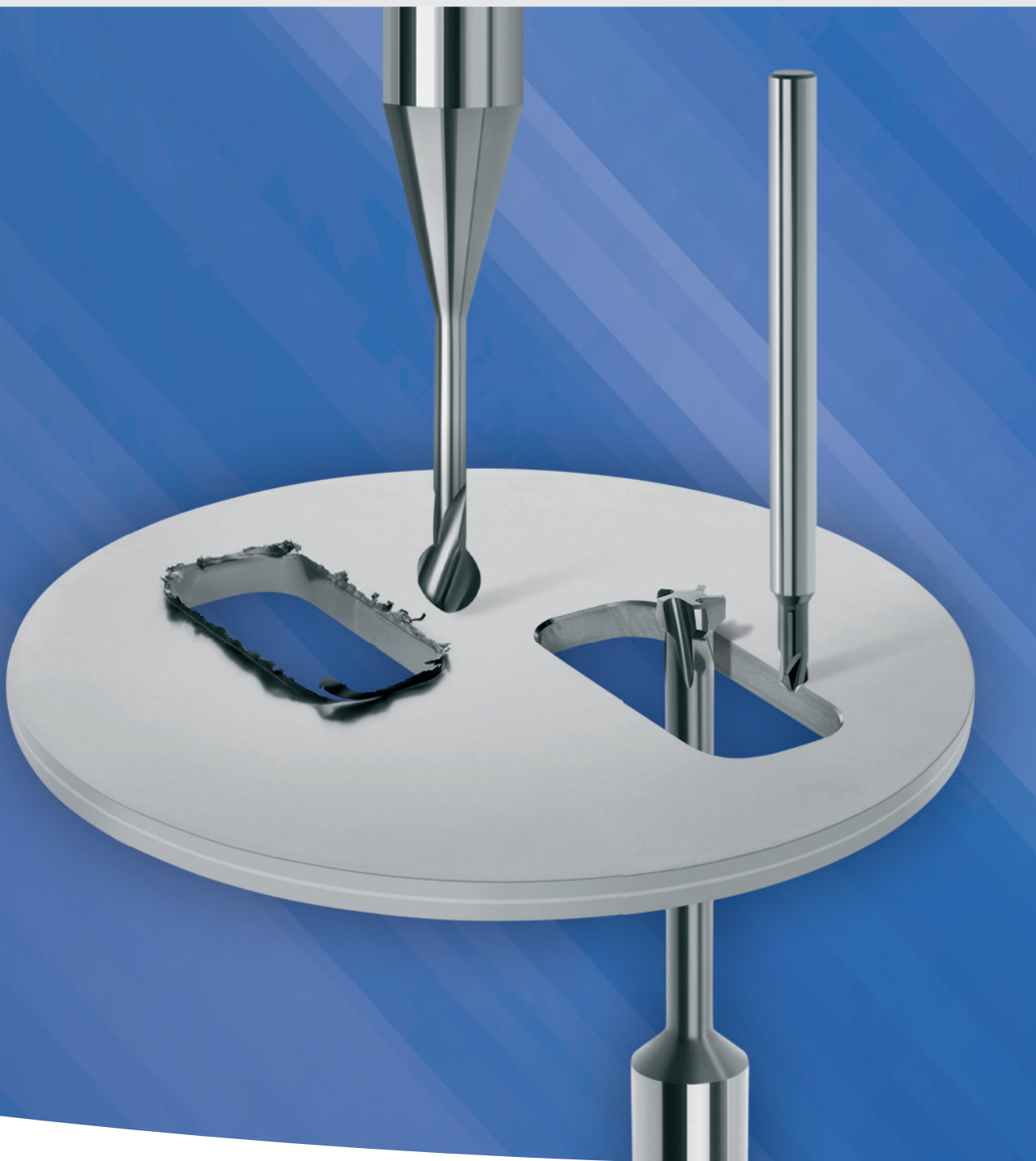


# Deburring and chamfering

**MIKRON**



for smooth finishing operations

**CRAZYMILL™**  
by Mikron Tool

# Chamfering in smallest dimensions

**CRAZYMILL™**  
by Mikron Tool  
Frontchamfer

CrazyMill Frontchamfer matches ideally the existing cutting tool program of Mikron Tool. Available from diameter 1 mm, this chamfer milling cutter is suitable for machining smallest workpieces and can reach practically all angles and corners. The high number of teeth – 4 to 6 depending on diameter – allows high feeds. The positive cutting geometry guarantees an excellent surface quality.

## The features:

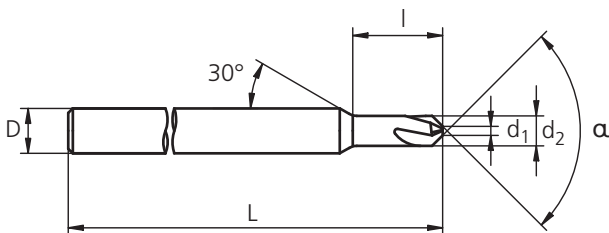
- Carbide alloy
- All tools are coated
- Diameters from 1 to 6 mm
- Chamfer of 90°
- 4 to 6 teeth
- Suitable for all materials

Item number	$\alpha$	z	$d_1$ mm	$d_2$ mm	l mm	D (h6) mm	L mm
FC.03010090.1	90°	4	0.3	1	3	3	40
FC.06020090.1	90°	4	0.6	2	6	3	40
FC.10030090.1	90°	5	1	3	-	3	50
FC.15040090.1	90°	6	1.5	4	-	4	50
FC.20060090.1	90°	6	2	6	-	6	50

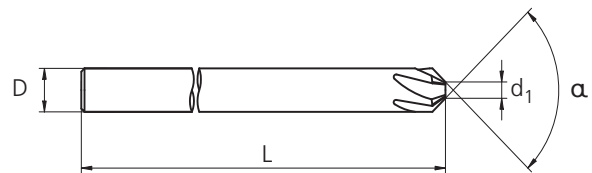
## Upon request:

- special executions in particular dimensions, number of teeth or different chamfer angle
- definite geometry for the machining of hardened steel over 56 HRC

