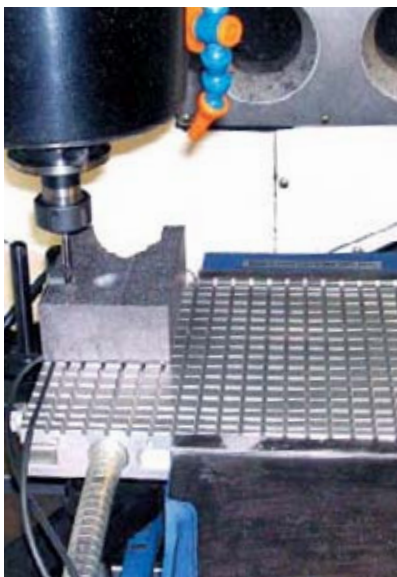


Vacuum Chuck:

# Holding It In Place

Vacuum systems are putting the squeeze on conventional clamping methods by providing safe and simple solutions. By **Maren Roeding**, PR manager, Witte Far East.



*Using O-shaped seal, the clamping area (to which vacuum is applied) is limited according to the workpiece outline*

**T**o fix and hold a part for CNC machining processes is not a problem. There are a variety of different clamping means available for today's users. These range from numerous variations of vices, to different kinds of three-jaw chucks to magnetic clamping fixtures. That is assuming the work piece or material to be machined is suitable for these conventional clamping methods.

However if very fragile materials, extremely thin work pieces or specific machining requirements are involved, special clamping methods are essential. Many materials require particularly careful handling and can be warped or damaged by using jaws or vices.

One possibility to hold sensitive

parts securely and safely without applying force is vacuum clamping technology. This is applicable to almost all established CNC machines and is also increasingly in use for measuring processes. Only a vacuum chuck and a pump are required. The pump evacuates air between clamping plate and work piece underside and allows a vacuum to develop.

Depending on applications, systems can be extended with further accessories such as liquid separators for draining off coolant and lubricants, safety switches and manifold distributors.

## Air Tight Chucks

Clamping with vacuum constitutes a safe and simple method, which is used



*It is possible to hold extremely thin parts on chuck with completely porous surface*

*Vacuum grid chucks are suitable for many kinds of machining like grinding and light machining*

for both light machining processes such as grinding and also for heavy cutting jobs. For different clamping or machining tasks there are different kinds of vacuum systems available.

A further advantage of vacuum clamping is that up to five sides can be machined in one single clamping process. As there is only the need to align and fix the part only once, it leads to substantial timesavings. Certain factors such as size, weight, material and material thickness of the part as well as the type of machining involved have to be taken into account when choosing a clamping system.

According to vacuum chuck manufacturer Witte Far East (Singapore), grid type chucks are the most widely accepted. They can be used for both light and heavy cutting processes of almost all materials.

Grid chucks are suitable for parts of different shapes and sizes. Standard modular chucks, which measure 200 x 300 mm, can be assembled to make a larger clamping surface. In addition, special contour chucks are possible. Using O-shaped seal, the clamping area (to which vacuum is applied) is limited according to the workpiece outline.

The area outside that limited area is not affected by vacuum. For the next workpiece, only the O-shaped seal must be rearranged. The elastic seal offers a further advantage of being able to compensate unevenness on the part clamping surface.

Depending on the seal diameter, unevenness and/or curvature of up to 1 mm can be evened out. This type

of vacuum chuck is versatile and covers many applications. However, there are limits when milling cutouts or contours or when machining fine, thin materials.

Machining cutouts requires special attention. With conventional clamping methods, cutting through workpieces is a difficult process.

Cut parts can fly off and cause accidents. That is why such parts are usually only surface-milled to a certain thickness, which leads to time consuming finishing work. The remaining material must be separated and deburred by hand.

### Fine Applications

Vacuum clamping technology is not only applicable for milling and turning, but also for other machining methods.

The full range of applicability becomes apparent when using chucks with a universal porous and air-permeable surface. This type of vacuum chuck is frequently used for holding thin foils or rubber products. A preferred application is also in measuring and inspection.

Parts such as circuit boards, circuit foils and electronic chips are secured and are rendered damage and deformation free by the porosity and evenness of the chuck over the whole surface.

In order to reach an accuracy of 5 µm, the surfaces are generally diamond-milled. The chucks are equipped with fitted bushes around the edge to facilitate repeatable positioning using stops. These chucks also have the advantage that unused clamping surfaces do not need to be covered.

Different vacuum clamping systems are available in standard dimensions of 200 x 300 mm since applications, which require the use of vacuum clamping technology, frequently prove to be difficult. Therefore design and manufacture of special solutions from chucks to complete engineering projects are often the case. **MEN**

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## Witte: Vacuum Clamping System



The Vac Mat vacuum clamping system by Witte enables the clamping process to be simplified and sped up. This system comprises of a vacuum chuck on which flexible rubber mats are laid. The thin, soft mats have vacuum suction holes through which air is conveyed between part and mat clamping surface. Underneath the mats, plastic lugs serve to position them on the chuck.

Adopting this system allows the milling of cutouts and slots. In addition, machining of outlines and chamfers, which would normally only be possible with special adapter plates, is feasible with this method. The system is capable of completing part machining in one clamping process.

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