



University
of Idaho

INL GRINDER WATER FILTRATION SYSTEM

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OBJECTIVE



Redesign and build a water filtration system for a grinder and polisher within a hot cell

PREVIOUS DESIGN



REQUIREMENTS

- Whole System

- Weigh less than 750lb
- 304 SS with mill finish
- Fits in 9"x 24"x 22.5" envelope
- Have a bypass valve
- Swagelok fittings
- Easily accessible and changeable
- Compatible with EMM's and mechanical slaves
- Guide pins

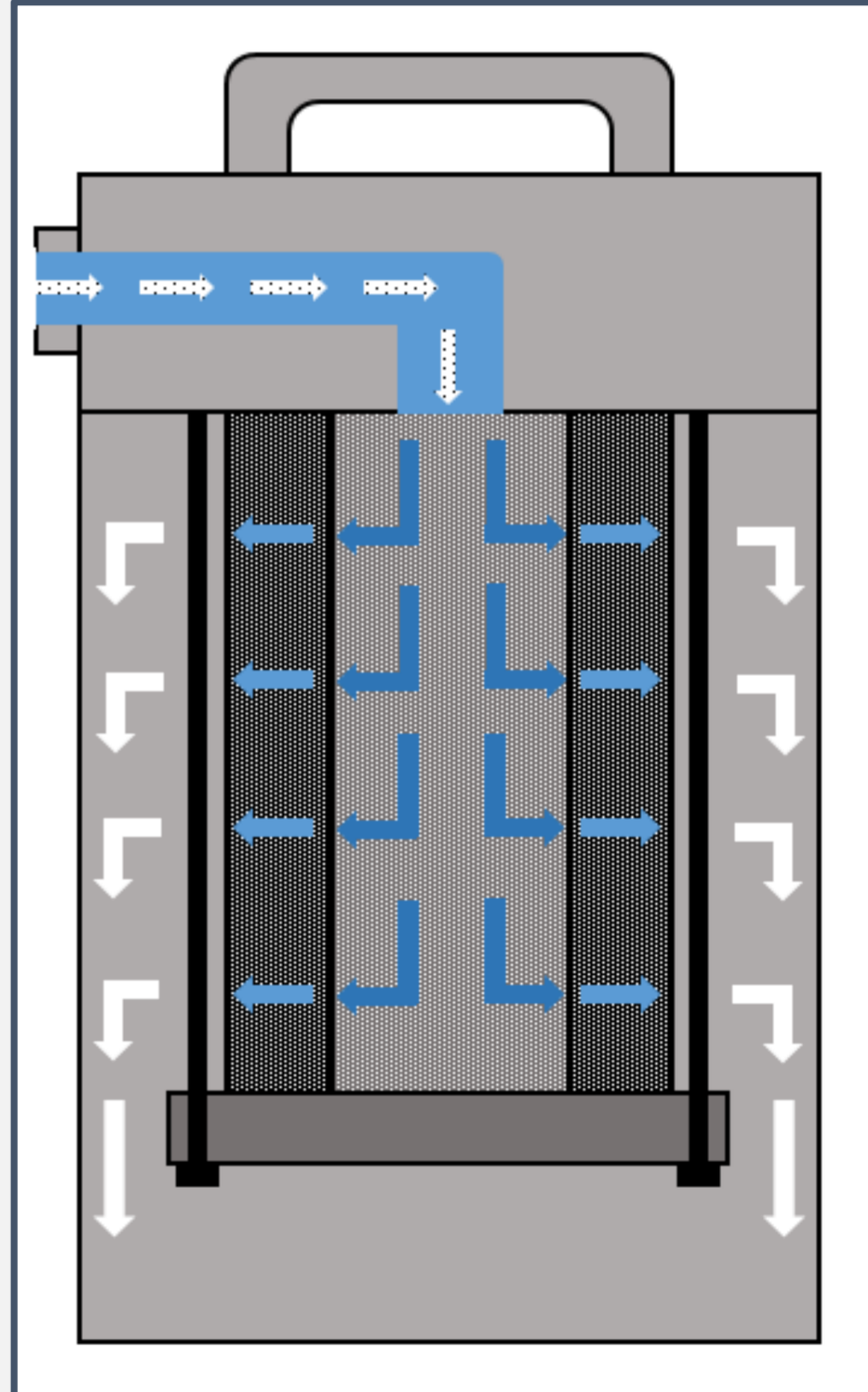
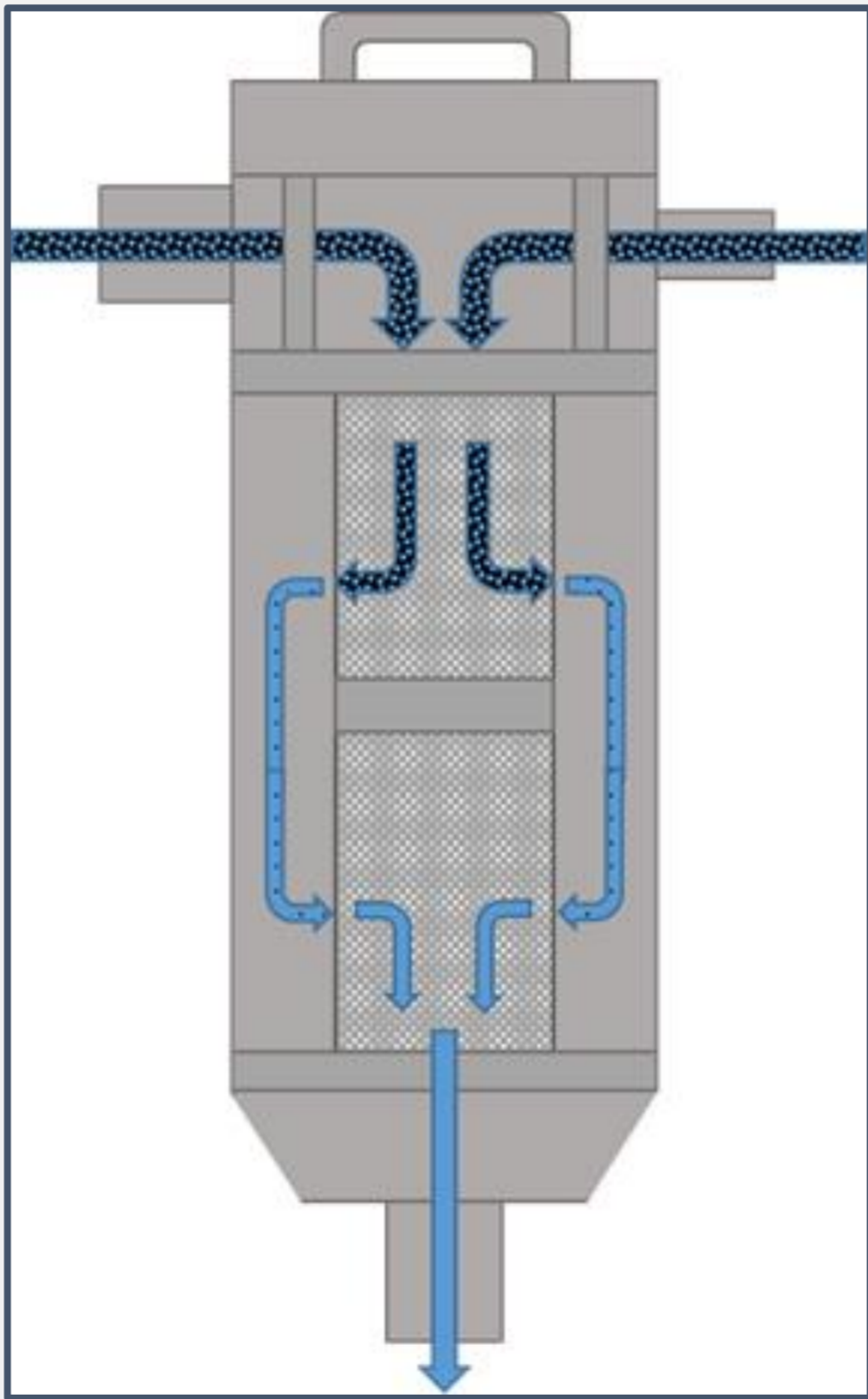
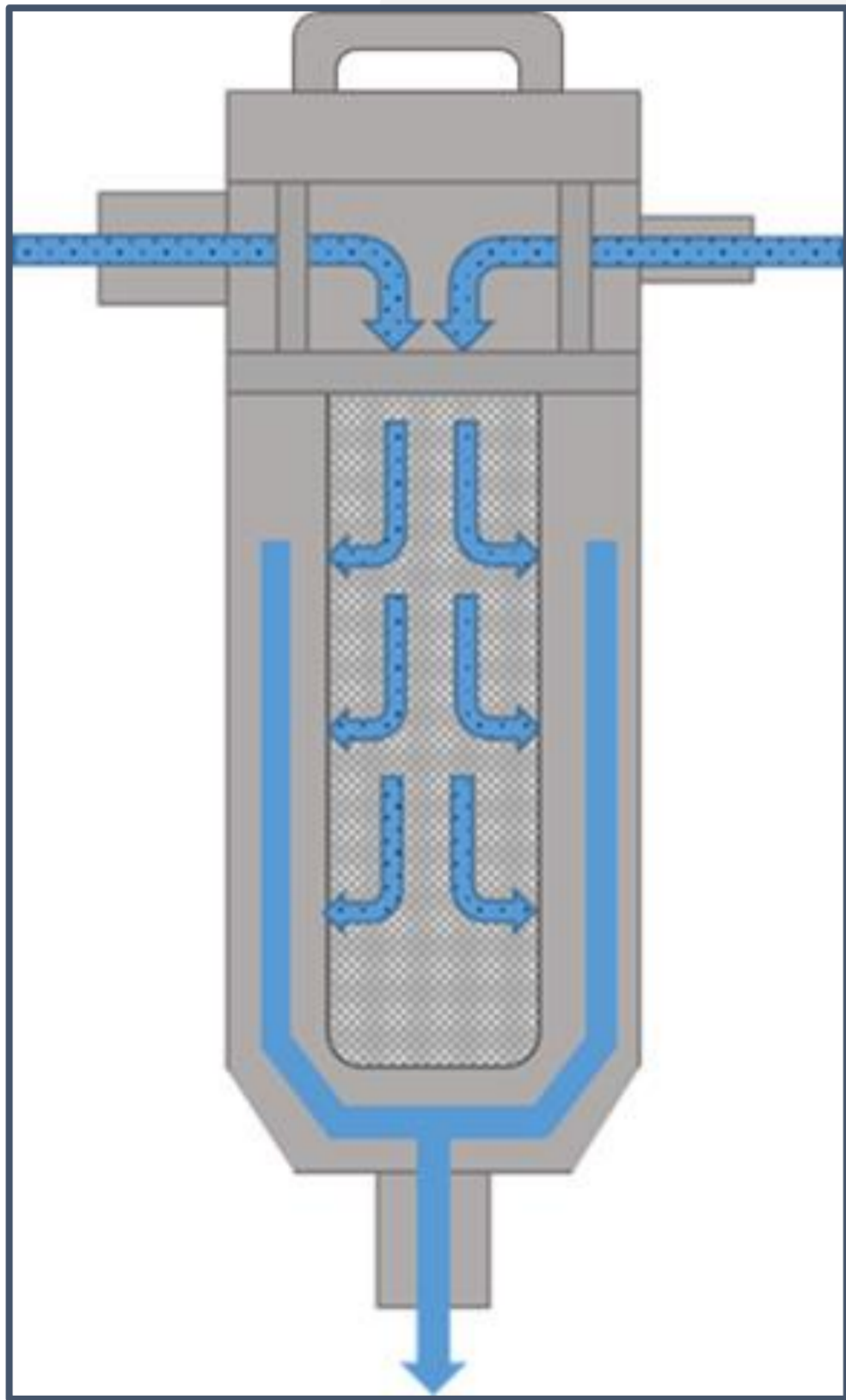
- Filter

