



Oscillation Technology

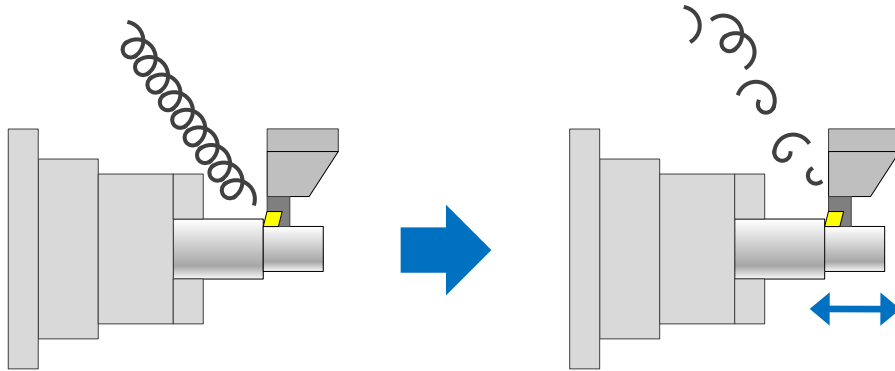
- A new proposal for swarf problems -

Oscillation Cutting

Oscillation Cutting

Software

Oscillation Cutting using servo control technology is a function that vibrates the tool **to cut chips into small pieces**.



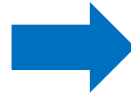
Oscillation in the cutting direction

- ◆ Prevention of chip entanglement
- ◆ Improved chip evacuation

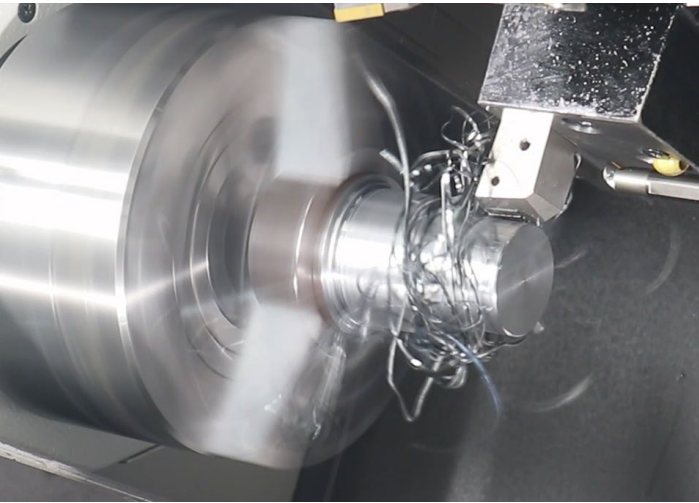
Oscillation Cutting

Software

Long chips can cause defects!



Oscillation Cutting is a new measure to solve this.



