

ABSTRACT

This project is to design a saw door for the CNH Industrial's New Holland Agricultural Plant, which is seeking a solution to reduce the amount of energy consumption due to their saw door openings. The current door at the plant is an inadequate insulator against the cold air that enters the building. Our project is going to improve the working conditions for the saw operator by reducing the wind and snow that enters through the opening, the design will also reduce the amount of CO₂ emissions via reducing the use of the heating system in the winter months. Several design options were presented, and as the designs became narrowed down, thorough investigations were performed to determine the best possible solution. An economic analysis is completed for each of the prospective design options, as well as detailed calculations to determine if the designs would withstand the forces of the system. The final design is chosen with the recommendation of CNH Industrial based on the benefits it may provide, the ease of use, and the reduction of maintenance required.

METHODOLOGY

- Payback period of 3 years → Max. Budget of \$3,453
- Data recording completed by CNH Industrial
- No energy savings available for the space occupied by average size of HSS

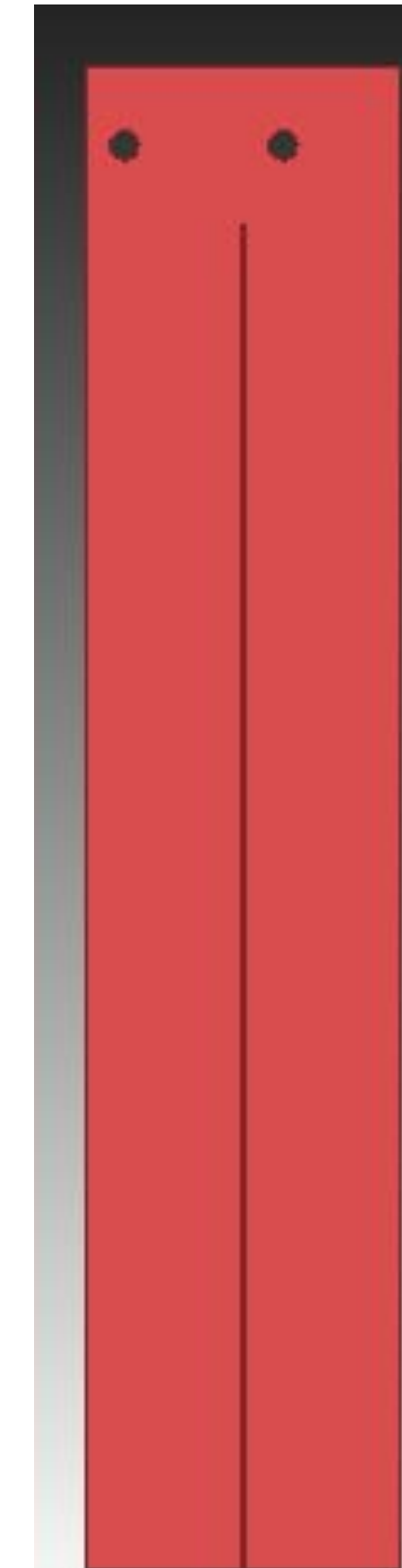
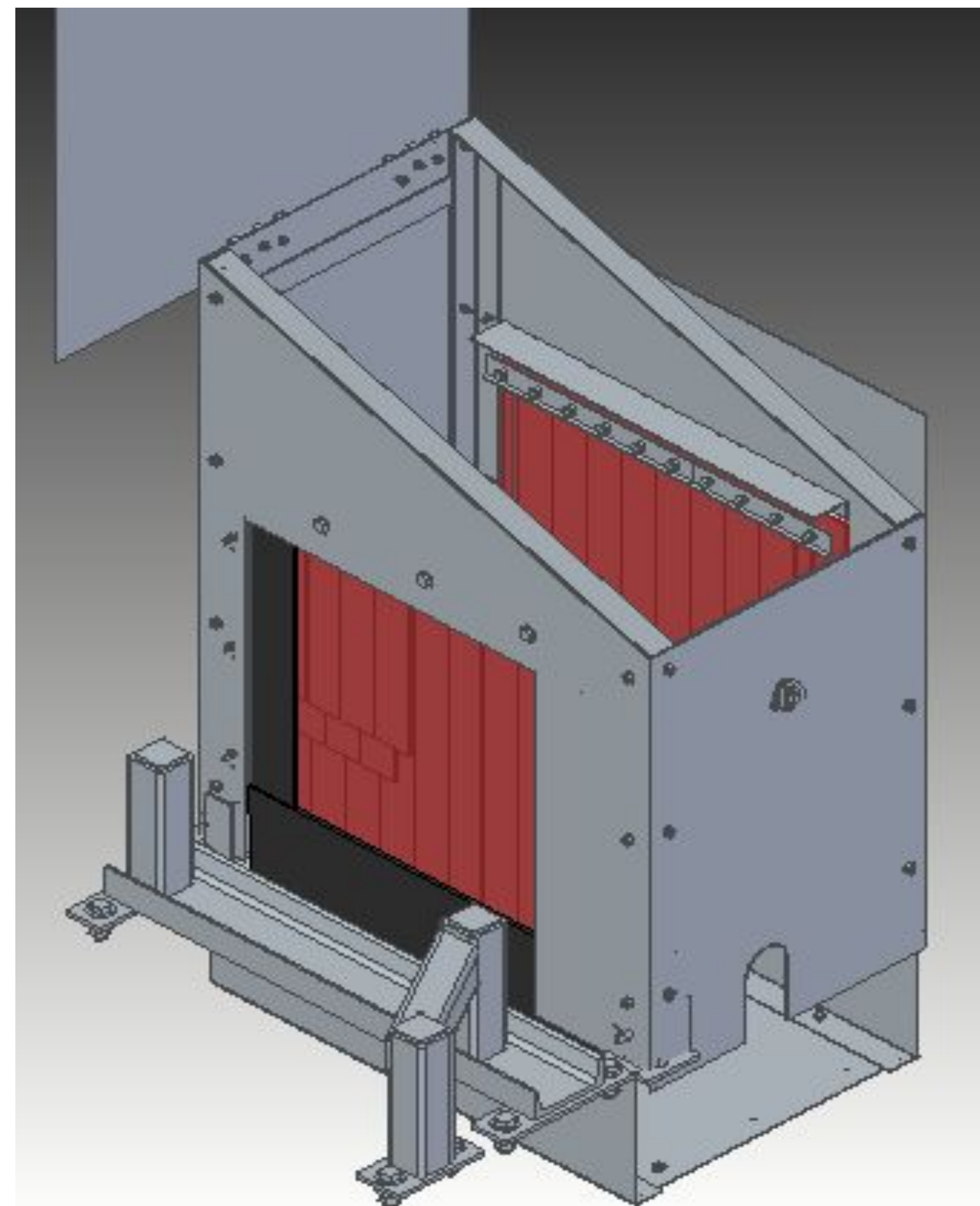
The methodology steps followed:

- Market research,
- Brainstorm concepts,
- Material research,
- SolidEdge modelling,
- Heat / Energy loss calculations, and
- Force / Impact calculations.

OBJECTIVES

The goals of the new saw door system were to:

- Create a more insulated door solution,
- Minimize the costs of of the door solution,
- Have it able to withstand its industrial environment,
- Require little or no operator adjustment,
- Make maintenance on and around the door easy,
- Increase the safety and quality of work life for the saw operator, and
- Reduce the CO₂ emissions via reduced heating.



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RESULTS

The vestibule and rubber curtain design was found have savings of \$1,037 per year (84% of the original incurred natural gas cost). The cost of the new door system will be \$3,869.

The guardrail system was designed to withstand the force of 42,250 N. This is quadruple the weight of the largest material specified for this saw table to account for a safety factor of two.

CONCLUSION

The vestibule and guard rail were designed to:

- Reduce heat loss by 84%,
- Ensure the implemented designs will withstand impact and weather,
- Improve safety and quality of work life for saw operator, and
- Ensure the saw operator can maintain the design themselves.

This pilot project is the first iteration for CNH Industrial to improve the quality of work life for their saw operators while also reducing the amount of overall energy consumption throughout the winter months. It started out to reduce energy consumption exclusively but shifted as this design option provided many intangible benefits to the saw operator.

To be manufactured and installed by CNH Industrial by November 30, 2021.