL FOR INCLINED SURFACES UP TO 60°

Mikron Tool offers with CrazyDrill Crosspilot a coated solid carbide pilot drill for direct drilling on inclined surfaces up to a maximum inclined angle of 60°. The drill is available from stock in diameters of 0.4 mm to 6.35 mm.

Producing pilot holes directly on inclined surfaces, means to reduce the three steps needed up to now "milling – centering – drilling" to two steps "pilot drilling – drilling".

The compact and sturdy design of CrazyDrill Crosspilot provides for good position accuracy. The drill with a 170° tip angle affords the follow-up drill a perfect centering and cylindrical guidance. Highest degree of precision and straightness is assured. Perfectly matched diameter tolerances guarantee accurate deep hole drilling on inclined surfaces.

CRAZYDRILL™ by Mikron Tool Crosspilot

CRAZYDRILL™ by Mikron Tool Crosspilot

PILOT DRILLING AND SHORT DRILLING TOOLS
CRAZYDRILL CROSSPILOT

Perfect pilot drill for holes on inclined surfaces

DRILLING ON INCLINED, CONVEX AND CONCAVE SURFACES

Mikron Tool offers with CrazyDrill Crosspilot a coated solid carbide pilot drill for direct drilling on inclined surfaces up to a maximum inclined angle of 60°. The drill is available from stock in diameters of 0.4 mm to 6.35 mm.

- CrazyDrill Crosspilot, drilling depth up to 2 x d (nominal),with external cooling

CrazyDrill Crosspilot is used for:

Inclined holes with angle up to 60° on flat surfaces.

Inclined holes with angle up to 60° on convex surfaces.

Eccentric holes on convex surfaces.

Inclined holes with angle up to 60° on concave surfaces.

CrazyDrill Crosspilot

- Coated
- External cooling

1 | SHAFT
The reinforced shaft with its sturdy design counteracts lateral forces and guarantees highest position.

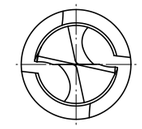
2 | SOLID CARBIDE
A special solid carbide assures high drilling speed.

3 | COATING
An optimal coating protects the solid carbide drill from wear and increases its tool life.

4 | GUIDING MARGINS
No lateral catching due to guiding margins and therefore higher process reliability.

5 | TIP ANGLE GEOMETRY
The special tip angle geometry of 170° minimizes radial forces and enables drilling up to a maximum inclined angle of 60°. Concurrently, the geometry assures a good centering and prevents cutting edge breakage of the follow-up drill.

Drill tip



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CRAZYDRILL by Mikron Tool Crosspilot

CRAZYDRILL by Mikron Tool Crosspilot

PILOT DRILLING AND SHORT DRILLING TOOLS
CRAZYDRILL CROSSPILOT

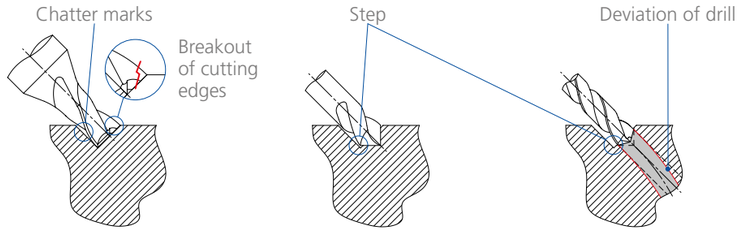
Benefits and applications

PERFECT FOR HOLES ON INCLINED SURFACES

- **SHORT MACHINING TIME** | pilot hole directly on inclined surfaces
- **HIGH PROCESS RELIABILITY** | due to an innovative tool design
- **HIGH DEGREE OF PRECISION** | due to small tolerances
- **LOW PRODUCTION COSTS** | savings of one tool: two instead of three work steps

The comparison

■ Machining of inclined holes with traditional method



Step 1: flat milling
Tool: Milling cutter

Step 2: centering
Tool: NC spot drill

Step 3: flat milling
Tool: Twist drill

■ Inclined hole, performed with CrazyDrill Crosspilot

Step 1: inclined spot drilling with Mikron Tool pilot drill
Tool: CrazyDrill Crosspilot

