

CNC MILLING TOOLS



UPDATE
01/2024



Welcome to vhf!

For 35 years, we at vhf are living a vision: *Creating Perfection*. For our customers, we go the proverbial extra mile and do our utmost every day to create the perfect tools for you.

I am proud to present you the new catalog in its fresh and modern look. Thanks to the clear structure, you will now find your way around the extensive vhf tool portfolio even better than before. There is a particularly useful tool for this purpose on pages 22 and 23: Here we have compiled a **clear recommendation matrix** for you, where you can see at a glance which tool is suitable for which material and how well. No matter for which machining task you need our tools – what they all have in common is the uncompromisingly high quality standard we set for them.

Our friendly and competent vhf tool team is always available to answer your questions. We will be pleased to advise you!

Frank Benzinger
Chief Executive Officer

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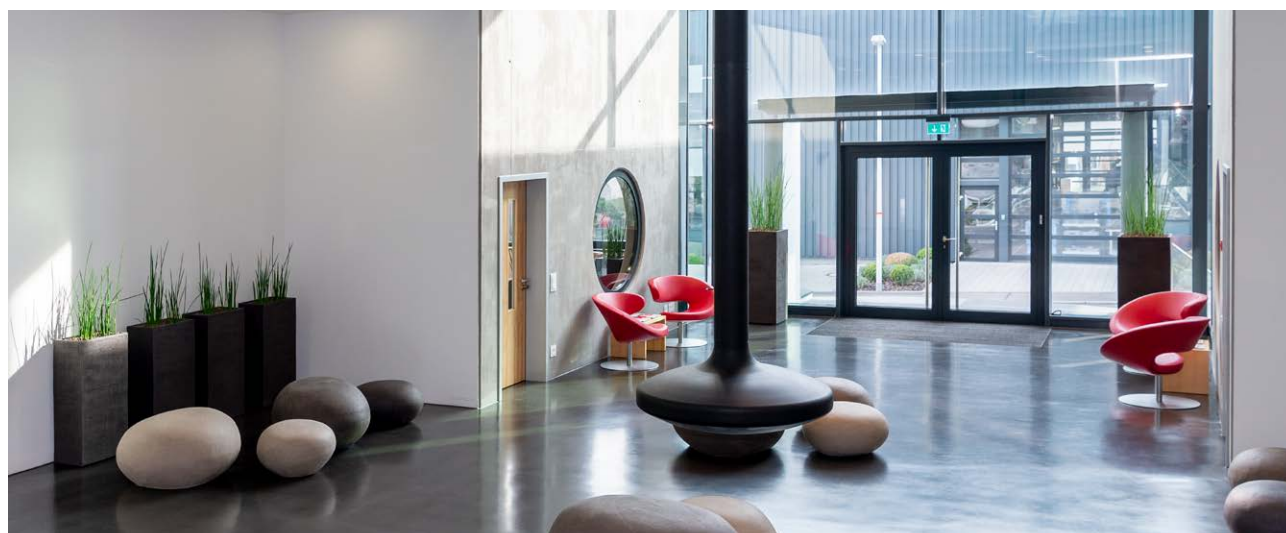
PASSION FOR PERFECTION FOR 35 YEARS

vhf camufacture AG is a worldwide leading manufacturer of CNC milling machines and tools for the industry, sign making and the dental sector. Our company can meanwhile benefit from 35 years of experience in machining technology.

Currently, vhf employs 350 employees worldwide and is growing steadily. On the vhf campus in Ammerbuch, not far from Stuttgart, the entire manufacturing process from development to production to the global distribution into the world takes place. The production of our CNC milling tools is performed on state-of-the-art production facilities – of which we would like to give you a small insight on the following pages.

Highest customer satisfaction is always vhf's claim: From the development of the cutting edge geometries to the production and complex test series, everything is done in-house at vhf.

The quality management system applied at vhf according to the DIN ISO 9001:2015 standard underlines this. But sustainable responsibility goes beyond that: our company generates a part of its energy demand itself. In addition, we use hydropower from the region and thus use 100% green electricity.



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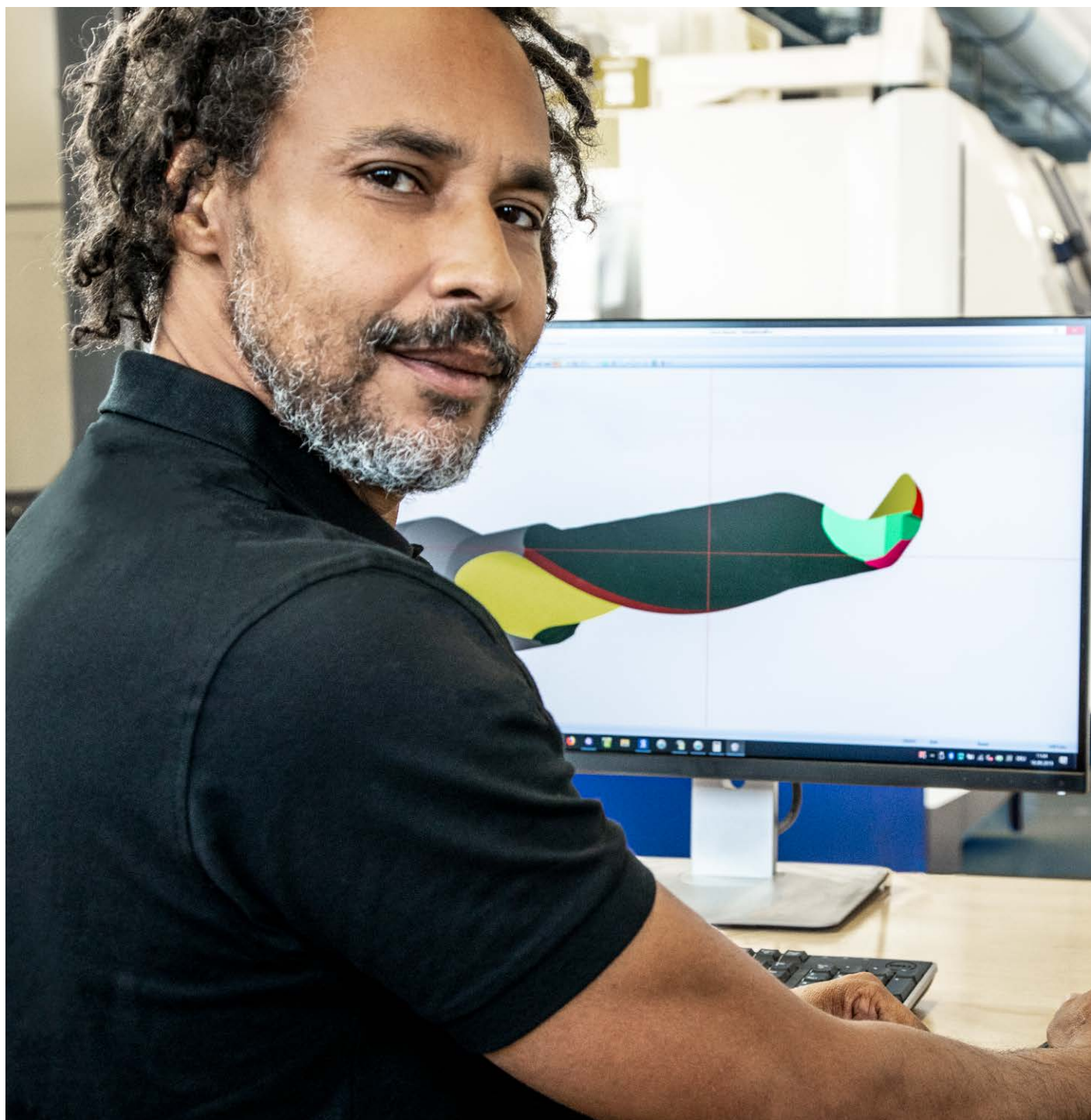
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DEVELOPMENT AND PRODUCTION FROM ONE SOURCE

The vhf tool experts develop sophisticated cutting edge geometries in order to exactly adjust the tools to different materials and machining strategies. Powerful simulators allow them to three-dimensionally display the tools as well as visualize the machine movements

These standard and special tools will be manufactured on most modern six-axis precision grinding centers. These guarantee optimal conditions for the production of complex tools with highest quality.

For our tools, we exclusively use ultra finest grain or super finest grain carbides of German origin. Thus, you will always get an absolutely high-quality tool for your tasks that you can rely on 100%. Promised!

- ◀ Qualified vhf employees design and optimize our tools. They can draw on decades of know-how.

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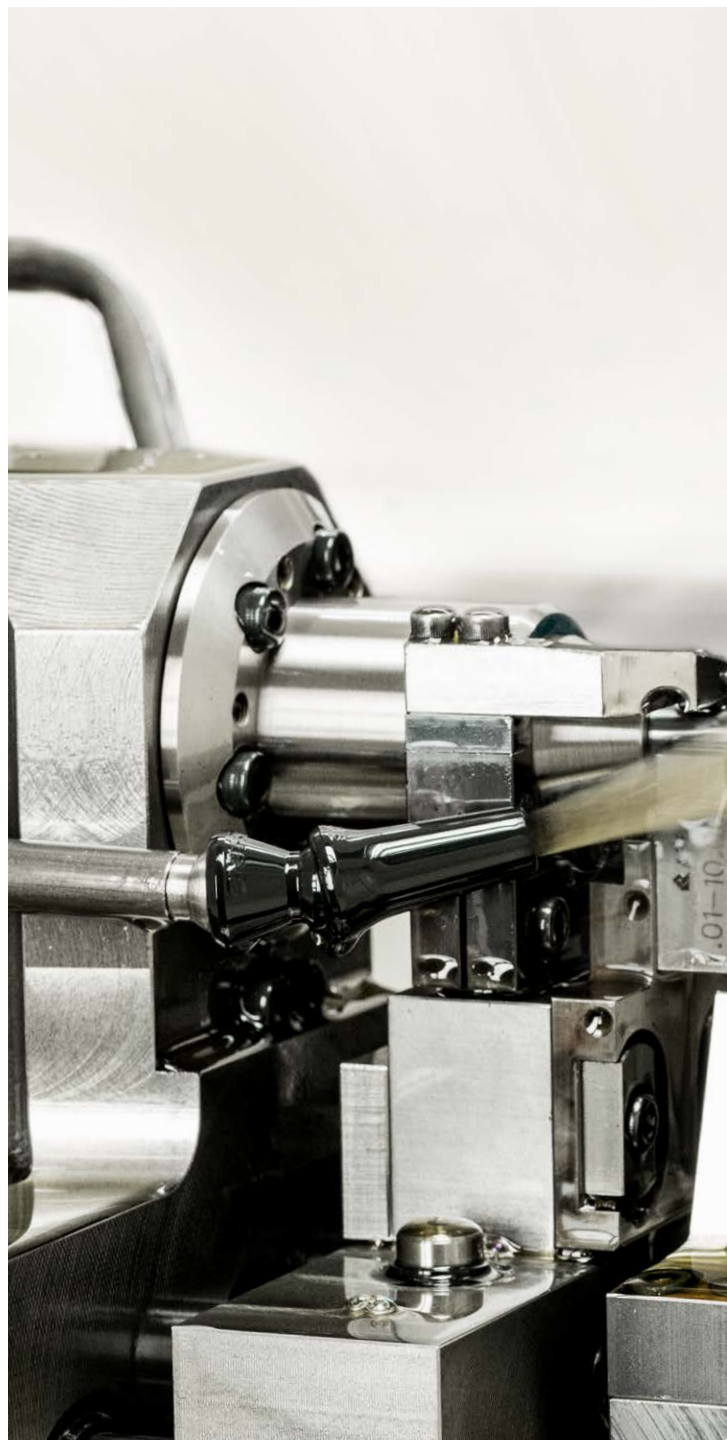
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*Economical,
clean, accurate –
tool production in
state-of-the-art
precision grinding
centers.*

Our highly qualified employees >
control the fully automated manufac-
turing process of vhf tools.



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Controlled quality

The manufactured tools are inspected by a CNC measuring machine with four cameras and a measured value resolution of $0.25\ \mu\text{m}$ to guarantee the highest quality. Thanks to this non-contact complete measurement, we can reliably control the production process. Maximum precision is our top priority – so that our customers achieve the best machining results.

We also regularly test the performance and quality of our tools in practice. Because at vhf, we produce numerous machine parts for our CNC milling machines in-house with our own tools. Thus, we do not only check the quality, but we also have the incentive to optimize our tools continuously. Using our own products is also part of Creating Perfection.

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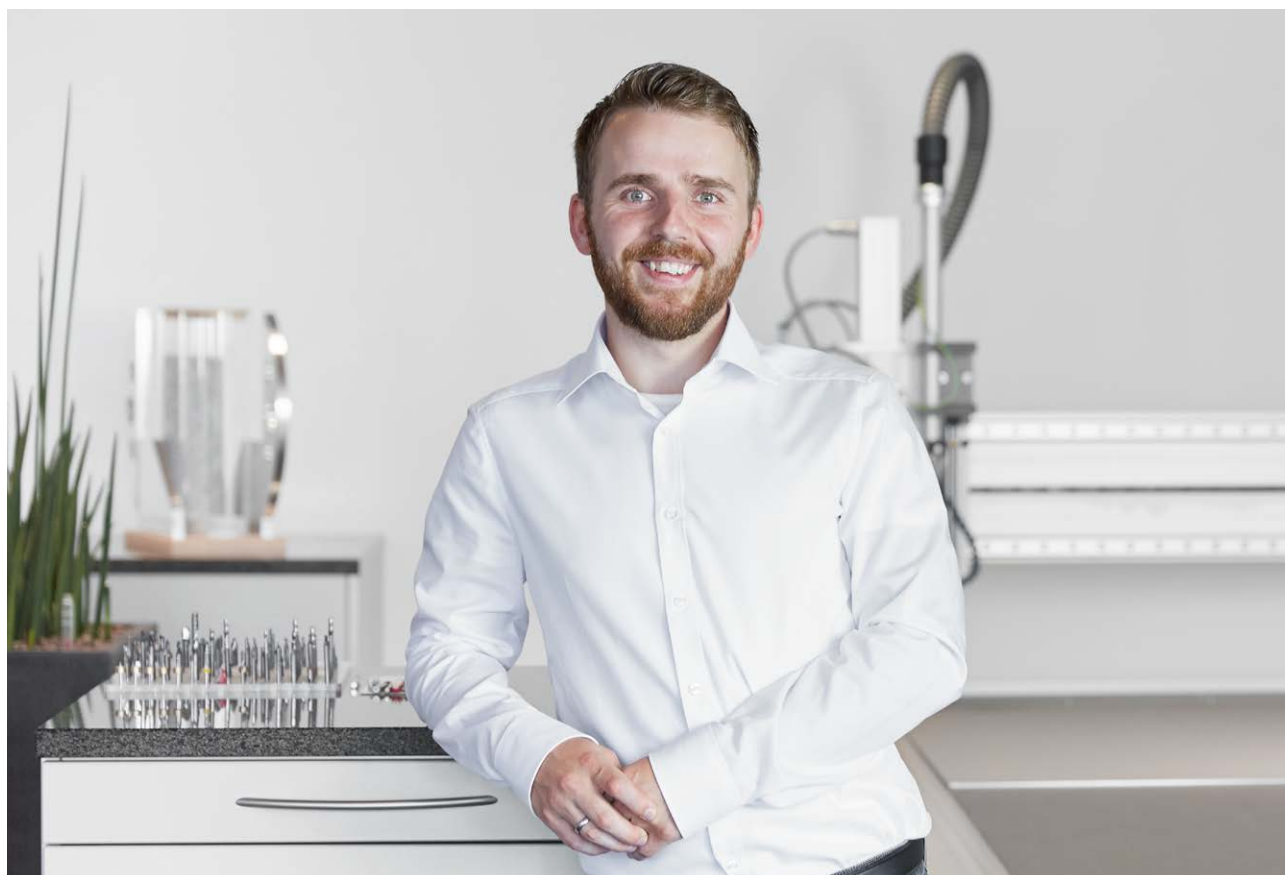
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EXPERT ADVICE



Can we support you?

We will be pleased to assist you with the tool selection as well as with the machining parameters of your vhf tools. Contact us and benefit from our broad experience.

Would you like a little more?

Do you have a great demand for a certain kind of tool? In this case, we can agree on annual purchase quantities of all tools from this catalog at an attractive price. Ask for an individual offer if you are interested in annual orders or single orders of large quantities.

Custom-made tools – tools for special tasks

Are you missing a certain geometry in our product range? We can produce several kinds of tools exactly according to your specifications. Just contact our tool sales department and we will check our possibilities in a timely manner.

*Take advantage of
personal advice from our
milling tool specialists:
+49 7032 97097 430
tools@vhf.de*



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- +49 7032 97097 400 (fax: 490)
- order@vhf.de

Please note that free delivery is only possible for orders placed at shop.vhf.de

TERMS OF DELIVERY

	Minimum-order value	Minimum quantity surcharge	Shipping costs <31kg	
			ordering by phone/e-mail/fax	ordering online
Germany	€ 75	€ 10	5.80 €	free
EU	€ 200	€ 25	16.80 €	free
Switzerland	€ 250	€ 35	16.80 €	free
World	€ 300	€ 45	custom calculation, dep. on weight & country (at least € 44.80)	

MILLING CUTTERS

ENGRAVING TOOLS

DEBURRING TOOLS

ROUTER BITS

THREAD CUTTERS

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TRADE FAIRS



Milling tools in action

We exhibit our carbide and diamond tools each year at numerous trade fairs with a wide range of topics.

We would be pleased to welcome you to one of them, where you can see many tools live in action on our CNC milling machines. You can contact us for information on the current trade fair dates, or you can find them directly at vhf.com.

Visit us and experience the vhf tools live in action on our milling machines at numerous trade fairs.



CARBIDE AND DIAMOND TOOLS



Due to its extraordinary features, tools made of carbide metal are far superior to those made of high speed steel (HSS) and you benefit from significantly higher cutting speeds and tool lives. Carbide is a material consisting of various originally powdered hard materials that are

baked, i.e. sintered, under high pressure and at high temperatures to form a solid body. Our precision tools are ground from the rods created in this way. The composition of the carbide is always optimized for the application – just like our cutting edge geometries.



Diamond is even much harder than carbide. The carbide tools with diamond attachment which are offered by vhf have a multiple of the endurance. We use three sorts of diamonds: Monocrystalline diamonds (MCD) consist of pure carbon and are extremely resistant to wear. Although they have been produced synthetically, they have the same characteristics as natural diamonds and

are excellent for polishing acrylic glass to a high gloss. Depending on the type, polycrystalline diamonds (PCD) can be used for milling or polishing. CVD thick film plates are built up in thin layers by Chemical Vapor Deposition (CVD) and provide an extremely smooth and sharp cutting edge for highest surface qualities.

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STRONG COATINGS: THE STRATUM SERIES FROM VHF

Carbide tools are often additionally hard-coated when used in machining. Our coatings, which are precisely matched to the respective material, offer you maximum

wear protection and you benefit from a significantly longer tool life.

STRATUM AS

Type	PVD coating
Material	TiB ₂
Coating thickness	2.0 µm ± 0.7
vhf tools	single tooth cutters with hawk beak, double tooth cutters for aluminium

- great hardness; excellent protection against wear
- prevents the formation of built-up edges
- reduces the friction at the cutting face and facilitates the chip flow
- especially designed for high performance milling of aluminium



STRATUM
AS



STRATUM
IX

- extremely hard and smooth
- especially for machining stainless steel

STRATUM IX

Type	PVD coating
Material	TiAlN/TiSiN
Coating thickness	3.0 µm ± 1.0
vhf tools	triple tooth cutters for stainless steel

STRATUM HL

Type	PVD coating
Material	AlTiN
Coating thickness	3.0 µm ± 1.0
vhf tools	four tooth cutters Varius®

- excellent hardness
- almost free from internal stress
- for stainless steel, cast iron and materials which are difficult to machine
- especially for roughing



STRATUM
HL

STRATUM TN

Type	PVD-Schicht
Material	TiAlN
Coating thickness	3.0 µm ± 1.0 (1.5 µm ± 0.5)
vhf tools	engraver's milling cutters and double tooth cutters for stainless steel; double, triple and four tooth cutters Varius®, deburring tools, thread whirling cutters

- all-round coating wide application field
- for roughing and finishing tasks

STRATUM
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TOOLSDEBURRING
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STRATUM
DLC

- abrasion-resistant carbon layer
- for dry machining
- ideal for machining solid wood and laminates
- affordable alternative to diamond coating

STRATUM DLC

Type	DLC coating
Material	ta-C
Coating thickness	2.5 µm ± 0.5
vhf tools	single tooth cutters Varius®, V-slot cutters for aluminium composites, double tooth cutters for wood

STRATUM MS

Type	CVD coating
Material	diamond
Coating thickness	3.0 µm ± 1.0
vhf tools	single tooth cutters Varius®

- high-end multilayer coating
- smooth surfaces
- long tool life
- relatively thin – the cutting edges will nearly not be rounded off
- for non-ferrous metals and wood

STRATUM
MSSTRATUM
DIA

- multilayer coating
- best possible price/performance ratio
- optimized for almost all tasks in the field of printed circuit board production

STRATUM DIA

Type	CVD coating
Material	diamond
Coating thickness	9.0 µm ± 3.0
vhf tools	PCB outline cutters diamond-toothed and spiral-toothed



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SIGN S AND SYMBOLS






Characteristics

	cutting edge type: cylinder, conus, radius, chamfer, torus, quadrant	top angle	milling direction/ cutting direction
	number of cutting edges/ X = staggered tooth system	lead angle of the spiral flute	type of coating

Dimensioning

D1	cutting edge diameter/head diameter	L1	total length
D2	shank diameter	L2	cutting edge length/max. immersion depth
D3	engraving width/bottom width	L3	undercut/bisecting depth/distance side clamping area
α	top angle	L4	drill tip/radius concave
β	chamfering angle		

Material suitability

	PMMA PVC foams, PVC hard PP, PC, PE/PS foams		soft aluminium hard aluminium brass		construction steel stainless steel
	HPL aluminium composites GRP/CRP circuit boards		soft wood hard wood MDF/multiplex		

*** very well suitable | ** well suitable | * suitable

Shop link



direct link to the
product page in the
vhf shop

you find our new suggestion matrix on
tools and materials on the next page

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			from page	plastics						
				PMMA	PVC foam	PVC hard	PP	PC	PE PS	foams
MILLING CUTTERS	TOOLS	MATERIALS	Single tooth cutters Varius®	28	**	**	***	***	**	**
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			Single tooth cutters Varius® – STRATUM MS	30						
ENGRAVING TOOLS			Single tooth cutters Varius® with left-hand twist	31	**	**	***	***	**	**
			Single tooth cutters with polished flute	32	***	***	**	**	***	***
			Single tooth cutters, polished, with left-hand twist	35	***	***	**	**	***	***
			Single tooth cutters with hawk beak profile	36	*	*	*	*	*	*
			Single tooth cutters, hawk beak profile – STRATUM AS	38						
DEBURRING TOOLS			Single tooth cutters with undercut	39	*	*	*	*	*	*
			Single tooth cutters with face radius	40	***	***	***	***	***	***
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			V-slot cutters for alumin. composites – STRATUM DLC	41						
			Double tooth cutters Varius®	44						
ROUTER BITS			Double tooth cutters with polished flute	46	***	***	***	***	***	***
			Double tooth cutters for stainless steel	47						
			Double tooth cutters with fishtail	48		*	*	*	*	*
			Double tooth cutters for aluminium – all types	50						
			Double tooth cutters for wood	52						
THREAD CUTTERS			Double tooth cutters with face radius	53	***	***	***	***	***	***
			Rub out cutters	54						
			Triple tooth cutters Varius®	58						
			Triple tooth cutters for foam	60						***
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DRILLS			Four tooth cutters Varius® – all types	62						
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			Composite cutters, coarsely toothed	69						
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			Honeycomb cutters, spiral-fluted	72	**	**	**	**	**	**
			Gravers	78	**	**	**	**	**	**
			Box gravers	81	***	***	***	***	***	***
LANCES AND KNIVES			Isolation engraving tools	82						
			Engraver's milling cutters for stainless steel	83						
			Engraver's milling cutters for acrylic	84	***	***	***	***	***	***
			Deburring tools	90	*	*	*	*	*	*
			Deburring tools with quadrant	91	***	***	***	***	***	***
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			V-slot cutters for aluminium composites	95						
			Long hole slot cutters	96	**	**	**	**	**	**
			Slot cutters	97	**	**	**	**	**	**
			Chamfering cutters	98	**	**	**	**	**	**
			Cutters with quadrant	99	**	**	**	**	**	**
			Radius cutters	100	**	**	**	**	**	**
			Triple tooth surface milling cutters	101	***	***	***	***	***	**
			Thread whirling cutters	106	***	***	***	***	***	*
			Thread whirling cutters – STRATUM TN	107						
			Circular thread cutters	108	***	***	***	***	***	*
			Drills with 3 mm shank	112	***	***	***	***	***	***
			Drills with 6 mm shank	114	***	***	***	***	***	***
			PCD polishing cutters	118	***					
			MCD polishing cutters	119	***					
			PCD polishing gravers	120	***					
			MCD polishing gravers	121	***					
			PCD single tooth cutters	122			*	*	*	
			PCD double tooth cutters	123			*	*	*	
			CVD cutters	124			*	*	*	

*** very well suitable | ** well suitable | * suitable

RECOMMENDATION MATRIX

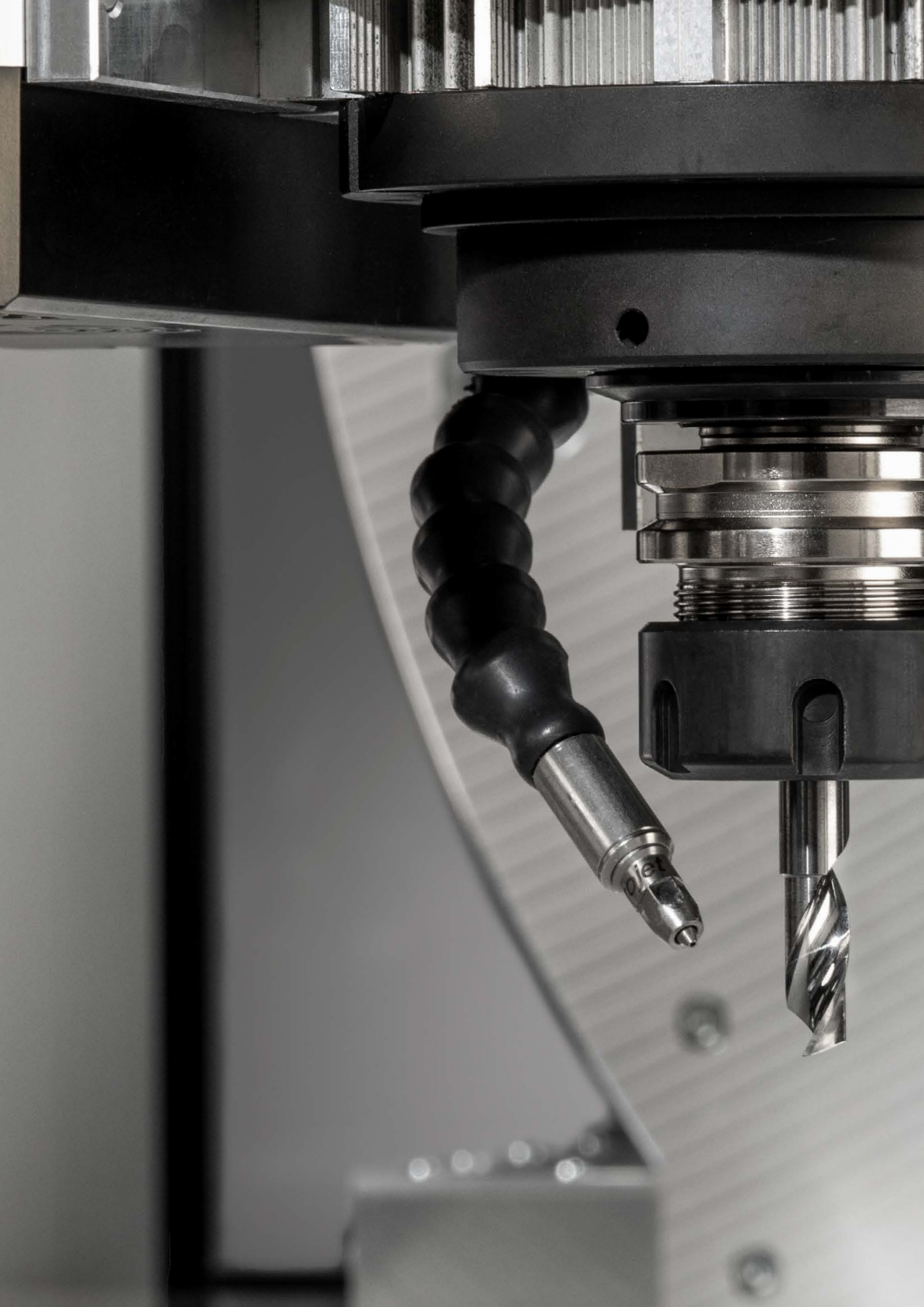
non-ferrous metals			ferrous metals		composites				wood		
alumin. soft	alumin. hard	brass	constr. steel	stainless steel	HPL	alumin. compos.	GRP CRP	circuit boards	soft wood	hard wood	MDF multiplex
**	*	**			**	***			***	**	***
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MILLING CUTTERS
ENGRAVING TOOLS
DEBURRING TOOLS
ROUTER BITS
THREAD CUTTERS
DILLS
DIAMOND TOOLS
LANCES AND KNIVES
ACCESSORIES

¹ Suitable for tool machines and machining centers that have lower speeds available at high torque.





A TRADEMARK TO WHICH YOU WILL REMAIN LOYAL:
THE SINGLE TOOTH CUTTER VARIUS® FROM VHF.

