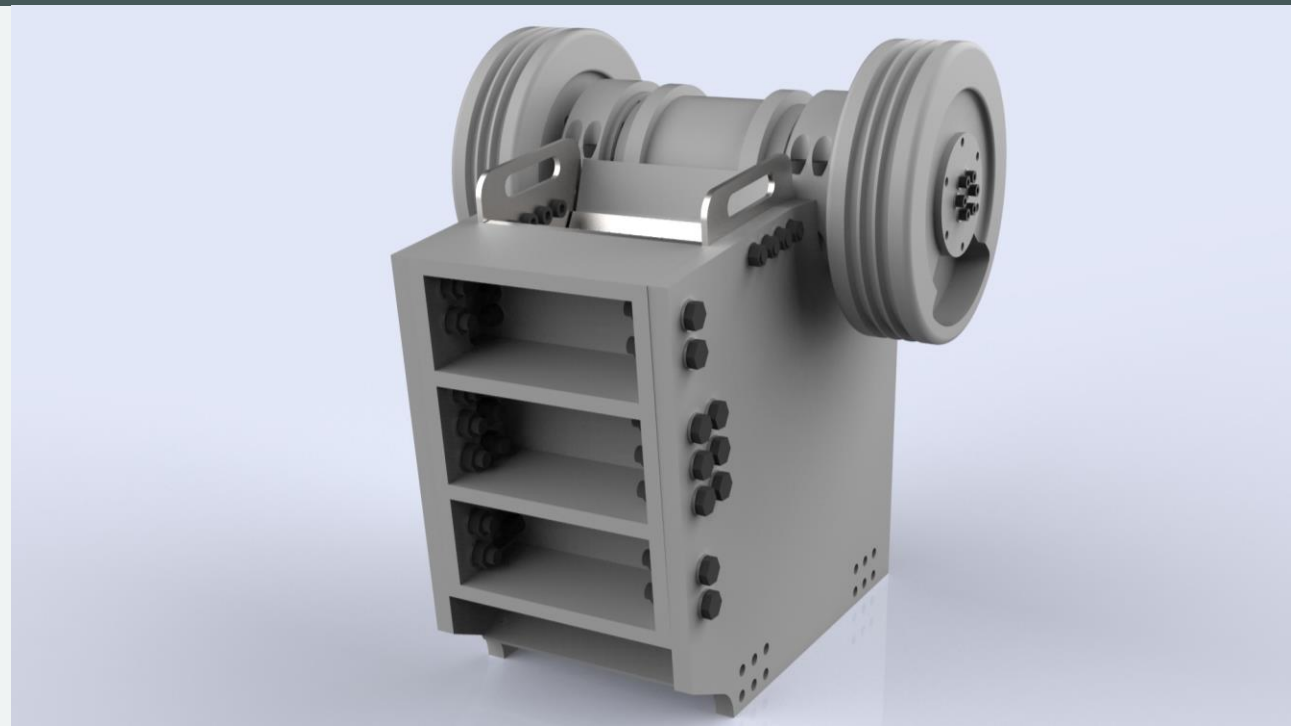
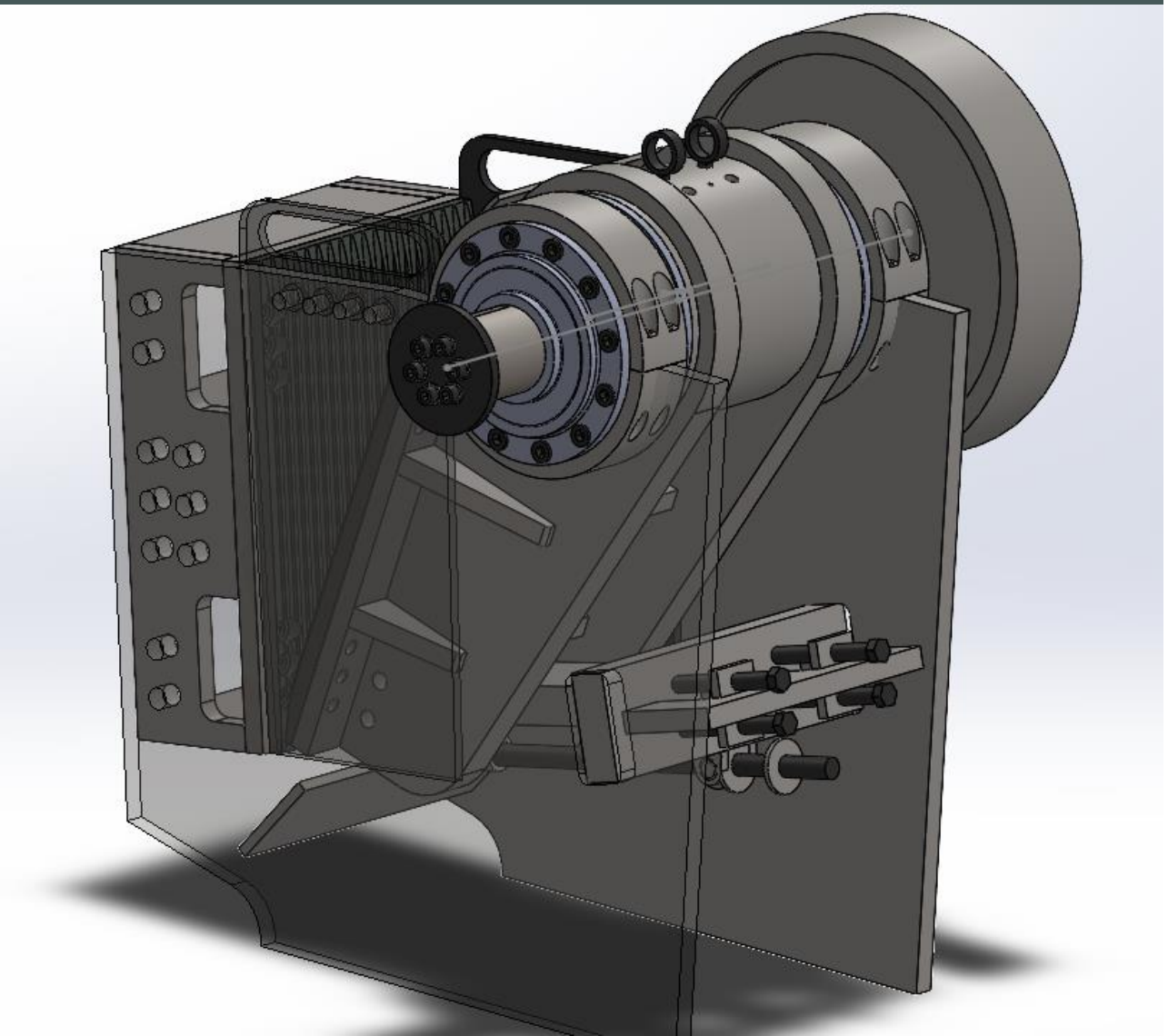
PRIMARY ROCK CRUSHER DESIGN

