

Pneumatic Rotating Rack for the OSU TRIGA Reactor



Oregon State University

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Background

- The rotating rack at OSU's TRIGA facility currently only has manual capabilities for removing samples
- Safety precautions prevent the rack from being used on any day except Thursdays and Fridays
- Transition to 24/7 reactor operation would even further limit opportunities to use the rotating rack for irradiations
- A new system is needed to allow samples to be removed and safely stored more efficiently

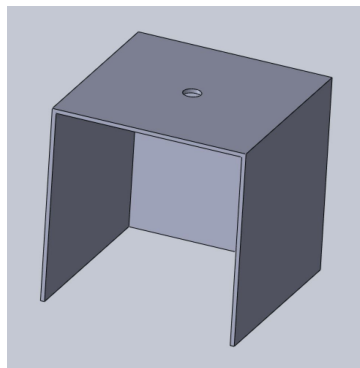
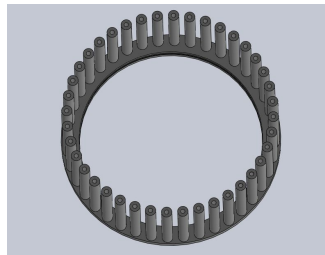


Requirements

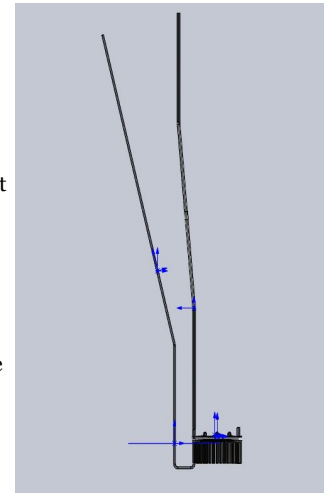
- Implement removal system for irradiated samples from the OSTR Rotating Rack without shutting the reactor down.
- Modify spare Rotating Rack to accommodate new system.
- Implement piping and shielding for the new removal system.
- Maintain the ability to use manual removal system if needed.

Modifications

- The current irradiation facilities at OSU must be modified to allow for pneumatic sample removal from the rotating rack
- The [pneumatic transfer system](#) currently in place must redirect unused sample and air pathways to the rotating rack
- Samples will travel from the pneumatic transfer send and receive station into the rack and then from the rack to the deposit box after irradiation
- The spare lazy susan will be modified to accommodate [air vent pathways for each sample slot](#)
- A narrow tube will go underneath the Rotating rack to provide pressurized air to shoot samples
- Shot samples travel through the main pipe into the deposit box



[Lazy Susan Deposit Box](#)



[Piping Assembly](#)

Safety & Shielding

- Shielding is essential to the success of this design and any dealing with radioactive materials.
- To calculate the proper thickness and material to use, a simple attenuation calculation was done.
- Original and desired intensities were derived using data given to us by researchers that frequently use the OSU TRIGA Rotating Rack.
- Once calculations were done, the next step was to begin designing the shielding cave.
- Chose square aluminum box for sample deposit.
- Lead bricks from Radiation Center stacked around the box for shielding
- One side is left open so that blocks can be removed to access samples when they are safe to remove

Future Work

- Make physical modifications to spare rack
- Installation
- Enable 24/7 operations
 - Mo-99 production
 - Increased number of uses for facility
- Reduced costs
 - Labor
 - Sample encapsulation

