I Have a VACUUM APPLICATION...

Vacuum applications, just like applications for pneumatics and hydraulics, vary greatly in their component choices and system integration methods. Fluid power engineers or technical salespeople are spoiled for choice with pneumatic and hydraulic manufacturers' catalogues and online tools, which include 2D and 3D CAD downloads and various component-sizing programs. With vacuum applications, however, this type of technology is not so readily available. Fewer vacuum component manufacturers exist because vacuum is simply a much smaller industry compared with the aforementioned technologies.

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Therefore, the user is often reliant on the experience and knowledge of the salesperson employed by the manufacturer of the existing vacuum equipment they use. The knowledge of this salesperson, however, is often limited to that of the manufacturer they work for or represent in respect to what product and indeed what methods of integration should be offered. This article highlights some obvious, yet often overlooked, options the salesperson or application engineer should explore in order to select the components or alternate methods that should be considered in a new or existing vacuum application.

Most inquiries given to a vacuum component manufacturer, at least from a reseller or distributor, are those of component replacement. The distributor salesperson will visit a customer's site and come away with an opportunity for a sale. The problem is that unless the distributor's source for vacuum components is the original supplier of the equipment, trying to "fit" a competitor's model in its place can be difficult. The following needs to be asked of the user:

Does it have to be the same exact part? Just because a particular part is what they are using now does not mean it is the correct part to use again. For example, if the customer is handling molded plastic parts that, when released from the mold, have a surface temperature of 120˚F, they will probably be using cups manufactured in a silicone compound. The salesperson's immediate choice from his supplier is again a silicone cup, but of course this is not necessary, as most compounds are able to handle this surface temperature. Selecting silicone is the easiest thing for the salesperson to do. However, a Nitrile rubber-based material is able to handle products of this temperature and is of a lesser cost than silicone. So with a little bit of thought, the salesperson could save the customer money and most importantly gain the customer's trust and repeat business in the future.

This example of different product applications is an easy one to undertake. However, what if the salesperson's vacuum cup supplier does not produce a cup that is dimensionally identical to the competitor's model? What if the salesperson's cup is slightly longer as shown by dimension C of Fig. 1? Is the user able to adjust the machine stroke in order to accommodate this longer cup? More importantly, is the customer willing to make this machine adjustment? If so, the alternate cup

can be used. Another problem is when the salesperson's cup does not fit the competitor's cup fitting. This is normally due to the different size or shape of dimension ØA shown in *Fig. 1*. However, if the complete fitting is changed, this problem is overcome as long as the mounting threads of the two fittings are the same. If the cup is a similar diameter, the fitting thread is often the same, such as 1/8" or ¼ NPT.

The cost of supplying this new fitting (sometimes referred to as a "support") is usually absorbed by the distributor, but if the ongoing cup replacement business can offset this one-time fitting change, then the exercise could be worthwhile. The benefit to the distributor, of course, is that the previous supplier's cup is no longer suitable.

These few examples refer to simple vacuum cups, and this is a relatively low-dollar exercise in product replacement. However, if the inquiry from the user is for a higher-value item, such as a vacuum venturi or pump, more thought should be given to replacement options. If the existing vacuum venturi has failed and needs replacement, just like the cup application described above, a direct replacement is the easy option. Selecting a different type of venturi, however, offers various challenges. The first consideration is the mounting of the venturi. If it is mounted onto a panel or the side of a machine using a unique hole pattern in the body of the venturi as shown in *Fig. 2*, facilitating a different model is difficult. If the mounting holes of the venturi are not important because it is installed using the actual venturi vacuum port, which is easier to match, the next criteria to meet is the vacuum flow or "size" of venturi. This simple data is easy to replicate but not necessarily relevant. If the venturi has a free air flow of 18 cfm, it should be regarded as a guide--not evidence--that the venturi is sized correctly. Like the choice of vacuum cup material described before, by understanding the application, the salesperson might be able to offer a better solution for the user. A smaller venturi uses less compressed air, which saves the user energy costs, yet may still offer adequate performance for the machinery. Quite often the venturi in use is oversized for the application. Alternatively, if the vacuum venturi is being used in an application where the vacuum is employed to hold a work piece for a long period of time, an energy-saving unit could be offered this time around that will turn the venturi off when a safe vacuum level is achieved. Higher initial cost possibly, but tremendous air savings occur over a period of time. Knowing the application for which the component is being used is very important in vacuum product selection. Just because the user has been employing the same method for years does not mean it was the ideal or perfect choice when it was originally selected.

