



WHITE PAPER

# The Next Generation of Retained Product Monitoring

**CIVACOMMAND SMART TANK SYSTEM FROM CIVACON PROVIDES FUEL-TRANSPORT COMPANIES AND THEIR DRIVERS A HIGHLY RELIABLE NEW WEAPON IN THE CONSTANT BATTLE TO ELIMINATE RETAINED PRODUCT CONDITIONS**

*By Frank Stemporzewski*

One of the most important tasks of the drivers who deliver motor fuels to retail, commercial and municipal fueling locations would also seem to be the most obvious: get the right fuel and the right quantity into the right tank – every time. However, those transport-truck drivers, along with management, will tell you that satisfying that task each and every time is often easier said than done.

At times, any one of those three conditions – right fuel/right quantity/right tank – being wrong can lead to a “retained product” condition in one of the cargo tank’s compartments. This means that some amount of fuel that was supposed to be delivered into the site’s underground storage tanks (USTs) has, perhaps unbeknownst to the driver, remained in the fuel compartment. No driver wants to return to the terminal with undelivered product in his trailer, for if they do, a whole Pandora’s box of negative outcomes can be set in motion.

That’s why transport companies and the outfitters of cargo tanks have worked tirelessly over the years to develop

equipment and systems that can indicate, alert and prohibit loading if any product remains; thus eliminating any potential negative outcomes. While there is no doubt that there have been vast improvements in the ways that retains can be identified and prevented, the chances that it can still occur are there. This white paper will highlight a new, digitally based delivery-monitoring system that is the best answer yet to the age-old question of how to prevent the retention of product from occurring.

## The Challenge

The first line of defense against retained product is the transport driver, who is many times at risk of a product retain due to site issues, possible equipment failure or simply human error.

Prior to delivering at a retail site, the driver must ensure that there is available space in the USTs. If the delivery site is open and manned, the driver will most always get an up-



to-date inventory level of each storage tank from the site's electronic inventory system and compare this to the amount of fuel to be dropped that is listed on the bill of lading. Generally, drivers are also required to manually "stick" each UST to directly measure the product level, comparing these measured heights to the tank's strapping chart to double check for available space. However, with the stricter UST tank-tightness regulations enacted over the last decade, it is not uncommon for a stick reading to be off by several inches due to fluctuating positive or negative pressure in the underground tank, directly affecting an accurate stick reading. Drivers will also, while sticking the tank, coat the bottom of the stick with a water detecting paste that changes color when it comes into contact with water; this is a means of determining if there is water in the fuel or at the bottom of each UST. The driver records all of this information manually, which creates a delivery-specific record that can be referred to if a claim is ever made by the fueling-site operator of a delivery discrepancy.

Once the actual delivery begins, there are some basic ways that drivers, over the years, have used to prevent a retain occurrence when delivering fuel. One is to remain aware of hose vibration resulting from fuel movement through the hose. Whereby, when this vibration ceases, the tank compartment should be empty. More common, though, is via the sight glass on the delivery elbow. If no fuel is observed in the elbow's sight-glass window, the hose and compartment are likely empty. While helpful, these methods

are not always the most reliable in determining that the trailer's compartment is indeed "really" empty. An unnoticed condition, like loss of air pressure on the trailer from an unheard leak can allow the tanker's emergency valve at the bottom of each compartment to close, resulting in stoppage of product offloading. So, what is seen by the driver as a dry hose and an empty delivery elbow sight glass may not truly be a complete delivery! The above can easily allow an unaware driver to leave the site with retained product still onboard. Other simple reasons like an uneven parking surface, with the tanker pitched in a way that all the fuel can't drain out properly can also result in unknowingly leaving a site with retained product.

From an equipment perspective, to further assist drivers, transport equipment manufacturers have designed analog systems that sometimes feature retain sensors in the bottom of each tanker compartment. These systems typically illuminate an LED to indicate that there is still product remaining in a compartment, as sensed by the compartment mounted bottom sensor. While each of these type of analog systems does visually indicate when there is product in the bottom of a compartment and will inhibit loading at the terminal if one of the retained sensor lights is lit, each also has a simple override pushbutton switch installed that allows manual acknowledgement of this product with a "push of the button," whereupon loading on top of this remaining product is now allowed.

