



**NEW**

FIND OUR PRODUCTS ONLINE

[SHOP.DIAGER-INDUSTRIE.COM](http://SHOP.DIAGER-INDUSTRIE.COM)

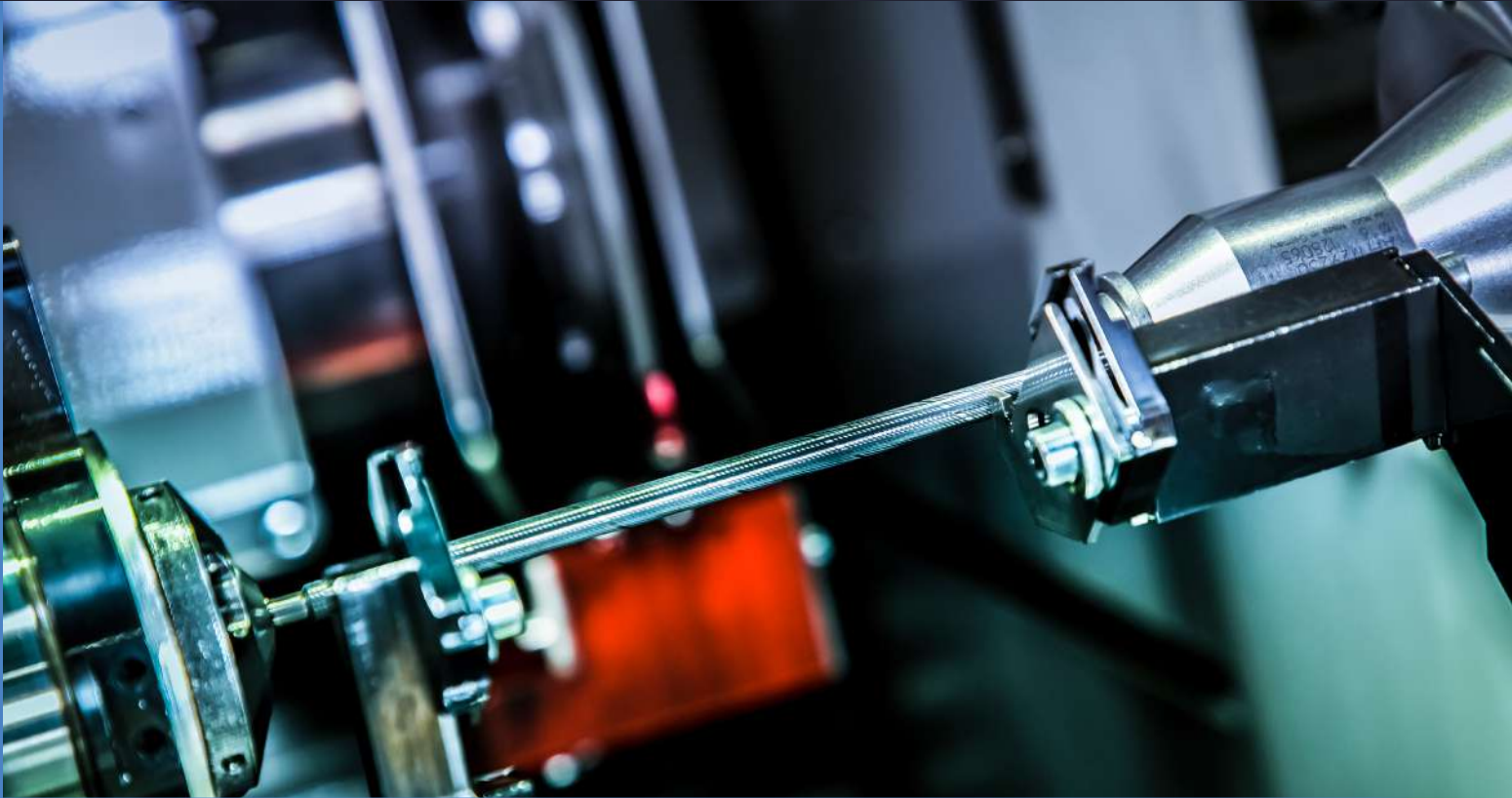


# CUTTING TOOLS FOR SOFT MATERIALS

SPECIFICALLY FOR PLASTICS, ALUMINIUM,  
WOOD, COMPOSITES, ETC...



**DIAGER<sup>®</sup>**  
INDUSTRIE



**F**or almost 70 years, Diager Industrie has operated as a specialised French designer and manufacturer of rotary carbide cutting tools. Located in Poligny in the Jura region of eastern France, the company develops special and standard, single-piece cutting tools. Diager Industrie draws on all the synergies generated by a group structure to design high-quality tools for manufacturers. The company has fostered strong partnerships with leading players in the engineering, aeronautics, space and automotive industries and focuses its expertise on a range of high quality products.

## **RESEARCH & DEVELOPMENT: TAKING THE COMPANY TO THE NEXT LEVEL**

We invest heavily in research, development and innovation. Our ambition is to be able to resolve the machining problems you face. Our investments enable us to develop comprehensive and innovative solutions for these problems. For all your drilling, milling and boring operations, our experts develop not only cutting tools but also the optimal process for your application since we are, first and foremost, a supplier of solutions.

To facilitate this, we have set up: a team tasked with finding solutions that optimise your manufacturing strategy and industrial logistics; and testing platforms designed to be compatible with customers' equipment that enables us to

validate our machining processes in real-life conditions. These resources enable us to accurately measure the productivity achievable with our cutting tools and thus provide you with a complete picture of the costs associated with our solutions and the production times they allow. Consequently, we can meet, very precisely, the most demanding requirements specifications and guarantee the performance of our cutting tools.

Our pool of 135 machining tools, 45 of which are numerically controlled, gives us total control over our processes and tools, to make them even more efficient.

# A MOTIVATED AND COMMITTED COMPANY

Diager Industrie's ethos is founded on excellent customer service and on ensuring the high quality of its products. Thanks to modern technologies and a significant investment from our staff, we do everything we can to reduce our impact on the environment. By adhering to a comprehensive environmental policy, we can guarantee that we control our activities and products. Caring for the environment is a constant priority, and informs all the activities performed by the company.



## PROCEDURES AND ACCREDITATIONS:



Certified ISO 9001 and 14001



Quality



Compliance with standards, respect for the environment



Awarded CSR (ISO) 26000 by AFNOR and certified at the "CONFIRMED" level.



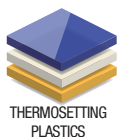
Our approach to CSR is a philosophy which drives our actions and guides our strategy. Our commitment to CSR indicates that our organisation takes responsibility for the impacts of its decisions and of its duties with regard to the sustainable development of its activities. We are proud of our certification which recognises our commitments to the well-being of our staff, our respect for the environment and product quality.

**Diager Industrie solutions come with the additional benefits of comprehensive support and optimal technical follow-up. Our teams are ready to work with you to ensure your success.**



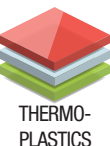


# MATERIALS



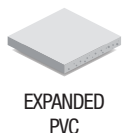
## THERMOSET PLASTICS

(PUR, Epoxy, DAP, PI, PF)

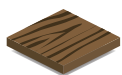


## THERMOPLASTICS

(PMMA, PE, PP, ABS, PC, POM, PET, PEEK, PS, PA)



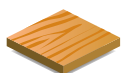
## EXPANDED PVC



HARDWOODS

## HARDWOODS

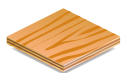
(Oak, beech, chestnut, elm, acacia, etc.)



SOFTWOODS

## SOFTWOODS

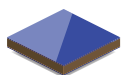
(Pine, birch, larch, spruce, etc.)



COMPOSITE WOOD PRODUCTS

## COMPOSITE WOOD PRODUCTS

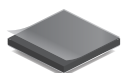
(MDF, melamine, plywood, etc.)



COMPACT LAMINATES

## COMPACT LAMINATES

(TRESPA®, FunderMAX®, etc.)



PHENOLIC MATERIALS

## PHENOLIC MATERIALS



NON-FERROUS METALS

## NON-FERROUS METALS

(Aluminium, brass)



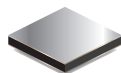
STEEL

## STEEL



STAINLESS STEEL

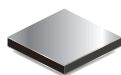
## STAINLESS STEEL



ALUMINIUM-FACED COMPOSITE PANELS

## ALUMINIUM-FACED COMPOSITE PANELS

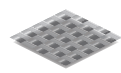
(Dibond®, Alucobond®)



STEEL-FACED COMPOSITE PANELS

## STEEL-FACED COMPOSITE PANELS

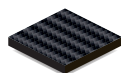
(Steelbond®)



GLASS-FILLED PLASTICS

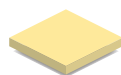
## GLASS-FILLED PLASTICS

(<40% glass fibres)



KEVLAR

## KEVLAR



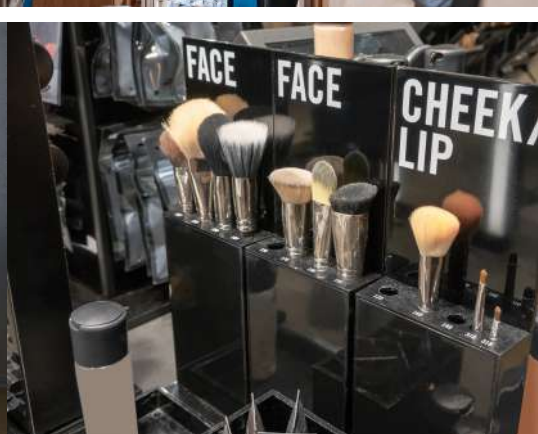
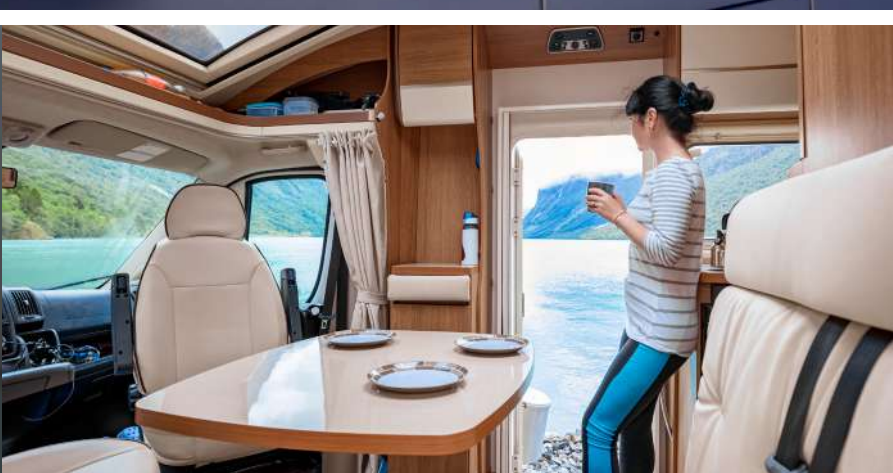
FOAMED MATERIALS

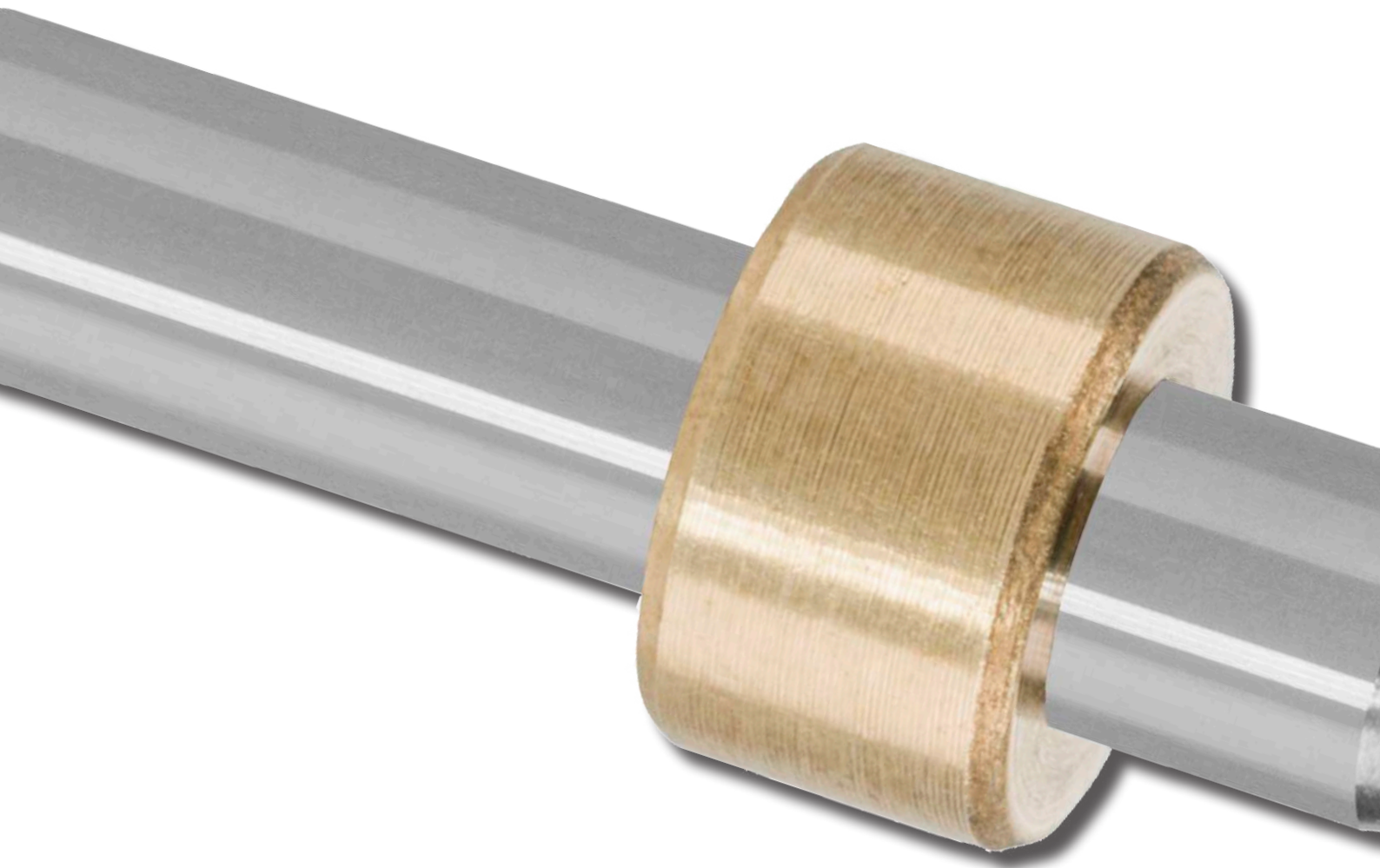
## FOAMED MATERIALS





**POS ADVERTISING  
SIGNAGE  
FACADES  
JOINERY ITEMS  
ACCESSORIES  
STANDS**





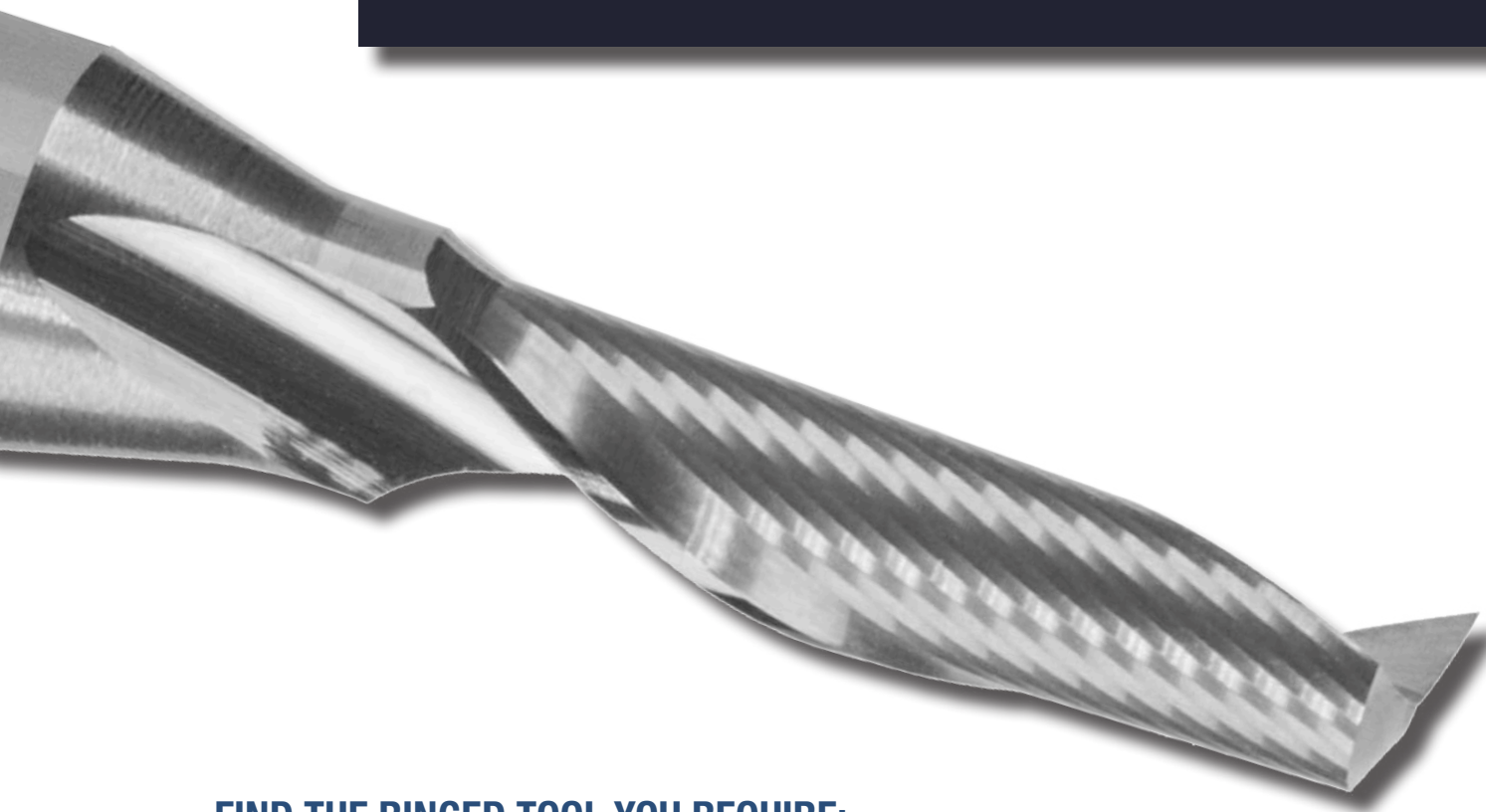
**DIAGER INDUSTRIE NOW OFFERS A RANGE OF RINGED TOOLS FOR PLASTICS AND COMPOSITES ON CUTTERS WITH A 6 MM SHANK.**

