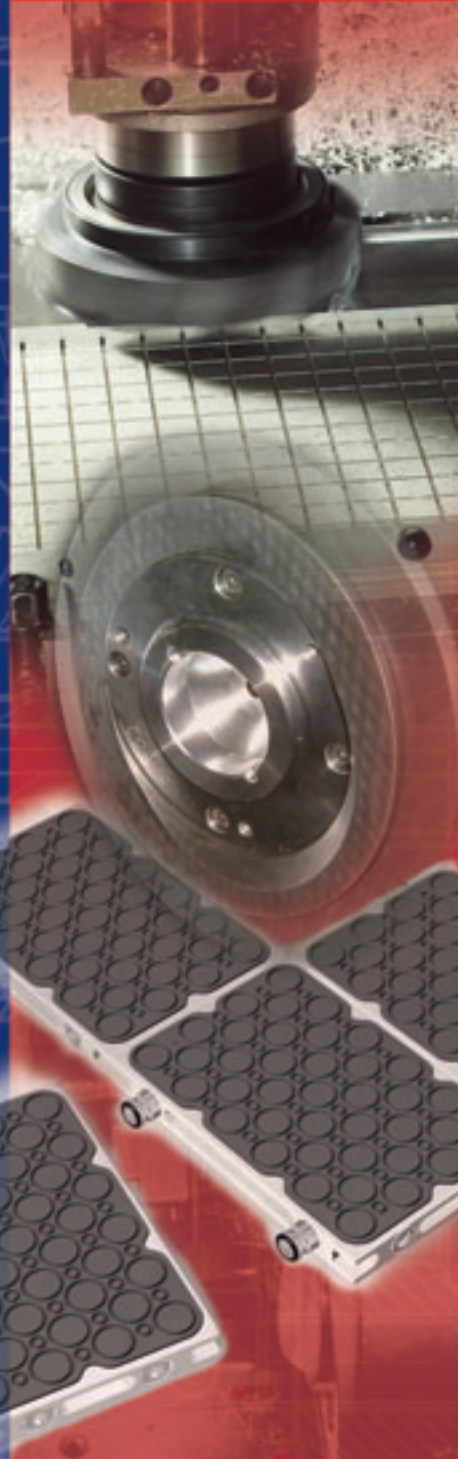




THAME

WORKHOLDING



**VACUUM
CATALOGUE**

Vacuum Workholding Solutions

Thame's experienced team of workholding engineers have provided standard and special workholding solutions using vacuum to all sectors of industrial manufacturing for over 25 years. Covering Aerospace, Medical, Motorsport, Electronic and Precision Sub-Contracting industries we have many successful working vacuum applications throughout the UK.

Vacuum Workholding – How does it Work ?

On all surfaces of an object there is an even pressure of approximately 1 Bar, due to the surrounding atmosphere. Using a vacuum pump the air underneath the component is sucked away, so that the pressure load on these surfaces is partly removed, the clamping or holding force results from the difference in pressure between the upper and lower component surfaces.

The amount of one-sided pressure is, dependant on the amount of under pressure or Vacuum generated. Modern Vacuum pumps reach a vacuum of approximately 990mBar. (20mbar absolute or 98% of the atmospheric air pressure of about 1 bar).

Using this theoretical example the pressure remaining on the lower surface is approximately 20mbar, the component is held by the difference between the upper and lower pressure.

In practice the weather and position above sea level of the vacuum application will have an affect on the actual clamping force obtained for a specific application.

Vacuum Workholding – What hold down force can I achieve?

The clamping force on a component is proportional to the surface area, therefore for a component size of 20 x 40 cm and a vacuum of 0.8 bar the clamping force can be calculated. (1 bar = 100 kN/m² or 14.5 lbs/in²)

Clamping force in kN/m² is:

0.20m x 0.40m x 80kN/m² = 6.4 kN

Clamping force in lbs/in² is:

7.87" x 15.75" x 11.6 lbs/in² = 1437.8 lbs

Vacuum Workholding – Machining Guide Lines.

When using vacuum to hold parts it may be necessary to change the machining process to suit this style of workholding. This could mean you machine several parts from a plate of raw material rather than machining individual pieces as a larger surface area gives more pull down force. Cutting tool technique when using vacuum fixtures tends to mean using smaller diameter cutters, increasing spindle speeds and feed rates but reducing the depth of the cut. Cutting forces must be considered and on larger pieces it may be necessary to employ the use of stops directing the cutting tool pressure towards the stop is advised. Unsuitable or blunt tools increase cutting force pressure and should be avoided.