The same can be said of vacuum pump selection. Often with vacuum pumps, the user states that they need a certain vacuum flow rate with a specific vacuum level. This is normally based upon the model they are replacing or duplicating for a similar system. The user will invariably ask for a similar type of pump, as well. However, newer, more-efficient pump technologies could now exist. This is particularly true if the original installation is many years old. Consideration should be made as to what the pump is being used for. A 300 cfm centralized pump system that was purchased many years ago may now need replacing, but has the amount or type of machinery changed in this time period? A different size replacement pump may now be considered. The more information learned, the better the new solution.

Control valves used in vacuum circuits are often incorrect because few manufacturers offer true vacuum valves. A lot of applications use pneumatic valves instead, with the performance of the machinery suffering and the user unaware of the alternatives available. Most fluid power houses do not have a full vacuum component offering. Consequently, if the user specifies a manufacturer's model number, it is not necessarily what they should be using. Knowing what the cycle time is and what the vacuum flow required by the machine is rather than what the pump can offer is critical in selecting the correct control valve. Just because the pump can flow 200 cfm and the pipe going into the machine is 2" NPT does not mean the user needs a 200 cfm valve with 2" NPT ports.

Knowing and understanding the vacuum application is very important. Unlike hydraulic and pneumatic components where the industry has evolved into a very "fit, form, and function" product offering due to such standards as ISO or NFPA conformity, there is no such familiarity in design in the vacuum industry unless simple copying of another manufacturer has taken place. Consequently, if the application is understood, a better solution can be offered to the user, and this should be the goal of every application engineer or salesperson in the fluid power industry. A low price is very attractive initially, but a proper solution is enjoyed by the user for many years to come because of performance and ongoing savings in production.

This article is intended as a general guide and as with any industrial application involving machinery choice, independent professional advice should be sought to ensure correct selection and installation.

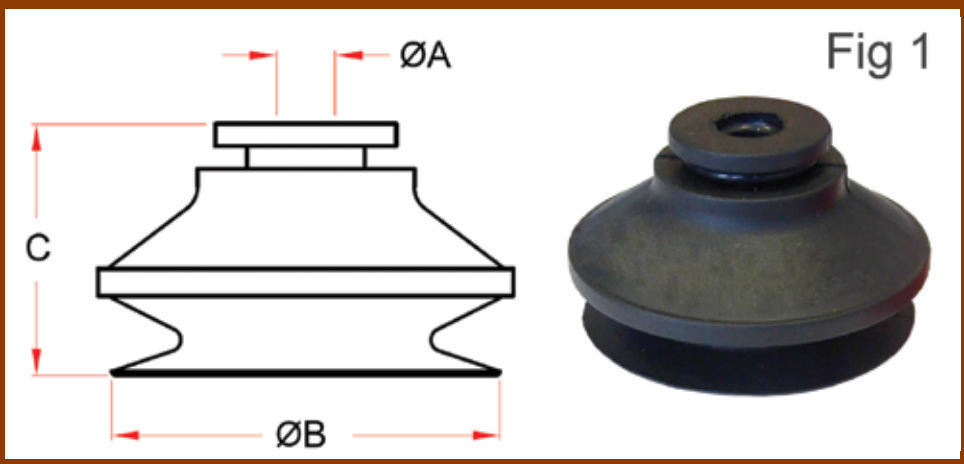

Fig 1

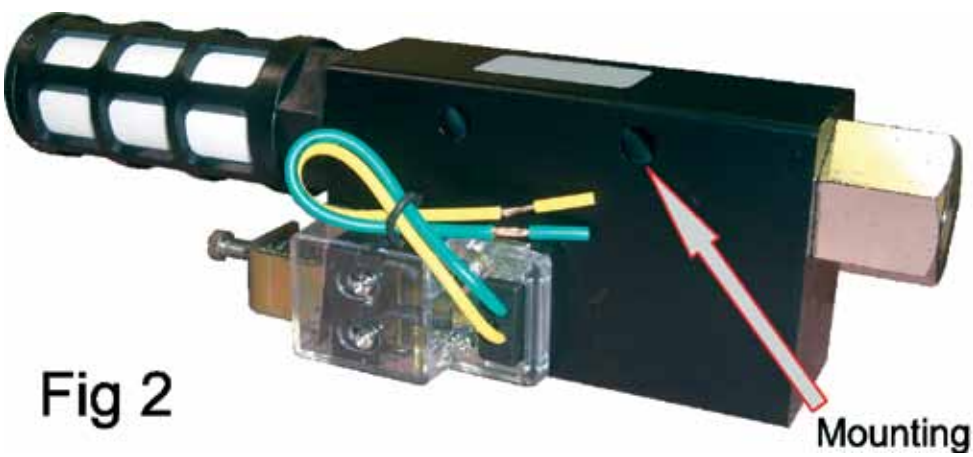

Fig 2