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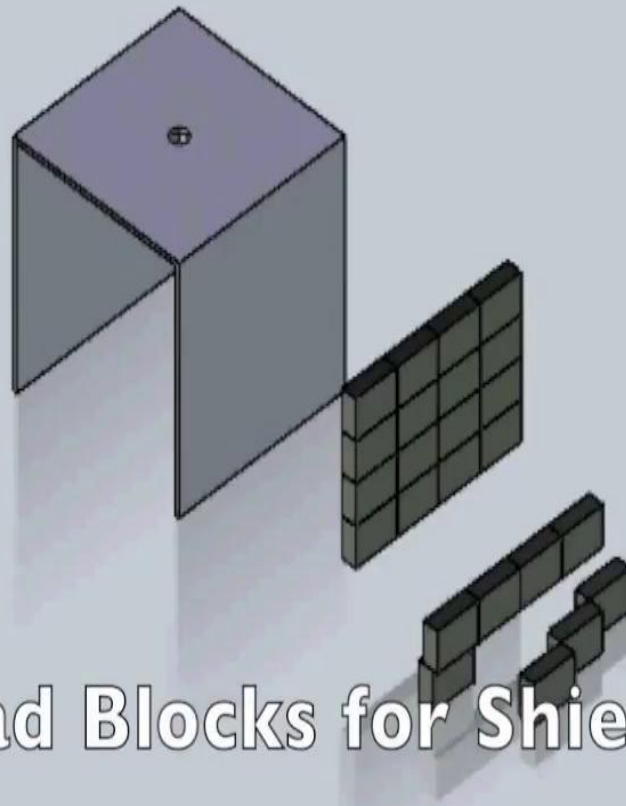


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Lead Blocks for Shielding

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Current Pneumatic Transfer System

