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FLIP-POD™ VACUUM HOLDING SYSTEM
COMMONLY ASKED QUESTIONS

Why should I consider the Flip-Pod system for my CNC router?

The Flip-Pod System allows great flexibility in controlling the area through which vacuum acts to hold the part being processed. Parts of various shapes can be held simply by reconfiguring the pod positions, rather than having to create a special customized fixture for each part. This eliminates the time spent making new fixtures and greatly reduces the time required to switch production on the CNC router from one part to another.

How does the system work?

The system consists of plastic cups or "Pods" which fit into holes machined into a "Pod Panel" which is placed on top of the CNC router bed and attached to the router's vacuum source. Each individual Pod acts as a vacuum switch - when placed in the down position they tightly seal the pod cavity and prevent air from flowing through it; when placed in the up position they allow the vacuum to pass through the pod cavity and act on the item being held.

I understand the pods also hold the part up away from the CNC router bed for easy edge access - how high is the part raised?

When placed on top of the Flip-Pods, the bottom of the part is about 1.13 inches above the top of the pod panel which allows easy access for edge boring or shaping.

I often use stacked tooling requiring greater clearances - are higher pods available?

Currently, all pods are the same height - however, accessories called "lift rings" are available. (Part number FP-1505) They snap onto the pods and provide an extra 1/2 inch of lift for special situations.

I see the Flip-Pod system is sold as a kit. What is the smallest kit available and what exactly is included with each kit?

The product line currently consists of the FPKIT100EXT, FPKIT200EXT, FPKIT300EXT and FPKIT400EXT. Each kit contains the specified number of pod assemblies (as designated by the kit number) with each assembly consisting of a pod body, filter, check ball, lip seal, and large cavity gasket. In addition, each kit provides

three fixed locators and three retractable locators to help in positioning parts. After initially purchasing a kit, additional parts and accessories are available on an as-needed basis. Please refer to the price list for full details.

What does the term "lip seal" refer to?

The lip seal is a specially molded, flexible outer ring seal which presses into the narrow grove on the outer edge of the pod and acts as the interface between the pod and the part being held. It is meant to maximize the seal between the pod and the part by conforming to any slightly irregular surface features such as a slight warp in the material. It also has the effect of greatly increasing the holding power by increasing friction and vacuum area. With smaller parts, where it's only possible to position a small number of open pods, this increased holding power can be especially important. This design also permits the bottom surface of the part being held to directly contact the upper surface of the precision molded pod body which helps ensure the most accurate height, or Z-axis positioning, possible.

What is not included with each kit that would be needed to make the system work?

The system does not include the vacuum pump - in most cases, the pump that is currently being used by the CNC router can supply the necessary vacuum. The system also does not include the pod panel material, which can be more economically purchased locally and machined directly on the CNC router with which it will be used.

What type of material should the pod panel be made of?

The pod panel should be made of a tough, non-porous, easily machined material. Panels made of MDF or similar materials are too porous to give adequate results - they allow air to pass through the panel itself thus compromising the vacuum pump's performance. In general, non-porous plastic materials perform much better. Many users have made panels from a material called UHMW which stands for Ultra High Molecular Weight polyethylene. This material is very tough, reasonably priced, easy to machine, and widely available in sizes up to 5 feet by 10 feet in the thickness required. If you are unable to locate a supplier of suitable material in your area, please contact Carter Products for a supplier listing.

Exactly what thickness should the pod panel be?

In order to provide the depth of cavity required to fully seat the Flip-Pods, the pod panel should be at least 1 3/4 inches thick. You may want to consider using 2 inch thick material, especially if you plan to machine the top surface flat for appearance sake or to machine the bottom surface to provide channels to distribute the vacuum to each pod cavity (which may be necessary if the pod panel is to be placed on a router bed consisting of only a flat surface).

Why do you recommend that the pod panel be machined on the actual router with which it will be used?

Machining the pod panel in this way ensures maximum accuracy. Each pod is precision molded to provide consistent height. If the pod cavities are cut directly on the router, the critical lip of the cavity where the flange of the pod rests when it is in the up position will be machined to a consistent "Z" (or vertical) dimension to within whatever tolerance your CNC router is capable. This will ensure a flat, level pod array regardless of any table misalignment that might exist. This also allows the pattern of pod cavities to be arranged to suit the needs of the end-user.

What sort of pattern should the pod cavities be arranged in?

Each pod has a maximum diameter of 3 1/2 inches. In a straight rectangular pattern the pods may be placed as close as 3 3/4 inches from center to center. For many, a simple rectangular pattern is adequate. If more flexibility is desired, a more densely spaced diamond pattern can be used. If only circular parts are to be processed, a pattern consisting of concentric circular rings can be used. A pod panel need not be limited to only one pattern. Various patterns can be utilized on different sections of the same pod panel - for example a tight diamond pattern on one quadrant for handling small pieces, with the remaining quadrants using a looser rectangular pattern for larger parts.