Step 2: long, inclined hole
Tool: Twist drill

APPLICATION DOMAINS	COMPONENTS EXAMPLES
Dental	Dental implants
Aerospace industry	Spherical joint
Medical technology	Component for measuring instrument
Mold making	Mould for blister packaging
Automotive industry	Injector body
Mechanical engineering	Hub with inclined holes
Hydraulics / Pneumatics	Safety screw

MATERIALS GROUPS	EXAMPLES		
	Mat. no.	DIN	AISI / ASTM / UNS
Group P Unalloyed and alloyed steel	1.0401	C15	1015
	1.3505	100Cr6	52100
	1.2436	X210CrW12	D4 / D6
Group M Stainless steel	1.4105	X6CrMoS17	430F
	1.4112	X90CrMoV18	440B
	1.4301	X5CrNi 18-10	304
Group K Cast iron	0.7040	GGG40	60-40-18
Group N Non ferrous metals	3.2315	AlMgSi1	6351
	3.2163	GD-AlSi9Cu3	A380
	2.004	Cu-OF / CW008A	C10100
	2.0321	CuZn37 CW508L	C27400
	2.102	CuSn6	C51900
	2.096	CuAl9Mn2	C63200
Group S2 Titanium (pure and alloyed)	3.7035	Gr.2	B348 / F67
	3.7165	TiAl6V4	B348 / F136
Group H1 Hardened steel <55 HRC	1.2510	100MnCrMoW4	O1

CRAZYDRILL Crosspilot

PILOT DRILLING AND SHORT DRILLING TOOLS
CRAZYDRILL CROSSPILOT

CrazyDrill Crosspilot - 2 x d (nominal)

Carbide | 2xd1 | 170° | Z2 | eXedur RI/RIP

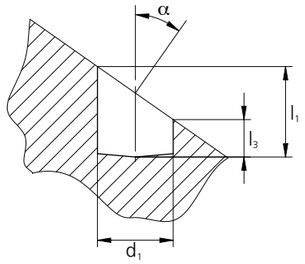
Ø d_1	0.1 - 3.0 mm	3.1 - 6.0 mm	6.1 - 10.0 mm
Tolerance	+ 0.006 mm 0	+ 0.009 mm + 0.001 mm	+ 0.010 mm + 0.001 mm

DRILLING WITH EXTERNAL COOLING

The coated solid carbide drill for steel, stainless steel materials, titanium and nonferrous metals is an unique specialist for holes on inclined, convex and concave surfaces. It produces pilot holes directly in surfaces with up to a maximum inclined angle of 60°. CrazyDrill Crosspilot reduces by one operation the traditional centering process.

The compact and sturdy design of CrazyDrill Crosspilot provides for good position accuracy, its geometry is designed for extreme applications. Its 170° tip angle affords good centering, reduction of radial forces and prevents cutting edge breakage of the follow-up drill. Pilot drilling with CrazyDrill Crosspilot assures a cylindrical guidance of the follow-up drill. The result: process reliability, highest position and alignment accuracy.

The formula: $l_3 = 2 \times d_1 - d_1 \times \tan(\alpha)$



The example:
Inclination angle 35°, bore diameter 2 mm.

$l_3 = 2 \times 2\ mm - 2\ mm \times (\tan 35°) = 2.6\ mm$

With an inclination angle of 35° and a depth of 4 mm (2 x d_1) on long side, the hole depth on the short side becomes 2.6 mm (1.3 x d_1).

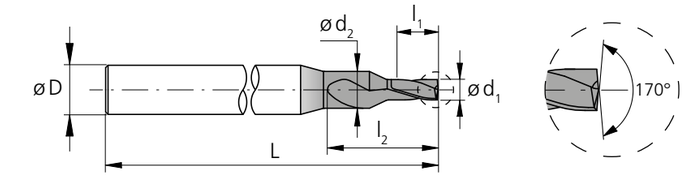
Coolant type, pressure and filtration

Recommendations for coolant type, pressure and filtration are on page "drilling process".

Please note

You couldn't find your suitable version of the CrazyDrill Crosspilot (diameter, length, cutting direction…)? Ask us about our customized versions!