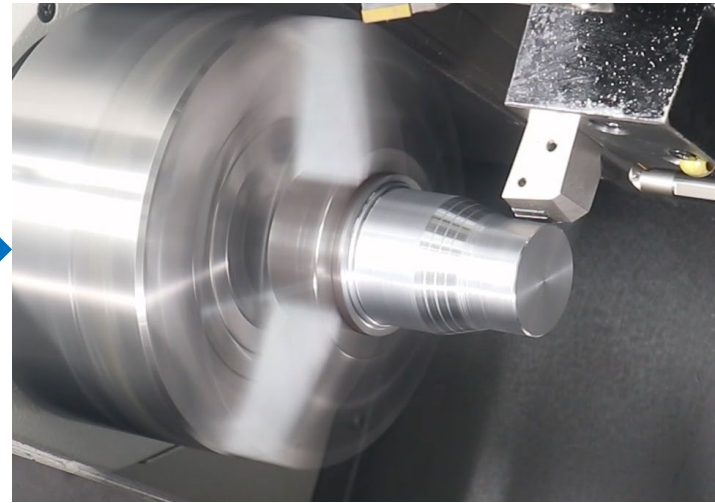
Current means

- High pressure coolant
- Chip breaker



New means

- Oscillation cutting

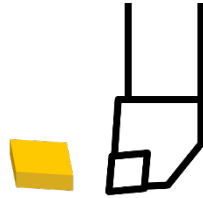


Oscillation Cutting

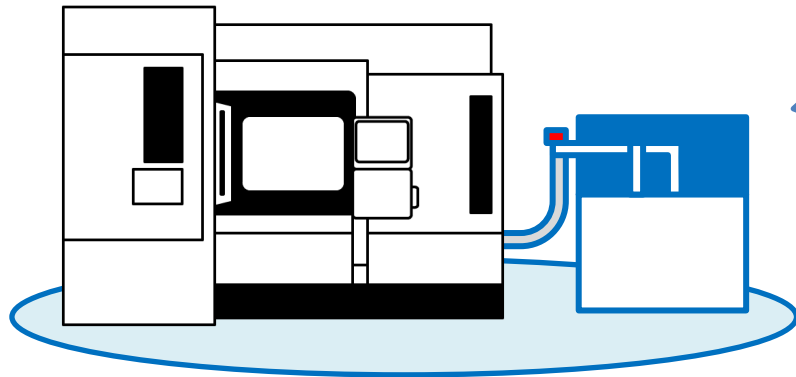
Software

Current means

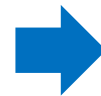
- Chip breaker
- High pressure coolant



- Some chips cannot be divided.
- It takes some costs.



- It takes some costs.
- It consumes electricity.
- Requires installation space.



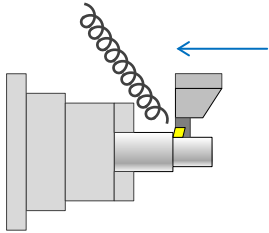
Oscillation cutting is a new measure to solve this.

Oscillation Cutting

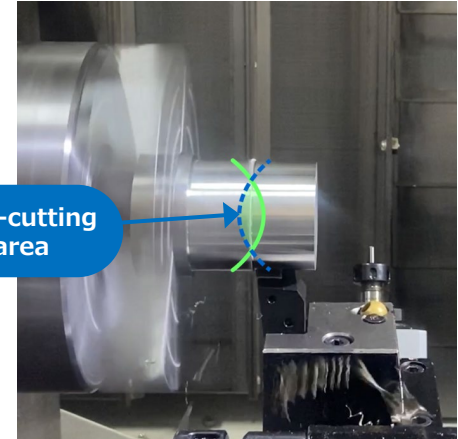
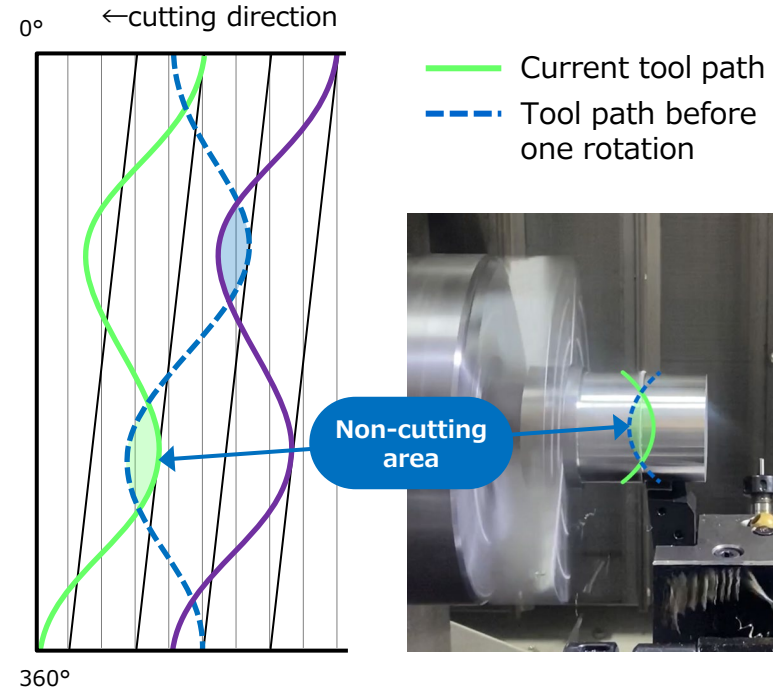
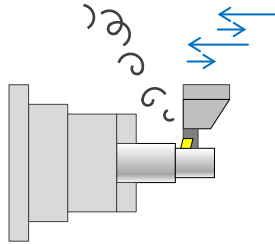
Software