- Easily accessible and changeable
- Weigh 20 lbs or less
- Particulate accumulation on inside of filter

- Pump

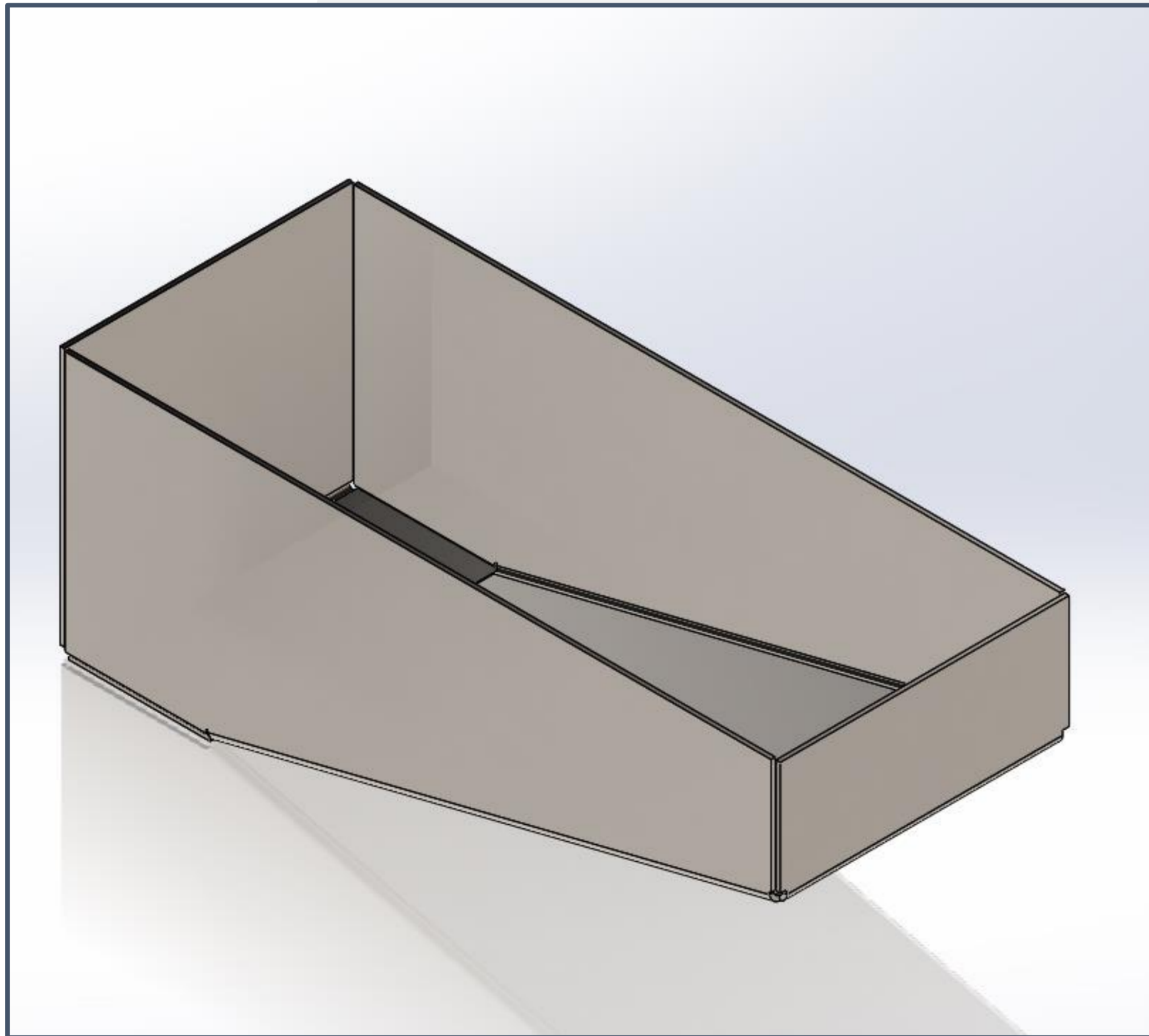
- Volumetric Flow rate of at least .2gpm
- Handle radioactive environment
- Amphenol connection compatible