At the loading terminal, all of these bottom sensor LEDs must be off, and the tanker completely empty for the onboard monitoring system, to allow reloading the tanker. If the system indicates that fuel has been retained, it does not permit the tanker to be reloaded. However, as all of these older analog retained monitoring systems, as mentioned earlier, feature a simple override pushbutton switch that allows the driver to acknowledge the presence of any retained product with a simple "push" to get a permit to load, sadly, many drivers are in the habit of pushing this override pushbutton switch every time they arrive at the terminal, retained product or not. Some drivers may not bother to actually look to see if one of the retained indicator LEDs is even lit, or investigate the details if one truly is. The resulting trailer load of product can be thus contaminated before leaving the terminal.

At a delivery site, a disputed delivery from the prior load is just one of three common outcomes when a retain product occurs. The other two are:



- **Mixed Product:** A retain event at the terminal that results in mixed product in a compartment arriving at the retail site, can have potentially serious effects if unloaded into a UST at the retail site. The resulting cross-contamination in the site's storage tank may involve the shutdown of fueling services for several hours at the retail site while the fouled fuel is pumped out of the UST and a new load of fuel delivered. Even a seemingly minor mistake like this results in the site experiencing lost revenue due to the site being idled, as well as the transport company facing the unplanned costs of the potential pump-out, replacement of the fouled fuel and its disposal costs. There are varying levels of concern, and cost, when a retain-caused cross-drop occurs. The easiest to mitigate is when unleaded fuel is contaminated with premium-unleaded fuel; in this case, the fuel can stay in the tank, but the higher-grade fuel will be sold at the lower grade price. When low grade is dropped into a high-grade UST, either more high-grade fuel can be delivered, or the tank can be emptied, in which case the transport company absorbs the cost.

Before the mixed product cross drop is actually discovered and some of the contaminated fuel makes its way into the customer's vehicles, especially when gasoline and diesel are mixed, is where the real problems begin to occur. A diesel into gasoline cross-drop error is not quite as bad, since the worst thing that will likely happen is clogged vehicle fuel filters that can be cleaned or replaced, plus the contaminated fuel in the tank drained. But when gasoline is delivered into a diesel UST, the ultimate worst-case scenario occurs: the engine of the diesel vehicle that receives the contaminated fuel may be permanently damaged and need to be repaired or replaced.

- **Overfill Condition:** Back at the terminal, a product retain as a result of a compartment on the trailer not being completely emptied for whatever reason during the prior delivery can easily turn into an overfill condition. Especially if a driver is in the habit of routinely pushing the retained reset button on the onboard monitor. Product overfill incidents at a loading terminal are dangerous and generally involve an immediate and abrupt shutdown of the trailer loading process mid-load until investigated and the root cause determined. All can create future unsafe operating conditions or even a potential fire hazard. Terminals treat these occurrences very seriously and will often ban a transport driver from using their facility if multiple occurrences by the same driver happen.

Unfortunately, no matter the level of sophistication of tank-monitoring equipment and systems, responsibility for ensuring that a retain condition does not occur ultimately falls on the shoulders of the driver. All drivers are hard-working people who want to do their job correctly, but – darn that human fallibility – they are not immune from making mistakes.

If or when a product-retain event occurs at a delivery site, most drivers are honest and forthright about admitting their mistake. In this case, they notify their dispatcher and the site operator as soon as possible so proper rectifications can be made. The bottom line is that if a mistake has been made, the driver will generally not be punished for it, as long as the mistake is admitted quickly and the error can be resolved to the satisfaction of the customer. However, that's not to say that a driver who makes the same mistake repeatedly won't be held to account. At first, this may mean additional training for the driver or a ride along with the company's driver trainer. If the problem persists, the transport company will have no other recourse than to let the driver go, as liability is too great.

## The Solution

With the need to both load and deliver the proper fuel type and quantity being paramount concerns for both the transport company and the customer, every effort must be made to ensure that a retained product does not occur. While old-school analog overfill and retained product detection systems have been the industry standard for many years, there are enough blind spots in their capabilities that they can not be trusted to keep these situations from happening.

Knowing the stress that delivery companies and their drivers can be put under as they attempt to ensure that the right



fuel in the right quantity goes into the right tank 100% of the time, Civacon, Hamilton, OH, an OPW company, has designed, engineered and developed a way to incorporate cutting-edge digital technologies into its cargo tank-monitoring and control product line. The result is the new CivaCommand Smart Tank System.