Regrinding: This product can be reground starting from Ø 1.4 mm.



d_1 [mm]	d_1 [inch]	l_1 [mm]	d_2 [mm]	l_2 [mm]	D (h6) [mm]	L [mm]	Item number	Availability
0.396	**1/64**	0.8	1.0	2.6	4	50	2.PD.F164.170	■
0.40		0.8	1.0	2.6	4	50	2.PD.00400.170	■
0.45		0.9	1.0	2.8	4	50	2.PD.00450.170	■
0.50		1.0	1.2	3.2	4	50	2.PD.00500.170	■
0.55		1.1	1.2	3.3	4	50	2.PD.00550.170	■
0.60		1.2	1.5	4.0	4	50	2.PD.00600.170	■
0.65		1.3	1.5	4.1	4	50	2.PD.00650.170	■
0.70		1.4	1.5	4.2	4	50	2.PD.00700.170	■
0.75		1.5	1.5	4.3	4	50	2.PD.00750.170	■
0.793	**1/32**	1.6	1.7	4.8	4	50	2.PD.F132.170	■
0.80		1.6	1.7	4.8	4	50	2.PD.00800.170	■
0.85		1.7	1.7	4.9	4	50	2.PD.00850.170	■
0.90		1.8	1.7	5.0	4	50	2.PD.00900.170	■
0.95		1.9	1.7	5.1	4	50	2.PD.00950.170	■
1.00		2.0	2.0	5.7	4	55	2.PD.01000.170	■
1.05		2.1	2.0	5.8	4	55	2.PD.01050.170	■
1.10		2.2	2.0	6.0	4	55	2.PD.01100.170	■
1.15		2.3	2.0	6.1	4	55	2.PD.01150.170	■
1.20		2.4	2.0	6.2	4	55	2.PD.01200.170	■
1.25		2.5	2.5	7.2	4	55	2.PD.01250.170	■
1.30		2.6	2.5	7.3	4	55	2.PD.01300.170	■
1.35		2.7	2.5	7.4	4	55	2.PD.01350.170	■
1.40		2.8	2.5	7.5	4	55	2.PD.01400.170	■
1.45		2.9	2.5	7.6	4	55	2.PD.01450.170	■
1.50		3.0	3.0	8.6	4	55	2.PD.01500.170	■
1.55		3.1	3.0	8.7	4	55	2.PD.01550.170	■
1.587	**1/16**	3.2	3.0	8.8	4	55	2.PD.F116.170	■
1.60		3.2	3.0	8.8	4	55	2.PD.01600.170	■
1.65		3.3	3.0	8.9	4	55	2.PD.01650.170	■
1.70		3.4	3.0	9.1	4	55	2.PD.01700.170	■
1.75		3.5	3.0	9.2	4	55	2.PD.01750.170	■
1.80		3.6	3.5	10.1	4	55	2.PD.01800.170	■
1.85		3.7	3.5	10.3	4	55	2.PD.01850.170	■
1.90		3.8	3.5	10.4	4	55	2.PD.01900.170	■

■ Stock item

Complementary products
All "CrazyDrill" family

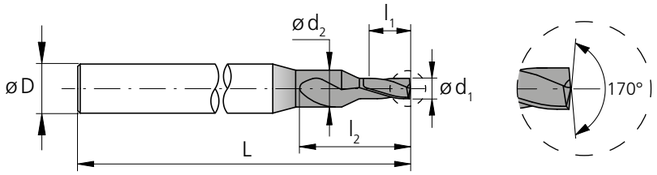
PILOT DRILLING AND SHORT DRILLING TOOLS
CRAZYDRILL CROSSPILOT

CrazyDrill Crosspilot - 2 x d (nominal)

Carbide | 2xd$_1$ | 170° | Z2 | eXedur RI/RIP

Ø d$_1$	0.1 - 3.0 mm	3.1 - 6.0 mm	6.1 - 10.0 mm
Tolerance	+ 0.006 mm 0	+ 0.009 mm + 0.001 mm	+ 0.010 mm + 0.001 mm