## Executions 1 and 2 mm



## Executions 3 to 6 mm



# Guidelines for cutting parameters



Materials to be machined	Examples	Cutting speed vc m/min	Feed $f_z$ in mm/revolution per tooth	
			mill Ø 1.0 - 2.0 mm	mill Ø 3.0 - 6.0 mm
Carbon Steel low-alloy	Ck45, 16MnCr5, 20MnCr6	up to 120	0.01 - 0.04	0.03 - 0.05
Tool Steels low-alloy	100Cr6, 90MnCrV8	up to 100	0.01 - 0.03	0.02 - 0.04
Carbon Steel high-alloy	G-X 100 CrMoV 5 1, X210CrW12, S 18-1-2-10	up to 80	0.01 - 0.02	0.01 - 0.03
Hardened Steel >50HRC	90MnCrV8, X40CrV5-1	up to 60	0.01 - 0.02	0.01 - 0.03
Stainless Steel ferritique	X17CrNi16-2, X6CrMo 17-1, X20Cr13, G-X130CrSi29	up to 50	0.01 - 0.02	0.02 - 0.03
Stainless Steel austenitique	X5CrNi 18-10, X10CrNiS 18-9	up to 50	0.01 - 0.02	0.02 - 0.03
Titanium and Titanium alloy	Ti. Gr2, Ti. Gr5	up to 40	0.01 - 0.02	0.02 - 0.03
Cast iron	GG 20 - GGG 50 GGG 40 - GGG 70 GTW/GTS	up to 60	0.01 - 0.02	0.01 - 0.03
Copper easy to machine	CuZn39Pb2	up to 200	0.02 - 0.05	0.03 - 0.07
Copper hard to machine	Cu, CuZn10, CuZn30, CuNi18Zn20	up to 200	0.02 - 0.05	0.03 - 0.07
Aluminum Alloys wrought, Magnesium alloys	AlSi1, AlSi1 MGMn, AlCuMgPb	up to 200	0.02 - 0.05	0.03 - 0.07
Aluminum alloys cast		up to 200	0.02 - 0.05	0.03 - 0.07
Gold Silver		up to 100	0.01 - 0.03	0.02 - 0.04

