

## Reducing Remote Inventory Logistics Costs

15 minutes

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### Overview

Many companies that make products like cryogenic gases, fuel oils, propane, and specialty chemicals deliver the material – often by truck – to tanks at customer plants or other remote distribution sites.



Making sure those tanks always have enough material to meet customer needs can be a logistical challenge, especially if you don't know how much the tanks contain until the truck driver checks their contents on his next visit.

- Send the driver too often, and you run up delivery costs – as well as tying up product that might be sold elsewhere.
- Send him too seldom, and you could find yourself with an empty tank and an angry customer – plus the cost of an expedited delivery.

In this course you'll learn how wireless technology can easily help you monitor remote inventory and improve logistics efficiency so you avoid both problems.

### Hint

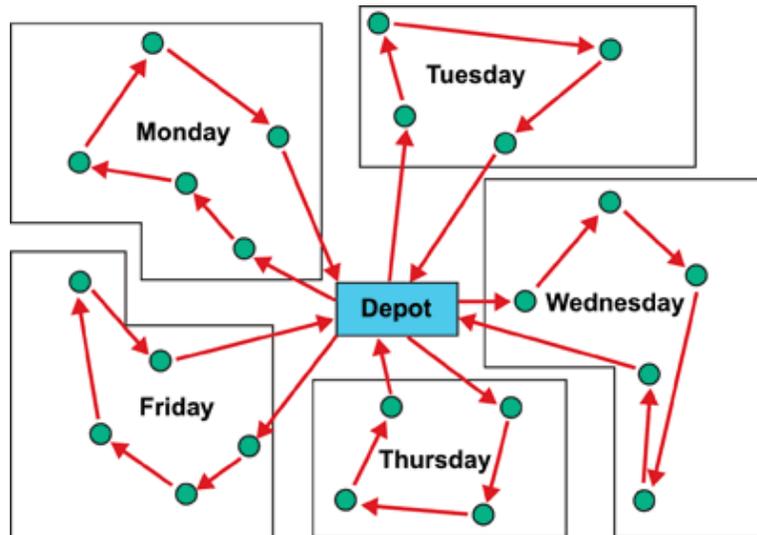
As you go through the topics in this course, watch for answers to these questions:

- What are the drawbacks to regular time-based delivery routes?
- What are key points to include when making a business case for improving logistics efficiency?
- How does wireless tank monitoring overcome the drawbacks of previous solutions?
- What are the primary components of a wireless monitoring solution?

## The challenge

Delivering the right amount of material to each remote tank at the right time can be an enormous logistical challenge – especially if you don't know how much the tank already contains or how quickly it's being depleted.

One approach is to send a delivery truck to "top off" each tank on a regular schedule. A truck may cover a specific route on a daily or weekly basis, for example, checking the contents of each tank on the route and refilling it as necessary.



Regular delivery routes don't typically match actual delivery needs.

But not all customers on a route are likely to use the product at the same rate – and each customer's usage may vary from one week to the next.

Unless you know the content level in every tank before the truck leaves the depot, some stops on a route will most likely be wasted because some tanks still contain enough inventory to last until the next scheduled visit. And if a tank on Monday's route unexpectedly runs low on Thursday, for example, you'll have to send the driver back out on a costly extra trip – or pay for enough extra trucks and drivers to handle such expedited deliveries.

Delivery costs aren't the only potential penalty. You may have carrying costs for excess inventory in customer tanks and in trucks that return with a partial load. There's also a lost opportunity cost if you could have sold that excess inventory to another customer.

One solution has been to have users manually measure tank contents at their sites and call in delivery requirements to the supplier. However, end users have not always been responsive to this approach.

Suppliers have also tried using automated local measurements, with data transmitted back to the depot over local telephone lines. While more efficient than manual readings, the legacy technologies used are now outdated.

A more reliable method of collecting and transmitting the data would enable more efficient distribution and logistics.

## Business case

Obviously, any business investment must be justified by benefits that outweigh the costs. In the case of improving distribution efficiency, that's not difficult to do.

When logistics planners know exactly how much material is in each tank, and what the usage trend has been, they can adjust routes dynamically so tanks are filled when necessary – and *only* when necessary. For example: When tank contents reach a specified level, an automatic notification will alert you that it's time to schedule the next delivery. Automatic notification takes the guesswork out of information gathering and allows you to optimize the truck schedules. Benefits include fewer trips, fewer miles driven, fewer trucks returning with partial loads, and ultimately a more satisfied end user of the inventory product.

Operating costs for a typical delivery truck – including driver time, fuel, maintenance, and overhead – are approximately \$1-\$2/mile in the U.S. More efficient truck use results in fewer miles traveled, and thus lower costs. Producers using modern tank-monitoring solutions commonly reduce truck and driver costs between 5% and 25% depending on current practices.

Additional savings occur when automated systems replace labor-intensive (and error-prone) manual systems.

Capital costs can also be reduced. With fewer miles driven, you may be able to extend the service life of your trucks and defer the purchase of new ones – or reduce the size of your fleet.

