

# Innovating Safely

Fluidtrol recently announced a new product line of sand filters. These new filters were designed using our ISO certified design process and managed by a professional engineer. The following overview of our design process shows how Fluidtrol ensures safe operating designs while incorporating innovations.

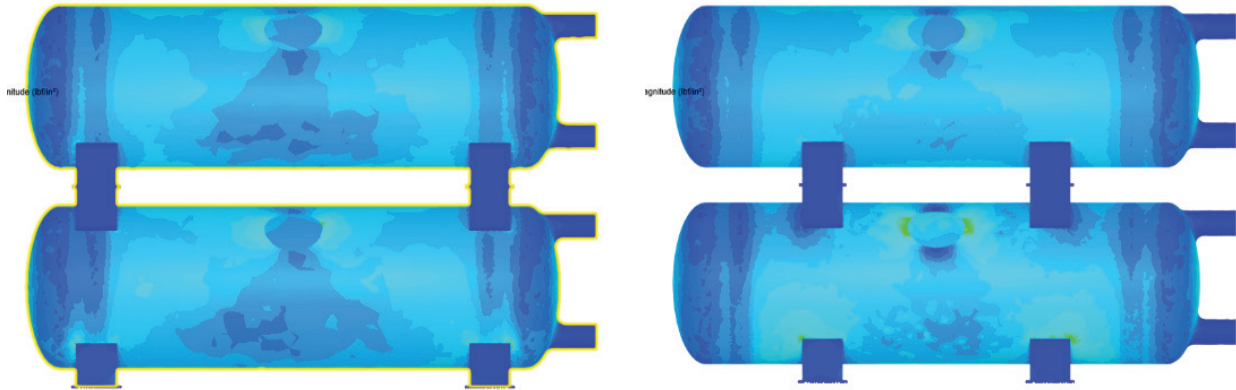


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## DESIGNING A NEW PRODUCT LINE

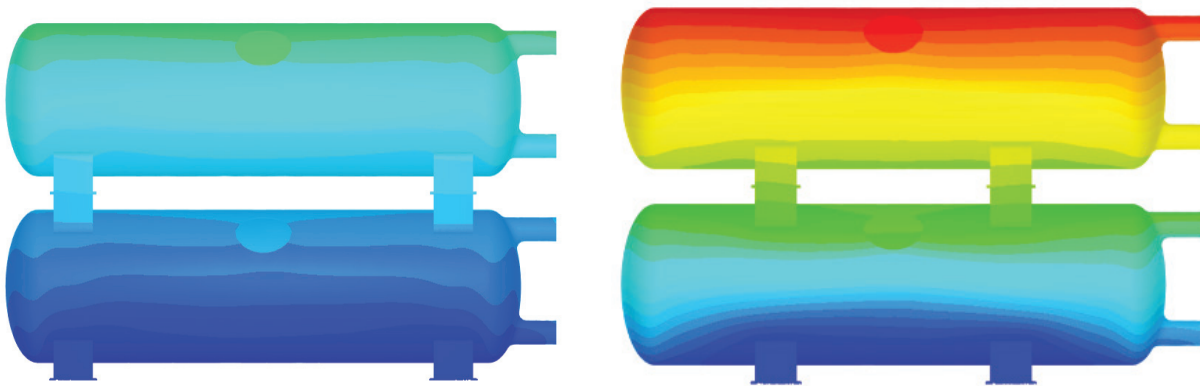
Designing a safe vessel requires considering the materials used, likely application, and manufacturing tolerances. Our filter vessel shell was specified using burst calculations and FEA modeling of stress and strain. The FEA modeling also helped us consider the best installation and support by simulating different scenarios.



FEA simulation of stress in stacked sand filters with saddles placed wide and narrow stance

## FINDING ADVANTAGES

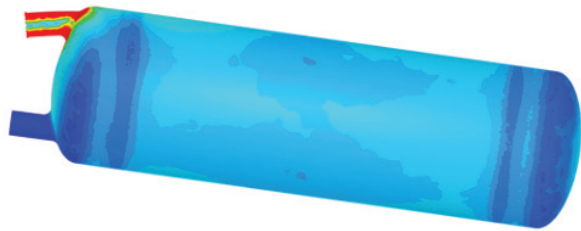
We place our saddles on the sand filter to minimize the stress on the vessel and on the face piping. Our vessel design is stiffer near the ends because of the internal construction, which allows us to place saddles near the nozzles. This location translates into almost a 50% reduction in total strain at the nozzles. Reducing the strain imposed on the face piping can reduce leaky gaskets, cracked flanges and early pipe fatigue. This innovation is patent pending.



FEA simulation of deflection in stacked sand filters with saddles placed wide and narrow stance

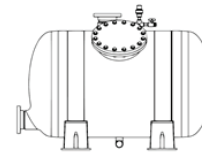
## CONSIDERING FAILURE MODES

One of likely applications involves installing a filter with a loose saddle support. A loose saddle can sag and allow the face piping to take most of the weight. This can lead to cracked nozzles or cracked face piping. All of Fluidtrol's filters saddles are affixed to the shell.



