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The Stockton terminal's new rail siding features six loading platforms

The right balance

RAIL LOADING Time is money at the loading rack and when operations are complex operators are keen to find an efficient solution. NuStar's demand for new rail tank loading equipment was satisfied by OPW's new Hi-Load counterbalance, as *Bret Marquis** explains

Many successful companies will figuratively 'bend over backwards' to meet the specific needs of their clients. In 2011, the personnel working at San Antonio, Texas-based NuStar Energy's refined products terminal in Stockton, California, not only bent over backwards, but were also literally 'driving in circles' to satisfy the parameters of a client's new supply contract.

NuStar has terminal operations across the country and the Stockton facility is one of its largest. It features 33 storage tanks with a total storage capacity of nearly 900,000 barrels (143,100 m³) for a mix of gasoline, diesel/ULSD, ethanol and aviation fuel. It sports a three-truck loading rack with nine loading lanes, as well as two rail spurs with 16 loading/unloading positions. The facility also offers automated additive and dye-injection services, truck scales and dry warehouse storage.

"We had a customer ask us if we could move red-dyed diesel fuel by rail to a mining site in Nevada," explains Dan Thomas, terminal manager at NuStar's Stockton facility. "We

could and we began by transloading the red-dye diesel via a fleet of trucks that would fill up at our truck rack and then drive to the rail siding where they would be pumped off with a portable pump into the railcar. We would need to use three trucks running a continuous loop from the truck rack to load one railcar."

Not the ideal solution

This was not only a repetitious process, but also a time-consuming one – since only one truck could be unloaded at a time, it would take more than 10 hours to load five railcars. As the railcars were being bottom-loaded from the trucks, there were also ergonomic and safety concerns for the technicians who were facilitating the loading process.

"Once the contract was finalised for the red-dye diesel and we saw how long it was taking to get those railcars loaded, we knew we would build a new rail siding," says Jude Singleton, NuStar's engineering manager.

The plans called for the new rail siding to

feature six loading platforms that would be fed via a pipeline that would run directly from the storage tanks. After that plan was in place, the next question that needed to be answered was: "What type of loading equipment would be used to outfit the platforms?"

For assistance, NuStar turned to PFT-Alexander, Inc of Signal Hill, California. For more than 50 years, PFT-Alexander has been a West Coast leader in providing flow-measurement and control equipment, calibration and fabrication services to the refined fuels industry. PFT-Alexander specialises in helping its customers design, select and procure equipment, as well as fabricate, install, test, inspect and commission complete flow-measurement and control systems.

"NuStar contacted us for the complete fabrication of the platforms that would provide top access to the railcars, and also for the loading arms," says Kathy West of PFT-Alexander's sales team. "We worked with NuStar's engineering company, as well as the platform designer, on the design of the platforms and loading arms."



The terminal manager at NuStar's Stockton facility, says he can't be more pleased with the new loading system

Technical requirements

There were three main considerations that had to be satisfied when selecting the loading arms:

- They had to be long enough to easily extend out to each of the railcars that would be positioned on the siding.
- The drop tubes on the loading arms had to be long enough to reach to the floor of the railcar when loading operations were taking place.
- The loading arms had to have torsion-spring operation, rather than pneumatic.

"The arms had to be able to accommodate different railcars because no two railcars are the same," says Thomas. "The booms had to be long enough to reach out to each manhole on every railcar."

"The drop tube had to go to the very bottom of the railcar's interior to ensure safety from static," explains West. "When the drop tube goes to the very bottom of the tank car and the fuel is discharged there, there is a better flood of the compartment to eliminate static. If a railcar has gasoline vapours and you drop in diesel, it will explode. By telescoping the arm all the way to the bottom of the railcar, you help eliminate or negate any vapours that may remain. Loading all the way at the bottom also helps ensure that there will be no chance of product cross-contamination."

"When we were looking at the selection of the loading arms, with the length and the reach and the travel that we needed, there was a limited number of solutions, many of which needed an air-operated actuator," says Singleton. "However, there is a lot of additional cost when you have air-actuated assist because you have to pay for air, so we were looking to go with a torsion-spring design."

Finding a balance

As fate would have it, at the time that NuStar was planning its new railcar loading platforms, OPW Engineered Systems of Lebanon, Ohio, a leading manufacturer of systems for the safe and efficient loading of hazardous materials and a division of the OPW Fluid Transfer Group, was releasing its new 890 Series 'Hi-Load' counterbalance to the market.

OPW-ES designed the 890 Series counterbalance for loading arms that are required to handle extremely heavy loads and travel a long distance. The 890 Series has a high-load spring that means it does not require the pneumatic system that is typical for loading arms that have a longer reach or additional weight. The high-load spring technology allows the 890 Series to handle roughly 50 per cent higher load capacities without worrying about the dangerous drift that can compromise load stability. Maintenance is also simplified as any spring-tension adjustments can be completed by one technician, armed with just a socket wrench.

"When we suggested the 890 Series, NuStar liked the idea of not needing to have additional support structures on the platforms, which can make them harder to operate, and it also saves money," says West. "This is also a long-reaching boom arm with 180 inches (4.5 metres) of total extension. They also liked the ability of the swivels to enter into the top of the railcar. The loading arm is also easier to move around, easier to stow and handle, lighter and more maneuverable. The drop tube also has nice, big D-style handles. One of the operators told me that he feels real confident grabbing it and handling it, that it doesn't feel like he has to yank on it to move it."

NuStar's decision to install the new 890 Series counterbalances on the railcar loading platforms was also aided by its past history with OPW products, according to Thomas. "I know we have used OPW equipment on loading racks at other NuStar terminals, like the ones in Portland (Oregon) and Houston," he says. "We weren't trying to reinvent the wheel with this project. We just thought, 'If it's working well up there, why not use OPW here, too?'"

Proof of the pudding

Construction of the new rail siding and loading platforms began in the summer of 2011 with the new railcar-loading system fully operational and ready for business by December 1. The reviews since then have been overwhelmingly positive.

"This is our first attempt using this kind of spring and it's working very well," says Singleton. "We were really nervous that we would go over budget if we had to use pneumatic counterbalances with air actuators. We had the funding, but people were thinking, 'Oh, my God, we'll be over budget' but these springs helped us meet budget and also enabled us to install a system that our operations people are very, very happy with."

Looking at the bigger picture, the new loading system is not only operating at a high level, but its design is also enabling NuStar to optimise its railcar loading operations. "The operators are ecstatic, the customers are impressed – they call it first-rate," says Thomas. "This new loading system has dropped the loading time from five cars in ten hours to six cars in three-and-a-half hours. The system is also ergonomic for the operators so they're no longer getting under the railcar since we're now top-loading through the boom arms."

Singleton believes that once the terminal technicians become completely familiar with the loading system they will be able to load two railcars simultaneously at a maximum of 750 gallons (2,840 litres) a minute in less than an hour, including the time spent on hookup and disassembly. That means that six railcars will be able to be loaded in less than three hours, less than one-third of the time that was previously needed to transload five railcars off of tanker trucks.

"We are extremely pleased with how the OPW loading system has worked," says Thomas. "I always ask the operators every morning how things are going and I had one say, 'I love this system, Dan. It's so much easier than what we used to do.' This really is the only way to load a railcar."

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