Alexander Buckeridge



Project Overview



1.0 **Design Ideation**

1.1 **Problem Definition**

1.2 Engineering Simulation

3.0 **Manufacturing**

4.0 Testing

Initial Concept and Design

Problem:

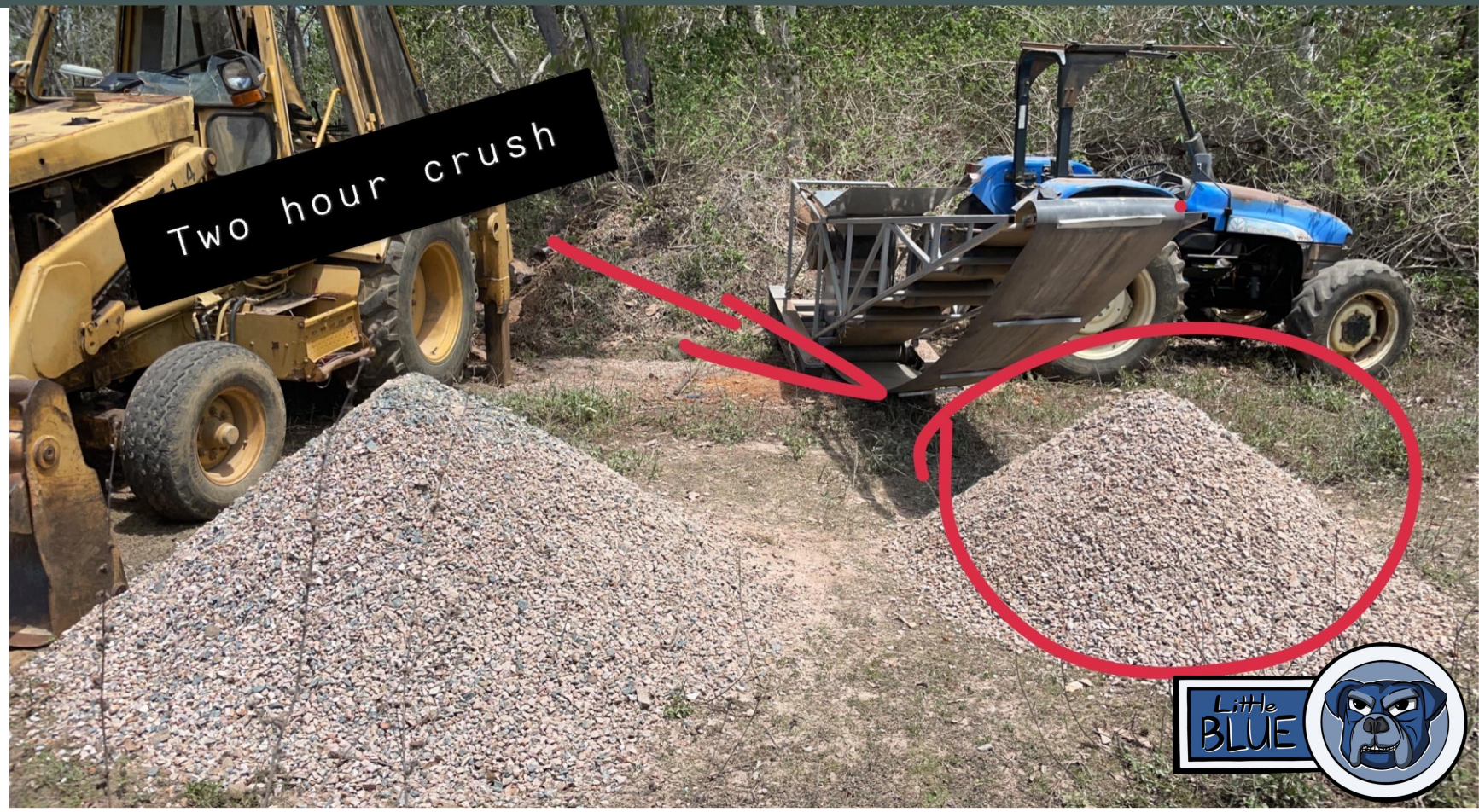
- The client lives in a rural area with no sealed roads and each year the wet season washes away and leaves a clay-based roadbase which is difficult to drive on in the wet and hard to maintain
- Road base would solve this problem however, it is expensive to transport to the area.