Cut the chips by missing

Without
Oscillation Cutting



With
Oscillation Cutting



Use the “Servo learning oscillation function(FANUC)”.
It can be easily executed with just a G code command.

G8.5 P2 Z0 I1.5 K1.2

P0: Oscillation mode OFF

P2: Oscillation mode ON

X0 or Z0 : Axis Select

I : Oscillation frequency scale

K: Amplitude scale
=Retract amount scale

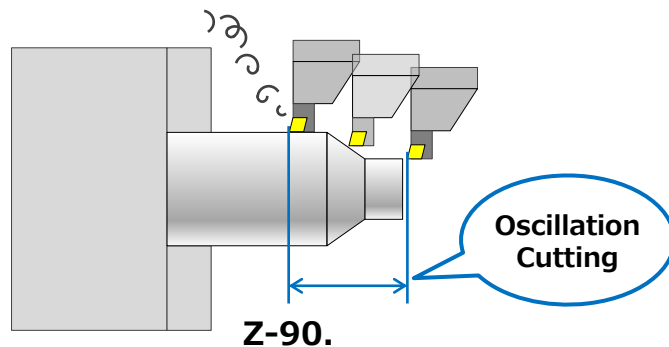
Command with a
cutting program
in between.

G1 Z-30. F0.1

X90. Z-60.

Z-90.

G8.5 P0



Setup Screen

Software

Determination of whether chips can be cut

Max. Chip length(mm)

Theoretical surface roughness(Rz)

MACHINING CONDITIONS - JUDGEMENT	
SPINDLE SPEED S [/min]	2000
FEEDRATE F [mm/rev]	0.100
FREQUENCY I [times]	1.000
AMPLITUDE K [times]	1.200
CHIP SHREDDING	NO GOOD
LIMIT CHECK AXIS	ALL

In case of NG ↑

MACHINING CONDITIONS - JUDGEMENT	
SPINDLE SPEED S [/min]	2000
FEEDRATE F [mm/rev]	0.100
FREQUENCY I [times]	0.500
AMPLITUDE K [times]	1.200
CHIP SHREDDING	OK
LIMIT CHECK AXIS	ALL

OSCILLATION STATUS(1/3)	
FREQUENCY I [times]	0.500
AMPLITUDE K [times]	1.200
WORK ϕ [mm]	50.800
SP MAX CHIP LENGTH [mm]	255.591

SURFACE ROUGHNESS(3/3)	
TOOL NOSE RADIUS [mm]	0.800
THEORY MAX Rz [μ m]	6.250
FEED F EQUIVALENT TO NON-OSCILLATION	
ROUGHNESS [mm/rev]	0.050