Lower costs are only part of the equation. End users' satisfaction increases when their tanks never go empty unexpectedly. Managing end users' inventory for them can also be a value-added service – and a tool for winning and retaining their business.

## Why wireless?

As mentioned earlier, previous solutions for collecting and transmitting tank-level data have been less than ideal. In particular, the great distances between tank locations – sometimes hundreds of miles – make wired solutions impractical. Besides the cost of the wires themselves, installing wired equipment at all those remote locations can be time-consuming and expensive.

A wireless solution overcomes these drawbacks. It eliminates the need for wires by leveraging the same communication technology as your personal cellular phone. Some solutions also offer integrated power source options for the instruments installed at each remote location.

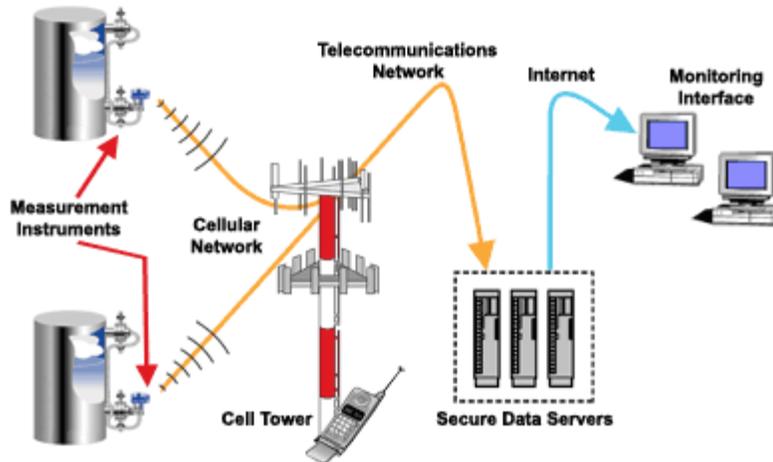
The result: No phone lines, no power lines, no site construction, no utility connections, and no need for multiple site visits to complete the installation. The complete monitoring solution can be up and running within a few minutes – and it's easy to add more monitoring points later.

The simplicity of a reliable wireless solution greatly reduces total cost of ownership and enables you to quickly begin improving logistics operations. The payback period for a remote monitoring solution is often as short as one to three years depending on current practices.

## Solution components

A proven form of wireless asset monitoring includes three primary components:

1. Local measurement **instruments** to acquire the measurement data and transmit it wirelessly.
2. Cellular and land-line telephone **networks** and the Internet to communicate the data from the collection point to data servers at a central location.
3. Specialized web-based monitoring **interface** to give users access to the data wherever it's needed.



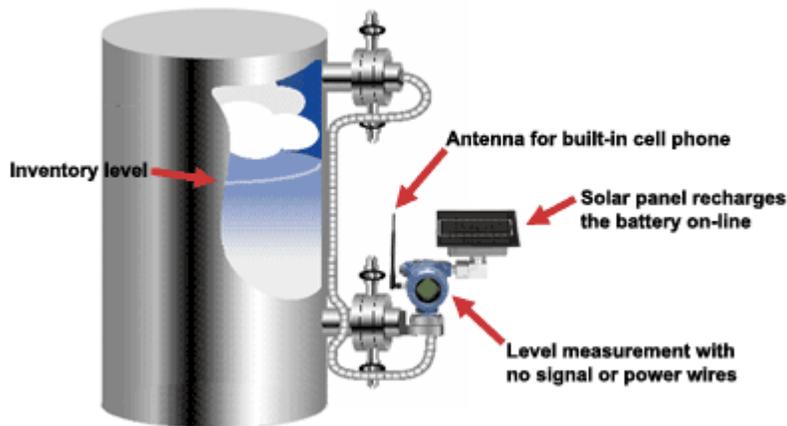
A wireless monitoring solution includes components for collecting, communicating, and accessing asset-monitoring data.

Let's take a closer look at each of these three components.

## Solution components Instruments

Tank information is collected by local sensors and relayed to the network by wireless devices.

Aside from their wireless capabilities and optional integrated power sources, these devices use the same measurement technologies as wired devices and can handle all typical measurement types – including pressure, temperature, level, and flow.



Wireless devices provide an easily installed, self-contained solution and support the same types of measurements as wired devices.

"Smart" instruments can also transmit device diagnostics to confirm that measurements are valid and aid in predictive maintenance, including monitoring battery life.

### The Emerson Advantage

Emerson's Rosemount 753R remote web-based monitoring indicator adds wireless communication to automated level, pressure, temperature, and analytical data collection. It integrates with the entire line of best-in-class Rosemount HART instrumentation, as well as to web-based monitoring interface. Features include:

- Advanced power management for up to 37-day battery life without solar recharging. With solar recharging, battery life can be 2-6 years depending on usage.
- Status alerts to provide assurance the device is working properly.
- Configurable alarm points – for example, to alert you when a tank is running low.
- Data logging for up to 400 readings, plus store-and-forward protocol so all data is delivered.
- Signal strength optimization to maximize telecommunication availability through multiple carriers.
- Programmable data collection and transmission intervals for tailoring data collection to user requirements.

