

12 Ways to Lower Costs and Boost Performance of Water Filtration Skids



Best practices for OEMs to simplify and streamline their development, production and ongoing support of high-performance filtration skids for water treatment facilities

Water Filtration Skids: Delivering Performance With Profitability

Builders of filtration skids for water treatment facilities face two big opportunities to boost their profitability and competitiveness. One is to manufacture their skids more cost-effectively to meet or exceed customer specifications. Two is to provide the very best support and service after installation with the least amount of cost, no matter how far away a deployment may be.

Put another way, the big question for filtration skid builders is this: *How do you deliver exceptional price-performance in your solutions along with responsive post-installation support and service — and do so profitably and better than your competition?*

Answering this question is the point of this paper. Given our experience in working closely with tens of thousands of industrial customers around the world, especially OEMs making water filtration skids for public- and private-sector applications, we see three solution lifecycle phases in which improvements can yield significant time and cost benefits:

- **Design:** While costs can have many drivers, among the biggest are complexity, variability and proprietary inputs from suppliers. By reducing these, you can have cost impacts throughout your solution's entire lifecycle, from assembly to installation and commissioning to serviceability.
- **Assembly:** Streamlined assembly means faster assembly, which can potentially reduce labor costs as well as how much money work-in-progress will tie up. It also will help cut lead times, improving customer satisfaction and competitiveness. Better procurement practices can cut assembly times and costs, too.
- **Support:** Highly responsive, post-installation support and service can make or break your reputation as a dependable supplier of reliable, high-performance water filtration skids. We offer some pointers on how to use performance data to boost operating visibility and provide remote, predictive diagnostics to help avoid disruptive downtime.

In what follows, we suggest 12 ways to simplify your designs, streamline assembly, and provide the most responsive support possible to your customers around the world. Our suggestions can be grouped in the lifecycle phases mentioned above in greater detail.

Design: Open Standards Development, I/P Integration and Space Optimization

Cost optimization of your water filtration skid solutions starts with simplified design and engineering that's both time- and space-efficient. That's to say, *time-efficient* both in how long this important phase takes to complete and in the assembly time the design requires; and *space-efficient* in how much functionality can be packed in the least amount of space. Also, consider using "Configure to Order" (CTO) baseline designs, which reduce the variability that come with custom "Engineered to Order" (ETO) designs. Avoid higher-cost proprietary components and subsystems, if possible. Here are our first four suggestions for the design phase:

1. **Online engineering tools:** Use online engineering tools, like those Festo makes available, to optimize valve and tubing sizes. Order precisely what's needed and avoid over-sizing "to be safe." This can reduce component costs and improve energy efficiency and operating costs. Shorten design time by working with suppliers who can provide CAD files and 3D models that you can quickly import into your designs instead of creating them on your own.
2. **Open control software and hardware:** Consider adopting a CODESYS control environment, if you haven't already. Based on the open global



standard IEC 61131 Part 3 and now in its third edition, CODESYS licenses are free of charge. Software developed from it can run on virtually any manufacturers hardware, so you can avoid paying premium prices for proprietary automation components. Standalone or embedded in an HMI or valve/electrical terminal, it will communicate with leading industrial Ethernet and fieldbus protocols.

3. **Integrated I/P onto valve terminal:** Embed the I/P directly on the same terminal as the pneumatic valves, for applications requiring proportional pressure control. This reduces many skid components: the I/O count; the number of supply lines needed; and the number of components mounted on skid. Plus, it simplifies installation and commissioning, while improving serviceability.
4. **Direct-mounted hardware:** Mount terminals and connections with IP65/67 ratings directly on your skid's frame. This reduces both cabinet size and cost requirements. It also can boost performance by moving pneumatic pilot valves closer to actuators.