Solution:

- Develop Rock Crusher to process ‘Blue Metal’ deposits that are already on site to make roadbase for
- This crusher would be inexpensive and run off of a tractor PTO.

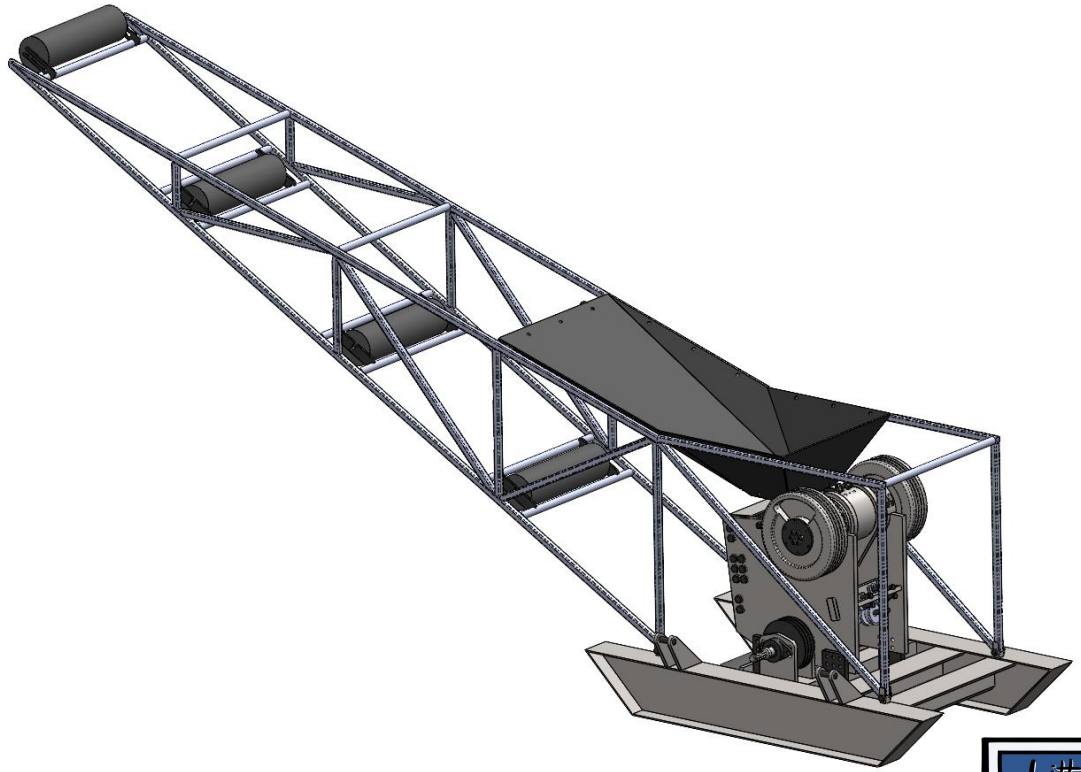
Crusher Concept

- Powered by tractor PTO
- Fed Rocks through the top
- The Crusher Breaks down the material Into Roadbase