These values are intended to represent approximate ranges. Different conditions due to machine, spindle, coolant, etc. can influence the performance. The optimized parameters for each operation should be determined by tests or during the machining process.

## Important for successful machining:

- Mikron Tool recommends simultaneous milling in two steps, thus avoiding secondary burrs.
- Due to the high number of teeth 50% higher feeds are allowed.

# Back chamfering without re-clamping

**CRAZYMILL™**  
by Mikron Tool  
Backchamfer

With CrazyMill Backchamfer no work piece turnover and re-clamping is necessary to machine hard-to-reach holes or edges on the back side of a work-piece. This chamfer mill allows miniature machining, starting from holes or slots as small as 0.4 mm. The high number of teeth guarantees an excellent surface quality. Main applications for this new milling cutter are found where small machining operations with very high quality are required, such as med-tech parts, watch industry, automotive, etc. CrazyMill Backchamfer can be used for all metals and is also suitable for tough materials that generate long chips.

## The features:

- Carbide alloy
- All tools are coated
- Diameters from 0.36 to 5.7 mm
- For hole diameters from 0.4 mm
- Chamfer of 90°
- 3 to 6 teeth
- Suitable for all materials
- Dimensions matched to CrazyDrill program

## Usable length 3 x d<sub>2</sub>

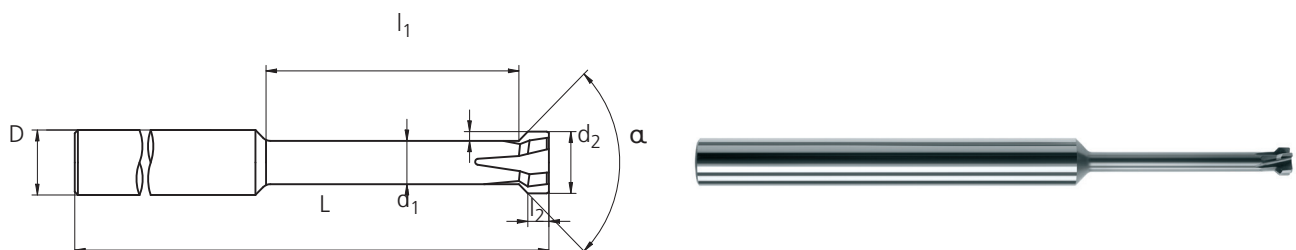
Item number	α	z	d <sub>1</sub> mm	d <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>2</sub> mm	D (h6) mm	L mm	Max. chamfer width (f) mm
BC.03036090.1	90°	3	0.22	0.36	1.5	0.20	3	45	0.03
BC.03046090.1	90°	3	0.3	0.46	1.9	0.25	3	45	0.04
BC.03065090.1	90°	3	0.4	0.65	2.6	0.35	3	45	0.04
BC.03090090.1	90°	4	0.6	0.9	3.7	0.50	4	53	0.075
BC.03140090.1	90°	4	0.95	1.4	5.6	0.90	4	53	0.1
BC.03190090.1	90°	5	1.40	1.9	7.8	1.00	4	53	0.1
BC.03290090.1	90°	5	2.10	2.9	10.8	1.50	4	60	0.2
BC.03370090.1	90°	5	2.70	3.7	14.0	2.00	4	60	0.3
BC.03470090.1	90°	6	3.30	4.7	17.5	2.00	6	70	0.4
BC.03570090.1	90°	6	4.00	5.7	20	2.00	6	70	0.5

