

ICE-VICE® Freeze clamp technology

Clamping by freezing on a thin water film

Workpieces can now be clamped for machining simply, accurately and tension-free using ice. Place the workpiece on the previously cooled plate and spray a thin film of water onto plate and workpiece. Approximately 90 seconds later the workpiece is frozen to the working surface. Experience has shown that a temperature of -10° has proven to be ideal for freeze clamp technology. At -10° the ice has not yet become brittle and cracked. By using custom-built adapter plates workpieces are positioned and clamped with repeatable accuracy. The use of coolants should be avoided during machining. If this is not possible we will gladly suggest or quote alternatives. We differentiate between two alternative methods of freezing workpieces:

1.) Ice-Vice®-System

1.1) The so-called Ice-Vice clamping system comprises of two main components, the cooling unit and the freeze plate. With the help of integrated electronics a closed cooling system within these two components controls the temperature, which can be chosen freely and the set value remains within a tolerance of $\pm 2^{\circ}$. Sensors check this procedure constantly. The ideal temperature is given at -10° . The micro electronic controls check all functions.

1.2) Two freeze plates can be connected simultaneously to the cooling unit. This means two independent freeze plates can be used on two different machining centres.

1.3) After setting the ideal temperature according to experience, accuracy of $\pm 3\mu$ can be achieved on the workpiece after machining.

1.4) Freezing the workpiece to the plate takes 90 seconds. Thawing is supported by a heating car-

tridge (integrated in the freeze plate) and requires approximately the same amount of time.

Ice-Vice® freeze plates can also be supplied with a vacuum connection for clamping workpiece specific adapter plates in order to shorten clamping cycles. This works best when one freeze plate is in use on the machine while the other plate is in a freezing or thawing modus.

2. Ice-Vice® AFP System (Air Freeze Plate)

2.1) Cold air is produced by feeding in and compressing air at min 6 bar. This chuck can be connected to any available air compressor. In order to achieve the required -6° – -10°C approx. 6 bar of compressed air is necessary (these values are valid for an environment temperature of 20°C , but also for the temperature of the compressed air).

2.2) By using a switch the compressed air inside the AFP plate can be changed round so that the compressed air warms the plate in order to thaw the ice.

2.3) The AFP system is also available for use on a lathe it has a steel base that can be clamped on a magnetic worktable.

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Examples of workpieces and materials which can be machined using freeze clamp technology:

Glass and quartz parts which have to be held tension-free for instance to remove samples or remove small parts from a profile.

Parts made of steel which have to be machined tension-free

Complicated small plastic and graphite workpieces

Watch and clock parts

Aluminium and plastic housings

If you belong to one of the following trades, freeze clamp technology could be the solution you are looking for:

Processing and machining ceramics, manufacturing ceramics, processing graphite, semi-conductor industry, optical industry, watchmaker, glass processing, quartz processing, metal-machining, medicinal technology, small parts stainless steel machining, laboratories in high schools and institutes