**AVAILABLE FOR MACHINES REQUIRING THIS CONFIGURATION, THE NEW RANGE OF DIAGER INDUSTRIE TOOLS OFFERS COMPREHENSIVE CHOICE, HIGH QUALITY AND OUTSTANDING PERFORMANCE FOR ALL YOUR MACHINING NEEDS.**



# NEW

## RINGED CUTTERS



### FIND THE RINGED TOOL YOU REQUIRE:

Example with reference:

- standard without ring: 4013--0400C
- with ring: 4013--0400C-B

Add “-B” to the end of your usual reference

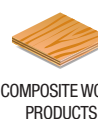
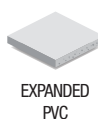
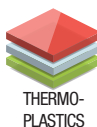
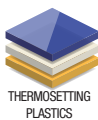
### FIND THE REFERENCES IN OUR PRODUCT LISTS:

Ø D1 mm	Ø D2 mm	L2 mm	L1 mm	z	Part Ref.	With ring	Standard coating	With ring	Upgraded coating	With ring
4	6*	10	50	1	4023--0400	4023--0400-B	4023-X0400	4023-X0400-B	4023-NHC0400B	4023-NHC0400-B
5	6*	12	50	1	4023--0500	4023--0500-B	4023-X0500	4023-X0500-B	4023-NHC0500B	4023-NHC0500-B

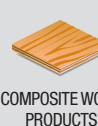


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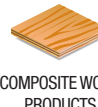
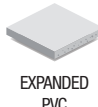
## 4013 SINGLE-TOOTH CUTTERS WITH RIGHT-HAND HELIX P. 12



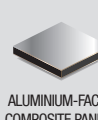
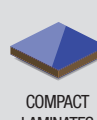
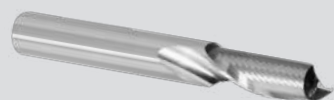
## 4012 SINGLE-TOOTH CUTTERS WITH LEFT-HAND HELIX P. 13



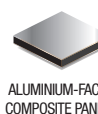
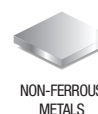
## 4013S SINGLE-TOOTH CUTTERS WITH RIGHT-HAND HELIX WITH FLAT TIP FOR FINISH P. 14



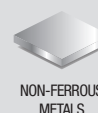
## 4053 SINGLE-TOOTH WITH RIGHT-HAND HELIX, HIGH-EFFICIENCY CUTTERS P. 15



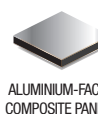
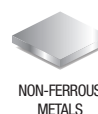
## 4023 SINGLE-TOOTH CUTTERS WITH RIGHT-HAND HELIX FOR ALUMINIUM P. 16



## 4022 SINGLE-TOOTH CUTTERS WITH LEFT-HAND HELIX FOR ALUMINIUM P. 17



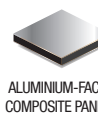
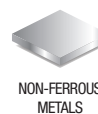
## 4001 SINGLE-TOOTH STUB CUTTERS WITH RIGHT-HAND HELIX FOR ALUMINIUM P. 18

























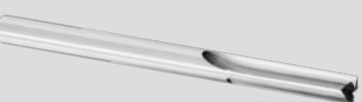






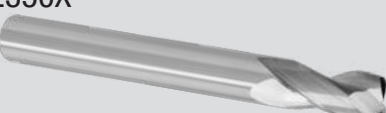











## 4001X COATED, SINGLE-TOOTH STUB CUTTERS WITH RIGHT-HAND HELIX FOR ALUMINIUM P. 19



## 4002 COATED, SINGLE-TOOTH STUB CUTTERS WITH LEFT-HAND HELIX FOR ALUMINIUM P. 21



4202	SINGLE-TOOTH CUTTERS WITH CHAMFER FOR PLASTICS	P. 22
	 THERMOSETTING PLASTICS  THERMO-PLASTICS  EXPANDED PVC  HARDWOODS  SOFTWOODS  COMPOSITE WOOD PRODUCTS  NON-FERROUS METALS  ALUMINIUM-FACED COMPOSITE PANELS	
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4014	TWO-TOOTH CUTTERS WITH LEFT-HAND HELIX	P. 25
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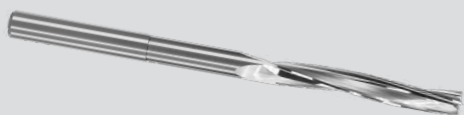
## 4060 THREE-TOOTH CUTTERS FOR FOAMED MATERIALS AND WOOD

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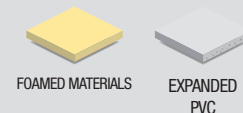


## 4061 LONG THREE-TOOTH CUTTERS FOR FOAMED MATERIALS

P.32



NEW



## 4030 WOODSPEED - COATED COMPRESSION CUTTERS

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## 4100 TWO-TOOTH CUTTERS FOR CUTTING PROFILES AND SLOTS IN FIBROUS MATERIALS (KEVLAR/ARAMIDE)

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## 2344 SPHERICAL, TWO-TOOTH CUTTERS

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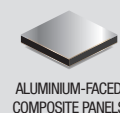


## 4045 HIGH-SPEED CONICAL TWO-TOOTH CUTTERS FOR SLOT CUTTING - FOLDING

P.37

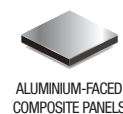


NEW



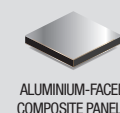
## 4041 CONICAL ONE-TOOTH CUTTERS

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## 4040 CONICAL CUTTERS

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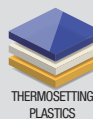
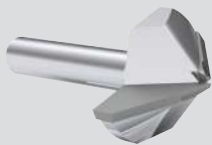
## 4044 CONICAL CUTTERS

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## 4042 CONICAL CUTTERS



THERMOSETTING  
PLASTICS



EXPANDED  
PVC



HARDWOODS



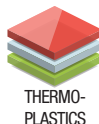
COMPOSITE WOOD  
PRODUCTS



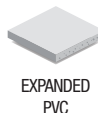
COMPACT  
LAMINATES

P. 42

## 4043 CONICAL CUTTERS



THERMO-  
PLASTICS



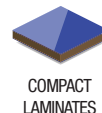
EXPANDED  
PVC



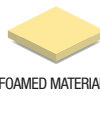
SOFTWOODS



COMPOSITE WOOD  
PRODUCTS



COMPACT  
LAMINATES



FOAMED MATERIALS

P. 43

## 4070 CONICAL ENGRAVING CUTTERS



THERMOSETTING  
PLASTICS



THERMO-  
PLASTICS



EXPANDED  
PVC



HARDWOODS



SOFTWOODS



COMPOSITE WOOD  
PRODUCTS



COMPACT  
LAMINATES



NON-FERROUS  
METALS



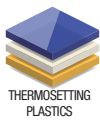
ALUMINIUM-FACED  
COMPOSITE PANELS



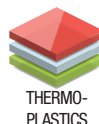
STEEL-FACED  
COMPOSITE PANELS

P. 44

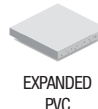
## 4080 FACE MILLING CUTTERS



THERMOSETTING  
PLASTICS



THERMO-  
PLASTICS



EXPANDED  
PVC



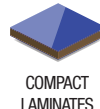
HARDWOODS



SOFTWOODS



COMPOSITE WOOD  
PRODUCTS



COMPACT  
LAMINATES

P. 45

## 4110 SLITTING SAW CUTTERS ON A SHANK



THERMOSETTING  
PLASTICS



THERMO-  
PLASTICS



EXPANDED  
PVC



HARDWOODS



SOFTWOODS



COMPOSITE WOOD  
PRODUCTS



COMPACT  
LAMINATES

P. 46

## KNIFE BLADES



NEW

P. 47

## COLLETS



P. 52

## CUTTING CONDITIONS

P. 54

IMPACT OF COLLETS ON CUTTING QUALITY  
ADVICE ABOUT MACHINING.  
DEPTH OF CUT AND MACHINING DIRECTION

P. 55

## MATERIALS:



THERMOSETTING  
PLASTICS



THERMO-  
PLASTICS



EXPANDED  
PVC



HARDWOODS



SOFTWOODS



COMPOSITE WOOD  
PRODUCTS



FOAMED MATERIALS

## Possible uses:



COMPACT  
LAMINATES



ALUMINIUM-FACED  
COMPOSITE PANELS



GLASS-FILLED  
PLASTICS

## THE MOST VERSATILE RANGE

SMOOTH AND POLISHED FLUTE, LIMITED BUILT-UP EDGE EFFECTS

UPCUT TOOL, UPWARDS CHIP REMOVAL:

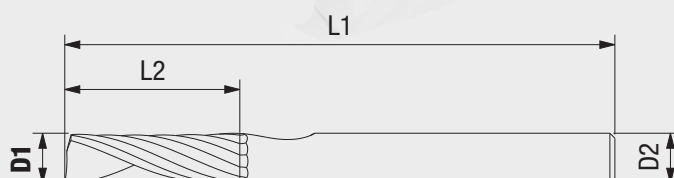
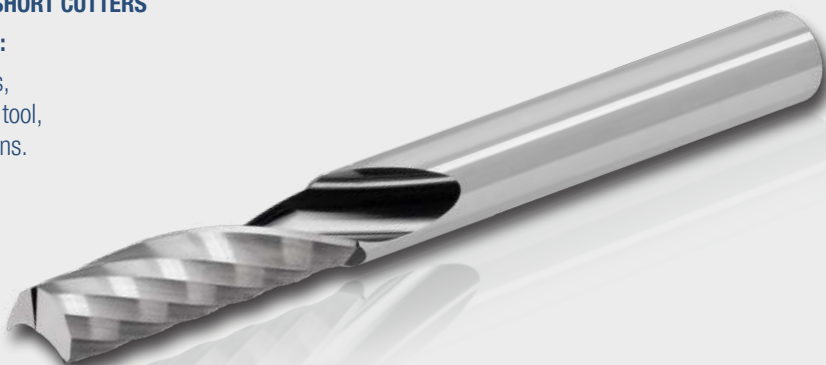
Chips evacuated efficiently.

The most commonly used.

## WHEN POSSIBLE, SELECT SHORT CUTTERS

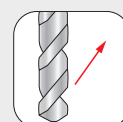
(CUTTING LENGTH = 2 X Ø):

- Improves surface finishes,
- Longer service life of the tool,
- Improves cutting conditions.



Carbide

SOLID  
CARBIDE



UPCUT  
TOOL



MILLING /  
SLOTTING

Ø D1 mm	Ø D2 mm	L2 mm	L1 mm	z	Part Ref.	NEW With ring
1	3*	4	30	1	4013--0100	
1.5	3*	6	30	1	4013--0150	
2	2	4	30	1	4013--0200	
2	6*	4	50	1	4013--0200A	4013--0200A-B
2	2	8	30	1	4013--0200B	
2	2	8	60	1	4013--0200C	
2	3*	8	30	1	4013--0200D	
2	6*	8	50	1	4013--0200E	4013--0200E-B
2.5	2.5	8	40	1	4013--0250	
2.5	2.5	8	60	1	4013--0250A	
3	3	6	40	1	4013--0300	
3	6*	6	50	1	4013--0300A	4013--0300A-B
3	3	10	40	1	4013--0300B	
3	3	10	60	1	4013--0300C	
3	6*	10	50	1	4013--0300D	4013--0300D-B
3	3	12	40	1	4013--0300E	
3	6*	12	50	1	4013--0300F	4013--0300F-B
3	3	15	40	1	4013--0300G	
3	3	20	60	1	4013--0300H	
3	6*	20	60	1	4013--0300J	4013--0300J-B
3.17	3.17	12.7	50.8	1	4013--0317	
3.17	6.35*	12.7	50.8	1	4013--0317A	
4	4	8	50	1	4013--0400	
4	6*	8	50	1	4013--0400A	4013--0400A-B
4	4	12	50	1	4013--0400B	
4	6*	12	50	1	4013--0400C	4013--0400C-B
4	4	14	50	1	4013--0400D	
4	6*	14	50	1	4013--0400E	4013--0400E-B

Ø D1 mm	Ø D2 mm	L2 mm	L1 mm	z	Part Ref.	NEW With ring
4	4	22	60	1	4013--0400F	
4	6*	22	60	1	4013--0400G	4013--0400G-B
4	4	30	70	1	4013--0400H	
4.76	4.76	15.87	50.8	1	4013--0476	
4.76	6.35*	15.87	50.8	1	4013--0476A	
4.76	6.35*	31.75	76.2	1	4013--0476B	
5	5	16	60	1	4013--0500	
5	6*	16	50	1	4013--0500A	4013--0500A-B
5	5	22	60	1	4013--0500B	
5	6*	22	60	1	4013--0500C	4013--0500C-B
5	5	30	70	1	4013--0500D	
6	6	14	50	1	4013--0600	4013--0600-B
6	6	22	60	1	4013--0600A	4013--0600A-B
6	6	32	70	1	4013--0600B	4013--0600B-B
6	6	38	80	1	4013--0600C	4013--0600C-B
6.35	6.35	19.05	50.8	1	4013--0635	
6.35	6.35	28.57	76.2	1	4013--0635A	
6.35	6.35	38.1	76.2	1	4013--0635B	
8	8	22	60	1	4013--0800	
8	8	32	70	1	4013--0800A	
8	8	38	80	1	4013--0800B	
8	8	42	80	1	4013--0800C	
10	10	32	75	1	4013--1000	
10	10	45	85	1	4013--1000A	
12	12	32	75	1	4013--1200	
12	12	42	100	1	4013--1200A	
12	12	52	105	1	4013--1200B	
14	14	62	120	1	4013--1400	

\* Strengthened shank

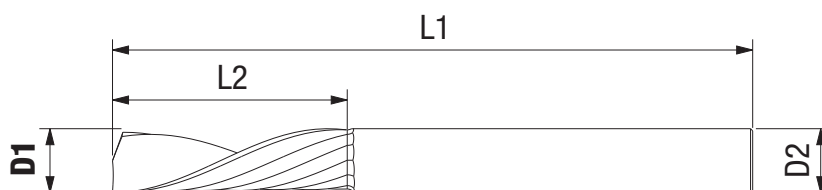
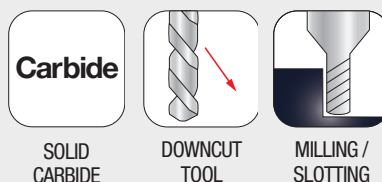
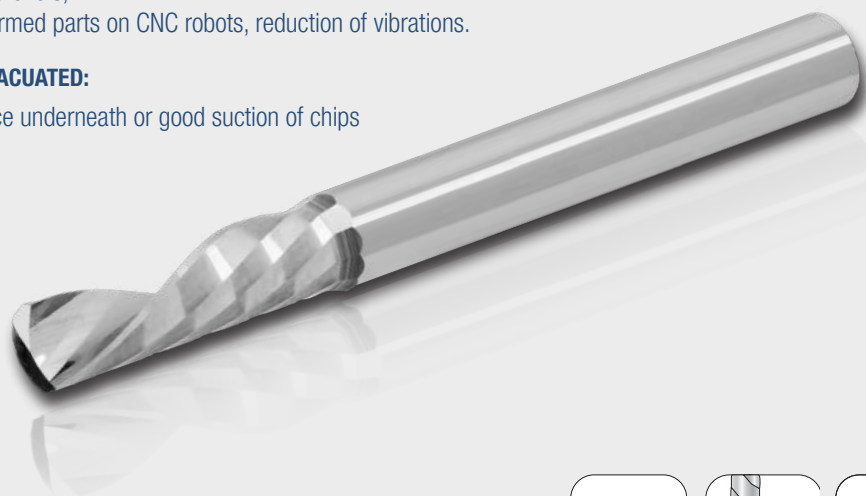
## VERSATILE RANGE

SMOOTH AND POLISHED FLUTE, LIMITED BUILT-UP EDGE EFFECTS  
DOWNCUT TOOL, DOWNWARDS REMOVAL OF CHIPS

- Workpieces held better due to the downwards force.
- Limits the delamination of the upper face,
- Suited to thin materials,
- Milling thermoformed parts on CNC robots, reduction of vibrations.

## CHIPS POORLY EVACUATED:

Provide clear space underneath or good suction of chips



Ø D1 mm	Ø D2 mm	L2 mm	L1 mm	z	Part Ref.	NEW With ring
1	3*	4	30	1	4012--0100	
1.5	3*	6	30	1	4012--0150	
2	2	8	30	1	4012--0200	
2	2	8	60	1	4012--0200A	
2	3*	8	30	1	4012--0200B	
2	6*	8	50	1	4012--0200C	4012--0200C-B
2.5	2.5	8	40	1	4012--0250	
2.5	2.5	8	60	1	4012--0250A	
3	3	10	40	1	4012--0300	
3	3	10	60	1	4012--0300A	
3	6*	10	50	1	4012--0300B	4012--0300B-B
3.17	6.35*	12.7	50.8	1	4012--0317	
4	4	12	50	1	4012--0400	
4	6*	12	50	1	4012--0400A	4012--0400A-B

Ø D1 mm	Ø D2 mm	L2 mm	L1 mm	z	Part Ref.	NEW With ring
4	4	20	60	1	4012--0400B	
4	4	30	70	1	4012--0400C	
4.76	6.35*	15.87	50.8	1	4012--0476	
5	5	16	60	1	4012--0500	4012--0500A-B
5	6*	16	50	1	4012--0500A	
5	5	30	70	1	4012--0500B	4012--0600-B
6	6	20	60	1	4012--0600	4012--0600A-B
6	6	30	70	1	4012--0600A	4012--0600B-B
6	6	38	80	1	4012--0600B	
6.35	6.35	19.05	50.8	1	4012--0635	
8	8	22	60	1	4012--0800	
8	8	38	80	1	4012--0800A	
10	10	30	75	1	4012--1000	
12	12	30	75	1	4012--1200	

\*Strengthened shank

## MATERIALS:



## Possible uses:





## MATERIALS:



THERMOSETTING  
PLASTICS



THERMO-  
PLASTICS



EXPANDED  
PVC



HARDWOODS



SOFTWOODS



COMPOSITE WOOD  
PRODUCTS



FOAMED MATERIALS

## Possible uses:



COMPACT  
LAMINATES



ALUMINIUM-FACED  
COMPOSITE PANELS

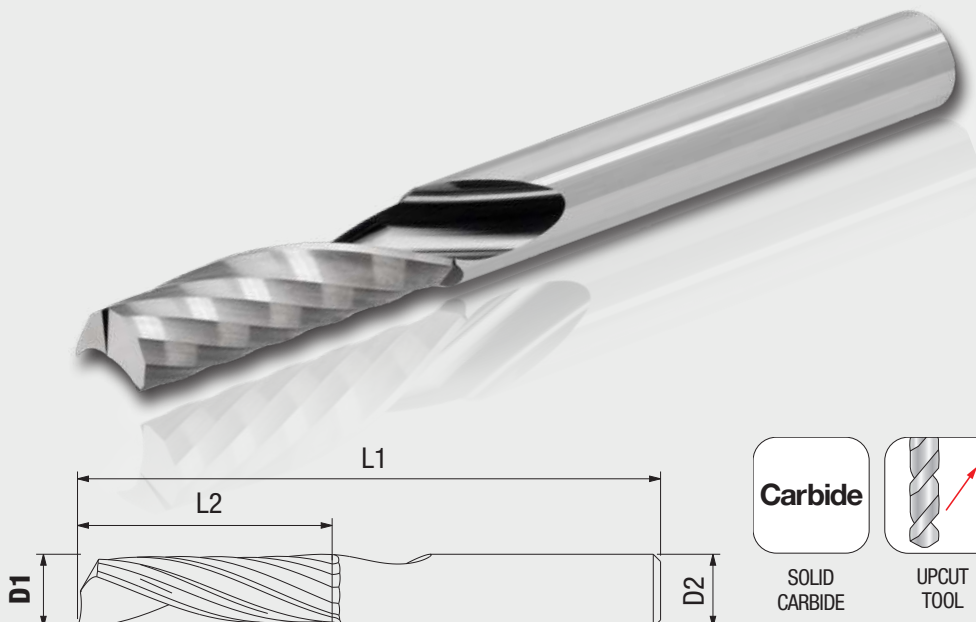


GLASS-FILLED  
PLASTICS

## CUTTER DERIVED FROM THE 4013 WITH FLAT TIP FOR FINISH.

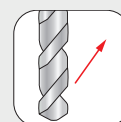
IMPROVES THE SURFACE FINISH AT THE BOTTOM OF THE POCKET.  
SMOOTH AND POLISHED FLUTE, LIMITED BUILT-UP EDGE EFFECTS.  
UPCUT TOOL, UPWARDS REMOVAL OF CHIPS.  
CHIPS EVACUATED EFFICIENTLY.