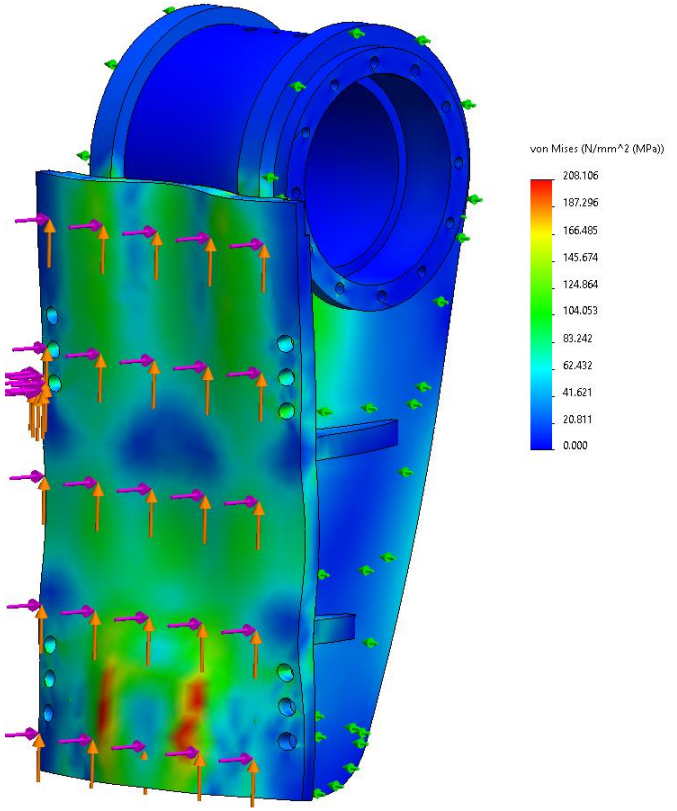
Working Principle

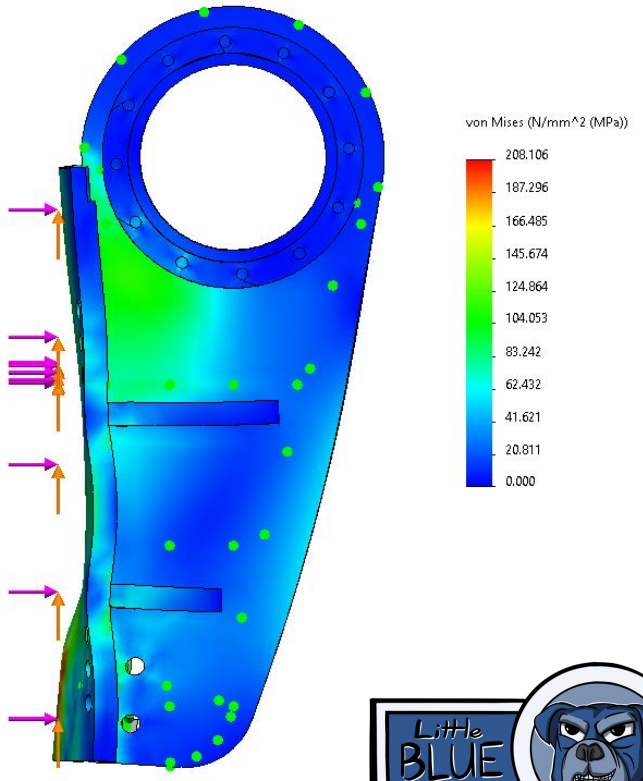
Crushing Rocks to form roadbase



Stress Analysis and Design

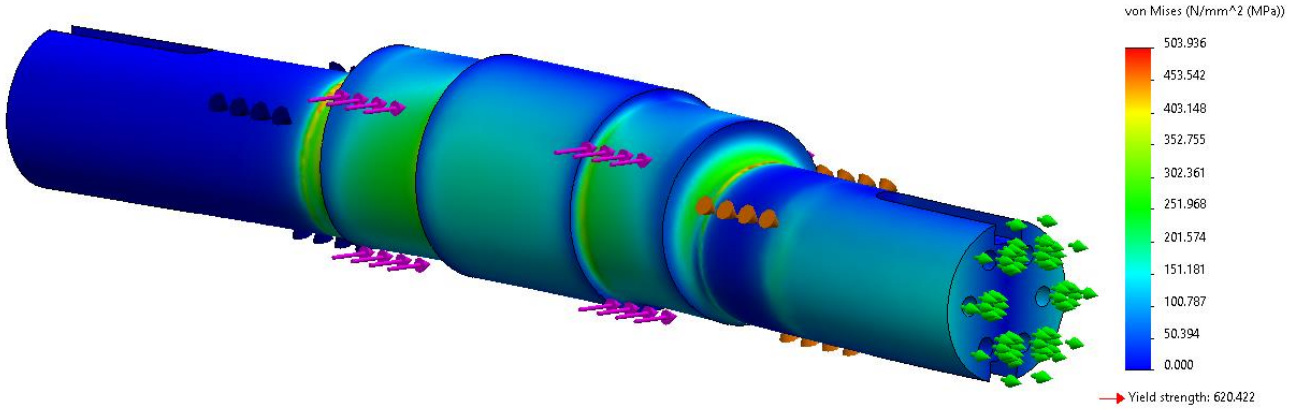
- The rocks were taken from the site and the compressive strength of these rocks were tested, which then informed the loadcases for the design.
- The geometry was designed to have a stress less than the fatigue limit of the material





