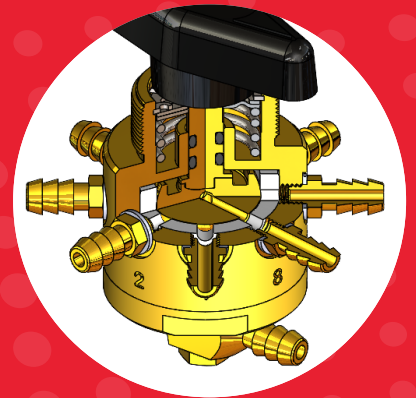


CUSTOMIZED AND CUSTOM

Ideas around engineering the **exact** flow control device you need.



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Here are some considerations when weighing the benefits of customized and custom designs.

Flow control devices, aka valves, couplers, and fittings, come in numerous types, sizes and shapes to suit countless different applications. But design engineers who must select and specify such products often face a dilemma when a standard, off-the-shelf part doesn't quite make the grade. Reasons abound. There might be fluid compatibility issues, or the need for a nonstandard size or fitting. Perhaps the component they currently use is plagued with reliability or inefficiency problems. And sometimes, it is simply obsolete.

In such cases, updating a component's design can improve efficiency, reduce space requirements, and reduce total system costs.

Most flow control component manufacturers see non-standard designs as either an afterthought or a nuisance. Specialty Manufacturing Co. takes a different approach. The company designs and manufactures flow control products to fit a customer's specific need, so the design engineer is not forced to choose a stock part that is underbuilt and hurts performance or overbuilt and wastes money, or that doesn't completely fulfill the application requirements. It also permits more flexibility on the design of the rest of the machine or system.

Two complementary options that design engineers need to consider are customized and custom designs. In broad terms, a customized product is a standard product that is modified or "tweaked." A custom design, on the other hand, typically involves a new or reimagined product built from the ground up to meet exacting operational specifications.

As with any project, engineers must balance the competing demands of deadlines, costs, and expected performance. Here are some considerations when weighing the benefits of customized and custom designs.

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The customized approach takes advantage of applying simple modifications to proven base designs.

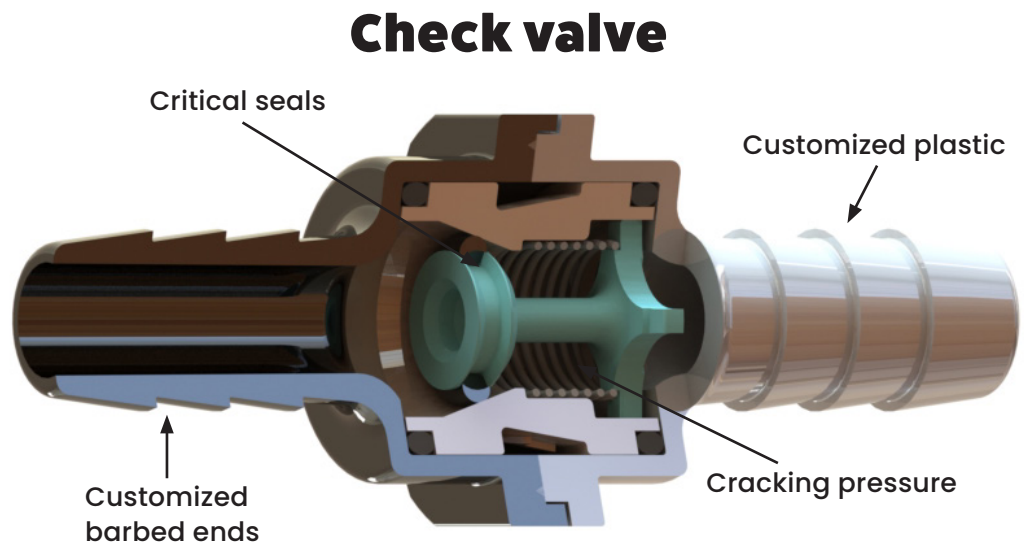
Customized designs – speed and efficiency

Engineers should look to customized designs when:

- The project is operating in a short time frame and quick turnaround is essential.
- Cost is an important consideration.
- “OK” is good enough. Fit, form and function are met but the solution is not ideal.
- Checklists or menus of options let engineers quickly assess alternatives and decide on the preferred path.

