



CLEAN SHIPPING INDEX

How terminals can help lines' environmental performance

Page 49

MODAL SHIFT

Cash incentives to switch container freight from road to rail

Page 20

PORTS AT THE COAL FACE

Continuing Chinese demand fuels Australian coal port development

Page 39, 93

Optimizing financial performance of aboveground storage tanks

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In today's economy, tank operators are seeking means of improving the financial and operational performance of their tank assets. Terminal operators and their customers are concerned more than ever with increasing working capacity, reducing heel, extending service life and reducing emissions and evaporative product loss. This article takes a closer look at these key concerns and considers some potential strategies to improve performance, increase tank working capacity and reduce heel.

Tank working capacity is driven by the distance the floating roof can travel when the tank is cycled. This distance is, in turn, driven by the constraints at the top and bottom of the tank and the depth of the floating roof system. Increasing working capacity can result in operational efficiencies and drive increased revenue.

Heel reduction is a related, but separate issue. Heel refers to the inventory that is stranded at the bottom of the tank between the tank bottom and the floating roof when the roof is at its lowest operating position. For the owner of the stored product, this inventory acts, financially, just like a fixed asset, in essence tying up working capital indefinitely.

Reducing this heel has a direct positive impact on cash flow. For example, replacing a traditional steel pontoon IFR with a low profile, suspended IFR system can allow for up to an additional 2 feet in roof travel. On a 150 foot crude storage tank, this equates to over 6,200 barrels, or more than \$620,000 of immediate positive cash flow. Design details, such as the use of drain dry sumps or low profile nozzles, can aid in achieving these results.

The use of a mesa or plateau style bottom (a raised bottom which displaces a portion of the liquid) can also achieve significant heel reduction; however, this method does not result in the working capacity increases that can be achieved by lowering the IFR.

Many factors influence working capacity and heel:

- Depth of the floating roof and seal systems
- Floating roof support method and design details
- Equipment located under the floating roof (for example, mixers, diffusers, piping and hoses)
- Safety buffers above and below the floating roof
- Inlet type and position
- Bottom treatments such as drain dry sumps or mesa bottoms

Best practice #1 – Do the math

Begin with a thorough operational analysis to assess the current working capacity constraints and partner with a provider that can offer options. Options vary and can include flush mounted dome roofs; suspended, low profile IFRs and seals; pontoon modifications, and alternative bottom fill systems. These details can have a big impact on financial performance.

Extending service life

Increasing out of service intervals and reducing unplanned outages can add hundreds of thousands of dollars, even millions to the bottom line. In an effort to make tank operations more efficient and increase profitability, many operators are specifying materials with longer life spans and fewer maintenance requirements.



Aluminum domes offer several advantages, including superior corrosion resistance and positive impacts to both tank capacity and emissions mitigation.

Storage terminals near ports typically have high cycle frequencies and flow rates, increasing repetitive stresses on floating roof and seal systems. Thoughtful selection and design of these systems can mean the difference between 10 and 20 year service intervals. In addition, most unplanned maintenance can be avoided by specifying systems and materials that are built to last and designed to perform under the types of dynamic loading situations the system can be expected to encounter.

Years ago, when the first aluminum IFRs were brought to market, these technologies were underdeveloped and unproven. Fast forward 40 years and multiple aluminum roof manufacturers have evolved and offer extremely high quality, well engineered and cost effective systems that offer significant benefits over traditional steel options.

Some of these benefits include:

- Aluminum does not require painting or coating
- Aluminum domes do not require the periodic structural repairs commonly required with cone roofs



Tank bottom treatments such as drain dry sumps or mesa bottoms can have significant impacts on heel reduction.



Aluminum IFRs can be suspended to improve capacity, heel reduction and seamless IFRs are unsurpassed in mitigating emissions.

- Superior corrosion resistance
- Faster, safer and more economical installation
- Exceptional strength to weight ratio
- Exceptional design versatility
- The well designed systems on the market are durable and able to handle high flow rates and heavy cycles
- Aluminum can be suspended (reduced heel, increased working capacity, reduced emissions and improved tank safety)

Best practice #2 – Research materials and partner with a provider that can offer proven technologies

The right materials coupled with proven designs can improve tank efficiencies, extend service life, and result in savings in several key areas.

Reducing emissions and evaporative product loss

In addition to environmental concerns, product loss is an important consideration in assessing tank financial performance. Many factors influence tank emissions, including those which can be controlled through proactive design decisions:

- Type of fixed roof (clear span or column supported)

- Floating roof seal design and details (pressure application system, material durability and ability to conform to shell deviations)
- Floating roof penetrations and seams
- Gauge pole or guide pole well treatments

Best practice #3 – Engage an emissions or environmental expert and research options to reduce emissions and product loss

Multiple options, such as best in class seals; suspended, zero deck seam full contact IFRs; clear span dome roofs and guide pole or gauge pole well treatments can make the difference of thousands of pounds of product loss yearly. In areas where emissions are tightly regulated, this can help avoid costly penalties.

Proactive assessment and collaboration

Over the years, tank equipment has evolved considerably. Materials are lighter weight, have higher life expectancy and require less maintenance. Design practices have also evolved to solve many operating problems and constraints. A good tank equipment provider can help operators assess their current tankage and provide customized solutions to meet key financial and operational objectives.

Each tank is unique and solutions are never one size fits all. Proactive collaboration between tank operators and equipment suppliers can deliver a major boost to the bottom line.

ABOUT THE AUTHOR

Jeff Eickhoff is the general manager of sales and marketing for HMT and also manages the company's Latin America and Canada businesses. In addition, Mr. Eickhoff has co-developed HMT's current program of technical seminars created to increase awareness of design innovations and fundamental best practices for aboveground storage tanks. The most recent of these seminars was presented at the NISTM conference in Orlando in March. Mr. Eickhoff joined HMT in 2010 and holds BA and BS degrees in Architecture from Washington State University.

ABOUT THE COMPANY

HMT is the global leader in aboveground storage tank solutions. HMT brings a distinct level of innovation and service to the tank industry through a unique approach of partnering with customers to optimize tank operations. Knowing that every customer's need is different, they use their decades of experience to customize solutions that help tank operations become more efficient, more productive and more profitable.

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