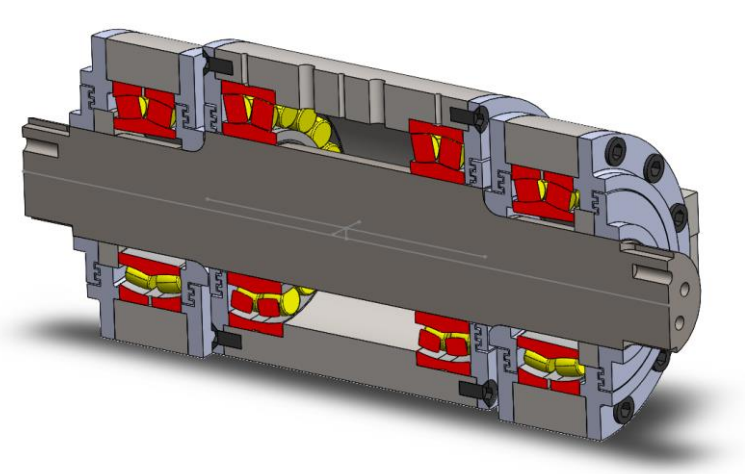
Shaft Design

Shaft Design

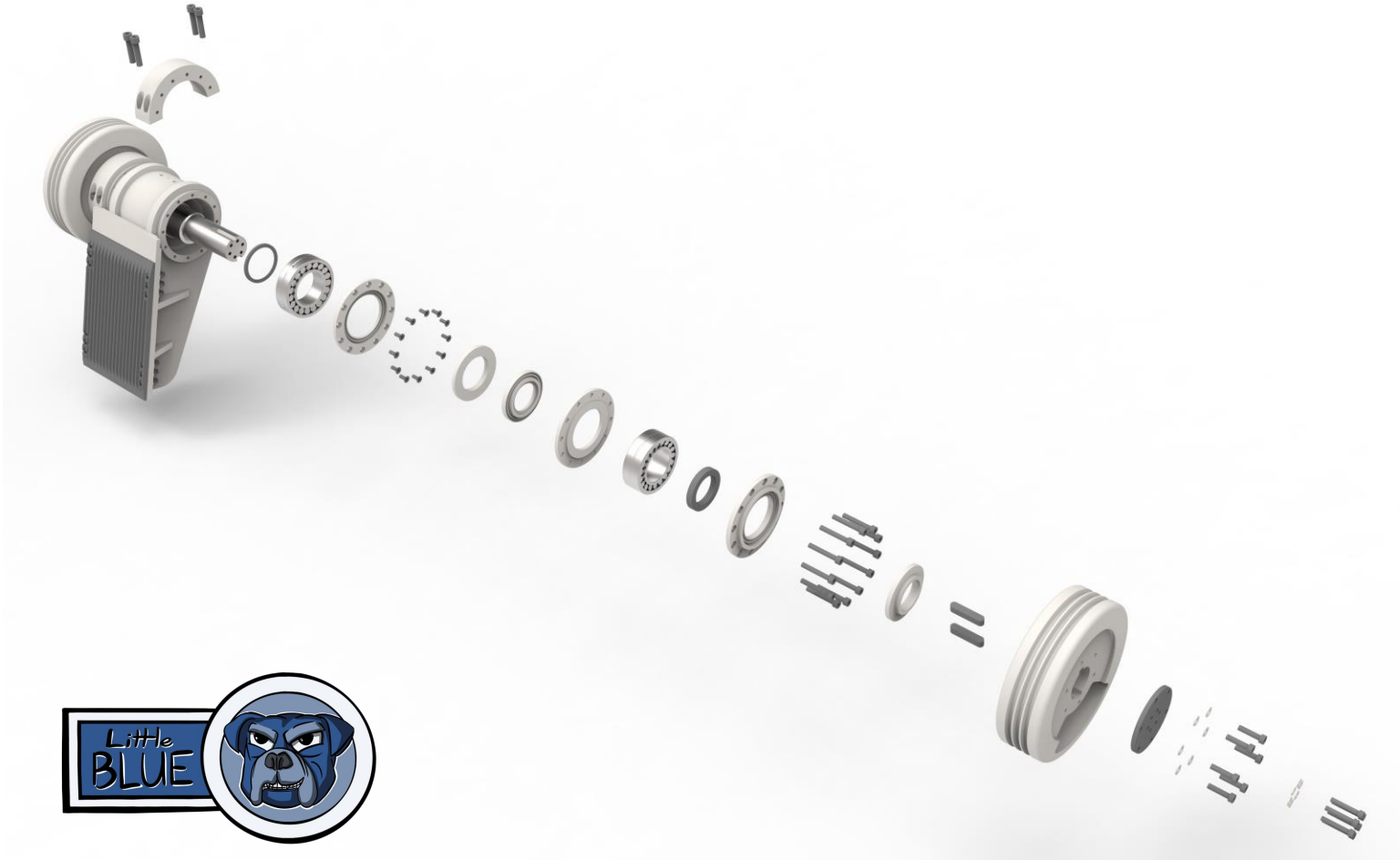


Wear Plates

Labyrinth Sealing Method

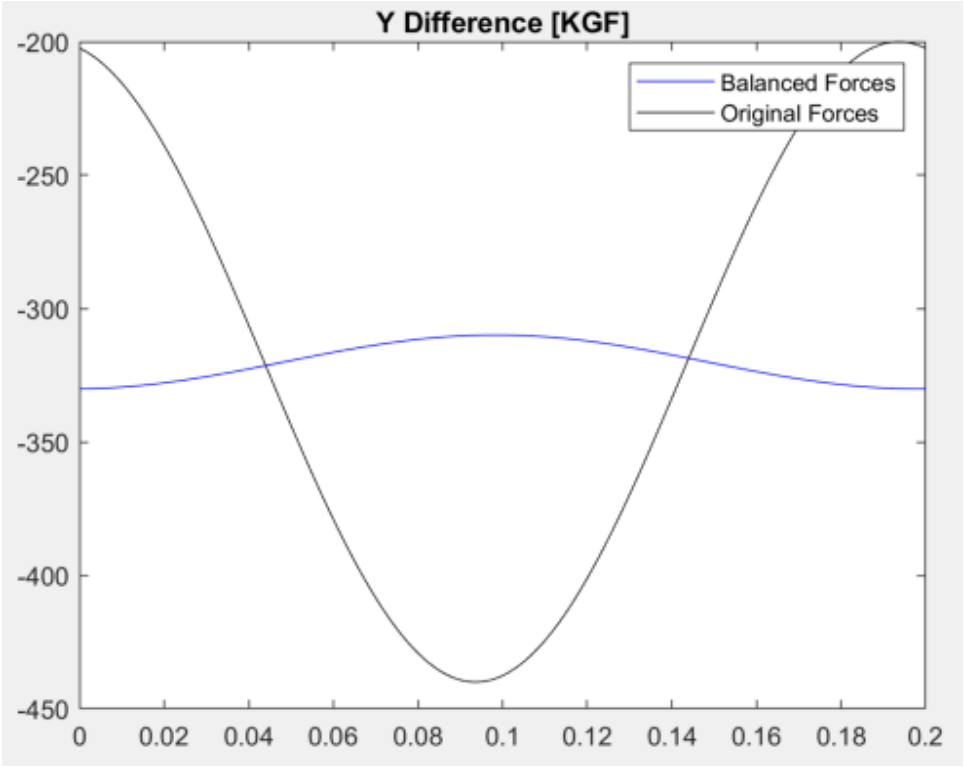


