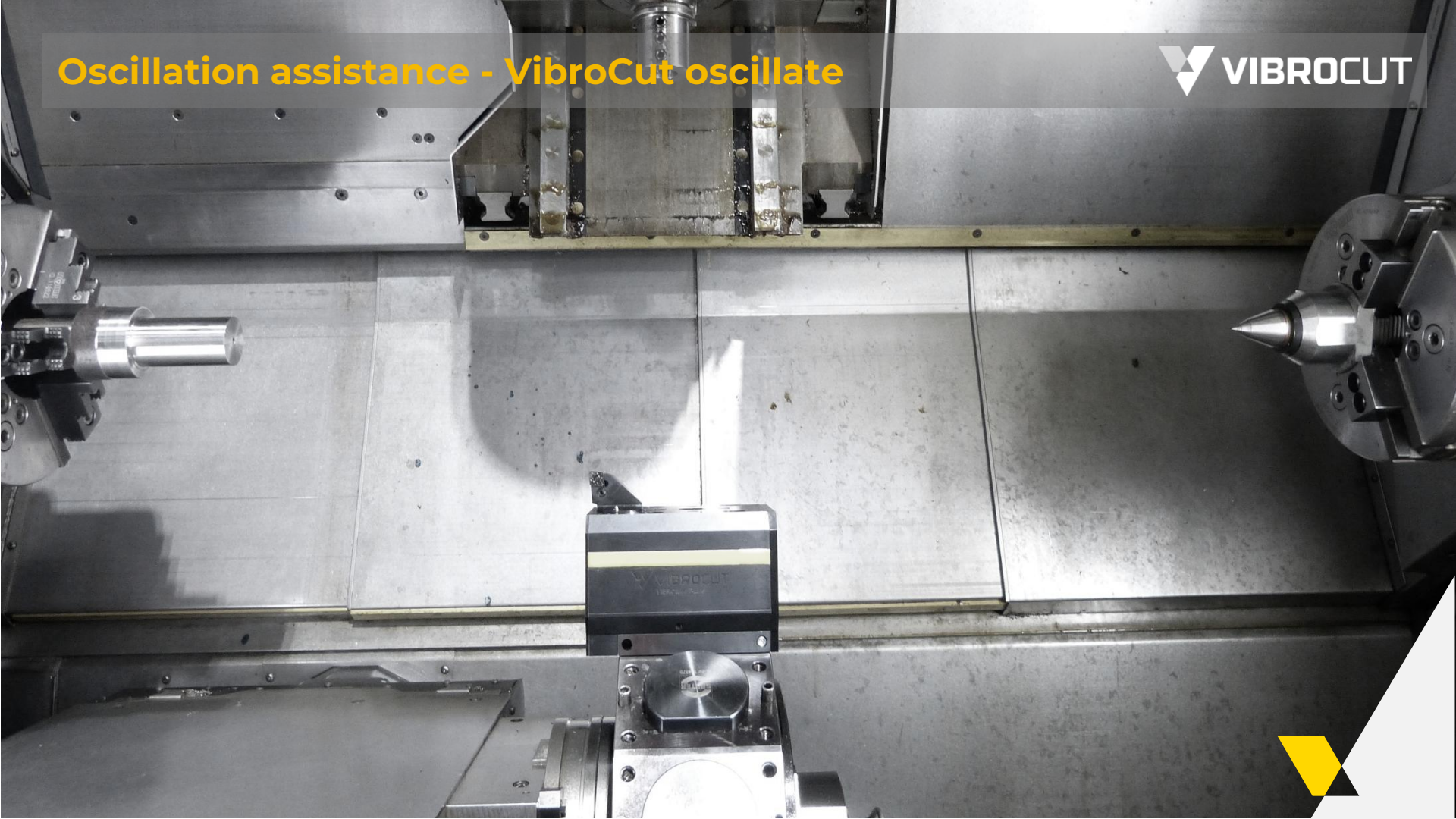


Oscillation assistance - VibroCut oscillate



## Classification of the technology

### Manufacturing process:

- Turning (longitudinal / facing turning, grooving / parting off, internal / external turning, etc.)