ACCESSORIES	LANCES AND KNIVES	DIAMOND TOOLS	DRILLS	THREAD CUTTERS	ROUTER BITS	DEBURRING TOOLS	ENGRAVING TOOLS	MILLING CUTTERS
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SINGLE TOOTH CUTTERS

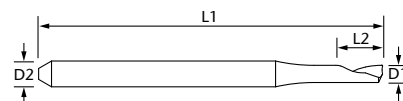
On the following pages you will find an impressive range of single tooth cutters – in about 300 different geometries! Especially for wood, plastics and non-ferrous metals; also with left-hand twist.

- **SINGLE TOOTH CUTTERS VARIUS®**
- **SINGLE TOOTH CUTTERS VARIUS® WITH LEFT-HAND TWIST**
- **SINGLE TOOTH CUTTERS WITH POLISHED FLUTE**
- **SINGLE TOOTH CUTTERS, POLISHED, WITH LEFT-HAND TWIST**
- **SINGLE TOOTH CUTTERS WITH HAWK BEAK PROFILE**
- **SINGLE TOOTH CUTTERS WITH UNDERCUT**
- **SINGLE TOOTH CUTTERS WITH FACE RADIUS**
- **V-SLOT CUTTERS FOR ALUMINIUM COMPOSITES**



SINGLE TOOTH CUTTERS VARIUS®

- universally applicable
- specialist for aluminium composites
- uncoated version very well suitable for plastics
- STRATUM DLC coating for increased tool life
- STRATUM MS coating for especially long tool life
- exclusive own brand



Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	-5 % 2-4	-10 % 5-9	-15 % 10-19	-20 % 20-49				
uncoated tools													
PMMA **	PVC foam **	PVC hard ***	PP ***	PC **	PE PS **	alumin. soft **	alumin. hard *	brass **	HPL **	alumin. compos. ***	soft wood ***	hard wood **	MDF multiplex ***
ES-SC-0020-3-006-40	0.20	3	0.6	40	27.80	26.41	25.02	23.63	22.24				
ES-SC-0050-3-015-40	0.50	3	1.5	40	23.60	22.42	21.24	20.06	18.88				
ES-SC-0060-3-030-40	0.60	3	3.0	40	19.10	18.14	17.19	16.23	15.28				
ES-SC-0070-3-040-40	0.70	3	4.0	40	19.40	18.43	17.46	16.49	15.52				
ES-SC-0080-3-040-40	0.80	3	4.0	40	19.40	18.43	17.46	16.49	15.52				
with edge chamfer 0.05 mm × 45°													
ES-SC-0100-3-030-40	1.00	3	3.0	40	19.10	18.14	17.19	16.23	15.28				
ES-SC-0100-3-050-40	1.00	3	5.0	40	19.40	18.43	17.46	16.49	15.52				
ES-SC-0100-6-050-40	1.00	6	5.0	40	23.60	22.42	21.24	20.06	18.88				
ES-SC-0150-3-050-40	1.50	3	5.0	40	19.40	18.43	17.46	16.49	15.52				
ES-SC-0150-6-050-40	1.50	6	5.0	40	23.60	22.42	21.24	20.06	18.88				
ES-SC-0180-3-070-40	1.80	3	7.0	40	19.40	18.43	17.46	16.49	15.52				

Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	-5% 2-4	-10% 5-9	-15% 10-19	-20% 20-49
uncoated tools									
with edge chamfer 0.05 mm × 45°									
ES-SC-0200-3-050-40	2.00	3	5.0	40	19.10	18.14	17.19	16.23	15.28
ES-SC-0200-3-080-40	2.00	3	8.0	40	19.40	18.43	17.46	16.49	15.52
ES-SC-0200-4-070-40	2.00	4	7.0	40	21.40	20.33	19.26	18.19	17.12
ES-SC-0200-6-050-40	2.00	6	5.0	40	23.60	22.42	21.24	20.06	18.88
ES-SC-0200-6-070-40	2.00	6	7.0	40	24.60	23.37	22.14	20.91	19.68
ES-SC-0250-3-100-40	2.50	3	10.0	40	19.40	18.43	17.46	16.49	15.52
ES-SC-0250-6-100-50	2.50	6	10.0	50	24.60	23.37	22.14	20.91	19.68
ES-SC-0300-3-050-40	3.00	3	5.0	40	15.10	14.34	13.59	12.83	12.08
ES-SC-0300-3-100-40	3.00	3	10.0	40	16.10	15.30	14.49	13.68	12.88
ES-SC-0300-3-120-40	3.00	3	12.0	40	17.20	16.34	15.48	14.62	13.76
ES-SC-0300-4-100-40	3.00	4	10.0	40	21.40	20.33	19.26	18.19	17.12
ES-SC-0300-6-050-40	3.00	6	5.0	40	22.50	21.38	20.25	19.12	18.00
ES-SC-0300-6-080-50	3.00	6	8.0	50	23.60	22.42	21.24	20.06	18.88
ES-SC-0300-6-100-50	3.00	6	10.0	50	24.60	23.37	22.14	20.91	19.68
ES-SC-0300-6-120-50	3.00	6	12.0	50	25.70	24.41	23.13	21.84	20.56
ES-SC-0350-6-140-50	3.50	6	14.0	50	25.70	24.41	23.13	21.84	20.56
ES-SC-0400-4-060-40	4.00	4	6.0	40	18.20	17.29	16.38	15.47	14.56
ES-SC-0400-4-100-40	4.00	4	10.0	40	19.30	18.34	17.37	16.41	15.44
ES-SC-0400-4-140-50	4.00	4	14.0	50	20.40	19.38	18.36	17.34	16.32
ES-SC-0400-4-220-60	4.00	4	22.0	60	22.50	21.38	20.25	19.12	18.00
ES-SC-0400-6-060-40	4.00	6	6.0	40	23.60	22.42	21.24	20.06	18.88
ES-SC-0400-6-120-50	4.00	6	12.0	50	24.60	23.37	22.14	20.91	19.68
ES-SC-0400-6-180-60	4.00	6	18.0	60	25.80	24.51	23.22	21.93	20.64
with edge chamfer 0.10 mm × 45°									
ES-SC-0500-5-120-50	5.00	5	12.0	50	21.30	20.23	19.17	18.11	17.04
ES-SC-0500-5-160-60	5.00	5	16.0	60	22.50	21.38	20.25	19.12	18.00
ES-SC-0500-6-070-40	5.00	6	7.0	40	23.60	22.42	21.24	20.06	18.88
ES-SC-0500-6-140-50	5.00	6	14.0	50	25.30	24.04	22.77	21.51	20.24
ES-SC-0600-6-050-40	6.00	6	5.0	40	21.30	20.23	19.17	18.11	17.04
ES-SC-0600-6-080-40	6.00	6	8.0	40	22.50	21.38	20.25	19.12	18.00
ES-SC-0600-6-140-50	6.00	6	14.0	50	23.60	22.42	21.24	20.06	18.88
ES-SC-0600-6-200-60	6.00	6	20.0	60	24.60	23.37	22.14	20.91	19.68
ES-SC-0600-6-250-60	6.00	6	25.0	60	25.70	24.41	23.13	21.84	20.56
ES-SC-0600-6-350-75	6.00	6	35.0	75	31.10	29.55	27.99	26.44	24.88
ES-SC-0800-8-140-50	8.00	8	14.0	50	27.80	26.41	25.02	23.63	22.24
ES-SC-0800-8-200-60	8.00	8	20.0	60	30.90	29.35	27.81	26.26	24.72
ES-SC-0800-8-250-75	8.00	8	25.0	75	34.90	33.16	31.41	29.66	27.92
ES-SC-0800-8-350-85	8.00	8	35.0	85	43.90	41.70	39.51	37.31	35.12
with edge chamfer 0.15 mm × 45°									
ES-SC-1000-10-140-50	10.00	10	14.0	50	40.70	38.67	36.63	34.59	32.56
ES-SC-1000-10-250-75	10.00	10	25.0	75	46.10	43.80	41.49	39.19	36.88
ES-SC-1000-10-280-75	10.00	10	28.0	75	48.20	45.79	43.38	40.97	38.56
ES-SC-1200-12-250-75	12.00	12	25.0	75	56.80	53.96	51.12	48.28	45.44

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SINGLE TOOTH
CUTTERS

ENGRAVING
TOOLS

DEBURRING
TOOLS

ROUTER
BITS

THREAD
CUTTERS

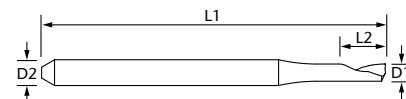
DRILLS

DIAMOND
TOOLS

LANCES
AND KNIVES

ACCESSORIES

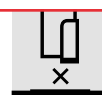
CONTINUATION SINGLE TOOTH CUTTERS VARIUS®



Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	-5% 2-4	-10% 5-9	-15% 10-19	-20% 20-49				
tools with STRATUM DLC coating													
PMMA	PVC hard	PP	PC	PE PS	alumin. soft	alumin. hard	brass	HPL	alumin. compos.	soft wood	hard wood	MDF multiplex	
*	*	*	*	*	**	**	***	**	***	***	***	***	
ES-SC-0100-3-030-40-DLC	1.00	3	3.0	40	26.70	25.36	24.03	22.70	21.36				
ES-SC-0100-6-050-40-DLC	1.00	6	5.0	40	31.20	29.64	28.08	26.52	24.96				
ES-SC-0150-3-050-40-DLC	1.50	3	5.0	40	27.00	25.65	24.30	22.95	21.60				
ES-SC-0150-6-050-40-DLC	1.50	6	5.0	40	31.20	29.64	28.08	26.52	24.96				
ES-SC-0200-6-050-40-DLC	2.00	6	5.0	40	31.20	29.64	28.08	26.52	24.96				
ES-SC-0200-6-070-40-DLC	2.00	6	7.0	40	32.20	30.59	28.98	27.37	25.76				
ES-SC-0300-3-100-40-DLC	3.00	3	10.0	40	23.70	22.52	21.33	20.14	18.96				
ES-SC-0300-6-050-40-DLC	3.00	6	5.0	40	31.10	29.55	27.99	26.44	24.88				
ES-SC-0300-6-080-50-DLC	3.00	6	8.0	50	31.20	29.64	28.08	26.52	24.96				
ES-SC-0300-6-100-50-DLC	3.00	6	10.0	50	32.20	30.59	28.98	27.37	25.76				
ES-SC-0300-6-120-50-DLC	3.00	6	12.0	50	33.30	31.63	29.97	28.30	26.64				
ES-SC-0350-6-140-50-DLC	3.50	6	14.0	50	33.30	31.63	29.97	28.30	26.64				
ES-SC-0400-4-140-50-DLC	4.00	4	14.0	50	28.00	26.60	25.20	23.80	22.40				
ES-SC-0400-6-060-40-DLC	4.00	6	6.0	40	31.20	29.64	28.08	26.52	24.96				
ES-SC-0400-6-120-50-DLC	4.00	6	12.0	50	32.20	30.59	28.98	27.37	25.76				
ES-SC-0400-6-180-60-DLC	4.00	6	18.0	60	33.40	31.73	30.06	28.39	26.72				
ES-SC-0500-5-160-60-DLC	5.00	5	16.0	60	30.10	28.60	27.09	25.59	24.08				
ES-SC-0500-6-070-40-DLC	5.00	6	7.0	40	31.20	29.64	28.08	26.52	24.96				
ES-SC-0500-6-140-50-DLC	5.00	6	14.0	50	32.90	31.25	29.61	27.96	26.32				
ES-SC-0600-6-050-40-DLC	6.00	6	5.0	40	28.90	27.45	26.01	24.57	23.12				
ES-SC-0600-6-080-40-DLC	6.00	6	8.0	40	30.10	28.60	27.09	25.59	24.08				
ES-SC-0600-6-140-50-DLC	6.00	6	14.0	50	31.20	29.64	28.08	26.52	24.96				
ES-SC-0600-6-200-60-DLC	6.00	6	20.0	60	32.20	30.59	28.98	27.37	25.76				
ES-SC-0600-6-250-60-DLC	6.00	6	25.0	60	33.30	31.63	29.97	28.30	26.64				
ES-SC-0800-8-140-50-DLC	8.00	8	14.0	50	37.50	35.62	33.75	31.88	30.00				
ES-SC-0800-8-200-60-DLC	8.00	8	20.0	60	40.60	38.57	36.54	34.51	32.48				
ES-SC-0800-8-250-75-DLC	8.00	8	25.0	75	44.60	42.37	40.14	37.91	35.68				
ES-SC-1000-10-250-75-DLC	10.00	10	25.0	75	55.80	53.01	50.22	47.43	44.64				
all tools with edge chamfer: 0.05 mm × 45° for D1 ≥ 1.00 mm 0.10 mm × 45° for D1 ≥ 5.00 mm 0.15 mm × 45° for D1 ≥ 10.00 mm													
tools with STRATUM MS coating*													
alumin. soft	alumin. hard	brass	HPL	alumin. compos.	soft wood	hard wood	MDF multiplex						
**	**	***	**	***	***	***	***						
ES-SC-0300-3-100-40-MS	3.00	3	10.0	40	32.20	30.59	28.98	27.37	25.76				
ES-SC-0400-4-140-50-MS	4.00	4	14.0	50	43.90	41.70	39.51	37.31	35.12				
ES-SC-0600-6-140-50-MS	6.00	6	14.0	50	54.60	51.87	49.14	46.41	43.68				
ES-SC-0800-8-220-60-MS	8.00	8	22.0	60	77.10	73.24	69.39	65.53	61.68				
all tools with edge chamfer: 0.05 mm × 45° for D1 ≥ 3.00 mm 0.10 mm × 45° for D1 ≥ 6.00 mm													

* Info:

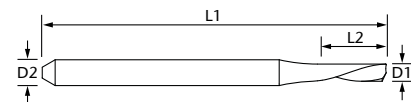
Since the diamond layer is electrically insulating, calibration with measuring systems that require electrical contact is not possible.





SINGLE TOOTH CUTTERS VARIUS® WITH LEFT-HAND TWIST

- the left-hand twist presses the chips downwards; the tool is right-cutting like all vhf tools
- ideal for working on thin materials or such which tend to fray easily
- especially for milling works on a vacuum table with low holding force
- particularly suitable for aluminium, wood, thermosetting plastics and thermoplastics



Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	−5 % 2–4	−10 % 5–9	−15 % 10–19	−20 % 20–49				
PMMA	PVC foam	PVC hard	PP	PC	PE PS	alumin. soft	brass	HPL	alumin. compos.	soft wood	hard wood	MDF multiplex	
**	**	***	***	**	**	**	*	**	***	***	**	***	
with edge chamfer 0.05 mm × 45°													
ES-SC-LD-0100-3-050-40	1.00	3	5.0	40	20.60	19.57	18.54	17.51	16.48				
ES-SC-LD-0150-3-050-40	1.50	3	5.0	40	20.40	19.38	18.36	17.34	16.32				
ES-SC-LD-0200-3-080-40	2.00	3	8.0	40	20.40	19.38	18.36	17.34	16.32				
ES-SC-LD-0300-3-100-40	3.00	3	10.0	40	20.20	19.19	18.18	17.17	16.16				
ES-SC-LD-0300-6-100-50	3.00	6	10.0	50	25.90	24.60	23.31	22.02	20.72				
ES-SC-LD-0400-4-120-50	4.00	4	12.0	50	22.50	21.38	20.25	19.12	18.00				
ES-SC-LD-0400-6-120-50	4.00	6	12.0	50	25.90	24.60	23.31	22.02	20.72				
with edge chamfer 0.10 mm × 45°													
ES-SC-LD-0500-5-160-60	5.00	5	16.0	60	25.60	24.32	23.04	21.76	20.48				
ES-SC-LD-0600-6-140-50	6.00	6	14.0	50	25.60	24.32	23.04	21.76	20.48				
ES-SC-LD-0600-6-220-60	6.00	6	22.0	60	26.80	25.46	24.12	22.78	21.44				
ES-SC-LD-0800-8-220-75	8.00	8	22.0	75	37.30	35.43	33.57	31.71	29.84				

SINGLE TOOTH
CUTTERS

ENGRAVING
TOOLS

DEBURRING
TOOLS

ROUTER
BITS

THREAD
CUTTERS

DRILLS

DIAMOND
TOOLS

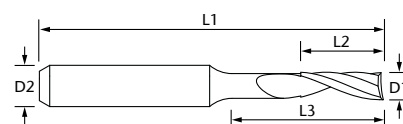
LANCES
AND KNIVES

ACCESSORIES



SINGLE TOOTH CUTTERS WITH POLISHED FLUTE

- mirror finished polished flute
- very good chip clearance
- extremely sharp
- available with undercut
- especially for acrylic glass and other thermoplastics



Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L3 (mm)	L1 (mm)	Price in €	-5% 2-4	-10% 5-9	-15% 10-19	-20% 20-49
PMMA ***	PVC foam ***	PVC hard **	PP **	PC ***	PE PS ***	alumin. soft *	alumin. compos. *	soft wood *	MDF multiplex *	
ES-PS-0100-3-040-40	1.00	3	4.0		40	25.70	24.41	23.13	21.84	20.56
ES-PS-0100-6-050-50	1.00	6	5.0		50	29.10	27.65	26.19	24.73	23.28
ES-PS-0150-3-060-40	1.50	3	6.0		40	25.70	24.41	23.13	21.84	20.56
ES-PS-0200-2-080-30	2.00	2	8.0		30	20.80	19.76	18.72	17.68	16.64
ES-PS-0200-3-050-40	2.00	3	5.0		40	25.70	24.41	23.13	21.84	20.56
ES-PS-0200-3-080-30	2.00	3	8.0		30	25.70	24.41	23.13	21.84	20.56
ES-PS-0200-3-080-40	2.00	3	8.0		40	26.00	24.70	23.40	22.10	20.80
ES-PS-0200-3-090-40	2.00	3	9.0		40	26.00	24.70	23.40	22.10	20.80
ES-PS-0200-3-110-40	2.00	3	11.0		40	26.10	24.80	23.49	22.18	20.88
ES-PS-0200-6-050-50	2.00	6	5.0		50	28.90	27.45	26.01	24.57	23.12
ES-PS-0200-6-080-50	2.00	6	8.0		50	30.10	28.60	27.09	25.59	24.08
ES-PS-0250-3-100-40	2.50	3	10.0		40	26.00	24.70	23.40	22.10	20.80

Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L3 (mm)	L1 (mm)	Price in €	−5% 2–4	−10% 5–9	−15% 10–19	−20% 20–49
ES-PS-0300-3-080-40	3.00	3	8.0		40	19.30	18.34	17.37	16.41	15.44
ES-PS-0300-3-100-30	3.00	3	10.0		30	20.00	19.00	18.00	17.00	16.00
ES-PS-0300-3-120-40	3.00	3	12.0		40	21.40	20.33	19.26	18.19	17.12
ES-PS-0300-3-120-60	3.00	3	12.0		60	22.50	21.38	20.25	19.12	18.00
ES-PS-0300-3-160-50	3.00	3	16.0		50	23.60	22.42	21.24	20.06	18.88
ES-PS-0300-3-220-60	3.00	3	22.0		60	24.60	23.37	22.14	20.91	19.68
ES-PS-0300-4-120-50	3.00	4	12.0		50	26.00	24.70	23.40	22.10	20.80
ES-PS-0300-6-080-50	3.00	6	8.0		50	29.10	27.65	26.19	24.73	23.28
ES-PS-0300-6-100-50	3.00	6	10.0		50	30.10	28.60	27.09	25.59	24.08
ES-PS-0300-6-120-50	3.00	6	12.0		50	31.20	29.64	28.08	26.52	24.96
ES-PS-0300-6-160-50	3.00	6	16.0		50	33.20	31.54	29.88	28.22	26.56
ES-PS-0300-6-220-60	3.00	6	22.0		60	34.30	32.58	30.87	29.16	27.44
ES-PS-0400-4-080-40	4.00	4	8.0		40	20.40	19.38	18.36	17.34	16.32
ES-PS-0400-4-120-50	4.00	4	12.0		50	22.50	21.38	20.25	19.12	18.00
ES-PS-0400-4-160-50	4.00	4	16.0		50	24.60	23.37	22.14	20.91	19.68
ES-PS-0400-4-220-60	4.00	4	22.0		60	26.80	25.46	24.12	22.78	21.44
ES-PS-0400-4-320-70	4.00	4	32.0		70	28.90	27.45	26.01	24.57	23.12
ES-PS-0400-6-060-50	4.00	6	6.0		50	28.00	26.60	25.20	23.80	22.40
ES-PS-0400-6-080-50	4.00	6	8.0		50	29.10	27.65	26.19	24.73	23.28
ES-PS-0400-6-100-50	4.00	6	10.0		50	30.10	28.60	27.09	25.59	24.08
ES-PS-0400-6-120-50	4.00	6	12.0		50	31.20	29.64	28.08	26.52	24.96
ES-PS-0400-6-160-50	4.00	6	16.0		50	33.20	31.54	29.88	28.22	26.56
ES-PS-0400-6-220-60	4.00	6	22.0		60	34.30	32.58	30.87	29.16	27.44
ES-PS-0500-5-120-50	5.00	5	12.0		50	23.60	22.42	21.24	20.06	18.88
ES-PS-0500-5-160-60	5.00	5	16.0		60	25.70	24.41	23.13	21.84	20.56
ES-PS-0500-5-320-70	5.00	5	32.0		70	32.20	30.59	28.98	27.37	25.76
ES-PS-0500-6-140-50	5.00	6	14.0		50	30.10	28.60	27.09	25.59	24.08
ES-PS-0500-6-220-60	5.00	6	22.0		60	34.30	32.58	30.87	29.16	27.44
ES-PS-0600-6-100-50	6.00	6	10.0		50	24.60	23.37	22.14	20.91	19.68
ES-PS-0600-6-140-50	6.00	6	14.0		50	26.80	25.46	24.12	22.78	21.44
ES-PS-0600-6-220-60	6.00	6	22.0		60	28.90	27.45	26.01	24.57	23.12
ES-PS-0600-6-320-70	6.00	6	32.0		70	35.40	33.63	31.86	30.09	28.32
ES-PS-0600-6-420-80	6.00	6	42.0		80	40.70	38.67	36.63	34.59	32.56
ES-PS-0800-8-140-50	8.00	8	14.0		50	38.60	36.67	34.74	32.81	30.88
ES-PS-0800-8-220-60	8.00	8	22.0		60	43.90	41.70	39.51	37.31	35.12
ES-PS-0800-8-320-70	8.00	8	32.0		70	49.30	46.83	44.37	41.91	39.44
ES-PS-0800-8-420-80	8.00	8	42.0		80	54.60	51.87	49.14	46.41	43.68
ES-PS-1000-10-140-60	10.00	10	14.0		60	46.10	43.80	41.49	39.19	36.88
ES-PS-1000-10-220-70	10.00	10	22.0		70	51.40	48.83	46.26	43.69	41.12
ES-PS-1000-10-320-75	10.00	10	32.0		75	56.80	53.96	51.12	48.28	45.44
ES-PS-1200-12-220-70	12.00	12	22.0		70	63.20	60.04	56.88	53.72	50.56
ES-PS-1200-12-320-100	12.00	12	32.0		100	68.50	65.08	61.65	58.23	54.80
ES-PS-1200-12-420-100	12.00	12	42.0		100	85.70	81.42	77.13	72.84	68.56

continued on the next page ...

Practical tip:

If the tool has finished its lifetime and is no longer sharp enough for milling acrylic glass, you can still use it for machining aluminium composite plates or similar materials.

SINGLE TOOTH
CUTTERS

ENGRAVING
TOOLS

DEBURRING
TOOLS

ROUTER
BITS

THREAD
CUTTERS

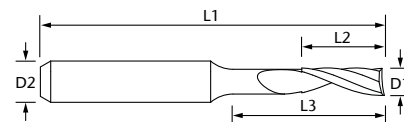
DRILLS

DIAMOND
TOOLS

LANCES
AND KNIVES

ACCESSORIES

CONTINUATION SINGLE TOOTH CUTTERS WITH POLISHED FLUTE



Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L3 (mm)	L1 (mm)	Price in €	−5% 2–4	−10% 5–9	−15% 10–19	−20% 20–49
PMMA ***	PVC foam ***	PVC hard **	PP **	PC ***	PE PS ***	alumin. soft *	alumin. compos. *	soft wood *	MDF multiplex *	
tools with undercut										
ES-PS-0100-6-050-0120-50	1.00	6	5.0	12.0	50	31.40	29.83	28.26	26.69	25.12
ES-PS-0200-6-080-0160-50	2.00	6	8.0	16.0	50	31.20	29.64	28.08	26.52	24.96
ES-PS-0300-6-100-0220-50	3.00	6	10.0	22.0	50	31.20	29.64	28.08	26.52	24.96
ES-PS-0400-6-120-0220-50	4.00	6	12.0	22.0	50	32.20	30.59	28.98	27.37	25.76
ES-PS-0500-6-140-0220-50	5.00	6	14.0	22.0	50	31.10	29.55	27.99	26.44	24.88
ES-PS-0600-6-140-0220-50	6.00	6	14.0	22.0	50	27.80	26.41	25.02	23.63	22.24
ES-PS-0600-6-420-0650-100	6.00	6	42.0	65.0	100	54.60	51.87	49.14	46.41	43.68
ES-PS-0800-8-140-0220-50	8.00	8	14.0	22.0	50	39.60	37.62	35.64	33.66	31.68
ES-PS-0800-8-220-0420-75	8.00	8	22.0	42.0	75	47.10	44.75	42.39	40.04	37.68
ES-PS-1000-10-140-0220-60	10.00	10	14.0	22.0	60	47.10	44.75	42.39	40.04	37.68
ES-PS-1000-10-220-0320-70	10.00	10	22.0	32.0	70	52.50	49.88	47.25	44.62	42.00
ES-PS-1000-10-220-0420-75	10.00	10	22.0	42.0	75	54.60	51.87	49.14	46.41	43.68

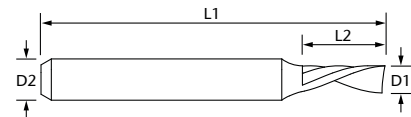
Practical tip:

If the tool has finished its lifetime and is no longer sharp enough for milling acrylic glass, you can still use it for machining aluminium composite plates or similar materials.



