Smart Industrial Strainer

TEAM: 58

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Introduction

Industrial strainers play a critical role in fluid handling systems across industries such as water treatment, petrochemicals, and food production. However, traditional strainers are prone to clogging, leading to operational inefficiencies and increased costs. This project addresses the need for a smarter, more efficient solution.

Problem Statement

Traditional strainers often clog, resulting in downtime, high maintenance costs, and potential equipment damage. A self-regulating filtration system is essential to overcome these limitations.

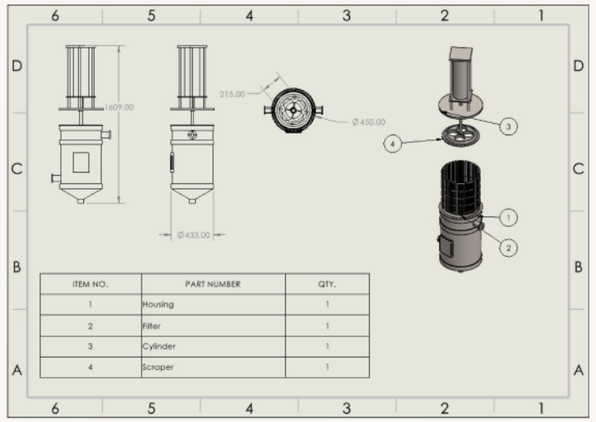
Proposed Solution

The Smart Industrial Strainer is an automated filtration system equipped with a self-cleaning mechanism and real-time data monitoring. Designed for efficiency and reliability, it reduces maintenance and downtime across industrial applications.

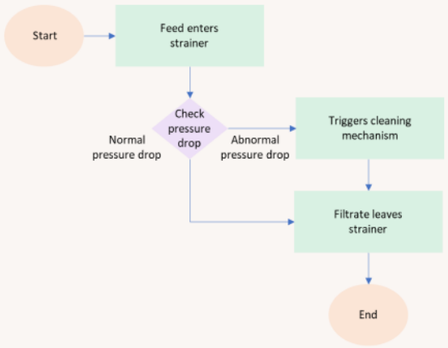
Constraints

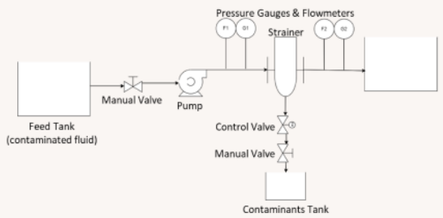
- The time to complete the system.

Final CAD



Process Map & Testing PFD





Equations

$$\text{Beta Ratio } (\beta_x) = \frac{\text{Number of particles} \geq \text{size x upstream}}{\text{Number of particles} \geq \text{size x downstream}}$$

$$\text{Filtration Surface Area } (A_s) = 2\pi rh$$

Target Specifications

- More than 90% Cleaning Efficiency
- Maximum Operating Pressure up to 5 bar
- Temperature Tolerance Range between 0°C and 80°C
- Handles fluids with a pH range of 6 to 9
- No more than 10% of Pressure Drop
- 0.5 m² of Filtration Surface Area

Conclusions

This system can be further improved by introducing a vibrator for the filter element that operates at the beginning of the cleaning cycle. This mechanism would weaken the bonds of debris adhered to the filter surface, making it a more effective and comprehensive solution for maintaining filtration efficiency and reducing system downtime.

Process Mechanism