Group M1.03 – Lighthouse Project

Holly Magee, Caleb Johnson, Obinna Maduagwuna
Sharotry Abhimanyu

Project Description

-Current Goals-

Locate, isolate, and reduce the sound and vibration levels within the system.

-Future Goals-

Further sound dampening capabilities and create a digital twin to track different parameters within the system to predict things like part failures and efficiency.

Background

The West Texas Lighthouse for the Blind is a manufacturing facility in San Angelo, Texas which employs people who are blind or have severely impaired vision. The Lighthouse was established in 1963 as a non-profit organization and now has over 60 team members.

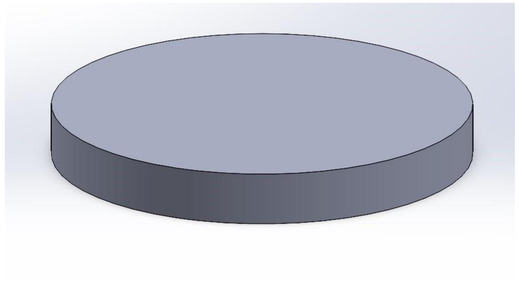
Revision & Re-Design

Mark1 of the sound dampening pad we constructed was too large for the base of the press. We based the part on an online model rendered from a digital scan of the workstation instead of the actual press. We redesigned this part to fit the press with real measurements from the press.

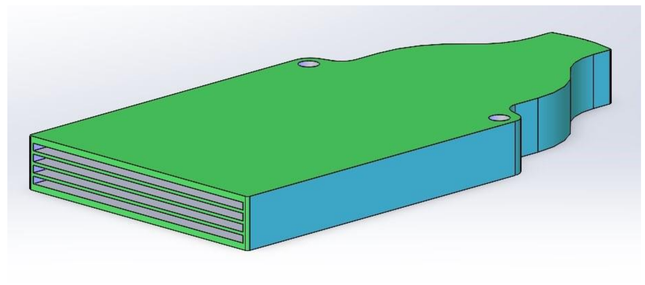
We discovered that the 3D printed buffers had minimal affect on reducing sound. We decided these buffers were too hard. The problem was they only helped transfer the sound because they had no elasticity. So, we shifted gears and continued tests with a more rubber-based buffer with more elasticity.

While running buffer tests we discovered that the top of the press was creating more noise than we had originally thought. Without the press contacting the actual punch, the press creates around 100dB of noise by itself.

Digital Models of Prototypes



Sound dampening buffer SW model



Sound dampening pedestal SW model that is placed at the base of the machine

Prototypes

Mark1 - 3D printed sound dampening buffers, each a different thickness to test its effectiveness

Mark1 - 3D printed sound dampening pedestal model

Results

Control Trial	Noise Level (dB)
1	115.0
2	117.0
3	119.0
Range	118.0 - 120.0

Buffer	Trial 1 (dB)	Trial 2 (dB)	Trial 3 (dB)
1/16 in	-	No change	-
1/8 in	113.0	115.0	117.0
3/16 in	111.0	113.0	-
Rubber	110.0	111.0	109.0

Future Steps

- Construct a sound dampening box around the top section of the press
- Model and design the digital twin based off the pneumatic press's given data
- Collect data from digital twin to create a paradigm shift within the system from a traditional "learn and control" to "learn and adapt."

Process

The press produces around 120 dB. Sounds above 85 dB is generally considered harmful sound levels. this is the main problem our team will address. After inspection we located three main points that are causing the most noise. After, brainstorming ideas, first we constructed a sound dampening pad for the base of the press. Next, we created small buffers for the interior of the punching machine. lastly, we will be creating a sound dampening box for the head of the press.
With the sound dampening pad and the buffers, we have reduced the sound by about 10 dB.

Meet the team