The highlight of the CivaCommand System is its user-friendly digital cargo tank-control technology that features an easy-to-read graphic touchscreen display that is in direct digital communication with the trailer's various fuel-delivery and operation-control components. The touchscreen display, which is securely activated by the driver – even while wearing gloves – optionally via a unique user ID and PIN, consolidates access to the many different control aspects on a cargo tank, including retain product monitoring, overfill detection and control, pneumatic (air pressure) monitoring, product-crossover prevention, system troubleshooting and usage/event history.

The digital technology enables the system to more accurately and securely detect retained product through the use of patented fluid-property sensors installed at the tanker's product loading and unloading adaptor, rather than a simple analog sensor in the bottom of the tank. These, in conjunction with other digital sensor inputs like air pressure and direct bottom-loading adaptor open/closed status

feedback, eliminate the possible ways that the older analog systems could be "fooled" into displaying a compartment was erroneously dry when it indeed still had product onboard. In addition, CivaCommand's easy-to-read graphic touchscreen alerts the driver of not only the presence of any retained product, but also where and what needs to be done to correct the situation via plain text messages on the display. All of the above is also captured real time in the system's event history memory.

Prior to loading at the terminal, if any retained product loading is detected, the CivaCommand System will not permit loading and will display the specific compartment and fuel type on its graphical display. Overriding this retain product is done securely, if authorized, and with full record keeping.

At the delivery site, the CivaCommand system monitors that the delivery process concludes completely and successfully only when the cargo tank is completely empty. If a compartment is not completely emptied, the system will alert the driver of the retained product and the specific reason, i.e. the unloading adaptor being closed prematurely, or too little air pressure remaining on the tanker to properly keep the tank's emergency valves open, etc. The sensed error condition is displayed on the system's touchscreen in a plain, easy to understand text box alert, with on-screen

help offering the proper steps toward resolving the situation. If, for whatever reason, a retained product condition is not resolved prior to the tanker leaving the retail site, this issue is logged and can also be immediately relayed to the transport company's dispatcher through the optional CivaConnect Asset Manager web portal's text and email messaging capability. With the dispatcher knowing immediately that the trailer just left a site with product not fully delivered, the driver can be notified within minutes, giving him a chance to return to the site and finish dropping the remaining fuel before returning to the terminal to pick up a new load.

If the transport company is also taking advantage of the CivaCommand's optional cross-over-prevention capabilities at delivery sites, wireless RFID technology "tags" on the site's USTs, letting the driver undeniably know which product is being unloaded into each UST, with the system prohibiting any delivery operation in which the wrong fuel is attempting to be dropped into the wrong storage tank. If an incorrect trailer-to-underground storage tank connection is attempted, the trailer's emergency valve air controls and API handles will not unlock and be prevented from opening and the potential incorrect delivery from occurring. This eliminates the chance that costly cross-drops and ensuing fuel contamination will occur.

The CivaCommand system also has many ancillary features that have been designed to further modernize the fuel-delivery process, including real-time storage and retention of all of the driver's interactions with the system and logging of each of the system's component status. All are accessible via the touchscreen display. Fault Logs show how many times and when product-retain conditions occurred and if they

were addressed properly. Equipment Device Status is also constantly monitored and logged for all sensors, sockets, ground verification devices, air pressure, etc., allowing the system to be aware if any onboard maintenance issues occur. If the CivaCommand-equipped trailer is also taking advantage of the optional CivaConnect Asset Manager web portal's performance monitoring capability, management can be immediately notified of any equipment issue that would prevent the trailer from remaining in service, so it can be redirected to a maintenance facility rather than be turned away from the terminal.

The CivaConnect Asset Manager also stores and organizes unique performance data, such as total cargo-tank unloading average flow time, non-flow average time and total delivery time average, along with site and driver efficiency reports, which can help fleet management review and compare driver, trailer and site performance. All of this helps the fleet company achieve maximum fleet utilization.

## Conclusion

Fuel-transport companies and their clients share the same goals: the site operators want to receive the right fuel, at the right time and in the right quantity ordered. The fuel transport company wants to deliver that proper fuel and quantity when it should and without any delays or incidents.

To mitigate against retained product, Civacon has developed one of the industry's best defenses in its CivaCommand Smart Tank System. CivaCommand takes fuel-delivery peace of mind to the next level by using cutting-edge digital technology to help ensure that errors do not occur during the fuel-delivery cycle.

## About the Author:

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