SINGLE TOOTH CUTTERS, POLISHED, WITH LEFT-HAND TWIST

- mirror finished polished flute
- very sharp cutting edge
- especially for milling works on a vacuum table with low holding force
- against fraying of the material
- especially suitable for acrylic glass and other thermoplastics, particularly with thin material thickness



Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	-5% 2-4	-10% 5-9	-15% 10-19	-20% 20-49
PMMA ***	PVC foam ***	PVC hard **	PP **	PC ***	PE PS ***	alumin. soft *	soft wood *		
ES-PS-LD-0100-3-040-40	1.00	3	4.0	40	27.00	25.65	24.30	22.95	21.60
ES-PS-LD-0150-3-060-40	1.50	3	6.0	40	27.00	25.65	24.30	22.95	21.60
ES-PS-LD-0200-3-080-40	2.00	3	8.0	40	27.00	25.65	24.30	22.95	21.60
ES-PS-LD-0300-3-100-30	3.00	3	10.0	30	21.40	20.33	19.26	18.19	17.12
ES-PS-LD-0300-3-120-40	3.00	3	12.0	40	22.50	21.38	20.25	19.12	18.00
ES-PS-LD-0300-6-120-50	3.00	6	12.0	50	33.20	31.54	29.88	28.22	26.56
ES-PS-LD-0400-4-120-50	4.00	4	12.0	50	23.60	22.42	21.24	20.06	18.88
ES-PS-LD-0400-4-220-60	4.00	4	22.0	60	27.80	26.41	25.02	23.63	22.24
ES-PS-LD-0400-6-120-50	4.00	6	12.0	50	33.20	31.54	29.88	28.22	26.56
ES-PS-LD-0500-5-160-60	5.00	5	16.0	60	26.80	25.46	24.12	22.78	21.44
ES-PS-LD-0600-6-220-60	6.00	6	22.0	60	30.00	28.50	27.00	25.50	24.00
ES-PS-LD-0800-8-220-60	8.00	8	22.0	60	45.00	42.75	40.50	38.25	36.00
ES-PS-LD-0800-8-320-70	8.00	8	32.0	70	50.30	47.78	45.27	42.76	40.24
ES-PS-LD-1000-10-300-100	10.00	10	30.0	100	58.90	55.95	53.01	50.06	47.12

SINGLE TOOTH
CUTTERSENGRAVING
TOOLSDEBURRING
TOOLSROUTER
BITSTHREAD
CUTTERS

DRILLS

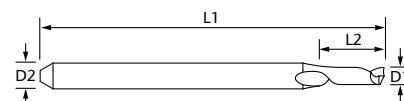
DIAMOND
TOOLSLANCES
AND KNIVES

ACCESSORIES



SINGLE TOOTH CUTTERS WITH HAWK BEAK PROFILE

- low risk of clogging due to very sharp, exposed cutting edge with large flute
- special milling cutter for aluminium and other non-ferrous metals
- the hawk beak at the tip facilitates straight immersion
- the high-performance coating STRATUM AS increases the tool life and prevents the caking of aluminium chips



Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	-5% 2-4	-10% 5-9	-15% 10-19	-20% 20-49				
uncoated tools													
PMMA	PVC foam	PVC hard	PP	PC	PE PS	alumin. soft	alumin. hard	brass	alumin. compos.	soft wood			
*	*	*	*	*	*	***	**	**	**	*			
with edge chamfer 0.05 mm × 45°													
ES-HB-0100-3-030-40	1.00	3	3.0	40	20.20	19.19	18.18	17.17	16.16				
ES-HB-0100-3-050-40	1.00	3	5.0	40	20.40	19.38	18.36	17.34	16.32				
ES-HB-0100-6-050-40	1.00	6	5.0	40	24.70	23.46	22.23	20.99	19.76				
ES-HB-0150-3-050-40	1.50	3	5.0	40	20.40	19.38	18.36	17.34	16.32				
ES-HB-0200-3-050-40	2.00	3	5.0	40	20.20	19.19	18.18	17.17	16.16				
ES-HB-0200-3-060-40	2.00	3	6.0	40	20.20	19.19	18.18	17.17	16.16				
ES-HB-0200-3-080-40	2.00	3	8.0	40	20.60	19.57	18.54	17.51	16.48				
ES-HB-0200-4-070-40	2.00	4	7.0	40	22.50	21.38	20.25	19.12	18.00				
ES-HB-0200-6-050-40	2.00	6	5.0	40	24.50	23.27	22.05	20.82	19.60				
ES-HB-0200-6-070-40	2.00	6	7.0	40	25.70	24.41	23.13	21.84	20.56				
ES-HB-0250-3-100-40	2.50	3	10.0	40	20.60	19.57	18.54	17.51	16.48				

Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	-5% 2-4	-10% 5-9	-15% 10-19	-20% 20-49
uncoated tools									
with edge chamfer 0.05 mm × 45°									
ES-HB-0300-3-060-40	3.00	3	6.0	40	16.00	15.20	14.40	13.60	12.80
ES-HB-0300-3-100-40	3.00	3	10.0	40	17.20	16.34	15.48	14.62	13.76
ES-HB-0300-3-120-40	3.00	3	12.0	40	18.20	17.29	16.38	15.47	14.56
ES-HB-0300-4-100-40	3.00	4	10.0	40	22.50	21.38	20.25	19.12	18.00
ES-HB-0300-6-050-40	3.00	6	5.0	40	23.60	22.42	21.24	20.06	18.88
ES-HB-0300-6-080-50	3.00	6	8.0	50	24.60	23.37	22.14	20.91	19.68
ES-HB-0300-6-100-50	3.00	6	10.0	50	25.70	24.41	23.13	21.84	20.56
ES-HB-0300-6-120-50	3.00	6	12.0	50	26.80	25.46	24.12	22.78	21.44
ES-HB-0400-4-060-40	4.00	4	6.0	40	19.00	18.05	17.10	16.15	15.20
ES-HB-0400-4-100-40	4.00	4	10.0	40	20.20	19.19	18.18	17.17	16.16
ES-HB-0400-4-140-50	4.00	4	14.0	50	21.30	20.23	19.17	18.11	17.04
ES-HB-0400-4-220-60	4.00	4	22.0	60	23.60	22.42	21.24	20.06	18.88
ES-HB-0400-6-060-40	4.00	6	6.0	40	24.60	23.37	22.14	20.91	19.68
ES-HB-0400-6-120-50	4.00	6	12.0	50	25.70	24.41	23.13	21.84	20.56
ES-HB-0400-6-180-60	4.00	6	18.0	60	26.90	25.55	24.21	22.87	21.52
with edge chamfer 0.10 mm × 45°									
ES-HB-0500-5-160-60	5.00	5	16.0	60	23.60	22.42	21.24	20.06	18.88
ES-HB-0500-6-070-40	5.00	6	7.0	40	24.60	23.37	22.14	20.91	19.68
ES-HB-0500-6-140-50	5.00	6	14.0	50	26.30	24.98	23.67	22.36	21.04
ES-HB-0600-6-060-40	6.00	6	6.0	40	22.50	21.38	20.25	19.12	18.00
ES-HB-0600-6-090-40	6.00	6	9.0	40	24.50	23.27	22.05	20.82	19.60
ES-HB-0600-6-110-50	6.00	6	11.0	50	25.70	24.41	23.13	21.84	20.56
ES-HB-0600-6-140-50	6.00	6	14.0	50	24.70	23.46	22.23	20.99	19.76
ES-HB-0600-6-160-50	6.00	6	16.0	50	24.90	23.65	22.41	21.16	19.92
ES-HB-0600-6-200-60	6.00	6	20.0	60	25.70	24.41	23.13	21.84	20.56
ES-HB-0600-6-210-60	6.00	6	21.0	60	25.90	24.60	23.31	22.02	20.72
ES-HB-0600-6-250-60	6.00	6	25.0	60	26.40	25.08	23.76	22.44	21.12
ES-HB-0800-8-060-40	8.00	8	6.0	40	27.80	26.41	25.02	23.63	22.24
ES-HB-0800-8-140-50	8.00	8	14.0	50	30.00	28.50	27.00	25.50	24.00
ES-HB-0800-8-200-60	8.00	8	20.0	60	32.20	30.59	28.98	27.37	25.76
ES-HB-0800-8-250-75	8.00	8	25.0	75	35.90	34.10	32.31	30.51	28.72
ES-HB-0800-8-350-85	8.00	8	35.0	85	46.10	43.80	41.49	39.19	36.88
with edge chamfer 0.15 mm × 45°									
ES-HB-1000-10-140-50	10.00	10	14.0	50	42.80	40.66	38.52	36.38	34.24
ES-HB-1000-10-250-75	10.00	10	25.0	75	48.20	45.79	43.38	40.97	38.56
ES-HB-1200-12-250-75	12.00	12	25.0	75	60.00	57.00	54.00	51.00	48.00

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SINGLE TOOTH
CUTTERS

ENGRAVING
TOOLS

DEBURRING
TOOLS

ROUTER
BITS

THREAD
CUTTERS

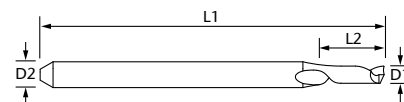
DRILLS

DIAMOND
TOOLS

LANCES
AND KNIVES

ACCESSORIES

CONTINUATION SINGLE TOOTH CUTTERS WITH HAWK BEAK PROFILE

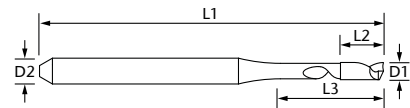


Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	-5 % 2-4	-10 % 5-9	-15 % 10-19	-20 % 20-49
tools with STRATUM AS coating									
alumin. soft ***	alumin. hard ***	brass ***	alumin. compos. **						
with edge chamfer 0.05 mm × 45°									
ES-HB-0200-3-060-40-AS	2.00	3	6.0	40	25.60	24.32	23.04	21.76	20.48
ES-HB-0200-3-080-40-AS	2.00	3	8.0	40	26.00	24.70	23.40	22.10	20.80
ES-HB-0200-6-050-40-AS	2.00	6	5.0	40	29.90	28.40	26.91	25.41	23.92
ES-HB-0200-6-070-40-AS	2.00	6	7.0	40	31.10	29.55	27.99	26.44	24.88
ES-HB-0300-3-060-40-AS	3.00	3	6.0	40	21.40	20.33	19.26	18.19	17.12
ES-HB-0300-3-100-40-AS	3.00	3	10.0	40	22.60	21.47	20.34	19.21	18.08
ES-HB-0300-6-050-40-AS	3.00	6	5.0	40	29.00	27.55	26.10	24.65	23.20
ES-HB-0300-6-080-50-AS	3.00	6	8.0	50	30.00	28.50	27.00	25.50	24.00
ES-HB-0300-6-100-50-AS	3.00	6	10.0	50	31.10	29.55	27.99	26.44	24.88
ES-HB-0300-6-120-50-AS	3.00	6	12.0	50	32.20	30.59	28.98	27.37	25.76
ES-HB-0400-4-060-40-AS	4.00	4	6.0	40	24.40	23.18	21.96	20.74	19.52
ES-HB-0400-4-140-50-AS	4.00	4	14.0	50	26.70	25.36	24.03	22.70	21.36
ES-HB-0400-4-220-60-AS	4.00	4	22.0	60	29.00	27.55	26.10	24.65	23.20
ES-HB-0400-6-060-40-AS	4.00	6	6.0	40	30.00	28.50	27.00	25.50	24.00
ES-HB-0400-6-120-50-AS	4.00	6	12.0	50	31.10	29.55	27.99	26.44	24.88
ES-HB-0400-6-180-60-AS	4.00	6	18.0	60	32.30	30.68	29.07	27.46	25.84
with edge chamfer 0.10 mm × 45°									
ES-HB-0500-6-070-40-AS	5.00	6	7.0	40	30.00	28.50	27.00	25.50	24.00
ES-HB-0500-6-140-50-AS	5.00	6	14.0	50	31.70	30.11	28.53	26.95	25.36
ES-HB-0600-6-060-40-AS	6.00	6	6.0	40	27.90	26.50	25.11	23.71	22.32
ES-HB-0600-6-090-40-AS	6.00	6	9.0	40	29.90	28.40	26.91	25.41	23.92
ES-HB-0600-6-110-50-AS	6.00	6	11.0	50	31.10	29.55	27.99	26.44	24.88
ES-HB-0600-6-140-50-AS	6.00	6	14.0	50	30.10	28.60	27.09	25.59	24.08
ES-HB-0600-6-200-60-AS	6.00	6	20.0	60	31.10	29.55	27.99	26.44	24.88
ES-HB-0600-6-210-60-AS	6.00	6	21.0	60	31.30	29.73	28.17	26.61	25.04
ES-HB-0600-6-250-60-AS	6.00	6	25.0	60	31.80	30.21	28.62	27.03	25.44
ES-HB-0800-8-060-40-AS	8.00	8	6.0	40	37.40	35.53	33.66	31.79	29.92
ES-HB-0800-8-140-50-AS	8.00	8	14.0	50	39.60	37.62	35.64	33.66	31.68
ES-HB-0800-8-200-60-AS	8.00	8	20.0	60	41.80	39.71	37.62	35.53	33.44
ES-HB-0800-8-250-75-AS	8.00	8	25.0	75	45.50	43.23	40.95	38.67	36.40
with edge chamfer 0.15 mm × 45°									
ES-HB-1000-10-250-75-AS	10.00	10	25.0	75	57.80	54.91	52.02	49.13	46.24



SINGLE TOOTH CUTTERS WITH UNDERCUT

- easy immersion due to hawk beak profile
- great stability due to short spiralization of the cutting edge
- for milling very deep slots
- especially for aluminium, also in the form of profile material



Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L3 (mm)	L1 (mm)	Price in €	-5% 2-4	-10% 5-9	-15% 10-19	-20% 20-49
PMMA	*									
PVC foam	*									
PVC hard	*									
PP	*									
PC	*									
PE PS	*									
alumin. soft	***									
alumin. hard	**									
brass	**									
soft wood	*									
MDF multiplex	*									
ES-HB-FS-0100-3-050-0100-40	1.00	3	5.0	10.0	40	22.60	21.47	20.34	19.21	18.08
ES-HB-FS-0150-3-050-0100-40	1.50	3	5.0	10.0	40	22.40	21.28	20.16	19.04	17.92
ES-HB-FS-0200-3-050-0120-40	2.00	3	5.0	12.0	40	22.40	21.28	20.16	19.04	17.92
ES-HB-FS-0200-6-050-0120-50	2.00	6	5.0	12.0	50	26.80	25.46	24.12	22.78	21.44
ES-HB-FS-0300-3-050-0220-50	3.00	3	5.0	22.0	50	22.40	21.28	20.16	19.04	17.92
ES-HB-FS-0300-6-050-0220-50	3.00	6	5.0	22.0	50	26.80	25.46	24.12	22.78	21.44
ES-HB-FS-0400-4-080-0220-50	4.00	4	8.0	22.0	50	22.60	21.47	20.34	19.21	18.08
ES-HB-FS-0400-4-080-0320-60	4.00	4	8.0	32.0	60	24.60	23.37	22.14	20.91	19.68
ES-HB-FS-0400-6-080-0220-50	4.00	6	8.0	22.0	50	26.80	25.46	24.12	22.78	21.44
ES-HB-FS-0500-6-140-0220-50	5.00	6	14.0	22.0	50	27.00	25.65	24.30	22.95	21.60
ES-HB-FS-0500-6-140-0320-60	5.00	6	14.0	32.0	60	27.80	26.41	25.02	23.63	22.24
ES-HB-FS-0600-6-140-0220-50	6.00	6	14.0	22.0	50	26.70	25.36	24.03	22.70	21.36
ES-HB-FS-0600-6-140-0320-60	6.00	6	14.0	32.0	60	27.60	26.22	24.84	23.46	22.08
ES-HB-FS-0600-6-140-0420-70	6.00	6	14.0	42.0	70	28.90	27.45	26.01	24.57	23.12
ES-HB-FS-0800-8-140-0420-75	8.00	8	14.0	42.0	75	37.30	35.43	33.57	31.71	29.84
ES-HB-FS-0800-8-140-0520-85	8.00	8	14.0	52.0	85	39.40	37.43	35.46	33.49	31.52
ES-HB-FS-0800-8-220-0620-100	8.00	8	22.0	62.0	100	41.60	39.52	37.44	35.36	33.28
ES-HB-FS-1000-10-250-0420-75	10.00	10	25.0	42.0	75	52.50	49.88	47.25	44.62	42.00

all tools with edge chamfer: 0.05 mm × 45° for D1 ≥ 1.00 mm | 0.10 mm × 45° for D1 ≥ 5.00 mm | 0.15 mm × 45° for D1 ≥ 10.00 mm

SINGLE TOOTH
CUTTERSENGRAVING
TOOLSDEBURRING
TOOLSROUTER
BITSTHREAD
CUTTERS

DRILLS

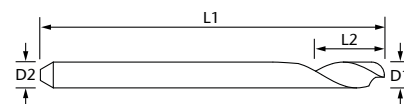
DIAMOND
TOOLSLANCES
AND KNIVES

ACCESSORIES



SINGLE TOOTH CUTTERS WITH FACE RADIUS

- especially for model and mold making as well as 3D machining
- good chip clearance due to radial relief grinding and its large flute
- especially suitable for aluminium, thermosetting plastics and thermoplastics as well as wood

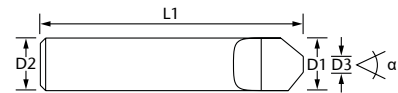


Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	−5% 2–4	−10% 5–9	−15% 10–19	−20% 20–49				
PMMA ***	PVC foam ***	PVC hard ***	PP ***	PC ***	PE PS ***	alumin. soft ***	brass *	HPL **	soft wood ***	hard wood **	MDF multiplex ***		
ES-SCR-0100-3-050-40	1.00	3	5.0	40	23.60	22.42	21.24	20.06	18.88				
ES-SCR-0100-6-050-40	1.00	6	5.0	40	27.80	26.41	25.02	23.63	22.24				
ES-SCR-0200-3-080-40	2.00	3	8.0	40	23.60	22.42	21.24	20.06	18.88				
ES-SCR-0200-6-070-40	2.00	6	7.0	40	27.80	26.41	25.02	23.63	22.24				
ES-SCR-0300-3-100-40	3.00	3	10.0	40	23.60	22.42	21.24	20.06	18.88				
ES-SCR-0300-6-100-50	3.00	6	10.0	50	27.80	26.41	25.02	23.63	22.24				
ES-SCR-0400-4-120-50	4.00	4	12.0	50	25.70	24.41	23.13	21.84	20.56				
ES-SCR-0400-6-120-50	4.00	6	12.0	50	27.80	26.41	25.02	23.63	22.24				
ES-SCR-0500-6-140-50	5.00	6	14.0	50	27.80	26.41	25.02	23.63	22.24				
ES-SCR-0600-6-140-50	6.00	6	14.0	50	27.80	26.41	25.02	23.63	22.24				
ES-SCR-0800-8-200-60	8.00	8	20.0	60	40.70	38.67	36.63	34.59	32.56				
ES-SCR-1000-10-220-75	10.00	10	22.0	75	53.60	50.92	48.24	45.56	42.88				



V-SLOT CUTTERS FOR ALUMINIUM COMPOSITES

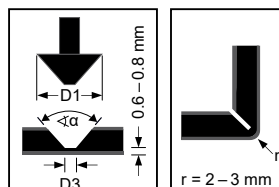
- extra balanced, so it runs very smoothly
- for rectangular bendings in materials of up to 4 mm thickness
- high feed rates possible
- with STRATUM DLC coating for increased tool life and for harder types of aluminium
- refurbishing available (uncoated tools)



Article no.	α	D1 (mm)	D3 (mm)	D2 (mm)	L1 (mm)	Price in €	-5% 2-4	-10% 5-9	-15% 10-19	-20% 20-49
uncoated tools										
alumin. soft	alumin. hard	alumin. compos.								
*	*	***								
ES-AV-090-1000-180-6-50	90°	10.00	1.80	6	50	65.30	62.03	58.77	55.50	52.24
ES-AV-090-1000-180-10-50	90°	10.00	1.80	10	50	53.60	50.92	48.24	45.56	42.88
ES-AV-090-1000-300-6-50	90°	10.00	3.00	6	50	65.30	62.03	58.77	55.50	52.24
ES-AV-090-1000-300-10-50	90°	10.00	3.00	10	50	53.60	50.92	48.24	45.56	42.88
tools with STRATUM DLC coating										
alumin. soft	alumin. hard	brass	alumin. compos.							
*	*	**	***							
ES-AV-090-1000-300-6-50-DLC	90°	10.00	3.00	6	50	77.70	73.81	69.93	66.05	62.16
ES-AV-090-1000-300-10-50-DLC	90°	10.00	3.00	10	50	65.00	61.75	58.50	55.25	52.00

Practical tip:

The bottom width (D3) of this tool is 1.8 or 3 mm. It determines the later bending radius (r). Please note that there has to remain a rest of 0.6 to 0.8 mm of the plate which must not be milled.



ACCESSORIES	LANCES AND KNIVES	DIAMOND TOOLS	DRILLS	THREAD CUTTERS	ROUTER BITS	DEBURRING TOOLS	ENGRAVING TOOLS	MILLING CUTTERS
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DOUBLE TOOTH CUTTERS

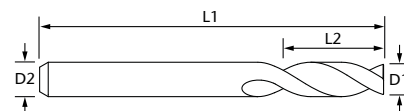
More than 120 tools for materials of medium hardness. You will also find very special grindings for certain materials among them.

- **DOUBLE TOOTH CUTTERS VARIUS®**
- **DOUBLE TOOTH CUTTERS WITH POLISHED FLUTE**
- **DOUBLE TOOTH CUTTERS FOR STAINLESS STEEL**
- **DOUBLE TOOTH CUTTERS WITH FISHTAIL**
- **DOUBLE TOOTH CUTTERS FOR ALUMINIUM**
- **DOUBLE TOOTH CUTTERS FOR WOOD**
- **DOUBLE TOOTH CUTTERS WITH FACE RADIUS**
- **RUB OUT CUTTERS**



DOUBLE TOOTH CUTTERS VARIUS®

- exclusive own brand
- universally applicable
- with edge chamfer from 5 mm cutting edge diameter
- STRATUM TN coating
- for different sorts of aluminium, brass, construction or cementation steel
- cooling lubricant required for machining construction or cementation steel



Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	-5% 2-4	-10% 5-9	-15% 10-19	-20% 20-49
alumin. soft ***	alumin. hard ***	brass ***	constr. steel ***	HPL *	alumin. compos. *	soft wood *	hard wood *	MDF multiplex *	
tools with STRATUM TN coating									
ZS-SC-0020-3-006-40-TN	0.20	3	0.6	40	27.80	26.41	25.02	23.63	22.24
ZS-SC-0050-3-015-40-TN	0.50	3	1.5	40	23.60	22.42	21.24	20.06	18.88
ZS-SC-0100-3-030-40-TN	1.00	3	3.0	40	19.50	18.52	17.55	16.57	15.60
ZS-SC-0150-3-045-40-TN	1.50	3	4.5	40	19.50	18.52	17.55	16.57	15.60
ZS-SC-0200-3-060-40-TN	2.00	3	6.0	40	19.50	18.52	17.55	16.57	15.60
ZS-SC-0200-3-090-40-TN	2.00	3	9.0	40	19.50	18.52	17.55	16.57	15.60
ZS-SC-0200-6-070-50-TN	2.00	6	7.0	50	23.80	22.61	21.42	20.23	19.04
ZS-SC-0250-3-050-40-TN	2.50	3	5.0	40	19.30	18.34	17.37	16.41	15.44
ZS-SC-0300-3-090-40-TN	3.00	3	9.0	40	19.40	18.43	17.46	16.49	15.52
ZS-SC-0300-3-120-40-TN	3.00	3	12.0	40	19.60	18.62	17.64	16.66	15.68
ZS-SC-0300-6-070-50-TN	3.00	6	7.0	50	23.60	22.42	21.24	20.06	18.88
ZS-SC-0400-4-120-50-TN	4.00	4	12.0	50	19.30	18.34	17.37	16.41	15.44
ZS-SC-0400-6-080-50-TN	4.00	6	8.0	50	23.60	22.42	21.24	20.06	18.88

Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	−5% 2–4	−10% 5–9	−15% 10–19	−20% 20–49
tools with STRATUM TN coating, edge chamfer 0.20 mm × 45°									
ZS-SC-0500-6-150-50-TN	5.00	6	15.0	50	24.60	23.37	22.14	20.91	19.68
ZS-SC-0600-6-120-50-TN	6.00	6	12.0	50	23.60	22.42	21.24	20.06	18.88
ZS-SC-0600-6-180-60-TN	6.00	6	18.0	60	24.60	23.37	22.14	20.91	19.68
ZS-SC-0800-8-120-50-TN	8.00	8	12.0	50	27.80	26.41	25.02	23.63	22.24
ZS-SC-0800-8-220-60-TN	8.00	8	22.0	60	32.20	30.59	28.98	27.37	25.76
ZS-SC-1000-10-120-50-TN	10.00	10	12.0	50	40.70	38.67	36.63	34.59	32.56
ZS-SC-1000-10-220-75-TN	10.00	10	22.0	75	46.10	43.80	41.49	39.19	36.88
ZS-SC-1000-10-280-75-TN	10.00	10	28.0	75	48.20	45.79	43.38	40.97	38.56

DOUBLE TOOTH
CUTTERS

ENGRAVING
TOOLS

DEBURRING
TOOLS

ROUTER
BITS

THREAD
CUTTERS

DRILLS

DIAMOND
TOOLS

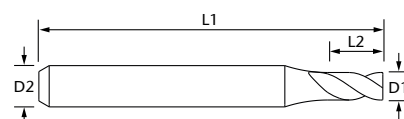
LANCES
AND KNIVES

ACCESSORIES



DOUBLE TOOTH CUTTERS WITH POLISHED FLUTE

- extremely sharp cutting edges with a high-end finishing
- runs very smoothly due to its two cutting edges
- radial relief grinding
- for acrylic glass and other thermoplastics



Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	-5% 2-4	-10% 5-9	-15% 10-19	-20% 20-49
<div>PMMA</div> <div>***</div>	<div>PVC foam</div> <div>***</div>	<div>PVC hard</div> <div>***</div>	<div>PP</div> <div>***</div>	<div>PC</div> <div>***</div>	<div>PE PS</div> <div>***</div>	<div>alumin. soft</div> <div>*</div>	<div>soft wood</div> <div>*</div>	<div>MDF multiplex</div> <div>*</div>	
with edge chamfer 0.15 mm × 45°									
ZS-PS-0300-6-120-50	3.00	6	12.0	50	40.80	38.76	36.72	34.68	32.64
ZS-PS-0400-6-120-50	4.00	6	12.0	50	40.50	38.48	36.45	34.42	32.40
ZS-PS-0600-6-140-50	6.00	6	14.0	50	36.40	34.58	32.76	30.94	29.12
ZS-PS-0600-6-220-60	6.00	6	22.0	60	40.70	38.67	36.63	34.59	32.56
with edge chamfer 0.25 mm × 45°									
ZS-PS-0800-8-220-60	8.00	8	22.0	60	43.90	41.70	39.51	37.31	35.12



DOUBLE TOOTH CUTTERS FOR STAINLESS STEEL

- increased wear resistance due to its edge radius
- short cutting edge facilitates a high stiffness
- undercut for machining deeper slots
- for steel and stainless steel
- STRATUM TN coating
- cooling with an appropriate cooling lubricant necessary

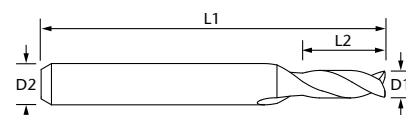


Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L3 (mm)	L1 (mm)	Price in €	-5 % 2-4	-10 % 5-9	-15 % 10-19	-20 % 20-49
<div>constr. steel **</div> <div>stainless steel ***</div>										
tools with STRATUM TN coating										
with edge radius 0.10 mm										
ZS-ED-0090-3-009-0018-40-TN	0.90	3	0.9	1.8	40	20.40	19.38	18.36	17.34	16.32
ZS-ED-0100-3-010-0020-40-TN	1.00	3	1.0	2.0	40	20.40	19.38	18.36	17.34	16.32
ZS-ED-0150-3-015-0030-40-TN	1.50	3	1.5	3.0	40	20.40	19.38	18.36	17.34	16.32
with edge radius 0.20 mm										
ZS-ED-0200-3-020-0040-40-TN	2.00	3	2.0	4.0	40	20.40	19.38	18.36	17.34	16.32
ZS-ED-0250-3-025-0050-40-TN	2.50	3	2.5	5.0	40	20.40	19.38	18.36	17.34	16.32
with edge radius 0.25 mm										
ZS-ED-0300-3-030-0060-40-TN	3.00	3	3.0	6.0	40	20.40	19.38	18.36	17.34	16.32



DOUBLE TOOTH CUTTERS WITH FISHTAIL

- easy immersion due to fishtail grinding
- four area grinding for plane-milling surfaces (from 4 mm shank diameter)
- versatile use
- 3 mm shanks equipped with stop ring; distance from tool tip to back of ring: 21 mm
- for non-ferrous metals, plastics, wood and composites



Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	-5% 2-4	-10% 5-9	-15% 10-19	-20% 20-49
PVC foam	*								
PVC hard	*								
PP	*								
PC	*								
PE PS	*								
alumin. soft	*								
alumin. hard	*								
brass	*								
HPL	*								
GRP CRP	**								
circuit boards	**								
soft wood	*								
hard wood	*								
MDF multiplex	*								
tools with stop rings									
ZS-FS-0030-3-015-38	0.30	3	1.5	38	10.20	9.69	9.18	8.67	8.16
ZS-FS-0040-3-020-38	0.40	3	2.0	38	10.20	9.69	9.18	8.67	8.16
ZS-FS-0050-3-030-38	0.50	3	3.0	38	10.20	9.69	9.18	8.67	8.16
ZS-FS-0060-3-030-38	0.60	3	3.0	38	10.20	9.69	9.18	8.67	8.16
ZS-FS-0080-3-050-38	0.80	3	5.0	38	10.20	9.69	9.18	8.67	8.16
ZS-FS-0100-3-050-38	1.00	3	5.0	38	10.20	9.69	9.18	8.67	8.16
ZS-FS-0120-3-050-38	1.20	3	5.0	38	10.20	9.69	9.18	8.67	8.16
ZS-FS-0140-3-060-38	1.40	3	6.0	38	10.20	9.69	9.18	8.67	8.16
ZS-FS-0150-3-060-38	1.50	3	6.0	38	10.20	9.69	9.18	8.67	8.16
ZS-FS-0160-3-060-38	1.60	3	6.0	38	10.20	9.69	9.18	8.67	8.16
ZS-FS-0200-3-090-38	2.00	3	9.0	38	10.20	9.69	9.18	8.67	8.16
ZS-FS-0240-3-100-38	2.40	3	10.0	38	10.20	9.69	9.18	8.67	8.16
ZS-FS-0300-3-120-38	3.00	3	12.0	38	10.20	9.69	9.18	8.67	8.16

Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	−5 % 2–4	−10 % 5–9	−15 % 10–19	−20 % 20–49
tools with four area grinding									
ZS-FS-0300-6-120-50	3.00	6	12.0	50	19.30	18.34	17.37	16.41	15.44
ZS-FS-0400-4-120-50	4.00	4	12.0	50	16.00	15.20	14.40	13.60	12.80
ZS-FS-0400-4-220-60	4.00	4	22.0	60	19.30	18.34	17.37	16.41	15.44
ZS-FS-0400-6-120-50	4.00	6	12.0	50	19.30	18.34	17.37	16.41	15.44
ZS-FS-0400-6-220-60	4.00	6	22.0	60	22.50	21.38	20.25	19.12	18.00
ZS-FS-0500-6-120-50	5.00	6	12.0	50	19.30	18.34	17.37	16.41	15.44
ZS-FS-0600-6-120-50	6.00	6	12.0	50	19.30	18.34	17.37	16.41	15.44
ZS-FS-0600-6-220-60	6.00	6	22.0	60	22.50	21.38	20.25	19.12	18.00
ZS-FS-0600-6-320-70	6.00	6	32.0	70	25.70	24.41	23.13	21.84	20.56
ZS-FS-0800-8-220-60	8.00	8	22.0	60	26.80	25.46	24.12	22.78	21.44
ZS-FS-0800-8-320-75	8.00	8	32.0	75	31.10	29.55	27.99	26.44	24.88

Practical tip:

When you are machining abrasive materials and they should be milled through completely, please take care that the fishtail grinding will fully immerse into the run-out material (vacuum fleece etc.), as it is most susceptible to wear.