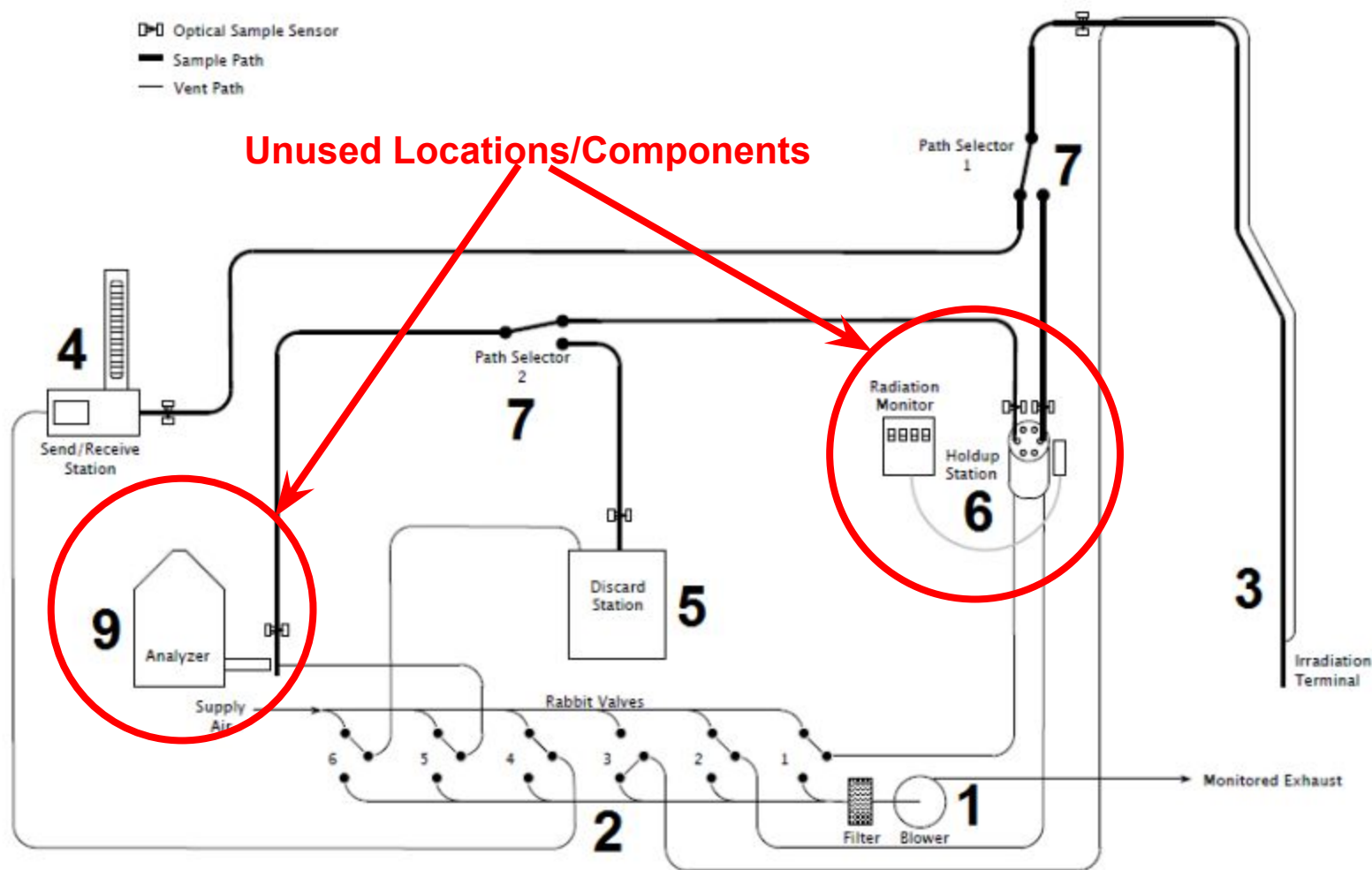
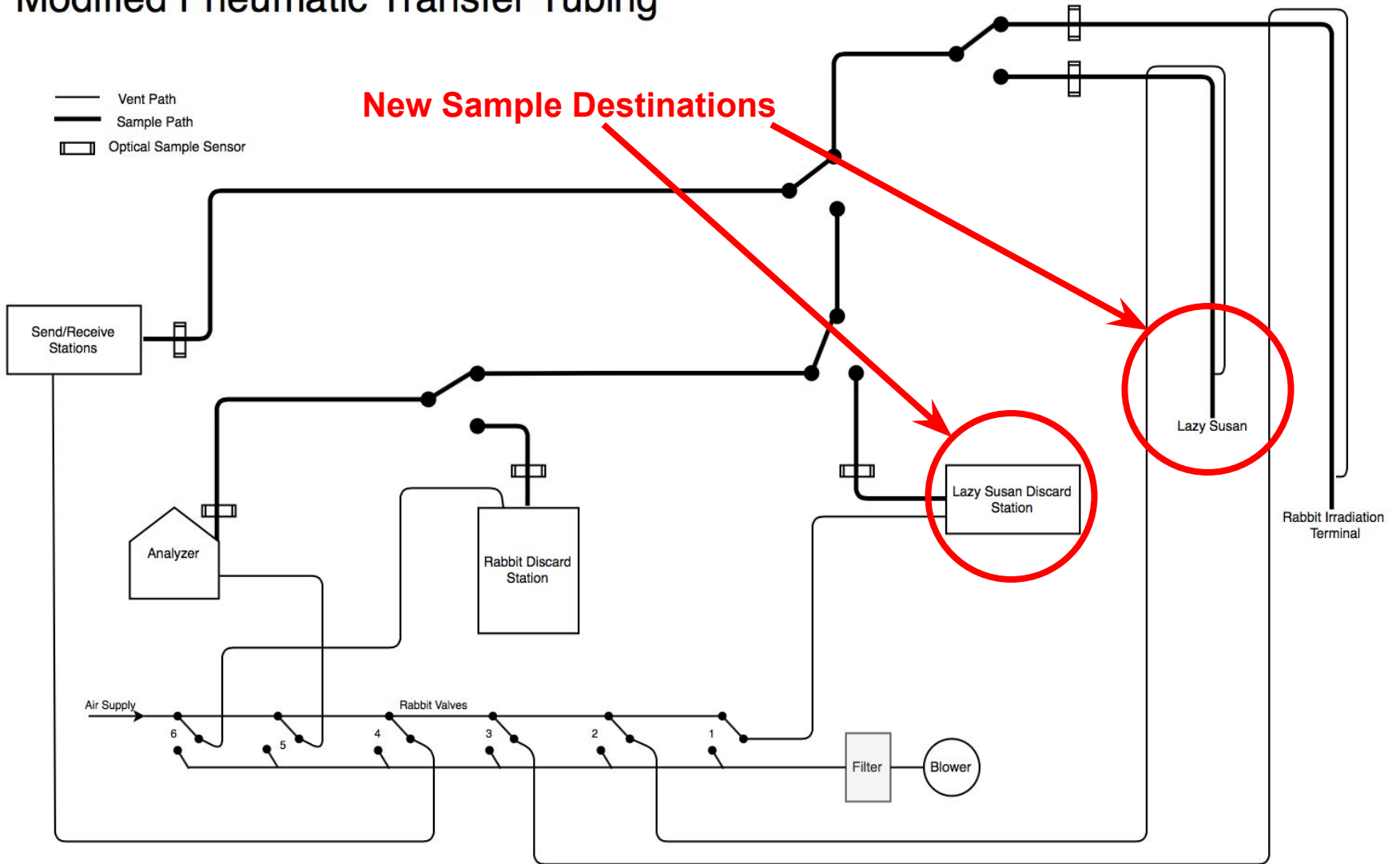