## Usable length 5 x d<sub>2</sub>

Item number	α	z	d <sub>1</sub> mm	d <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>2</sub> mm	D (h6) mm	L mm	Max. chamfer width (f) mm
BC.05036090.1	90°	3	0.22	0.36	2.4	0.20	3	50	0.03
BC.05046090.1	90°	3	0.3	0.46	3.0	0.25	3	50	0.04
BC.05065090.1	90°	3	0.4	0.65	4.2	0.35	3	50	0.04
BC.05090090.1	90°	4	0.6	0.9	6.0	0.50	4	60	0.075
BC.05140090.1	90°	4	0.95	1.4	9.0	0.90	4	60	0.1
BC.05190090.1	90°	5	1.40	1.9	12.0	1.00	4	60	0.1
BC.05290090.1	90°	5	2.10	2.9	18.0	1.50	4	70	0.2
BC.05370090.1	90°	5	2.70	3.7	24.0	2.00	4	70	0.3
BC.05470090.1	90°	6	3.30	4.7	30.0	2.00	6	80	0.4
BC.05570090.1	90°	6	4.00	5.7	36.0	2.00	6	80	0.5

## Upon request:

- special executions for different lengths, dimensions, number of teeth or different chamfer angle
- definite geometry for the machining of hardened steel over 56 HRC



# Guidelines for cutting parameters



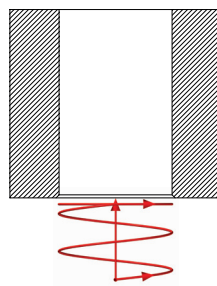
Materials to be machined	Examples	Cutting speed vc m/min	Feed $f_z$ in mm/revolution per tooth	
			Ø 0.36 - 1.90 mm	Ø 2.90 - 5.70 mm
Carbon Steel low-alloy	Ck45, 16MnCr5, 20MnCr6	up to 120	up to 0.03	up to 0.04
Tool Steels low-alloy	100Cr6, 90MnCrV8	up to 100	up to 0.02	up to 0.03
Carbon Steel high-alloy	G-X 100 CrMoV 5 1, X210CrW12, S 18-1-2-10	up to 80	up to 0.015	up to 0.03
Hardened Steel >50HRC	90MnCrV8, X40CrV5-1	up to 60	up to 0.015	up to 0.02
Stainless Steel ferritique	X17CrNi16-2, X6CrMo 17-1, X20Cr13, G-X130CrSi29	up to 50	up to 0.01	up to 0.03
Stainless Steel austenitique	X5CrNi 18-10, X10CrNiS 18-9	up to 50	up to 0.015	up to 0.03
Titanium and Titanium alloy	Ti. Gr2, Ti. Gr5	up to 40	up to 0.02	up to 0.03
Cast iron	GG 20 - GGG 50 GGG 40 - GGG 70 GTW/GTS	up to 60	up to 0.015	up to 0.03
Copper easy to machine	CuZn39Pb2	up to 200	up to 0.03	up to 0.04
Copper hard to machine	Cu, CuZn10, CuZn30, CuNi18Zn20	up to 200	up to 0.03	up to 0.04
Aluminum Alloys wrought, Magnesium alloys	AlSi1, AlSi1 MGMn, AlCuMgPb	up to 200	up to 0.03	up to 0.04
Aluminum alloys cast	GD-AlSi9Cu3, GD-AlSi12, GD-AlSi10Mg	up to 200	up to 0.03	up to 0.04
Gold Silver		up to 100	up to 0.02	up to 0.03

These values are intended to represent approximate ranges. Different conditions due to machine, spindle, coolant, etc. can influence the performance. The optimized parameters for each operation should be determined by tests or during the machining process.