### Solution components Network

The extensive coverage of public GSM cellular networks – and their support for GPRS data-transfer technology – makes them an ideal way to wirelessly collect and transmit or forward information from remote tanks.

*(For more on cellular technologies, including GSM and GPRS, see **Cellular Networks**.)*

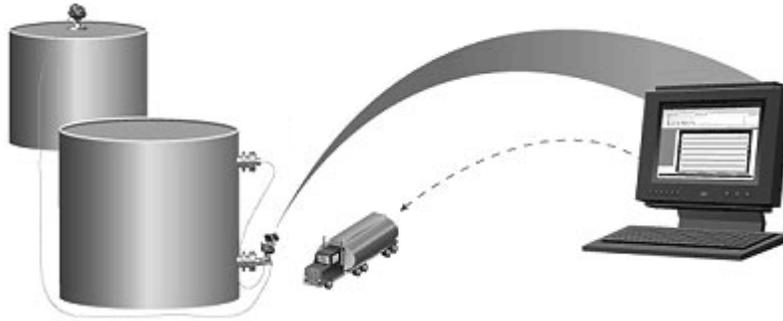
From the cellular system, the tank information travels over public data networks (such as the

Internet) to centrally located data servers where it is stored until needed.

Users anywhere in the world can then access the information using a secure web connection. No special software is required.

## Solution components Interface

A complete monitoring solution includes a specialized interface that enables users to access tank data over a secure web connection, much as you might view your bank-account balance online. They can then use the data to optimize delivery schedules.



A specialized interface and a secure web connection enable users to monitor tank levels anytime, anywhere without the need for special software.

The ideal interface would also ...

- Allow customers as well as producers to monitor tank levels from their own offices
- Enable remote configuration and diagnostics of the measurement instruments
- Provide alerts for low-tank conditions and / or other abnormal situations
- Offer encryption and user authentication to protect data
- Support data export to other logistics programs.

## The Emerson Advantage

Emerson's complete, integrated monitoring solution includes the secure, web-based iTraX<sup>®</sup> user interface. iTraX enables users to monitor tank data, configure transmitter settings, and receive alerts by e-mail or pager. The interface and data are hosted on central servers to allow secure access from anywhere in the world, as well as improved security, easier system upgrades, and managed backups.

## Maintenance

With any new technology, it's smart to consider what's required to keep it up and running. A wireless monitoring solution may help you reduce product-delivery trips – but will you lose all those savings on frequent maintenance trips to replace batteries, check on finicky instruments, or make repairs?

The answer, of course, depends on the technologies and products you choose. As you evaluate suppliers and solutions, keep the following maintenance-reducing factors in mind:

- **Instrument reliability.** Instruments with a track record of stable, reliable long-term operation under field conditions are less likely to need attention.
- **Power management.** Energy-efficient designs, power-management techniques, and options like solar power can make battery-replacement intervals something measured in years, not weeks or months.
- **Diagnostics.** Some instruments and wireless monitoring solutions include built-in diagnostics to tell you if there's a problem – or, more often, confirm that everything's working normally so you don't have to do frequent field checks.
- **Interface software.** Locally installed PC-based solutions can require software patches and updates.

### The Emerson Advantage

Emerson's wireless solutions combine our long record of rock-solid instrument reliability with more recent innovations to help reduce maintenance costs. For example,

- Rosemount pressure transmitters have proven capabilities for extended operation, including 5-year "set and forget" stability.
- Expected battery life in our 753R wireless monitoring instrument with solar recharging is 2-6 years, depending on usage.
- The 753R also offers status alerts to notify you if the instrument needs attention. Built-in diagnostics also enable you to verify proper operation remotely.
- With our web-based interface, there's no local software to maintain. We take care of any updates on our servers.

### Application criteria

Despite its advantages, the cellular-based wireless tank monitoring technology described here isn't suitable for every application. In particular, because readings are transmitted infrequently, it doesn't provide the continuous, high-speed data flow sometimes required for process control.

However, wireless web-based monitoring can be the answer if...

- You have remote assets that are typically monitored infrequently – for example, as part of a daily, weekly or monthly truck route.
- Your total logistics costs average more than 15% of the material's cost. (But don't overlook the delivery costs of high-value products, where even proportionately small delivery costs can still add up.)
- You often have to make expedited deliveries to keep customers from running out of material.
- You are using a logistics management program. Such programs are only as good as the measurement data used to analyze customer usage.

## Summary

In this course, you've learned that...

- Scheduling deliveries without reliable data on how much each tank currently contains increases logistics costs. It can also reduce customer satisfaction if the tank runs empty.
- More efficient scheduling can reduce both operating and capital costs, as well as enabling producers to offer value-added inventory management services.
- Wireless tank-monitoring technology is significantly less costly and easier to implement than wired solutions.
- A fully integrated solution includes instruments to gather and transmit reliable data, networks to deliver it where it's needed, and an interface to provide data access and management.
- Wireless cellular technologies – especially GSM and GPRS – are ideal for such data-monitoring applications (not for control).
- A web-based monitoring interface can provide secure data access from anywhere in the world.