Applications and Advantages

We offer Vacuum workholding for the following : -

- Horizontal and Vertical Milling Machines.
- Machining Centres with or without Pallets.
- Turning machines – Manual or CNC.
- Grinding machines – Surface and Cylindrical.
- Engraving Machines.
- Measuring Machines.
- Special purpose machines and Applications.

Vacuum workholding offers the following benefits: -

- Clamping with no distortion or clamping marks.
- Very fast clamp and un-clamp cycle time.
- Machining without vibration- thus preventing chatter marks.
- Machining area free of clamps for possible multi-surface working.
- Suitable for many materials.
- Adaptable to many different processes.



Certificate No. 2227/00

VAC MAC™

The vacuum workholding system you can cut right into!

A unique method of vacuum workholding using a patented plastic mat which keeps the part securely held down even when penetrated by the milling cutter, so windows, pockets and profiles can be machined in one set up giving tremendous productivity gains over conventional vacuum fixtures.

What is a VAC-MAT?

It is a thin soft plastic mat with a uniformed top face of 77 vacuum suckers in two different sizes each with a fine hole in the centre and a raised lip. On the underside of the mat there are six lugs which locate in the Vac-Mat fixture plate and a distribution grid of grooves to each hole for extracting the air. A lip right around the outside mat edge ensures no leakage.

What size is VAC-MAT?

All Vac-Mats are one size 300x200x 2.5mm. The mat tolerance lies at $\pm 0.04\text{mm}$ and concave up to 0.1mm. To increase the size of the working area, the mats are placed on modular fixture plates that interconnect.

Are there different types of VAC-MAT?

There are 5 types' available each with their own colour for identification.

Part Number	Dimensions (mm)			Application
	A	B	C	
TD01	300	200	2.5	Blue Mat Standard for normal machining.
TD02	300	200	2.5	Black Mat for Masking unused areas.
TD03	300	200	2.5	Green Mat slightly harder for heavier machining.
TD04	300	200	2.5	Red Mat can only be used once.
TD05	300	200	2.5	Heat Resistant Mat up to max 80° C.

How many times can a VAC-MAT be used?

The working life of a VAC-MAT depends on the machining application. If the mat is cut into during machining it is unlikely that you can re-use the mat. If the application does not cut the mat it can be re-used generally until a noticeable deterioration in the sucker lips. Higher machining heat will generally mean re-using the mat less.

What sizes are the fixture plates?

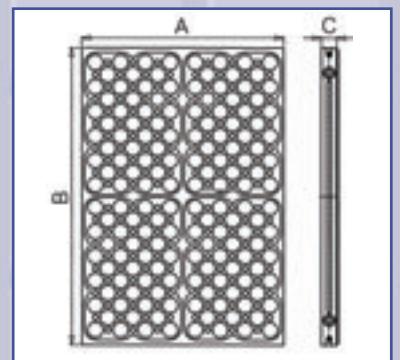
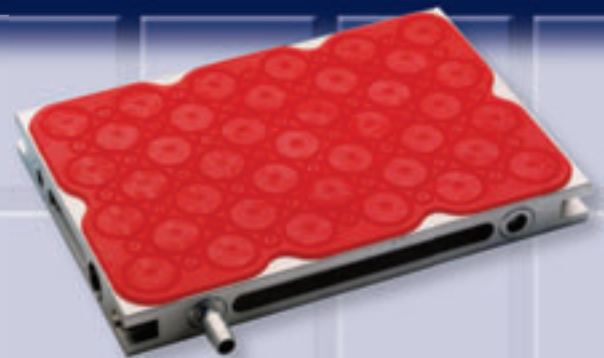
The plates come in two sizes 300x200x31.5mm or 600x400x31.5mm and are inter connectable to form larger fixtures.

Modular Fixture Plates

Part Number	Dimensions (mm)			Material	No. of Mats
	A	B	C		
TD32	300	200	31.5	High Tensile Aluminium	Single Mat Fixture
TD64	600	400	31.5	High Tensile Aluminium	Four Mat Fixture
<ul style="list-style-type: none"> Plates can be joined together using through connectors to form larger fixtures. Supply includes connection elements and tool required, depending on number of fixtures ordered. Plates are machined to a thickness tolerance of $\pm 0.025\text{mm}$. 					

