CASE STUDY

A new fuel-supply contract prompted NuStar Energy to upgrade the railcar loading/unloading area at its Stockton, CA, terminal facility.

Finding The Right Balance

New 890 Series "Hi-Load" Counterbalances from OPW Engineered Systems help NuStar Energy optimize railcar-loading operations at its Stockton, CA, USA, terminal

By Bret Marquis

Many successful companies will figuratively "bend over backwards" to meet the specific needs of their clients. In 2011, the personnel working at San Antonio, TX, USA-based NuStar Energy's refined products terminal in Stockton, CA, USA, 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 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," explained Dan Thomas, the 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."

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. Since 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 finalized 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," said 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

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

was in place, the next question that needed to be answered was, "What type of loading equipment would be used to outfit the platforms?"

A Trio Of Challenges

For assistance, NuStar turned to PFT-Alexander, Inc., Signal Hill, CA, USA. 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 specializes 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," said Kathy West, Sales for PFT-Alexander. "We worked with NuStar's engineering company, as well as the platform designer, on the design of the platforms and loading arms."

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

- 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 drop tube had to go to the very bottom of the railcar's interior to ensure safety from static," said 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 vapors 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 vapors that may remain. Loading all the way at the bottom also helps ensure that there will be no chance of product cross-contamination."

- The loading arms had to have torsion-spring operation, rather than pneumatic.

"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," said 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."

The operators of the Stockton facility required a loading-arm system with a 15-foot reach, drop tubes long enough to reach the interior bottom of any railcar and a torsion-spring counterbalance.

Finding A Balance

As fate would have it, at the time that NuStar was planning its new railcar-loading platforms, OPW Engineered Systems, Lebanon, OH, USA, 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% 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," said West. "This is also a long-reaching boom arm with 180 inches (15 feet) 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 (OR) and Houston (TX)," he said. "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?'"

The 890 Series "Hi-Load" Counterbalance has been designed for loading-arm systems that need to handle extremely heavy loads and travel a long distance.

Dan Thomas, Terminal Manager at NuStar's Stockton facility, says he can't be more pleased with the new loading system from OPW Engineered Systems: "This really is the only way to load a railcar."

Construction on 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 Dec. 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," said 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 optimize its railcar-loading operations.

"The operators are ecstatic, the customers are impressed – they call it first-rate," said Thomas. "This new loading system has dropped the loading time from five cars in 10 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."

Troy Richter is one of the operators at the Stockton facility that has benefited from the new loading system's speed and ease of operation, as well as its ergonomic design.

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 liters) 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.

Conclusion

NuStar Energy has considered the needs of a client's new supply contract, identified the shortcomings in its existing product-loading process and developed a solution that meets every need. Playing a key role in this enhanced railcar-loading operation are 890 Series "Hi-Load" Counterbalances from OPW Engineered Systems, which give NuStar the performance, versatility and reliability to successfully perform a challenging operation.

"We are extremely pleased with how the OPW loading system has worked," said 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."

About The Author

Bret Marquis is the Chemical & Industrial Western Regional Manager for OPW Engineered Systems. He can be contacted at (281) 687-6527 or bmarquis@opw-es.com. For more information on complete Loading Arm Systems and the 890 Series "Hi-Load" Counterbalance, or any other products from OPW Engineered Systems, please contact Greg Carrino, Director of Sales & Marketing, at gcarrino@opw-es.com or +1 (513) 696-1500.