## Important for successful machining:

- Mikron Tool recommends conventional milling for avoiding secondary burrs.
- Ideal are two milling passages
- For small diameters, the quality and above all the straightness of the hole are of utmost importance.
- Mikron Tool recommends to drill a pilot hole with CrazyDrill Pilot and a precise drilling with CrazyDrill.

- Tangential approach prevents a vibration and a subsequent breakage of the milling tool.



# One clamping for front and back side chamfering

**CRAZYMILL™**  
by Mikron Tool Doublechamfer

With a single tool front and back side chamfering of edges and hard-to-reach spots: CrazyMill Doublechamfer allows it also in a smallest diameter range - for diameters from Ø 1 mm. The high number of teeth guarantees an excellent surface quality. Main applications for this new milling cutter are found where small machining operations with very high quality are required, such as med-tech parts, watch industry, automotive, etc.

## The features:

- Carbide alloy
- All tools are coated
- Diameters from 0.9 to 5.7 mm
- Chamfer of 45° resp. 90°
- 4 to 6 teeth
- Suitable for all materials

## Usable length 3 x d<sub>2</sub>

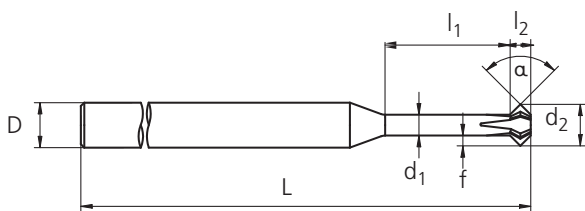
Item number	α	z	d <sub>1</sub> mm	d <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>2</sub> mm	D (h6) mm	L mm	Max. chamfer width (f) mm
DC.03090090.1	90°	4	0.45	0.9	2.7	0.45	4	53	0.225
DC.03140090.1	90°	5	0.7	1.4	4.2	0.7	4	53	0.35
DC.03180090.1	90°	5	0.9	1.8	5.4	0.9	4	55	0.45
DC.03280090.1	90°	5	1.4	2.8	8.4	1.4	4	60	0.70
DC.03370090.1	90°	5	1.85	3.7	11.1	1.85	4	60	0.925
DC.03470090.1	90°	5	2.35	4.7	14.1	2.35	6	70	1.175
DC.03570090.1	90°	6	2.85	5.7	17.1	2.85	6	70	1.425

## Usable length 6 x d<sub>2</sub>

Item number	α	z	d <sub>1</sub> mm	d <sub>2</sub> mm	l <sub>1</sub> mm	l <sub>2</sub> mm	D (h6) mm	L mm	Max. chamfer width (f) mm
DC.06090090.1	90°	4	0.54	0.9	5.4	0.36	4	60	0.18
DC.06140090.1	90°	5	0.84	1.4	8.4	0.56	4	60	0.28
DC.06180090.1	90°	5	1.08	1.8	10.8	0.72	4	60	0.36
DC.06280090.1	90°	5	1.68	2.8	16.8	1.12	4	60	0.56
DC.06370090.1	90°	5	2.22	3.7	22.2	1.48	4	60	0.74
DC.06470090.1	90°	5	2.82	4.7	28.2	1.88	6	80	0.94
DC.06570090.1	90°	6	3.42	5.7	34.2	2.28	6	80	1.14

## Upon request:

- special executions for different lengths, dimensions, number of teeth or different chamfer angle