DOUBLE TOOTH
CUTTERSENGRAVING
TOOLSDEBURRING
TOOLSROUTER
BITSTHREAD
CUTTERS

DRILLS

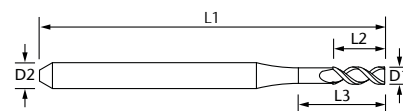
DIAMOND
TOOLSLANCES
AND KNIVES

ACCESSORIES



DOUBLE TOOTH CUTTERS FOR ALUMINIUM

- flatter spiralization for especially smooth edges of cut
- especially for harder aluminium and other non-ferrous metals
- some types available with undercut
- ideal for trimming
- the high-performance coating STRATUM AS increases the tool life and prevents the caking of aluminium chips



Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L3 (mm)	L1 (mm)	Price in €	-5% 2-4	-10% 5-9	-15% 10-19	-20% 20-49
alumin. soft *										
alumin. hard ***										
brass **										
uncoated tools										
ZS-AL-0100-3-030-40	1.00	3	3.0		40	18.20	17.29	16.38	15.47	14.56
ZS-AL-0150-3-045-40	1.50	3	4.5		40	18.20	17.29	16.38	15.47	14.56
ZS-AL-0200-3-060-40	2.00	3	6.0		40	18.20	17.29	16.38	15.47	14.56
ZS-AL-0200-6-060-50	2.00	6	6.0		50	22.50	21.38	20.25	19.12	18.00
ZS-AL-0250-3-075-40	2.50	3	7.5		40	18.20	17.29	16.38	15.47	14.56
ZS-AL-0300-3-090-40	3.00	3	9.0		40	18.20	17.29	16.38	15.47	14.56
ZS-AL-0300-6-090-50	3.00	6	9.0		50	22.50	21.38	20.25	19.12	18.00
ZS-AL-0400-4-120-50	4.00	4	12.0		50	18.20	17.29	16.38	15.47	14.56
ZS-AL-0400-6-120-50	4.00	6	12.0		50	22.50	21.38	20.25	19.12	18.00
ZS-AL-0500-6-150-50	5.00	6	15.0		50	22.50	21.38	20.25	19.12	18.00
ZS-AL-0600-6-120-50	6.00	6	12.0		50	22.50	21.38	20.25	19.12	18.00
ZS-AL-0600-6-180-60	6.00	6	18.0		60	24.60	23.37	22.14	20.91	19.68
ZS-AL-0800-8-140-50	8.00	8	14.0		50	28.90	27.45	26.01	24.57	23.12
ZS-AL-0800-8-250-75	8.00	8	25.0		75	34.30	32.58	30.87	29.16	27.44

Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L3 (mm)	L1 (mm)	Price in €	−5% 2–4	−10% 5–9	−15% 10–19	−20% 20–49
uncoated tools with undercut										
ZS-AL-0100-3-030-0050-40	1.00	3	3.0	5.0	40	20.40	19.38	18.36	17.34	16.32
ZS-AL-0150-3-045-0075-40	1.50	3	4.5	7.5	40	20.40	19.38	18.36	17.34	16.32
ZS-AL-0200-3-060-0100-40	2.00	3	6.0	10.0	40	20.40	19.38	18.36	17.34	16.32
ZS-AL-0250-3-075-0125-40	2.50	3	7.5	12.5	40	20.40	19.38	18.36	17.34	16.32
tools with STRATUM AS coating										
ZS-AL-0100-3-030-40-AS	1.00	3	3.0		40	23.60	22.42	21.24	20.06	18.88
ZS-AL-0200-6-060-50-AS	2.00	6	6.0		50	27.80	26.41	25.02	23.63	22.24
ZS-AL-0300-3-090-40-AS	3.00	3	9.0		40	23.60	22.42	21.24	20.06	18.88
ZS-AL-0300-6-090-50-AS	3.00	6	9.0		50	27.80	26.41	25.02	23.63	22.24
ZS-AL-0400-4-120-50-AS	4.00	4	12.0		50	23.60	22.42	21.24	20.06	18.88
ZS-AL-0400-6-120-50-AS	4.00	6	12.0		50	27.80	26.41	25.02	23.63	22.24
ZS-AL-0500-6-150-50-AS	5.00	6	15.0		50	27.80	26.41	25.02	23.63	22.24
ZS-AL-0600-6-120-50-AS	6.00	6	12.0		50	27.80	26.41	25.02	23.63	22.24
ZS-AL-0600-6-180-60-AS	6.00	6	18.0		60	30.00	28.50	27.00	25.50	24.00
ZS-AL-0800-8-140-50-AS	8.00	8	14.0		50	38.50	36.58	34.65	32.73	30.80
ZS-AL-0800-8-250-75-AS	8.00	8	25.0		75	43.90	41.70	39.51	37.31	35.12

DOUBLE TOOTH
CUTTERSENGRAVING
TOOLSDEBURRING
TOOLSROUTER
BITSTHREAD
CUTTERS

DRILLS

DIAMOND
TOOLSLANCES
AND KNIVES

ACCESSORIES

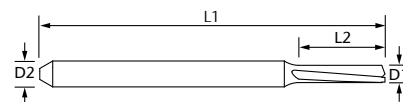
Info:

Suitable for tool machines and machining centers that have lower speeds available at high torque.



DOUBLE TOOTH CUTTERS FOR WOOD

- nearly straightly slotted
- low drag forces prevent fraying
- ideal for wood and all sorts of laminates
- STRATUM DLC coating

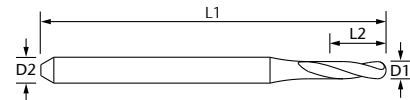


Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	-5% 2-4	-10% 5-9	-15% 10-19	-20% 20-49
HPL ***									
soft wood ***									
hard wood ***									
MDF multiplex ***									
tools with STRATUM DLC coating									
ZS-WO-0200-3-100-40-DLC	2.00	3	10.0	40	24.60	23.37	22.14	20.91	19.68
ZS-WO-0300-3-120-40-DLC	3.00	3	12.0	40	24.60	23.37	22.14	20.91	19.68
ZS-WO-0300-6-120-50-DLC	3.00	6	12.0	50	29.30	27.84	26.37	24.91	23.44
ZS-WO-0400-4-120-50-DLC	4.00	4	12.0	50	24.60	23.37	22.14	20.91	19.68
ZS-WO-0400-4-220-60-DLC	4.00	4	22.0	60	28.90	27.45	26.01	24.57	23.12
ZS-WO-0400-6-120-50-DLC	4.00	6	12.0	50	29.10	27.65	26.19	24.73	23.28
ZS-WO-0500-6-120-50-DLC	5.00	6	12.0	50	28.90	27.45	26.01	24.57	23.12
ZS-WO-0600-6-120-50-DLC	6.00	6	12.0	50	28.70	27.27	25.83	24.39	22.96
ZS-WO-0600-6-220-60-DLC	6.00	6	22.0	60	33.20	31.54	29.88	28.22	26.56
ZS-WO-0600-6-320-70-DLC	6.00	6	32.0	70	38.60	36.67	34.74	32.81	30.88
ZS-WO-0800-8-220-60-DLC	8.00	8	22.0	60	42.80	40.66	38.52	36.38	34.24
ZS-WO-0800-8-320-75-DLC	8.00	8	32.0	75	45.00	42.75	40.50	38.25	36.00
ZS-WO-0800-8-420-85-DLC	8.00	8	42.0	85	50.30	47.78	45.27	42.76	40.24
ZS-WO-1000-10-220-70-DLC	10.00	10	22.0	70	52.50	49.88	47.25	44.62	42.00
ZS-WO-1000-10-320-75-DLC	10.00	10	32.0	75	55.70	52.92	50.13	47.34	44.56



DOUBLE TOOTH CUTTERS WITH FACE RADIUS

- semi-circular rounded tip
- especially for model, tool and mold making as well as 3D machining
- for aluminium and other non-ferrous metals, wood as well as thermosetting plastics and thermoplastics



Article no.		D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	−5 % 2–4	−10 % 5–9	−15 % 10–19	−20 % 20–49			
PMMA	PVC foam	PVC hard	PP	PC	PE PS	alumin. soft	alumin. hard	brass	HPL	soft wood	hard wood	MDF multiplex	
***	***	***	***	***	***	***	***	***	***	***	***	***	
ZS-SCR-0100-3-050-40			1.00	3	5.0	40	20.40	19.38	18.36	17.34	16.32		
ZS-SCR-0150-3-060-40			1.50	3	6.0	40	20.40	19.38	18.36	17.34	16.32		
ZS-SCR-0200-3-090-40			2.00	3	9.0	40	20.40	19.38	18.36	17.34	16.32		
ZS-SCR-0250-3-100-40			2.50	3	10.0	40	20.40	19.38	18.36	17.34	16.32		
ZS-SCR-0300-3-120-40			3.00	3	12.0	40	20.00	19.00	18.00	17.00	16.00		
ZS-SCR-0300-3-250-60			3.00	3	25.0	60	25.70	24.41	23.13	21.84	20.56		
ZS-SCR-0400-4-120-50			4.00	4	12.0	50	20.60	19.57	18.54	17.51	16.48		
ZS-SCR-0400-4-250-60			4.00	4	25.0	60	25.70	24.41	23.13	21.84	20.56		
ZS-SCR-0600-6-160-50			6.00	6	16.0	50	27.80	26.41	25.02	23.63	22.24		
ZS-SCR-0600-6-300-70			6.00	6	30.0	70	39.60	37.62	35.64	33.66	31.68		
ZS-SCR-0800-8-200-60			8.00	8	20.0	60	39.60	37.62	35.64	33.66	31.68		
ZS-SCR-0800-8-350-75			8.00	8	35.0	75	50.30	47.78	45.27	42.76	40.24		
ZS-SCR-1000-10-220-75			10.00	10	22.0	75	56.80	53.96	51.12	48.28	45.44		
ZS-SCR-1000-10-450-100			10.00	10	45.0	100	68.50	65.08	61.65	58.23	54.80		
ZS-SCR-1200-12-220-75			12.00	12	22.0	75	79.30	75.33	71.37	67.41	63.44		
ZS-SCR-1200-12-450-100			12.00	12	45.0	100	91.10	86.54	81.99	77.44	72.88		

DOUBLE TOOTH CUTTERS

ENGRAVING TOOLS

DEBURRING TOOLS

ROUTER BITS

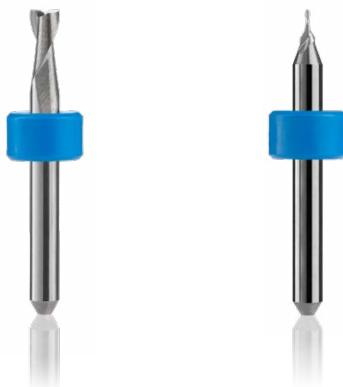
THREAD CUTTERS

DRILLS

DIAMOND TOOLS

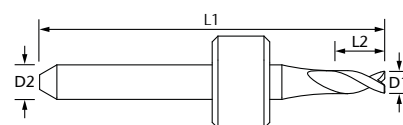
LANCES AND KNIVES

ACCESSORIES



RUB OUT CUTTERS

- greater stability due to shortened cutting edge
- very easy immersion due to fishtail grinding
- especially for rub out areas of printed circuit boards
- four area grinding enables very plane surfaces
- equipped with stop ring; distance from tool tip to back of ring: 15 mm



Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	-5 % 2-4	-10 % 5-9	-15 % 10-19	-20 % 20-49
alumin. soft *									
alumin. hard *									
brass *									
circuit boards ***									
RO-0050-3-015-30	0.50	3	1.5	30	10.80	10.26	9.72	9.18	8.64
RO-0100-3-025-30	1.00	3	2.5	30	10.80	10.26	9.72	9.18	8.64
RO-0200-3-045-30	2.00	3	4.5	30	10.80	10.26	9.72	9.18	8.64
RO-0300-3-065-30	3.00	3	6.5	30	10.80	10.26	9.72	9.18	8.64

DOUBLE TOOTH CUTTERS

ENGRAVING
TOOLS

DEBURRING TOOLS

ROUTER
BITS

THREAD CUTTERS

DRILLS

DIAMOND
TOOLS

LANCES
AND KNIVES

ACCESSORIES

ACCESSORIES	LANCES AND KNIVES	DIAMOND TOOLS	DRILLS	THREAD CUTTERS	ROUTER BITS	DEBURRING TOOLS	ENGRAVING TOOLS	MILLING CUTTERS
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MULTI-TOOTH CUTTERS

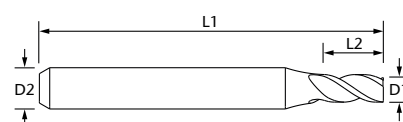
In addition to universally applicable triple and four tooth cutters, we offer an extra-long triple tooth cutter for foams and a triple tooth cutter for stainless steel with an especially short cutting edge for particularly effective machining.

- **TRIPLE TOOTH CUTTERS VARIUS®**
- **TRIPLE TOOTH CUTTERS FOR FOAM**
- **TRIPLE TOOTH CUTTERS FOR STAINLESS STEEL**
- **FOUR TOOTH CUTTERS VARIUS®**



TRIPLE TOOTH CUTTERS VARIUS®

- exclusive own brand
- especially suitable for milling tool steel
- with edge chamfer (from 5 mm cutting edge diameter)
- center-cutting
- STRATUM TN coating
- cooling with an appropriate cooling lubricant necessary



Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	-5% 2-4	-10% 5-9	-15% 10-19	-20% 20-49
alumin. hard *									
brass *									
constr. steel ***									
stainless steel *									
tools with STRATUM TN coating									
DS-SC-0100-3-030-40-TN	1.00	3	3.0	40	20.40	19.38	18.36	17.34	16.32
DS-SC-0150-3-045-40-TN	1.50	3	4.5	40	20.40	19.38	18.36	17.34	16.32
DS-SC-0200-3-060-40-TN	2.00	3	6.0	40	20.40	19.38	18.36	17.34	16.32
DS-SC-0200-3-090-40-TN	2.00	3	9.0	40	20.40	19.38	18.36	17.34	16.32
DS-SC-0200-6-070-50-TN	2.00	6	7.0	50	24.60	23.37	22.14	20.91	19.68
DS-SC-0300-3-090-40-TN	3.00	3	9.0	40	20.40	19.38	18.36	17.34	16.32
DS-SC-0300-3-120-40-TN	3.00	3	12.0	40	20.40	19.38	18.36	17.34	16.32
DS-SC-0300-6-070-50-TN	3.00	6	7.0	50	24.60	23.37	22.14	20.91	19.68
DS-SC-0400-4-120-50-TN	4.00	4	12.0	50	20.40	19.38	18.36	17.34	16.32
DS-SC-0400-6-080-50-TN	4.00	6	8.0	50	24.60	23.37	22.14	20.91	19.68

Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	−5 % 2–4	−10 % 5–9	−15 % 10–19	−20 % 20–49
tools with STRATUM TN coating, edge chamfer 0.20 mm × 45°									
DS-SC-0500-6-100-50-TN	5.00	6	10.0	50	24.60	23.37	22.14	20.91	19.68
DS-SC-0500-6-150-50-TN	5.00	6	15.0	50	25.70	24.41	23.13	21.84	20.56
DS-SC-0600-6-120-50-TN	6.00	6	12.0	50	24.60	23.37	22.14	20.91	19.68
DS-SC-0600-6-180-60-TN	6.00	6	18.0	60	25.70	24.41	23.13	21.84	20.56
DS-SC-0800-8-120-50-TN	8.00	8	12.0	50	28.90	27.45	26.01	24.57	23.12
DS-SC-0800-8-220-60-TN	8.00	8	22.0	60	33.20	31.54	29.88	28.22	26.56
DS-SC-1000-10-120-50-TN	10.00	10	12.0	50	41.80	39.71	37.62	35.53	33.44
DS-SC-1000-10-220-75-TN	10.00	10	22.0	75	47.10	44.75	42.39	40.04	37.68

MULTI-TOOTH
CUTTERS

ENGRAVING
TOOLS

DEBURRING
TOOLS

ROUTER
BITS

THREAD
CUTTERS

DRILLS

DIAMOND
TOOLS

LANCES
AND KNIVES

ACCESSORIES

Info:

Suitable for tool machines and machining centers that have lower speeds available at high torque.

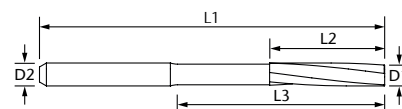


TRIPLE TOOTH CUTTERS FOR FOAM

- especially steep spiralization for an efficient clearance of chip-pings
- optimized against fraying of the vertical edges
- ideal for suitcases insertions

Practical tip:

- set a fill overlapping of at least 25 % for your milling works
- clean the cutting edge with an acetone-based cleaner or in an ultrasonic bath



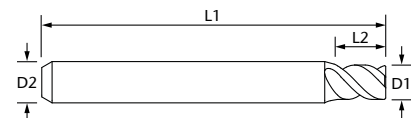
Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L3 (mm)	L1 (mm)	Price in €	-5 % 2-4	-10 % 5-9	-15 % 10-19	-20 % 20-49
foams										

tools with edge chamfer 0.10 mm × 45°										
DS-FO-0300-3-120-0200-50	3.00	3	12.0	20.0	50	26.80	25.46	24.12	22.78	21.44
DS-FO-0300-3-200-0450-75	3.00	3	20.0	45.0	75	32.20	30.59	28.98	27.37	25.76
DS-FO-0400-4-300-0450-75	4.00	4	30.0	45.0	75	43.90	41.70	39.51	37.31	35.12
DS-FO-0500-5-250-0450-75	5.00	5	25.0	45.0	75	43.90	41.70	39.51	37.31	35.12
DS-FO-0600-6-250-0450-75	6.00	6	25.0	45.0	75	49.30	46.83	44.37	41.91	39.44
DS-FO-0600-6-400-0700-100	6.00	6	40.0	70.0	100	61.10	58.05	54.99	51.94	48.88
DS-FO-0800-8-250-0450-75	8.00	8	25.0	45.0	75	66.40	63.08	59.76	56.44	53.12
DS-FO-0800-8-400-0700-100	8.00	8	40.0	70.0	100	71.70	68.12	64.53	60.95	57.36
DS-FO-0800-8-400-1150-150	8.00	8	40.0	115.0	150	77.10	73.24	69.39	65.53	61.68
DS-FO-1000-10-400-0700-100	10.00	10	40.0	70.0	100	91.10	86.54	81.99	77.44	72.88
DS-FO-1000-10-500-0850-120	10.00	10	50.0	85.0	120	101.70	96.62	91.53	86.45	81.36
DS-FO-1000-10-500-1150-150	10.00	10	50.0	115.0	150	113.50	107.83	102.15	96.47	90.80
DS-FO-1200-12-500-0850-125	12.00	12	50.0	85.0	125	151.00	143.45	135.90	128.35	120.80
DS-FO-1200-12-500-1150-150	12.00	12	50.0	115.0	150	156.40	148.58	140.76	132.94	125.12



TRIPLE TOOTH CUTTERS FOR STAINLESS STEEL

- very short cutting edge for greater stability
- for milling of steel and stainless steel
- with STRATUM IX coating
- especially flat spiralization reduces the abrasive force on the workpiece
- cooling with an appropriate cooling lubricant necessary



Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	-5% 2-4	-10% 5-9	-15% 10-19	-20% 20-49
<div>constr. steel</div> <div>**</div>									
<div>stainless steel</div> <div>***</div>									
tools with STRATUM IX coating									
with edge chamfer 0.075 mm × 45°									
DS-ED-0100-4-020-50-IX	1.00	4	2.0	50	37.50	35.62	33.75	31.88	30.00
DS-ED-0150-4-030-50-IX	1.50	4	3.0	50	37.50	35.62	33.75	31.88	30.00
DS-ED-0200-4-030-50-IX	2.00	4	3.0	50	37.30	35.43	33.57	31.71	29.84
with edge chamfer 0.10 mm × 45°									
DS-ED-0250-4-030-50-IX	2.50	4	3.0	50	37.10	35.25	33.39	31.54	29.68
DS-ED-0300-6-045-57-IX	3.00	6	4.5	57	39.60	37.62	35.64	33.66	31.68
with edge chamfer 0.15 mm × 45°									
DS-ED-0400-6-060-57-IX	4.00	6	6.0	57	39.60	37.62	35.64	33.66	31.68
DS-ED-0500-6-070-57-IX	5.00	6	7.0	57	39.60	37.62	35.64	33.66	31.68
DS-ED-0600-8-080-63-IX	6.00	8	8.0	63	43.90	41.70	39.51	37.31	35.12

MULTI-TOOTH
CUTTERS

ENGRAVING
TOOLS

DEBURRING
TOOLS

ROUTER
BITS

THREAD
CUTTERS

DRILLS

DIAMOND
TOOLS

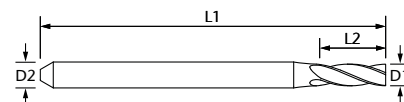
LANCES
AND KNIVES

ACCESSORIES



FOUR TOOTH CUTTERS VARIUS®

- exclusive own brand
- center-cutting
- for tempered steel, cast, etc.
- with STRATUM TN coating for increased tool life
- the STRATUM HL coating is especially suitable for very hard types of steel
- cooling with an appropriate cooling lubricant necessary



Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	-5 % 2-4	-10 % 5-9	-15 % 10-19	-20 % 20-49
<div>constr. steel</div> <div>***</div>									
<div>stainless steel</div> <div>*</div>									
tools with STRATUM TN coating									
VS-SC-0050-3-015-40-TN	0.50	3	1.5	40	24.60	23.37	22.14	20.91	19.68
VS-SC-0100-3-030-40-TN	1.00	3	3.0	40	20.40	19.38	18.36	17.34	16.32
VS-SC-0150-3-045-40-TN	1.50	3	4.5	40	20.40	19.38	18.36	17.34	16.32
VS-SC-0200-3-060-40-TN	2.00	3	6.0	40	20.40	19.38	18.36	17.34	16.32
VS-SC-0250-3-075-40-TN	2.50	3	7.5	40	20.40	19.38	18.36	17.34	16.32
VS-SC-0300-3-090-40-TN	3.00	3	9.0	40	20.40	19.38	18.36	17.34	16.32
VS-SC-0300-3-120-40-TN	3.00	3	12.0	40	20.70	19.66	18.63	17.59	16.56
VS-SC-0400-4-120-50-TN	4.00	4	12.0	50	21.40	20.33	19.26	18.19	17.12
additionally with edge chamfer 0.20 mm × 45°									
VS-SC-0500-6-150-50-TN	5.00	6	15.0	50	25.70	24.41	23.13	21.84	20.56
VS-SC-0600-6-180-60-TN	6.00	6	18.0	60	25.70	24.41	23.13	21.84	20.56
VS-SC-0800-8-220-60-TN	8.00	8	22.0	60	33.20	31.54	29.88	28.22	26.56
VS-SC-1000-10-220-75-TN	10.00	10	22.0	75	47.10	44.75	42.39	40.04	37.68

Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	−5 % 2–4	−10 % 5–9	−15 % 10–19	−20 % 20–49
tools with STRATUM HL coating									
VS-SC-0300-6-070-50-HL	3.00	6	7.0	50	25.90	24.60	23.31	22.02	20.72
VS-SC-0400-6-080-50-HL	4.00	6	8.0	50	25.60	24.32	23.04	21.76	20.48
additionally with edge chamfer 0.20 mm × 45°									
VS-SC-0500-6-100-50-HL	5.00	6	10.0	50	25.30	24.04	22.77	21.51	20.24
VS-SC-0600-6-120-50-HL	6.00	6	12.0	50	25.30	24.04	22.77	21.51	20.24
VS-SC-0800-8-120-50-HL	8.00	8	12.0	50	30.00	28.50	27.00	25.50	24.00

MULTI-TOOTH
CUTTERS

ENGRAVING
TOOLS

DEBURRING
TOOLS

ROUTER
BITS

THREAD
CUTTERS

DRILLS

DIAMOND
TOOLS

LANCES
AND KNIVES

ACCESSORIES

Info:

Suitable for tool machines and machining centers that have lower speeds available at high torque.

ACCESSORIES	LANCES AND KNIVES	DIAMOND TOOLS	DRILLS	THREAD CUTTERS	ROUTER BITS	DEBURRING TOOLS	ENGRAVING TOOLS	MILLING CUTTERS
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COMPOSITE CUTTERS

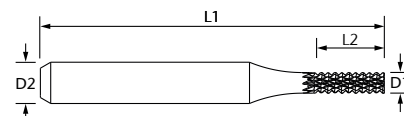
We offer a whole series of special milling cutters with cross cut, diamond or spiral toothing for highly abrasive materials like GRP/CRP or honeycomb plates.

- **COMPOSITE CUTTERS, FINELY TOOTHED**
- **COMPOSITE CUTTERS, FINELY TOOTHED WITH CHIP BREAKER**
- **COMPOSITE CUTTERS, MEDIUM-TOOTHED**
- **COMPOSITE CUTTERS, COARSELY TOOTHED**
- **PCB OUTLINE CUTTERS, DIAMOND-TOOTHED**
- **PCB OUTLINE CUTTERS, SPIRAL-TOOTHED**
- **HONEYCOMB CUTTERS, SPIRAL-FLUTED**



COMPOSITE CUTTERS, FINELY TOOTHED

- for GRP/CRP materials with a medium (30–60%) to high fiber amount (> 60%)
- no delamination of material layers
- fine-staggered tooth system of 10 to 14 micro-teeth rows
- double-tooth face grinding with four areas

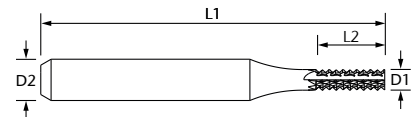


Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	–5% 2–4	–10% 5–9	–15% 10–19	–20% 20–49
GRP CRP ***									
circuit boards **									
LK-F-0300-3-090-40	3.00	3	9.0	40	17.40	16.53	15.66	14.79	13.92
LK-F-0300-3-120-40	3.00	3	12.0	40	18.00	17.10	16.20	15.30	14.40
LK-F-0300-3-160-50	3.00	3	16.0	50	18.50	17.57	16.65	15.72	14.80
LK-F-0300-6-120-50	3.00	6	12.0	50	27.20	25.84	24.48	23.12	21.76
LK-F-0300-6-160-50	3.00	6	16.0	50	28.20	26.79	25.38	23.97	22.56
LK-F-0400-4-100-40	4.00	4	10.0	40	19.50	18.52	17.55	16.57	15.60
LK-F-0400-4-220-60	4.00	4	22.0	60	22.80	21.66	20.52	19.38	18.24
LK-F-0400-6-120-50	4.00	6	12.0	50	27.20	25.84	24.48	23.12	21.76
LK-F-0400-6-160-50	4.00	6	16.0	50	28.20	26.79	25.38	23.97	22.56
LK-F-0500-6-140-50	5.00	6	14.0	50	28.20	26.79	25.38	23.97	22.56
LK-F-0500-6-220-60	5.00	6	22.0	60	30.50	28.98	27.45	25.93	24.40
LK-F-0600-6-140-50	6.00	6	14.0	50	27.20	25.84	24.48	23.12	21.76
LK-F-0600-6-220-60	6.00	6	22.0	60	31.00	29.45	27.90	26.35	24.80
LK-F-0600-6-320-70	6.00	6	32.0	70	34.80	33.06	31.32	29.58	27.84
LK-F-0800-8-220-60	8.00	8	22.0	60	44.50	42.27	40.05	37.83	35.60
LK-F-0800-8-320-75	8.00	8	32.0	75	48.90	46.45	44.01	41.56	39.12



COMPOSITE CUTTERS, FINELY TOOTHED WITH CHIP BREAKER

- for GRP/CRP materials with a medium (30–60%) to high fiber amount (> 60%)
- no delamination of material layers
- fine-staggered tooth system of 10 to 14 micro-teeth rows with integrated chip breaker flute
- double-tooth face grinding with four areas

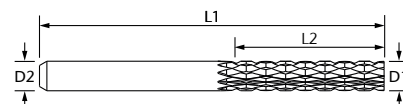


Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	–5 % 2–4	–10 % 5–9	–15 % 10–19	–20 % 20–49
GRP CRP ***									
circuit boards **									
LK-FSB-0300-3-060-40	3.00	3	6.0	40	19.00	18.05	17.10	16.15	15.20
LK-FSB-0300-3-090-40	3.00	3	9.0	40	19.50	18.52	17.55	16.57	15.60
LK-FSB-0300-3-120-40	3.00	3	12.0	40	20.10	19.10	18.09	17.09	16.08
LK-FSB-0300-3-160-50	3.00	3	16.0	50	20.70	19.66	18.63	17.59	16.56
LK-FSB-0300-6-120-50	3.00	6	12.0	50	29.30	27.84	26.37	24.91	23.44
LK-FSB-0300-6-160-50	3.00	6	16.0	50	30.50	28.98	27.45	25.93	24.40
LK-FSB-0400-4-060-40	4.00	4	6.0	40	20.70	19.66	18.63	17.59	16.56
LK-FSB-0400-4-100-40	4.00	4	10.0	40	21.20	20.14	19.08	18.02	16.96
LK-FSB-0400-4-140-50	4.00	4	14.0	50	21.70	20.61	19.53	18.45	17.36
LK-FSB-0400-4-180-50	4.00	4	18.0	50	22.30	21.19	20.07	18.96	17.84
LK-FSB-0400-4-220-60	4.00	4	22.0	60	22.80	21.66	20.52	19.38	18.24
LK-FSB-0400-6-120-50	4.00	6	12.0	50	29.30	27.84	26.37	24.91	23.44
LK-FSB-0500-5-160-60	5.00	5	16.0	60	30.50	28.98	27.45	25.93	24.40
LK-FSB-0500-6-140-50	5.00	6	14.0	50	32.70	31.07	29.43	27.79	26.16
LK-FSB-0600-6-140-50	6.00	6	14.0	50	32.70	31.07	29.43	27.79	26.16
LK-FSB-0600-6-220-60	6.00	6	22.0	60	34.80	33.06	31.32	29.58	27.84
LK-FSB-0800-8-220-60	8.00	8	22.0	60	44.50	42.27	40.05	37.83	35.60
LK-FSB-0800-8-320-75	8.00	8	32.0	75	46.70	44.37	42.03	39.70	37.36



COMPOSITE CUTTERS, MEDIUM-TOOTHED

- for GRP/CRP materials with a low fiber amount (< 30%) to medium fiber amount (30–60%)
- double-tooth face grinding with four areas
- medium-staggered tooth system of eight to twelve micro-teeth rows
- shears off the fibers of the composite materials very accurately

