

Glitch Works LLC is a chip manufacturing company located in Buena Vista, VA. Glitch Works LLC is a growing business and recently moved into a larger facility as part of their company expansion. The current HVAC system in the chip manufacturing room has been expensive to run and does not meet the heating and cooling needs of the space, resulting in uncomfortable working conditions. The purpose of our project was to design an HVAC system which provides adequate heating and cooling for the chip manufacturing room at Glitch Works LLC. As part of our project deliverables, the client requested that the heat and air unit be a rooftop unit. Additionally, the client requested as part of our design we recommend a replacement garage door and room isolation which will make the room more thermally efficient.

Table 3: Ducting Diameters Based on Ducting System Design and Unit

| Duct | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |
|---------------|-------|-------|-------|------|-------|-------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| v (ft/s) | 31.18 | 57.30 | 38.20 | 6.24 | 19.10 | 38.20 | 6.24 | 42.44 | 33.95 | 19.10 | 33.95 | 33.95 | 33.95 | 33.95 | 33.95 | 33.95 | 33.95 | 33.95 | 33.95 | 33.95 | 33.95 | 33.95 | 33.95 | 33.95 | 33.95 | 33.95 |
| I (ft) | 5.00 | 5.00 | 5.00 | 5.00 | 10.00 | 0.58 | 0.58 | 0.58 | 0.58 | 0.58 | 0.58 | 0.58 | 0.58 | 0.58 | 0.58 | 0.58 | 0.58 | 0.58 | 0.58 | 0.58 | 0.58 | 0.58 | 0.58 | 0.58 | 0.58 | 0.58 |
| Diameter (ft) | 1.17 | 1.00 | 0.50 | 0.67 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |

Once the ducting has been designed, a static structural analysis can be conducted. This is done by using the weight of the ducts, weight of the roof, and weight of the unit to evaluate the steel I-beams holding everything up. This is done because it is important to make sure the steel I-beams can support the load so the roof will not cave in.

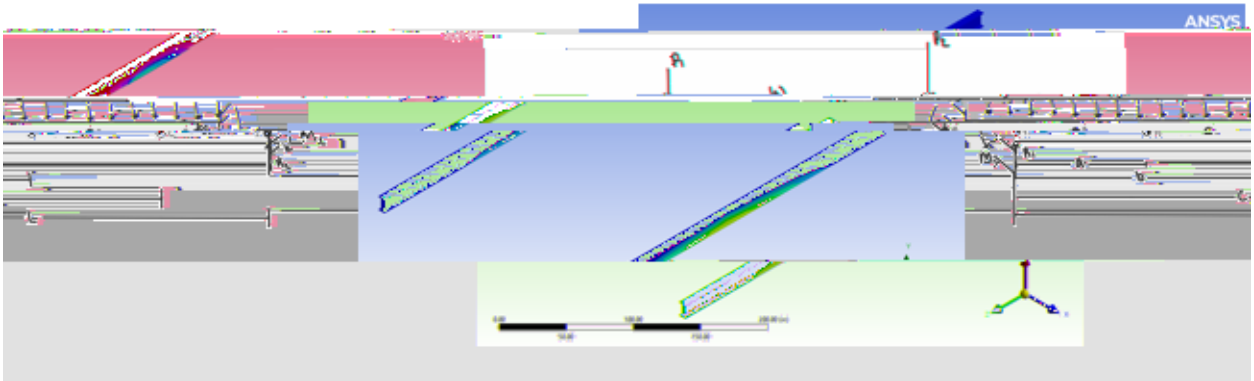


Figure 1: Static Structural Analysis

Finally, we conducted a cost analysis of our design. This involves the cost of all components like insulation, units, ducting, and electricity or gas prices. This also involves finding the annual energy consumption of the unit to determine the yearly cost of the electricity or gas. The cost analysis is important because it can tell us if the design is cost efficient and worth installation.