Order Example

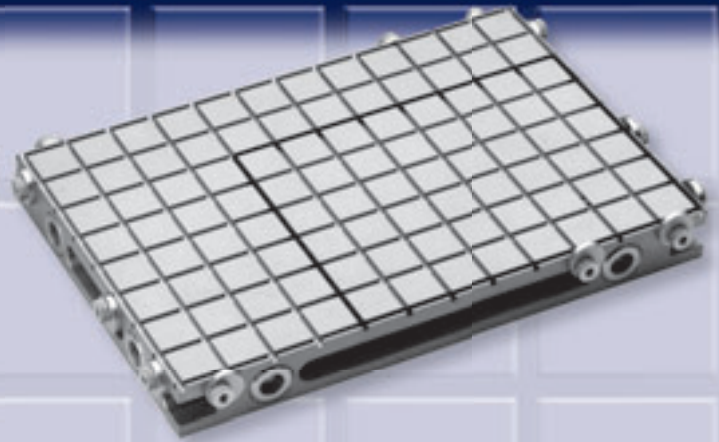
1 off TD 64 Fixture
 50 off TD01 Blue Vac-Mats
 1 off System 3 Operating System (see page 6)



Vacuum Fixtures

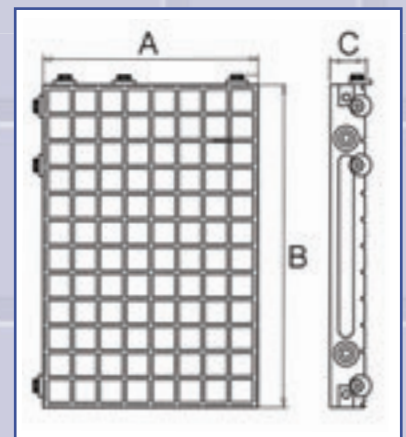
Grid Type Vacuum Fixtures

Perhaps the most common form of vacuum clamping, these anodised high-tensile aluminium fixture plates provide an excellent platform for clamping workpieces during milling or grinding. The neoprene seal pressed into the grid slots offers a good seal on uneven surfaces to securely hold the workpiece.



Part Number	Dimensions (mm)			Material	Grid Size
	A	B	C		
82978	300	200	32.5	High Tensile Aluminium	25mm squares
84161	300	400	32.5		25mm squares
84162	600	400	32.5		25mm squares
89676	300	200	32.5		12.5mm squares
90249	400	300	32.5		12.5mm squares

- Fixtures can be connected by using through connectors to form larger fixtures.
- Supply includes vacuum connection hose, 10m seal, stops and through connectors depending on the number of fixtures ordered.
- Fixtures are machined to a thickness tolerance of $\pm 0.025\text{mm}$

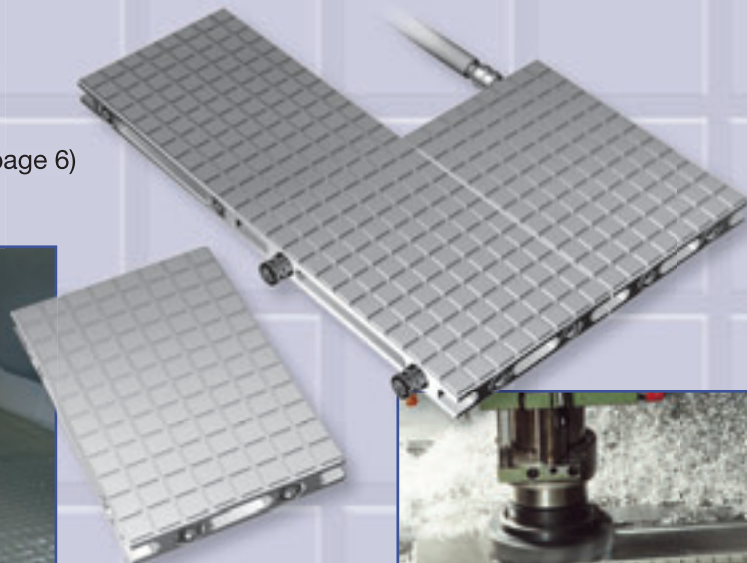


Modular Grid

Other size Grid Type Vacuum Fixtures can be supplied with different grid patterns and from steel, please enquire with our sales office.