DRILLING WITH EXTERNAL COOLING



d$_1$ [mm]	d$_1$ [inch]	l$_1$ [mm]	d$_2$ [mm]	l$_2$ [mm]	D (h6) [mm]	L [mm]	Item number	Availability
1.95		3.9	3.5	10.5	4	55	2.PD.01950.170	■
2.00		4.0	3.5	10.6	6	65	2.PD.02000.170	■
2.05		4.1	3.5	10.7	6	65	2.PD.02050.170	■
2.10		4.2	3.5	10.8	6	65	2.PD.02100.170	■
2.15		4.3	3.5	10.9	6	65	2.PD.02150.170	■
2.20		4.4	4.5	12.8	6	65	2.PD.02200.170	■
2.25		4.5	4.5	12.9	6	65	2.PD.02250.170	■
2.30		4.6	4.5	13.0	6	65	2.PD.02300.170	■
2.35		4.7	4.5	13.1	6	65	2.PD.02350.170	■
2.381	**3/32**	4.8	4.5	13.2	6	65	2.PD.F332.170	■
2.40		4.8	4.5	13.2	6	65	2.PD.02400.170	■
2.45		4.9	4.5	13.4	6	65	2.PD.02450.170	■
2.50		5.0	4.5	13.5	6	65	2.PD.02500.170	■
2.55		5.1	4.5	13.6	6	65	2.PD.02550.170	■
2.60		5.2	4.5	13.7	6	65	2.PD.02600.170	■
2.65		5.3	5.0	14.7	6	65	2.PD.02650.170	■
2.70		5.4	5.0	14.8	6	65	2.PD.02700.170	■
2.75		5.5	5.0	14.9	6	65	2.PD.02750.170	■
2.80		5.6	5.0	15.0	6	65	2.PD.02800.170	■
2.85		5.7	5.0	15.1	6	65	2.PD.02850.170	■
2.90		5.8	5.0	15.2	6	65	2.PD.02900.170	■
2.95		5.9	5.0	15.4	6	65	2.PD.02950.170	■
3.00		6.0	6.0	17.2	6	70	2.PD.03000.170	■
3.05		6.1	6.0	17.3	6	70	2.PD.03050.170	■
3.10		6.2	6.0	17.4	6	70	2.PD.03100.170	■
3.15		6.3	6.0	17.5	6	70	2.PD.03150.170	■
3.175	**1/8**	6.4	6.0	17.7	6	70	2.PD.F18.170	■
3.20		6.4	6.0	17.7	6	70	2.PD.03200.170	■
3.25		6.5	6.0	17.8	6	70	2.PD.03250.170	■
3.30		6.6	6.0	17.9	6	70	2.PD.03300.170	■
3.35		6.7	6.0	18.0	6	70	2.PD.03350.170	■
3.40		6.8	6.0	18.1	6	70	2.PD.03400.170	■
3.45		6.9	6.0	18.2	6	70	2.PD.03450.170	■
3.50		7.0	6.0	18.3	6	70	2.PD.03500.170	■

■ Stock item

d$_1$ [mm]	d$_1$ [inch]	l$_1$ [mm]	d$_2$ [mm]	l$_2$ [mm]	D (h6) [mm]	L [mm]	Item number	Availability
3.55		7.1	6.0	18.4	6	70	2.PD.03550.170	■
3.60		7.2	6.0	18.6	6	70	2.PD.03600.170	■
3.65		7.3	6.0	18.7	6	70	2.PD.03650.170	■
3.70		7.4	6.0	18.8	6	70	2.PD.03700.170	■
3.75		7.5	6.0	18.9	6	70	2.PD.03750.170	■
3.80		7.6	6.0	19.0	6	70	2.PD.03800.170	■
3.85		7.7	6.0	19.1	6	70	2.PD.03850.170	■
3.90		7.8	6.0	19.2	6	70	2.PD.03900.170	■
3.95		7.9	6.0	19.4	6	70	2.PD.03950.170	■
3.968	**5/32**	9.6	8.0	27.4	8	80	2.PD.F532.170	■
4.00		8.0	6.0	19.5	6	70	2.PD.04000.170	■
4.10		8.2	6.0	21.3	6	70	2.PD.04100.170	■
4.20		8.4	6.0	21.4	6	70	2.PD.04200.170	■
4.30		8.6	6.0	21.6	6	70	2.PD.04300.170	■
4.40		8.8	6.0	21.7	6	70	2.PD.04400.170	■
4.50		9.0	8.0	27.0	8	80	2.PD.04500.170	■
4.60		9.2	8.0	27.1	8	80	2.PD.04600.170	■
4.70		9.4	8.0	27.3	8	80	2.PD.04700.170	■
4.762	**3/16**	9.6	8.0	27.4	8	80	2.PD.F316.170	■
4.80		9.6	8.0	27.4	8	80	2.PD.04800.170	■
4.90		9.8	8.0	27.6	8	80	2.PD.04900.170	■
5.00		10.0	8.0	27.7	8	80	2.PD.05000.170	■
5.10		10.2	8.0	27.9	8	80	2.PD.05100.170	■
5.20		10.4	8.0	28.0	8	80	2.PD.05200.170	■
5.30		10.6	8.0	28.1	8	80	2.PD.05300.170	■
5.40		10.8	8.0	28.3	8	80	2.PD.05400.170	■
5.50		11.0	8.0	28.4	8	80	2.PD.05500.170	■
5.560	**7/32**	11.2	8.0	28.6	8	80	2.PD.F732.170	■
5.60		11.2	8.0	28.6	8	80	2.PD.05600.170	■
5.70		11.4	8.0	28.7	8	80	2.PD.05700.170	■
5.80		11.6	8.0	28.9	8	80	2.PD.05800.170	■
5.90		11.8	8.0	29.0	8	80	2.PD.05900.170	■
6.00		12.0	8.0	29.1	8	80	2.PD.06000.170	■
6.350	**1/4**	12.7	8.0	29.6	8	80	2.PD.F14.170	■