### Mode:

- 1-dimensional (longitudinal)

### Oscillation frequency:

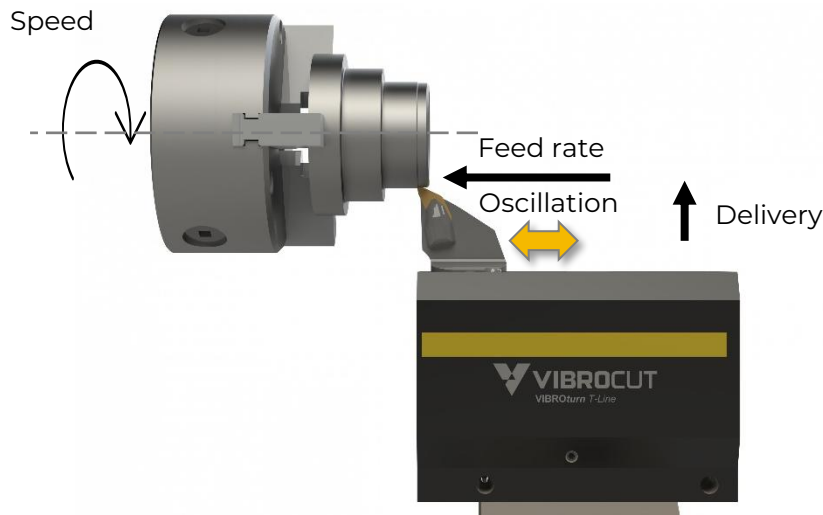
- Low frequency 1...100 Hz

### Oscillation generation:

- Non-resonant

### Orientation to process kinematics:

- In feed direction



**Objective:** Realization of an economical and robust chip breaking behavior



**Process reliability**



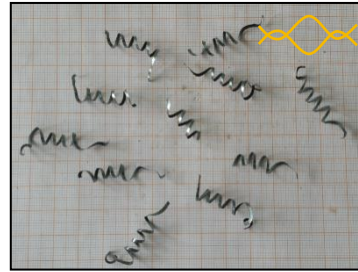
**Productivity**

## Chip breaking behavior as a function of the oscillation parameters

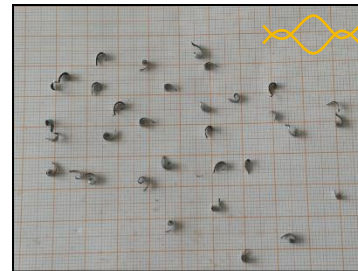


- Material C55
- $v_c = 190$  m/min
- $a_p = 0,5$  mm
- $f = 0,1$  mm

### With cut interruption



$\hat{A} = 0,11$  mm |  $f_{vib} = 13$  Hz



$\hat{A} = 0,11$  mm |  $f_{vib} = 65$  Hz

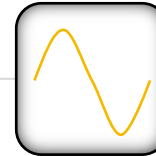
### Without cutting interruption



$\hat{A} = 0,08$  mm |  $f_{vib} = 13$  Hz



$\hat{A} = 0,08$  mm |  $f_{vib} = 65$  Hz



$\hat{A}$ ...Oszillation stroke  
 $f_{vib}$ ...Oszillation frequency

## USP of oscillation technology

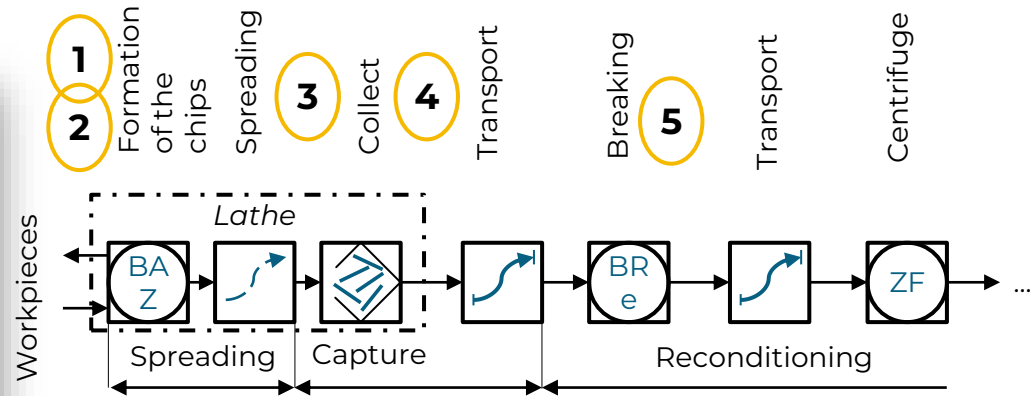
- Short chips in any material
- Safe chip breaking
  - for all:
    - Cutting values
    - Tool geometries
  - and independent of:
    - Material batch fluctuations
    - Tool wear
- Adjustable chip length with oscillation parameters



➤ **Robust and safe chip breaking!**

## Problem definition: In the chip flow - from machining to disposal

- 1. Formation of long single chips and tangled chips**  
Poor chip breaking reduces process reliability!
- 2. Formation of chip nests**  
Chip nests increase the risk of collision!
- 3. Discharge by chip conveyor is hindered**  
Process stop for manual removal of chips!
- 4. Low bulk density in the chip container**  
Frequent changing and transport of containers!
- 5. Poor output rates during crushing**  
Inefficient chip processing!





