

ELIMINATE THE BIG 6 ERRORS



How to Eliminate 6 Common Fuel-Delivery Loading and Unloading Errors

NEW SYSTEM FOR TANK TRAILERS REMOVES UNCERTAINTY AND HUMAN ERROR

By Randy Robinson

Introduction

Until the day comes when our robot overlords populate the highways with self-driving fuel-delivery fleets, human drivers will continue to have the bulk of the responsibility in ensuring that all loading activities at the loading terminal and unloading activity at retail or commercial fueling sites are conducted accurately and safely. The fly in the ointment in this scenario is that since all drivers are human (currently) they can understandably be susceptible to committing errors that can compromise the accuracy and safety of fuel loading and unloading.

There have been some noteworthy technological advances in the equipment and systems that drivers utilize today to perform the fuel loading/unloading process. However, much of it is based on outdated analog and manually activated technology and does not take full advantage of the digital technology that is available in today's world.

As this white paper will show you, new smart-tank systems are predicted to make a major impact by using next-generation user-interface and wireless-communication technology to create a digitally engineered tank ecosystem that integrates all fuel-delivery functions, controls, security,

diagnostics and usage history while virtually eliminating the chance for human error. These systems will provide protection against what are known as the "six common errors" of fuel loading and unloading.

The Challenge

Studies of tank-trailer usage patterns have determined that the average trailer makes 10 fuel deliveries a day, which amounts to 3,650 total deliveries per trailer in a calendar year. With the average trailer having four fuel compartments, that means that there are 14,600 annual opportunities for any number of fuel-delivery failure modes to occur, whether by human error, equipment breakdown or system failure. For the most part, the only safeguard against these events occurring has been driver training.

Despite that, these drivers – who are conscientious and want to perform their jobs in the safest, most accurate and reliable way – have been found to be susceptible to falling prey to the six common loading/unloading risks. Let's take a closer look at the causes and effects of each:

1 Driver unloads wrong product into the wrong storage tank

This most commonly occurs when a distracted or hurried driver connects the wrong trailer compartment to the wrong storage tank. The chance of this error occurring increases when there are unclear or improper product-type markings on the storage tank. In analyzing delivery histories, the unintended mixing of gasoline octane types happens once in every 14,000 deliveries with a gasoline/diesel mixup happening once in every 45,500 deliveries.

The ultimate effect of this fuel-type cross-contamination is shutdown of the site for several hours as the tanks are emptied and cleaned, which will result in lost revenue and unplanned maintenance costs. There is also the chance the fouled fuel will make its way into the driver's vehicle, which can lead to damage of the fueling system. The current safeguard against this error is requiring the driver to always unload diesel first so that a repeatable routine is established. Again, this routine can be thrown off if the driver is rushed or working at a site in which product types are not clearly identified.

2 Driver loads wrong product into wrong trailer compartment

This is the inverse of Error No. 1, but can have the same dire consequences that can lead to site shutdown and prohibitive cleanup and maintenance costs. In this case, an erroneous octane mix will occur once in every 73,000 deliveries, while a gasoline/diesel mixup will happen once in every 182,500 deliveries. To prevent this from happening, most trailers are outfitted with a manually adjustable product-grade indicator (PGI), but the driver may forget to reset or adjust the PGI before a different product is loaded at the next delivery stop.

3 Compartment loaded with contaminated product from terminal

This happens about once in every 365,000 deliveries and takes place when a malfunction occurs in the terminal's loading system, or if there is an incomplete cleanout or purge of the loading equipment (hose, elbows, adaptors, etc.). Again, if this damaged fuel makes it to the fueling site, revenue-robbing shutdown can occur, as well as vehicle damage. In this scenario, the driver has no recourse but to trust that the information on the bill of lading (BOL) from the terminal is accurate and that the proper product has been loaded

4 Product retained on trailer results in mixed product

There are many possible causes to be aware of in this error scenario, including the trailer may have lost air pressure, causing the valve to close before the compartment is completely empty; driver forgets to unload a compartment; trailer "heel" is unlevel, preventing all product from draining; and driver closes the compartment too early. When this error occurs, a potential overfill situation is created, along with the chance of product cross-contamination. This error has been known to happen once in every 125,000 deliveries, with only one in every 24,000 retain events identified during loading and not delivered. The current safeguard against this error involves the driver performing a bucket test after unloading, but this can be unreliable since an empty hose or pipe does not necessarily mean a totally empty fuel compartment.

5 Fuel retain that results in a shortage and possible disputed delivery

Fuel-delivery studies show that one out of every 4,000 deliveries will result in the recipient of the fuel questioning whether or not the indicated amount of fuel has actually been delivered. The same causes and effects – and current method of possible mitigation – that were highlighted in Error No. 4 are also in play here. What makes this error even more detrimental, however, is the potential damage that can be caused to the relationship between the fuel-delivery company and the retailer. If this error occurs too often, this can lead to relationship-related damage that is not easily undone and can ultimately result in the site operator looking for a new fuel supplier.