At Specialty Mfg., customized valves are configurations that don't currently exist, although all the constituent components are readily available, proven, and can be quickly combined into a new design using a modular, building-block approach.

The customized approach takes advantage of applying simple modifications to proven base designs. Changing a seal material or fluid connection is far less expensive than a total redesign and typically has been thoroughly tested and proven in similar situations – just not in this exact configuration.



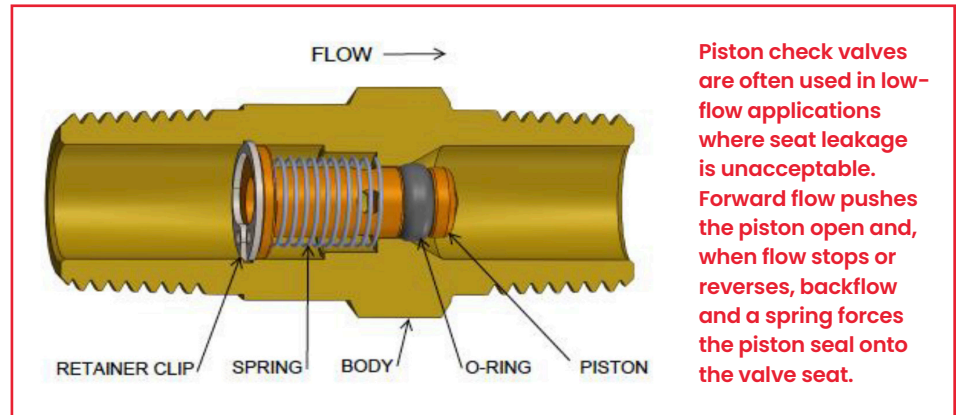
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Customized flow control

Check valves, also known as back-flow valves, ensure that media flows in only one direction. The devices come in a variety of styles with ball, piston and poppet being common. These reliable designs are often used without modification. But many complex applications require check valve customization to address issues like media-compatibility concerns, pressure or temperature extremes, and cost constraints, just to name a few.

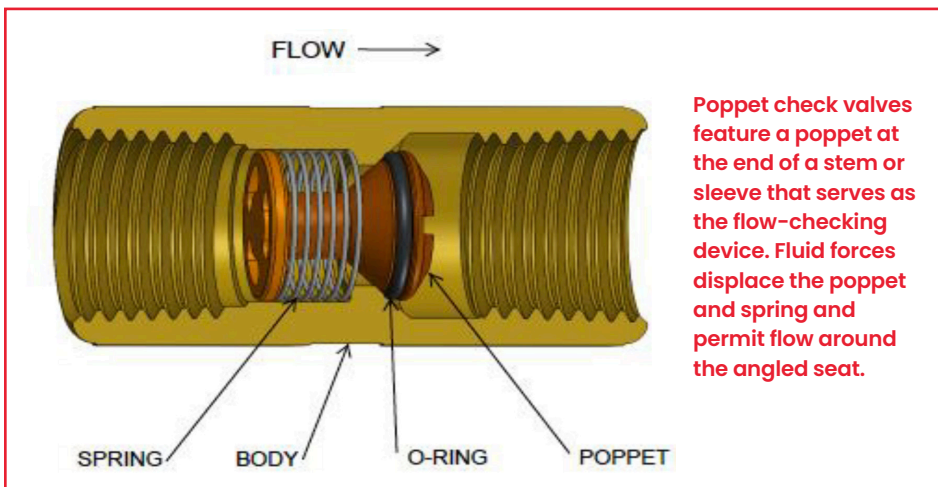
Ball check valves, for example, are available in metal and other materials, with or without O-ring seals. Specialty Mfg. engineers were recently called on to customize valves to eliminate backflow in an oil bath application. The customer sought a valve that operated across a wide temperature range, from -20° to 200° C, which meant O-ring sealing was unsuitable. The design did not need to meet stringent pressure specifications or be completely leak-proof. In



this case, changing from standard materials to a stainless-steel body, ball and spring provided a quick and economical solution.

Piston check valves are also highly customizable. One customer needed a check valve for an automotive cooling system, to reduce energy consumption when emergency vehicles idle. The solution featured two piston check valves built to optimize flow, were robust, and fit the existing system. This design incorporated a high-temperature O-ring material to ensure a reliable seal with complex performance requirements.