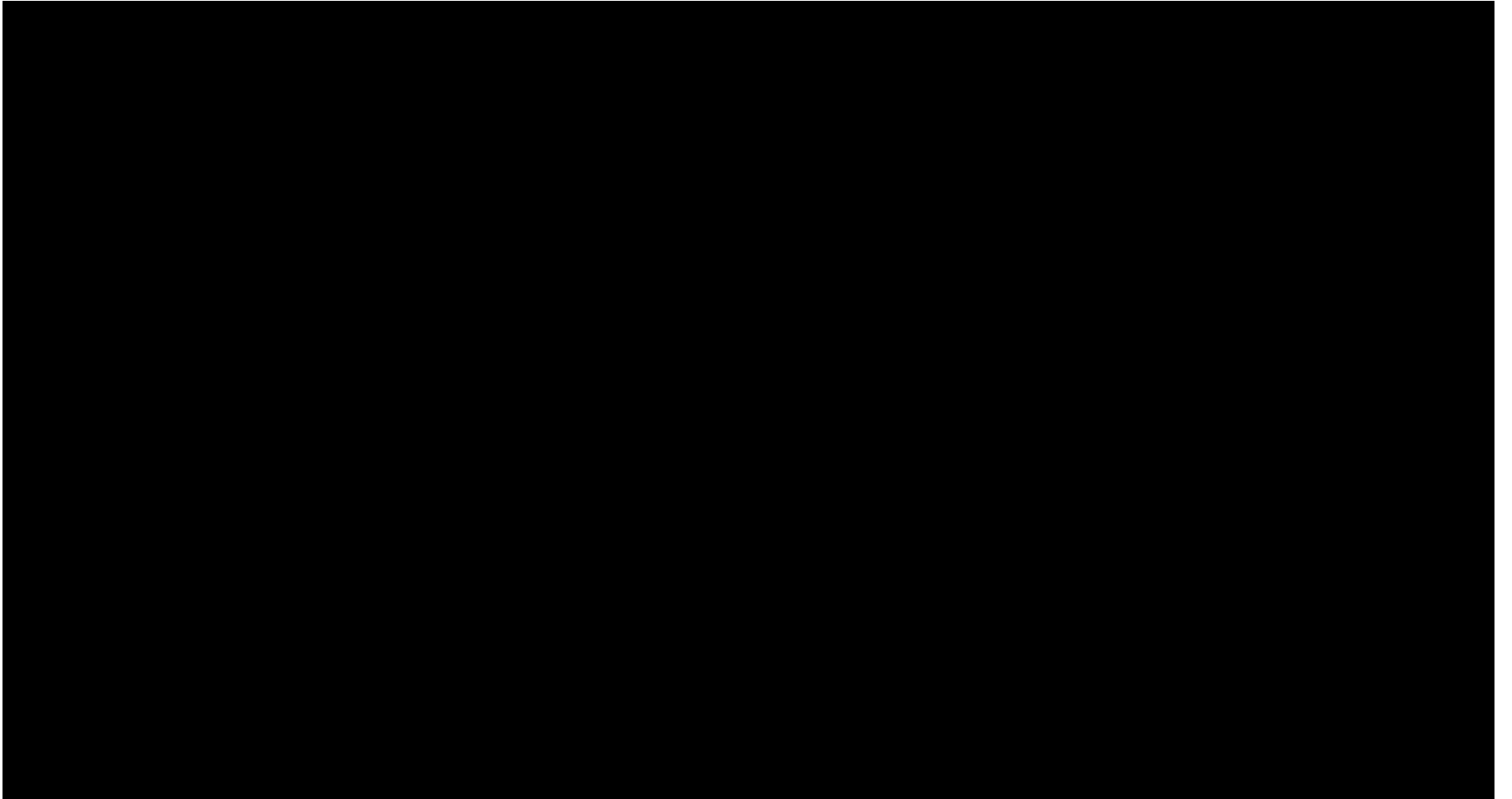


