



Case Study # 22

Liquid Hydrogen Storage for Aerospace



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Highlights:

- Largest shop-built liquid hydrogen tank (LH₂)
- Part of the ground propellant storage system for reusable rockets
- Able to complete multiple tanks within 12 month window

Location—Major USA Launch site

Scope of Project:

- Design maximum capacity cryogenic ground storage vessels, fully piped and plumbed

Application:

Today's new rockets are designed for multiple launches for cost effectiveness. The propellants have also changed to provide lower cost, utilizing cryogenic liquids in many cases. New engines being developed utilize combinations of LNG, Oxygen and notably Hydrogen in greater volumes for deeper space penetration. The LH₂ volumes demanding Chart's tanks provide 2nd stage fuel with LOX and are stored near the launch complex for full transfer prior to lift off.

Project Background:

An Aerospace Company consulted with Chart for LH₂ special large tankage due to Chart's 45 years of design experience. It was important to build the hydrogen tanks to a demanding schedule and do so in the USA for integration into the launch complex.

Design Parameters:

Progression on the design yielded necessity to marry design pressure, storage capacity, and total weight of the unit to create a shippable unit. In addition, large cryogenic lines were needed to support the high flows needed to transfer to the 2nd stage of the rocket. In addition, Chart undertook the design of special pressure building units for the LH₂ system to eliminate the need for pump transfer of hydrogen.

Major Accomplishments:

Part of the total package was integration of the system components to arrive at the site on time, via the best cost option. Special handling via Goldhofer trailers to a barge yard facilitated loading and shipment from there to the Minnesota River, and then the Mississippi River. Finally the units were loaded back on Goldhofer trailers for transport to the launch site.