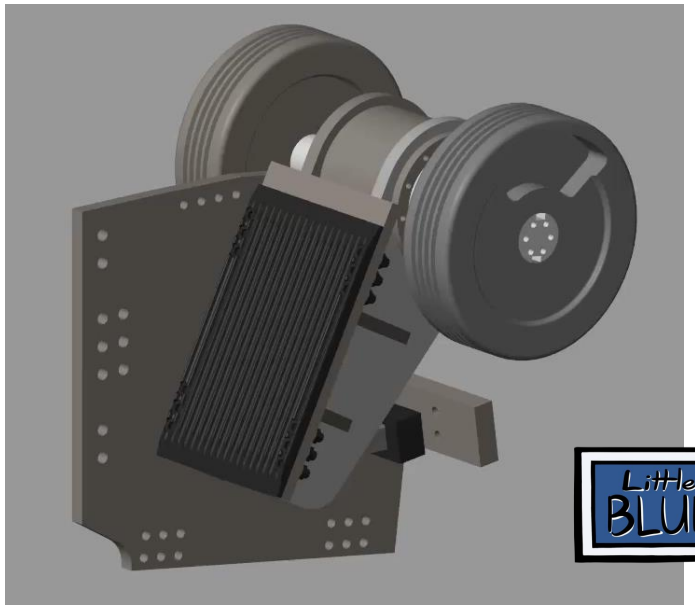
- The labyrinth Sealing Method was used to intrusion seal the shafts
- Grease is fed into the internal space using grease nipples to ‘bleed’ the system



