University of Idaho
College of Engineering

Expo 2017

H_2Only
The Sediment Solution

Sponsor
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University of Idaho Facilities

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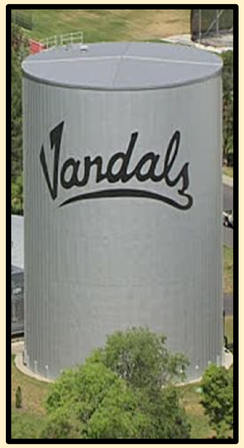
Problem

The floor of the University of Idaho's chilled water tower accumulates sediment as the water lies stagnant. The current method for sediment removal is very expensive and stops operation of the tank.



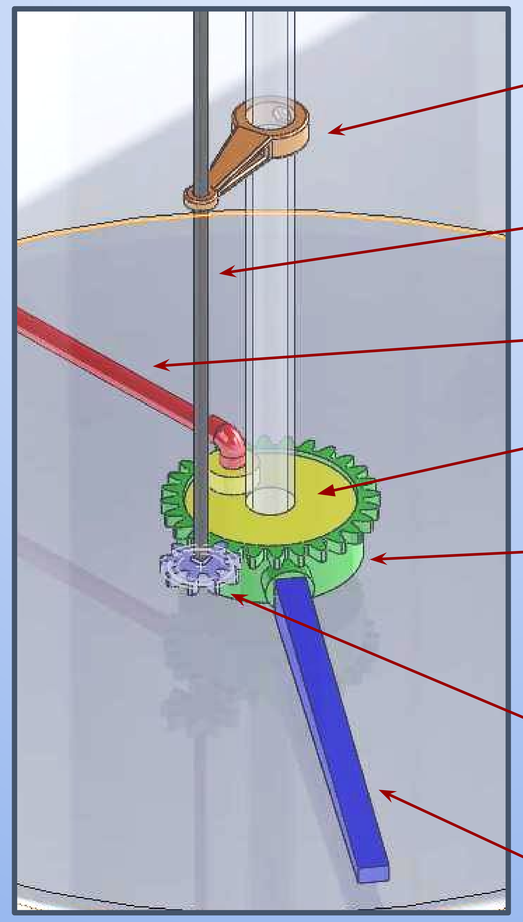
Eric Hill, James Rockwell, Lucio Barajas, Marshall Bolen

Project Goal

Design, fabricate, and test a small scale prototype that will extract sediment from the bottom of the water tank on campus. It must be scalable to water tank size for future implementation.

Solution

- Rotating suction sweeper with slit down middle
- Center cavity (slip ring) attached to exit pipe
- Axle and gears drive rotation
- Mounts hold axle and stepper motor in place
- Suction head created by elevating our tank and using pump

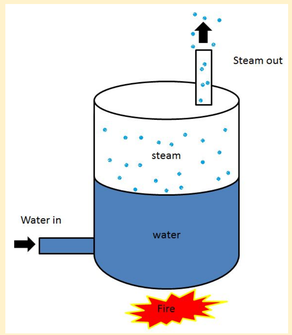


Project Learning

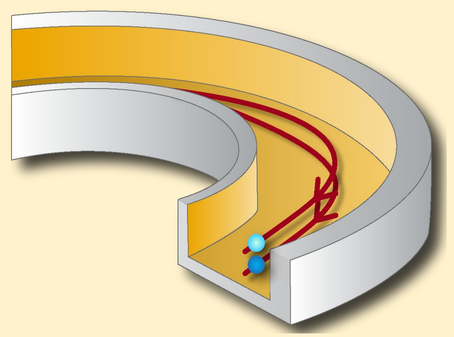
- Real world exposure to engineering projects
- Interacted and collaborated with a client
- Communicated ideas to teammates and colleagues
- Exposed to team environment
- Used engineering knowledge to solve problems
- Implemented a solution

Future Work and Design Features

- 1:33 small to full scale ratio
- Drive motor attached to tip of sweeper arm
- Automated sediment level detection
- External separation needed to return water



Evaporation



Centrifugal Separation

Results/Conclusions

- Sweeper speed is too slow to create turbulent flow, resuspension isn't a problem
- Optimal operation speed is 0.5 to 2 rpm
- Majority of sediment is removed in one cycle
- Arduino, H-bridge, and motor allow full automation
- Even suction through slit due to 1:1 area ratio between exit pipe and slit.
- Tapered underside of sweeper reduces "shoveling" affect of sediment