**NEW**



**Carbide**

SOLID  
CARBIDE



UPCUT  
TOOL



MILLING /  
SLOTING

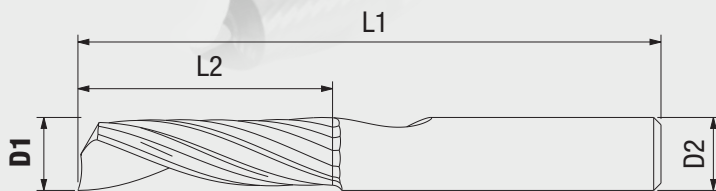
Ø D1	Ø D2	L2	L1	z	Part Ref.	NEW With ring
mm	mm	mm	mm			
3	6	10	50	1	4013S--0300	4013S--0300-B
4	6	12	50	1	4013S--0400	4013S--0400-B
5	6	16	50	1	4013S--0500	4013S--0500-B
6	6	22	60	1	4013S--0600	4013S--0600-B
8	8	22	60	1	4013S--0800	
10	10	32	75	1	4013S--1000	
12	12	32	75	1	4013S--1200	

**THIS RANGE'S GEOMETRY HAS BEEN SPECIALLY DEVELOPED TO PRODUCE A BETTER SURFACE FINISH IN PMMA, POLYCARBONATE, PA6, CORIAN AND COMPACT LAMINATES.**  
SMOOTH AND POLISHED FLUTE, LIMITED BUILT-UP EDGE EFFECTS.  
UPCUT TOOL, UPWARDS REMOVAL OF CHIPS.  
MORE RESISTANT TO ABRASION.

#### WHERE POSSIBLE, SELECT SHORT CUTTERS

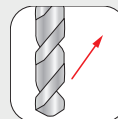
(CUTTING LENGTH = 2 X Ø):

- Improves surface finishes,
- Longer service life of the tool,
- Improves cutting conditions.



**Carbide**

SOLID  
CARBIDE



UPCUT  
TOOL



MILLING /  
SLOTTING

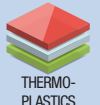
Ø D1 mm	Ø D2 mm	L2 mm	L1 mm	z	Part Ref.	NEW With ring
2	3*	4	30	1	4053--0200	
2	6*	4	50	1	4053--0200A	4053--0200A-B
2	6*	6	50	1	4053--0200B	4053--0200B-B
2	3*	8	30	1	4053--0200C	
3	3	6	40	1	4053--0300	
3	6*	6	50	1	4053--0300A	4053--0300A-B
3	3	9	40	1	4053--0300B	
3	6*	9	50	1	4053--0300C	4053--0300C-B
4	4	8	50	1	4053--0400	
4	6*	8	50	1	4053--0400A	4053--0400A-B
4	4	13	50	1	4053--0400B	
4	6*	13	50	1	4053--0400C	4053--0400C-B
4.76	4.76	12.7	50.8	1	4053--0476	
5	5	16	60	1	4053--0500	
5	6*	16	50	1	4053--0500A	4053--0500A-B
6	6	16	50	1	4053--0600	4053--0600-B
6	6	22	60	1	4053--0600A	4053--0600A-B
6	6	32	70	1	4053--0600B	4053--0600B-B
6.35	6.35	15.87	50.8	1	4053--0635	
8	8	22	60	1	4053--0800	
8	8	32	70	1	4053--0800A	
9.52	9.52	25.4	60.3	1	4053--0952	
10	10	23	60	1	4053--1000	
10	10	32	75	1	4053--1000A	
12	12	42	100	1	4053--1200	

\*Strengthened shank

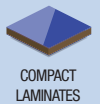
#### MATERIALS:



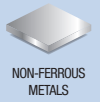
THERMOSETTING  
PLASTICS



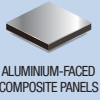
THERMO-  
PLASTICS



COMPACT  
LAMINATES

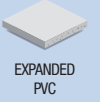


NON-FERROUS  
METALS



ALUMINIUM-FACED  
COMPOSITE PANELS

#### Possible uses:



EXPANDED  
PVC



HARDWOODS



SOFTWOODS



COMPOSITE WOOD  
PRODUCTS



GLASS-FILLED  
PLASTICS

# FAMILY 4023

# SINGLE-TOOTH CUTTERS WITH RIGHT-HAND HELIX FOR ALUMINIUM

## MATERIALS:



NON-FERROUS  
METALS



ALUMINIUM-FACED  
COMPOSITE PANELS

## Possible uses:



THERMOSETTING  
PLASTICS



THERMO-  
PLASTICS



EXPANDED  
PVC



HARDWOODS



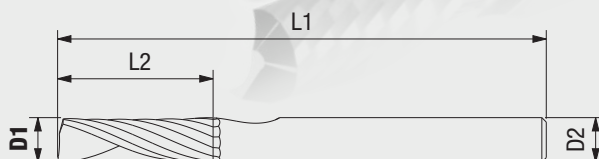
SOFTWOODS



COMPOSITE WOOD  
PRODUCTS

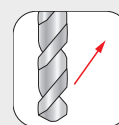
**RANGE SPECIFICALLY FOR NON-FERROUS METALS (ALUMINIUM, BRASS, COPPER, ETC.)**  
SMOOTH AND POLISHED FLUTE, LIMITED BUILT-UP EDGE EFFECTS  
UPCUT TOOL, UPWARDS REMOVAL OF CHIPS.

Uncoated cutter, lubrication recommended.



**Carbide**

SOLID  
CARBIDE



UPCUT  
TOOL



MILLING /  
SLOTTING



USE  
COOLANT

Ø D1 mm	Ø D2 mm	L2 mm	L1 mm	z	Part Ref.	NEW With ring	Standard coating	NEW With ring	Upgraded coating	NEW With ring
1.5	3*	4	30	1	4023--0150		4023-X0150		4023-NHC0150	
2	3*	5	30	1	4023--0200		4023-X0200		4023-NHC0200	
2.5	3*	6	30	1	4023--0250		4023-X0250		4023-NHC0250	
3	3	8	40	1	4023--0300		4023-X0300		4023-NHC0300	
3.17	3.17	7.93	38.1	1	4023--0317		4023-X0317		4023-NHC0317	
3.17	6.35*	7.93	50.8	1	4023--0317A		4023-X0317A		4023-NHC0317A	
4	6*	10	50	1	4023--0400	4023--0400-B	4023-X0400	4023-X0400-B	4023-NHC0400	
4	4	12	60	1	4023--0400A		4023-X0400A		4023-NHC0400A	
4	4	20	60	1	4023--0400B		4023-X0400B		4023-NHC0400B	4023-NHC0400-B
4	4	30	70	1	4023--0400C		4023-X0400C		4023-NHC0400C	
4.76	4.76	12.7	50.8	1	4023--0476		4023-X0476		4023-NHC0476	
4.76	6.35*	12.7	50.8	1	4023--0476A		4023-X0476A		4023-NHC0476A	
5	6*	12	50	1	4023--0500	4023--0500-B	4023-X0500	4023-X0500-B	4023-NHC0500	
5	5	16	60	1	4023--0500A		4023-X0500A		4023-NHC0500A	
5	8*	25	70	1	4023--0500B		4023-X0500B		4023-NHC0500B	4023-NHC0500-B
5	5	30	70	1	4023--0500C		4023-X0500C		4023-NHC0500C	
5	8*	35	80	1	4023--0500D		4023-X0500D		4023-NHC0500D	
6	6	15	50	1	4023--0600	4023--0600-B	4023-X0600	4023-X0600-B	4023-NHC0600	
6	6	15	70	1	4023--0600A	4023--0600A-B	4023-X0600A	4023-X0600A-B	4023-NHC0600A	
6	6	20	60	1	4023--0600B	4023--0600B-B	4023-X0600B	4023-X0600B-B	4023-NHC0600B	4023-NHC0600-B
6	6	30	70	1	4023--0600C	4023--0600C-B	4023-X0600C	4023-X0600C-B	4023-NHC0600C	4023-NHC0600A-B
6	8*	30	80	1	4023--0600D		4023-X0600D		4023-NHC0600D	4023-NHC0600B-B
6	6	38	80	1	4023--0600E	4023--0600E-B	4023-X0600E	4023-X0600E-B	4023-NHC0600E	4023-NHC0600C-B
6.35	6.35	15.87	50.8	1	4023--0635		4023-X0635		4023-NHC0635	
8	8	20	60	1	4023--0800		4023-X0800		4023-NHC0800	4023-NHC0600E-B
8	8	20	80	1	4023--0800A		4023-X0800A		4023-NHC0800A	
8	8	38	80	1	4023--0800B		4023-X0800B		4023-NHC0800B	
10	10	23	60	1	4023--1000		4023-X1000		4023-NHC1000	
10	10	23	100	1	4023--1000A		4023-X1000A		4023-NHC1000A	
10	10	30	75	1	4023--1000B		4023-X1000B		4023-NHC1000B	

\*Strengthened shank





# SINGLE-TOOTH CUTTERS WITH LEFT-HAND HELIX FOR ALUMINIUM

## FAMILY 4022

### RANGE SPECIFICALLY FOR NON-FERROUS METALS (ALUMINIUM, BRASS, COPPER, ETC.)

SMOOTH AND POLISHED FLUTE, LIMITED BUILT-UP EDGE EFFECTS  
DOWNCUT TOOL, DOWNWARDS REMOVAL OF CHIPS

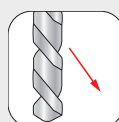
- Workpieces held better due to the downwards force.
- Limits the delamination of the upper face.
- Suited to thin materials.
- Milling thermoformed parts on CNC robots, reduction of vibrations.

Uncoated cutter, lubrication recommended.

Use NHC coated version for lubrication-free machining



SOLID CARBIDE



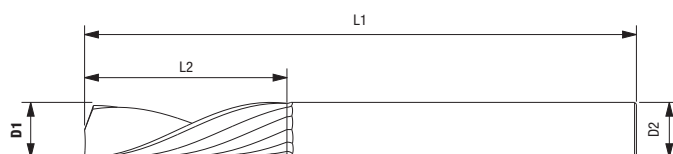
DOWNCUT TOOL



MILLING / SLOTTING



USE COOLANT



Ø D1 mm	Ø D2 mm	L2 mm	L1 mm	z	Part Ref.	NEW	Standard coating	NEW	Upgraded coating	NEW
						With ring		With ring		With ring
1.5	3*	4	30	1	4022--0150		4022-X0150		4022-NHC0150	
2	3*	5	30	1	4022--0200		4022-X0200		4022-NHC0200	
2.5	3*	6	30	1	4022--0250		4022-X0250		4022-NHC0250	
3	3	8	40	1	4022--0300		4022-X0300		4022-NHC0300	
3.17	6.35*	7.93	50.8	1	4022--0317		4022-X0317		4022-NHC0317	
4	6*	10	50	1	4022--0400	4022--0400-B	4022-X0400	4022-X0400-B	4022-NHC0400	4022-NHC0400-B
4	4	12	60	1	4022--0400A		4022-X0400A		4022-NHC0400A	
4.76	6.35*	12.7	50.8	1	4022--0476A		4022-X0476A		4022-NHC0476A	
5	6*	12	50	1	4022--0500	4022--0500-B	4022-X0500	4022-X0500-B	4022-NHC0500	4022-NHC0500-B
5	5	16	60	1	4022--0500A		4022-X0500A		4022-NHC0500A	
6	6	15	60	1	4022--0600	4022--0600-B	4022-X0600	4022-X0600-B	4022-NHC0600	4022-NHC0600-B
6.35	6.35	15.87	50.8	1	4022--0635		4022-X0635		4022-NHC0635	
8	8	20	60	1	4022--0800		4022-X0800		4022-NHC0800	
10	10	23	60	1	4022--1000		4022-X1000		4022-NHC1000	

\* Strengthened shank

FOR THE 4022 AND 4023 CUTTERS, THE TWO COATED VERSIONS ARE SUITED TO MACHINING WITHOUT LUBRICATION.

THE UPGRADED COATING OFFERS GREATER RESISTANCE TO ABRASION

### MATERIALS:



NON-FERROUS METALS



ALUMINIUM-FACED COMPOSITE PANELS

### Possible uses:



THERMOSETTING PLASTICS



THERMO-PLASTICS



EXPANDED PVC



HARDWOODS



SOFTWOODS



COMPOSITE WOOD PRODUCTS

## MATERIALS:



NON-FERROUS  
METALS



ALUMINIUM-FACED  
COMPOSITE PANELS

## Possible uses:



THERMOSETTING  
PLASTICS



THERMO-  
PLASTICS



EXPANDED  
PVC



HARDWOODS



SOFTWOODS



COMPOSITE WOOD  
PRODUCTS

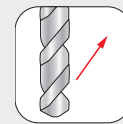
**RANGE SPECIFICALLY FOR NON-FERROUS METALS (ALUMINIUM, BRASS, COPPER, ETC.)**  
**PARTICULARLY RECOMMENDED FOR DIBOND® TYPE TAC AND ACM**  
**SMOOTH AND POLISHED FLUTE, LIMITED BUILT-UP EDGE EFFECTS**  
**UPCUT TOOL, UPWARDS REMOVAL OF CHIPS. STUB CUTTER SERIES, HIGH RIGIDITY**

- Improves surface finishes,
- Longer service life of the tool,
- Improves cutting conditions.

Uncoated cutter, lubrication recommended



SOLID  
CARBIDE



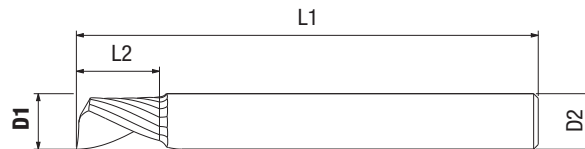
UPCUT  
TOOL



MILLING /  
SLOTTING



USE  
COOLANT



Ø D1 mm	Ø D2 mm	L2 mm	L1 mm	z	Part Ref.	NEW With ring
3	3	4.5	40	1	4001--0300	
3	6*	4.5	50	1	4001--0300A	4001--0300A-B
4	4	6	50	1	4001--0400	
4	6*	6	50	1	4001--0400A	4001--0400A-B
5	5	7.5	50	1	4001--0500	
5	6*	7.5	50	1	4001--0500A	4001--0500A-B
6	6	9	50	1	4001--0600	4001--0600-B
8	8	12	60	1	4001--0800	
10	10	15	65	1	4001--1000	
12	12	18	65	1	4001--1200	

\* Strengthened shank

# COATED, SINGLE-TOOTH STUB CUTTERS WITH RIGHT-HAND HELIX FOR ALUMINIUM

**FAMILY  
4001 X**

**RANGE SPECIFICALLY FOR NON-FERROUS METALS (ALUMINIUM, BRASS, COPPER, ETC.)**

PARTICULARLY RECOMMENDED FOR DIBOND® TYPE TAC AND ACM

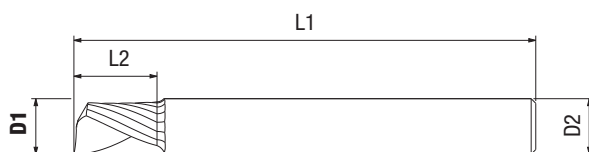
SMOOTH AND POLISHED FLUTE, LIMITED BUILT-UP EDGE EFFECTS

UPCUT TOOL, UPWARDS REMOVAL OF CHIPS.

STUB CUTTER SERIES, HIGH RIGIDITY

COATED CUTTER, FOR USE WITHOUT LUBRICATION.

- Improves surface finishes,
- Longer service life of the tool,
- Improves cutting conditions.



Ø D1 mm	Ø D2 mm	L2 mm	L1 mm	z	Part Ref.	<b>NEW</b> With ring	Upgraded coating	<b>NEW</b> With ring
2	6*	3	50	1	4001-X0200	4001-X0200-B	4001-NHC0200	4001-NHC0200-B
3	3	4.5	40	1	4001-X0300		4001-NHC0300	
3	6*	4.5	50	1	4001-X0300A	4001-X0300A-B	4001-NHC0300A	4001-NHC0300A-B
4	4	6	50	1	4001-X0400		4001-NHC0400	
4	6*	6	50	1	4001-X0400A	4001-X0400A-B	4001-NHC0400A	4001-NHC0400A-B
5	5	7.5	50	1	4001-X0500		4001-NHC0500	
5	6*	7.5	50	1	4001-X0500A	4001-X0500A-B	4001-NHC0500A	4001-NHC0500A-B
6	6	9	50	1	4001-X0600	4001-X0600-B	4001-NHC0600	4001-NHC0600-B
8	8	12	60	1	4001-X0800		4001-NHC0800	
10	10	15	65	1	4001-X1000		4001-NHC1000	
12	12	18	65	1	4001-X1200		4001-NHC1200	

\*Strengthened shank



THE UPGRADED COATING OFFERS GREATER RESISTANCE TO ABRASION.