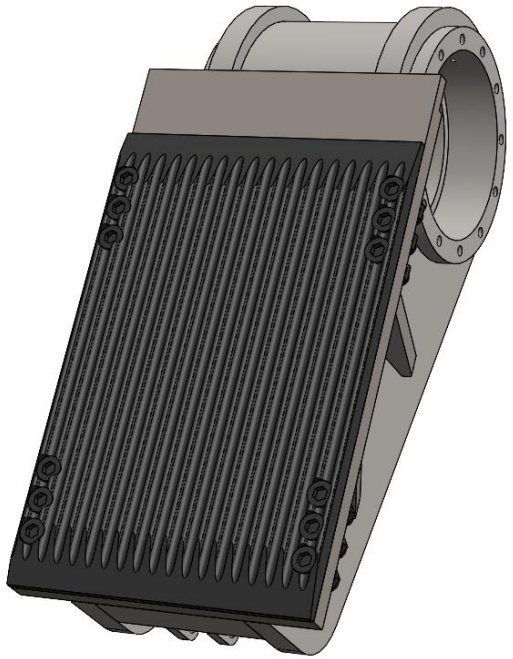
Counterweight Analysis

- Dynamic Analysis was done on the system to minimize the unbalanced forces from the shaft onto the bearings
- This was a problem as we did not want to put unnecessary loading on the bearings
- The weight on the flywheel was changed to optimize the net cyclic loading on the shaft.





Manufacturing And Testing



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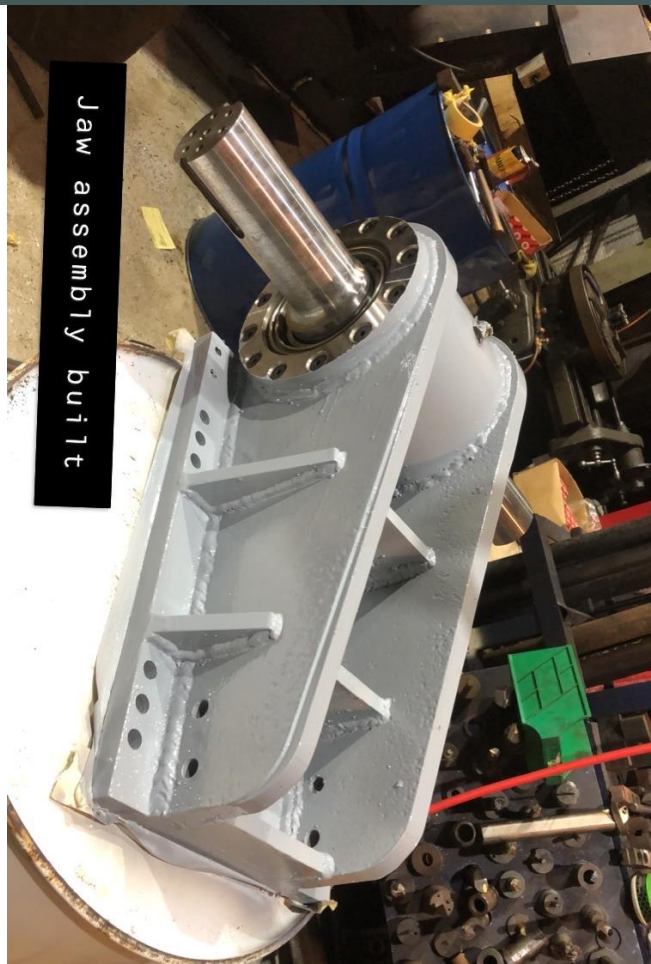
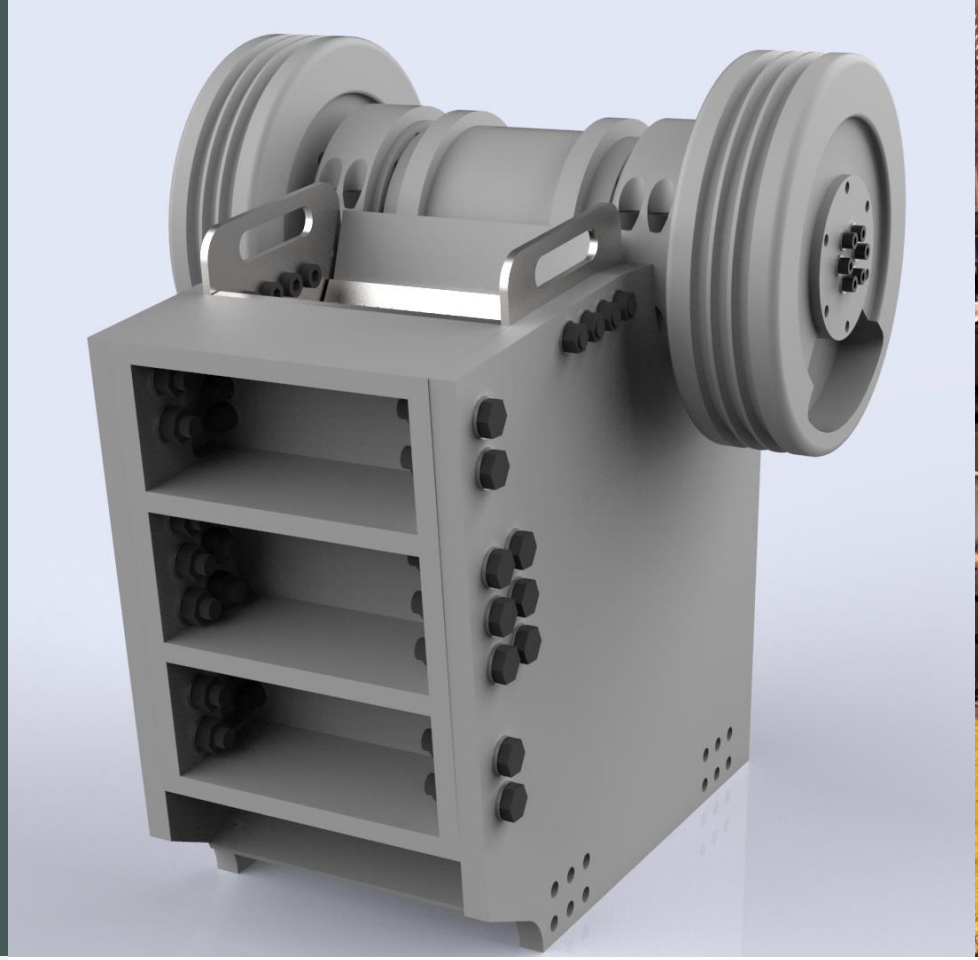