TOOL PATH CHECK(TURNING)	
0.100mm	
0°	
360°	

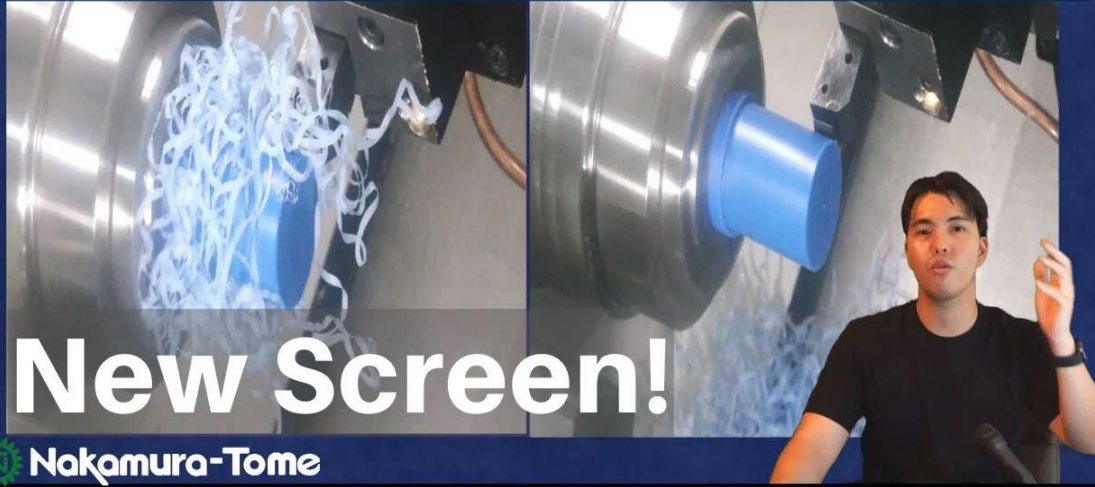
PROGRAM	
//CNC_MEM/USER/PATH1/	
00100	(FG-EDIT) UPPER
G0 X92.0 ;	
G1 X-1.6 F0.2 ;	
G0 X90.0 Z2.0 ;	
G0 X86.0 ;	
G8.5 P2 I0.500 K1.200 ;	
G1 Z-60. F0.1 ;	
G8.5 P0 ;	
G1 U1.0 ;	

Parameters in the Oscillation Cutting (I: Frequency ratio, K: Amplitude ratio) can be set on the screen. Chip breakup, chip length, and theoretical surface roughness can be adjusted by the parameter's settings.

Movie

Software

Oscillation Cutting



Click here for video

*Go to YouTube



Oscillation Threading

Problems in Thread Cutting

- Long Chips during threading with difficult materials
- Chips get lodged inside
- With longer thread lengths, chips become entangled.
- Automation is difficult due to the chips



Oscillation Threading

Software

Chip breaking in threading “Oscillation Threading”

Function to **break chips** by
executing **oscillating motion**
by servo-oscillation

What is the
Oscillation
Threading?