**MATERIALS:**



NON-FERROUS  
METALS



ALUMINIUM-FACED  
COMPOSITE PANELS

**Possible uses:**



THERMOSETTING  
PLASTICS



THERMO-  
PLASTICS



EXPANDED  
PVC



HARDWOODS



SOFTWOODS



COMPOSITE WOOD  
PRODUCTS







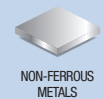
# COATED, SINGLE-TOOTH STUB CUTTERS WITH LEFT-HAND HELIX FOR ALUMINIUM

**FAMILY  
4002**

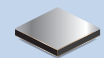
**RANGE SPECIFICALLY FOR NON-FERROUS METALS (ALUMINIUM, BRASS, COPPER, ETC.)**  
**PARTICULARLY RECOMMENDED FOR DIBOND® TYPE TAC AND ACM**  
**SMOOTH AND POLISHED FLUTE, LIMITED BUILT-UP EDGE EFFECTS**

Coated cutter, for use without lubrication.

## MATERIALS:



NON-FERROUS  
METALS

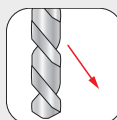


ALUMINIUM-FACED  
COMPOSITE PANELS



**Carbide**

SOLID  
CARBIDE



DOWNCUT  
TOOL



MILLING /  
SLOTTING

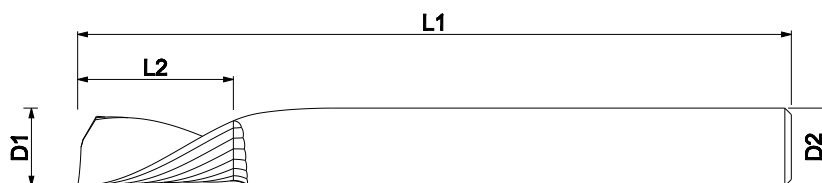


**Coated**

COATED  
TOOL



DRY  
CUTTING



Ø D1 mm	Ø D2 mm	L2 mm	L1 mm	z	Part Ref.	NEW With ring
2	3*	3	30	1	4002-X0200	
3	6*	4.5	50	1	4002-X0300	4002-X0300-B
4	6*	6	50	1	4002-X0400	4002-X0400-B

\*Strengthened shank



### DOWNCUT TOOL, DOWNWARDS REMOVAL OF CHIPS

Workpieces held better due to the downwards force.

- Limits the delamination of the upper face.
- Suited to thin materials.

### STUB CUTTER SERIES, HIGH RIGIDITY

- Improves surface finishes.
- Improves service life.
- Improves cutting conditions.

## MATERIALS:



THERMOSETTING  
PLASTICS



THERMO-  
PLASTICS



EXPANDED  
PVC



HARDWOODS



SOFTWOODS



COMPOSITE WOOD  
PRODUCTS

## Possible uses:



COMPACT  
LAMINATES



NON-FERROUS  
METALS

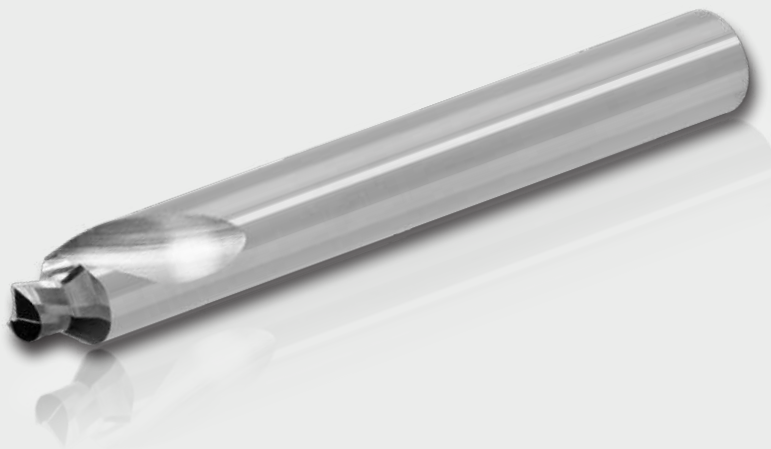


ALUMINIUM-FACED  
COMPOSITE PANELS

## RANGE SPECIFICALLY FOR PLASTICS

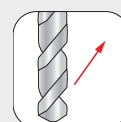
### CUTS OUT AND CHAMFERS THE MATERIAL AS A SINGLE OPERATION

CAUTION: Ensure that the material is flat!



Carbide

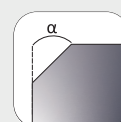
SOLID  
CARBIDE



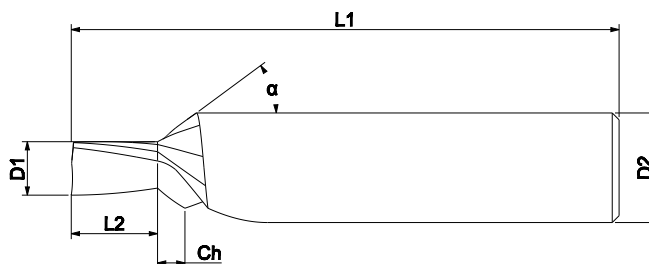
UPCUT  
TOOL



MILLING /  
SLOTTING



MILLING WITH  
CHAMFER



Ø D1 mm	Ø D2 mm	L2 mm	L1 mm	Ch mm	α °	z	Part Ref.
4	8*	4.3	60	2	45°	1	4202--0400A
4	8*	6.3	60	2	45°	1	4202--0400B

\* Strengthened shank

# SINGLE-TOOTH CUTTERS WITH CHAMFER FOR ALUMINIUM

**FAMILY  
4203**

**RANGE SPECIFICALLY FOR NON-FERROUS METALS (ALUMINIUM, BRASS, COPPER, ETC.).  
ALSO RECOMMENDED FOR DIBOND® TYPE TAC AND ACM  
CUTS OUT AND CHAMFERS THE MATERIAL AS A SINGLE OPERATION.**

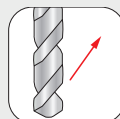
CAUTION: ensure that the material is flat!

Uncoated cutter; lubrication is strongly recommended when used on aluminium.

Coating on demand.



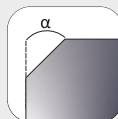
SOLID  
CARBIDE



UPCUT  
TOOL



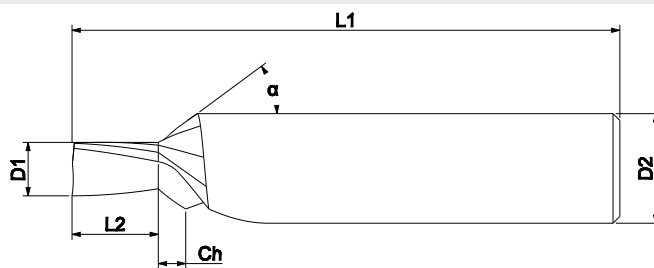
MILLING /  
SLOTING



MILLING WITH  
CHAMFER



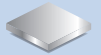
USE  
COOLANT



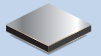
Ø D1 mm	Ø D2 mm	L2 mm	L1 mm	Ch mm	α °	z	Part Ref.	NEW With ring
4	6*	1.9	50	1	45°	1	4203--0400A	4203--0400A-B
4	6*	2.3	50	1	45°	1	4203--0400B	4203--0400B-B
4	6*	2.9	50	1	45°	1	4203--0400C	4203--0400C-B
4	6*	3.3	50	1	45°	1	4203--0400D	4203--0400D-B

\* Strengthened shank

## MATERIALS:

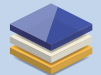


NON-FERROUS  
METALS



ALUMINIUM-FACED  
COMPOSITE PANELS

## Possible uses:



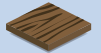
THERMOSETTING  
PLASTICS



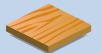
THERMO-  
PLASTICS



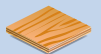
EXPANDED  
PVC



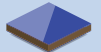
HARDWOODS



SOFTWOODS



COMPOSITE WOOD  
PRODUCTS



COMPACT  
LAMINATES

## MATERIALS:



EXPANDED  
PVC



HARDWOODS



SOFTWOODS



COMPOSITE WOOD  
PRODUCTS



FOAMED MATERIALS

## Possible uses:



THERMOSETTING  
PLASTICS



THERMO-  
PLASTICS

## CUTTERS DERIVED FROM THE 4013 BUT WITH TWO TEETH

### SMOOTH AND POLISHED FLUTE, LIMITED BUILT-UP EDGE EFFECTS

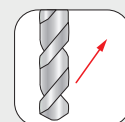
Improves the surface finish when used on foamed materials and woods compared with a single-tooth cutter.

**UPCUT TOOL, UPWARDS REMOVAL OF CHIPS.**



**Carbide**

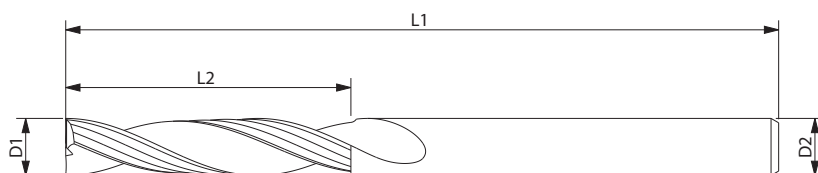
SOLID  
CARBIDE



UPCUT  
TOOL



MILLING /  
SLOTTING



Ø D1 mm	Ø D2 mm	L2 mm	L1 mm	z	Part Ref.	NEW With ring
3	3	10	40	2	4015--0300	
3	6*	10	50	2	4015--0300A	4015--0300A-B
4	4	12	60	2	4015--0400	
4	6*	12	50	2	4015--0400A	4015--0400A-B
5	5	20	70	2	4015--0500	
6	6	22	80	2	4015--0600	4015--0600-B
8	8	22	80	2	4015--0800	
8	8	32	80	2	4015--0800A	
10	10	32	75	2	4015--1000	
10	10	42	85	2	4015--1000A	
12	12	35	84	2	4015--1200	

\*Strengthened shank



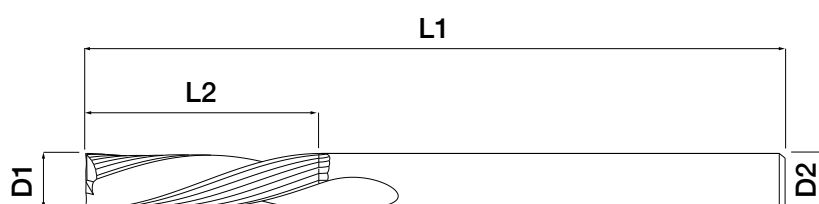
**CUTTERS DERIVED FROM THE 4012 BUT WITH TWO TEETH****SMOOTH AND POLISHED FLUTE, LIMITED BUILT-UP EDGE EFFECTS**

Improves the surface finish when used on foamed materials and woods compared with a single-tooth cutter.

**DOWNCUT TOOL, DOWNWARDS REMOVAL OF CHIPS**

Workpieces held better due to the downwards force.

- Limits the delamination of the upper face.
- Suited to thin materials.



Ø D1 mm	Ø D2 mm	L2 mm	L1 mm	z	Part Ref.	NEW With ring
3	3	10	40	2	4014--0300	
3	6*	10	50	2	4014--0300A	4014--0300A-B
4	4	12	60	2	4014--0400	
4	6*	12	50	2	4014--0400A	4014--0400A-B
5	5	16	60	2	4014--0500	
6	6	22	60	2	4014--0600	4014--0600-B
8	8	25	80	2	4014--0800	

\*Strengthened shank

**MATERIALS:**

EXPANDED  
PVC



HARDWOODS



SOFTWOODS



COMPOSITE WOOD  
PRODUCTS



FOAMED MATERIALS

**Possible uses:**

THERMOSETTING  
PLASTICS



THERMO-  
PLASTICS

## MATERIALS:



EXPANDED  
PVC



HARDWOODS



SOFTWOODS



COMPOSITE WOOD  
PRODUCTS

## Possible uses:



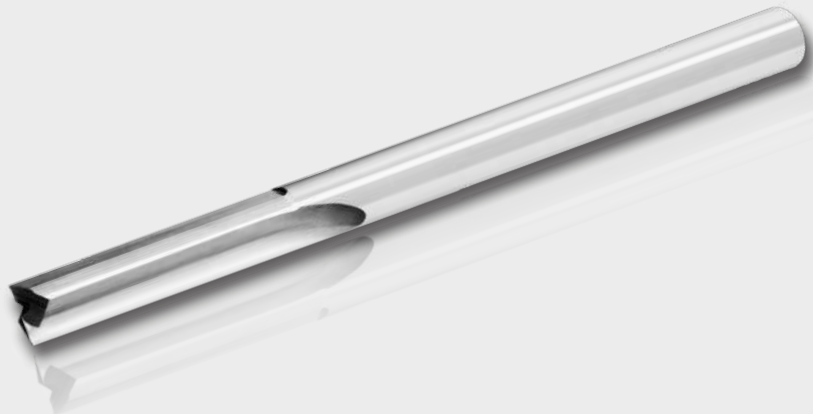
THERMOSETTING  
PLASTICS

## STRAIGHT-FLUTED CUTTERS

### NO CHIP REMOVAL DIRECTION.

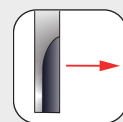
Used mainly for wood.

This cutter may also be used to produce a finished surface on certain thermoplastics, with a final cut of a few hundredths of a millimetre.



Carbide

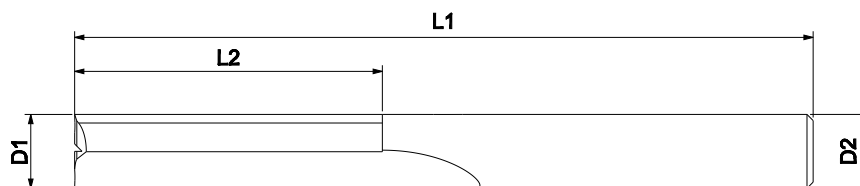
SOLID  
CARBIDE



STRAIGHT  
CUT



MILLING /  
SLOTING



Ø D1 mm	Ø D2 mm	L2 mm	L1 mm	z	Part Ref.	NEW With ring
3	3	15	60	2	4120--0300	
4	4	20	60	2	4120--0400	
5	5	20	60	2	4120--0500	
6	6	25	60	2	4120--0600	4120--0600-B
8	8	35	80	2	4120--0800	

\* Strengthened shank

# TWO-TOOTH CUTTERS FOR CUTTING SLOTS IN NON-FERROUS METALS

**FAMILY 4003**

## TWO-TOOTH CUTTERS FOR NON-FERROUS METALS WITH A SMALL PROTECTIVE CHAMFER

### SMOOTH AND POLISHED FLUTE, LIMITED BUILT-UP EDGE EFFECTS

Cuts slots in certain plastics, resins, compact laminates and Corian®.

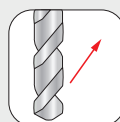
Improves surface finishes at the bottom of a pocket.

Coating on demand.



**Carbide**

SOLID CARBIDE



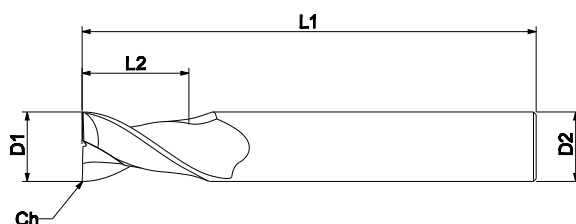
UPCUT TOOL



MILLING / SLOTTING



USE COOLANT



Ø D1 mm	Ø D2 mm	L2 mm	L1 mm	Ch 45° mm	z	Part Ref.	NEW With ring
2	6*	6	50	0.1	2	4003--0200	4003--0200-B
3	6*	7	50	0.1	2	4003--0300	4003--0300-B
4	6*	8	50	0.1	2	4003--0400	4003--0400-B
5	6*	10	50	0.2	2	4003--0500	4003--0500-B
6	6	10	50	0.2	2	4003--0600	4003--0600-B
8	8	15	60	0.2	2	4003--0800	
10	10	18	60	0.25	2	4003--1000	

\*Strengthened shank

### MATERIALS:



NON-FERROUS METALS

### Possible uses:



THERMOSETTING PLASTICS



THERMO-PLASTICS



HARDWOODS



COMPACT LAMINATES

## MATERIALS:



STEEL

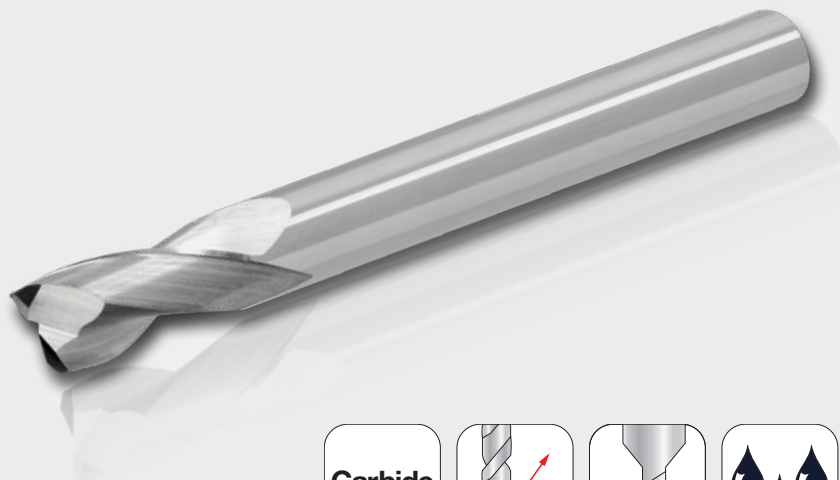


STAINLESS  
STEEL

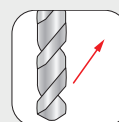
## TWO-TOOTH CUTTERS FOR MACHINING METALS

### UNCOATED VERSION

COATED VERSION EXTENDS THE SERVICE LIFE



SOLID  
CARBIDE



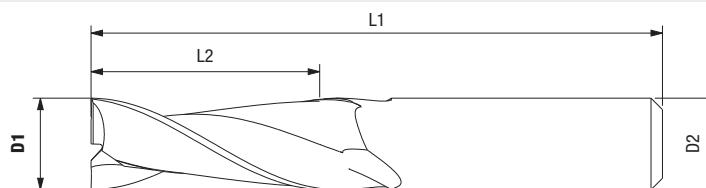
UPCUT  
TOOL



MILLING /  
SLOTTING



USE  
COOLANT

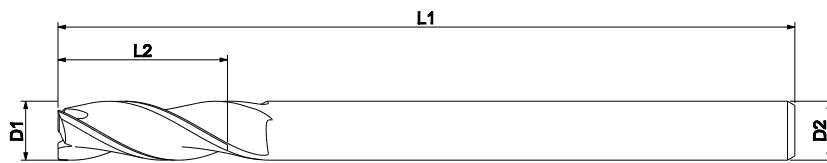


Ø D1 mm	Ø D2 mm	L2 mm	L1 mm	Z	Part Ref.	TIALNX coated
1	1	4	35	2	2350--0100	2350-X0100
1.5	1.5	4	35	2	2350--0150	2350-X0150
2	2	8	35	2	2350--0200	2350-X0200
2.5	2.5	8	38	2	2350--0250	2350-X0250
3	3	8	38	2	2350--0300	2350-X0300
3.5	3.5	10	43	2	2350--0350	2350-X0350
4	4	11	43	2	2350--0400	2350-X0400
4.5	4.5	13	47	2	2350--0450	2350-X0450
5	5	13	47	2	2350--0500	2350-X0500
5.5	5.5	13	57	2	2350--0550	2350-X0550
6	6	13	57	2	2350--0600	2350-X0600
6.5	6.5	16	63	2	2350--0650	2350-X0650
7	7	16	63	2	2350--0700	2350-X0700
8	8	19	63	2	2350--0800	2350-X0800
9	9	19	72	2	2350--0900	2350-X0900
10	10	22	72	2	2350--1000	2350-X1000
12	12	22	76	2	2350--1200	2350-X1200
14	14	26	83	2	2350--1400	2350-X1400
16	16	32	89	2	2350--1600	2350-X1600
18	18	32	92	2	2350--1800	2350-X1800
20	20	38	101	2	2350--2000	2350-X2000



## COATED, THREE-TOOTH CUTTERS FOR MACHINING METALS

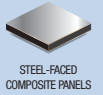
PARTICULARLY SUITED TO THE MACHINING OF STEEL-FACED COMPOSITE PANELS (SUCH AS STEELBOND® OR KÖMASTEEL®).