Simulation of the vessel being supported by one nozzle because saddles allowed deflection

Another likely scenario is entrapped air. Some facilities may pump a significant amount of air in the line, which is usually collected in slow moving water like tanks or filters. When more than 2 gallons of air is trapped at 50 psi, it is storing enough energy to cause fatal harm in the event of shell failure. Some filter designs use tubes across the filter bed to push excess air out during operation. However Fluidtrol chose to use an external air release that is easy to inspect, maintenance, and verify it has not become clogged with sand or other debris. The air release also assists venting when filling the vessel, the most likely time air will be pressurized and prior to pump operation.

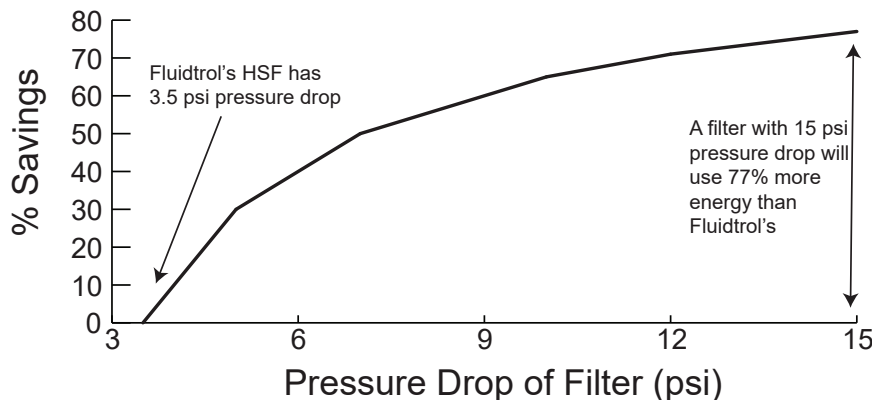


## DESIGNING SUSTAINABLE DESIGNS

In addition to designing safe vessels, part of our design process adopts the goals of NSPE and LEED to consider sustainable designs that minimize environmental impact and operation costs. One of the major expenses operating a sand filter is the pressure drop. We researched the pressure drop of several NSF approved filters and found the range of pressure drop varied significantly. Several leading brands have a clean filter pressure drop of 10-12 psi. This may seem insignificant when your pump is producing 30-40 psi, but it does consume more

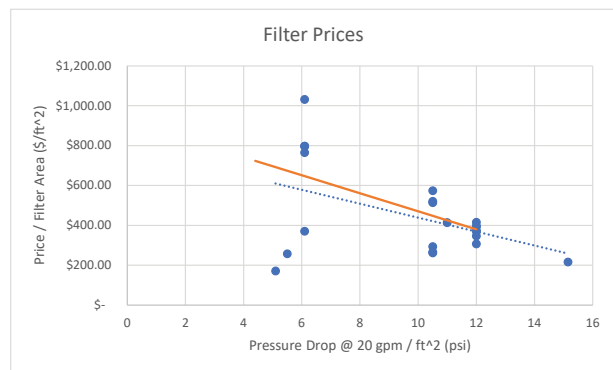
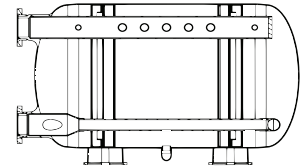
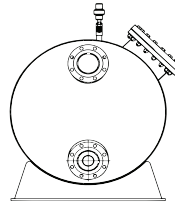
energy with little to no benefit. Fluidtrol's sand filter can reduce your pumping costs by up to \$69 per square foot of filtration area. When typical filters run \$380 per square foot of filtration area, that energy savings pays itself back at 20% annually. Below is a graph of NSF approved sand filters market pricing per square foot of filtration and their pressure drop.

## Energy Savings During Operation



## SUSTAINABILITY THROUGH INNOVATION

Fluidtrol accomplished this pressure drop by optimizing the flow. We performed CFD to determine the best diffuser layout and the best lateral design. The CFD results drove us to invent the Triflow, a molded pipe fitting that balances flow across the laterals with the least amount of pressure drop. Most lateral systems have several sharp corners and labyrinth mazes. Our design is simple and patent pending.



## INDEPENDENT VALIDATION

We also validated our design and claims by testing at Fluidtrol’s facility and at an independent lab, NSF. The NSF certification process required validating the pressure drop curve, the media migration, the cleanability, and structural integrity in addition to toxicity of the materials. NSF tested our vessel with cycling the pressure 20,000 times to a typical pump pressure of 35 psi. Then they pressurized it to 100 psi to prove the rating of 50 psi is safe. We feel confident our filter will perform as advertised.



Certified to NSF/ANSI Standard 50

## CUSTOMER SUPPORT

Fluidtrol’s design process produces innovative products that are carefully reviewed, tested, and validated. We provide great products and great customer service. Please consider using Fluidtrol for your next filtration project. For technical questions please contact Fluidtrol’s Engineering Department at 256-859-1609.