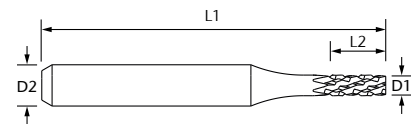


Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	–5% 2–4	–10% 5–9	–15% 10–19	–20% 20–49
GRP CRP ***									
circuit boards **									
LK-M-0300-3-090-40	3.00	3	9.0	40	17.40	16.53	15.66	14.79	13.92
LK-M-0300-3-120-40	3.00	3	12.0	40	18.00	17.10	16.20	15.30	14.40
LK-M-0300-3-160-50	3.00	3	16.0	50	18.50	17.57	16.65	15.72	14.80
LK-M-0300-6-120-50	3.00	6	12.0	50	27.20	25.84	24.48	23.12	21.76
LK-M-0300-6-160-50	3.00	6	16.0	50	28.20	26.79	25.38	23.97	22.56
LK-M-0400-4-100-40	4.00	4	10.0	40	19.50	18.52	17.55	16.57	15.60
LK-M-0400-4-220-60	4.00	4	22.0	60	22.80	21.66	20.52	19.38	18.24
LK-M-0400-6-120-50	4.00	6	12.0	50	27.20	25.84	24.48	23.12	21.76
LK-M-0400-6-160-50	4.00	6	16.0	50	28.20	26.79	25.38	23.97	22.56
LK-M-0500-6-140-50	5.00	6	14.0	50	28.20	26.79	25.38	23.97	22.56
LK-M-0500-6-220-60	5.00	6	22.0	60	30.50	28.98	27.45	25.93	24.40
LK-M-0600-6-140-50	6.00	6	14.0	50	27.20	25.84	24.48	23.12	21.76
LK-M-0600-6-220-60	6.00	6	22.0	60	31.00	29.45	27.90	26.35	24.80
LK-M-0600-6-320-70	6.00	6	32.0	70	34.80	33.06	31.32	29.58	27.84
LK-M-0800-8-220-60	8.00	8	22.0	60	42.40	40.28	38.16	36.04	33.92
LK-M-0800-8-320-75	8.00	8	32.0	75	46.70	44.37	42.03	39.70	37.36



COMPOSITE CUTTERS, COARSELY TOOTHED

- for GRP/CRP materials with a low fiber amount (< 30%), for semi-finished fiber matrix products
- shears off the fibers of the composite materials accurately
- coarse-staggered tooth system of six to eight micro-teeth rows
- double-tooth face grinding with four areas

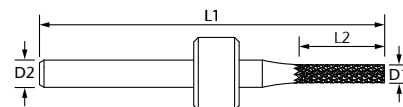


Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	-5% 2-4	-10% 5-9	-15% 10-19	-20% 20-49
GRP CRP ***									
circuit boards **									
LK-G-0300-3-090-40	3.00	3	9.0	40	17.40	16.53	15.66	14.79	13.92
LK-G-0300-3-120-40	3.00	3	12.0	40	18.00	17.10	16.20	15.30	14.40
LK-G-0300-3-160-50	3.00	3	16.0	50	18.50	17.57	16.65	15.72	14.80
LK-G-0300-6-120-50	3.00	6	12.0	50	27.20	25.84	24.48	23.12	21.76
LK-G-0300-6-160-50	3.00	6	16.0	50	28.20	26.79	25.38	23.97	22.56
LK-G-0400-4-100-40	4.00	4	10.0	40	19.50	18.52	17.55	16.57	15.60
LK-G-0400-4-220-60	4.00	4	22.0	60	22.80	21.66	20.52	19.38	18.24
LK-G-0400-6-120-50	4.00	6	12.0	50	27.20	25.84	24.48	23.12	21.76
LK-G-0400-6-160-50	4.00	6	16.0	50	28.20	26.79	25.38	23.97	22.56
LK-G-0500-6-140-50	5.00	6	14.0	50	28.20	26.79	25.38	23.97	22.56
LK-G-0500-6-220-60	5.00	6	22.0	60	30.50	28.98	27.45	25.93	24.40
LK-G-0600-6-140-50	6.00	6	14.0	50	27.20	25.84	24.48	23.12	21.76
LK-G-0600-6-220-60	6.00	6	22.0	60	31.00	29.45	27.90	26.35	24.80
LK-G-0600-6-320-70	6.00	6	32.0	70	34.80	33.06	31.32	29.58	27.84
LK-G-0800-8-220-60	8.00	8	22.0	60	42.40	40.28	38.16	36.04	33.92
LK-G-0800-8-320-75	8.00	8	32.0	75	46.70	44.37	42.03	39.70	37.36



PCB OUTLINE CUTTERS, DIAMOND-TOOTHED

- very good tool life due to diamond-toothing
- fishtail grinding at the tool tip
- ideal for printed circuit boards and GRP/CRP materials
- equipped with stop ring; distance from tool tip to back of ring: 21 mm
- with STRATUM DIA coating for especially long tool life



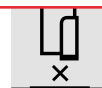
Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	-5% 2-4	-10% 5-9	-15% 10-19	-20% 20-49
GRP CRP ***									
circuit boards ***									
uncoated tools									
LK-0080-3-050-38	0.80	3	5.0	38	9.80	9.31	8.82	8.33	7.84
LK-0100-3-050-38	1.00	3	5.0	38	9.80	9.31	8.82	8.33	7.84
LK-0160-3-085-38	1.60	3	8.5	38	9.80	9.31	8.82	8.33	7.84
LK-0200-3-090-38	2.00	3	9.0	38	9.80	9.31	8.82	8.33	7.84
LK-0300-3-105-38	3.00	3	10.5	38	9.80	9.31	8.82	8.33	7.84
tools with STRATUM DIA coating*									
LK-0100-3-050-38-DIA	1.00	3	5.0	38	19.70	18.71	17.73	16.74	15.76
LK-0200-3-090-38-DIA	2.00	3	9.0	38	19.70	18.71	17.73	16.74	15.76
LK-0300-3-105-38-DIA	3.00	3	10.5	38	19.70	18.71	17.73	16.74	15.76

Practical tip:

When you are machining abrasive materials and they should be milled through completely, please take care that the fishtail grinding will fully immerse into the run-out material (vacuum fleece etc.), as it is most susceptible to wear.

* Info:

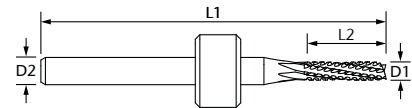
Since the diamond layer is electrically insulating, calibration with measuring systems that require electrical contact is not possible.





PCB OUTLINE CUTTERS, SPIRAL-TOOTHED

- very good chip clearance due to spiral-toothing
- fishtail grinding at the tool tip
- ideal for printed circuit boards and GRP/CRP materials
- equipped with stop ring; distance from tool tip to back of ring: 21 mm
- with STRATUM DIA coating for especially long tool life



Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	-5% 2-4	-10% 5-9	-15% 10-19	-20% 20-49
GRP CRP ***									
circuit boards ***									
uncoated tools									
LK-SV-0100-3-050-38	1.00	3	5.0	38	9.80	9.31	8.82	8.33	7.84
LK-SV-0200-3-090-38	2.00	3	9.0	38	9.80	9.31	8.82	8.33	7.84
LK-SV-0300-3-090-38	3.00	3	9.0	38	9.80	9.31	8.82	8.33	7.84
tools with STRATUM DIA coating*									
LK-SV-0100-3-050-38-DIA	1.00	3	5.0	38	19.70	18.71	17.73	16.74	15.76
LK-SV-0200-3-090-38-DIA	2.00	3	9.0	38	19.70	18.71	17.73	16.74	15.76
LK-SV-0300-3-090-38-DIA	3.00	3	9.0	38	19.70	18.71	17.73	16.74	15.76

Practical tip:

When you are machining abrasive materials and they should be milled through completely, please take care that the fishtail grinding will fully immerse into the run-out material (vacuum fleece etc.), as it is most susceptible to wear.

* Info:

Since the diamond layer is electrically insulating, calibration with measuring systems that require electrical contact is not possible.



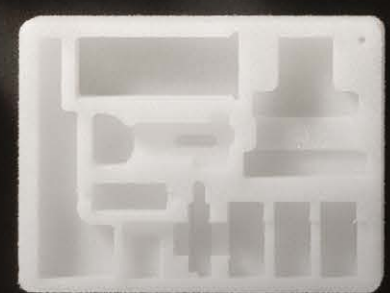
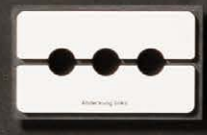
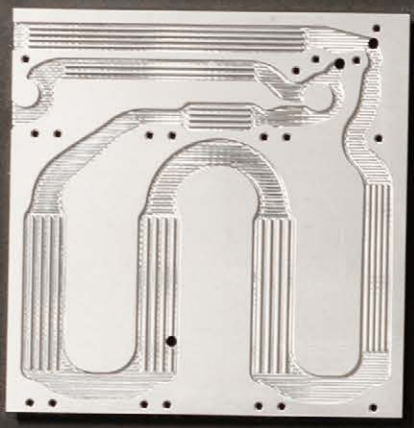
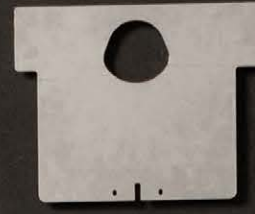


HONEYCOMB CUTTERS, SPIRAL-FLUTED

- six tooth cutter with opposed chip breakers
- optimal immersion due to a center-crossing tooth
- no delamination of material layers
- steep spiralization exerts only a slight tractive force on the workpiece
- for honeycomb plates, aramid fibre reinforced plastics and GRP/CRP materials

Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	-5% 2-4	-10% 5-9	-15% 10-19	-20% 20-49
PMMA **	PVC foam **	PVC hard **	PP **	PC **	PE PS **	GRP CRP **			
LK-HCS-0300-3-120-40	3.00	3	12.0	40	19.80	18.81	17.82	16.83	15.84
LK-HCS-0300-3-160-50	3.00	3	16.0	50	20.40	19.38	18.36	17.34	16.32
LK-HCS-0300-6-120-50	3.00	6	12.0	50	26.80	25.46	24.12	22.78	21.44
LK-HCS-0300-6-160-50	3.00	6	16.0	50	27.80	26.41	25.02	23.63	22.24
LK-HCS-0400-4-140-50	4.00	4	14.0	50	22.50	21.38	20.25	19.12	18.00
LK-HCS-0400-4-220-60	4.00	4	22.0	60	24.60	23.37	22.14	20.91	19.68
LK-HCS-0400-6-120-50	4.00	6	12.0	50	26.80	25.46	24.12	22.78	21.44
LK-HCS-0600-6-140-50	6.00	6	14.0	50	32.20	30.59	28.98	27.37	25.76
LK-HCS-0600-6-220-60	6.00	6	22.0	60	35.40	33.63	31.86	30.09	28.32
LK-HCS-0600-6-320-70	6.00	6	32.0	70	37.50	35.62	33.75	31.88	30.00
LK-HCS-0800-8-320-75	8.00	8	32.0	75	47.10	44.75	42.39	40.04	37.68

COMPOSITE CUTTERS	ENGRAVING TOOLS	DEBURRING TOOLS	ROUTER BITS	THREAD CUTTERS	DRILLS	DIAMOND TOOLS	LANCES AND KNIVES	ACCESSORIES
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ENDLESS POSSIBILITIES.
WITH ORIGINAL TOOLS FROM VHF.

ACCESSORIES	LANCES AND KNIVES	DIAMOND TOOLS	DRILLS	THREAD CUTTERS	ROUTER BITS	DEBURRING TOOLS	ENGRAVING TOOLS	MILLING CUTTERS
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ENGRAVING TOOLS

vhf offers gravers and engraver's milling cutters with a wide range of sizes and top angles for machining materials from plastics to stainless steel. Gravers with a shank diameter from 6 mm on are balanced by default. On top of that, there is a special tool for engraving isolation channels on printed circuit boards.

■ GRAVERS

■ BOX GRAVERS

■ ISOLATION ENGRAVING TOOLS

■ ENGRAVER'S MILLING CUTTERS FOR STAINLESS STEEL

■ ENGRAVER'S MILLING CUTTERS FOR ACRYLIC

■ SEMI-FINISHED GRAVERS



MILLING
CUTTERS

ENGRAVING
TOOLS

DEBURRING
TOOLS

ROUTER
BITS

THREAD
CUTTERS

DRILLS

DIAMOND
TOOLS

LANCES
AND KNIVES

ACCESSORIES



cone

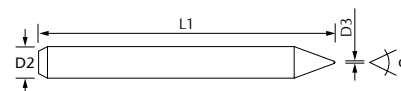


15-90°



GRAVERS

- with balance grinding (from 6 mm shank diameter and top angle of 36°)
- 3 mm shanks equipped with stop ring; distance from tool tip to back of ring: 21 mm
- four different top angles available
- the immersion depth determines the engraving width



Article no.	α	D3 (mm)	D2 (mm)	L1 (mm)	Price in €	-5 % 2-4	-10 % 5-9	-15 % 10-19	-20 % 20-49
PMMA **									
PVC foam **									
PVC hard **									
PP **									
PC **									
PE PS **									
alumin. soft ***									
alumin. hard **									
brass **									
alumin. compos. ***									
circuit boards *									
soft wood ***									
hard wood **									
MDF multiplex ***									
GS-015-010-3-40	15°	0.10	3	40	12.40	11.78	11.16	10.54	9.92
GS-015-020-3-40	15°	0.20	3	40	12.40	11.78	11.16	10.54	9.92
GS-015-030-3-40	15°	0.30	3	40	12.40	11.78	11.16	10.54	9.92
GS-015-030-6-30	15°	0.30	6	30	18.60	17.67	16.74	15.81	14.88
GS-015-040-3-40	15°	0.40	3	40	12.40	11.78	11.16	10.54	9.92
GS-015-050-3-40	15°	0.50	3	40	12.40	11.78	11.16	10.54	9.92
GS-015-050-6-30	15°	0.50	6	30	18.60	17.67	16.74	15.81	14.88
GS-015-070-3-40	15°	0.70	3	40	12.40	11.78	11.16	10.54	9.92
GS-015-100-3-40	15°	1.00	3	40	12.40	11.78	11.16	10.54	9.92

Practical tip:

When engraving without workpiece levelling, we recommend our special 15° gravers.

Article no.	α	D3 (mm)	D2 (mm)	L1 (mm)	Price in €	-5% 2-4	-10% 5-9	-15% 10-19	-20% 20-49
GS-036-010-3-40	36°	0.10	3	40	12.40	11.78	11.16	10.54	9.92
GS-036-010-4-40	36°	0.10	4	40	14.50	13.78	13.05	12.32	11.60
GS-036-010-6-40	36°	0.10	6	40	18.60	17.67	16.74	15.81	14.88
GS-036-020-3-40	36°	0.20	3	40	12.40	11.78	11.16	10.54	9.92
GS-036-020-4-40	36°	0.20	4	40	14.50	13.78	13.05	12.32	11.60
GS-036-020-6-40	36°	0.20	6	40	18.60	17.67	16.74	15.81	14.88
GS-036-030-3-40	36°	0.30	3	40	12.40	11.78	11.16	10.54	9.92
GS-036-030-4-40	36°	0.30	4	40	14.50	13.78	13.05	12.32	11.60
GS-036-030-6-40	36°	0.30	6	40	18.60	17.67	16.74	15.81	14.88
GS-036-040-3-40	36°	0.40	3	40	12.40	11.78	11.16	10.54	9.92
GS-036-040-4-40	36°	0.40	4	40	14.50	13.78	13.05	12.32	11.60
GS-036-040-6-40	36°	0.40	6	40	18.60	17.67	16.74	15.81	14.88
GS-036-050-3-40	36°	0.50	3	40	12.40	11.78	11.16	10.54	9.92
GS-036-050-4-40	36°	0.50	4	40	14.50	13.78	13.05	12.32	11.60
GS-036-050-6-40	36°	0.50	6	40	18.60	17.67	16.74	15.81	14.88
GS-036-070-3-40	36°	0.70	3	40	12.40	11.78	11.16	10.54	9.92
GS-036-070-4-40	36°	0.70	4	40	14.50	13.78	13.05	12.32	11.60
GS-036-070-6-40	36°	0.70	6	40	18.60	17.67	16.74	15.81	14.88
GS-036-100-3-40	36°	1.00	3	40	12.40	11.78	11.16	10.54	9.92
GS-036-100-4-40	36°	1.00	4	40	14.50	13.78	13.05	12.32	11.60
GS-036-100-6-40	36°	1.00	6	40	18.60	17.67	16.74	15.81	14.88
GS-060-010-3-40	60°	0.10	3	40	12.40	11.78	11.16	10.54	9.92
GS-060-010-4-40	60°	0.10	4	40	14.50	13.78	13.05	12.32	11.60
GS-060-010-6-40	60°	0.10	6	40	18.60	17.67	16.74	15.81	14.88
GS-060-020-3-40	60°	0.20	3	40	12.40	11.78	11.16	10.54	9.92
GS-060-020-4-40	60°	0.20	4	40	14.50	13.78	13.05	12.32	11.60
GS-060-020-6-40	60°	0.20	6	40	18.60	17.67	16.74	15.81	14.88
GS-060-030-3-40	60°	0.30	3	40	12.40	11.78	11.16	10.54	9.92
GS-060-030-4-40	60°	0.30	4	40	14.50	13.78	13.05	12.32	11.60
GS-060-030-6-40	60°	0.30	6	40	18.60	17.67	16.74	15.81	14.88
GS-060-040-3-40	60°	0.40	3	40	12.40	11.78	11.16	10.54	9.92
GS-060-040-4-40	60°	0.40	4	40	14.50	13.78	13.05	12.32	11.60
GS-060-040-6-40	60°	0.40	6	40	18.60	17.67	16.74	15.81	14.88
GS-060-050-3-40	60°	0.50	3	40	12.40	11.78	11.16	10.54	9.92
GS-060-050-4-40	60°	0.50	4	40	14.50	13.78	13.05	12.32	11.60
GS-060-050-6-40	60°	0.50	6	40	18.60	17.67	16.74	15.81	14.88
GS-060-070-3-40	60°	0.70	3	40	12.40	11.78	11.16	10.54	9.92
GS-060-070-4-40	60°	0.70	4	40	14.50	13.78	13.05	12.32	11.60
GS-060-070-6-40	60°	0.70	6	40	18.60	17.67	16.74	15.81	14.88
GS-060-100-3-40	60°	1.00	3	40	12.40	11.78	11.16	10.54	9.92
GS-060-100-4-40	60°	1.00	4	40	14.50	13.78	13.05	12.32	11.60
GS-060-100-6-40	60°	1.00	6	40	18.60	17.67	16.74	15.81	14.88

continued on the next page ...

MILLING
CUTTERS

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TOOLS

DEBURRING
TOOLS

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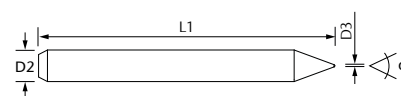
DRILLS

DIAMOND
TOOLS

LANCES
AND KNIVES

ACCESSORIES

CONTINUATION GRAVERS

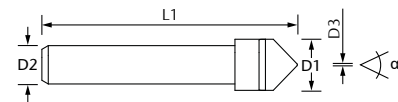


Article no.		α	D3 (mm)	D2 (mm)	L1 (mm)	Price in €		-5% 2-4	-10% 5-9	-15% 10-19	-20% 20-49		
PMMA	PVC foam	PVC hard	PP	PC	PE PS	alumin. soft	alumin. hard	brass	alumin. compos.	circuit boards	soft wood	hard wood	MDF multiplex
**	**	**	**	**	**	***	**	**	***	*	***	**	***
GS-090-010-3-40			90°	0.10	3	40	12.40	11.78	11.16	10.54	9.92		
GS-090-010-4-40			90°	0.10	4	40	14.50	13.78	13.05	12.32	11.60		
GS-090-010-6-40			90°	0.10	6	40	18.60	17.67	16.74	15.81	14.88		
GS-090-020-3-40			90°	0.20	3	40	12.40	11.78	11.16	10.54	9.92		
GS-090-020-4-40			90°	0.20	4	40	14.50	13.78	13.05	12.32	11.60		
GS-090-020-6-40			90°	0.20	6	40	18.60	17.67	16.74	15.81	14.88		
GS-090-030-3-40			90°	0.30	3	40	12.40	11.78	11.16	10.54	9.92		
GS-090-030-4-40			90°	0.30	4	40	14.50	13.78	13.05	12.32	11.60		
GS-090-030-6-40			90°	0.30	6	40	18.60	17.67	16.74	15.81	14.88		
GS-090-040-3-40			90°	0.40	3	40	12.40	11.78	11.16	10.54	9.92		
GS-090-040-4-40			90°	0.40	4	40	14.50	13.78	13.05	12.32	11.60		
GS-090-040-6-40			90°	0.40	6	40	18.60	17.67	16.74	15.81	14.88		
GS-090-050-3-40			90°	0.50	3	40	12.40	11.78	11.16	10.54	9.92		
GS-090-050-4-40			90°	0.50	4	40	14.50	13.78	13.05	12.32	11.60		
GS-090-050-6-40			90°	0.50	6	40	18.60	17.67	16.74	15.81	14.88		
GS-090-070-3-40			90°	0.70	3	40	12.40	11.78	11.16	10.54	9.92		
GS-090-070-4-40			90°	0.70	4	40	14.50	13.78	13.05	12.32	11.60		
GS-090-070-6-40			90°	0.70	6	40	18.60	17.67	16.74	15.81	14.88		
GS-090-100-3-40			90°	1.00	3	40	12.40	11.78	11.16	10.54	9.92		
GS-090-100-4-40			90°	1.00	4	40	14.50	13.78	13.05	12.32	11.60		
GS-090-100-6-40			90°	1.00	6	40	18.60	17.67	16.74	15.81	14.88		



BOX GRAVERS

- for producing boxes or light boxes etc.
- the oversize of 2° equals tolerances and offers space for glue
- with balance grinding (from 6 mm shank diameter)
- for bevelling: the material will be cut through nearly completely and then bent up under heating; alternatively you can completely mill through



Article no.	α	D1 (mm)	D3 (mm)	D2 (mm)	L1 (mm)	Price in €	-5% 2-4	-10% 5-9	-15% 10-19	-20% 20-49
PMMA ***										
PVC foam ***										
PVC hard ***										
PP ***										
PC ***										
PE PS ***										
alumin. soft **										
alumin. hard *										
alumin. compos. *										
GS-092-0300-010-3-40	92°	3.00	0.10	3	40	14.00	13.30	12.60	11.90	11.20
GS-092-0400-020-4-40	92°	4.00	0.20	4	40	16.00	15.20	14.40	13.60	12.80
GS-092-0600-020-6-40	92°	6.00	0.20	6	40	20.40	19.38	18.36	17.34	16.32
GS-092-0800-030-6-50	92°	8.00	0.30	6	50	45.00	42.75	40.50	38.25	36.00
GS-092-0800-030-8-50	92°	8.00	0.30	8	50	39.60	37.62	35.64	33.66	31.68
GS-092-1000-040-6-50	92°	10.00	0.40	6	50	50.30	47.78	45.27	42.76	40.24
GS-092-1000-040-10-50	92°	10.00	0.40	10	50	62.10	59.00	55.89	52.79	49.68
GS-092-1200-050-12-50	92°	12.00	0.50	12	50	62.10	59.00	55.89	52.79	49.68

Info:

For bendings in aluminium composite plates, you find a special tool on page 41.





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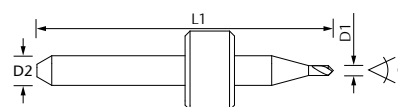
LANCES
AND KNIVES

ACCESSORIES



ISOLATION ENGRAVING TOOLS

- equipped with stop ring;
15 mm distance from tool tip to
back of ring (for L1 = 30 mm)
respectively 21 mm (for L1 =
40 mm)
- conic tapered tool tip from 0.05
to 1.0 mm
- 90° top angle
- for burr-free and finely cleared
out milling channels
- for isolation engraving of
printed circuit board proto-
types

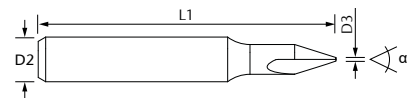


Article no.	α	D1 (mm)	D2 (mm)	L1 (mm)	Price in €	-5 % 2-4	-10 % 5-9	-15 % 10-19	-20 % 20-49
circuit boards ***									
RS-ISO-090-3-30	90°	1.00	3	30	10.80	10.26	9.72	9.18	8.64
RS-ISO-090-3-40	90°	1.00	3	40	10.80	10.26	9.72	9.18	8.64



ENGRAVER'S MILLING CUTTERS FOR STAINLESS STEEL

- manufactured as three-quarter carbide rod for stability reasons
- short cutting edge and stable cutting edge geometry
- 0.2 and 0.4 mm engraving width
- two different top angles
- for steel and stainless steel
- with STRATUM TN coating
- cooling with appropriate cooling lubricant necessary



Article no.		α	D3 (mm)	D2 (mm)	L1 (mm)	Price in €	−5% 2–4	−10% 5–9	−15% 10–19	−20% 20–49
alumin. soft	alumin. hard	brass	constr. steel	stainless steel						
*	*	**	***	***						
tools with STRATUM TN coating										
GF-035V-020-3-40-TN		35°	0.20	3	40	22.50	21.38	20.25	19.12	18.00
GF-035V-020-4-40-TN		35°	0.20	4	40	24.60	23.37	22.14	20.91	19.68
GF-035V-020-6-40-TN		35°	0.20	6	40	28.90	27.45	26.01	24.57	23.12
GF-035V-040-3-40-TN		35°	0.40	3	40	22.50	21.38	20.25	19.12	18.00
GF-035V-040-4-40-TN		35°	0.40	4	40	24.60	23.37	22.14	20.91	19.68
GF-035V-040-6-40-TN		35°	0.40	6	40	28.90	27.45	26.01	24.57	23.12
GF-060V-020-3-40-TN		60°	0.20	3	40	22.50	21.38	20.25	19.12	18.00
GF-060V-020-4-40-TN		60°	0.20	4	40	24.60	23.37	22.14	20.91	19.68
GF-060V-020-6-40-TN		60°	0.20	6	40	28.90	27.45	26.01	24.57	23.12
GF-060V-040-3-40-TN		60°	0.40	3	40	22.50	21.38	20.25	19.12	18.00
GF-060V-040-4-40-TN		60°	0.40	4	40	24.60	23.37	22.14	20.91	19.68
GF-060V-040-6-40-TN		60°	0.40	6	40	28.90	27.45	26.01	24.57	23.12



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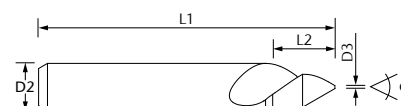
LANCES
AND KNIVES

ACCESSORIES



ENGRAVER'S MILLING CUTTERS FOR ACRYLIC

- available with three different top angles
- conic tools with an additional polished spiral flute
- tools with 8 mm shank have a partly cylindric cutting edge
- especially for engraving acrylic glass and other plastics, but also for wood and non-ferrous metals



Article no.	α	D3 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	-5 % 2-4	-10 % 5-9	-15 % 10-19	-20 % 20-49
PMMA ***										
PVC foam ***										
PVC hard ***										
PP ***										
PC ***										
PE PS ***										
alumin. soft *										
alumin. compos. *										
soft wood *										
hard wood *										
MDF multiplex *										
GF-030K-020-3-40	30°	0.20	3		40	20.40	19.38	18.36	17.34	16.32
GF-030K-020-4-40	30°	0.20	4		40	22.50	21.38	20.25	19.12	18.00
GF-030K-020-6-40	30°	0.20	6		40	26.80	25.46	24.12	22.78	21.44
GF-030K-050-3-40	30°	0.50	3		40	20.40	19.38	18.36	17.34	16.32
GF-030K-050-4-40	30°	0.50	4		40	22.50	21.38	20.25	19.12	18.00
GF-030K-050-6-40	30°	0.50	6		40	26.80	25.46	24.12	22.78	21.44
GF-030K-070-3-40	30°	0.70	3		40	20.40	19.38	18.36	17.34	16.32
GF-030K-070-4-40	30°	0.70	4		40	22.50	21.38	20.25	19.12	18.00
GF-030K-070-6-40	30°	0.70	6		40	26.80	25.46	24.12	22.78	21.44

Article no.	α	D3 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	−5% 2–4	−10% 5–9	−15% 10–19	−20% 20–49
GF-060K-020-3-40	60°	0.20	3		40	20.40	19.38	18.36	17.34	16.32
GF-060K-020-4-40	60°	0.20	4		40	22.50	21.38	20.25	19.12	18.00
GF-060K-020-6-40	60°	0.20	6		40	26.80	25.46	24.12	22.78	21.44
GF-060K-050-3-40	60°	0.50	3		40	20.40	19.38	18.36	17.34	16.32
GF-060K-050-4-40	60°	0.50	4		40	22.50	21.38	20.25	19.12	18.00
GF-060K-050-6-40	60°	0.50	6		40	26.80	25.46	24.12	22.78	21.44
GF-060K-050-8-0120-50	60°	0.50	8	12.0	50	42.80	40.66	38.52	36.38	34.24
GF-060K-070-3-40	60°	0.70	3		40	20.40	19.38	18.36	17.34	16.32
GF-060K-070-4-40	60°	0.70	4		40	22.50	21.38	20.25	19.12	18.00
GF-060K-070-6-40	60°	0.70	6		40	26.80	25.46	24.12	22.78	21.44
GF-090K-020-3-40	90°	0.20	3		40	20.40	19.38	18.36	17.34	16.32
GF-090K-020-4-40	90°	0.20	4		40	22.50	21.38	20.25	19.12	18.00
GF-090K-020-6-40	90°	0.20	6		40	26.80	25.46	24.12	22.78	21.44
GF-090K-050-3-40	90°	0.50	3		40	20.40	19.38	18.36	17.34	16.32
GF-090K-050-4-40	90°	0.50	4		40	22.50	21.38	20.25	19.12	18.00
GF-090K-050-6-40	90°	0.50	6		40	26.80	25.46	24.12	22.78	21.44
GF-090K-050-8-0120-50	90°	0.50	8	12.0	50	42.80	40.66	38.52	36.38	34.24
GF-090K-070-3-40	90°	0.70	3		40	20.40	19.38	18.36	17.34	16.32
GF-090K-070-4-40	90°	0.70	4		40	22.50	21.38	20.25	19.12	18.00
GF-090K-070-6-40	90°	0.70	6		40	26.80	25.46	24.12	22.78	21.44

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LANCES
AND KNIVES

ACCESSORIES



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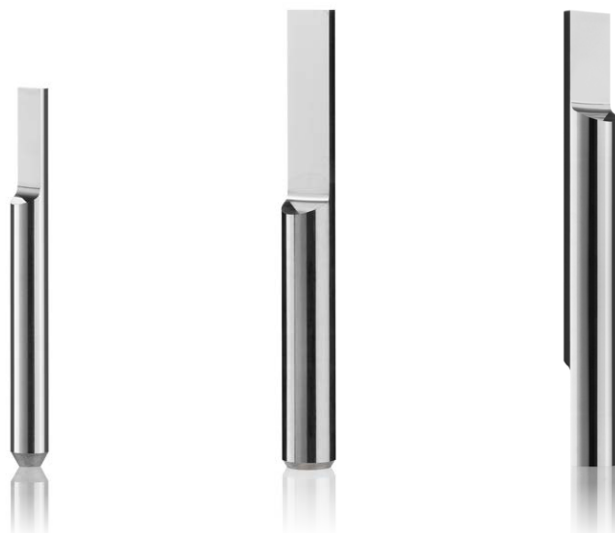
THREAD
CUTTERS

DRILLS

DIAMOND
TOOLS

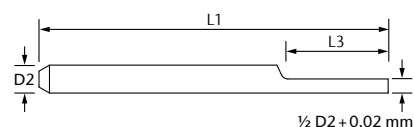
LANCES
AND KNIVES

ACCESSORIES



SEMI-FINISHED GRAVERS

- semi-finished gravers with preground profile
- you can finish them according to your needs
- the halving area is located 0.02 mm over the center
- please note: these are not directly usable tools



Article no.	D2 (mm)	L3 (mm)	L1 (mm)	Price in €	-5 % 2-4	-10 % 5-9	-15 % 10-19	-20 % 20-49
single-halved								
GS-HZ-3-10-40	3	10	40	6.40	6.08	5.76	5.44	5.12
GS-HZ-4-10-40	4	10	40	8.10	7.69	7.29	6.88	6.48
GS-HZ-4-15-50	4	15	50	10.10	9.59	9.09	8.58	8.08
GS-HZ-6-10-40	6	10	40	9.60	9.12	8.64	8.16	7.68
GS-HZ-6-15-50	6	15	50	11.80	11.21	10.62	10.03	9.44
GS-HZ-6-20-50	6	20	50	12.80	12.16	11.52	10.88	10.24
double-halved								
GS-HZ-D-4-10-50	4	10	50	11.80	11.21	10.62	10.03	9.44
GS-HZ-D-6-10-50	6	10	50	15.00	14.25	13.50	12.75	12.00

MILLING CUTTERS	ENGRAVING TOOLS	DEBURRING TOOLS	ROUTER BITS	THREAD CUTTERS	DRILLS	DIAMOND TOOLS	LANCES AND KNIVES	ACCESSORIES
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ACCESSORIES	LANCES AND KNIVES	DIAMOND TOOLS	DRILLS	THREAD CUTTERS	ROUTER BITS	ENGRAVING TOOLS	ENGRAVING TOOLS	MILLING CUTTERS
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DEBURRING TOOLS

These tools can be used for deburring, countersinking, chamfering and edge-working of non-ferrous metals and plastics. They are available with top angles of 60°, 90° and 120° and a quadrant grinding.