Oscillation OFF



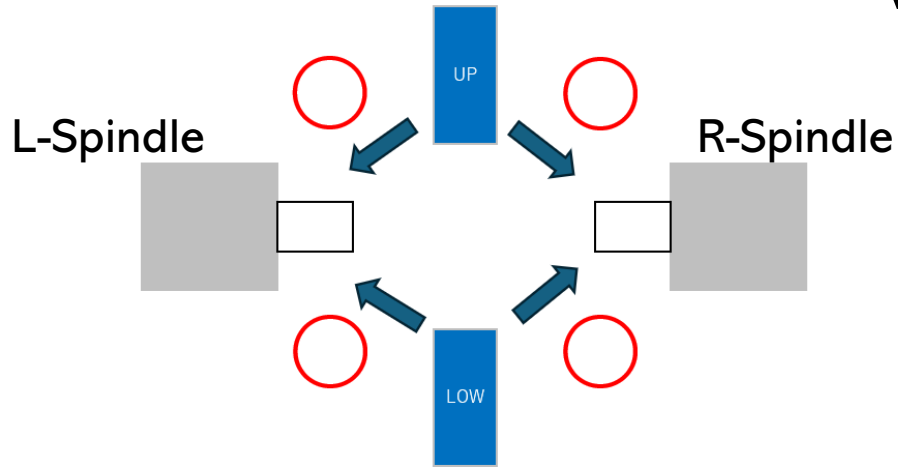
Oscillation ON



Applicable to various threading

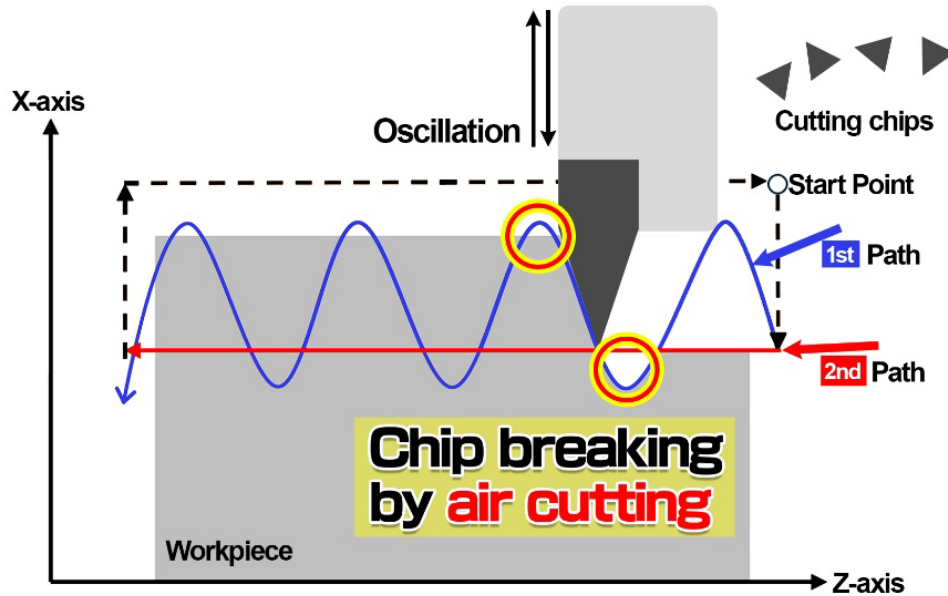


Applicable to G92 and G76, and also applicable to taper threads, PT, PF, etc.
Applicable to both O.D. and I.D.



Various threading patterns

Both UPPER and LOWER can perform Oscillation Threading in both spindles.



Chip breaking

By oscillating the cutting edge, it moves away from the workpiece, creating air cuts that break the chips.

G8.5 P4. I__ . K__ . [Q__ . R__ . J__ . ,A__.] ← **ON**

• • • Threading Program • • •

G8.5 P0. ← ----- **OFF**

P4 : Servo-learning oscillation threading mode on

P0 : Servo-learning oscillation threading mode off

I : Oscillation frequency ratio

K : Oscillation amplitude ratio

The following parameters are used only for threading cycles.

Q : Thread X-coordinate

R : Thread Finish X-coordinate

The following parameters are used only when the threading cycle performs other than right-angle cutting.

J : Z-coordinate of thread finishing process start

,A: Angle of thread cutting edge (thread)

Simple program commands

You can apply Oscillating Threading by enclosing the desired machining part between **G8.5 P4. (start)** and **G8.5 P0. (end)** codes.

Movie

Software



Click here for video

*Go to YouTube



Supported Model

Supported models

Click [here](#) to download machinecatalogs.

Model	SC-100	SC-100X ²	AS-200	AS-200L	NT-Flex	WT-100	WT-150II
Oscillation Cutting	○	○(Std.)	△	△	○(Std.)	○	○
Oscillation Threading	○	○	-	-	○	○	○

Model	WY-100V	WY-150V	WY-250L	NTY ³ -100V	NTY ³ -150V	NTY ³ -250	NTJ-100	Super NTJ
Oscillation Cutting	○	○	○	○	○	○	○	△
Oscillation Threading	○	○	○	○	○	○	△	△

Model	MX-100	JX-200	JX-250	NTRX-300	NTRX-300L
Oscillation Cutting	○	○	○	○	○
Oscillation Threading	○	○	○	○	○

- ※ SC-100X² and NT-Flex are equipped with the Oscillation Cutting as standard, while other models are as an option.
- ※ The Oscillation Cutting is available only on the Z-axis for AS-200, AS-200L, and Super NTJ.
- ※ The Oscillation Threading is not available for AS-200 and AS-200L because the X-axis is a box-way slide.
- ※ The NTJ series can only apply the Oscillation Threading to the Lower turret. The Upper turret does not support this feature.

Solve chip problems with Nakamura-Tome's Oscillation Technology.

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