# Oscillation-assisted turning - VibroCut oscillate



## Product line - VibroCut oscillate

### Innovative, retrofittable tool holders:

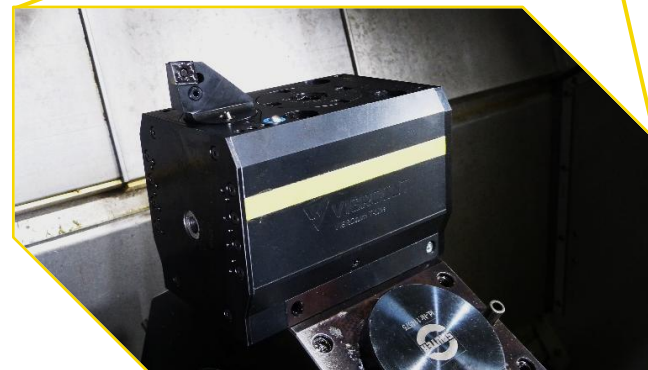
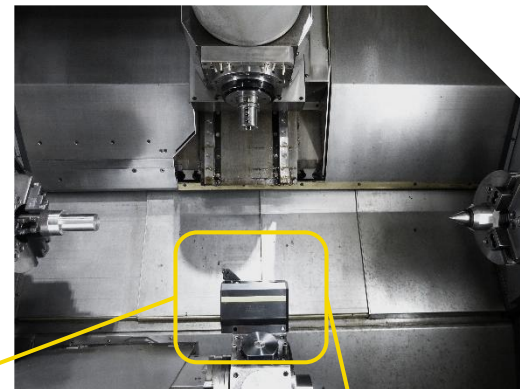
- Driven with live tool of the turret
- Rigid bearing of the tool holder
- Highest oscillation parameters

### Performance parameters:

Frequency:	$f_{\text{vib}} = 1 \dots 100 \text{ Hz}$
Stroke (adjustable):	$\hat{A} = 0 \dots 0.6 \text{ mm}$
Process forces:	$f_{\text{c, max}} = 9 \text{ kN}$

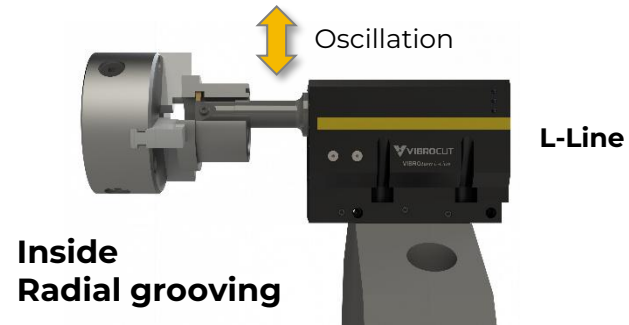
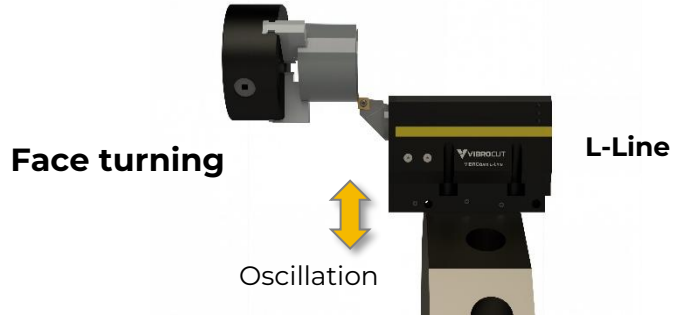
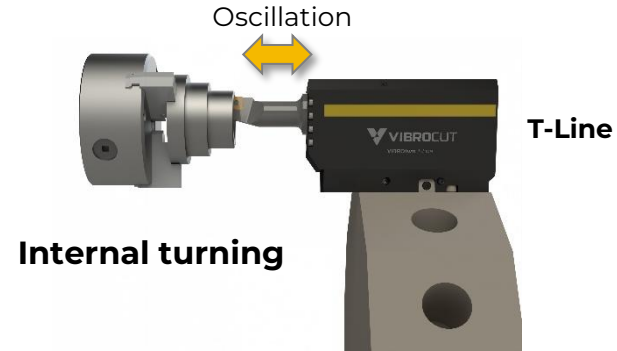
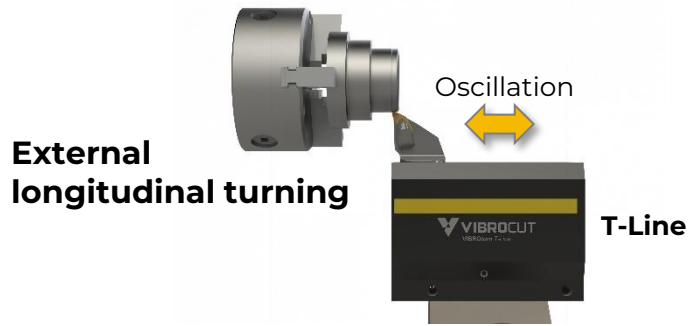
### Unique position:

- Unique performance
  - Gentle on the machine compared to control cycles
  - Reliable and adjustable chip breaking
  - Control-independent
- Flexible retrofitting independent of the machine manufacturer!



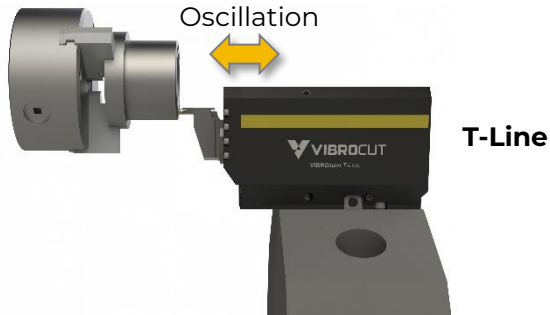
Oscillating system for turret axle

## VibroCut oscillate - Process variants



## VibroCut oscillate - Process variants

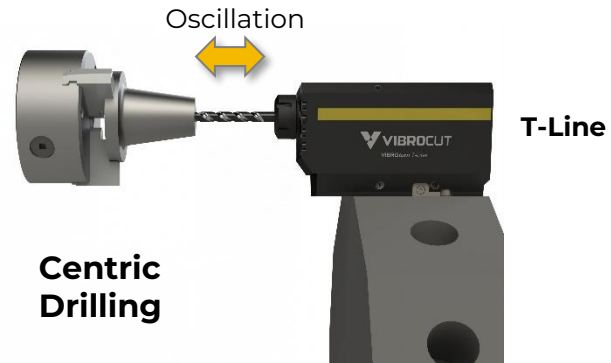
**Axial  
grooving**



**Radial  
grooving**



**Centric  
Drilling**





## Application for longitudinal turning of stainless steel (valves, surgical components etc.)

- Material: Stainless steel 1.4307 (X2CrNi18-9)
- Tool: VBMT 160404-MM 2015
- Cutting values:  $a_p = 0.2 \text{ mm}$ ;  $f = 0.08 \text{ mm}$ ;  
 $v_c = 200 \text{ m/min}$
- Oscillation parameters:  $f_{OS} = 27 \text{ Hz}$ ;  $\hat{A} = 0.115 \text{ mm}$
- **Problem:** long tangled chips, scratched surfaces and component rejects

