Optimizing Vacuum Applications

A FRESH PERSPECTIVE

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» **VACUUM TECHNOLOGY, INCLUDING** pneumatics and hydraulics, offers a wide range of component choices and system integration methods. Unlike its counterparts, vacuum technology has fewer component manufacturers and resources, making informed selection and integration more complex. As a result, end-users often depend heavily on the expertise of their local distributor or supplier's sales representatives, who may only be experts on their own firm's brands. Let's explore alternative approaches and often-overlooked options for optimizing vacuum applications. The goal is to provide a more effective and cost-efficient solution for the vacuum end-user.

Rethinking Replacement Parts in Vacuum Applications

When users seek vacuum components, the most common request is for direct replacements of existing parts. While this approach is straightforward, it may not always be the best option. Consider the case of a manufacturer using silicone vacuum cups to handle molded plastic components at 49°C

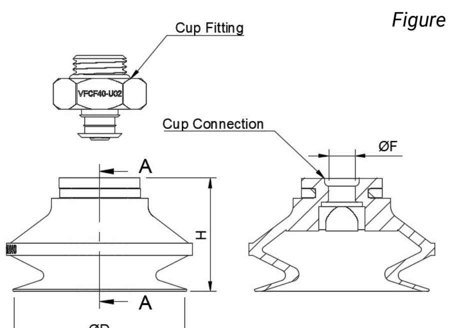
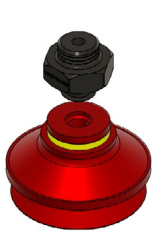


Figure 1



(120°F). While silicone is a common choice, other materials such as nitrile rubber (NBR) may perform just as well, offering cost savings given that NBR is less costly.

Similarly, dimensional differences between suction cups can cause hesitation in switching suppliers. If a competitor's cup is slightly longer, (Fig 1), the user should assess whether machine stroke adjustments can accommodate the new part. If the cup connection differs from the original (dimension F), replacing the cup fitting with the new supplier's suction cup may be a viable solution using familiar threads, such as 3 mm or 6 mm (1/8 or 1/4NPT). This occurs often at a cost offset by long-term savings and improved supply chain options.

Evaluating Vacuum Venturi and Pumps

Beyond vacuum cups, selecting the right vacuum venturi or pump requires careful consideration. If a venturi requires replacement, the easiest choice is to find an exact match. However, this is not always optimal. Factors such as mounting configurations and vacuum flow capacity should be evaluated before settling on a replacement. For instance, an existing venturi with a 500 lpm (18 cfm) airflow may have been initially oversized for the application. The reasons for this are numerous but often a "That should do it!" attitude leads from the front.

Figure 2

A smaller unit might reduce compressed air consumption without sacrificing machine performance. In applications requiring extended vacuum hold times, integrating an energy-saving venturi automatically shuts off the compressed air supply when a stable vacuum level is reached. This can significantly lower operational costs. Fig 2 shows this energy savings kit setup installed on a vacuum generator.

Vacuum pump selection follows similar principles. Users often request the same pump specifications they have been using for years, without considering advances in pump technology. If an 8,500 lpm (300 cfm) centralized vacuum system was installed years ago, has the production environment changed since then? A revaluation might reveal that a smaller, more efficient pump is now a better fit.

Addressing Vacuum Control Valves and System Efficiency

Vacuum control valves are another frequently misapplied component. Many systems use pneumatic valves instead of purpose-built vacuum ones, leading to suboptimal performance. Unlike hydraulics and pneumatics industry standards for consistent sizing and functionality, vacuum components vary significantly between manufacturers. This lack of standardization underscores the importance of selecting components based on actual application needs rather than simply replacing parts with identical specifications.

For instance, a vacuum system using a 5,600 lpm (200 cfm) pump does not automatically require a 5,600 lpm (200 cfm) control valve. The key consideration should be the actual vacuum flow demand of the application, not just the pump's capacity. Understanding the system's cycle time and flow requirements allows for smarter valve selection, improving efficiency and reliability.

Conclusion: A Smarter Approach to Vacuum Component Selection

A well-informed approach to vacuum system design can yield significant benefits in cost savings, efficiency, and long-term performance. Rather than defaulting to direct replacements, Sales Engineers and Application Specialists should focus on understanding the broader application requirements. By exploring material alternatives, adjusting system configurations, and leveraging newer technologies, businesses can improve performance and lower operating costs.

While reduced upfront costs may seem appealing, the true value of a well-optimized vacuum system lies in its long-term reliability and efficiency. By taking a proactive approach to component selection, fluid power professionals can provide their customers with solutions that enhance productivity and operational sustainability.

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