■ DEBURRING TOOLS

■ DEBURRING TOOLS WITH QUADRANT


MILLING
CUTTERS

ENGRAVING
TOOLS

DEBURRING
TOOLS

ROUTER
BITS

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DRILLS

DIAMOND
TOOLS

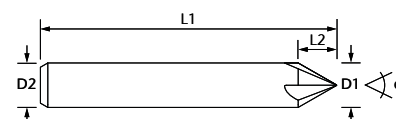
LANCES
AND KNIVES

ACCESSORIES



DEBURRING TOOLS

- four cutting edges as standard; from 10 mm cutting edge diameters five cutting edges
- ideal for quickly deburring or chamfering
- three different top angles
- with STRATUM TN coating
- for machining steel and other ferrous metals an appropriate lubricant for cooling is necessary



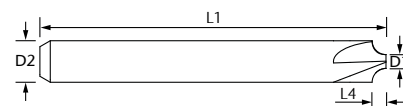
Article no.	α	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	-5 % 2-4	-10 % 5-9	-15 % 10-19	-20 % 20-49
PMMA	*									
PVC foam	*									
PVC hard	*									
PP	*									
PC	*									
PE PS	*									
alumin. soft	**									
alumin. hard	**									
brass	**									
constr. steel	***									
stainless steel	**									
HPL	*									
tools with STRATUM TN coating										
EG-060-0400-6-034-40-TN	60°	4.00	6	3.4	40	25.70	24.41	23.13	21.84	20.56
EG-060-0600-6-052-40-TN	60°	6.00	6	5.2	40	25.70	24.41	23.13	21.84	20.56
EG-060-0800-8-069-50-TN	60°	8.00	8	6.9	50	37.50	35.62	33.75	31.88	30.00
EG-060-1000-10-086-50-TN	60°	10.00	10	8.6	50	46.10	43.80	41.49	39.19	36.88
EG-090-0200-4-010-100-50-TN*	90°	2.00	4	1.0	50	23.60	22.42	21.24	20.06	18.88
EG-090-0300-6-015-40-TN	90°	3.00	6	1.5	40	25.70	24.41	23.13	21.84	20.56
EG-090-0400-4-020-40-TN	90°	4.00	4	2.0	40	21.40	20.33	19.26	18.19	17.12
EG-090-0400-4-020-60-TN	90°	4.00	4	2.0	60	23.60	22.42	21.24	20.06	18.88
EG-090-0400-6-020-40-TN	90°	4.00	6	2.0	40	25.70	24.41	23.13	21.84	20.56
EG-090-0600-6-030-40-TN	90°	6.00	6	3.0	40	25.70	24.41	23.13	21.84	20.56
EG-090-0800-8-040-50-TN	90°	8.00	8	4.0	50	37.50	35.62	33.75	31.88	30.00
EG-090-1000-6-050-50-TN	90°	10.00	6	5.0	50	46.10	43.80	41.49	39.19	36.88
EG-090-1000-10-050-50-TN	90°	10.00	10	5.0	50	56.80	53.96	51.12	48.28	45.44
EG-090-1200-12-060-50-TN	90°	12.00	12	6.0	50	56.80	53.96	51.12	48.28	45.44
EG-120-0600-6-017-40-TN	120°	6.00	6	1.7	40	25.70	24.41	23.13	21.84	20.56
EG-120-0800-8-023-50-TN	120°	8.00	8	2.3	50	37.50	35.62	33.75	31.88	30.00
EG-120-1000-10-028-50-TN	120°	10.00	10	2.8	50	46.10	43.80	41.49	39.19	36.88

* with undercut 10.0 mm



DEBURRING TOOLS WITH QUADRANT

- for round chamferings in plastics or non-ferrous metals
- smooth round chamferings due to quadrant grinding
- different radii available



Article no.														L4 (mm)	D1 (mm)	D2 (mm)	L1 (mm)	Price in €	-5% 2-4	-10% 5-9	-15% 10-19	-20% 20-49
PMMA	PVC foam	PVC hard	PP	PC	PE PS	alumin. soft	alumin. hard	brass	HPL	alumin. compos.	soft wood	hard wood	MDF multiplex									
***	***	***	***	***	***	***	*	*	*	**	*	*	*									
EG-R05-0500-6-50			0.5	5.00	6	50	24.60	23.37	22.14	20.91	19.68											
EG-R10-0400-6-50			1.0	4.00	6	50	24.60	23.37	22.14	20.91	19.68											
EG-R15-0300-6-50			1.5	3.00	6	50	24.60	23.37	22.14	20.91	19.68											
EG-R20-0200-6-50			2.0	2.00	6	50	24.60	23.37	22.14	20.91	19.68											
EG-R25-0300-8-50			2.5	3.00	8	50	36.40	34.58	32.76	30.94	29.12											
EG-R30-0200-8-50			3.0	2.00	8	50	36.40	34.58	32.76	30.94	29.12											
EG-R35-0300-10-50			3.5	3.00	10	50	49.30	46.83	44.37	41.91	39.44											
EG-R40-0200-10-50			4.0	2.00	10	50	49.30	46.83	44.37	41.91	39.44											

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ACCESSORIES	LANCES AND KNIVES	DIAMOND TOOLS	DRILLS	THREAD CUTTERS	ROUTER BITS	DEBURRING TOOLS	ENGRAVING TOOLS	MILLING CUTTERS
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ROUTER BITS

Router bits are mostly used for machining wood. However, due to their carbide cutting edges they are also very well suitable for working on other kinds of materials like plastics.

The router bits are available as different types for chamfering or bevelling, for milling slots and concave or convex radii, and for surface milling. The Orange Tools™ are manufactured by CMT, an experienced specialist for woodworking tools. The paint serves also as non-stick coating to prevent that resins and impurities may accumulate at the cutting edge.

- **V-SLOT CUTTERS**
- **V-SLOT CUTTERS FOR ALUMINIUM COMPOSITES**
- **LONG HOLE SLOT CUTTERS**
- **SLOT CUTTERS**
- **CHAMFERING CUTTERS**
- **CUTTERS WITH QUADRANT**
- **RADIUS CUTTERS**
- **TRIPLE TOOTH SURFACE MILLING CUTTERS**



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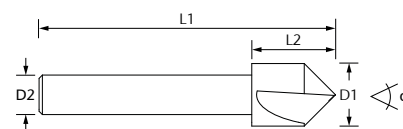
LANCES
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ACCESSORIES



V-SLOT CUTTERS

- massive steel body with integrated carbide cutting edges
- types with two or three cutting edges
- additional cylindric part of the cutting edge (tools with 90° top angle)
- for milling (decoration) slots, chamfering and engraving

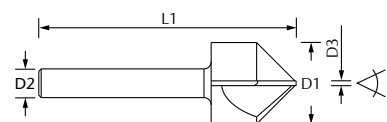


Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	-5% 2-4	-10% 5-9	-15% 10-19	-20% 20-49
PMMA	**	**	**	**	**	**	**	**	**
PVC foam	**	**	**	**	**	**	**	**	**
PVC hard	**	**	**	**	**	**	**	**	**
PP	**	**	**	**	**	**	**	**	**
PC	**	**	**	**	**	**	**	**	**
PE PS	**	**	**	**	**	**	**	**	**
alumin. soft	*	*	*	*	*	*	*	*	*
HPL	*	*	*	*	*	*	*	*	*
soft wood	***	***	***	***	***	***	***	***	***
hard wood	***	***	***	***	***	***	***	***	***
MDF multiplex	***	***	***	***	***	***	***	***	***
α = 60° top angle, triple tooth cutters									
RB-VN-060-1270-6-110-57	12.70	6	11.0	57	40.30	38.28	36.27	34.26	32.24
RB-VN-060-1270-8-110-57	12.70	8	11.0	57	40.30	38.28	36.27	34.26	32.24
α = 90° top angle, double tooth cutters									
RB-VN-090-0950-6-127-45	9.50	6	12.7	45	33.70	32.02	30.33	28.64	26.96
RB-VN-090-0950-8-127-45	9.50	8	12.7	45	33.70	32.02	30.33	28.64	26.96
RB-VN-090-1270-6-127-45	12.70	6	12.7	45	31.60	30.02	28.44	26.86	25.28
RB-VN-090-1270-8-127-45	12.70	8	12.7	45	31.60	30.02	28.44	26.86	25.28
RB-VN-090-1600-8-127-53	16.00	8	12.7	53	38.10	36.20	34.29	32.39	30.48
RB-VN-090-1900-6-160-56	19.00	6	16.0	56	38.10	36.20	34.29	32.39	30.48
RB-VN-090-3170-8-160-64	31.70	8	16.0	64	62.00	58.90	55.80	52.70	49.60
RB-VN-090-3800-8-190-64	38.00	8	19.0	64	67.40	64.03	60.66	57.29	53.92



V-SLOT CUTTERS FOR ALUMINIUM COMPOSITES

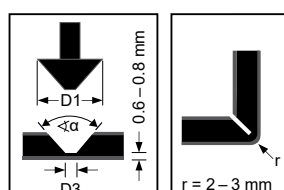
- massive steel body with an integrated double-cutting carbide cutting edge
- for rectangular or acute-angled bendings, depending on the top angle
- the 90° tool is suitable for materials up to 6 mm thickness; the 135° tool is suitable for materials up to 4 mm thickness



Article no.	α	D1 (mm)	D3 (mm)	D2 (mm)	L1 (mm)	Price in €	-5% 2-4	-10% 5-9	-15% 10-19	-20% 20-49
alumin. compos. ***										
RB-AV-090-1800-6-59	90°	18.00	3.00	6	59	53.30	50.63	47.97	45.30	42.64
RB-AV-090-1800-8-59	90°	18.00	3.00	8	59	53.30	50.63	47.97	45.30	42.64
RB-AV-135-1800-6-59	135°	18.00	2.00	6	59	53.30	50.63	47.97	45.30	42.64
RB-AV-135-1800-8-59	135°	18.00	2.00	8	59	53.30	50.63	47.97	45.30	42.64

Practical tip:

The bottom width (D3) of the milling cutter determines the later bending radius (r). Please note that there has to remain a rest of 0.6 to 0.8 mm of the plate which must not be milled.


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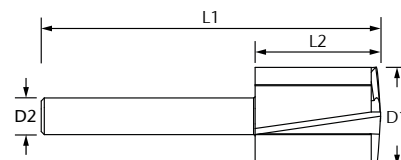
LANCES
AND KNIVES

ACCESSORIES



LONG HOLE SLOT CUTTERS

- massive steel body with two integrated carbide cutting edges
- negative cutting angle for perfectly even surfaces
- especially suitable for machining solid wood and sheet material
- straightly slotted to prevent fraying out of the material

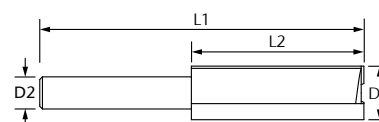


Article no.		D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	−5% 2–4	−10% 5–9	−15% 10–19	−20% 20–49			
PMMA **	PVC foam **	PVC hard **	PP **	PC **	PE PS **	alumin. soft *	HPL *	soft wood ***	hard wood ***	MDF multiplex ***			
RB-LN-1600-6-190-54			16.00	6	19.0	54	26.10	24.80	23.49	22.18	20.88		
RB-LN-1600-8-190-54			16.00	8	19.0	54	26.10	24.80	23.49	22.18	20.88		
RB-LN-1800-6-160-48			18.00	6	16.0	48	28.30	26.89	25.47	24.05	22.64		
RB-LN-1800-8-160-48			18.00	8	16.0	48	28.30	26.89	25.47	24.05	22.64		
RB-LN-2000-6-160-48			20.00	6	16.0	48	30.40	28.88	27.36	25.84	24.32		
RB-LN-2000-8-160-48			20.00	8	16.0	48	30.40	28.88	27.36	25.84	24.32		



SLOT CUTTERS

- massive steel body with two integrated carbide cutting edges
- straightly slotted to prevent fraying out of the material
- for milling plane surfaces, notches and tongue-and-groove joint



Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	-5 % 2-4	-10 % 5-9	-15 % 10-19	-20 % 20-49
PMMA									
PVC foam									
PVC hard									
PP									
PC									
PE PS									
alumin. soft									
HPL									
soft wood									
hard wood									
MDF multiplex									
RB-NF-1000-6-317-60	10.00	6	31.7	60	32.60	30.97	29.34	27.71	26.08
RB-NF-1000-8-317-60	10.00	8	31.7	60	32.60	30.97	29.34	27.71	26.08
RB-NF-1200-6-317-60	12.00	6	31.7	60	32.60	30.97	29.34	27.71	26.08
RB-NF-1200-8-317-60	12.00	8	31.7	60	32.60	30.97	29.34	27.71	26.08
RB-NF-1500-6-317-66	15.00	6	31.7	66	36.90	35.05	33.21	31.36	29.52
RB-NF-1500-8-317-66	15.00	8	31.7	66	36.90	35.05	33.21	31.36	29.52
RB-NF-1600-6-317-66	16.00	6	31.7	66	36.90	35.05	33.21	31.36	29.52
RB-NF-1600-8-317-66	16.00	8	31.7	66	36.90	35.05	33.21	31.36	29.52

Practical tip:

This milling cutter is ideal for large-area plane-milling of the surface of vacuum tables.

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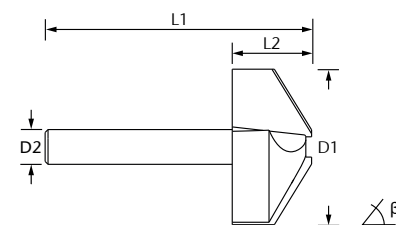
LANCES
AND KNIVES

ACCESSORIES



CHAMFERING CUTTERS

- for chamfering edges
- available with three different chamfering angles
- massive steel body with two integrated carbide cutting edges

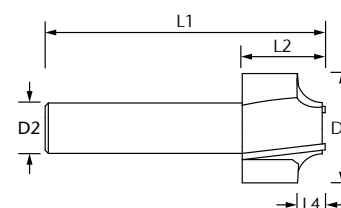


Article no.	β	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	−5% 2–4	−10% 5–9	−15% 10–19	−20% 20–49			
PMMA	PVC foam	PVC hard	PP	PC	PE PS	alumin. soft	HPL	soft wood	hard wood	MDF multiplex			
**	**	**	**	**	**	*	*	***	***	***			
RB-AF-015-2400-6-140-46	15°	24.00	6	14.0	46	28.30	26.89	25.47	24.05	22.64			
RB-AF-015-2400-8-140-46	15°	24.00	8	14.0	46	28.30	26.89	25.47	24.05	22.64			
RB-AF-030-2600-6-127-45	30°	26.00	6	12.7	45	28.30	26.89	25.47	24.05	22.64			
RB-AF-030-2600-8-127-45	30°	26.00	8	12.7	45	28.30	26.89	25.47	24.05	22.64			
RB-AF-045-2500-6-080-41	45°	25.00	6	8.0	41	28.30	26.89	25.47	24.05	22.64			
RB-AF-045-2500-8-080-41	45°	25.00	8	8.0	41	28.30	26.89	25.47	24.05	22.64			



CUTTERS WITH QUADRANT

- massive steel body with two integrated carbide cutting edges
- concave quadrant grinding
- a front and a cylindric part of the cutting edge
- for accurately rounded convex edges or internal profiles



Article no.			L4 (mm)	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	-5% 2-4	-10% 5-9	-15% 10-19	-20% 20-49	
PMMA	PVC foam	PVC hard	PP	PC	PE PS	alumin. soft	HPL	soft wood	hard wood	MDF multiplex			
**	**	**	**	**	**	*	*	***	***	***			
RB-VK-R40-1900-8-44			4.0	19.00	8	12.0	44	35.90	34.10	32.31	30.51	28.72	
RB-VK-R50-2100-8-44			5.0	21.00	8	12.0	44	35.90	34.10	32.31	30.51	28.72	
RB-VK-R60-2300-8-44			6.0	23.00	8	12.0	44	39.10	37.15	35.19	33.23	31.28	
RB-VK-R80-2860-8-45			8.0	28.60	8	12.7	45	42.40	40.28	38.16	36.04	33.92	
RB-VK-R95-3170-8-46			9.5	31.70	8	14.0	46	42.40	40.28	38.16	36.04	33.92	

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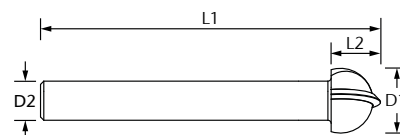
LANCES
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ACCESSORIES



RADIUS CUTTERS

- from 9.5 mm cutting edge diameter (D1) solid steel body with two integrated carbide cutting edges
- semi-circular tool tip for milling rounded concave slots



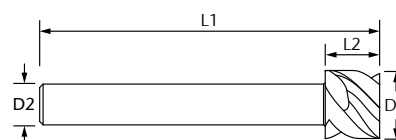
Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	−5% 2–4	−10% 5–9	−15% 10–19	−20% 20–49				
PMMA **	PVC foam **	PVC hard **	PP **	PC **	PE PS **	alumin. soft *	HPL *	soft wood ***	hard wood ***	MDF multiplex ***			
RB-RF-0320-6-095-51*	3.20	6	9.5	51	32.60	30.97	29.34	27.71	26.08				
RB-RF-0600-6-127-51*	6.00	6	12.7	51	32.60	30.97	29.34	27.71	26.08				
RB-RF-0950-6-064-51	9.50	6	6.4	51	32.60	30.97	29.34	27.71	26.08				
RB-RF-1270-6-095-51	12.70	6	9.5	51	32.60	30.97	29.34	27.71	26.08				
RB-RF-1270-8-095-51	12.70	8	9.5	51	32.60	30.97	29.34	27.71	26.08				
RB-RF-1580-6-095-51	15.80	6	9.5	51	34.80	33.06	31.32	29.58	27.84				
RB-RF-1580-8-095-51	15.80	8	9.5	51	34.80	33.06	31.32	29.58	27.84				
RB-RF-1900-6-115-51	19.00	6	11.5	51	36.90	35.05	33.21	31.36	29.52				
RB-RF-1900-8-115-51	19.00	8	11.5	51	36.90	35.05	33.21	31.36	29.52				

* Radius cutters with a cutting edge diameter (D1) of up to 6 mm are made of solid carbide.



TRIPLE TOOTH SURFACE MILLING CUTTERS

- ideal for an efficient surface milling of larger areas of wood, plastics and aluminium
- edge radius of 0.5 mm
- massive steel shank with a carbide head soldered on it
- refurbishing available (only D1 = 20 mm and 30 mm)



Article no.	D1 (mm)		D2 (mm)	L2 (mm)	L1 (mm)	Price in €	-5% 2-4	-10% 5-9	-15% 10-19	-20% 20-49			
PMMA ***	PVC foam ***	PVC hard ***	PP ***	PC ***	PE PS **	alumin. soft ***	alumin. hard **	HPL **	soft wood ***	hard wood ***	MDF multiplex ***		
RB-DS-1000-6-080-50	10.00	6	8.0	50	58.00	55.10	52.20	49.30	46.40				
RB-DS-1200-6-080-50	12.00	6	8.0	50	68.00	64.60	61.20	57.80	54.40				
RB-DS-1400-10-080-50	14.00	10	8.0	50	78.00	74.10	70.20	66.30	62.40				
RB-DS-1600-10-080-50	16.00	10	8.0	50	88.00	83.60	79.20	74.80	70.40				
RB-DS-1800-10-080-50	18.00	10	8.0	50	98.00	93.10	88.20	83.30	78.40				
RB-DS-2000-10-080-50	20.00	10	8.0	50	108.00	102.60	97.20	91.80	86.40				
RB-DS-3000-12-080-50	30.00	12	8.0	50	128.00	121.60	115.20	108.80	102.40				

Practical tip:

This milling cutter is ideal for large-area plane-milling of the surface of vacuum tables.

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AND KNIVES

ACCESSORIES



ALL MACHINES DESERVE PERFECT TOOLS.
WELCOME TO VHF.



ACCESSORIES	LANCES AND KNIVES	DIAMOND TOOLS	DRILLS	THREAD CUTTERS	ROUTER BITS	DEBURRING TOOLS	ENGRAVING TOOLS	MILLING CUTTERS
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THREAD CUTTERS

You can choose between thread whirling cutters and circular thread cutters. For the thread whirling cutters you will need a pre-drilled hole. The circular thread cutters drill the hole and cut the thread in the same working cycle.

■ THREAD WHIRLING CUTTERS

■ CIRCULAR THREAD CUTTERS



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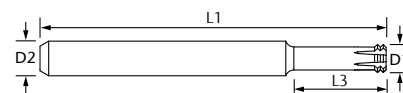
LANCES
AND KNIVES

ACCESSORIES



THREAD WHIRLING CUTTERS

- two rows of teeth
- threads will be machined down to the bottom of the pre-drilled (tapped blind) hole
- for machining aluminium, steel and other ferrous metals, an appropriate lubricant for cooling is necessary
- for metric standard threads
- very deep threads possible due to long undercut
- suitable for especially small threads from M 1
- with STRATUM TN coating for increased tool life



Article no.	Thread	D1 (mm)	D2 (mm)	L3 (mm)	L1 (mm)	Price in €	−5% 2–4	−10% 5–9	−15% 10–19	−20% 20–49			
uncoated tools													
PMMA	PVC foam	PVC hard	PP	PC	PE PS	alumin. soft	alumin. hard	brass	constr. steel	stainless steel	HPL	alumin. compos.	
***	***	***	***	***	*	***	**	**	**	**	*	*	
GW-M01-0073-3-032-40	M 1	0.73	3	3.2	40	60.00	57.00	54.00	51.00	48.00			
GW-M02-0155-3-064-40	M 2	1.55	3	6.4	40	60.00	57.00	54.00	51.00	48.00			
GW-M02.5-0200-3-080-40	M 2.5	2.00	3	8.0	40	60.00	57.00	54.00	51.00	48.00			
GW-M03-0244-4-096-40	M 3	2.44	4	9.6	40	65.30	62.03	58.77	55.50	52.24			
GW-M04-0320-4-128-40	M 4	3.20	4	12.8	40	65.30	62.03	58.77	55.50	52.24			
GW-M05-0400-6-160-60	M 5	4.00	6	16.0	60	76.10	72.29	68.49	64.69	60.88			
GW-M06-0485-6-192-60	M 6	4.85	6	19.2	60	76.10	72.29	68.49	64.69	60.88			
GW-M08-0650-8-256-75	M 8	6.50	8	25.6	75	87.90	83.51	79.11	74.72	70.32			
GW-M10-0790-8-320-75	M 10	7.90	8	32.0	75	87.90	83.51	79.11	74.72	70.32			

Article no.	Thread	D1 (mm)	D2 (mm)	L3 (mm)	L1 (mm)	Price in €	−5% 2–4	−10% 5–9	−15% 10–19	−20% 20–49
tools with STRATUM TN coating										
alumin. soft ***	alumin. hard ***	brass **	constr. steel ***	stainless steel ***	HPL **					
GW-M01-0073-3-032-40-TN	M 1	0.73	3	3.2	40	65.50	62.23	58.95	55.67	52.40
GW-M02-0155-3-064-40-TN	M 2	1.55	3	6.4	40	65.50	62.23	58.95	55.67	52.40
GW-M02.5-0200-3-080-40-TN	M 2.5	2.00	3	8.0	40	65.50	62.23	58.95	55.67	52.40
GW-M03-0244-4-096-40-TN	M 3	2.44	4	9.6	40	70.80	67.26	63.72	60.18	56.64
GW-M04-0320-4-128-40-TN	M 4	3.20	4	12.8	40	70.80	67.26	63.72	60.18	56.64
GW-M05-0400-6-160-60-TN	M 5	4.00	6	16.0	60	82.60	78.47	74.34	70.21	66.08
GW-M06-0485-6-192-60-TN	M 6	4.85	6	19.2	60	82.60	78.47	74.34	70.21	66.08
GW-M08-0650-8-256-75-TN	M 8	6.50	8	25.6	75	94.40	89.68	84.96	80.24	75.52
GW-M10-0790-8-320-75-TN	M 10	7.90	8	32.0	75	94.40	89.68	84.96	80.24	75.52

Info:

Please note that both, controller and production software, must be able to perform a helix movement.



MILLING
CUTTERS

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TOOLS

DEBURRING
TOOLS

ROUTER
BITS

THREAD
CUTTERS

DRLLS

DIAMOND
TOOLS

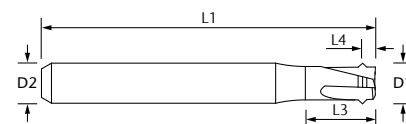
LANCES
AND KNIVES

ACCESSORIES



CIRCULAR THREAD CUTTERS

- two tools in one
- special tip grinding for drilling the tap hole and cutting the thread in the same working cycle (up to 2 × D1)
- for metric standard threads
- each thread cutter (except M 6) can be used for producing several thread sizes



Article no.		Thread	D1 (mm)	D2 (mm)	L4 (mm)	L3 (mm)	L1 (mm)	Price in €	−5% 2–4	−10% 5–9	−15% 10–19	−20% 20–49	
PMMA	PVC foam	PVC hard	PP	PC	PE PS	alumin. soft	alumin. hard	brass	alumin. compos.				
***	***	***	***	***	*	***	*	*	*				
BGF-M02.5-M03		M 2.5 –M 3	2.00	6	0.68	4.68	50	69.70	66.22	62.73	59.25	55.76	
BGF-M04-M05		M 4 –M 5	3.15	6	1.30	11.80	50	69.70	66.22	62.73	59.25	55.76	
BGF-M06		M 6	4.80	6	1.30	11.80	50	69.70	66.22	62.73	59.25	55.76	
BGF-M08-M10		M 8 –M 10	5.90	6	2.30	12.80	50	69.70	66.22	62.73	59.25	55.76	
BGF-M12-M16		M 12 –M 16	5.90	6	2.30	12.80	50	69.70	66.22	62.73	59.25	55.76	
BGF-MKV		MCG *	5.90	6	2.30	12.80	50	69.70	66.22	62.73	59.25	55.76	
BGF-PG07-PG48		PG 7 –PG 48	5.90	6	5.60	14.10	50	69.70	66.22	62.73	59.25	55.76	

* MCG = metric cable gland

Info:

Please note that both, controller and production software, must be able to perform a helix movement.



MILLING CUTTERS	ENGRAVING TOOLS	DEBURRING TOOLS	ROUTER BITS	THREAD CUTTERS	DRILLS	DIAMOND TOOLS	LANCES AND KNIVES	ACCESSORIES
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ACCESSORIES	LANCES AND KNIVES	DIAMOND TOOLS	DRILLS	THREAD CUTTERS	ROUTER BITS	DEBURRING TOOLS	ENGRAVING TOOLS	MILLING CUTTERS
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DRILLS

Our drills are suitable for materials like plastics, non-ferrous metals and printed circuit boards. A comprehensive selection of over 100 drills is available here – starting from a cutting edge diameter of 0.2 mm.