ALTERNATIVES FILTER



ALTERNATIVES

TANK



Pros

- Minimizes welding
- Slightly larger volume

Cons

- Difficult to bend

ALTERNATIVES

PUMP

VP SERIES



Pros

- Correct head for desired flow rate
- Vertical discharge port

Cons

- Slip on discharge port

AGITOR SERIES



Pros

- All stainless steel design
- Vertical discharge port

Cons

- Expensive and Agitator combats tank design

ALTERNATIVES

INTEGRATION



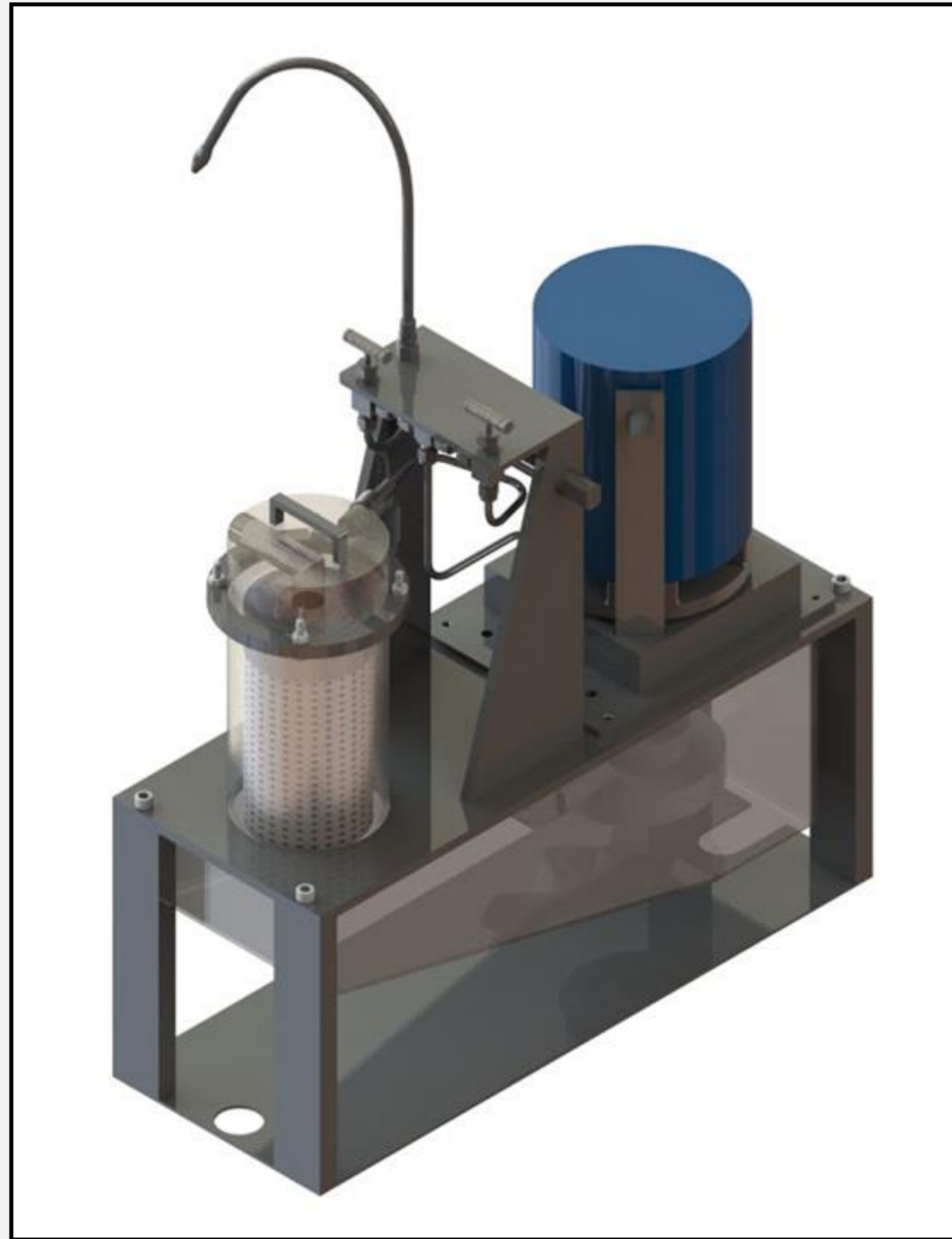
Pros

- Minimal Tubing
- Filter comes before Pump

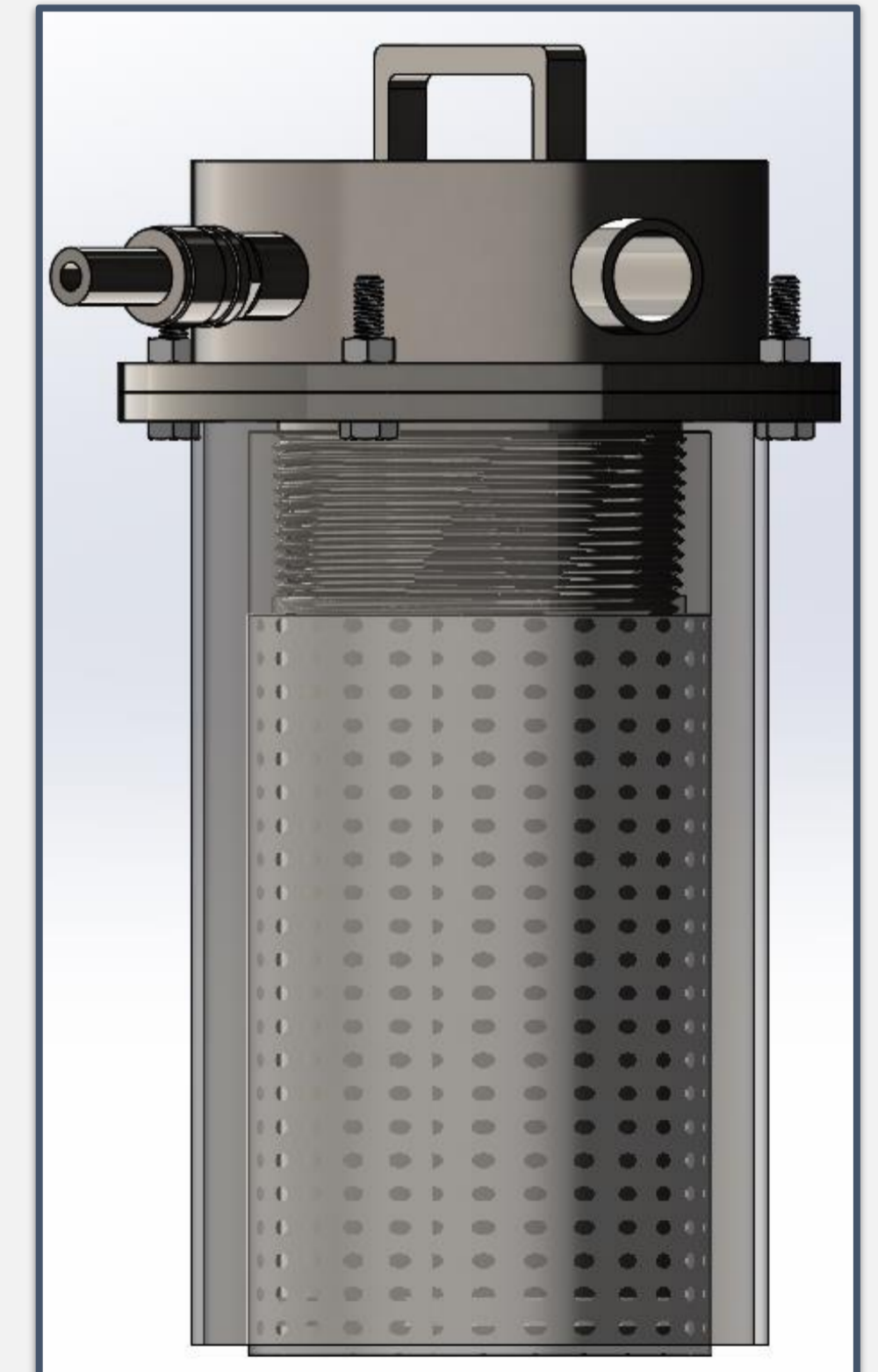
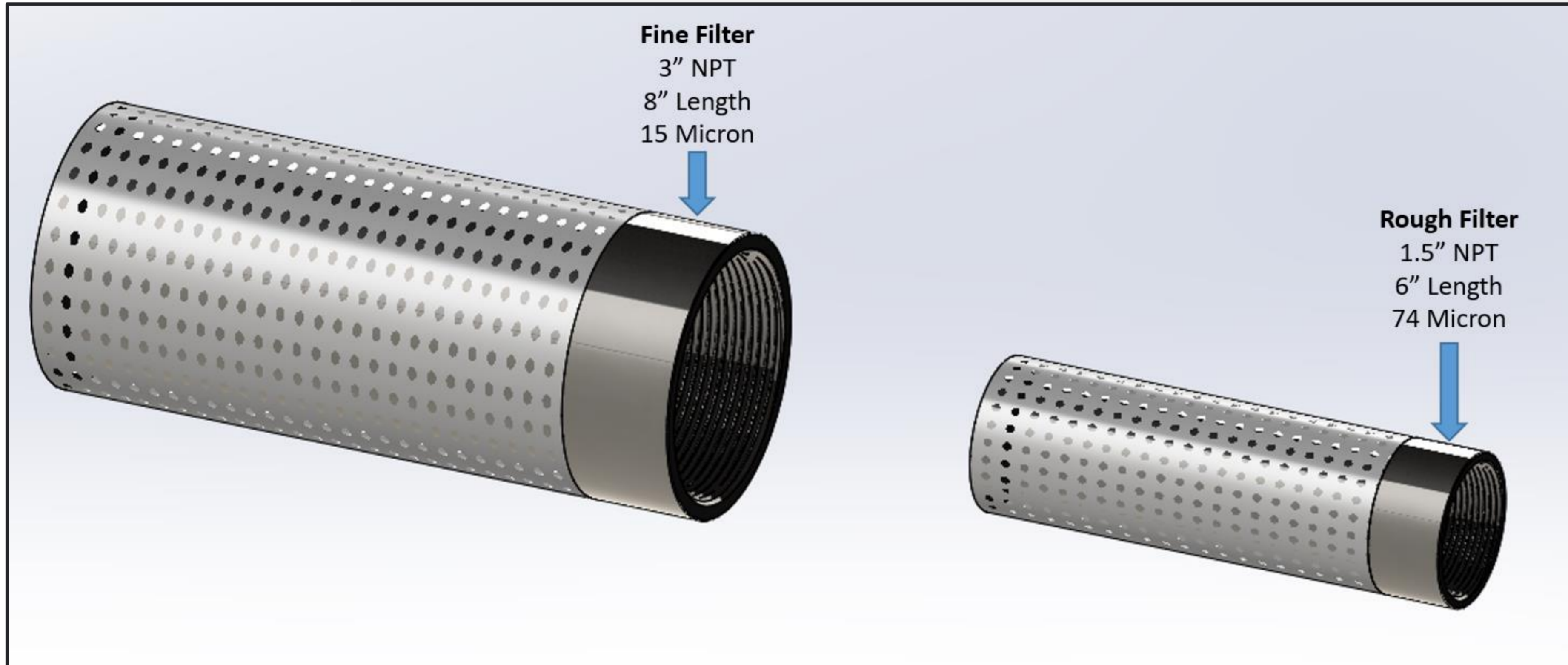
Cons