Ø D1 mm	Ø D2 mm	L2 mm	L1 mm	Z	Part Ref.
1	1	4	35	3	2352-X0100
1.5	1.5	4	35	3	2352-X0150
2	2	8	35	3	2352-X0200
2.5	2.5	8	38	3	2352-X0250
3	3	8	38	3	2352-X0300
3.5	4*	10	43	3	2352-X0350
4	4	11	43	3	2352-X0400
4.5	5*	13	47	3	2352-X0450
5	5	13	47	3	2352-X0500
5.5	6*	13	57	3	2352-X0550
6	6	13	57	3	2352-X0600
6.5	8*	16	63	3	2352-X0650
7	8*	16	63	3	2352-X0700
8	8	19	63	3	2352-X0800
9	10*	19	72	3	2352-X0900
10	10	22	72	3	2352-X1000
12	12	22	76	3	2352-X1200
14	14	26	83	3	2352-X1400
16	16	32	89	3	2352-X1600
18	18	32	92	3	2352-X1800
20	20	38	101	3	2352-X2000

\* Strengthened shank

## MATERIALS:



STEEL-FACED  
COMPOSITE PANELS



STEEL



STAINLESS  
STEEL

# FAMILY 4050

## THREE-TOOTH CUTTERS FOR HIGH-PRESSURE LAMINATES (HPL)

### MATERIALS:



COMPACT  
LAMINATES



PHENOLIC  
MATERIALS

### Possible uses:



HARDWOODS



SOFTWOODS



COMPOSITE WOOD  
PRODUCTS

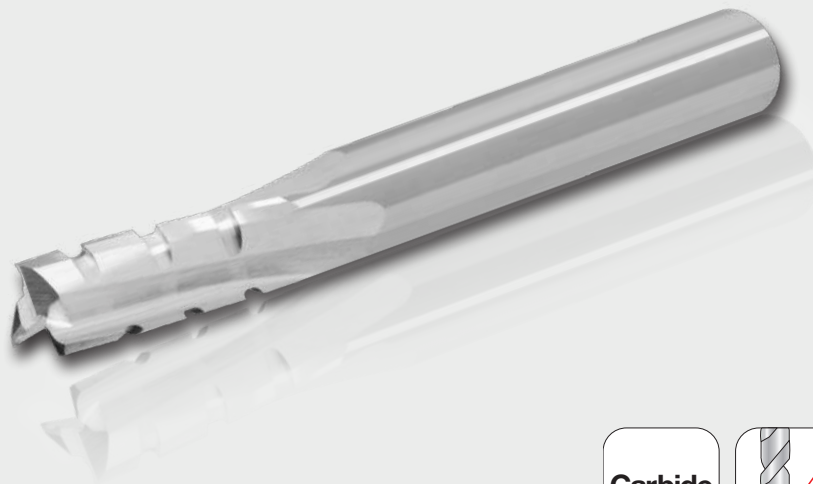
### RANGE SPECIFICALLY FOR HPL (TRESPA®, FUNDERMAX®)

#### UPCUT TOOL, UPWARDS REMOVAL OF CHIPS

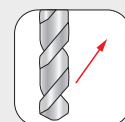
Chip breaker to improve ventilation and reduce heating.

Coating on demand.

The use of a coating extends the service life (consult us for details).



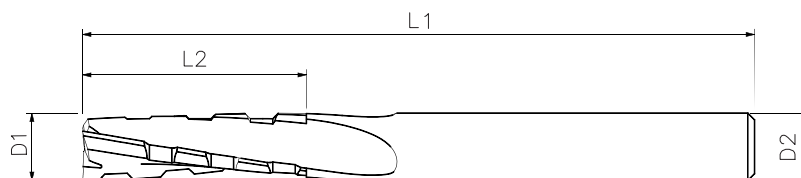
SOLID  
CARBIDE



UPCUT  
TOOL



MILLING /  
SLOTING



Ø D1 mm	Ø D2 mm	L2 mm	L1 mm	z	Part Ref.	NEW With ring
6	6	15	58	3	4050--0600	4050--0600-B
8	8	12	64	3	4050--0800	
8	8	20	64	3	4050--0800A	
10	10	22	73	3	4050--1000	
12	12	32	80	3	4050--1200	

## RANGE SPECIFICALLY FOR FOAMED MATERIALS AND WOOD

SMOOTH AND POLISHED FLUTE, LIMITED BUILT-UP EDGE EFFECTS

Upcut tool, upwards removal of chips.



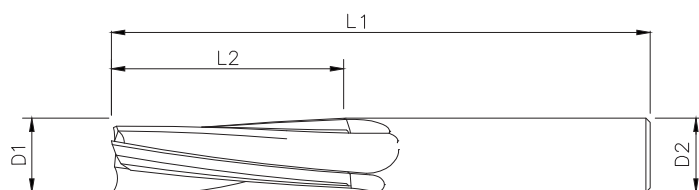
SOLID  
CARBIDE



UPCUT  
TOOL



MILLING /  
SLOTTING



Ø D1 mm	Ø D2 mm	L2 mm	L1 mm	z	Part Ref.	NEW With ring
6	6	25	80	3	4060--0600	4060--0600-B
8	8	25	80	3	4060--0800	
10	10	35	85	3	4060--1000	
12	12	45	100	3	4060--1200	

## MATERIALS:



FOAMED MATERIALS



HARDWOODS



SOFTWOODS



COMPOSITE WOOD  
PRODUCTS

## MATERIALS:



FOAMED MATERIALS



EXPANDED  
PVC

## SPECIAL LONG RANGE FOR FOAMED MATERIALS

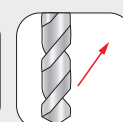
SMOOTH AND POLISHED FLUTE, LIMITED BUILT-UP EDGE EFFECTS.

Upcut tool, upwards removal of chips

**NEW**



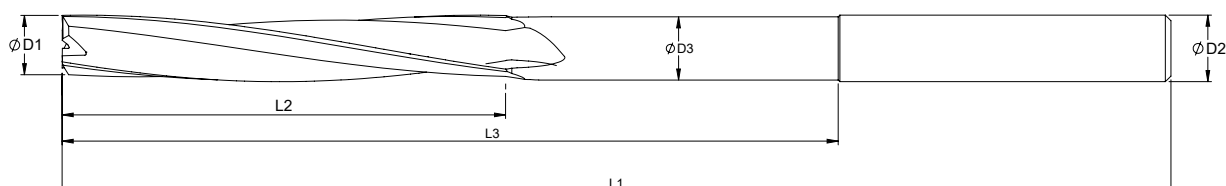
SOLID  
CARBIDE



UPCUT  
TOOL

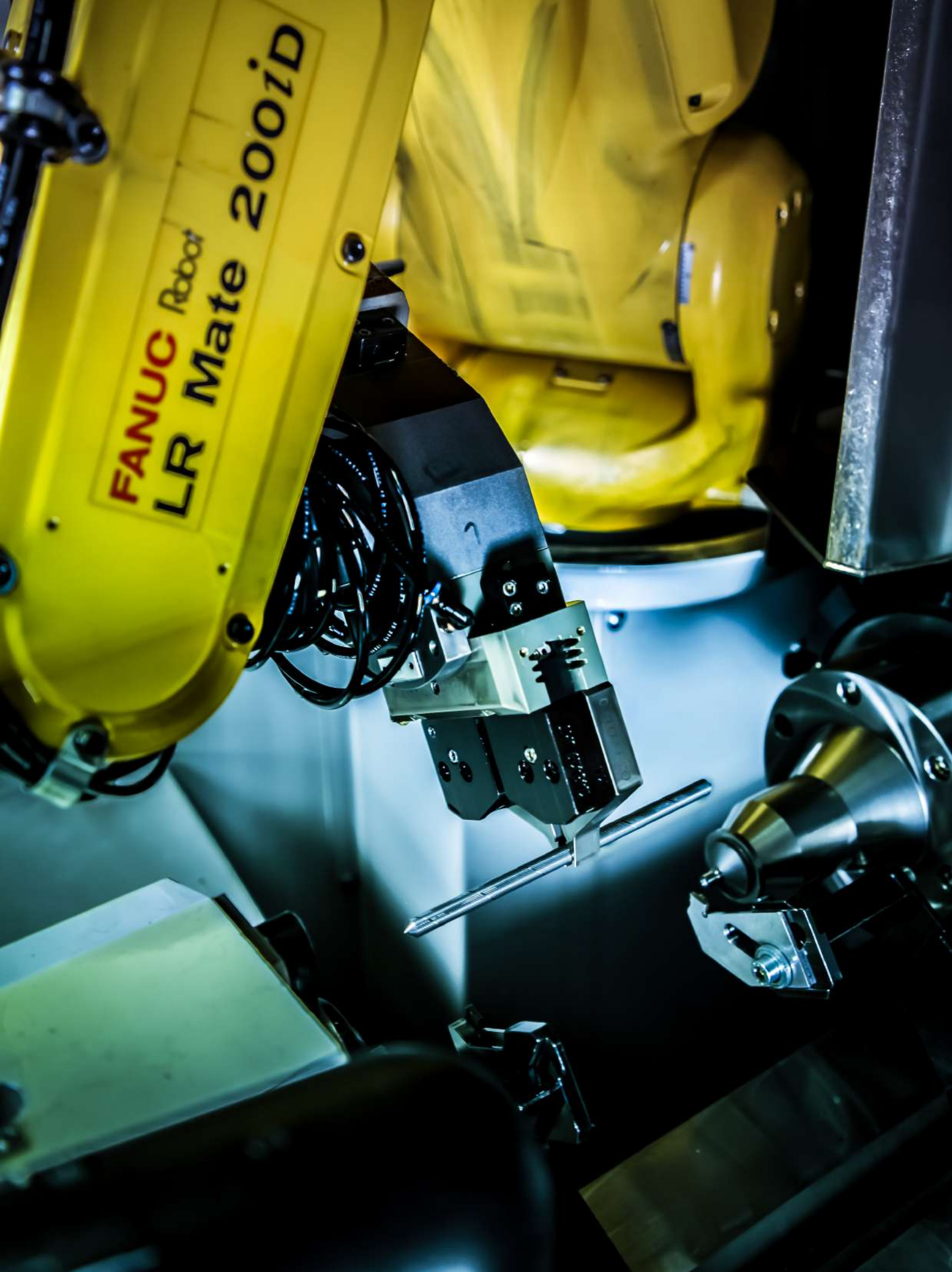


MILLING /  
SLOTING



Ø D1 mm	Ø D2 mm	Ø D3 mm	L2 mm	L3 mm	L1 mm	z	Part Ref.
3	3	2.7	20	40	75	3	4061--0300
4	4	3.7	30	45	75	3	4061--0400
5	5	4.7	25	45	78	3	4061--0500
6	6	5.7	50		80	3	4061--0600
6	6	5.7	40	70	100	3	4061--0600A
8	8	7.6	40	70	100	3	4061--0800
8	8	7.6	50		80	3	4061--0800A
8	8	7.6	40	115	150	3	4061--0800B
10	10	9.6	40	70	100	3	4061--1000
10	10	9.6	50	85	120	3	4061--1000A
10	10	9.6	50	115	150	3	4061--1000B
12	12	11.6	50	85	120	3	4061--1200





**FANUC** Robot  
**LR Mate 200iD**

**MATERIALS:**



HARDWOODS



SOFTWOODS



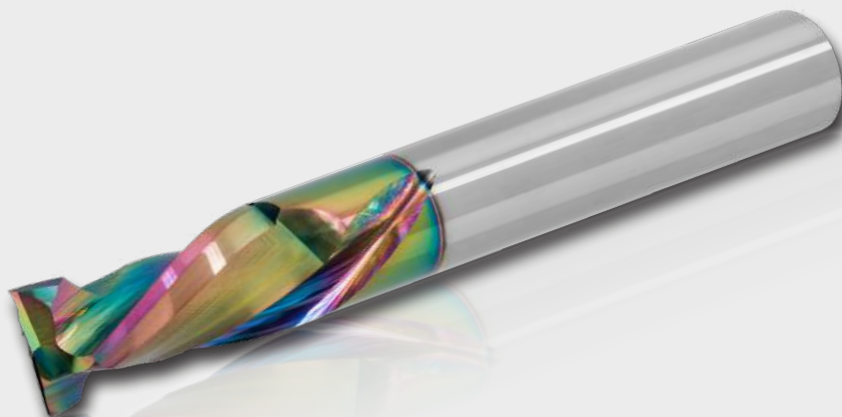
COMPOSITE WOOD  
PRODUCTS

**COMPRESSION CUTTERS FOR THE CONTOUR MILLING OF WOODEN BOARDS**

**THE DOUBLE-HELIX CONFIGURATION - PRODUCING AN UPCUT AT THE TIP AND THEN A DOWNCUT - PREVENTS DELAMINATION OF THE TWO FACES OF THE MATERIAL**

The cutting geometry allows high-speed machining and a perfect surface finish.

Long service life thanks to the specific carbide used and the coating.



SOLID  
CARBIDE



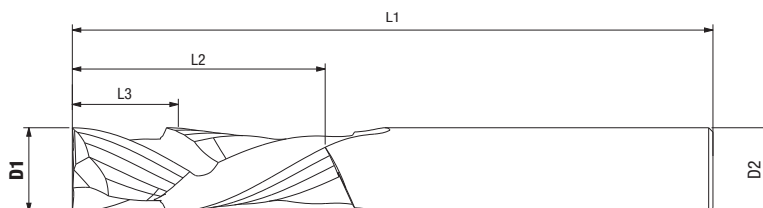
COMPRESSION



MILLING /  
SLOTTING



COATED  
TOOL



Ø D1 mm	Ø D2 mm	L2 mm	L3 mm	L1 mm	z	Part Ref.	NEW With ring
6	6	14	4	60	1+1	4030--0600	4030--0600-B
6	6	22	4	60	1+1	4030--0600A	4030--0600A-B
8	8	22	4	70	2+2	4030--0800	
10	10	22	4	80	2+2	4030--1000	
10	10	32	4	80	2+2	4030--1000A	
12	12	32	8	80	2+2	4030--1200	
12	12	42	12	100	2+2	4030--1200A	

# TWO-TOOTH CUTTERS FOR CUTTING PROFILES AND SLOTS IN FIBROUS MATERIALS

**FAMILY  
4100**

**GEOMETRY SPECIALLY DESIGNED TO SHEAR FIBRES (KEVLAR / ARAMIDE, ETC.)**

ALSO PERFECTLY SUITED TO THIN PLYWOOD

**MATERIALS:**



KEVLAR

**Possible uses:**



COMPOSITE WOOD  
PRODUCTS



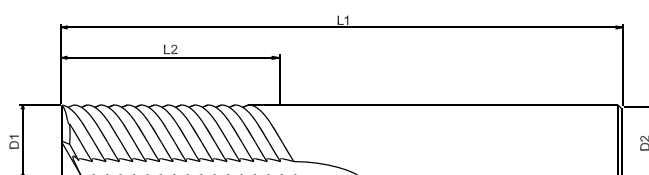
SOLID  
CARBIDE



COMPRESSION



MILLING /  
SLOTTING



Ø D1 mm	Ø D2 mm	L2 mm	L1 mm	z	Part Ref.	<b>NEW</b> With ring
3	3	12	60	2	4100--0300	
3	6*	12	60	2	4100--0300A	4100--0300A-B
4	4	15	60	2	4100--0400	
4	6*	15	60	2	4100--0400A	4100--0400A-B
6	6	25	75	2	4100--0600	4100--0600-B
8	8	25	75	2	4100--0800	
10	10	25	75	2	4100--1000	
12	12	25	75	2	4100--1200	

\* Strengthened shank

## MATERIALS:



THERMOSETTING  
PLASTICS



THERMO-  
PLASTICS



HARDWOODS



SOFTWOODS



COMPOSITE WOOD  
PRODUCTS



COMPACT  
LAMINATES

## Possible uses:



NON-FERROUS  
METALS



STEEL-FACED  
COMPOSITE PANELS



STEEL



STAINLESS  
STEEL



PHENOLIC  
MATERIALS



FOAMED MATERIALS

## FORM MILLING AND 3D MACHINING.

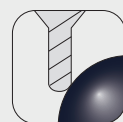


**Carbide**

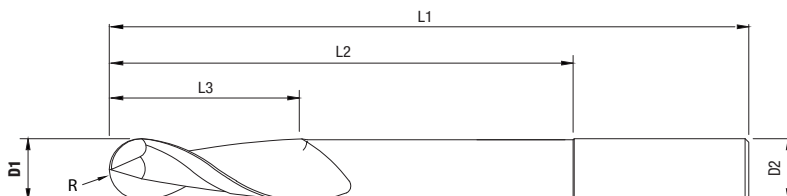
SOLID  
CARBIDE



MILLING /  
SLOTTING



FORM  
MILLING



D1 mm	D2 mm	L2 mm	L1 mm	R mm	Z	Part Ref.
2	2	8	35	1	2	2344--0200
2.5	2.5	8	38	1.25	2	2344--0250
3	3	8	38	1.5	2	2344--0300
4	4	11	43	2	2	2344--0400
5	5	13	47	2.5	2	2344--0500
6	6	13	57	3	2	2344--0600
7	7	16	63	3.5	2	2344--0700
8	8	19	63	4	2	2344--0800
9	9	19	72	4.5	2	2344--0900
10	10	22	72	5	2	2344--1000
12	12	22	76	6	2	2344--1200
14	14	26	83	7	2	2344--1400
16	16	32	83	8	2	2344--1600



# HIGH-SPEED CONICAL TWO-TOOTH CUTTERS FOR SLOT CUTTING - FOLDING

**FAMILY  
4045**

## HIGH-SPEED CUTTER FOR SLOT CUTTING - FOLDING SPECIALLY DESIGNED FOR ACM AND TAC (DIBOND®, ALUCOBOND®)

Very good surface finish  
Improves the evacuation of chips.  
High working speed

### UPCUT TOOL, UPWARDS REMOVAL OF CHIPS

Coating on demand.