CAD Vs. Reality



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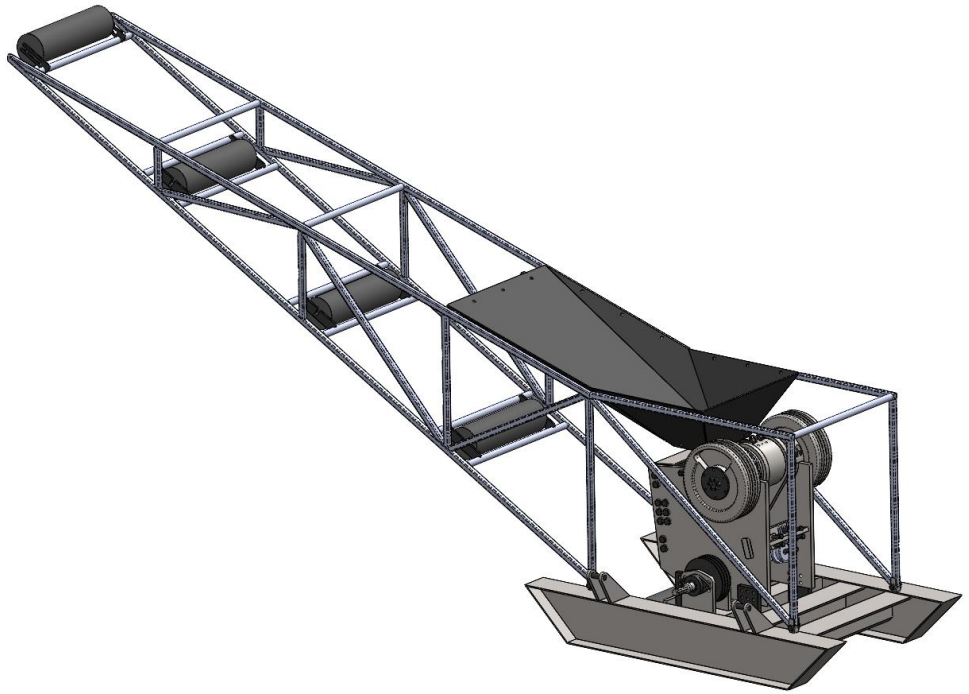

Prototype Testing


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