Order Example

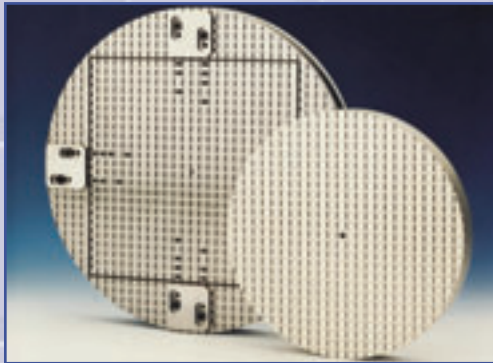
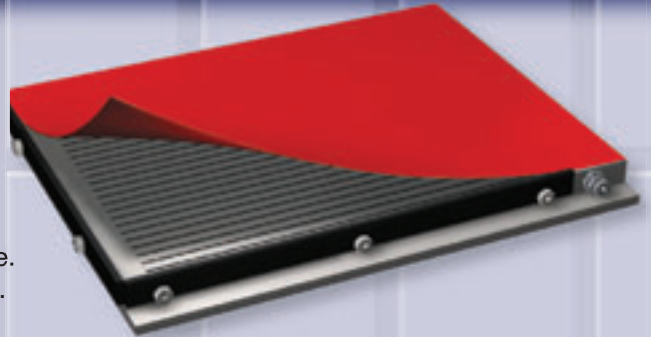
- 1 off 84161 Modular Grid Fixture
- 1 off System 2 Operating System (see page 6)



Vacuum Fixtures

Slot Vacuum Fixtures

These extremely light and thin fixture plates are made from anodised high tensile aluminium and are especially suited for small parts during light milling and drilling and all kinds of engraving. Rubber adaptor mats are used to permit fast changeover and offers high slip resistance to the workpiece. Plates sizes range from 150x100x28 up to 600x400x28mm.

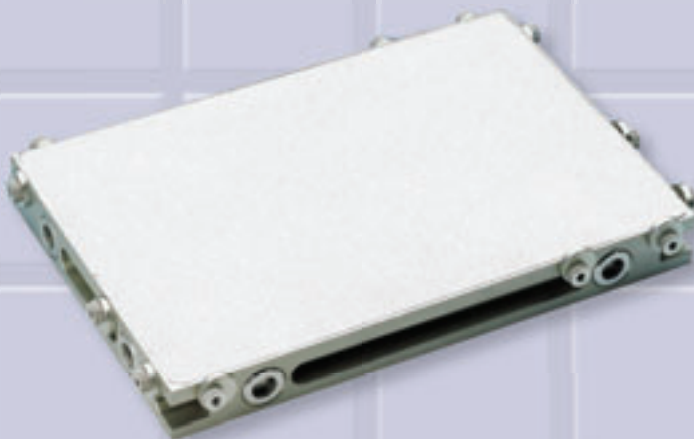
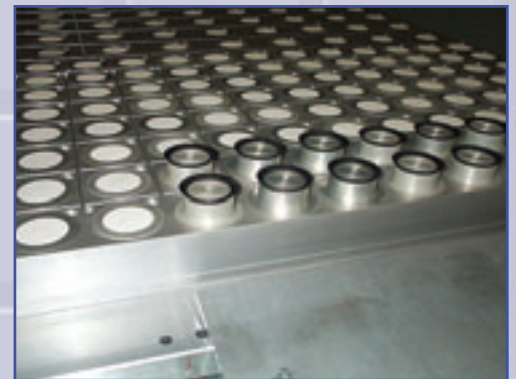


Rotary Vacuum Fixtures

Offer a wide scope of application for thin walled parts, aluminium and plastic parts, etc without causing distortion or clamping marks. Systems designed for CNC Turning Machines, Grinding Machines and Lathes with through spindles. Rotary chucks can, if required go up to 6000rpm.

Flip-Pod Vacuum Fixtures

A modular vacuum clamping system especially good for machining plastic, wood, glass and non-ferrous metals. Used in CNC Milling, Routing and Drilling operations. The pods activate on being 'flipped' and self-store or nest when not in use. The systems reduces set up times between workpiece changeover and thereby increases productivity. Systems are designed to suit workpiece requirements.



