

Why Wireless?

15 minutes

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Overview

The more you know about the process, physical assets, and overall operations of your plant, the safer and more profitable your business can become.

As any plant manager, engineer, operator, or maintenance technician can tell you, more (and better) information means more opportunities for reducing operational costs and improving quality, throughput, and availability.

In addition, new environmental and safety requirements have been established after many of today's facilities were built, and plants have struggled to get access to measurement and diagnostic information that could ease compliance.

So, why aren't more plants "measuring up"?

Too often, the cost or difficulty of adding new measurements has outweighed the perceived benefits. With traditional "wired" technologies, distance or complexity can make connecting the measurement point to a control system impractical or cost-prohibitive.

Wireless technology removes the barriers of traditional wired field solutions and gives you unprecedented access to data that was previously out of economic or technical reach.

Lower installation costs are only part of the equation. Even more important is **what you can do** with the additional information. Wireless technology also empowers mobile workers to do their job more efficiently by giving them remote access to the information they need.



That's why more and more plants are turning to wireless solutions.

This course provides a brief introduction to the economics of using wireless technology, and several examples of how it can help improve your operations.

Hint

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

- What are the relative costs of adding wired vs. wireless measurement points?
- How can adding wireless measurement points increase operator productivity?
- What information can be accessed wirelessly to check on device status from the maintenance shop?
- How might you use wireless technology to monitor inventory levels on the other side of the plant – or the country?
- How can wireless technology increase operator and maintenance productivity?

Ready to get started?

Lowering the barriers

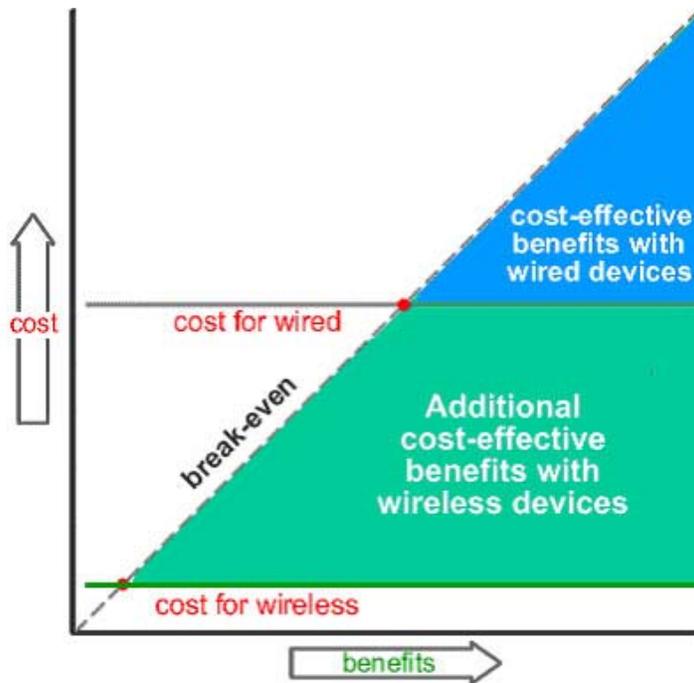
There are lots of reasons to choose wireless field networks over wired field network solutions, but the most obvious is installation cost. Eliminating or greatly reducing field wiring means huge savings in wiring and labor for installation and commissioning.

Estimates vary, but when you start to tally these up-front costs – including design, procurement, installation, and startup, as well as the infrastructure to support a typical wired analog measurement point – the total cost can far exceed the cost of the measurement device itself.

The cost can go even higher if wiring-related infrastructure – cable trays, junction boxes, marshalling panels, and rack rooms – is at capacity and must be expanded to accommodate more measurements. The same is true for automation infrastructure such as I/O cards, controllers, and software licenses.

In contrast, a smart wireless measurement point can be added for only a small fraction of the cost for wired installations.

This dramatically lowers the economic barrier to adding new measurement points. Information that was too expensive to collect in the past is now readily available to help you improve your operation.



By lowering the cost of adding measurement points, wireless technology also lowers the barrier to making cost-effective improvements in your operation.

If you use the wireless technology known as **self-organizing networks**, the barrier is even lower. These networks are even easier to install and expand than many other wireless technologies. As long as each new wireless device is within range of any other device in the network, it will automatically join the network as soon as it's installed. (For more on this topic, see the course titled *Planning and installing self-organizing networks*.)

Operator productivity

Most plants already collect data from hundreds – if not thousands – of stand-alone measurement points. It's all done manually, by operators making "clipboard rounds" to check gauges, sight glasses, chart recorders, or other indicators once per hour, shift, day, or week.

Operators spend a great deal of time collecting this data, often in remote or hazardous areas. It's a tedious task, with lots of opportunities for errors or missed readings. And the more time they spend collecting the data, the less time they have for analyzing and acting on it to improve operations.

Now imagine using wireless technology instead of clipboards to bring that data back to the control room. The lower cost for adding wireless devices makes it feasible to do so for many of those hundreds or thousands of measurement points.