6 Fuel retain that results in an overfill condition

This error – which happens in one of every 24,000 deliveries – results when a fuel compartment is not completely emptied due to an unlevel delivery location, premature closing of the fuel compartment or loss of air pressure during the unloading process. Product overfills are both dangerous and costly as they can harm the environment and create a possible fire hazard, while fuel that is spilled on the ground is not saleable, which affects the fueling site's bottom line. The current safeguard against this error is the installation of retain probes in the fuel compartments, but they are currently used on only about 20% of fuel trailers in the United States.



The Solution

To defend against these six common loading and unloading risks, Civacon, Kansas City, MO, an OPW company, has developed the CivaCommand Smart Tank System. This system is a highly engineered, but easy-to-use, solution that consolidates access to the many different control systems on the trailer – including overfill control, on-board monitoring, pneumatic (air pressure) control, crossover prevention, security, electronic PGIs (Product Grade Indicators), troubleshooting and usage history. The system operates by utilizing an easy-to-read graphic touchscreen display that communicates wirelessly with the trailer’s fuel-delivery and operation-monitoring components.

The graphic touchscreen unit can be securely activated by the driver – even when he or she is wearing gloves – using a unique user ID and PIN. The system is placed in Loading Mode when a load-rack connection is identified by the Smart Socket. Loading can only begin if the driver has full permit status, meaning that all valves, vapor connections, overfill components and grounding devices are safe and operational.

The various compartments on the trailer are used to hold specific product families, either gasoline (typically low-grade, mid-grade and high-grade/premium) or diesel (ULSD or dyed diesel). Drivers use electronic PGIs exclusive to CivaCommand Smart Tank systems to let them know which product is loaded into each compartment.

When the driver is ready to unload – and when using the fuel crossover prevention system (COPS) – the Smart Elbow is first attached to the underground storage tank

(UST). When the Smart Elbow is cammed to the UST, it sends a signal to the CivaCommand Smart Tank System and the correct compartment valve opens automatically. Additionally, the system will allow access to the correct API for that compartment. Access to compartments are only granted with correct matches to the Smart Elbow. Once the delivery hoses are connected, the unloading process may begin. At the end of the unloading process, and when the compartment is empty, the screen notifies the driver that all hoses, elbows and adaptors can be safely disconnected. The Smart Elbows may also be used conventionally if the driver is not utilizing the COPS system.

Another unique feature of the system is its ability to better notify the driver if a fuel retain condition has occurred. Specifically, a notification is sent to the touchscreen if the driver ends the process of delivery with fuel remaining in the compartment. In this instance, a Retain Fault warning will appear on the screen, communicating to the driver that “compartment X has detected a retain condition.” This message informs the driver that something has happened, and that all the product has not been fully drained from the compartment. In this case, it can be as simple as the API being closed prematurely or the air pressure being turned off accidentally. The driver can then use the innovative Troubleshooting feature to identify how to clear the Retain Fault condition and continue with the delivery until each compartment is fully empty.

The driver will also be alerted to a Retain Fault if the Smart Elbow becomes uncammed during delivery. This safety feature is designed to close the compartment valve (internal valve) automatically when the Smart Elbow becomes



uncammed and prevent product from spilling and creating a very dangerous condition.

Finally, the system will store all sorts of historical usage data, and individual component, truck and driver information. For example, a probe's serial number, installation date and last time it was wet will be recorded, as will an indicator that will be either green, red or yellow. Green means the probe is in good operating condition, red means it should be replaced immediately. Yellow would indicate that the probe is still functioning properly but recommends that the probe be serviced or replaced at the next service interval.

Useful data that can be stored in a CivaCommand Smart Tank System includes Fault Logs and Equipment Device Status Logs (Smart Elbows, probes, sockets, grounding equipment). The Asset Manager can also store and organize performance data such as total trailer flow time average, non-flow time average, total delivery time average, not to mention site and driver efficiency reporting capabilities.

Conclusion

Drivers are an undeniably integral part of the fuel-delivery chain, but even the most conscientious, knowledgeable, and experienced ones can make mistakes occasionally. To further remove uncertainty and human error from the fuel-delivery process, Civacon offers its new CivaCommand Smart Tank System, the global fueling industry's most advanced tank-trailer fuel-delivery system. It promises to be an indispensable tool for drivers who strive to complete every one of their deliveries accurately and safely, but sometimes aren't able to because of the demanding conditions in which they operate.

About the Author:

Randy Robinson of Civacon, Kansas City, MO, USA, has 14 years of experience in the fuel-transportation industry, including his involvement in advancing fuel-delivery technology. He can be reached at **(800) 560-6601** or **randy.robinson@opwglobal.com**. Civacon is delivering what's next through innovations designed to enhance safety, reliability, efficiency and business performance for the cargo-tank industry. Specifically, Civacon makes products and systems to safely load, monitor and unload petroleum, dry-bulk and petrochemical cargo tanks. Civacon is part of OPW, a leading equipment manufacturer in the retail-fueling, fluid-handling and car wash industries. OPW has manufacturing operations in North America, Europe, Latin America and Asia Pacific, with sales offices around the world. OPW is part of Dover Corporation. To learn more about how Civacon is delivering what's next in the cargo-tank industry, please visit **civacon.com**.