### Customer benefits

- ✓ Short chips
- ✓ No scratched surfaces



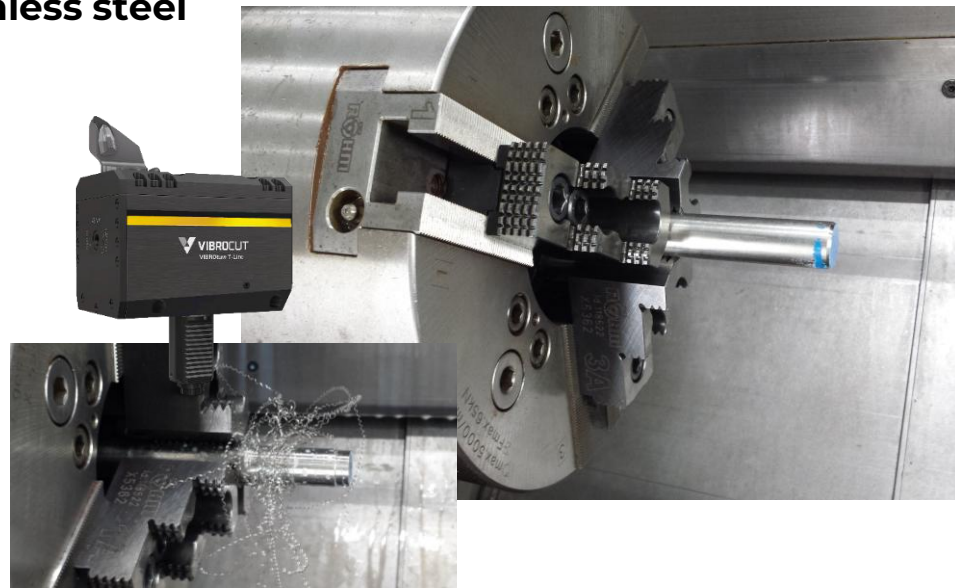
Improved process reliability



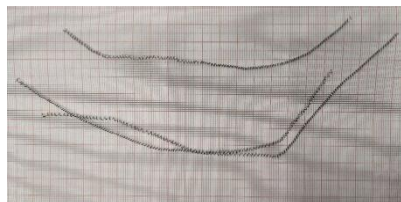
No component rejects



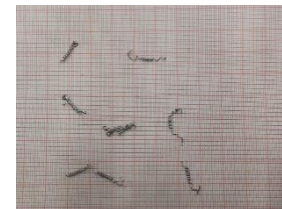
Automation possible



Conventional turning



VibroCut **oscillate**



## Application for internal turning of nickel-based alloys (engine components, boring bars etc.)

- Material: Inconel 718
- Tool: DNMG 150608-MR 4315
- Cutting values:  $a_p = 0.2 \text{ mm}$ ;  $f = 0.15 \text{ mm}$ ;  
 $v_c = 30 \text{ m/min}$
- Oscillation parameters:  $f_{OS} = 7...15 \text{ Hz}$ ;  $\hat{A} = 0.19 \text{ mm}$

➤ **Problem:** long tangled chips

### Customer benefits

- ✓ Short chips
- ✓ No chip jamming on boring bar



Improved process reliability



No machine downtimes due to machine downtimes



Automation possible



Conventional turning



VibroCut **oscillate**



## Application for longitudinal turning of plastics (distance parts, sockets etc.)

- Material: PP (schwarz)
  - Tool: VCGT 160408FN-ALU
  - Cutting values:  $a_p = 1 \text{ mm}$ ;  $f = 0,3 \text{ mm}$ ;  $n = 2.000 \text{ m/min}$
  - Oscillation parameters:  $f_{OS} = 50 \text{ Hz}$ ;  $\hat{A} = 0,45 \text{ mm}$
- **Problem:** long tangled chips, no automation possible

### Customer benefits

- ✓ Short chips
- ✓ No process problems due to chips



Improved process reliability



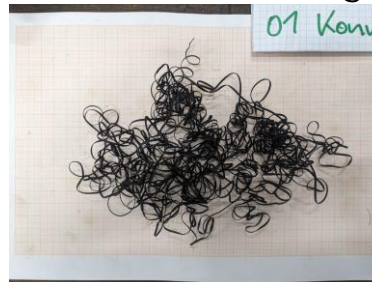
No machine downtimes due to machine downtimes



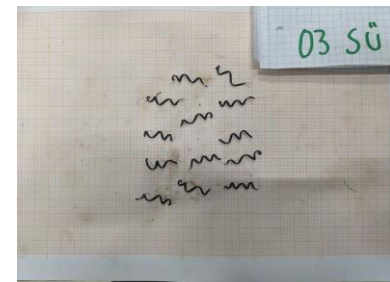
Automation possible



Conventional turning



VibroCut **oscillate**



## Benefits of VibroCut *oscillate*



Increase in machine availability



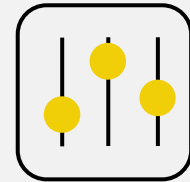
Improving process reliability



Enabling automation and  
unmanned operation



Improvement - chip handling  
and processing



Robust improvement  
of efficiency and cycle times

**ROI < 1 year**

**ROI-calculator:** <https://vibrocut.de/en/cost-savings-with-vibroturn/>

# Oscillation-assisted turning - VibroCut *oscillate*



## ROI < 1 year



Increase productivity



Increase TCO and OEE



Greater process reliability



Improvement of chip handling and processing



Automation and unmanned operation



Prevention of accidents at work

### Calculation example for controlled chip breaking



Hourly machine rate: 45 €/h



Planned occupancy time: 6000 h/year  
750 shifts/year



Machine downtimes due to chip breaking:  
2 - 6 minutes / h

**ROI < 1 year**

Standstill due to Chip breaking	Productivity increase [per a]	Savings per machine
2 minutes / h	200h (3,3%)	<b>9,000 €</b>
4 minutes / h	400h (6,7%)	<b>18,000 €</b>
6 minutes / h	600h (10%)	<b>27,000 €</b>

<https://vibrocute.de/en/cost-savings-with-vibroturn/>

Observe the protection notice in accordance with ISO 16016, particularly in the event of a property right being granted.



# VibroCut – Hybrid machining



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*"VibroCut combines  
technique and technology  
for hybrid machining"*