Cylinder

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Background

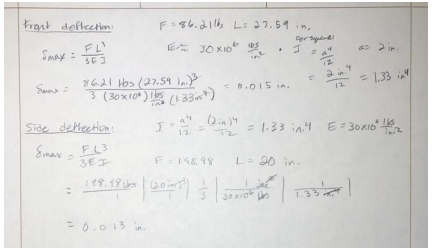
The dryer is a steel cylinder, approximately 36 inches in diameter and five feet in length. The cylinder also spins at a rate up to 10 rpm. The inside surface contains 48 “lifters”. These lifters have multiple variants and are made of mild steel. They are designed to move limestone through the cylinder while the cylinder spins.

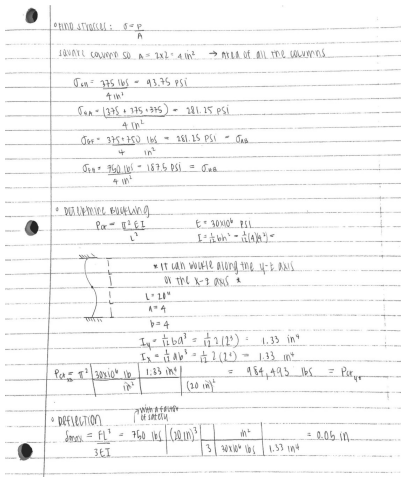
Goals

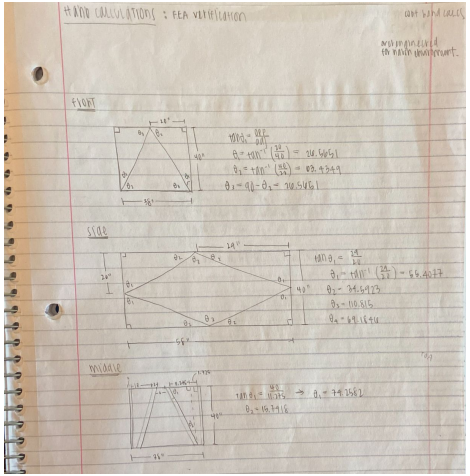
- Our team is tasked with building a lab scale rotary dryer for Lhoist North America.
- The purpose of this dryer is to give Lhoist the ability to test variables such as lifter types, lifter spacing, dryer inclination, and dryer speed.

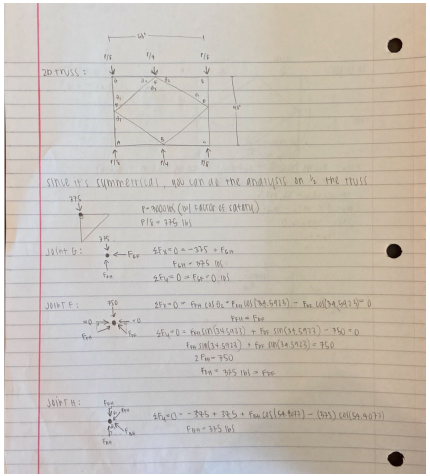
Supporting Structure

- Assumption: Cylinder + Limestone = 1,500 lbs
  - Factor of Safety is 2, therefore designed to withstand 3,000 lbs
- A multitude of hand calculations as well as FEAs were performed in order to verify the integrity of the base structure.



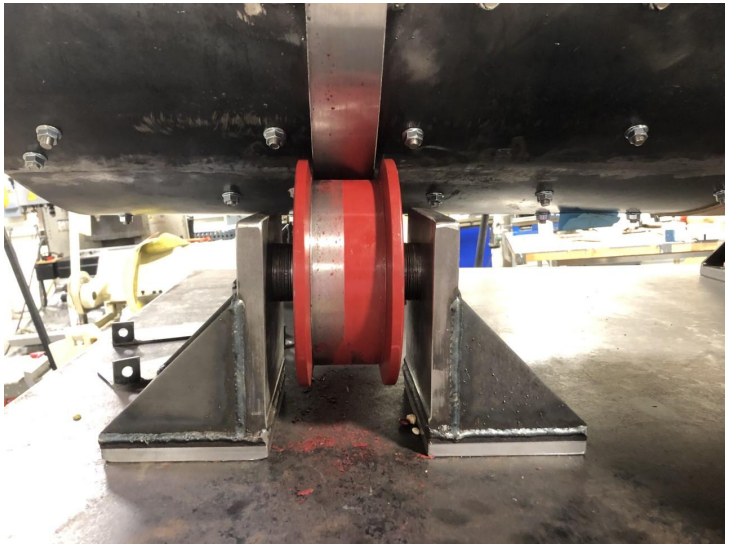


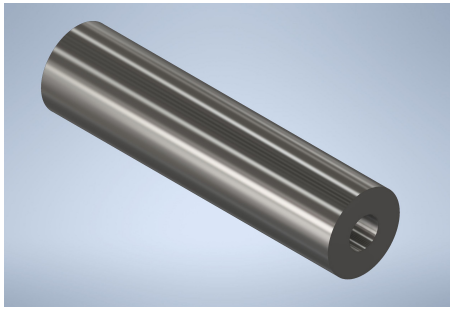




Roller Brackets

- The brackets holding the rollers in place had to be redesigned
  - Needed more flexibility in placement
- Designed with slots to allow movement in four directions





RPM & VFD

- The system is designed to move at a maximum of 10 RPM
- Our VFD is connected to the motor with a variable knob that can control the rotational speed of the cylinder