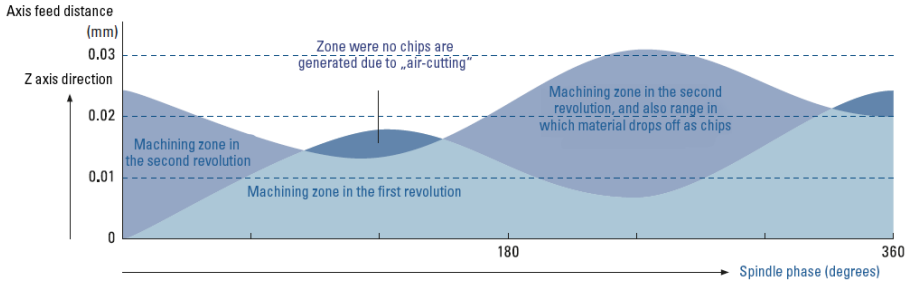
CITIZEN

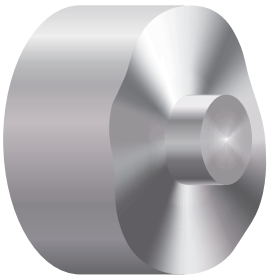
LFV-Technology

What is Low Frequency Vibration Cutting?

The servo axes are vibrated in the axial direction and cutting is performed while synchronizing this vibration with the rotation of the spindle. Because “air-cutting” times are provided during cutting, it is characterized by intermittent expulsion of chips. This widely applicable cutting technology (able to handle a broad range of machining shapes and materials) is ideal for cutting difficult-to-cut materials like inconel, stainless steel and copper. It is state-of-the-art and suppresses various risks associated with these materials, such as entanglement of chips and built-up edges.

Z axis feed distance per spindle revolution and the low frequency vibration waveform





How does the technology work?

Depending on the material being cut, a variety of problems can be caused by chips getting entangled with each other, including increased cutting resistance, scarring, changes in the texture of the machined surface, tool nose damage, and built-up edges due to cutting heat.

In low frequency vibration cutting, “air cutting” time provided during cutting serves to break chips up finely and expel them. This “air cutting” time also prevents the machining temperature rising, which both prolongs tool lives and gives relief from various problems caused by chips.

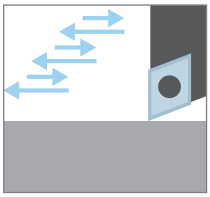
Chips during conventional turning

Chips with LFV technology

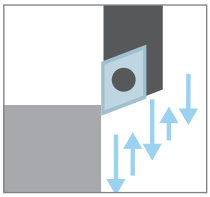
Variety of Machinable Geometries

Vibration cutting can handle a variety of types of machining in addition to linear machining on faces, including tapers, arcs, and drilling. Vibration cutting can be turned ON and OFF just by inserting G codes into a program, giving relief from chip entanglement and problems with the tool nose, depending on the material being machined.

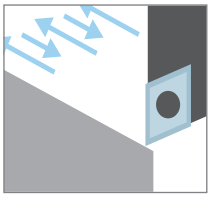
Horizontal face



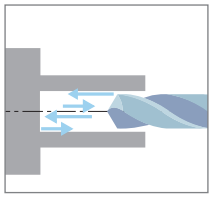
Vertical face



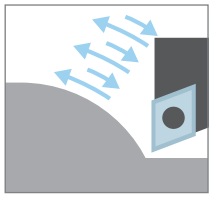
Taper



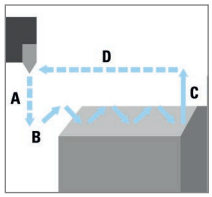
Drilling



Arc



Threading



Different working opportunities

Modus 1: Designate the number of vibrations per workpiece rotation.

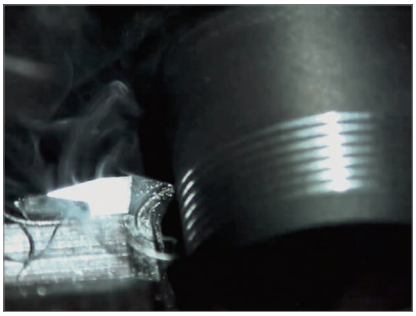
When fine swarf fragments are required.

Modus 2: Designate the amount of workpiece rotation per vibration.

When high peripheral speed is required for fine machining or deep, small-diameter holes.

Modus 3: Processing method which alters the vibration timing within the threading pass.

When breaking up chips during threading processing is desired.



Lathes with LFV-technology

Machine	Type	Axis with LFV	Modus 1	Modus 2	Modus 3
CINCOM					
M32	V	X1 / Z1 /X3 / Z3	x	x	x
	VIII	X1 / Z1 /X3 / Z3	x	x	x
L32	VIII	X1 / Z1 / X2 / Z2	x	x	x
	X	X1 / Z1 / X2 / Z2	x	x	x
	XII	X1 / Z1 / X2 / Z2	x	x	x
L20	VIII	X1 / Z1 / X2 / Z2	x	x	x
	X	X1 / Z1	x	x	x
	XII	X1 / Z1	x	x	x
L12	VII	X1 / Z1 / X2 / Z2	x	x	x
	X	X1 / Z1/ X2 / Z2	x	x	x
A20	VII	X1 / Z1 / X2 / Z2	x	–	–
D25	VIII	X1 / Z1 / X3 / Z3	x	x	x
	VII	X1 / Z1 / X3 / Z3	x	x	x
MC20	III	X / Z	x	x	x
	IV	X / Z	x	x	x
MIYANO					
BNA-42GTY		X1 / Z1	x	x	x
VC03		X / Z	x	x	x
ANX-42SYY		X1 / Z1 / X2 / Z2	x	–	–

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