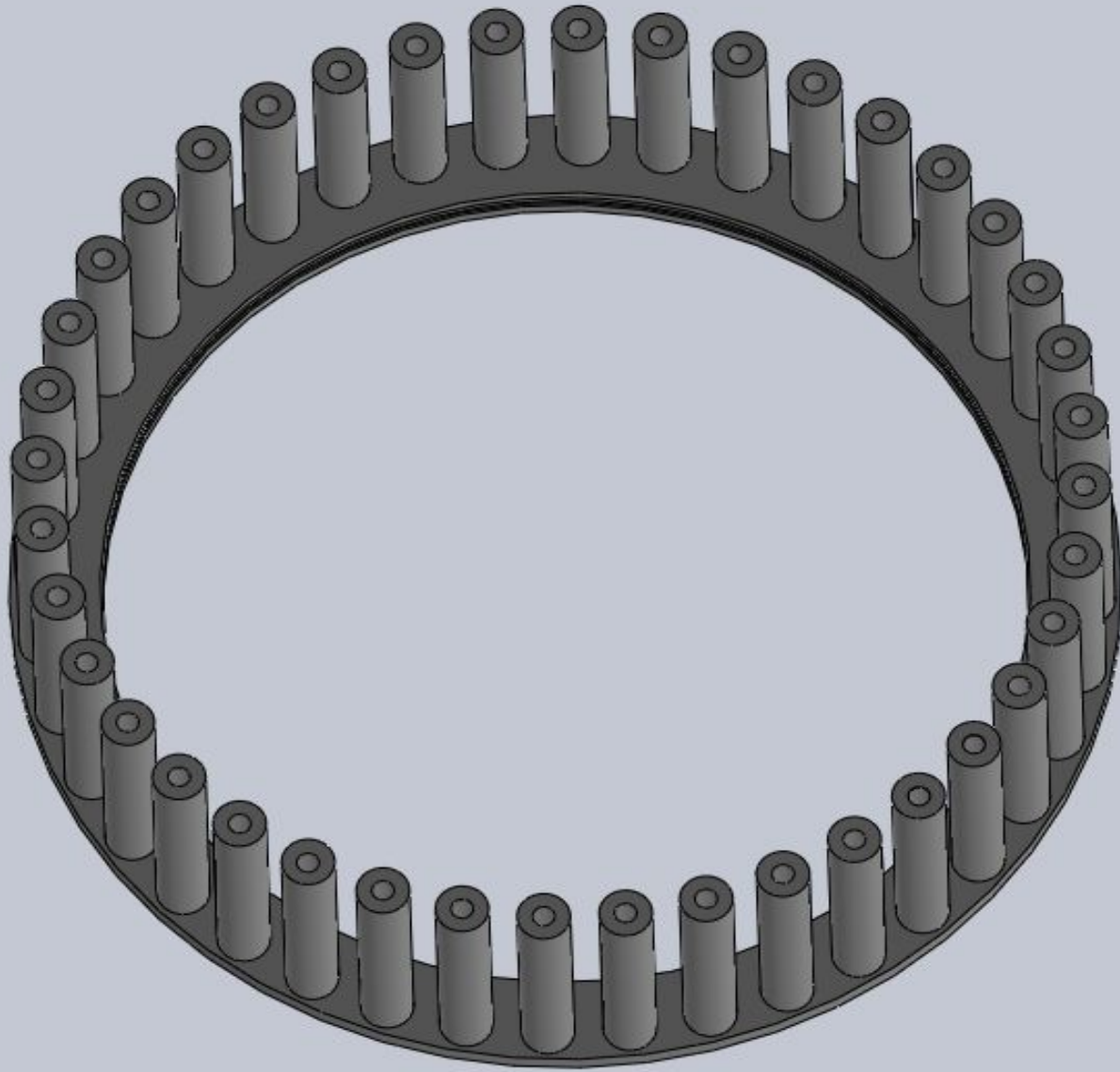
Figure 37 - Rabbit System Schematic

Modified Pneumatic Transfer Tubing





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