# Guidelines for cutting parameters

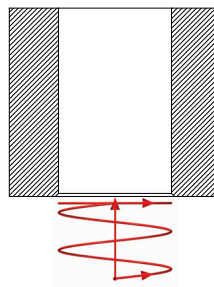


Materials to be machined	Examples	Cutting speed vc m/min	Feed $f_z$ in mm/revolution per tooth	
			Ø 0.36 - 1.90 mm	Ø 2.90 - 5.70 mm
Carbon Steel low-alloy	Ck45, 16MnCr5, 20MnCr6	up to 120	up to 0.03	up to 0.04
Tool Steels low-alloy	100Cr6, 90MnCrV8	up to 100	up to 0.02	up to 0.03
Carbon Steel high-alloy	G-X 100 CrMoV 5 1, X210CrW12, S 18-1-2-10	up to 80	up to 0.015	up to 0.03
Hardened Steel >50HRC	90MnCrV8, X40CrV5-1	up to 60	up to 0.015	up to 0.02
Stainless Steel ferritique	X17CrNi16-2, X6CrMo 17-1, X20Cr13, G-X130CrSi29	up to 50	up to 0.01	up to 0.03
Stainless Steel austenitique	X5CrNi 18-10, X10CrNiS 18-9	up to 50	up to 0.015	up to 0.03
Titanium and Titanium alloy	Ti. Gr2, Ti. Gr5	up to 40	up to 0.02	up to 0.03
Cast iron	GG 20 - GGG 50 GGG 40 - GGG 70 GTW/GTS	up to 60	up to 0.015	up to 0.03
Copper easy to machine	CuZn39Pb2	up to 200	up to 0.03	up to 0.04
Copper hard to machine	Cu, CuZn10, CuZn30, CuNi18Zn20	up to 200	up to 0.03	up to 0.04
Aluminum Alloys wrought, Magnesium alloys	AlSi1, AlSi1 MGMn, AlCuMgPb	up to 200	up to 0.03	up to 0.04
Aluminum alloys cast	GD-AlSi9Cu3, GD-AlSi12, GD-AlSi10Mg	up to 200	up to 0.03	up to 0.04
Gold Silver		up to 100	up to 0.02	up to 0.03

These values are intended to represent approximate ranges. Different conditions due to machine, spindle, coolant, etc. can influence the performance. The optimized parameters for each operation should be determined by tests or during the machining process.

## Important: for successful machining Mikron Tool recommends:

- Conventional milling
- Ideal are two milling passages for burr free edges and a good surface quality
- Especially for back side chamfering:
  - For small diameters, the quality and above all the straightness of the hole are of utmost importance.
  - Mikron Tool recommends to drill a pilot hole with CrazyDrill Pilot and a precise drilling with CrazyDrill.
- Mainly for long versions, tangential approach prevents a vibration and a subsequent breakage of the milling tool.



# For highest requirements: all in one tool

**CRAZYMILL™**  
by Mikron Tool  
Radiuschamfer

This universal radius chamfer tool has a big cutting area of 300°. Thus it is ideal for front and backside deburring as well as for all kind of inside and outside contours, intersections of drillings and millings. Due to its specific positive cutting geometry it also removes tenacious and ductile burrs and avoids the forming of new, secondary burrs. The extra long execution also permits machining on hard-to-reach spots (inclined hole exits etc.).

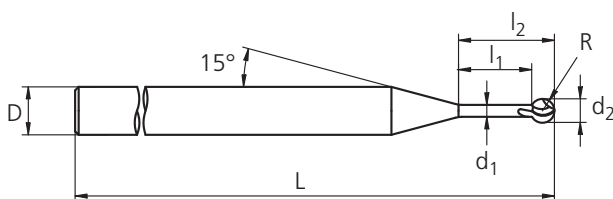
## The features:

- Usable cutting range 300°
- For front and backside deburring
- Specific positive cutting geometry
- Carbide alloy
- All tools are coated
- Suitable for all metals

Item number	R (-0.02) mm	z	d <sub>1</sub> mm	d <sub>2</sub> (0-0,04) mm	l <sub>1</sub> mm	l <sub>2</sub> mm	D (h6) mm	L mm
RC.040100.1	0.50	3	0.50	1.0	3.0	4	4	50
RC.040150.1	0.75	3	0.75	1.5	4.5	6	4	50
RC.040200.1	1.00	3	1.00	2.0	6.0	8	4	60
RC.040250.1	1.25	3	1.25	2.5	7.5	10	4	60
RC.040300.1	1.50	3	1.50	3.0	9.0	12	4	60
RC.040400.1	2.00	3	2.00	4.0	12.0	16	6	70
RC.040600.1	3.00	3	3.00	6.0	18.0	24	6	70

## Upon request:

- Special execution for lengths and other dimensions.