Poppet check valves are often used when applications demand high-flow and inexpensive solutions. An important consideration here is cracking pressure, the minimum differential pressure between inlet and outlet at which the valve will actuate. A medical equipment manufacturer enlisted Specialty Manufacturing to design check valves for sensitive measurements in high-end medical equipment that required more than a dozen check valves per unit, all working at different cracking pressures. It was also imperative that the valve seats are reliable and consistent.



The solution was to modify an existing Specialty Manufacturing valve by installing an O-ring that would sit within the check valve and open and close with a specific cracking pressure. The complex task required numerous iterations over the course of a year, and resulted in a single check valve design that could be customized to meet all the varying requirements.

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Other customized solutions



For example, an engineer may need to alter a threaded connection from NPT to SAE to promote a more rugged, leak-tight design, while the rest of the product remains the same. Or converting a system to a different fluid, say from oil to water-glycol, demands a different seal material. In fact, fluid media and compatibility concerns drive a lot of customization decisions.

Also consider the actual amount of time that will be required from when a need is identified and vetted to when actual parts are delivered and available for production. Specialty Mfg.'s standard lead time for a typical customized valve is three weeks. We rapidly move through the design, set up and manufacturing processes, and deliver the final product in short order. It shows that customization can be done quickly and efficiently, creating a customized part made of a previously non-existent combination of components that are used every day.

Nonetheless, with a customized part the design engineer must decide what is acceptable, and whether the revised product will satisfy the overall application demands.

A great example of customized design engineering in action is embodied in the [Speciality Mfg. Product Configurator](https://specialtymfg.com) (found at specialtymfg.com), a sophisticated online tool that helps engineers quickly navigate the often-complex array of product attributes to find the exact solution an application requires.

Users simply choose the valve type, and then follow a series of option menus to select variables like the body material among various metals or plastics; pressure ratings and flow patterns; type and size of end connections; actuation methods; and sealing and plating options. There are literally millions of possible permutations.

With the selections completed, the configurator displays the final version so users can view and compare search results, then download 3D CAD models and detailed product drawings and finally insert the model directly into their project.

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The customized approach takes advantage of applying simple modifications to proven base designs. Turnaround on customized valves is typically a few weeks.

*— Joe Krueger,
Director of
Engineering
Specialty Mfg.*

Your Valve Options

Your Search Results

Your Valve Made Real

Some users fully understand details like material-compatibility issues or pressure requirements and can quickly configure a product on their own. Others require a bit more assistance and work directly with the Specialty Mfg. Customer Service team for guidance through the configuration process.

Thus, configuration of a customized part involves an iterative process that entails a broad menu of options — whether completely customer driven, or an interactive collaboration. While there is appeal to the simplicity and the ease of use of the configuration tool, the goal is to find the exact valve that is needed and find it fast.

Fortunately, there isn't necessarily a price premium when customers opt for customized products. At Specialty Mfg., costs are simply based on the price of the underlying components and materials.

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Custom valves

Custom designs –in-depth and precise

In some applications functionality and performance are paramount, and override concerns regarding cost and delivery. Engineers should look to custom designs when:

- Compromise is not an option.
- Standard or customized solutions don't perform as required.
- The performance profile of the component or system is complex but clearly defined.

The design engineer must “own the outcome.” Multiport selector valves are, in essence, compact manifold systems with outlets that are all connected through a single body. A manual detented selector lets operators divert fluids as needed. For years Specialty Mfg. has manufactured multi-port ball valves made with a variety of metals, including brass and stainless steel with multiple options in terms of end connections and seal materials. They are a popular choice for fluid and pneumatic control and can be built to

handle air, vacuum, water and other fluids in instrumentation, process, and refrigeration, to name a few.

Custom nine-way brass valve

Beyond standard and customized products, we also create custom designs in many different configurations, materials, shapes and sizes. Specialty Mfg. recently developed a custom nine-way brass ball valve for a major international appliance marketer. The company had been successfully using existing Specialty's multiport selector valves for years. Now they required a product with a compact form and the same functionality – but capable of controlling the flow of up to eight unique fluids.

This was an interesting challenge because no existing valve had these characteristics. Specialty engineers pursued a custom design that addressed several critical hurdles, including minimizing overall footprint, providing ample flow and high performance, while meeting budget constraints. The final design passed rigorous testing requirements and surpassed all expectations. The finished assemblies are now successfully operating in the field.