Sinter Metal and Porous Aluminium Vacuum Fixtures

These fixtures have a porous surface area and are ideally suited for extremely thin workpieces where no deformation is required. Used in silicon wafer production, micro machining and measurement applications. Plates come in a wide range of sizes and are often made to measure.

Operating Equipment

Thame Workholding offer a very wide range of vacuum operating equipment including a large range of vacuum pumps to operate different types of vacuum fixtures.

TEC Standard Operating Systems

Suitable for VAT-MAT & Standard Grid Fixture Plates

System No.	Pump Size & Type		Liquid Separator Size	Manifold Outlet Ports	System suitable for	
					Vat-Mats	Surface Grid
1	10m ³ /h	Rotary Vane	5L	4	1 mat	< 600cm ²
2	20m ³ /h	Rotary Vane	5L	4	2 mats	< 1200cm ²
3	40m ³ /h	Rotary Vane	5L	4	4 mats	< 2m ²
4	70m ³ /h	Rotary Vane	10L	6	8 mats	< 3m ²
5	100m ³ /h	Rotary Vane	10L	6	16 mats	< 3m ²
6	22m ³ /h	Liquid Ring	-	4	2 mats	< 1200cm ²
7	45m ³ /h	Liquid Ring	-	4	4 mats	< 2m ²
8	65m ³ /h	Liquid Ring	-	6	8 mats	< 3m ²
9	100m ³ /h	Liquid Ring	-	10	16 mats	< 3m ²

Systems 1-5 use liquid separators to trap coolant drawn into the system; these prevent liquid entering the pump and causing damage. The separator has a sight glass which needs to be monitored and emptied when necessary.

Systems 6-9 use liquid ring pumps, which eliminate the need for a liquid separator, as any liquid entering the pump is integrated into the pumps operating cycle and returned to the machine tool sump. This pump lowers management time of the system and offers the possibility of unmanned running.

Each system consists of a vacuum pump, liquid separator (if required), integrated manifold and safety control unit including manual on/off control, vacuum gauge, vacuum hose and all connectors to suit the size of pump and fixture.

All vacuum pumps are 3 phase, 380v continuously rated suitable for wiring into an electrical supply via an on/off switch and isolator (not supplied).

Full installation and working instructions accompany each system.

Vacuum Accessories

Thame offers a full range of gauges, neoprene seal, hose, filters, valves, rotation joints, distributors, vacuum grease, etc.



Special Vacuum Packages

Please use our 25 years experience of designing and manufacturing vacuum workholding solutions to see if we can solve your clamping problems. Vacuum fixtures can improve productivity, part quality or simply give you the opportunity to do work that previously was not considered. You never know unless you ask.



Other Workholding Products From Thame

Precision Vices

For milling, grinding, EDM and measurement. Manual or Pneumatic and high pressure.



Inogrip

The controlled clamping jaw system for high metal removal and limitation of workpiece distortion.



Clean.Tec

Cleaning Fan for enclosed machining centres. Cleans away swarf & coolant automatically.



Quick.Point

0 point clamping system – highest clamping force, lowest height, high precision, low cost.



Grip.Fix

Complete clamping system for all metal cutting. Minimal gripping area – highest repeatability, highest gripping power – lowest pressure.

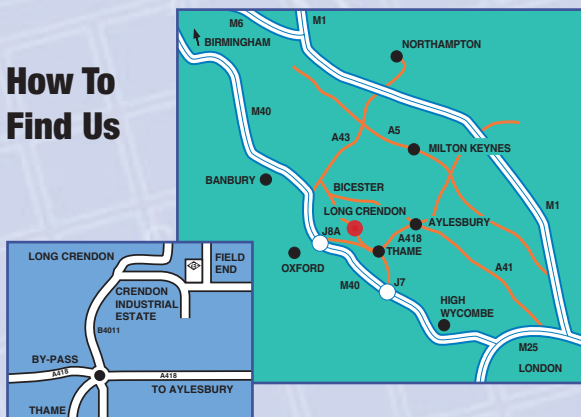


Vario.Tec

Minimizing set-up times –adjustable pins allow workpieces of all variation to be positioned precisely in a vice.



How To Find Us



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