Machining at MOTOROLA



Machining small graphite workpieces



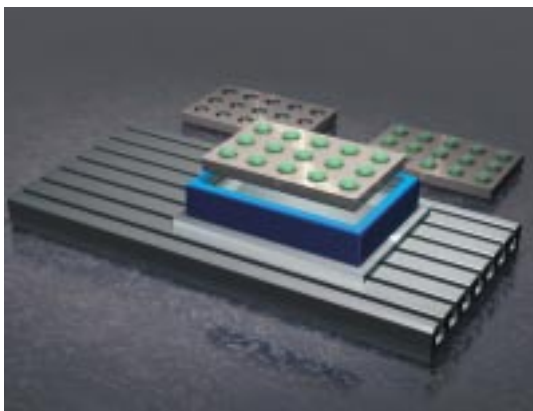
Metalcutting



Milling of honeycomb structure

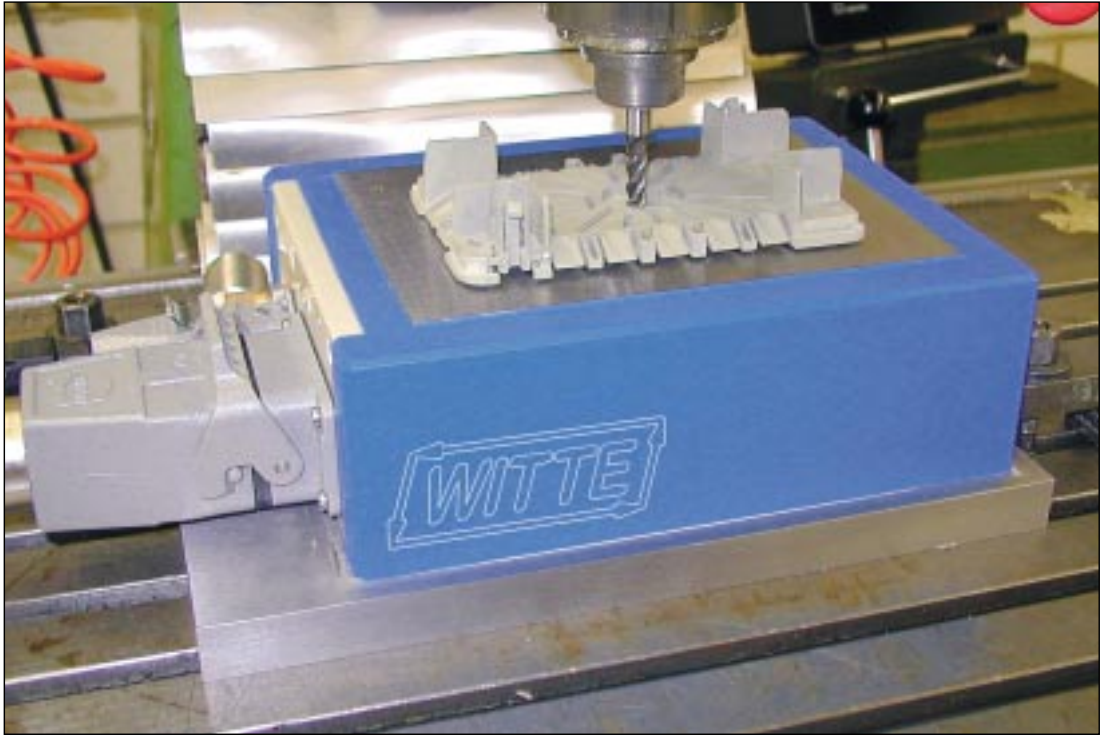


Comparison between milling tool and ball point



Ice-Vice® chucks in pallet form are used to increase productivity

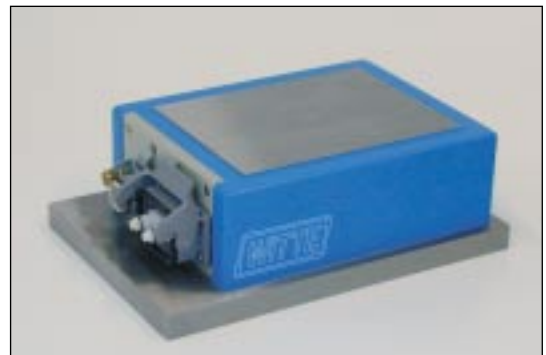
ICE-VICE® freeze chucks



Clamping by freezing on a thin water film

As in many other technical procedures the idea for development of freeze clamp technology came from nature itself.

During clamping with Ice-Vice systems workpieces are frozen tight onto a chuck for machining by a capillary film of water. Also for relatively uneven workpieces the gaps are filled completely with water and thereby frozen. The adhesion, detaching and shearing forces are strong enough to be able to mill, grind, drill or polish parts.



ICE-VICE®-freeze plate with an even contact surface for freeze-clamping flat-lying workpieces

ICE-VICE® freeze plates



ICE-VICE®- Freeze plate with cavity for freezing unevenly shaped or unstable workpieces

No.	lxwxh	area dm ²
91440	125x150x105	1,88
91441	125x200x105	2,50
91442	125x300x105	3,75
91443	150x150x105	2,25
91444	150x200x105	3,00
91445	150x250x105	3,75
91446	150x300x105	4,50
91447	200x200x105	4,00
91448	200x250x105	5,00
91449	200x300x105	6,00
91450	200x500x105	10,00
91451	320x320x105	10,24
91640	Additional vacuum suction connection	



Workpiece frozen with gel

Also available in special sizes!