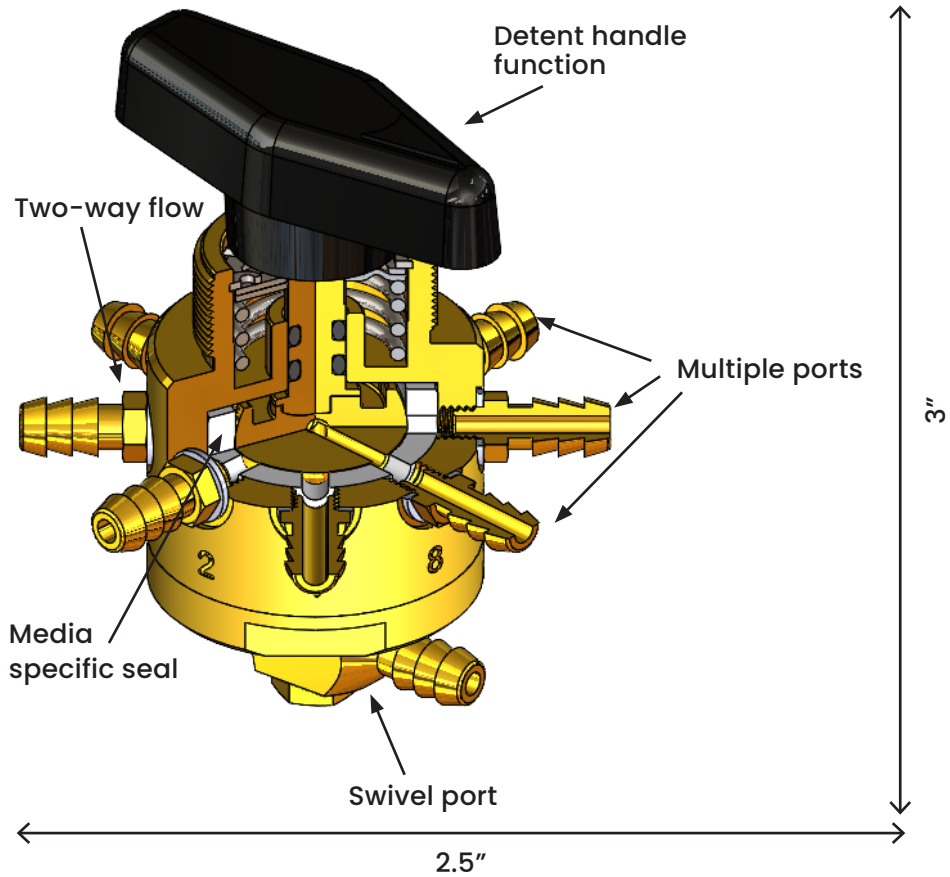


Custom valves can be built with a range of metals depending on the requirements of the application. The most common is brass. All other elements like seals, ends, and size can vary greatly. Specialty Mfg. Engineers will analyze all the variables to design the right configuration for you.

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Custom 9 way brass



Many times, the customer is willing to expend significant time, manpower and internal resources to conceive, craft and refine a greenfield or ground-floor solution to meet exacting application requirements. With a custom product, the designer gets exactly what is needed through an iterative process that assures high function. If "almost perfect" is unacceptable, a more-intensive custom approach is needed. But be aware, custom solutions take more time and could be more costly.

Consider custom when the design must be an exact fit for an application, because of the critical nature of certain features, form factors, functions and high-performance demands. For example, there are applications where a valve's CV factor and pressure-flow characteristics must perfectly match the total system requirements – otherwise it just won't work. The customer's design engineer is banking on us to deliver a product that precisely meets the spec.

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***— Joe Krueger,
Director of Engineering
Specialty Mfg.***

Specialty Mfg.’s engineering team can take a “clean sheet” approach with a custom product and consider numerous alternatives. It usually starts with materials of construction. For example, stainless steel may be a better option when meeting corrosion resistance or chemical compatibility requirements are known. Or if weight is a design driver, plastic is most desirable. Shape and geometry can also be adjusted to fit the needs of the application, or for mounting, manufacturability, or user-friendliness purposes.

Material selection can also address performance concerns such as flow capacity and pressure or vacuum capability. Or it can be based on the underlying technology. For instance, depending on a check valve’s back pressure and leakage expectations, an internal piston might be preferred over a ball/poppet design.