How many pods will my system require?

A typical rule of thumb is to estimate about 8 pods per square foot for a rectangular layout or 10 pods per square foot for a dense diamond pattern. So to calculate total pods required use this formula: *Width in feet X Length in feet X No. of pods per square foot = Total pods required.* For example, consider a 4 foot by 8 foot router bed using a dense diamond pattern. The result would be: *4 X 8 X 10 = 320 pods required*. In practice, the number of pods actually used will be slightly less since the pod pattern will probably stop somewhat short of the edge of the pod panel to leave room for hold-down bolts and such. However, having a few extra spare pods on hand is a good idea in case you should accidentally damage a pod with the router bit.

You say the dense diamond pattern is better for small parts, just how small of a part can the pod system hold?

To a large extent that depends on the pod spacing used and the capabilities of the vacuum source. In practical terms, it is always necessary to get at least four to six pods open under any part to provide adequate stability. Whether additional pods will be required will depend on the vacuum source and the type of processing being done.

Are smaller pods available to handle smaller parts?

Several accessories are available in different shapes to help you hold a portion of a part that you can not get a full pod underneath. All of the accessory pods are designed to fit into the standard pod cavities in the upright position only. They allow more flexibility in handling small parts.

Why do you use a semi-circular design for the Half-Pods rather than a smaller diameter?

Reducing the diameter of the pod to 1/2 its present size would reduce the vacuum area (and thus the holding power) to 1/4 that of the full pod. Because of the way the semi-circular Half-Pod is designed, it retains almost two-thirds the holding power of a full pod while still allowing the holding power closer to the edge of the part than would otherwise be possible.

What do I do if I have a part too small to get several pods under?

In such a case you can use a small auxiliary spoil board which will plug right into the cavities in the pod panel in place of several of the pods. You can make this board in such a way that it will focus the vacuum over just the small area required for your small part. Such an auxiliary board is very easy and inexpensive to make, easy to store and quick to set up since it always locates in the same place on the pod panel each time you use it. As soon as you're done running the small part, simply remove the auxiliary board from the top of the panel and you're immediately ready to run larger parts using the standard pods.

So far you've talked about using the pod systems only on CNC routers. Can it be used with other types of equipment or with routers cutting material other than wood?

While the most common use is on CNC routers, the Flip-Pod system can be a very effective tool for use with point-to-point boring machines as well. This generally requires slightly more effort to install (primarily in preparing the support structure underneath the pod panel) but can greatly increase productivity by reducing change-over time between parts. Also, the Flip-Pod system can be used to hold material other than wood products - such as plastics or thin, non-ferrous metals. You should note, however, that the system is not intended to be used where it will come in contact with cutting fluids or coolant liquids.

My point to point boring machine uses a venturi as a vacuum source. Will this work with the Flip-Pod system?

In general, no. A venturi is a device which produces vacuum by passing compressed air over an orifice. Though capable of producing quite strong vacuum levels, they usually are not capable of generating the air flow volumes required by the Flip-Pod system.

What types of vacuum sources should be used with the Flip-Pod system?

There are two issues with vacuum sources - the depth (or strength) of vacuum generated and the amount of air-flow available. The Flip-Pod works best when the vacuum source provides a depth of vacuum of at least 20 inches of mercury or greater. In addition, the air-flow capacity must be large enough to rapidly evacuate all the pods to provide secure gripping of the part being held and to overcome any small leaks that may occur around the pod panel or in the plumbing leading up to the pod panel. Rotary vane, rotary screw, or liquid ring pumps generally provide this level of performance. The exact capacities needed will depend on the size of the pod panel, the number of pods used, and the materials being processed. Many users are operating pumps of 10 HP or greater with good success. In general, as much vacuum capacity as possible is desirable since additional capacity provides extra margin to compensate for any miscellaneous vacuum leaks or losses.

It sounds like a very interesting system. Are there any situations where use of the Flip-Pod system is not recommended?

If the entire line of product being processed on your CNC router consists only of small parts, the Flip-Pod system may not be the best choice. Similarly, if your router runs only a very limited number of parts, each of which is run in very large quantities with few changeovers, you may not achieve the best benefit from the system. If an end-user is unwilling to properly set up the pod panel in the first place and to modify or upgrade the vacuum pump as necessary to provide the level of vacuum required, the system may not give the performance expected. However, a properly set up system which is used with an adequate pump can provide huge benefits to users who need to have the maximum utility from their router for processing a wide variety of parts for short-run, just-in-time production and prototyping.

Where can I learn more about the Flip-Pod system?

We invite you to contact Carter Products and request their 18 minute, narrated Flip-Pod video. This not only shows the system in operation on a variety of CNC routers, but also explains in full detail the steps necessary to properly implement the system. This video is available at no charge.