■ DRILLS WITH 3 MM SHANK

■ DRILLS WITH 6 MM SHANK

MILLING
CUTTERSENGRAVING
TOOLSDEBURRING
TOOLSROUTER
BITSTHREAD
CUTTERS

DRILLS

DIAMOND
TOOLSLANCES
AND KNIVES

ACCESSORIES


MILLING
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TOOLS

DEBURRING
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TOOLS

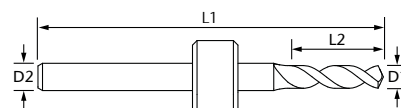
LANCES
AND KNIVES

ACCESSORIES



DRILLS WITH 3 MM SHANK

- especially for non-ferrous metals, plastics and printed circuit boards
- with stop ring (up to 3 mm cutting edge diameter); distance from tool tip to back of ring: 21 mm
- two different top angles depending on cutting edge diameter



Article no.		for thread	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	-5% 2-4	-10% 5-9	-15% 10-19	-20% 20-49		
PMMA ***	PVC foam ***	PVC hard ***	PP ***	PC ***	PE PS ***	alumin. soft ***	alumin. hard **	brass *	HPL *	alumin. compos. **	GRP CRP **	circuit boards ***	
130° top angle, 32° torsion													
LB-0020-3-035-38				0.20	3	3.5	38	5.00	4.75	4.50	4.25	4.00	
LB-0030-3-035-38				0.30	3	3.5	38	5.00	4.75	4.50	4.25	4.00	
LB-0040-3-055-38				0.40	3	5.5	38	4.50	4.28	4.05	3.83	3.60	
LB-0050-3-070-38				0.50	3	7.0	38	4.50	4.28	4.05	3.83	3.60	
LB-0060-3-070-38				0.60	3	7.0	38	4.50	4.28	4.05	3.83	3.60	
LB-0070-3-105-38				0.70	3	10.5	38	4.50	4.28	4.05	3.83	3.60	
LB-0080-3-105-38				0.80	3	10.5	38	4.50	4.28	4.05	3.83	3.60	
LB-0090-3-105-38				0.90	3	10.5	38	4.50	4.28	4.05	3.83	3.60	
LB-0100-3-105-38				1.00	3	10.5	38	4.50	4.28	4.05	3.83	3.60	
LB-0110-3-105-38				1.10	3	10.5	38	4.50	4.28	4.05	3.83	3.60	
LB-0120-3-105-38				1.20	3	10.5	38	4.50	4.28	4.05	3.83	3.60	
LB-0130-3-105-38				1.30	3	10.5	38	4.50	4.28	4.05	3.83	3.60	

Article no.	for thread	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	−5% 2–4	−10% 5–9	−15% 10–19	−20% 20–49
130° top angle, 32° torsion										
LB-0140-3-105-38		1.40	3	10.5	38	4.50	4.28	4.05	3.83	3.60
LB-0150-3-105-38		1.50	3	10.5	38	4.50	4.28	4.05	3.83	3.60
LB-0160-3-105-38	M 2	1.60	3	10.5	38	4.50	4.28	4.05	3.83	3.60
LB-0170-3-105-38		1.70	3	10.5	38	4.50	4.28	4.05	3.83	3.60
LB-0180-3-105-38		1.80	3	10.5	38	4.50	4.28	4.05	3.83	3.60
LB-0190-3-105-38		1.90	3	10.5	38	4.50	4.28	4.05	3.83	3.60
LB-0200-3-105-38		2.00	3	10.5	38	4.50	4.28	4.05	3.83	3.60
LB-0210-3-105-38	M 2.5	2.10	3	10.5	38	4.50	4.28	4.05	3.83	3.60
LB-0220-3-105-38		2.20	3	10.5	38	4.50	4.28	4.05	3.83	3.60
LB-0230-3-105-38		2.30	3	10.5	38	4.50	4.28	4.05	3.83	3.60
LB-0240-3-105-38		2.40	3	10.5	38	4.50	4.28	4.05	3.83	3.60
LB-0250-3-105-38	M 3	2.50	3	10.5	38	4.50	4.28	4.05	3.83	3.60
LB-0260-3-105-38		2.60	3	10.5	38	4.50	4.28	4.05	3.83	3.60
LB-0270-3-105-38		2.70	3	10.5	38	4.50	4.28	4.05	3.83	3.60
LB-0280-3-105-38		2.80	3	10.5	38	4.50	4.28	4.05	3.83	3.60
LB-0290-3-105-38	M 3.5	2.90	3	10.5	38	4.50	4.28	4.05	3.83	3.60
LB-0300-3-105-38		3.00	3	10.5	38	4.50	4.28	4.05	3.83	3.60
165° top angle, 30° torsion										
LB-0310-3-120-38		3.10	3	12.0	38	9.50	9.03	8.55	8.07	7.60
LB-0320-3-120-38		3.20	3	12.0	38	9.50	9.03	8.55	8.07	7.60
LB-0330-3-120-38	M 4	3.30	3	12.0	38	9.50	9.03	8.55	8.07	7.60
LB-0340-3-120-38		3.40	3	12.0	38	9.50	9.03	8.55	8.07	7.60
LB-0350-3-120-38		3.50	3	12.0	38	9.50	9.03	8.55	8.07	7.60
LB-0360-3-120-38		3.60	3	12.0	38	11.00	10.45	9.90	9.35	8.80
LB-0370-3-120-38	M 4.5	3.70	3	12.0	38	11.00	10.45	9.90	9.35	8.80
LB-0380-3-120-38		3.80	3	12.0	38	11.00	10.45	9.90	9.35	8.80
LB-0390-3-120-38		3.90	3	12.0	38	11.00	10.45	9.90	9.35	8.80
LB-0400-3-120-38		4.00	3	12.0	38	11.00	10.45	9.90	9.35	8.80
LB-0410-3-120-38		4.10	3	12.0	38	11.00	10.45	9.90	9.35	8.80
LB-0420-3-120-38	M 5	4.20	3	12.0	38	11.00	10.45	9.90	9.35	8.80
LB-0430-3-120-38		4.30	3	12.0	38	11.00	10.45	9.90	9.35	8.80
LB-0440-3-120-38		4.40	3	12.0	38	11.00	10.45	9.90	9.35	8.80
LB-0450-3-120-38		4.50	3	12.0	38	11.00	10.45	9.90	9.35	8.80
LB-0460-3-120-38		4.60	3	12.0	38	13.00	12.35	11.70	11.05	10.40
LB-0470-3-120-38		4.70	3	12.0	38	13.00	12.35	11.70	11.05	10.40
LB-0480-3-120-38		4.80	3	12.0	38	13.00	12.35	11.70	11.05	10.40
LB-0490-3-120-38		4.90	3	12.0	38	13.00	12.35	11.70	11.05	10.40
LB-0500-3-120-38	M 6	5.00	3	12.0	38	13.00	12.35	11.70	11.05	10.40
LB-0510-3-120-38		5.10	3	12.0	38	14.50	13.78	13.05	12.32	11.60
LB-0520-3-120-38		5.20	3	12.0	38	14.50	13.78	13.05	12.32	11.60
LB-0530-3-120-38		5.30	3	12.0	38	14.50	13.78	13.05	12.32	11.60
LB-0540-3-120-38		5.40	3	12.0	38	14.50	13.78	13.05	12.32	11.60
LB-0550-3-120-38		5.50	3	12.0	38	14.50	13.78	13.05	12.32	11.60
LB-0560-3-120-38		5.60	3	12.0	38	16.00	15.20	14.40	13.60	12.80
LB-0570-3-120-38		5.70	3	12.0	38	16.00	15.20	14.40	13.60	12.80
LB-0580-3-120-38		5.80	3	12.0	38	16.00	15.20	14.40	13.60	12.80
LB-0590-3-120-38		5.90	3	12.0	38	16.00	15.20	14.40	13.60	12.80
LB-0600-3-120-38		6.00	3	12.0	38	16.00	15.20	14.40	13.60	12.80
LB-0650-3-120-38		6.50	3	12.0	38	17.50	16.62	15.75	14.88	14.00

MILLING
CUTTERS

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TOOLS

DEBURRING
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CUTTERS

DRILLS

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LANCES
AND KNIVES

ACCESSORIES


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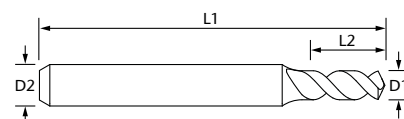
LANCES
AND KNIVES

ACCESSORIES



DRILLS WITH 6 MM SHANK

- for drilling non-ferrous metals or thermosetting plastics and thermoplastics, as well as composites
- four-facet grinding with polished radius thinning of the chisel edge enables a very good centering
- polished flutes reduce the risk of built-up edges and clogging of chips



Article no.	for thread	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	−5% 2–4	−10% 5–9	−15% 10–19	−20% 20–49			
130° top angle, short type													
PMMA ***	PVC foam ***	PVC hard ***	PP ***	PC ***	PE PS ***	alumin. soft ***	alumin. hard **	brass *	HPL *	alumin. compos. **	GRP CRP *	circuit boards **	
KB-0160-6-120-50	M 2	1.60	6	12.0	50	32.50	30.88	29.25	27.62	26.00			
KB-0200-6-120-50		2.00	6	12.0	50	32.50	30.88	29.25	27.62	26.00			
KB-0210-6-120-50	M 2.5	2.10	6	12.0	50	32.50	30.88	29.25	27.62	26.00			
KB-0250-6-120-50	M 3	2.50	6	12.0	50	32.50	30.88	29.25	27.62	26.00			
KB-0290-6-120-50	M 3.5	2.90	6	12.0	50	22.80	21.66	20.52	19.38	18.24			
KB-0300-6-120-50		3.00	6	12.0	50	22.80	21.66	20.52	19.38	18.24			
KB-0330-6-120-50	M 4	3.30	6	12.0	50	22.80	21.66	20.52	19.38	18.24			
KB-0370-6-120-50	M 4.5	3.70	6	12.0	50	22.80	21.66	20.52	19.38	18.24			
KB-0400-6-120-50		4.00	6	12.0	50	22.80	21.66	20.52	19.38	18.24			
KB-0420-6-120-50	M 5	4.20	6	12.0	50	22.80	21.66	20.52	19.38	18.24			
KB-0500-6-120-50	M 6	5.00	6	12.0	50	22.80	21.66	20.52	19.38	18.24			
KB-0600-6-120-50		6.00	6	12.0	50	22.80	21.66	20.52	19.38	18.24			

Article no.	for thread	D1 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	−5% 2–4	−10% 5–9	−15% 10–19	−20% 20–49
130° top angle, long type										
KB-0300-6-220-60		3.00	6	22.0	60	37.50	35.62	33.75	31.88	30.00
KB-0310-6-220-60		3.10	6	22.0	60	26.30	24.98	23.67	22.36	21.04
KB-0320-6-220-60		3.20	6	22.0	60	37.50	35.62	33.75	31.88	30.00
KB-0330-6-220-60	M 4	3.30	6	22.0	60	37.50	35.62	33.75	31.88	30.00
KB-0340-6-220-60		3.40	6	22.0	60	26.30	24.98	23.67	22.36	21.04
KB-0350-6-220-60		3.50	6	22.0	60	37.50	35.62	33.75	31.88	30.00
KB-0360-6-220-60		3.60	6	22.0	60	26.30	24.98	23.67	22.36	21.04
KB-0370-6-220-60	M 4.5	3.70	6	22.0	60	26.30	24.98	23.67	22.36	21.04
KB-0380-6-220-60		3.80	6	22.0	60	26.30	24.98	23.67	22.36	21.04
KB-0390-6-220-60		3.90	6	22.0	60	26.30	24.98	23.67	22.36	21.04
KB-0400-6-220-60		4.00	6	22.0	60	26.30	24.98	23.67	22.36	21.04
KB-0410-6-220-60		4.10	6	22.0	60	37.50	35.62	33.75	31.88	30.00
KB-0420-6-220-60	M 5	4.20	6	22.0	60	26.30	24.98	23.67	22.36	21.04
KB-0430-6-220-60		4.30	6	22.0	60	26.30	24.98	23.67	22.36	21.04
KB-0440-6-220-60		4.40	6	22.0	60	37.50	35.62	33.75	31.88	30.00
KB-0450-6-220-60		4.50	6	22.0	60	26.30	24.98	23.67	22.36	21.04
KB-0460-6-220-60		4.60	6	22.0	60	26.30	24.98	23.67	22.36	21.04
KB-0470-6-220-60		4.70	6	22.0	60	26.30	24.98	23.67	22.36	21.04
KB-0480-6-220-60		4.80	6	22.0	60	26.30	24.98	23.67	22.36	21.04
KB-0490-6-220-60		4.90	6	22.0	60	37.50	35.62	33.75	31.88	30.00
KB-0500-6-220-60	M 6	5.00	6	22.0	60	37.50	35.62	33.75	31.88	30.00
KB-0510-6-220-60		5.10	6	22.0	60	26.30	24.98	23.67	22.36	21.04
KB-0520-6-220-60		5.20	6	22.0	60	26.30	24.98	23.67	22.36	21.04
KB-0530-6-220-60		5.30	6	22.0	60	26.30	24.98	23.67	22.36	21.04
KB-0540-6-220-60		5.40	6	22.0	60	26.30	24.98	23.67	22.36	21.04
KB-0550-6-220-60		5.50	6	22.0	60	37.50	35.62	33.75	31.88	30.00
KB-0560-6-220-60		5.60	6	22.0	60	26.30	24.98	23.67	22.36	21.04
KB-0570-6-220-60		5.70	6	22.0	60	26.30	24.98	23.67	22.36	21.04
KB-0580-6-220-60		5.80	6	22.0	60	26.30	24.98	23.67	22.36	21.04
KB-0590-6-220-60		5.90	6	22.0	60	26.30	24.98	23.67	22.36	21.04
KB-0600-6-220-60		6.00	6	22.0	60	37.50	35.62	33.75	31.88	30.00

MILLING
CUTTERS

ENGRAVING
TOOLS

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ROUTER
BITS

THREAD
CUTTERS

DRILLS

DIAMOND
TOOLS

LANCES
AND KNIVES

ACCESSORIES

ACCESSORIES	LANCES AND KNIVES	DIAMOND TOOLS	DRILLS	THREAD CUTTERS	ROUTER BITS	DEBURRING TOOLS	ENGRAVING TOOLS	MILLING CUTTERS
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DIAMOND TOOLS

Our single and double tooth cutters of polycrystalline diamonds and CVD thick film plates have a very high tool life and can be used without cooling. Additionally we offer polishing tools for acrylic glass made of monocrystalline and polycrystalline diamonds.

All diamond tools are regrindable for several times. Please send us your tools for regrinding individually wrapped. Prices for the regrinding service are available on request.

■ PCD POLISHING CUTTERS

■ MCD POLISHING CUTTERS

■ PCD POLISHING GRAVERS

■ MCD POLISHING GRAVERS

■ PCD SINGLE TOOTH CUTTERS

■ PCD DOUBLE TOOTH CUTTERS

■ CVD CUTTERS



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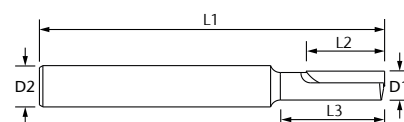
LANCES
AND KNIVES

ACCESSORIES



PCD POLISHING CUTTERS

- carbide shank with polycrystalline diamond; center-cutting
- extra long cutting edges polish also very thick plates in one cycle
- for polishing acrylic glass edges and pockets of any contour
- after preparation with a regular milling cutter, you can remove 0.10 – 0.14 mm of the material per working cycle with this tool
- regrindable for several times



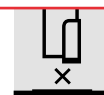
Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L3 (mm)	L1 (mm)	Price in €	-5% 2-4	-10% 5-9	-15% 10-19
PMMA ***									
PKD-PF-0400-6-100-0150-50	4.00	6	10.0	15.0	50	575.00	546.25	517.50	488.75
PKD-PF-0600-6-140-0180-50	6.00	6	14.0	18.0	50	645.00	612.75	580.50	548.25
PKD-PF-0800-8-180-0220-50	8.00	8	18.0	22.0	50	695.00	660.25	625.50	590.75
PKD-PF-1000-10-220-0260-60	10.00	10	22.0	26.0	60	725.00	688.75	652.50	616.25

Practical tip:

You will achieve the best polishing results if you do not remove more than 0.05 – 0.07 mm of material from the milled edges per step.

Info:

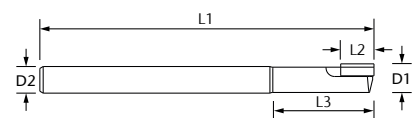
Since the diamond plate is electrically insulating, calibration with measuring systems that require electrical contact is not possible.





MCD POLISHING CUTTERS

- carbide shank with monocrystalline diamond of pure carbon
- glassy polishing edges (depending on machine)
- polishing of pockets with increased fill overlapping
- cuts sideways as well as downwards
- polishing acrylic glass edges and pockets of any contour
- regrindable for several times



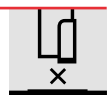
Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L3 (mm)	L1 (mm)	Price in €	-5% 2-4	-10% 5-9	-15% 10-19
PMMA ***									
with edge chamfer 0.15 mm × 45°									
MKD-PF-0400-4-050-0150-50	4.00	4	5.0	15.0	50	739.00	702.05	665.10	628.15
MKD-PF-0400-4-060-0150-50	4.00	4	6.0	15.0	50	835.00	793.25	751.50	709.75
MKD-PF-0600-6-050-0220-50	6.00	6	5.0	22.0	50	895.00	850.25	805.50	760.75
MKD-PF-0600-6-060-0250-57	6.00	6	6.0	25.0	57	994.00	944.30	894.60	844.90
MKD-PF-0600-6-080-0220-50	6.00	6	8.0	22.0	50	1377.00	1308.15	1239.30	1170.45

Practical tip:

You will achieve the best polishing results if you do not remove more than 0.05 – 0.07 mm of material from the milled edges per step.

Info:

Since the diamond plate is electrically insulating, calibration with measuring systems that require electrical contact is not possible.

MILLING
CUTTERSENGRAVING
TOOLSDEBURRING
TOOLSROUTER
BITSTHREAD
CUTTERS

DRILLS

DIAMOND
TOOLSLANCES
AND KNIVES

ACCESSORIES



MILLING
CUTTERS

ENGRAVING
TOOLS

DEBURRING
TOOLS

ROUTER
BITS

THREAD
CUTTERS

DRILLS

DIAMOND
TOOLS

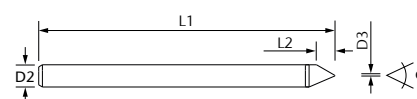
LANCES
AND KNIVES

ACCESSORIES



PCD POLISHING GRAVERS

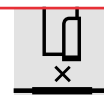
- carbide shank with polycrystalline diamond
- top angles of 60° and 90°
- up to an immersion depth of about 0.1 – 0.2 mm you can engrave directly
- up to the maximum engraving depth you have to pre-engrave with a regular graver
- for polishing chamfers or engravings in acrylic glass
- regrindable for several times



Article no.	α	D3 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	-5% 2-4	-10% 5-9	-15% 10-19
PMMA ***									
PKD-PS-060-020-6-50	60°	0.20	6	4.5	50	369.00	350.55	332.10	313.65
PKD-PS-090-010-6-50	90°	0.10	6	2.5	50	369.00	350.55	332.10	313.65

Info:

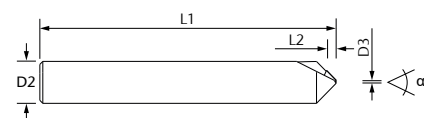
Since the diamond plate is electrically insulating, calibration with measuring systems that require electrical contact is not possible.





MCD POLISHING GRAVERS

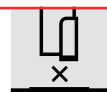
- carbide shank with monocrystalline diamond for crystal clear engravings (depending on machine)
- top angles of 60° and 90°
- up to an immersion depth of about 0.1 – 0.2 mm you can engrave directly
- up to the maximum engraving depth of approximately 2 mm you have to pre-engage with a regular graver
- for polishing chamfers or engravings in acrylic glass
- regrindable for several times



Article no.	α	D3 (mm)	D2 (mm)	L2 (mm)	L1 (mm)	Price in €	-5% 2-4	-10% 5-9	-15% 10-19
PMMA ***									
MKD-PS-060-030-4-50	60°	0.30	4	2.0	50	615.00	584.25	553.50	522.75
MKD-PS-060-030-6-50	60°	0.30	6	2.0	50	615.00	584.25	553.50	522.75
MKD-PS-090-030-4-50	90°	0.30	4	2.0	50	615.00	584.25	553.50	522.75
MKD-PS-090-030-6-50	90°	0.30	6	2.0	50	615.00	584.25	553.50	522.75

Info:

Since the diamond plate is electrically insulating, calibration with measuring systems that require electrical contact is not possible.

MILLING
CUTTERSENGRAVING
TOOLSDEBURRING
TOOLSROUTER
BITSTHREAD
CUTTERS

DRILLS

DIAMOND
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ACCESSORIES


MILLING
CUTTERS

ENGRAVING
TOOLS

DEBURRING
TOOLS

ROUTER
BITS

THREAD
CUTTERS

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DIAMOND
TOOLS

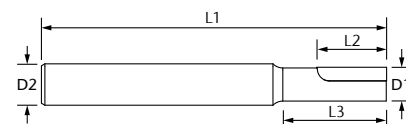
LANCES
AND KNIVES

ACCESSORIES



PCD SINGLE TOOTH CUTTERS

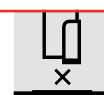
- carbide shank equipped with one polycrystalline diamond; center-cutting
- very fine granulation and extremely hard
- very long tool life
- especially for plastics which do not tend to smear and for non-ferrous metals
- regrindable for several times



Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L3 (mm)	L1 (mm)	Price in €	-5 % 2-4	-10 % 5-9	-15 % 10-19
PVC hard *									
PP *									
PC *									
alumin. soft *									
HPL *									
GRP CRP ***									
PKD-ES-0300-3-050-0080-40	3.00	3	5.0	8.0	40	148.00	140.60	133.20	125.80
PKD-ES-0300-3-100-0130-40	3.00	3	10.0	13.0	40	178.00	169.10	160.20	151.30
PKD-ES-0300-6-035-0055-42	3.00	6	3.5	5.5	42	133.00	126.35	119.70	113.05
PKD-ES-0400-4-080-0110-50	4.00	4	8.0	11.0	50	189.00	179.55	170.10	160.65
PKD-ES-0400-4-140-0170-50	4.00	4	14.0	17.0	50	198.00	188.10	178.20	168.30
PKD-ES-0500-6-100-0150-50	5.00	6	10.0	15.0	50	218.00	207.10	196.20	185.30
PKD-ES-0600-6-100-0150-50	6.00	6	10.0	15.0	50	218.00	207.10	196.20	185.30
PKD-ES-0600-6-200-0250-50	6.00	6	20.0	25.0	50	278.00	264.10	250.20	236.30
PKD-ES-0800-8-100-0150-50	8.00	8	10.0	15.0	50	243.00	230.85	218.70	206.55
PKD-ES-0800-8-200-0250-60	8.00	8	20.0	25.0	60	336.00	319.20	302.40	285.60

Info:

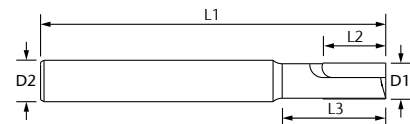
Since the diamond plate is electrically insulating, calibration with measuring systems that require electrical contact is not possible.





PCD DOUBLE TOOTH CUTTERS

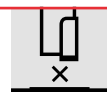
- carbide shank equipped with two cutting plates of polycrystalline diamond; center-cutting
- best surface qualities
- very long tool life
- for machining aluminium without cooling
- also for reinforced plastics and composites
- regrindable for several times



Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L3 (mm)	L1 (mm)	Price in €	-5% 2-4	-10% 5-9	-15% 10-19
<div>PVC hard *</div> <div>PP *</div> <div>PC *</div> <div>alumin. soft *</div> <div>HPL **</div> <div>GRP CRP ***</div>									
PKD-ZS-0500-6-100-0150-50	5.00	6	10.0	15.0	50	315.00	299.25	283.50	267.75
PKD-ZS-0600-6-100-0150-50	6.00	6	10.0	15.0	50	315.00	299.25	283.50	267.75
PKD-ZS-0600-6-200-0250-50	6.00	6	20.0	25.0	50	369.00	350.55	332.10	313.65
PKD-ZS-0800-8-100-0150-50	8.00	8	10.0	15.0	50	336.00	319.20	302.40	285.60
PKD-ZS-0800-8-200-0250-60	8.00	8	20.0	25.0	60	409.00	388.55	368.10	347.65

Info:

Since the diamond plate is electrically insulating, calibration with measuring systems that require electrical contact is not possible.

MILLING
CUTTERSENGRAVING
TOOLSDEBURRING
TOOLSROUTER
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DRILLS

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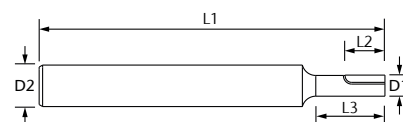
ACCESSORIES



CVD CUTTERS

- carbide shank equipped with one or two CVD cutting plates; center-cutting
- very homogeneous diamond structure and an extremely smooth cutting edge
- regrindable for several times

- greater hardness and resistance to wear than PCD tools
- ideal for abrasive materials like GRP/CRP, but also for aluminium and plastics which do not tend to smear



Article no.	D1 (mm)	D2 (mm)	L2 (mm)	L3 (mm)	L1 (mm)	Price in €	-5 % 2-4	-10 % 5-9	-15 % 10-19
PVC hard									
PP									
PC									
alumin. soft									
HPL									
GRP CRP									

CVD single tooth cutter

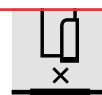
CVD-ES-0300-6-050-0100-50	3.00	6	5.0	10.0	50	273.00	259.35	245.70	232.05
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CVD double tooth cutters

CVD-ZS-0400-6-060-0120-50	4.00	6	6.0	12.0	50	359.00	341.05	323.10	305.15
CVD-ZS-0600-6-100-0140-50	6.00	6	10.0	14.0	50	402.00	381.90	361.80	341.70
CVD-ZS-0800-8-120-0160-50	8.00	8	12.0	16.0	50	455.00	432.25	409.50	386.75
CVD-ZS-1000-10-080-0180-60	10.00	10	8.0	18.0	60	455.00	432.25	409.50	386.75

Info:

Since the diamond plate is electrically insulating, calibration with measuring systems that require electrical contact is not possible.



MILLING CUTTERS	ENGRAVING TOOLS	DEBURRING TOOLS	ROUTER BITS	THREAD CUTTERS	DRILLS	DIAMOND TOOLS	LANCES AND KNIVES	ACCESSORIES
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ACCESSORIES	LANCES AND KNIVES	DIAMOND TOOLS	DRILLS	THREAD CUTTERS	ROUTER BITS	DEBURRING TOOLS	ENGRAVING TOOLS	MILLING CUTTERS
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LANCES AND KNIVES

For all materials which can be better cut than milled, we offer various lances and knives up to 70 mm cutting edge length which can be used with vhf cutting heads.

- **LANCES FOR OSCILLATING TANGENTIAL CUTTING HEAD**
- **LANCES FOR TANGENTIAL CUTTING HEAD**
- **KNIVES FOR DRAG KNIFE UNIT**
- **KNIVES FOR UNIVERSAL HEAD**
- **KNIVES FOR XtraUnit**



MILLING
CUTTERS

ENGRAVING
TOOLS

DEBURRING
TOOLS

ROUTER
BITS

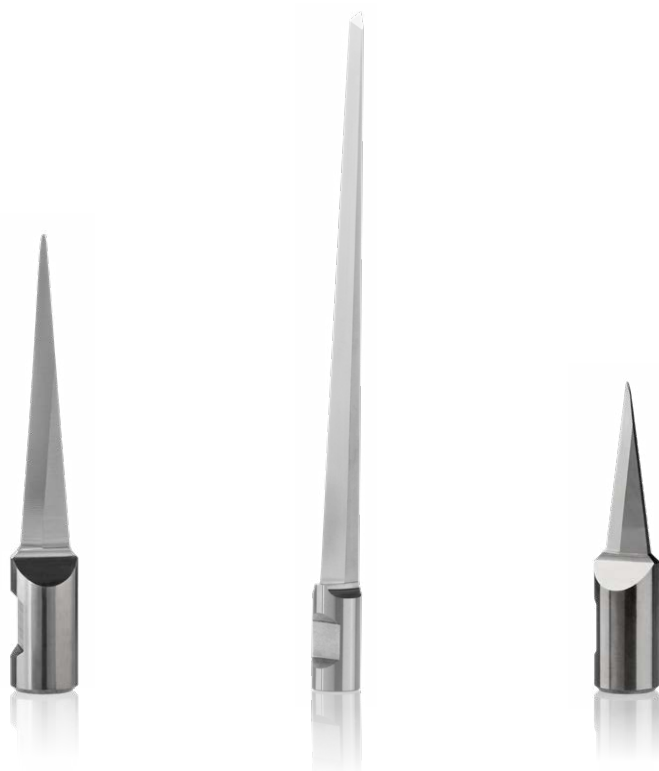
THREAD
CUTTERS

DRILLS

DIAMOND
TOOLS

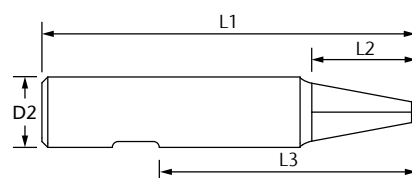
LANCES
AND KNIVES

ACCESSORIES



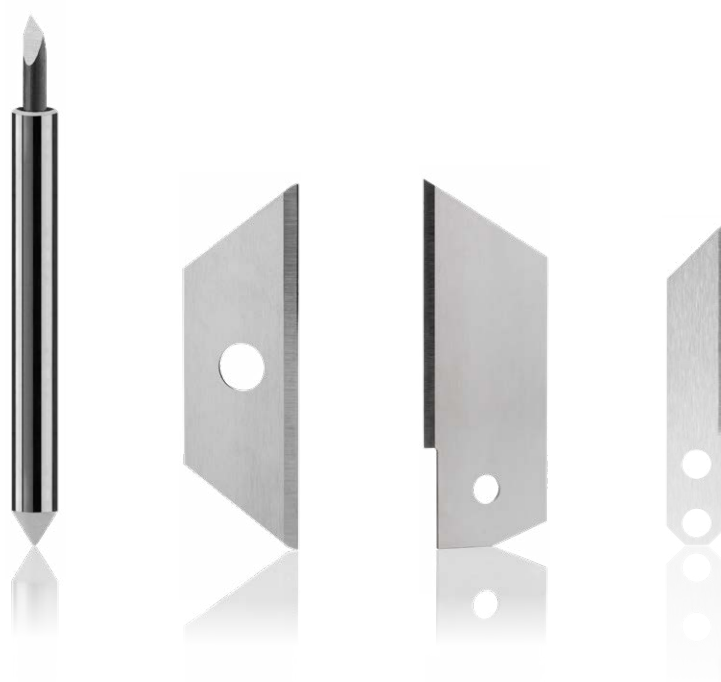
LANCES

- especially for the vhf oscillating tangential head; for materials which can be better cut than milled
- the lance for the tangential cutting head is especially suitable for foil cutting
- especially thin for cutting narrow curve radii; single-edged
- application fields: cardboard, foams, softer sandwich materials
- side clamping area in cutting direction



Article no.	Type	D2 (mm)	L2 (mm)	L3 (mm)	L1 (mm)	Price in €	-5 % 2-4	-10 % 5-9	-15 % 10-19	-20 % 20-49
lances for oscillating tangential cutting head										
HL-OT-05ES	extra thin	6	5.0	10.0	18	35.40	33.63	31.86	30.09	28.32
HL-OT-10ES	extra thin	6	10.0	15.0	23	42.80	40.66	38.52	36.38	34.24
HL-OT-12ES	extra thin	6	12.0	17.0	25	46.10	43.80	41.49	39.19	36.88
HL-OT-15ES	extra thin	6	15.0	20.0	28	50.30	47.78	45.27	42.76	40.24
HL-OT-20ES	extra thin	6	20.0	25.0	33	57.90	55.00	52.11	49.21	46.32
HL-OT-27ES	extra thin	6	27.0	32.0	40	68.50	65.08	61.65	58.23	54.80
HL-OT-50 ¹		6	50.0	57.0	65	138.20	131.29	124.38	117.47	110.56
HL-OT-70 ¹		6	70.0	75.0	83	170.40	161.88	153.36	144.84	136.32
lance for tangential cutting head + kiss-cut attachment of the multi unit and the XtraUnit										
HL-T-2.5-55	55° cutting edge	6	1.6	17.0	27	35.40	33.63	31.86	30.09	28.32

¹ Please note that you can use only lances with a cutting edge length of up to 27 mm in the oscillating tangential cutting head of a multi unit if you are working with the universal head at the same time.



