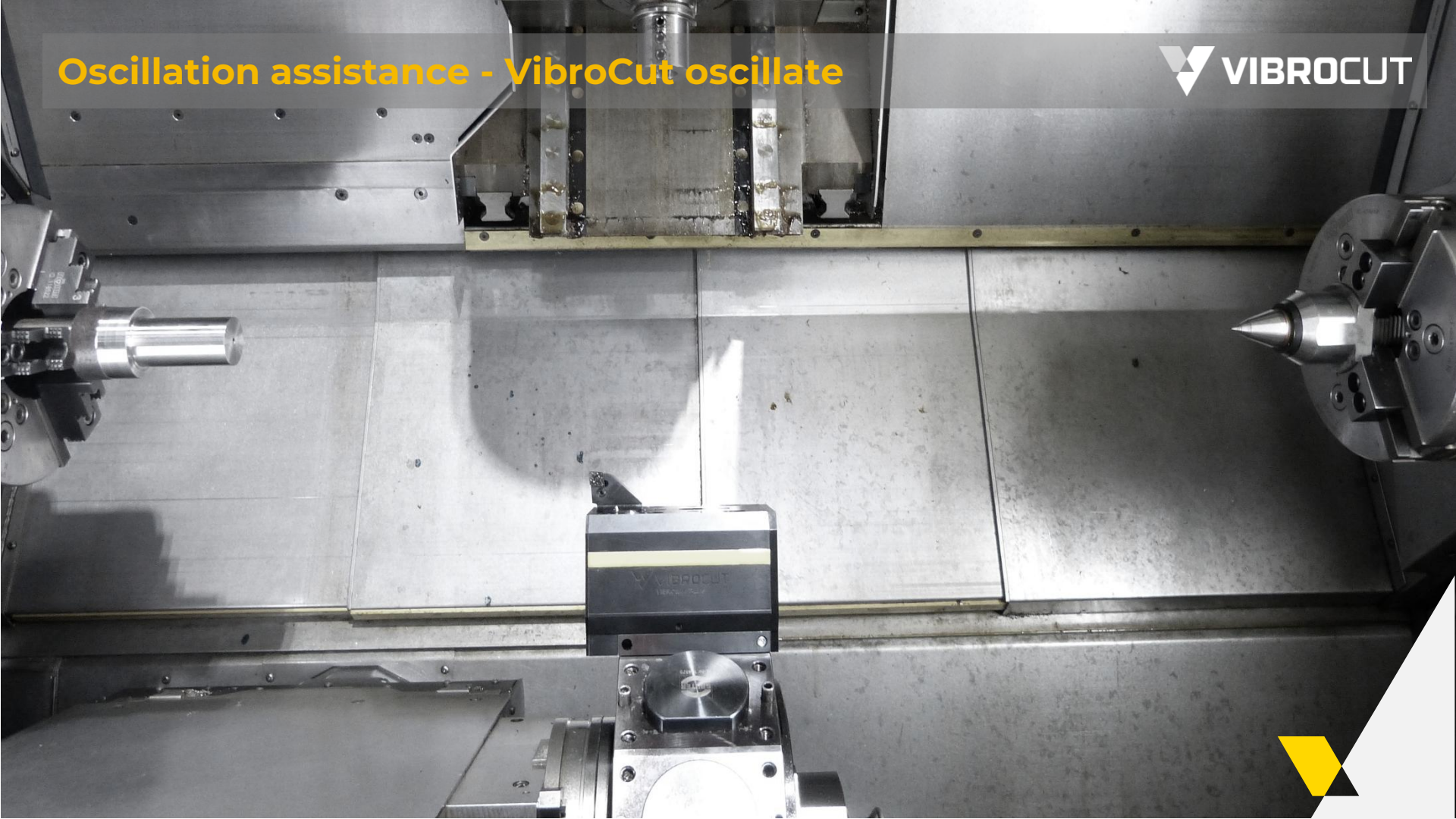


Oscillation assistance - VibroCut oscillate

 VIBROCUT



Classification of the technology

Manufacturing process:

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

Mode:

- 1-dimensional (longitudinal)

Oscillation frequency:

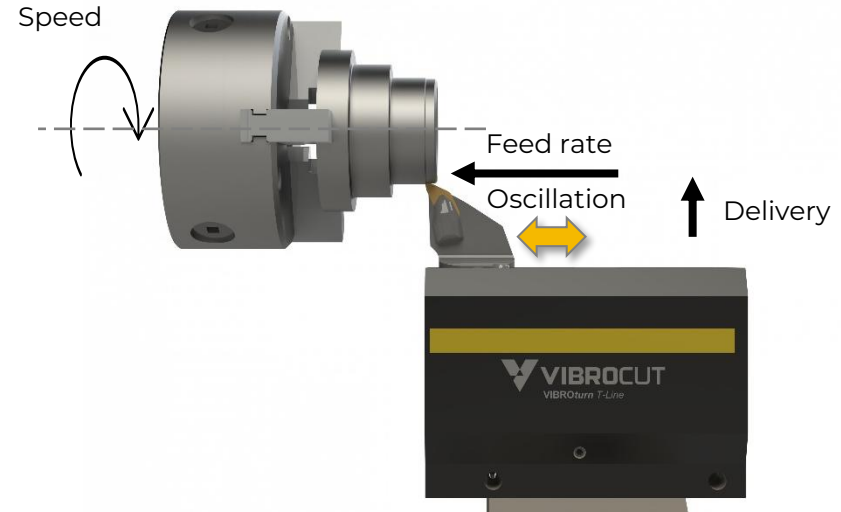
- Low frequency 1...100 Hz

Oscillation generation:

- Non-resonant

Orientation to process kinematics:

- In feed direction



Objective: Realization of an economical and robust chip breaking behavior



Process reliability



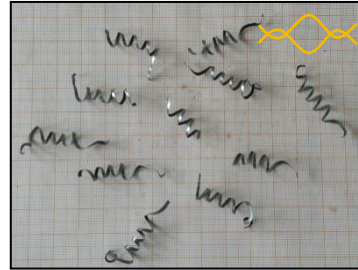
Productivity

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

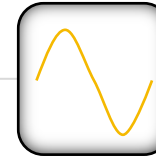
Without cutting interruption



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



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



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

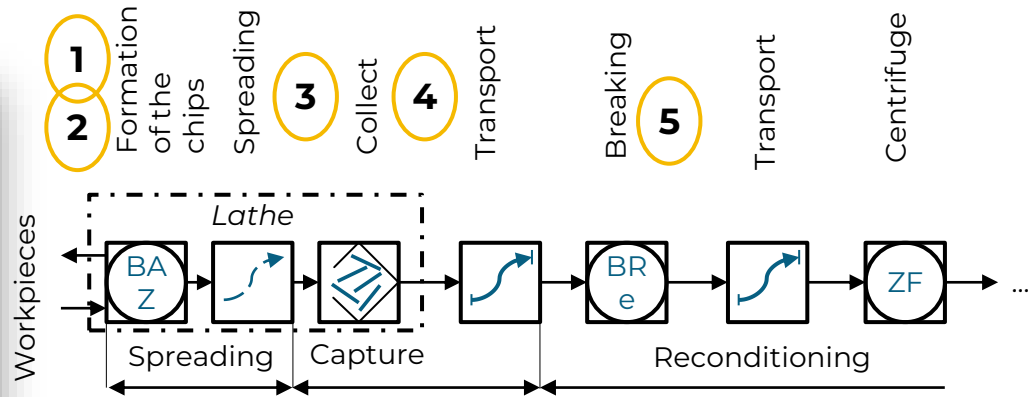
USP of oscillation technology

- 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:

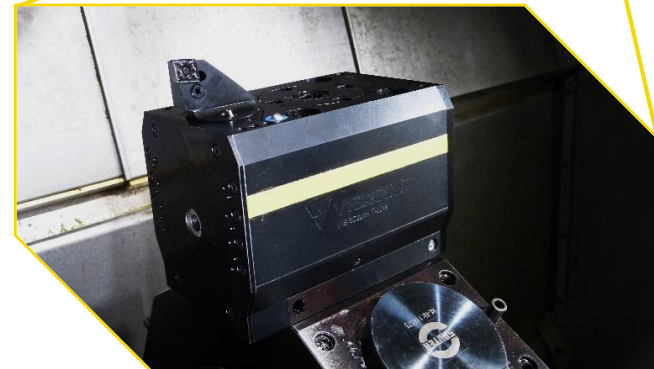
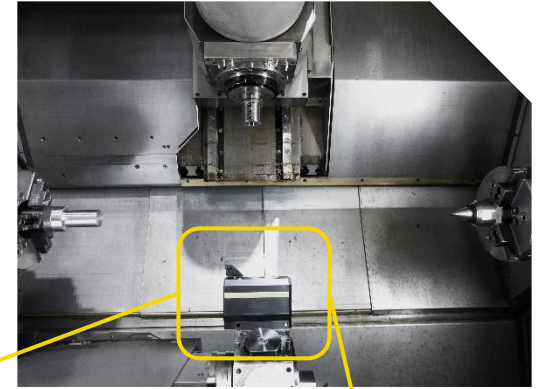
- Driven with live tool of the turret
- Rigid bearing of the tool holder
- Highest oscillation parameters

Performance parameters:

Vibration frequency:	$f_{\text{vib}} = 1...100 \text{ Hz}$
Swing range (adjustable):	$\hat{A} = 0...0.6 \text{ mm}$
Process forces:	$f_{\text{c, max}} = 9 \text{ kN}$

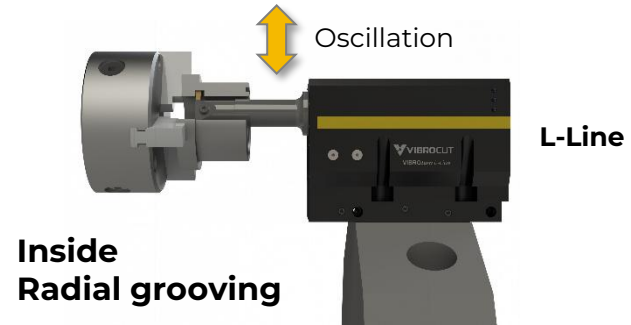
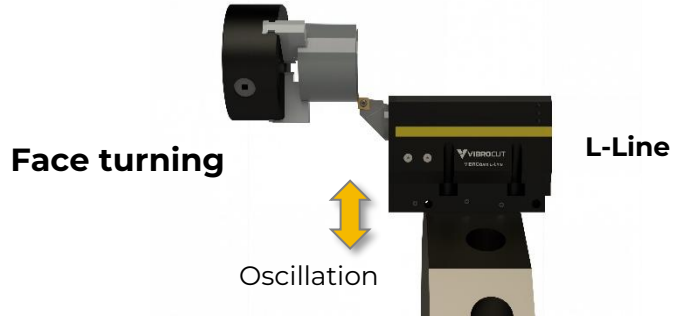
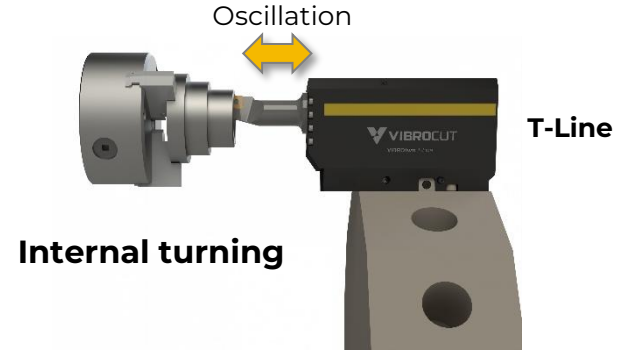
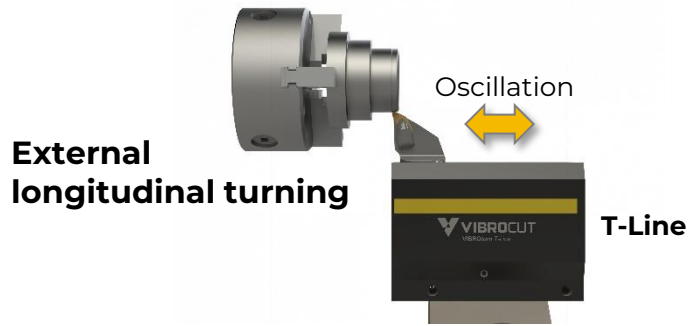
Unique position:

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



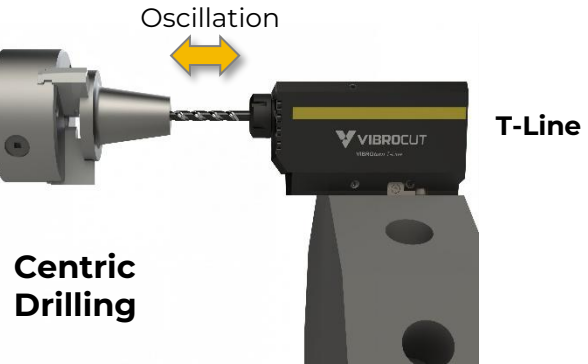
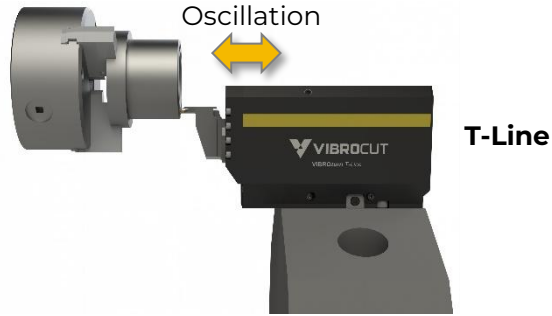
Oscillating system for turret axle

VibroCut oscillate - Process variants



VibroCut oscillate - Process variants

**Axial
grooving**



**Radial
grooving**



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



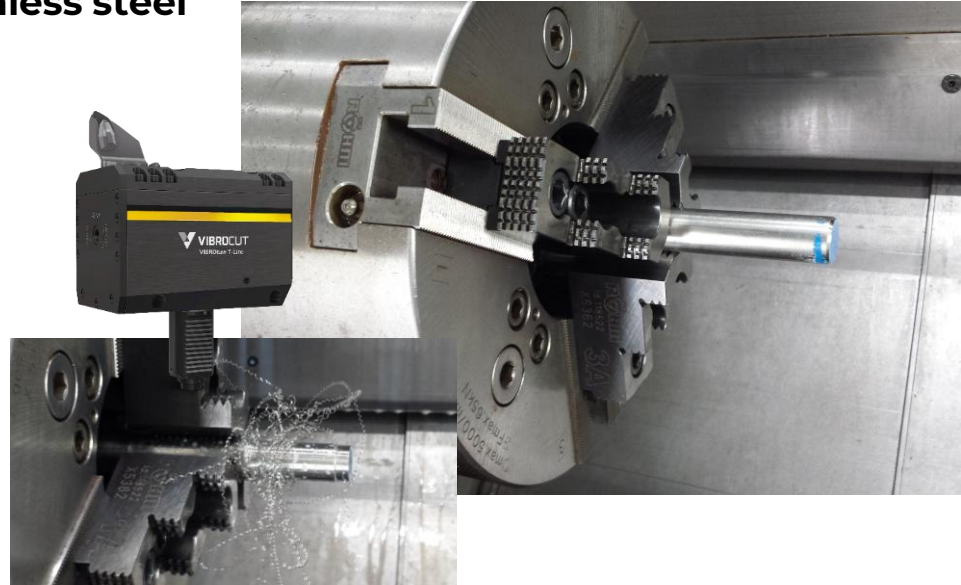
Improved process reliability



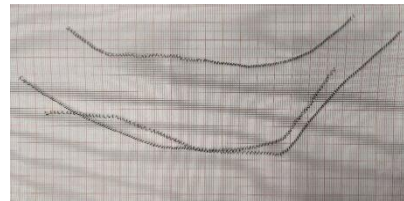
No component rejects



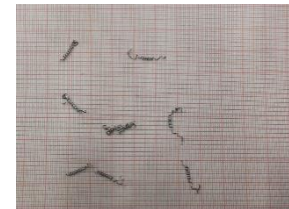
Automation possible



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**



Benefits of VibroCut *oscillate*



Increase in machine availability



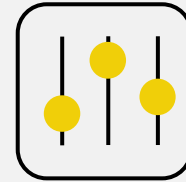
Improving process reliability



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%)	9,000 €
4 minutes / h	400h (6,7%)	18,000 €
6 minutes / h	600h (10%)	27,000 €

<https://vibrocut.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.

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