■ Stock item

Complementary products
All "CrazyDrill" family

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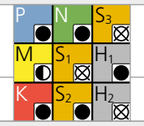
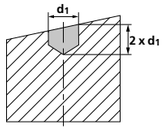
PILOT DRILLING AND SHORT DRILLING TOOLS
CRAZYDRILL CROSSPILOT

CrazyDrill Crosspilot - 2 x d (nominal)

RECOMMENDATION FOR USE
● Excellent | ◐ Good | ○ Acceptable | ⊠ Not recommended



DRILLING WITH EXTERNAL COOLING | CUTTING DATA OVERVIEW



Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	v_c [m/min]	f [mm/rev] Ød1 0.4 mm 1/64"	0.8 mm 1/32"	1.0 mm	1.5 mm 1/16"	2.0 mm	3.0 mm 1/8"	4.0 mm 5/32"	5.0 mm 3/16" - 7/32"	6.0 mm 1/4"
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	80	0.005	0.011	0.013	0.020	0.027	0.040	0.053	0.067	0.080
		1.0401	C15	AISI 1015										
		1.1191	C45E/CK45	AISI 1045										
		1.0044	S275JR	AISI 1020										
		1.0715	11SMn30	AISI 1215										
	Low alloyed steel Rm > 900 N/mm²	1.5752	15NiCr13	ASTM 3415 / AISI 3310	60	0.004	0.008	0.010	0.015	0.020	0.030	0.040	0.050	0.060
		1.7131	16MnCr5	AISI 5115										
		1.3505	100Cr6	AISI 52100										
		1.7225	42CrMo4	AISI 4140										
		1.2842	90MnCrV8	AISI O2										
	High alloyed tool steel Rm < 1200 N/mm²	1.2379	X153CrMoV12	AISI D2	50	0.004	0.008	0.010	0.015	0.020	0.030	0.040	0.050	0.060
		1.2436	X210CrW12	AISI D4/D6										
		1.3343	HS6-5-2C	AISI M2 / UNS T11302										
		1.3355	HS18-0-1	AISI T1 / UNS T12001										
M	Stainless steel ferritic	1.4016	X6Cr17	AISI 430 / UNS S43000	40	0.002	0.004	0.005	0.008	0.010	0.015	0.020	0.025	0.030
		1.4105	X6CrMoS17	AISI 430F										
	Stainless steel martensitic	1.4034	X46Cr13	AISI 420C	50	0.004	0.008	0.010	0.015	0.020	0.030	0.040	0.050	0.060
		1.4112	X90CrMoV18	AISI 440B										
	Stainless steel martensitic – PH	1.4542	X5CrNiCuNb 16-4	AISI 630 / ASTM 17-4 PH										
		1.4545	X5CrNiCuNb 15-5	ASTM 15-5 PH										
	Stainless steel austenitic	1.4301	X5CrNi 18-10	AISI 304	30	0.002	0.004	0.005	0.008	0.010	0.015	0.020	0.025	0.030
		1.4435	X2CrNiMo 18-14-3	AISI 316L										
		1.4441	X2CrNiMo 18-15-3	AISI 316LM										
		1.4539	X1NiCrMoCu 25-20-5	AISI 904L										
K	Cast iron	0.6020	GG20	ASTM 30	80	0.004	0.008	0.010	0.015	0.020	0.030	0.040	0.050	0.060
		0.6030	GG30	ASTM 40B										
		0.7040	GGG40	ASTM 60-40-18										
		0.7060	GGG60	ASTM 80-60-03										
N	Aluminium alloy wrought	3.2315	AlMgSi1	ASTM 6351	125	0.008	0.016	0.020	0.030	0.040	0.060	0.080	0.100	0.120
		3.4365	AlZnMgCu1.5	ASTM 7075										
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	125	0.008	0.016	0.020	0.030	0.040	0.060	0.080	0.100	0.120
		3.2381	GD-AlSi10Mg	UNS A03590										
	Copper	2.0040	Cu-OF / CW008A	UNS C10100	80	0.004	0.008	0.010	0.015	0.020	0.030	0.040	0.050	0.060
		2.0065	Cu-ETP / CW004A	UNS C11000										
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	80	0.004	0.008	0.010	0.015	0.020	0.030	0.040	0.050	0.060
		2.0360	CuZn40 CW509L	UNS C28000										
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	100	0.008	0.016	0.020	0.030	0.040	0.060	0.080	0.100	0.120
		2.1020	CuSn6	UNS C51900										
	Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	80	0.004	0.008	0.010	0.015	0.020	0.030	0.040	0.050	0.060
		2.0960	CuAl9Mn2	UNS C63200										
S_1	Super alloys	2.4856		Inconel 625										
		2.4668		Inconel 718										
		2.4617	NiMo28	Hastelloy B-2										
		2.4665	NiCr22Fe18Mo	Hastelloy X										
S_2	Titanium pure	3.7035	Gr.2	ASTM B348 / F67	25	0.004	0.008	0.010	0.015	0.020	0.030	0.040	0.050	0.060
		3.7065	Gr.4	ASTM B348 / F68										
	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	25	0.004	0.008	0.010	0.015	0.020	0.030	0.040	0.050	0.060
		9.9367	TiAl6Nb7	ASTM F1295										
S_3	CrCo alloys	2.4964	CoCr20W15Ni	Haynes 25										
			CrCoMo28	ASTM F1537										
H_1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	20	0.001	0.003	0.003	0.005	0.007	0.010	0.013	0.017	0.020
H_2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2										