KNIVES

- standard knife for vhf drag knife units – ideal for foils with carrier layer
- trapeze knife with 2 and 5 mm for vhf straight cutting attachment
- V-cut knife for 45° diagonal cutting for vhf V-cut attachment
- knife for vhf multi unit/universal head
- knife for XtraUnit for V-cut or straight cut

Article no.	Type	Price in €	–5 % 2–4	–10 % 5–9	–15 % 10–19	–20 % 20–49
knife for drag knife unit						
HL-SM-STD	standard drag knife	34.30	32.58	30.87	29.16	27.44
knives for universal head						
MUK-SC-02	trapeze knife – for straight cutting attachment, 2 and 5 mm (10 pieces)	5.40	5.13	4.86	4.59	4.32
MUK-SC-25	standing knife 25 mm (10 pieces)	10.80	10.26	9.72	9.18	8.64
MUK-VC	V-cut knife (5 pieces)	63.20	60.04	56.88	53.72	50.56
knives for XtraUnit						
X-VC-16	V-cut knife, immersion depth 16 mm, cutting edge length 29.5 mm	37.30	35.43	33.57	31.71	29.84
X-VC-2.5-10	knife for straight cut and V-cut, immersion depth 2.5 mm, 5 mm and 10 mm cutting edge length 19.5 mm	30.00	28.50	27.00	25.50	24.00

MILLING
CUTTERS

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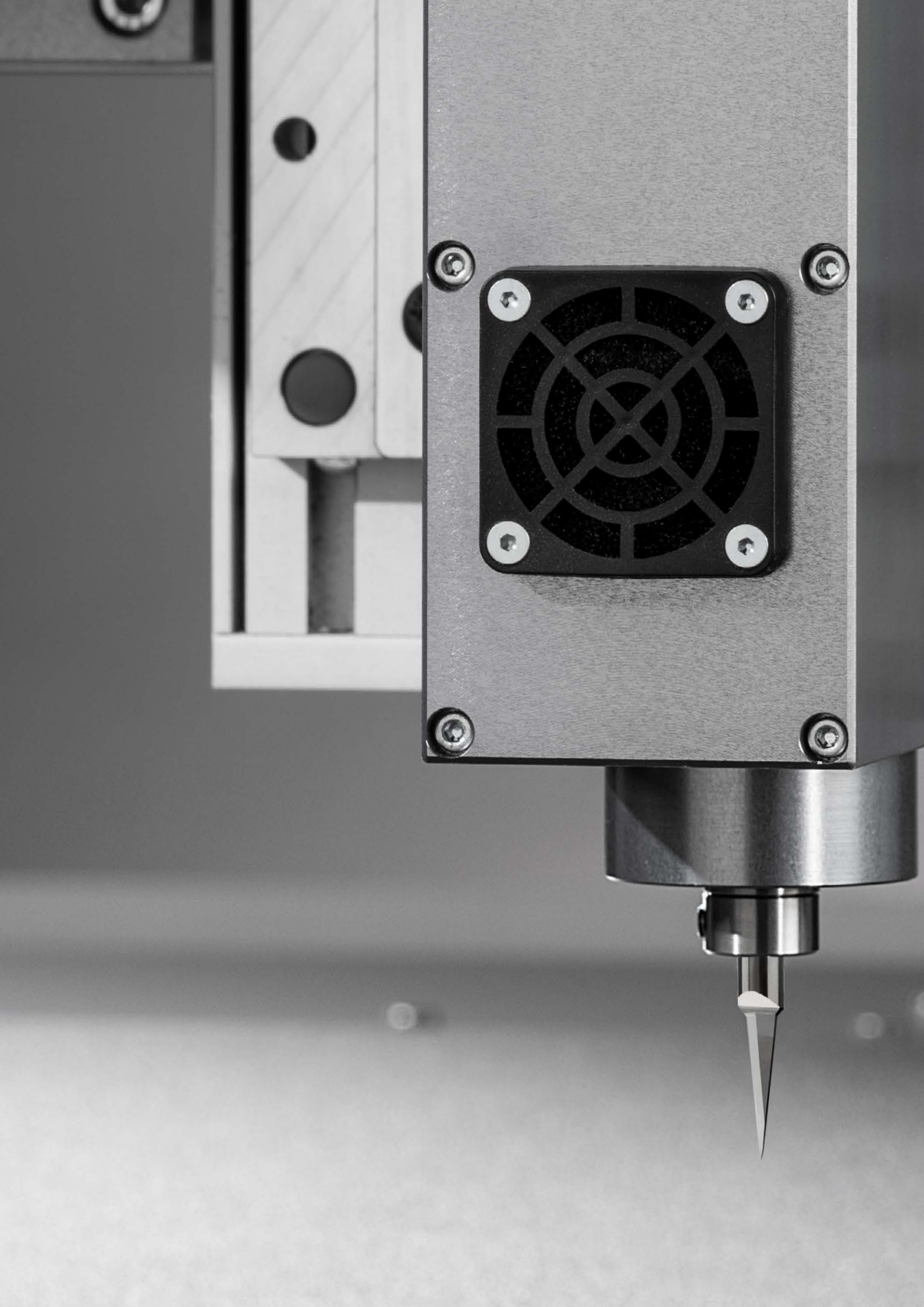
THREAD
CUTTERS

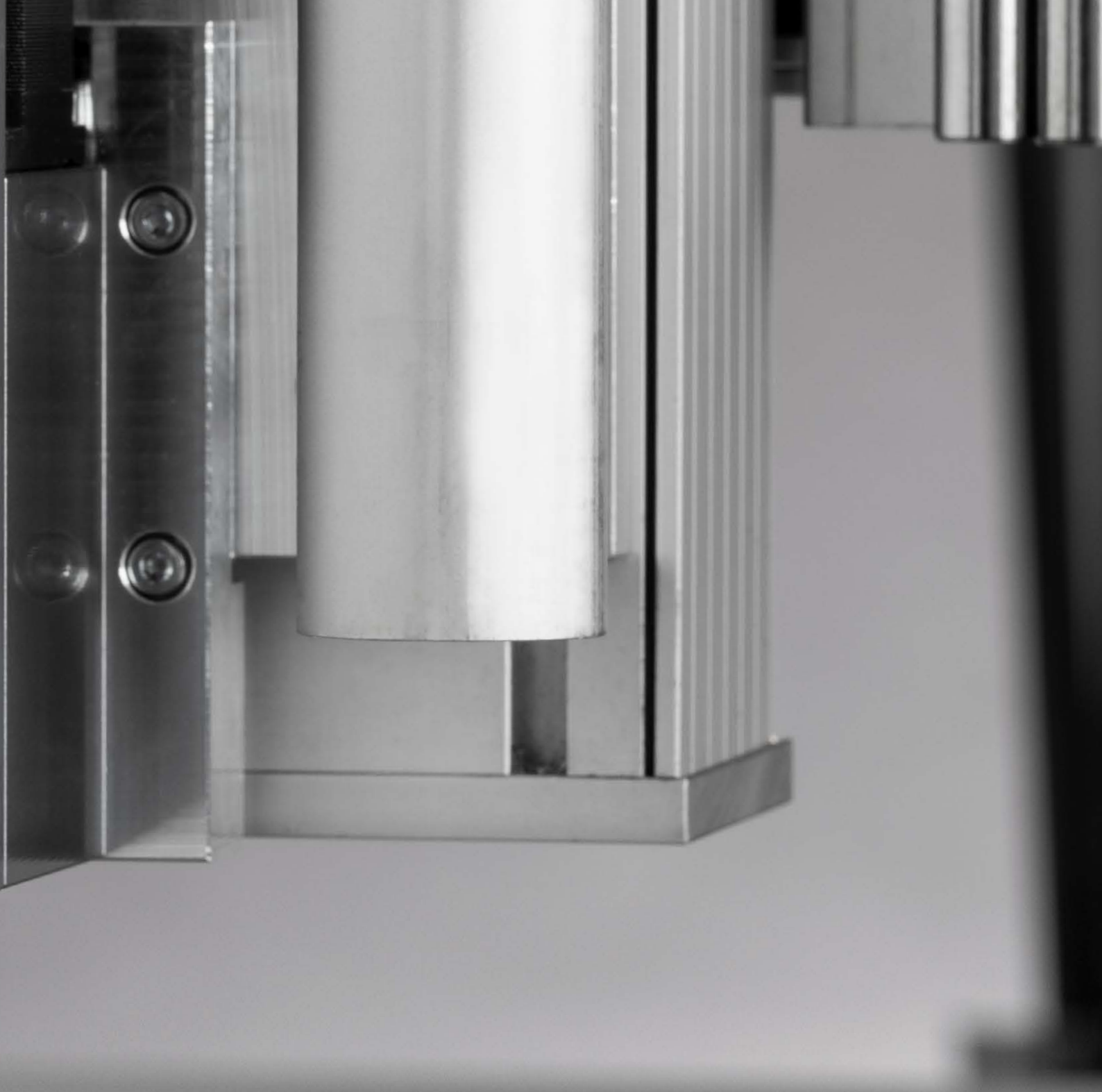
DRILLS

DIAMOND
TOOLS

LANCES
AND KNIVES

ACCESSORIES





SO THAT YOUR PROJECTS DO NOT STAND ON A
KNIFE EDGE. QUALITY TOOLS BY VHF.

ACCESSORIES	LANCES AND KNIVES	DIAMOND TOOLS	DRILLS	THREAD CUTTERS	ROUTER BITS	DEBURRING TOOLS	ENGRAVING TOOLS	MILLING CUTTERS
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ACCESSORIES

In this section you will find vacuum fleece and cutting mats, adhesive film, stop rings, reducing bushes for the usage of smaller tools in bigger collet chucks as well as coolants.

■ VACUUM FLEECE AND CUTTING MATS

■ SPECIAL ADHESIVE FILM

■ STOP RINGS

■ REDUCING BUSHES

■ COOLANTS

You can also find this and other accessories in our online store at **shop.vhf.de**



VACUUM FLEECE AND CUTTING MATS

- special, foamed material which is permeable to air
- vacuum fleece: extra thin type with a thickness of 1 mm and especially great holding force is particularly suitable for machining smaller workpieces; type with a thickness of 2 mm has a longer durability
- workpieces will still be fixed safely even if some areas of the table remain uncovered
- vacuum cutting mats made of special felt material: for all cutting applications; yields only very little even when the vacuum is turned on

Article no.	Description	Price in €	–5% 2–9	–10% 10–14	–15% 15–29	–25% ≥ 30
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vacuum fleece from the roll, charged per linear meter

ET-SV-VV-01-R1	1 mm thickness, 1 m width	14.00	13.30	12.60	11.90	10.50
ET-SV-VV-02-R05	2 mm thickness, 0.5 m width	12.50	11.88	11.25	10.62	9.38
ET-SV-VV-02-R1	2 mm thickness, 1 m width	23.00	21.85	20.70	19.55	17.25

vacuum fleece, cut into squares

ET-SV-VV-02-05	2 mm thickness, 500 x 500 mm packaging unit 5 pieces	38.00	36.10	34.20	32.30	28.50
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Article no.	Description	Price in €	–5% 2–4	–10% 5–9	–15% 10–19	–20% 20–49
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vacuum cutting mats, cut into pieces

ET-SVT-VSU-1015	2.5 mm thickness, 1,020 x 1,520 mm	95.00	90.25	85.50	80.75	76.00
ET-SVT-VSU-1020	2.5 mm thickness, 1,020 x 2,020 mm	122.00	115.90	109.80	103.70	97.60



SPECIAL ADHESIVE FILM

- for fixing workpieces directly on the polystyrene surface or a similar surface
- especially thin (80 µm thickness)

Article no.	Description	Price in €	–5% 2–4	–10% 5–9	–15% 10–19
ET-XF-DX1	special adhesive film DX 1, 25 m x 50 cm – regular adhesive force	148.00	140.60	133.20	125.80
ET-XF-DX2	special adhesive film DX 2, 25 m x 50 cm – double adhesive force	148.00	140.60	133.20	125.80

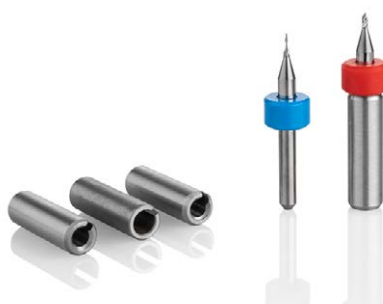


STOP RINGS

- stop rings made of brass (AR-...N) are designed for the tool fittings of a high frequency spindle tool changer
- plastic stop rings (AR-300K) are suitable for changing the tools manually
- optional ringing set for equipping tools with stop rings; the set consists of a ringing plate and a steel pin punch – all you need is a small hammer.

Article no.	Int. Ø	Ext. Ø	Height	PU	Price in €	-5 % 2-4	-10 % 5-9	-15 % 10-19
AR-300K	3 mm	7.7 mm	4.9 mm	20 pcs.	4.70	4.46	4.23	4.00
AR-300N	3 mm	10.6 mm	6.5 mm	5 pcs.	12.50	11.88	11.25	10.62
AR-400N	4 mm	10.6 mm	6.5 mm	5 pcs.	12.50	11.88	11.25	10.62
AR-500N	5 mm	10.6 mm	6.5 mm	5 pcs.	12.50	11.88	11.25	10.62
AR-600N	6 mm	10.6 mm	6.5 mm	5 pcs.	12.50	11.88	11.25	10.62
AR-600N-9	6 mm	9.0 mm	5.5 mm	5 pcs.	12.50	11.88	11.25	10.62

Article no.	Description	Price in €	-5 % 2-4	-10 % 5-9	-15 % 10-19
AR-BP-SET	ringing set (10.6 mm) with pin punch	19.00	18.05	17.10	16.15
AR-BP-SET-9	ringing set (9 mm) with pin punch	19.00	18.05	17.10	16.15



REDUCING BUSHES

- e.g. clamping a tool with a shank diameter of 4 mm into a collet chuck with a diameter of 6 mm when you use the reducing bush RH-46
- for clamping tools with a smaller shank diameter into a larger collet chuck

Article no.	Int. Ø	Ext. Ø	Length	Price in €	-5 % 2-4	-10 % 5-9	-15 % 10-19
RH-36	3 mm	6 mm	20 mm	16.00	15.20	14.40	13.60
RH-46	4 mm	6 mm	20 mm	16.00	15.20	14.40	13.60



MILLING
CUTTERS

ENGRAVING
TOOLS

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CUTTERS

DRILLS

DIAMOND
TOOLS

LANCES
AND KNIVES

ACCESSORIES



COOLANTS

- for some kinds of materials, it is absolutely necessary to use a cooling lubricant
- for better results and an extended tool life for engraving or milling

Article no.	Description	Application	Usage in*	Price in €	–10% 5–9	–15% 10–19	–20% ≥ 20
ET-MK-AT	cooling lubricant AquaTec® (1 liter) water-soluble application concentration 6–7%	for milling, drilling, cutting steel	CSU	22.00	19.80	18.70	17.60
ET-MK-ALUN	spray lubricant ALU-N (1 liter)	for milling, cutting, sawing non-ferrous metals	CSU	12.50	11.25	10.62	10.00
ET-MK-ALUN-5L	spray lubricant ALU-N (5 liters)	as above	CSU	46.00	41.40	39.10	36.80
ET-MK-WSP20	special lubricant WSP 20 (1 liter)	for working on non-ferrous metals and steel	MQL	32.00	28.80	27.20	25.60
ET-MK-WSP20-5L	special lubricant WSP 20 (5 liters)	as above	MQL	128.00	115.20	108.80	102.40
239117	cooling lubricant Tec Liquid Pro (1 liter) water-soluble application concentration 5%	for working on non-ferrous metals and steel/stainless steel	CSU MQL	21.00	18.90	17.85	16.80
239118	cooling lubricant Tec Liquid Pro (5 liters)	as above	CSU MQL	98.00	88.20	83.30	78.40

* CSU = cooling and spraying unit | MQL = minimum quantity lubrication unit

MORE ACCESSORIES IN THE VHF SHOP

■ collet chucks



■ clamping devices



■ suction shoes



■ cap nuts



■ pneumat. clamping devices



■ lubricants



■ jaw, hook and pin wrenches



■ vises



■ cleaners



■ cones



■ polystyrene stripes, adhesive



■ accessories for suction units



■ tool fittings



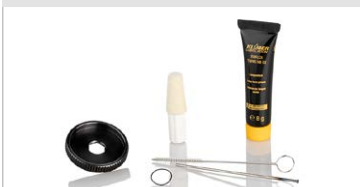
■ slide nuts for T-slots



■ vacuum suction units



■ service sets for collet chucks



■ vacuum adapter mats



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MILLING
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ACCESSORIES

ACCESSORIES	LANCES AND KNIVES	DIAMOND TOOLS	DRILLS	THREAD CUTTERS	ROUTER BITS	DEBURRING TOOLS	ENGRAVING TOOLS	MILLING CUTTERS
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APPENDIX

In this section you will find helpful practical tips and information on the use of tools.

- **USING TOOLS**
- **THE RIGHT NUMBER OF TEETH**
- **SETTING THE MACHINING PARAMETERS**
- **CHOICE OF THE MILLING DIRECTION**
- **SETTING THE IMMERSION DEPTH**
- **COOLING/LUBRICATION**
- **WHAT TO DO IN CASE OF PROBLEMS?**
- **YOUR CONTACT TO VHF**

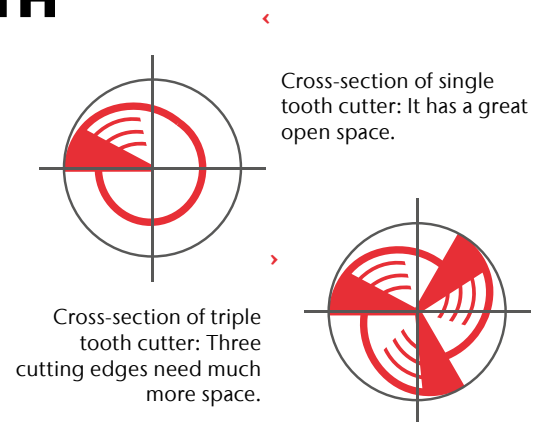
USING TOOLS

- Always choose a milling cutter which is suitable for the material which you process. Please note the corresponding icons and more detailed information in the description texts and use our recommendation matrix on page 22.
- The cutting edge length of the tool should be as short as possible and as long as necessary. It should be clamped as deep as possible into the collet chuck.
- If your material is not listed, select the material from the corresponding main category (plastics, non-ferrous metals, ...) that most closely matches your material in terms of hardness.

plastics ***	non-ferr. metals ***
ferrous metals ***	compo- sites ***
	wood ***

THE RIGHT NUMBER OF TEETH

- Single tooth cutters offer the largest open space in the chip flute and thus counteract the clogging of the cutter by material chips; so they have the lowest risk of clogging.
- The more cutting edges a milling tool has, the more the open space decreases, but at the same time, the wear is distributed over several cutting edges. The cutter also runs rounder and the surface becomes smoother.
- For plastics and non-ferrous metals, the single tooth cutter is the best option. A double tooth cutter is recommended when you are working on thermosetting plastics or harder sorts of aluminium. We recommend multi-tooth cutters almost exclusively for ferrous material.



SETTING THE MACHINING PARAMETERS

Given the multitude of parameters that interact with each other, it is not possible to provide general information about the tool parameters, so here are just a few general tips. **In any case, you must comply with all safety and security regulations of the machine!**

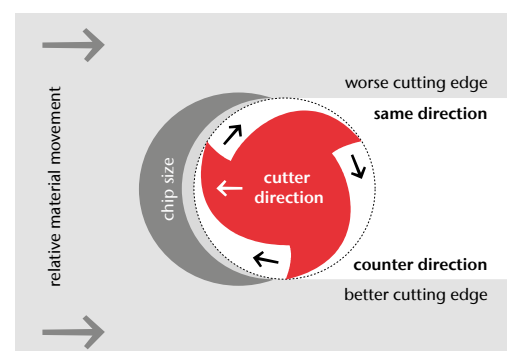
- In order to set optimal values for lowering speed, immersion depth, feed rate, and spindle speed when machining your workpieces, a large number of factors play a role, which you will find in the adjacent guiding questions.
- When you set the operational parameters, you should approach from the safe side, so you should choose at first for most materials a lower lowering speed, immersion depth and feed rate and then increase them gradually.

Guiding questions:

- What material is the workpiece made of?
- How is the workpiece fixed?
- Type of coolant/lubricant?
- Power/maximum rotational speed of the spindle?
- Minimum/maximum feed rate of the machine?
- Stiffness of the machine?

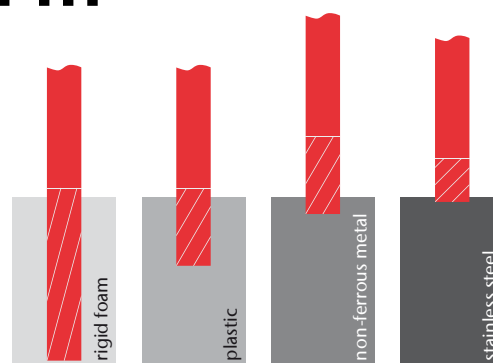
CHOICE OF THE MILLING DIRECTION

- The cutting edge runs in the counter direction as well as in most parts of the same direction against massive material. However, immediately before the exit, there is not much material left. So the last bit will often be rather torn off instead of being cleanly cut. Therefore the counter direction becomes smoother than the same direction.
- Thus we recommend to mill internal contours clockwise and external contours counterclockwise.
- However, a comparison is always recommended, as the effect varies depending on the machine, material and tool geometry.



SETTING THE IMMERSION DEPTH

- The immersion depth depends on the power of your spindle and on the stiffness of your machine. In case of doubt: When you mill deeper slots it is better to remove the material in several steps.
- General guidelines for the relationship of immersion depth and cutting edge diameter:
 - rigid foam up to 5-fold diameter
 - plastics (acrylic glass, etc.) up to 2-fold diameter
 - aluminium up to 0.5-fold diameter
 - steel up to 0.3-fold diameter
 - stainless steel up to 0.2-fold diameter.



COOLING/LUBRICATION

- The cooling with air or lubricant improves the surface quality and prolongs the tool life. If cooling is not possible, the recommended minimum values for rotational speed should be adhered to; the feed rate, however, should not be set too slow. In this case, the heat dissipation will be made by the chips, otherwise there is a risk of excessive heat generation.
- Recommended coolants/lubricants:
 - Aluminium: spray lubricant ALU-N or minimum quantity lubricant WSP 20 or Tec Liquid Pro
 - Steel/stainless steel: emulsion of spray lubricant AquaTec® and water or minimum quantity lubricant WSP 20 or Tec Liquid Pro
 - Plastics/acrylic glass: dry processing with chip extraction or cooling with compressed air.



WHAT TO DO IN CASE OF PROBLEMS?

- Melting of plastics: Reduce the rotational speed and increase the feed rate at the same time.
- Plugged milling cutter: Reduce immersion depth and avoid heat generation.
- Burr formation: Increase the cooling or increase the feed rate and reduce rotational speed and removal rate at the same time.
- Tool breakage: Reduce the feed rate and/or the immersion depth; check the collet chuck.
- If your machine permits only lower rates of feed than it would be possible according to tool and material data, you should reduce feed rate and rotational speed accordingly.



Ask us!

Take advantage of the possibility of personal advice by our milling tool specialists by phone or e-mail:
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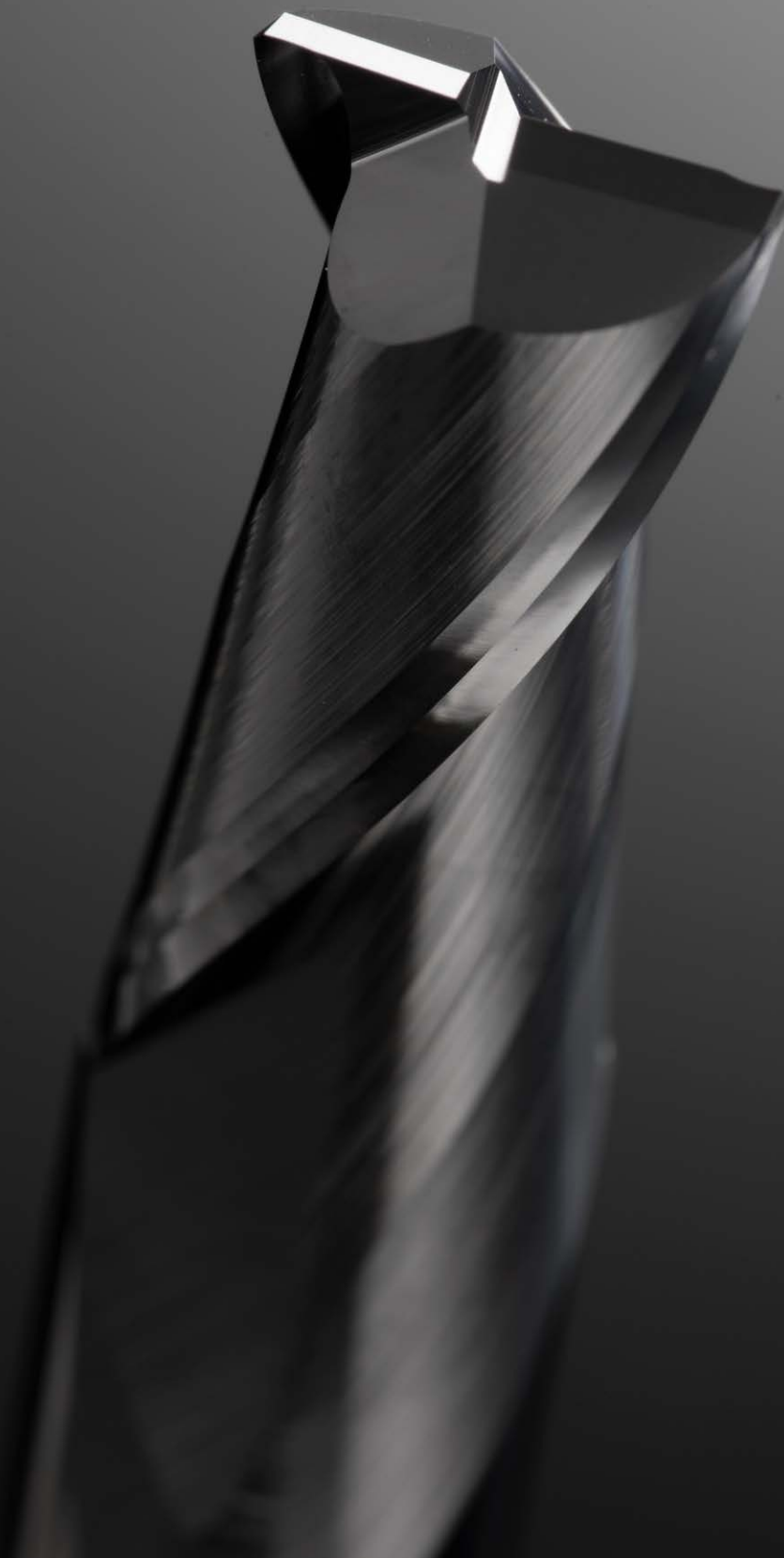
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