

Brine Truck Design Engineering

Case Study: Hi-Vac Corporation



SUMMARY

Industry

- Environmental Sustainability

Customer Location

- Marietta, OH

Business Situation

- Hi-Vac required design engineering services to develop a new line of service trucks complete with manufacturing documentation for a 100 and 110 barrel capacity tank

Technical Situation

- Hi-Vac wanted to introduce a custom engineered truck designed around industry standards and regulations, supported by structural engineering analysis

Solution

- NLS designed and engineered both the 100 and 110-barrel capacity trucks with manufacturing documents, for use by Hi-Vac to fabricate and manufacture the vehicles in house

Benefits

- NLS provided a complete design with documentation for manufacture, supported by in depth engineering analysis
- Trucks designed to meet regulations set forth by the ASME Boiler & Pressure Vessel Code
- Design simplicity allowed for ease of manufacture with reduced costs

Services

- Design and structural engineering services
- Manufacturing services
- Simulation based design optimization

Company Overview

The Hi-Vac Corporation was founded in 1969 and based in Chicago for 20 years. Originally, the company was formed to supply industrial vacuums for general housekeeping to the foundry industry. One of the first products developed was an industrial vacuum cleaner which was called the “Hi-Vac”. Their industrial vacuums were soon being put into service in cement plants, steel mills, ship yards, chemical plants, and other bulk solid handling and processing facilities. Over the next several decades, the Hi-Vac business expanded into the European, Asian, and Latin American markets, producing and distributing the Hi-Vac, UltraVac, RenVac, and X-Vac lines of industrial vacuum, excavation, and environmental cleanup equipment solutions.

For over 40 years Hi-Vac has provided products and systems that tackle some of the toughest infrastructure, maintenance, and clean up challenges in the world. Their products are at work behind the scenes maintaining infrastructure, improving air quality, non-destructively excavating, recycling, cleaning and maintaining the environment.

Situation

Hi-Vac approached Northern Lights Solutions to design and engineer a new line of equipment service trucks to handle the high pressure and vacuum loads experienced in similar environmental cleanup and maintenance operations. Hi-Vac supplied a stock vehicle chassis for which the truck’s tank and pumping system needed to mount to. Furthermore, Hi-Vac required that the truck be designed to meet the engineering standards set forth by the ASME Boiler & Pressure Vessel Code. Lastly, Hi-Vac requested that a complete manufacturing drawings package be submitted with the design from which Hi-Vac could manufacture the trucks in house.

Design Engineering

Our knowledgeable and talented engineers set forth in designing the truck to meet regulations and withstand the structural stresses that it would experience during service. The two varying vessel capacities were designed such that the ability to reuse fabricated components and systems made managing the builds as simple as possible, while keeping low overhead on stocked materials, and minimizing material waste and scrap.

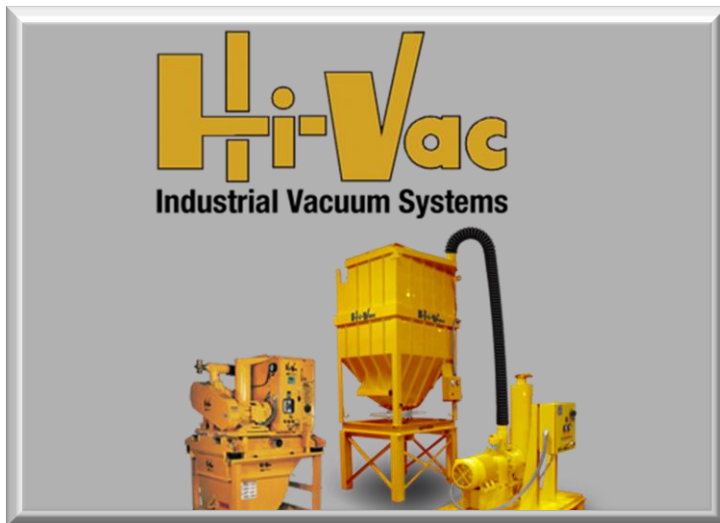
The modular design setup of the vessels ensured that should Hi-Vac require vessels in other capacities, the engineering time, as well as the manufacturing time, would be minimalized.

Structural Analysis

In order to validate the design engineering, a structural analysis was performed to test the pressure vessel. Additionally, in order for the vessel to be registered, the pressure vessel needed to be in compliance with ASME code calculations to ensure that the vessel is safe. Advanced pressure vessel simulation software was used to ensure this was the case. Performing the structural analysis in combination with the design engineering phase of the project allowed all parties involved to avoid the extra time and materials costs associated with engineering rework and redesign.

Results

Through expert engineering and design and FEA analysis validation, Hi-Vac had a new product line ready to be manufactured and introduced into their markets in a timely manner, while being able to use a comprehensive drawings package to manufacture the entire vessel in house, keeping costs low and improving production quality.



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The NLS logo consists of the letters "NLS" in white, bold, sans-serif font, set against a blue rectangular background.