ICE-VICE® supply unit



No	bxhxt	Connection	kg
91439	540x770x760	400V/50Hz	65
92365	540x770x760	400V/50Hz, 2-3kW	65
92366	540x770x760	400V/50Hz, Prec. control unit	65

ICE-VICE® supply unit with two regular cooling cycles for using two freeze plates independently; While one freeze plate is being used for machining the other can be prepared. After machining is finished the plate can be switched to thaw and the workpiece removed.

Supply includes:

4m electric cable
3m coolant connection

Nr	bxhxt	Anschluss	kg
88156	420x850x680	400V/50Hz	50

Aggregat mit einfachem Anschluß für nur eine Gefrierspannplatte maximaler Größe 150x250mm.



Vacuum adapter plates for ICE-VICE®

Nr	Name	Dim
34992	Vacuum adapter plate	125x200
34993	Vacuum adapter plate	125x300
34994	Vacuum adapter plate	150x150
34995	Vacuum adapter plate	150x200
34996	Vacuum adapter plate	150x250
34997	Vacuum adapter plate	150x300
34998	Vacuum adapter plate	200x200
34999	Vacuum adapter plate	200x250
34888	Vacuum adapter plate	200x300
51000	Vacuum adapter plate	200x500
51001	Vacuum adapter plate	400x400



ICE-VICE®-AFP Freeze plates



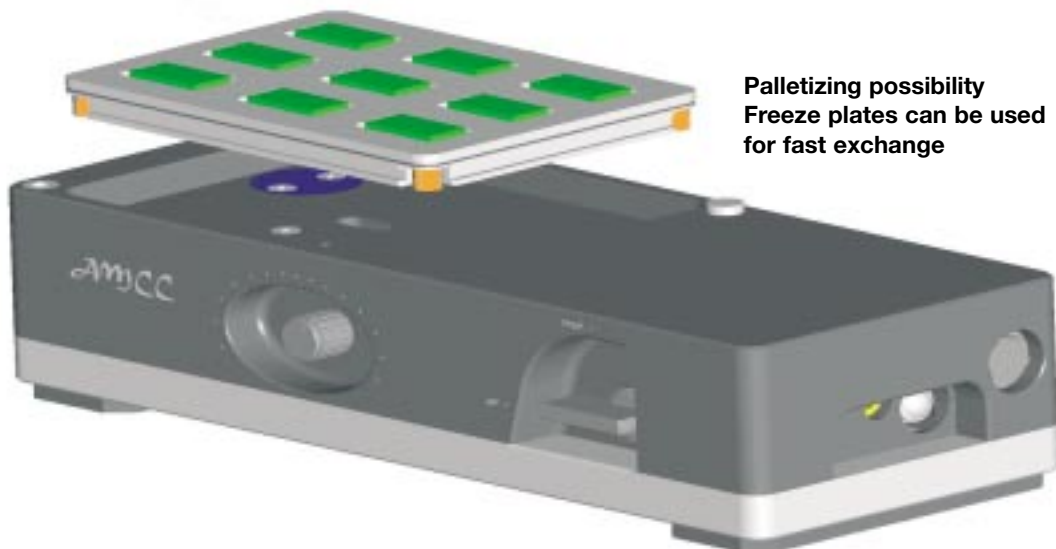
Producing cold with compressed air

Fragile, unstable parts are clamped gently and securely.
No deformation or breaks arise during clamping procedure.

Almost all materials can be clamped. Composites, graphites, ceramic, rubber and also difficult honeycomb structures, which usually have complete hollows, can be clamped easily with a clamping force of upto approx. $140\text{N}/\text{cm}^2$.



ICE-VICE®-AFP Freeze plates



Palletizing possibility
Freeze plates can be used
for fast exchange

Nr	Name	dim
91641	Freeze plate AFP-140	100x140
91642	Freeze plate AFP-250	150x250
92367	Adapter plate f AFP-140	7x100x140
13052	Silencer	
91643	Freeze plate AFC-20	ø20 mm
92539	Gefrierspannfutter AFC-IOL-20	ø20mm
92540	Ersatz-Gefrierspannpl. AFC-IOL-20	ø20mm
92541	Gefrierspannfutter AFC-55	ø55mm
92542	Ersatz-Gefrierspannpl. AFC-55	ø55mm
92543	Gefrierspannplatte AFC-80	ø80mm

Also available in special sizes!



Fixture for holding workpieces on lathe. Can be used for varying diameters



Silencer # 13052