PILOT DRILLING AND SHORT DRILLING TOOLS
CRAZYDRILL CROSSPILOT

Drilling process CrazyDrill Crosspilot

SHORT DRILLING ON INCLINED SURFACES UP TO 60°

Coolant type, pressure, filtration and flowrate

For best results, Mikron Tool recommends the use of cutting oil as coolant fluid. Alternatively, emulsion of 8% or more with EP-Additives (Extreme-Pressure-Additives) can be used with good results as well.

For tools with external cooling no specific parameters have to be considered concerning filter and coolant pressure and quantity. But it must be ensured that the cooling medium is conducted directly to the drill tip, thus cooling and lubricating the drill perfectly and flushing away the chips.

Tool holders

For detailed indications for tool holders see chapter "Technical information".

Pilot drilling and short drilling

CrazyDrill Crosspilot, combined with deep hole drills of the CrazyDrill family, is the perfect solution when drilling on inclined, concave or convex surfaces.

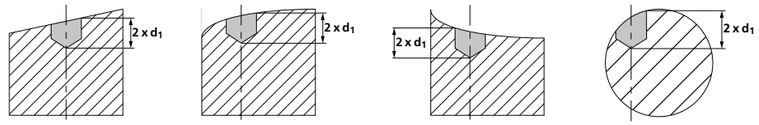
Drilling quality (position and alignment accuracy) and stable machining process are assured due to matched diameter tolerances of the tools.

CrazyDrill Crosspilot not only is the perfect preparation of deep follow-up holes. Concurrently it is a short drill for highly precise and quick drilling on concave, convex and inclined surfaces up to a maximum inclined angle of 60°.

DRILLING PROCESS

1 | PILOT DRILLING OR SHORT DRILLING

- Drilling in one step with recommended cutting speed and feed rate (see cutting data table).



Note:
After the drill reached desired cutting depth, return at increased feed rate (or in case of perfect conditions rapid traverse) to safety position.