- Old Pump Model/VP series
- Nozzle is not in correct location
- Center of Gravity is skewed
- Tubing goes over the pump handle

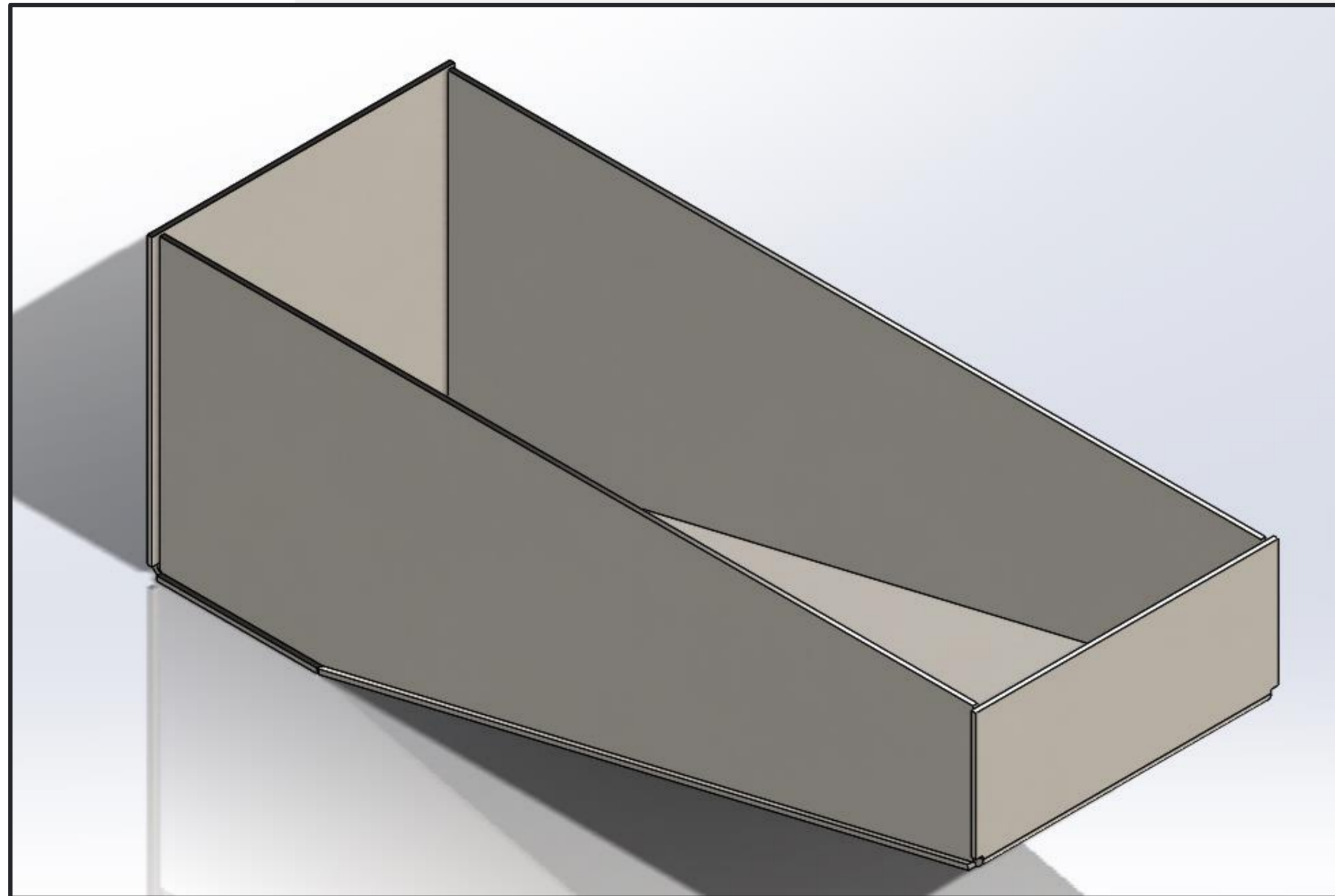
DESIGN



DESIGN FILTER



DESIGN TANK



Features

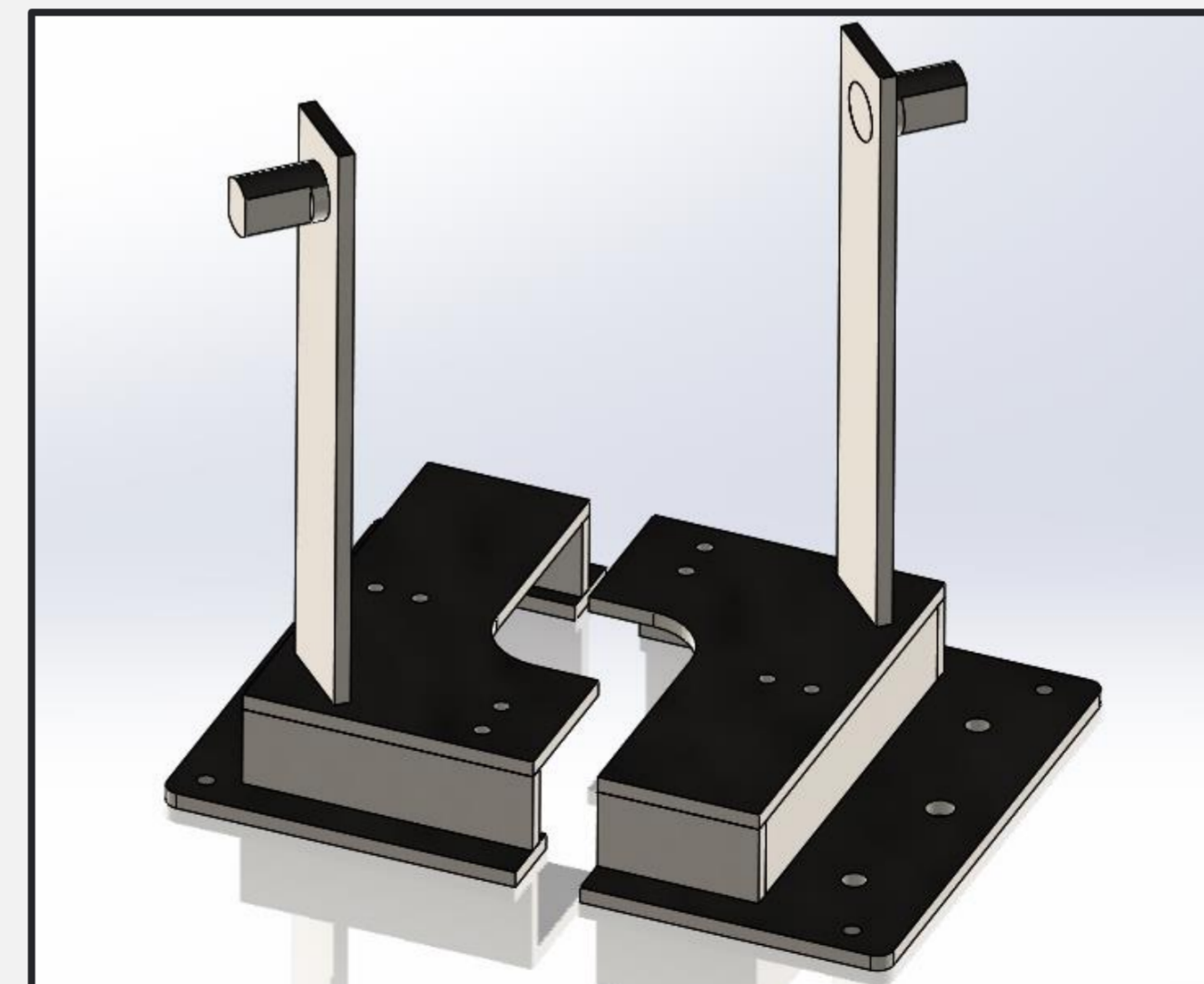
- Slanted for any stray particulate
- Gauge 11 stainless
- Separated side for easier bending

DESIGN PUMP

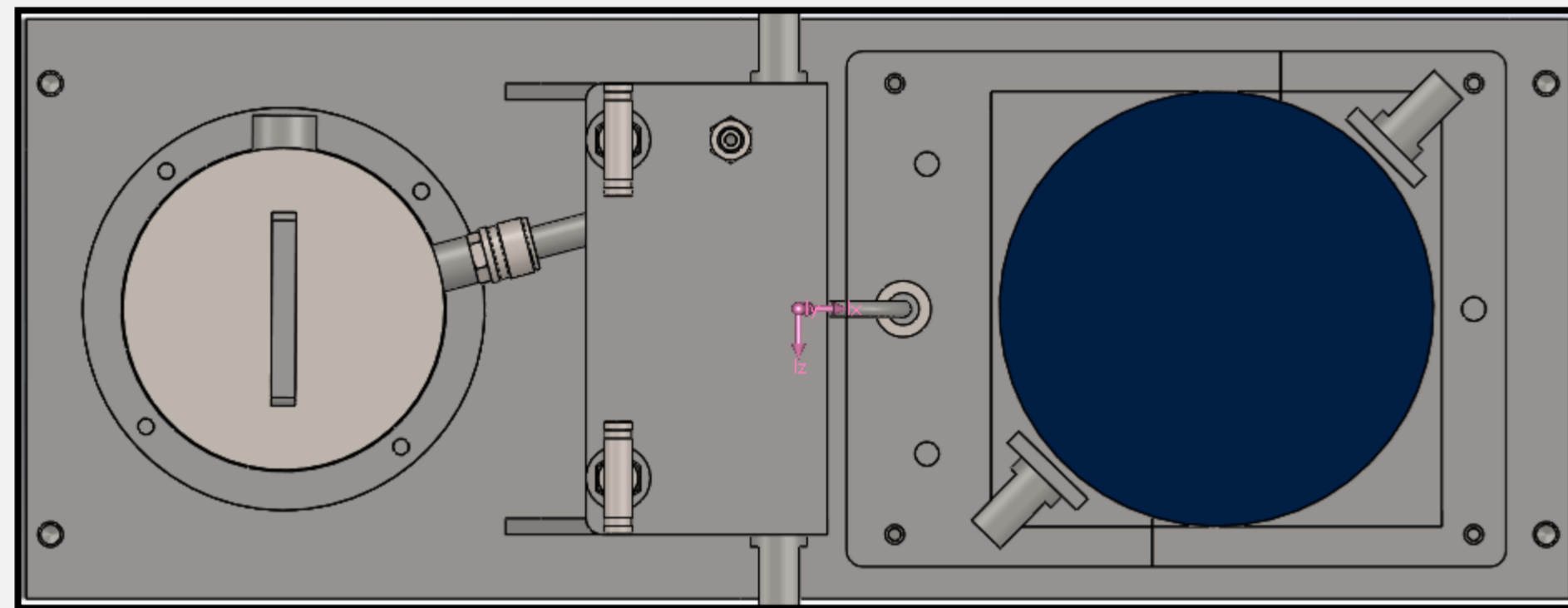


Features

- Elongated shaft
- Threaded NPT discharge
- 316 Stainless Steel body and shaft
- Celcon impeller and volute