**NEW**

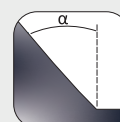


**Carbide**

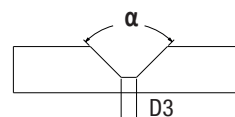
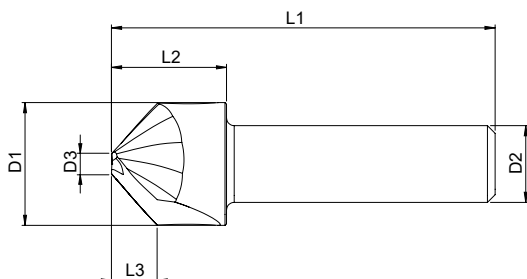
SOLID  
CARBIDE



MILLING /  
SLOTTING



MILLING WITH  
CHAMFER



Ø D1 mm	Ø D2 mm	Ø D3 mm	L3 mm	L2 mm	L1 mm	α °	z	Part Ref.
12	12	2	4.7	-	60	95°	2	4045--12-095°
16	10	3	6.1	15	50	95°	2	4045--16-095°
20	10	2	5.2	20	50	108°	2	4045--20-108°
20	10	2	3.7	20	50	135°	2	4045--20-135°

## MATERIALS:



ALUMINIUM-FACED  
COMPOSITE PANELS

# FAMILY 4041

# CONICAL, ONE-TOOTH CUTTERS FOR SLOT CUTTING - FOLDING

## MATERIALS:



ALUMINIUM-FACED  
COMPOSITE PANELS

## Possible uses:



NON-FERROUS  
METALS



COMPACT  
LAMINATES

## CUTTERS FOR CUTTING SLOTS - FOLDING

SPECIALLY DESIGNED FOR ACM AND TAC ( DIBOND®, ALUCOBOND® )

Very good surface finish.

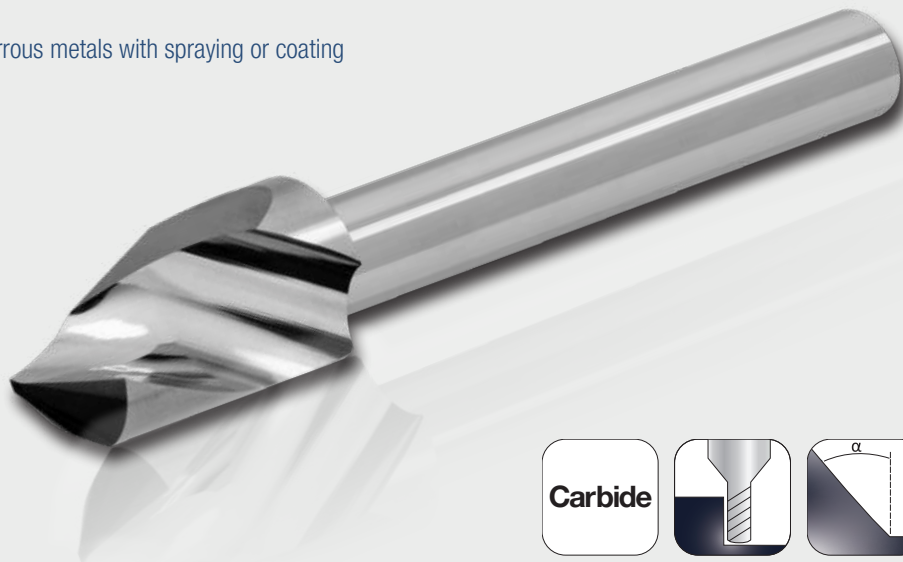
Improves the evacuation of chips.

## SMOOTH AND POLISHED FLUTE, LIMITED BUILT-UP EDGE EFFECTS

UPCUT TOOL, UPWARDS REMOVAL OF CHIPS.

Coating on demand.

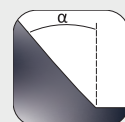
Machining of non-ferrous metals with spraying or coating



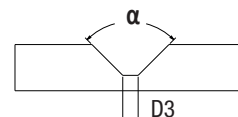
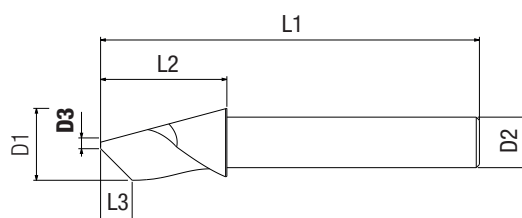
SOLID  
CARBIDE



MILLING /  
SLOTTING



MILLING WITH  
CHAMFER



Ø D1 mm	Ø D2 mm	Ø D3 mm	L3 mm	L2 mm	L1 mm	α °	z	Part Ref.	NEW With ring
6	6	0.3	2.3	-	60	100°	1	4041--06P0030-100°	4041--06P0030-100°-B
8	8	0.5	3.1	-	60	100°	1	4041--08P0050-100°	
10	6*	2	3.6	20	60	95°	1	4041--10P0200-095°	4041--10P0200-095°-B

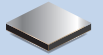
\* Smaller shank diameter

### CUTTERS FOR CUTTING SLOTS - FOLDING

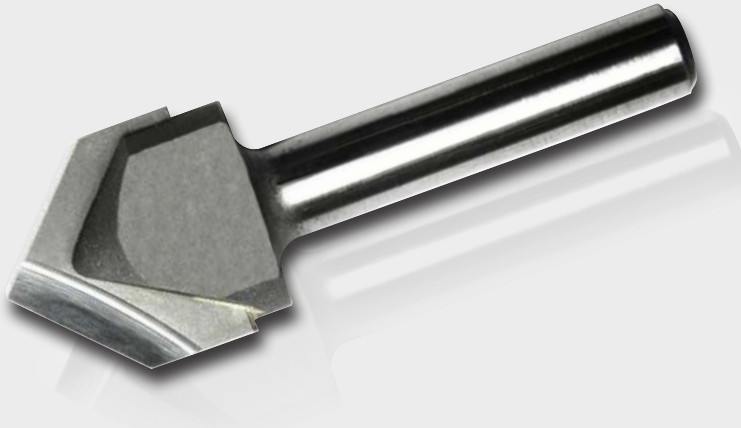
SPECIALLY DESIGNED FOR ACM AND TAC ( DIBOND®, ALUCOBOND® )

Coating on demand.

#### MATERIALS:



ALUMINIUM-FACED  
COMPOSITE PANELS

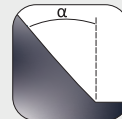


**Carbide  
Steel**

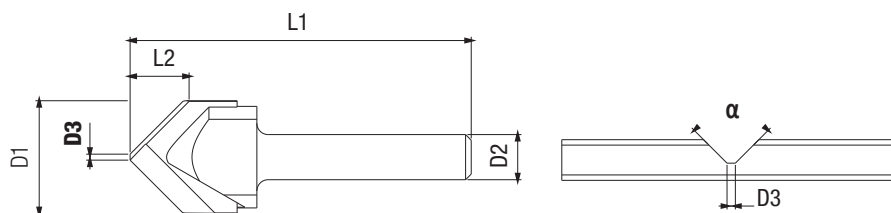
CARBIDE  
TIPPED  
STEEL BODY



MILLING /  
SLOTTING



MILLING WITH  
CHAMFER

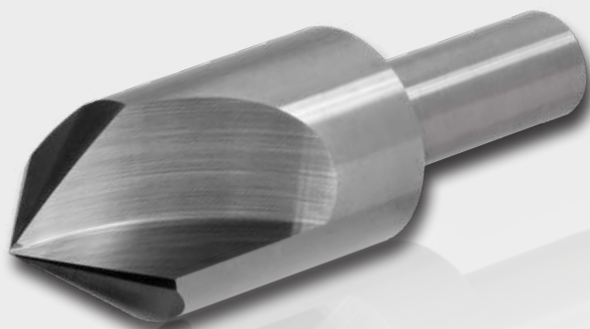


Ø D1 mm	Ø D2 mm	Ø D3 mm	L2 mm	L1 mm	α °	z	Part Ref.
20	8	3	8.5	60	90°	2	4040--090°
20	8	2	3.7	60	135°	2	4040--135°





**VERY GOOD SURFACE FINISH**  
SOLID CARBIDE TOOL, HIGH RIGIDITY

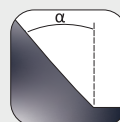


**Carbide**

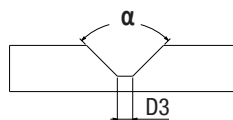
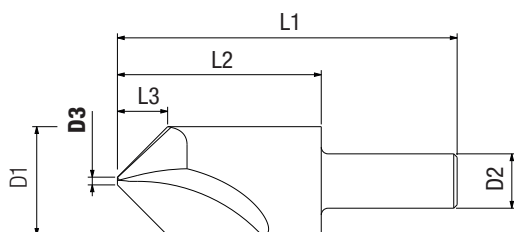
SOLID  
CARBIDE



MILLING /  
SLOTTING



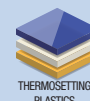
MILLING WITH  
CHAMFER



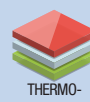
Ø D1 mm	Ø D2 mm	Ø D3 mm	L3 mm	L2 mm	L1 mm	α °	z	Part Ref.
8	8	0.2	3.9	-	50	90°	2	4044--08P0020-090°
10	6*	0.2	4.9	25	50	90°	2	4044--10P0020-090°
12	12	0.2	5.9	-	50	90°	2	4044--12P0020-090°
16	8*	0.2	7.9	12	50	90°	2	4044--16P0020-090°

\*Smaller shank diameter

## MATERIALS:



THERMOSETTING  
PLASTICS



THERMO-  
PLASTICS



EXPANDED  
PVC



HARDWOODS



SOFTWOODS



COMPOSITE WOOD  
PRODUCTS



COMPACT  
LAMINATES



PHENOLIC  
MATERIALS

## Possible uses:



ALUMINIUM-FACED  
COMPOSITE PANELS

## MATERIALS:



THERMOSETTING  
PLASTICS



EXPANDED  
PVC



HARDWOODS



COMPOSITE WOOD  
PRODUCTS



COMPACT  
LAMINATES

## Possible uses:



THERMO-  
PLASTICS



SOFTWOODS



FOAMED MATERIALS

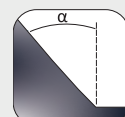
SPECIFICALLY DESIGNED FOR HARDER MATERIALS (PMMA, CORIAN, POLYCARBONATES, HARDWOODS, ETC.)



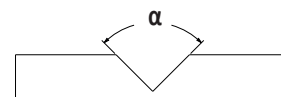
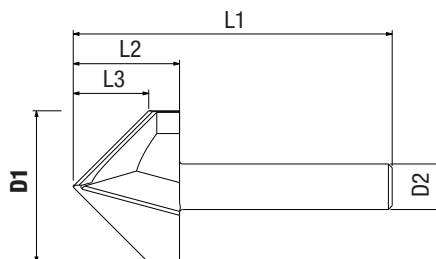
CARBIDE  
TIPPED  
STEEL BODY



MILLING /  
SLOTTING



MILLING WITH  
CHAMFER



Ø D1 mm	Ø D2 mm	L3 mm	L2 mm	L1 mm	α °	z	Part Ref.
20	6	17.3	20.5	48	60°	2	4042--20-060°
20	6	10	14	42	90°	2	4042--20-090°
20	6	5.8	9.8	38	120°	2	4042--20-120°

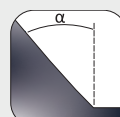
SPECIFICALLY DESIGNED FOR SOFT MATERIALS (SOFTWOODS, COMPOSITE WOOD PRODUCTS, FOAMED MATERIALS, ETC.)



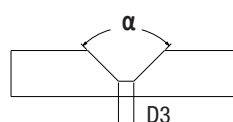
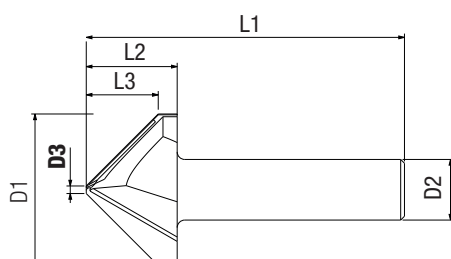
CARBIDE  
TIPPED  
STEEL BODY



MILLING /  
SLOTTING



MILLING WITH  
CHAMFER



Ø D1 mm	Ø D2 mm	Ø D3 mm	L3 mm	L2 mm	L1 mm	α °	z	Part Ref.
32	8	0.5	27.3	32	62	60°	2	4043--32P0050-060°
32	8	0.5	15.75	20	50	90°	2	4043--32P0050-090°
32	8	0.5	9.1	12	42	120°	2	4043--32P0050-120°

## MATERIALS:



THERMOSETTING  
PLASTICS



EXPANDED  
PVC



SOFTWOODS



COMPOSITE WOOD  
PRODUCTS



COMPACT  
LAMINATES



FOAMED MATERIALS

## Possible uses:



THERMO-  
PLASTICS



HARDWOODS

## MATERIALS:



THERMOSETTING  
PLASTICS



THERMO-  
PLASTICS



EXPANDED  
PVC



HARDWOODS



SOFTWOODS



COMPACT  
LAMINATES



NON-FERROUS  
METALS



ALUMINIUM-FACED  
COMPOSITE PANELS



STEEL-FACED  
COMPOSITE PANELS

## Possible uses:



PHENOLIC  
MATERIALS



GLASS-FILLED  
PLASTICS

## CONICAL, MULTI-MATERIAL ENGRAVING CUTTERS

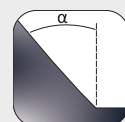


Carbide

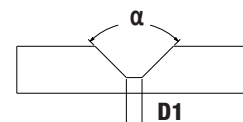
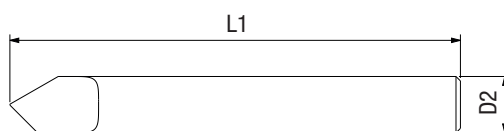
SOLID  
CARBIDE



ENGRAVING



MILLING WITH  
CHAMFER

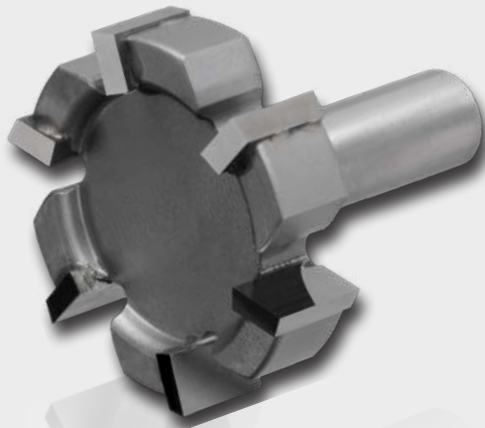


ØD1 mm	Ø D2 mm	L1 mm	α °	Z	Part Ref.	NEW With ring
0.3	3	30	30°	1	4070--03P0030-030°	
0.1	4	60	30°	1	4070--04P0010-030°	NEW
0.3	4	60	30°	1	4070--04P0030-030°	
0.1	6	60	30°	1	4070--06P0010-030°	4070--06P0010-030°-B NEW
0.5	6	60	30°	1	4070--06P0050-030°	4070--06P0050-030°-B
0.1	3	30	40°	1	4070--03P0010-040°	NEW
0.3	3	30	40°	1	4070--03P0030-040°	
0.3	4	60	40°	1	4070--04P0030-040°	
0.5	6	60	40°	1	4070--06P0050-040°	4070--06P0050-040°-B
0.1	3	30	60°	1	4070--03P0010-060°	
0.2	4	60	60°	1	4070--04P0020-060°	
0.4	6	60	60°	1	4070--06P0040-060°	4070--06P0040-060°-B
0.1	4	60	90°	1	4070--04P0010-090°	
0.1	6	60	90°	1	4070--06P0010-090°	4070--06P0010-090°-B



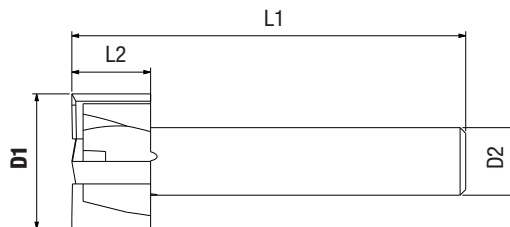
# FACE MILLING CUTTERS

(FACE MILLING ON SACRIFICIAL PANELS, ETC.)



