

## Drilling of composite materials



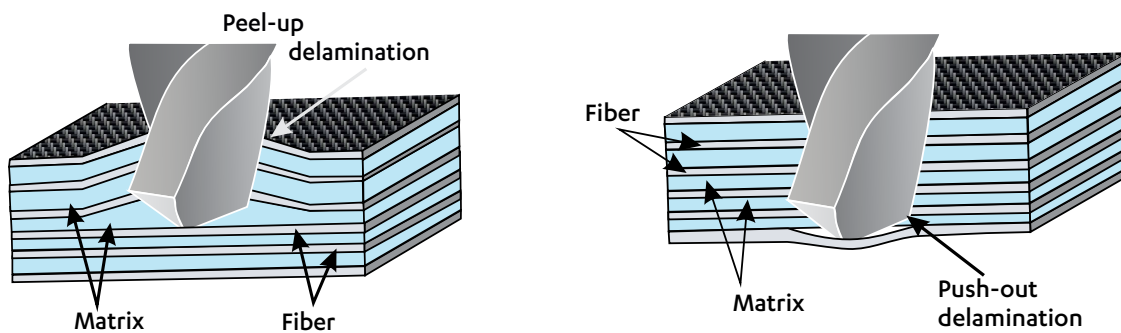
**A high performance  
drill**

# Machining of composite materials

## One problem

Carbon or Glass Fiber Reinforced Plastics (CFRP/GFRP) are very hard to machine. The drilling efficiency is reduced and delamination problems occur frequently.

As shown in the picture below, delamination may happen at two levels: at the entry of the drilled hole (peel-up delamination) and at the exit periphery of the drilled hole ("push out" delamination).



## One solution



- Bélet has developed a custom tool with specific carbide, geometry and coating for composite materials.
- This tool allows high speed drilling of thousands of holes in GFRP without experiencing delamination issues.

# N°1

This tool has been tested along with 12 competitors. Bélet's drill obtained the best results!

## Tool

Bélet's drill REF 300

## Through-hole drilling

1.6 mm

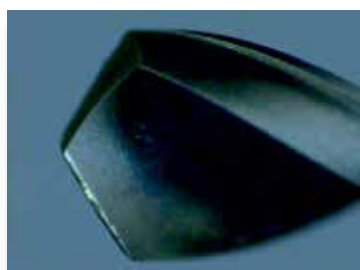
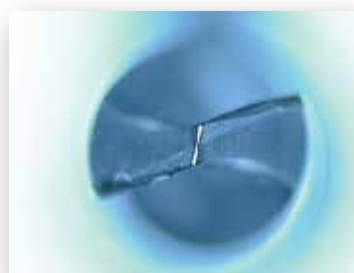
## Hole tolerance

± 0.05 mm

## Results

	Drill von Bélet REF 300	Competitor A
# holes	10'000	10'000
Conical from	All holes OK	3'000
Out of tolerances from hole n°	All holes OK	5'000
Burr on top from hole n°	All holes OK	2'400
Bottom burr from hole n°	6'600	3'000
Number of good holes	6'600	3'000
Tool wear after 10'000 holes	Good	Highly worn