Fluid connection possibilities can range across many standards and styles. Various treatments and coatings are available to increase corrosion protection, reduce friction or harden surfaces. And, like customized designs, it’s appropriate to select seals to suit the application, media and temperature.

Iterative process

The discussion surrounding a custom design usually begins with a conversation about Specialty Mfg.’s capabilities, and our expertise in fluid handling and fluid control technologies. Quite often a customer will approach Specialty with a simple problem statement: “Our current product doesn’t do the job, help us figure out why and how to fix it.” On the other hand, it’s not unusual for large multinational customers to send a 50-page specification for a new valve that breaks out every minute detail. We pride ourselves on coming up with the right solution for the customer, whether the problem statement is on the back of a napkin or in a gigabyte-size file.

Often, the customer knows there is a standard model or existing series design to build upon, but they’re looking for insight and direction on how to achieve the end goal with a part that best fits their specific application. What begins as a simple and straightforward customization process dovetails into a more in-depth conversation about functionality, processes and expectations, and quickly evolves into a custom project.

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In this iterative, back-and-forth process we'll review the problem, provide analysis and offer alternatives, with regular updates from concept, design and production to launch. If needed, testing is available to validate prototypes.

Essential to this process, Specialty Mfg. has some of the most-experienced engineers in the industry. Their breadth of knowledge is exemplary, as projects can range from miniature valves for dental equipment to livestock watering valves for hog farming operations — and everything in between. Because the applications are so varied, over the years we've built up a knowledge base in solving flow control applications while avoiding unforeseen challenges and pitfalls. It results in an engaging, creative and collaborative team environment that serves every customer well.

The end game is to find the right solution, as quickly as possible. By sharing ideas and concepts with our customer, a design emerges that suits the customer's performance requirements while also fitting our manufacturing capabilities to minimize the cost as much as practical.

By truly understanding the customer application, Specialty Mfg.'s design-for-manufacturability process often eliminates unneeded features, ensures appropriate choices in the materials, and reduces overall size and weight — while applying manufacturing disciplines that optimize quality, reliability, efficiency and overall cost.

Turnaround time for a custom product obviously depends on the design, materials and construction. If the constituent parts are of steel or brass and can be made using CNC machining processes, a custom valve can be generated in short order and very cost-effectively. Specialty Mfg. is vertically integrated with capabilities that include metal machining, plastic injection molding, stamping and grinding. Essentially, if a part is made of metal, we offer the flexibility to make virtually anything within reason. Vertical integration also ensures tight control of project management and supply chain efficiencies.

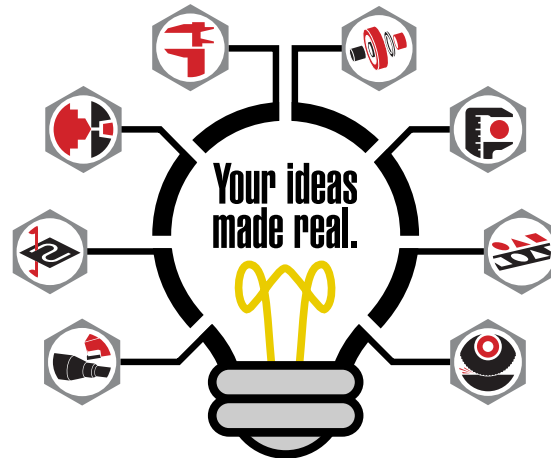
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Specialty Mfg. does the things that other companies can't or won't do, because we don't face the technology, experience and manufacturing limitations that hold others back.

If a custom valve requires plastic injection molding, we also work with tooling and have several options (in house, domestic, and foreign tooling suppliers) to consider. Specialty Manufacturing engineers routinely factor in the type of polymers and elastomers, lead-time to build the tooling, injection engineering team needs, mold costs, and so on. In the end, while machining metal parts is more timely compared to injection molding, it really depends on the specific product, materials, production volume and overall costs to decide on the best, most prudent path.

Our engineering teams stand ready to help guide our customers to the most high-value product that matches their requirements. Sometimes a customized version solves the problem quickly and economically. In other cases, there is no existing answer and a new design must be created from the ground up. Part of our value proposition is the technical expertise that is built into our products and each customized and custom application. Specialty Mfg. does the things that other companies can't or won't do, because we don't face the technology, experience and manufacturing limitations that hold others back.



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