## State-of-the art:

The specific positive cutting geometry:

- removes also tenacious and ductile burrs.

The big usable cutting area of 300°:

- allows an universal usage for front and backside deburring and chamfering.





# Guidelines for cutting parameters



Materials to be machined	Examples	Cutting speed vc m/min	Feed $f_z$ in mm/revolution per tooth	
			Ø 1 - 2 mm	Ø 3 - 6 mm
Carbon Steel low-alloy	Ck45, 16MnCr5, 20MnCr6	up to 120	up to 0.03	up to 0.04
Tool Steels low-alloy	100Cr6, 90MnCrV8	up to 100	up to 0.02	up to 0.03
Carbon Steel high-alloy	G-X 100 CrMoV 5 1, X210CrW12, S 18-1-2-10	up to 80	up to 0.015	up to 0.03
Hardened Steel >50HRC	90MnCrV8, X40CrV5-1	up to 60	up to 0.015	up to 0.02
Stainless Steel ferritique	X17CrNi16-2, X6CrMo 17-1, X20Cr13, G-X130CrSi29	up to 50	up to 0.01	up to 0.03
Stainless Steel austenitique	X5CrNi 18-10, X10CrNiS 18-9	up to 50	up to 0.015	up to 0.03
Titanium and Titanium alloy	Ti. Gr2, Ti. Gr5	up to 40	up to 0.02	up to 0.03
Cast iron	GG 20 - GGG 50 GGG 40 - GGG 70 GTW/GTS	up to 60	up to 0.015	up to 0.03
Copper easy to machine	CuZn39Pb2	up to 200	up to 0.03	up to 0.04
Copper hard to machine	Cu, CuZn10, CuZn30, CuNi18Zn20	up to 200	up to 0.03	up to 0.04
Aluminum Alloys wrought, Magnesium alloys	AlSi1, AlSi1 MGMn, AlCuMgPb	up to 200	up to 0.03	up to 0.04
Aluminum alloys cast	GD-AlSi9Cu3, GD-AlSi12, GD-AlSi10Mg	up to 200	up to 0.03	up to 0.04
Gold Silver		up to 100	up to 0.02	up to 0.03

These values are intended to represent approximate ranges. Different conditions due to machine, spindle, coolant, etc. can influence the performance. The optimized parameters for each operation should be determined by tests or during the machining process.

## Important for successful machining:

- Mikron Tool recommends conventional milling for avoiding secondary burrs.

# Flexibility with CrazyMill: the universal deburring tool

**CRAZYMILL™**  
by Mikron Tool

For difficult machining operations, tenacious burrs or hard-to-reach points. Often the individual solution is the most economical one, as it is matched ideally with the work piece and the material to be machined.

Mikron Tool develops and manufactures special executions of milling tools for any application.

## Examples:



- front and backside chamfering
- chamfer 90°
- tool diameter 2 mm
- reachable depth 10 mm
- 4 teeth



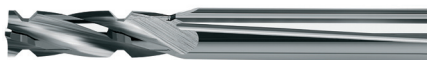
- front and backside chamfering
- chamfer 90°
- tool diameter 1.8 mm
- reachable depth 4 mm
- 3 teeth



- simultaneous front chamfering and back side deburring
- chamfer 90°
- diameter 5 mm
- drilling depth / border length 25 mm
- 5 teeth



- back side deburring and double chamfering on frontside
- chamfer 90°
- diameter 6.9 mm
- 6 teeth