Assembly: Simplified Procurement, Integrated Components and CTO designs

Starting with procurement, the more suppliers you have, the more complexity you have — stocking, sparing, documentation, and so on. So it helps to minimize the number of suppliers or consider sole-sourcing with a competent, responsive and financially sound supplier you can trust for the long term. Next, integrated components can reduce part counts, improving assembly speeds that much more because there are fewer components to attach and connect. CTO baseline designs can radically reduce the assembly time of your water filtration skids. That's because you can develop standardized processes with much faster cycle times that your production team members can use to be more efficient and also more easily cross-train on. Here are four more suggestions for the assembly phase of your filtration skid:

5. **Bulkhead mounted valves:** Use multipole plates for valve terminals mounted inside your skid's cabinet. This can lower assembly and material costs dramatically because only one cut-out is needed; no time is required for short runs of tubing inside the cabinet; and multiple bulkhead connections are eliminated.
6. **Integrated flow controls:** Use valve terminals with integrated flow controls that can govern process actuator speed. This eliminates installation time at the actuator, ensures longer process valve life, reduces potential water hammer, and reduces your skid's bill of materials.
7. **Configure terminals using L5K files:** For systems with Ethernet/IP on a Rockwell™ RSLogix platform, use L5K files, which enables you to quickly and easily import and export of all parameters to the valve terminal or electrical I/O terminal. It's a repeatable solution that will reduce time during assembly and during field service.



8. **Kitting:** For your baseline CTO skid designs, consider using a single vendor for as many parts as possible, if not all of them. The vendor can assign your order a single part number and send it in a single shipping container that simplify stock and vendor management as well as scheduling. It can also reduce the opening of different vendors' packaging and reduce packaging waste and disposal. Overall, it can reduce procurement costs.

Support: Operating Data for Visibility and Remote, Predictive Diagnostics

Your customers need to count on the reliable, day-to-day performance of your filtration skids. Disruptive downtime isn't an option. That's why making field-level SCADA operating data visible is so critical to ensuring peak performance around the clock. Today's industrial Ethernet and wireless communication protocols can let you, your customers and their higher-level systems monitor skid performance at anytime from just about anywhere in the world and from just about any device. Remote diagnostics can not only help troubleshooting when needed, but also help alert operators to issues before they cause a disruption. Highly responsive support and service are other keys both to setting your skids apart from your competitors as well as to defending against them. Following are four suggestions for enhancing these capabilities:

9. **16-bit analog I/O:** Use high-resolution 16-bit I/O instead of 12-bit I/O for applications such as filter integrity testing. This will provide data more quickly and accurately, helping to boost skid uptime.
10. **Compressed air flow meter:** Install a simple flow meter at the air preparation unit to provide volumetric air consumption for a cycle or real-time consumption rate. Comparing these values over time against factory test can be an advance indicator of failing actuator, broken tube or inefficient scrub operation.
11. **Internal diagnostics and conditioning monitoring:** Point diagnostics, such as a failed solenoid, broken wire or short circuit, are available for I/O and pneumatic valves. This can help the controller pinpoint and communicate locally or remotely exactly where an issue has occurred.
12. **Local controller for modular skids:** An electrical I/O or valve terminal can host an embedded controller for local subroutines. This offers an excellent opportunity to standardize on modules that can be scaled up or linked together as part of a larger filtration system – and better enable the support and service of baseline CTO designs.

Introducing the Festo CPX/MPA electrical I/O and pneumatic valve integrated terminal device



Functional integration via the Festo CPX/MPA can save engineering time, while simplifying assembly, installation, commissioning and post-deployment support and service. The device combines the Festo CPX electrical terminal handling I/O and communications with the Festo MPA high-capacity valve terminal.

Secret to Success: Simplify, Simplify, Simplify

More and more, cost and competitive pressures will drive OEMs of water filtration skids to realize that the one key to profitably delivering competitive, high-performance solutions is *simplification*. Simplified designs. Simplified engineering. Simplified procurement. Simplified assembly, installation and commissioning. And, after all that, simplified support and service wherever their skid solutions are deployed.

Functional integration of key components, such as electrical and pneumatic controls and automation, can play an important role in simplifying skid solutions, making them easier to engineer, build, support and service. Making performance data accessible not only via local HMIs but also to higher-level control and automation systems can provide OEM customers with greater operational visibility as well as predictive diagnostics. The latter can help alert them and their OEMs to declining skid performance, so preventive maintenance can be performed before costly disruptions occur.

With after-sales service available across the U.S. and in 176 nations, Festo can help you ensure your end-user customers will get the post-installation support they need just about anywhere in the world they might have operations. What's more, by investing nearly \$200 million a year of our nearly \$2.8 billion in global revenues in R&D, we can keep you and your water filtration skid solutions supplied with plenty of innovation for many decades to come. We invite you to visit our website or contact your local Festo representative to find out more.

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