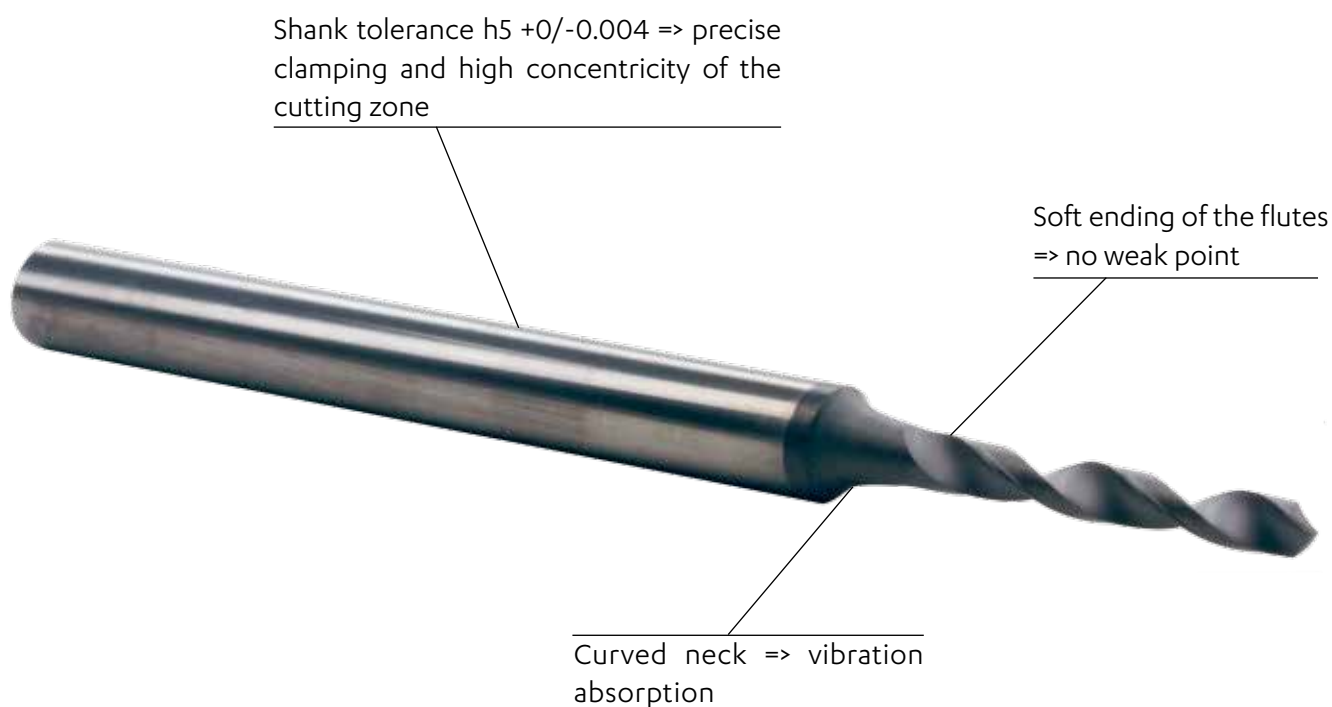
## Drill Bélet REF 300: tool wear after 10'000 holes



## Observations :

- After 10'000 holes, only the cutting edge is worn. Other edges are sharp
- The tip is intact
- The radial relief is present => drilling ø is correct
- The coating is still present

# Main features



## High quality micro grain solid carbide

- Chosen for its hardness and high tenacity
- Allows also a flexibility of the drill

## Polished surface

- Allows a good chip evacuation
- Sharp cutting edges

## Tight geometric tolerances

- Centered tool sharpening
- Less constraints when drilling

## Specific coating

- Reduces friction coefficient
- High reduction of the tool wear

# Drill for composite materials

REF. 300

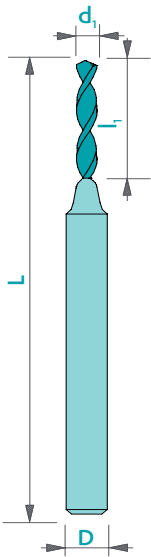
Material	Vc [m/min]
Composite materials	200

Tolerances

d<sub>1</sub> : +0  
-0.004  
D : h5

Long tool life

Minimal delamination



Z2



HM  
MG

N  
HSC

d <sub>1</sub>	L <sub>1</sub>	D	L
0.80	8	3.175	38
0.90	8	3.175	38
1.00	10	3.175	38
1.10	10	3.175	38
1.20	10	3.175	38
1.30	10	3.175	38
1.40	10	3.175	38
1.50	10	3.175	38
1.55	10	3.175	38
1.60	10	3.175	38
1.65	10	3.175	38
1.70	10	3.175	38
1.75	10	3.175	38
1.80	10	3.175	38
1.85	10	3.175	38
1.90	10	3.175	38
1.95	10	3.175	38
2.00	10	3.175	38

Prices  
and other  
dimensions  
available upon  
request