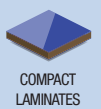
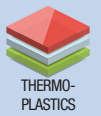
**Carbide  
Steel**

CARBIDE  
TIPPED  
STEEL BODY

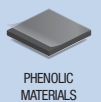
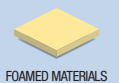


Ø D1 mm	Ø D2 mm	L2 mm	L1 mm	z	Part Ref.
20	6	7	35	4	4080--2000
30	8	8	35	6	4080--3000

## MATERIALS:



## Possible uses:



## MATERIALS:



THERMOSETTING  
PLASTICS



THERMO-  
PLASTICS



EXPANDED  
PVC



HARDWOODS



SOFTWOODS



COMPOSITE WOOD  
PRODUCTS



COMPACT  
LAMINATES

## Possible uses:



NON-FERROUS  
METALS



FOAMED MATERIALS



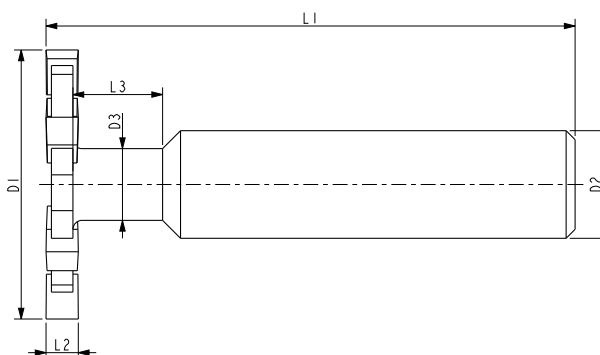
GLASS-FILLED  
PLASTICS

## SLITTING SAW CUTTERS WITH CARBIDE INSERTS ON A STEEL SHANK MACHINING OF SLOTS AND SLITS

Cutting out thermoformed parts



MILLING /  
SLOTTING



ØD1	Ø D2	L2	L1	Z	Part Ref.
25	8	1	62	6	4110--25-0100A
25	6	2	62	6	4110--25-0200
25	8	2	62	6	4110--25-0200A
35	6	2	62	8	4110--35-0200
50	10	3	62	8	4110--50-0300



**NEW**

# **KNIFE BLADES**

## **SOLID CARBIDE**

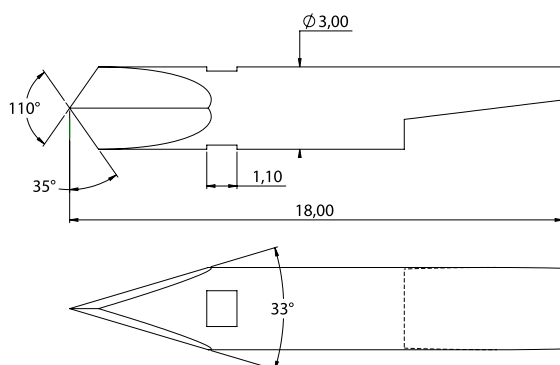
# KNIFE BLADES SOLID CARBIDE

NEW

DIAGER ref-  
erence

Machine  
compatibility

Manufacturer  
reference



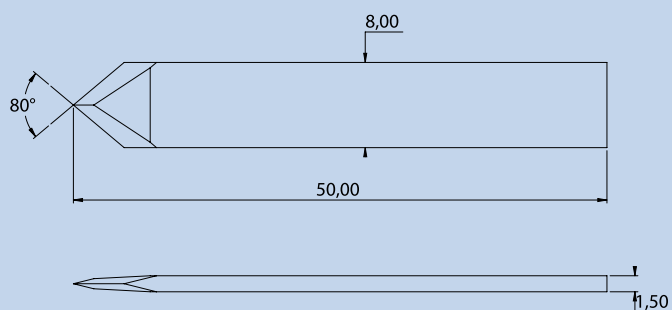
31385

Zünd

Z3 (3910115)

ESKO  
Kongsberg

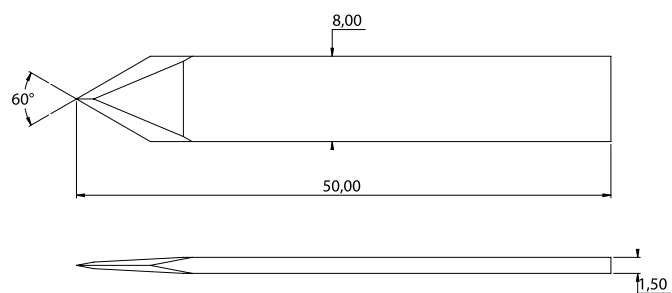
BLD-KC103 (42458323)



31394

Zünd

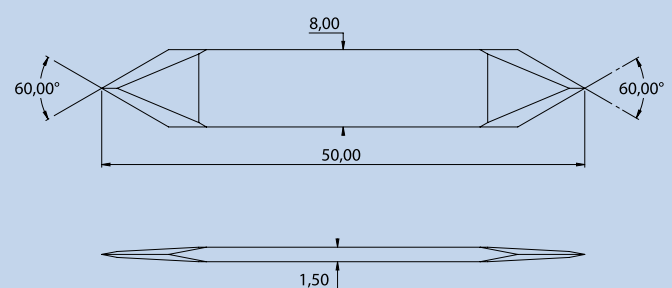
Z10 (3910301)



31382

Zünd

Z11 (3910309)



31335

Zünd

Z13 = Z11 x2

ESKO  
Kongsberg

BLD-DF213  
(42441204)

iEcho

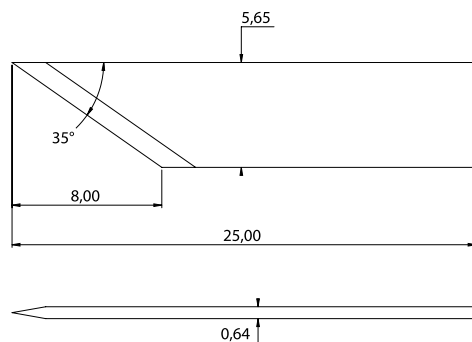
E13





# KNIFE BLADES SOLID CARBIDE

**NEW**



**31555**

Zünd

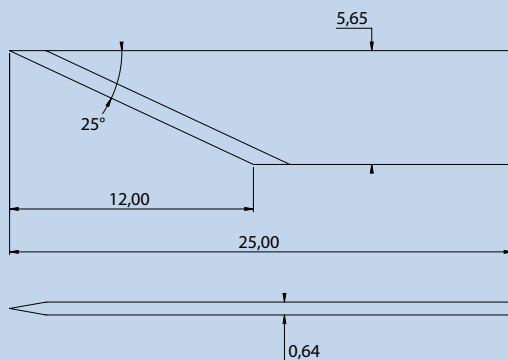
Z16 (3910306)

ESKO  
Kongsberg

BLD-SF216 (42441212)

iEcho

E16



**31531**

Zünd

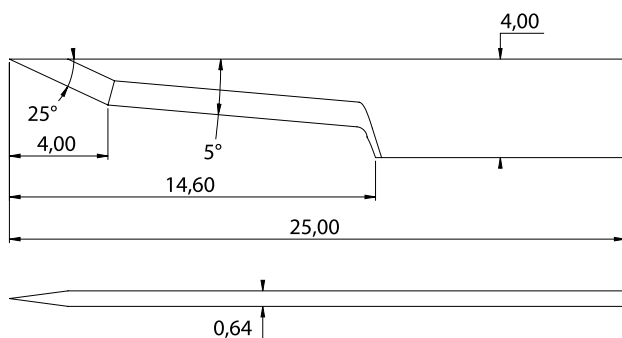
Z17 (3910307)

ESKO  
Kongsberg

BLD-SF217  
(G42441220)

iEcho

E17



**31505**

Zünd

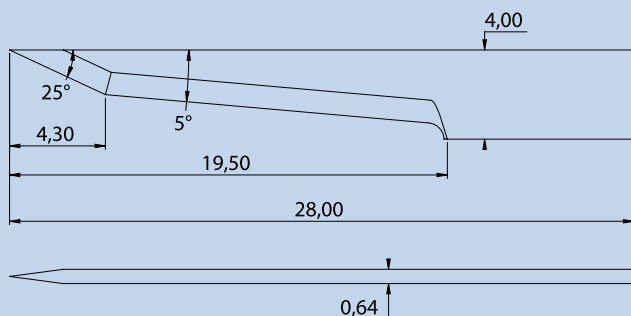
Z20 (3910313)

ESKO  
Kongsberg

BLD-SF420  
(G42421974)

Summa

500-9811, 500-0811



**31506**

Zünd

Z21 (3910314)

ESKO Kongsberg

BLD-SF421 (G42458257),  
42458257

iEcho

E21

Summa

500-9812, 500-0812

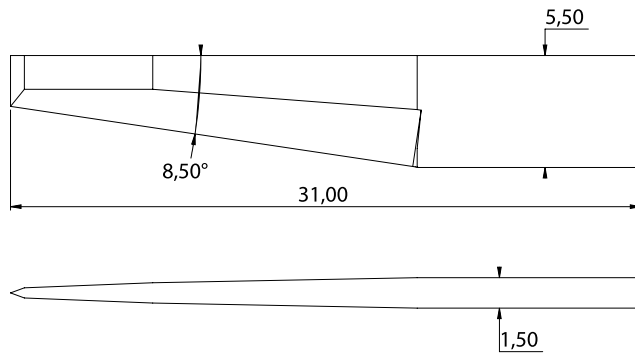
# KNIFE BLADES SOLID CARBIDE

**NEW**

**DIAGER  
reference**

**Machine  
compatibility**

**Manufacturer  
reference**



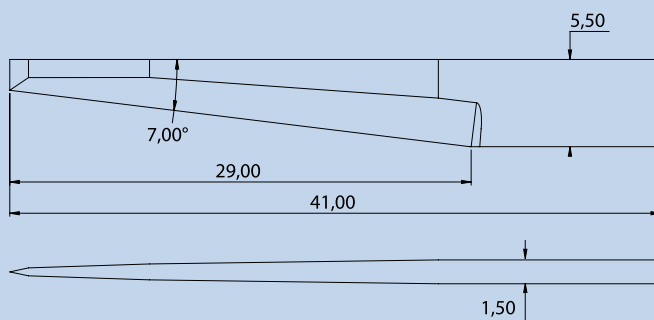
**31419**

Zünd

Z61 (5201343)

iEcho

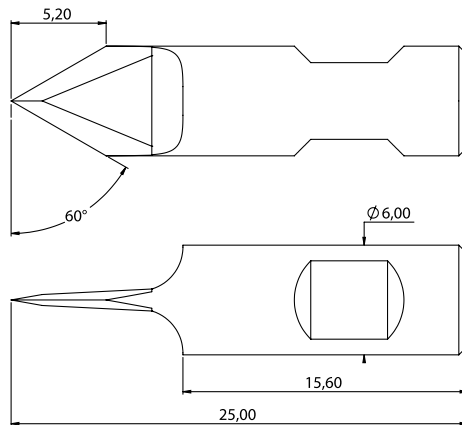
E61



**31567**

Zünd

Z68 (5204301)



**31562**

ESKO Kongsberg

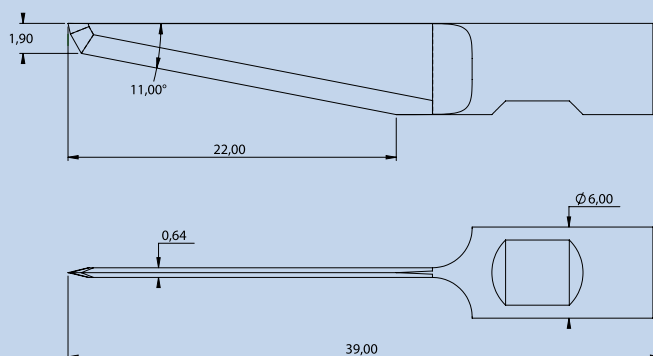
BLD-DR6160 (42445510)

Mécanuméric

100610660

AXYZ

B1051L-5



**31452**

ESKO Kongsberg

BLD-SR6310 (42441626)



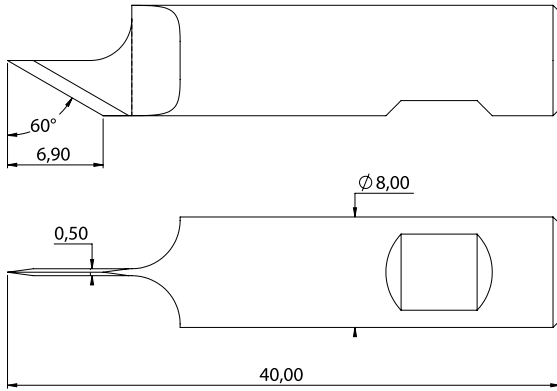
# KNIFE BLADES SOLID CARBIDE

**NEW**

**DIAGER**  
reference

**Machine**  
compatibility

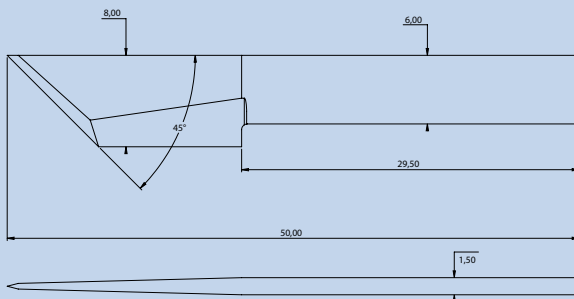
**Manufacturer**  
reference



**31435**

ESKO Kongsberg

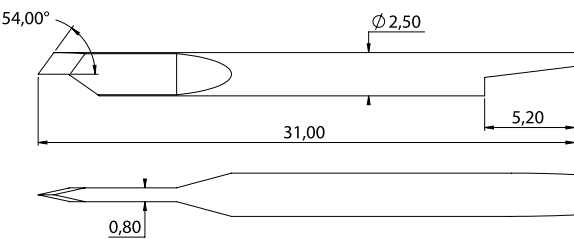
BLD-SR8170 (G42460394)



**31447**

ESKO Kongsberg

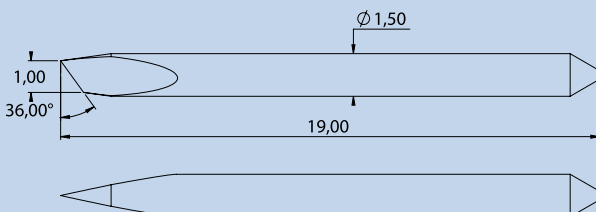
BLD-SF346 (42458406)



**31446**

Summa

390-534 (BDR-S36T)

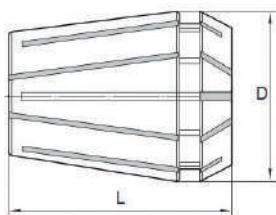


**31532**

Summa

391-360

# ER SPRING COLLETS DIN 6499 - ISO 15488



	<b>D (mm)</b>	<b>T (mm)</b>
ER16	17	27.5
ER20	21	31.5
ER25	26	34
ER32	33	40

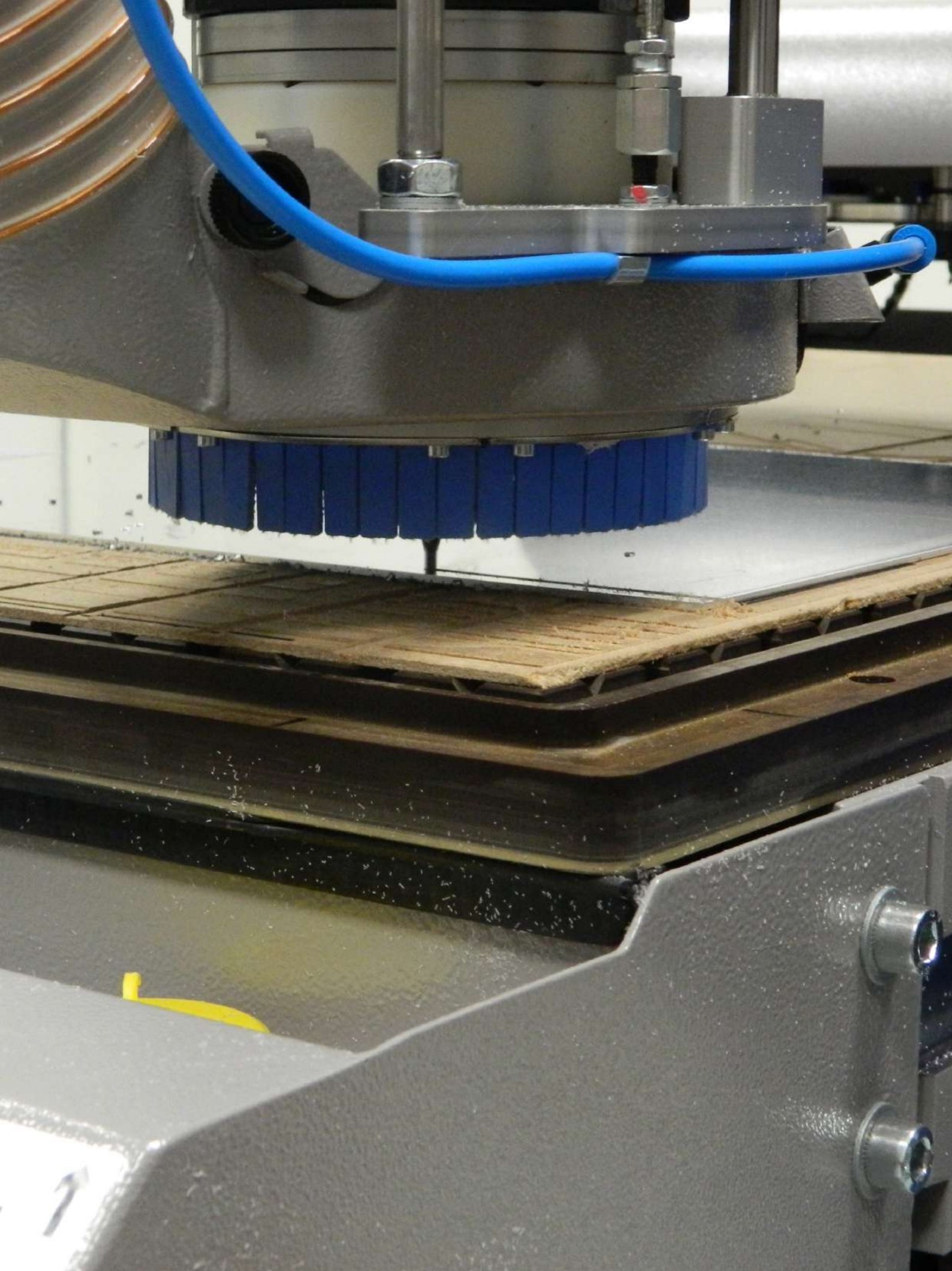
<b>ER 16</b>	
<b>Ref</b>	<b>Clamping range</b>
Collet ER16 Ø2.00	<b>Ø2.0</b> to Ø1.0
Collet ER16 Ø2.50	<b>Ø2.5</b>
Collet ER16 Ø3.00	<b>Ø3.0</b> to Ø2.0
Collet ER16 Ø4.00	<b>Ø4.0</b> to Ø3.0
Collet ER16 Ø5.00	<b>Ø5.0</b> to Ø4.0
Collet ER16 Ø6.00	<b>Ø6.0</b> to Ø5.0
Collet ER16 Ø8.00	<b>Ø8.0</b> to Ø7.0
Collet ER16 Ø10.00	<b>Ø10.0</b> to Ø9.0