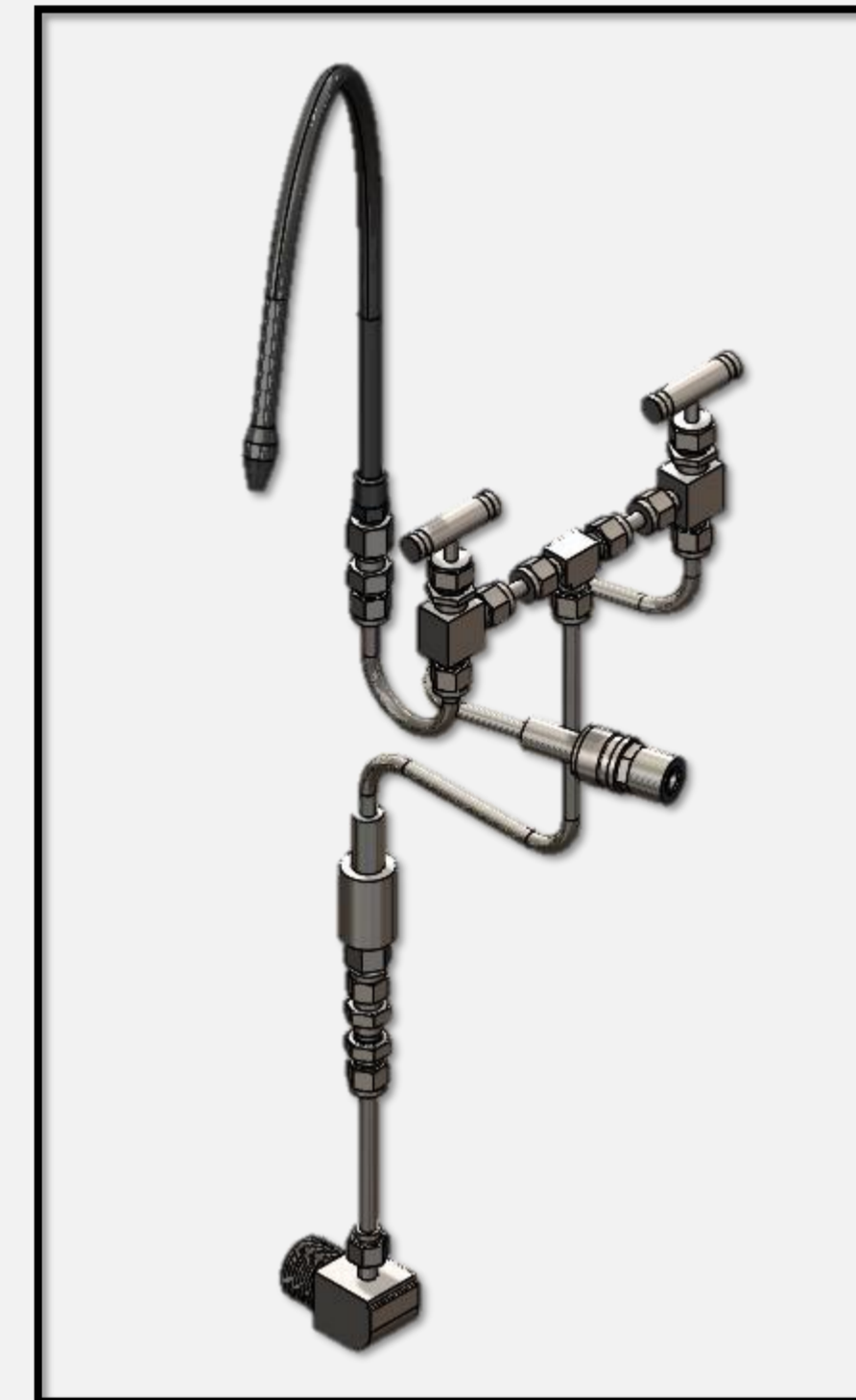


DESIGN INTEGRATION



Features

- 1/4" Tubing
- Swagelok Quick Disconnects
- Bypass into filter

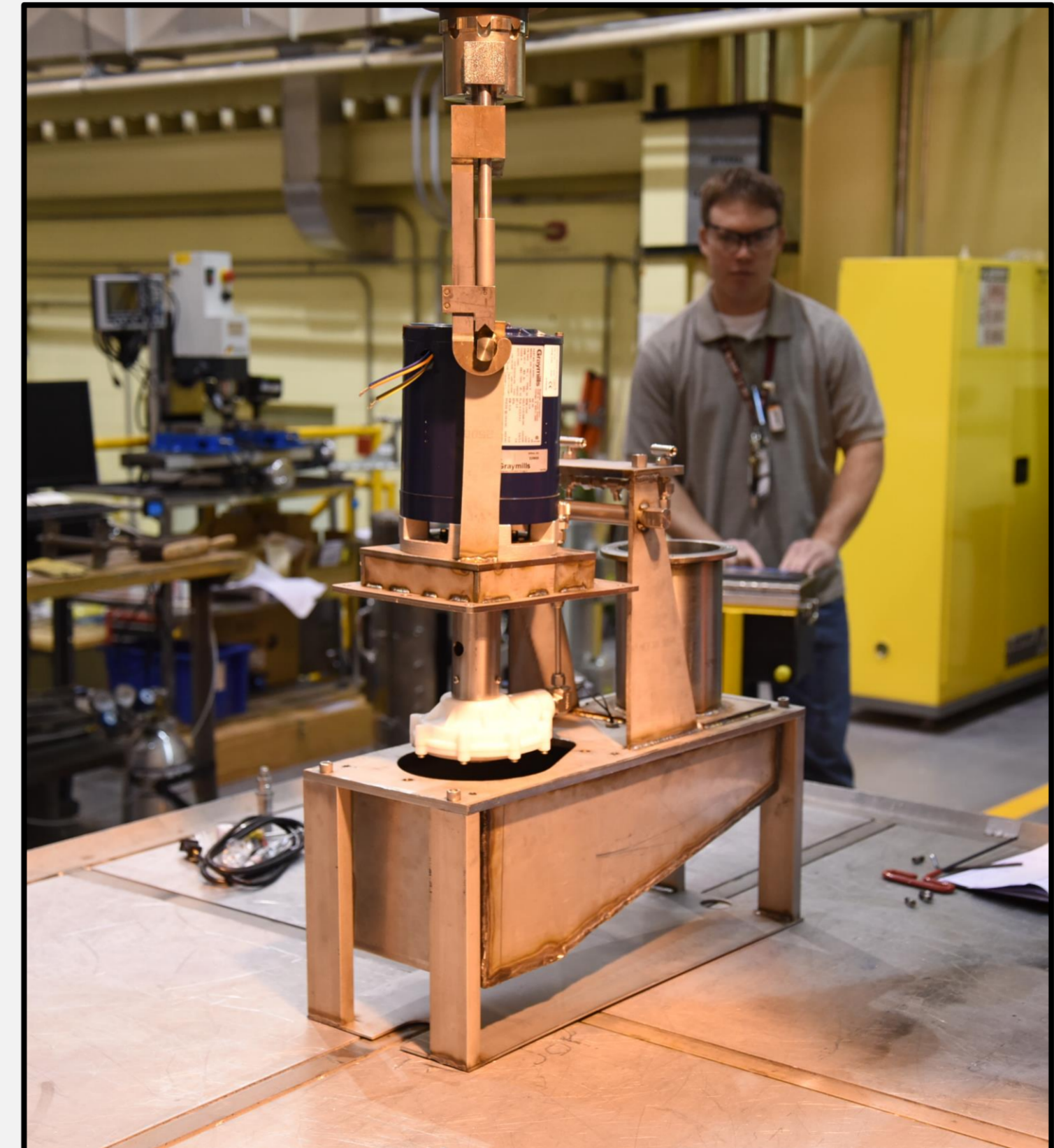


VALIDATION



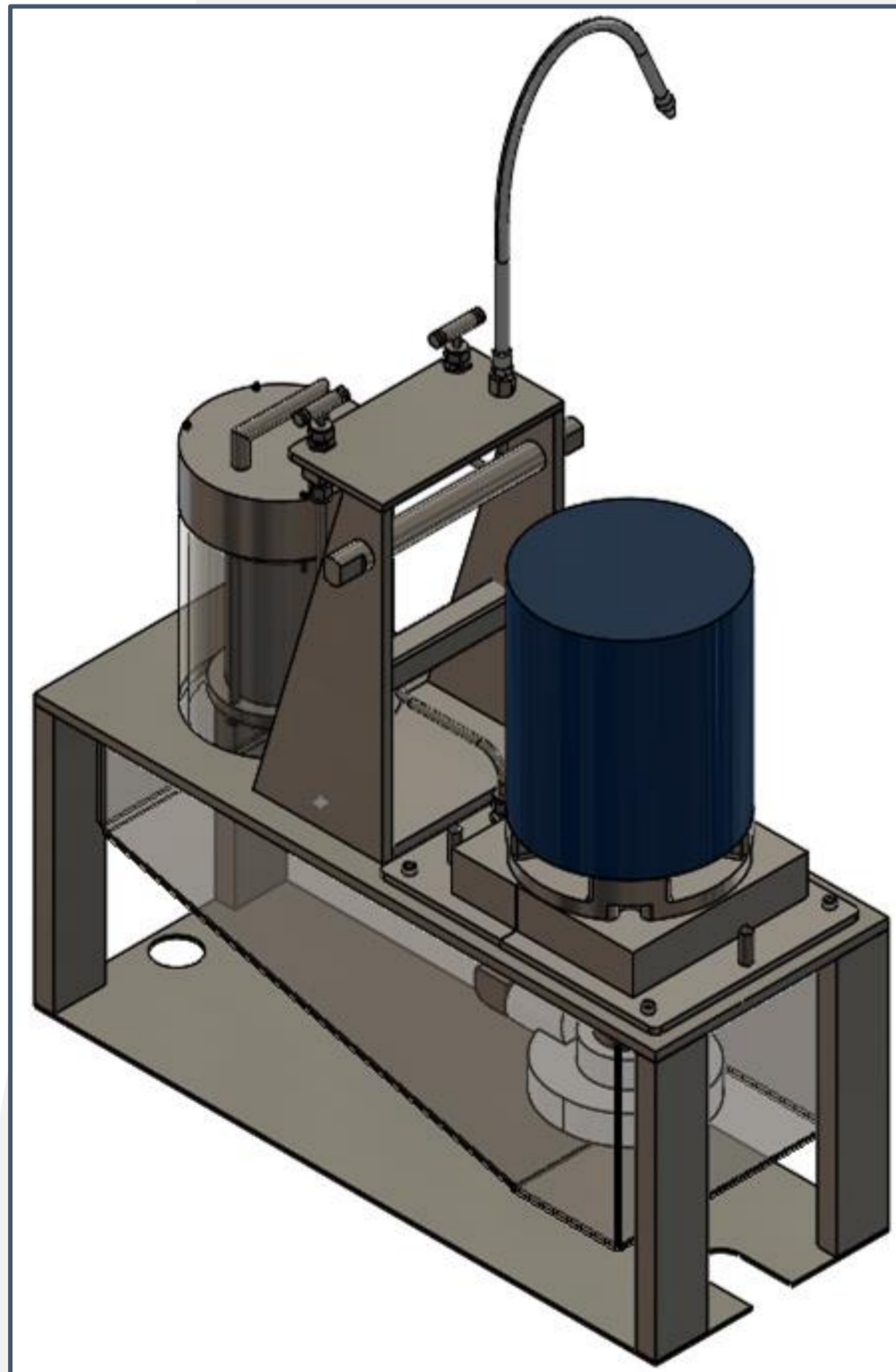
4 MAIN POINTS

- Meets specifications
- Affordable
- Easily Manufactured
- Easily Maintained



SUMMARY

System Overview



- Pump
 - Produces the desired volumetric flow rate
 - Easily removable for cleaning
- Two stage filter
 - Easy removal
 - Longer operating time between cleaning
- Tank
 - Slanted for particulates
 - Water height for pump

SUMMARY

RECOMMENDED DESIGN MODIFICATIONS



- Flexible tubing
- Swagelok quick disconnect
- Relocate the bypass on filter housing
- Add weight on the filter side for CG

ACKNOWLEDGEMENTS

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