- multiple chamfer milling cutter
- 4x chamfer 90°
- diameter 7 mm
- 4 teeth
- 4 inside cooling channels ground in shank



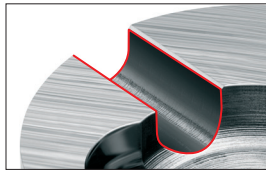
- multiple chamfer milling cutter
- 10x chamfer 90°
- diameter 10 mm
- 4 teeth

# Unlimited possibilities for specific applications

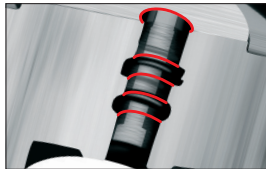
**CRAZYMILL™**  
by Mikron Tool

The CrazyMill chamfer and deburring tools can be used for various applications and for all materials. Special executions guarantee an optimal solution for every machining operation.

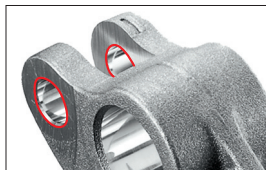
## Examples:



- Automotive
- low-alloy steel 16MnCr5
- CrazyMill Radiuschamfer
- Ø 1.5 mm



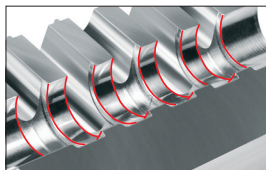
- Automotive
- low-alloy steel 18CrNi18
- Special chamfer tool for grooves and backside
- Ø 1 mm



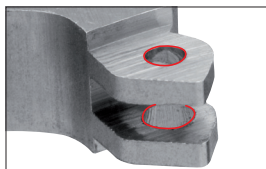
- Automotive
- Aluminum
- Quadruple chamfer milling cutter
- Ø 8mm



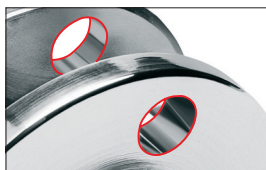
- Medical Engineering
- Stainless Steel
- CrazyMill Radiuschamfer
- Ø 3 mm



- Pneumatic
- Aluminum
- Multi chamfering milling cutter
- Ø 8 mm



- Watch Industry
- Stainless Steel
- Chamfering tool for 2 different hole sizes
- Ø 1 / 2 mm



- Appliances
- Steel
- Chamfering tool for 2 holes simultaneously
- Ø 3 mm

# Services that complete the concept

## Engineering and Consulting

Mikron Tool advises its customers on the selection of suitable tools with respect to material and geometry, necessary tolerances and ideal operating parameters, and partners with them from the initial trials through mass production.

## Star-Service

With the Star Service (Standard Tool Adjustment & Record Service), Mikron Tool also offers high-performance tools in dimensions outside the standard range.

## Packaging

Practical packaging provides optimum protection for the tool and allows easier, safer handling without the risk of personal injury or tool damage.

## Recycling

Worn tools are taken back by Mikron Tool, and the material is recycled – holding true our statement in our environmental certificate.

## Certifications

Mikron Tool is certified to:

ISO 9001:2008 for quality

ISO 14001:2004 for environment

OHSAS 18001:2007 for occupational health and safety management.



# High performance tools from Mikron Tool

## CrazyDrill: for large production lots and materials difficult to machine.

CrazyDrill is ideally suited for high volume production of precision parts. CrazyDrill offers, comparing to standard drills, much higher cutting speeds and feeds.



## MiquDrill: for smaller production lots and a variety of work pieces

Mikron Tool standard quality drills MiquDrill are the perfect solution for the machining of small to medium batches of parts, guaranteeing at the same time quality and process reliability.



## Special tools: customer tailored solutions for machining of precision parts

Developed for particular machining operations; special tools guarantee the best conditions for a process-sure, efficient machining of precision parts.

## Special tools



## Your contacts

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