<b>ER 25</b>	
<b>Ref</b>	<b>Clamping range</b>
Collet ER25 Ø2.00	<b>Ø2.0</b> to Ø1.0
Collet ER25 Ø2.50	<b>Ø2.5</b>
Collet ER25 Ø3.00	<b>Ø3.0</b> to Ø2.0
Collet ER25 Ø4.00	<b>Ø4.0</b> to Ø3.0
Collet ER25 Ø5.00	<b>Ø5.0</b> to Ø4.0
Collet ER25 Ø6.00	<b>Ø6.0</b> to Ø5.0
Collet ER25 Ø8.00	<b>Ø8.0</b> to Ø7.0
Collet ER25 Ø10.00	<b>Ø10.0</b> to Ø9.0
Collet ER25 Ø12.00	<b>Ø12.0</b> to Ø11.0

<b>ER 20</b>	
<b>Ref</b>	<b>Clamping range</b>
Collet ER20 Ø2.00	<b>Ø2.0</b> to Ø1.0
Collet ER20 Ø2.50	<b>Ø2.5</b>
Collet ER20 Ø3.00	<b>Ø3.0</b> to Ø2.0
Collet ER20 Ø4.00	<b>Ø4.0</b> to Ø3.0
Collet ER20 Ø5.00	<b>Ø5.0</b> to Ø4.0
Collet ER20 Ø6.00	<b>Ø6.0</b> to Ø5.0
Collet ER20 Ø8.00	<b>Ø8.0</b> to Ø7.0
Collet ER20 Ø10.00	<b>Ø10.0</b> to Ø9.0
Collet ER20 Ø12.00	<b>Ø12.0</b> to Ø11.0

<b>ER 32</b>	
<b>Ref</b>	<b>Clamping range</b>
Collet ER32 Ø2.00	<b>Ø2.0</b> to Ø1.0
Collet ER32 Ø2.50	<b>Ø2.5</b>
Collet ER32 Ø3.00	<b>Ø3.0</b> to Ø2.0
Collet ER32 Ø4.00	<b>Ø4.0</b> to Ø3.0
Collet ER32 Ø5.00	<b>Ø5.0</b> to Ø4.0
Collet ER32 Ø6.00	<b>Ø6.0</b> to Ø5.0
Collet ER32 Ø8.00	<b>Ø8.0</b> to Ø7.0
Collet ER32 Ø10.00	<b>Ø10.0</b> to Ø9.0
Collet ER32 Ø12.00	<b>Ø12.0</b> to Ø11.0
Collet ER32 Ø14.00	<b>Ø14.0</b> to Ø13.0
Collet ER32 Ø16.00	<b>Ø16.0</b> to Ø15.0





# CUTTING CONDITIONS (GUIDELINE DATA)

Calculation of the rotational speed of the spindle

$$n = (1000 \times V_c) / (\pi \times D)$$

Calculation of the feed speed:

$$V_f = F_z \times Z \times N$$

Calculation of the cutting speed

$$V_c = (n \times \pi \times D) / 1000$$

Calculation of the feed per tooth

$$F_z = V_f / (Z \times n)$$

$$\pi = 3.1416$$

Tool diameter	D	mm
Number of teeth	Z	
Cutting speed	V <sub>c</sub>	m/min
Rotational speed	N	rpm
Feed per tooth	F <sub>z</sub>	mm/z
Feed speed	V <sub>f</sub>	mm/min

## FOR EXAMPLE:

Single-tooth, Ø6 cutter

Material: PMMA

V<sub>c</sub> = 450

F<sub>z</sub> = 0.07

Rotational speed:

$$n = (1,000 \times 450) / (\pi \times 6) = 23,873 \text{ (24,000 rpm)}$$

Feed:

$$V_f = 0.07 \times 1 \times 24,000 = 1,680 \text{ mm/min}$$

MATERIALS		Feed per tooth F <sub>z</sub>			
		<Ø3	Ø3 to Ø5	Ø5 to Ø8	Ø8 to Ø14
Aluminium alloy	200 to 400	0.01 - 0.03	0.025 - 0.05	0.04 - 0.09	0.07 - 0.17
Unalloyed aluminium (1,000)	200 to 400	0.04 - 0.06	0.05 - 0.10	0.08 - 0.17	0.12 - 0.25
Brass	200 to 400	0.01 - 0.03	0.03 - 0.06	0.06 - 0.09	0.08 - 0.12
Bronze	100 to 150	0.008 - 0.02	0.02 - 0.04	0.035 - 0.05	0.05 - 0.08
Copper	150 to 300	0.01 - 0.03	0.015 - 0.04	0.03 - 0.07	0.06 - 0.14
Thermoplastics, Plexiglass, ABS,	300 to 500	0.02 - 0.05	0.05 - 0.08	0.07 - 0.14	0.12 - 0.25
Nylon, polyethylene, Acetate, High-impact PS	150 to 350	0.07 - 0.10	0.1 - 0.2	0.2 - 0.3	0.3 - 0.4
Plastics - PVC - PE - PP	100 to 300	0.045 - 0.11	0.10 - 0.20	0.18 - 0.35	0.20 - 0.45
Expanded PVC	250 to 500	0.08 - 0.15	0.15 - 0.25	0.25 - 0.35	0.20 - 0.45
POM-C, PA6	200 to 400	0.02 - 0.05	0.05 - 0.08	0.07 - 0.14	0.12 - 0.25
PEHD (500 - 1000)	300 to 450	0.04 - 0.08	0.08 - 0.12	0.12 - 0.25	0.25 - 0.35
High-impact PS	150 to 250	0.04 - 0.1	0.1 - 0.15	0.1 - 0.3	0.2 - 0.5
Corian	400 to 500	0.03 - 0.045	0.045 - 0.06	0.06 - 0.09	0.09 - 0.14
Polyester, PC, PET	250 to 400	0.015 - 0.025	0.025 - 0.04	0.04 - 0.08	0.08 - 0.12
PETG	400 to 500	0.02 - 0.04	0.045 - 0.07	0.06 - 0.10	0.09 - 0.15
Bakelite	100 to 250	0.04 - 0.06	0.05 - 0.10	0.08 - 0.17	0.12 - 0.25
Foamed materials	300 to 350	0.07 - 0.10	0.1 - 0.2	0.2 - 0.3	0.3 - 0.4
Horn	150 to 350	0.03 - 0.045	0.045 - 0.06	0.06 - 0.09	0.09 - 0.14
LAB	250 to 400	0.04 - 0.07	0.06 - 0.1	0.1 - 0.2	0.2 - 0.3
Natural PEEK	250 to 450	0.01 - 0.025	0.02 - 0.04	0.035 - 0.07	0.07 - 0.11
Wood	300 to 450	0.015 - 0.07	0.05 - 0.1	0.07 - 0.15	0.12 - 0.25
MDF with Z1	250 to 400	0.04 - 0.08	0.08 - 0.12	0.1 - 0.15	0.15 - 0.2
MDF with 4030	300 to 700			0.15 - 0.20	0.15 - 0.3
Trespa	300 to 500	0.04 - 0.08	0.08 - 0.12	0.1 - 0.15	0.15 - 0.2
Stainless steel	40 to 90	0.008 - 0.015	0.01 - 0.02	0.015 - 0.04	0.03 - 0.06
Galvanised steel	100 - 150	0.008 - 0.015	0.02 - 0.03	0.03 - 0.05	0.04 - 0.08

## IMPACT OF COLLETS ON CUTTING QUALITY

Poor collet condition accounts for the majority of the problems encountered: poor surface finishes, shorter tool life, abnormal machining noises, etc.

Perfect machining is only possible when every element in the clamping chain (spindle, chuck, collet) is in perfect condition.

### MAINTAINING SPRING COLLETS

During machining, chips and dust particles lodge inside collets.

For this reason, collets must be well maintained.

We recommend that you systematically clean the collet and the tool holder carefully at every tool changeover.

Apply a rust inhibiting product to collets before putting them in storage (remember to remove this product before reusing the collet).

### SERVICE LIFE OF COLLETS

Collets are wear parts and as such must be replaced regularly. They lose their elasticity and are marked by the various tools they come into contact with.

As a preventive measure, we recommend replacing them approximately every 500 hours.

Well-serviced collets may last much longer.

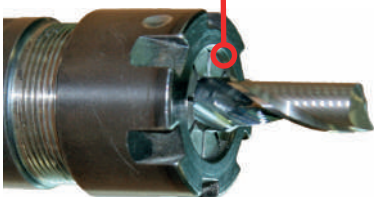
A collet must be replaced if the tool it was holding broke, since this would mark the collet and make the runout incompatible with high quality machining.

### GOOD CLAMPING PRACTICES

The tool must be held by as much of the collet's gripping surface as possible; at least 80 % of the length of the collet. This lets the tool rotate concentrically and limits vibrations that have an adverse effect on cutting quality.

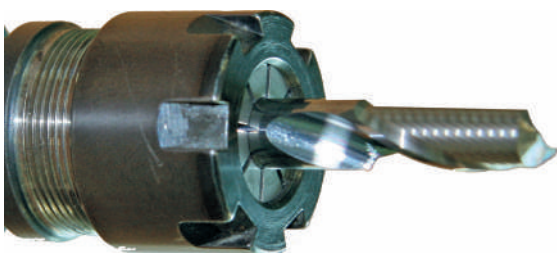
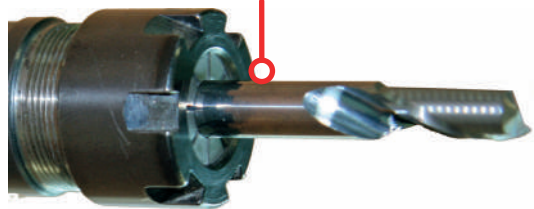
#### TOOL INSERTED TOO FAR INTO THE COLLET.

Bad runout is possible.  
Chips can get inside the collet.



#### TOOL INSUFFICIENTLY INSERTED.

Bad runout  
Vibration, poor surface finishes.  
Breakage possible  
Reduced service life  
Worsening cutting conditions



#### TOOL CORRECTLY INSERTED

2 to 3 mm of shank visible after the end of the flute.



# ADVICE ABOUT MACHINING

## PREAMBLE:

The key principles and recommendations are covered below.

Machining quality is dependent on many criteria. The five criteria for success are:

**1 ) Production equipment:** condition and choice of equipment (machine, spindle, suction, workpiece clamping, choice of cutting tool, etc.)

**2) Machining method** and strategy: machining direction (conventional (up) or down), number of cuts, type of entrance into the cut (angular, tangential), use or not of sprayed lubricant, etc.

**3) Human resources:** training, level of experience of the technicians in using the production resources.

**4) Material:** type and quality of the material.

**5) Environment:** dust, vibration, temperature (workshop and material), etc.

**And also,** required surface finish and target machining time.

## IMPACT OF SPINDLE POWER:

In general, low-power spindles (0.5 to 1.5 kW) can reach high rotational speeds, but deliver very low torque at low speeds. They should not, therefore, be fitted with tools whose diameter is more than 6 mm.

When machining thick materials, the number of cuts must be increased.

For cutters with a diameter of less than 4 mm, the axial depth of cut ( $A_p$ ) should be equal to the  $\emptyset$  and be about 3 mm for cutters with a diameter of 5 to 6 mm.

## ROTATIONAL SPEED OF SPINDLE: (REFER TO PAGE 54 “CUTTING CONDITIONS”)

The calculations (given in page 54 of this catalogue) used to determine the rotational speed of the spindle clearly show that when the  $\emptyset$  of the tool is larger, the rotational speed of the spindle needs to be reduced, irrespective of the material. The rotational speed should also be adjusted to suit the properties of the material.

For example: when machining soft materials, the rotational speed should be lower so as not to heat the material.

The rotational speed should also be reduced if the tool is long (since the potential out-of-balance is greater as is the risk of breakage and vibration).

## FEED: (REFER TO PAGE 54 “CUTTING CONDITIONS”)

A small-diameter tool is more susceptible to bending. The feed speed should therefore be set lower than that possible with a larger diameter.

The same principle applies for tools that have a long cutting length - the feed should be reduced since this type of tool generates a lot of bending.

When machining soft materials, the feed speed can be increased so as not to heat up the material.

Take care when calculating the feed speed: when you increase the number of teeth, you need to reduce the  $F_z$  value due to the impact of less effective chip evacuation (you cannot go three times quicker with three teeth than you can with one tooth).

The in-feed (or plunge) speed is normally half, or even a third, of the feed speed.

The impact on the machining time is not too significant, but this lower speed increases the service life of the tool (by protecting the tip) and the spindle.

(It can even be lower. For example:  $\emptyset$  20 face cutter fed directly onto the material:

in-feed (plunge) speed of about 50 mm/min)

There is no benefit in setting a very high feed for very small workpieces. The reason is that the machine only very rarely reaches this speed; the gain in time and in surface finish is very small. However, the geometry of the workpieces and the service life of the cutters is degraded.

#### **“RUNNING-IN” PERIOD FOR NEW TOOLS:**

New tools being used for the first time will not produce their best surface finish until the tool has machined a few metres of material, due to the extremely sharp edges on new tools.

This is particularly true for single-tooth tools used to machine plastics.

The 4053 series cuts less aggressively and does not need to be “run in”.

#### **CHOICE OF USEFUL LENGTH OF TOOL:**

The useful length must be greater than the thickness to be cut, without being too long, since this leads to:

- A longer unsupported length,
- A less rigid and more breakable tool,
- An impaired surface finish and shorter tool life.

#### **HELIX DIRECTION:**

Upcut cutters with a right-handed cut tend to pull the machined workpiece towards the tool: the chips are very well evacuated, but the workpiece must be clamped securely to avoid any vibration problems.

Downcut cutters with a right-handed cut tend to push the machined workpiece against the table of the machine, which reduces clamping-related issues. There will be no delamination of the material near the surface of the workpiece, but the chips will be poorly evacuated (with a risk of chip jamming).

Excellent chip suction or providing clear space under the workpiece are recommended.

#### **SURFACE FINISH:**

A number of criteria need to be satisfied to obtain a good surface finish, with feed speed far from being the only one.

- Securely holding the workpiece (extremely important).
- The right tool for the type and thickness of the material.
- Good condition of the machine (shafts, spindles, tapers, collets, etc.) and tool.
- Good chip suction.
- Good cutting conditions.
- Good machining strategies.

#### **FINISHING CUT:**

Removing 0.3 to 0.5 mm of material with a finishing cut is a good way to obtain a better surface finish for many materials. This eliminates any built-up edge-related issues and smooths out the effects of vibration. However, this is not true for all materials.

#### **MACHINING THE BOTTOM OF POCKETS:**

One-flute cutters, due to their geometry, do not produce the best surface finish in the bottom of pockets. Two-flute cutters have flatter tips and produce a better surface finish.

Smaller overlaps and lower speeds also greatly improve the surface finish.



## ADVICE ABOUT DEPTHS OF CUT.

### RADIAL DEPTH OF CUT, AE:

When contouring (or profiling) a workpiece, it is advisable to reduce the radial depth of cut (Ae) when machining hard materials and when using small-diameter tools.

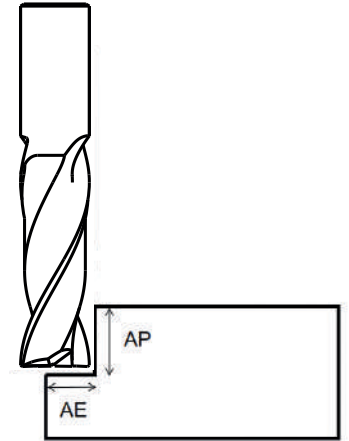
### AXIAL DEPTH OF CUT, AP:

For most plastics, the Ap should be 1 to 2 times the tool diameter.

For non-ferrous metals (aluminium, etc.), it should be 0.5 to 1 times the diameter of the tool.

### THESE ARE GUIDELINE VALUES.

For example: for expanded PVC, the Ap can be 3 to 4 times the tool  $\varnothing$  (for tools with a  $\varnothing$  of 6 mm and above)



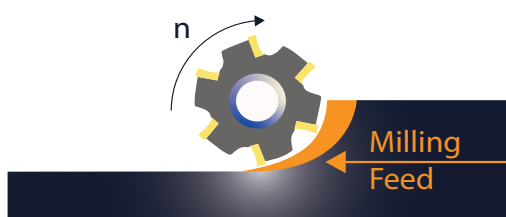
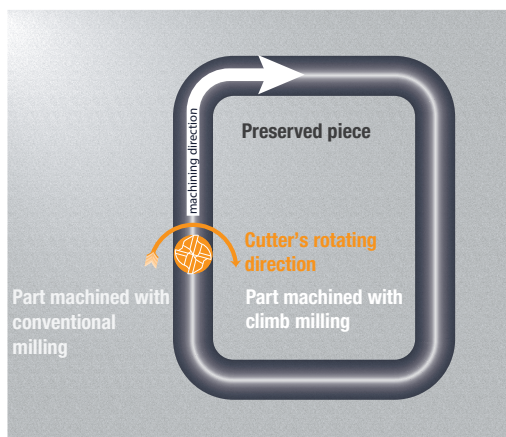
## MACHINING DIRECTION

THE CHOICE OF MACHINING DIRECTION IS PRIMARILY DETERMINED BY THE DESIRED QUALITY OF THE SURFACE FINISH. THE PROPERTIES OF THE MATERIAL ALSO HAS TO BE CONSIDERED.

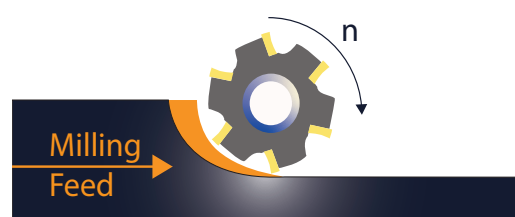
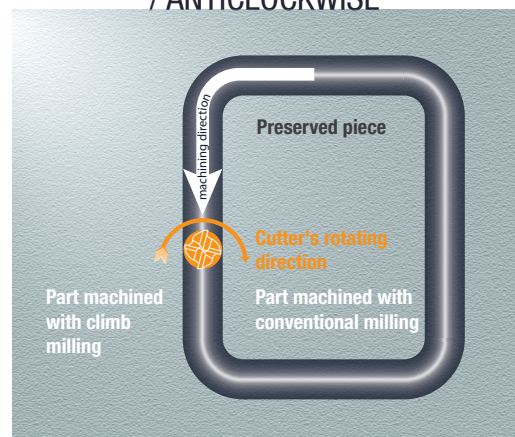
Down (or climb) milling is used for most plastics.  
The cuts are more “gentle”.

Conventional (up) milling tends to be used for soft or fibrous materials.  
The cut is more “aggressive”.

### CLIMB MILLING / CLOCKWISE



### CONVENTIONAL (UP) MILLING / ANTICLOCKWISE



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