Wireless technology can reduce the need for operators to collect data manually.

Because the wireless devices can collect and transmit the information automatically at frequent intervals, you'll get a more accurate, more up-to-date picture of what's happening in the plant – while your operators reduce their exposure to hazardous conditions and get more time for higher-value work.

With a wireless process control network, operators in the field can also use portable wireless devices – such as ruggedized tablet PCs – to access critical process and control information, historical data, and other functions without returning to the control room.

All these tools empower your operators and enable them to do their work more efficiently.

Maintenance productivity

Wireless technology can also provide much of the information that your maintenance technicians now have to collect manually – or that you can't access at all.

Millions of smart HART-based devices in the field today have some level of diagnostics capability. Unfortunately, many plants don't have the infrastructure to receive HART data in the control room. Since only a fraction of these devices are digitally monitored, the potential for accessing "stranded" diagnostics information in existing plants is significant.

Existing wired smart devices can be upgraded with a wireless adapter to transmit diagnostics information back to the control room or maintenance shop, where appropriate personnel can take corrective action as needed. Process control signals continue to be communicated over the wired connection, while diagnostic data is simultaneously transmitted wirelessly to an asset-management application.

This additional information opens the door to improved maintenance productivity.

For example, maintenance technicians often have to go into the field to check on devices whose readings aren't what operators expect. Often such trips reveal that there is nothing wrong, or the problem is elsewhere in the loop.

If you calculate the amount of time it takes to get a hot work permit, go to the device location, check its status, return to the maintenance shop, and close the work order – well, you get the picture. And, if the device happens to be in a hazardous area, technicians may also have to don protective gear – adding even more time as well as safety risk.

With wireless access to HART data, however, the maintenance team can quickly and easily check device status or perform diagnostics without leaving the control room or maintenance shop. Devices with advanced diagnostics can even enable you to detect potential problems before they occur – so you can take corrective action before operations are affected.

And when maintenance personnel are out in the plant, a wireless process control network can give them remote access to asset management systems for "on the spot" diagnostics and device information wherever they are – plus mobile productivity software for immediate tracking and reporting inspections, tests, maintenance, and repairs.

Inventory monitoring

Earlier we described how adding wireless measurement points could improve productivity by reducing manual data collection. How much greater would the benefit be if the measurement points were on the far side of the plant – or hundreds of kilometers away?

That's often the case for tank farms and other remote storage facilities. Unless an operator or delivery driver has just been there, you often don't know how much material is in each tank. If usage is unexpectedly high between visits, inventory levels can reach critically low levels – or even worse, lead to an outage. The alternative is to maintain a "safety margin" of extra material in each tank, tying up valuable product.

Wireless monitoring of tank levels can help you avoid both problems. Measurement data is automatically collected at the remote site, then transmitted wirelessly to the nearest cell-phone tower and from there through telecommunications networks to your plant – or wherever else it's needed.

Besides getting a constant, up-to-date view of inventory levels, you may also be able to reduce the number of site visits and therefore the associated transportation costs.

Environmental compliance

Additional measurement points that become cost-effective with wireless monitoring can also help with environmental compliance.

For instance, flow or pressure measurements along a pipeline can help detect leaks that lead to fugitive emissions – and quickly pinpoint their location so you can take corrective action before the problem grows.

Automated monitoring can also reduce the cost of compliance reporting and auditing because you'll have all the necessary information at your fingertips.

Let's use relief valve monitoring as an example. These valves are often installed in locations where adding a wired instrument would be costly or impractical. As a result, an operator has to check each valve periodically. If he finds a valve is missing the "sock" that usually covers it, he reports that the valve has been tripped – in other words, there was an emission.

The problem is that you have no way of knowing exactly when the emission occurred, for how long, or how much was released – only that it occurred sometime after the previous operator round. An audit by regulators could result in a penalty for the entire period since the last check, even if the emission occurred only a few minutes before the operator checked the valve.

To avoid this problem, you could install a wireless measurement transmitter next to the relief valve and send the information to a data historian in the control room. You'll have documented proof of exactly when any emissions occurred and how long they lasted.

Engineering the possibilities

We've looked at only a few examples of how wireless technology can help improve plant and process operations. The possibilities are almost limitless. They range from process control, equipment monitoring, environmental monitoring, asset management, device diagnostics, and energy monitoring/management to asset tracking, improving productivity of mobile workers, and security applications.

All you have to do is think of all the things you've always wanted to measure, manage, control, or track but couldn't justify the investment. Chances are that now you can.

What improvements are other users engineering with wireless field networks today?

- **Detecting condensate buildup in steam lines.** It's not uncommon for pockets of condensation to collect at various locations along a steam line, creating a potential "water hammer" effect that could damage the pipeline or downstream equipment. By placing wireless temperature sensors at various points along the steam line, however, you can watch for temperature gradients that indicate condensate buildup – and take action before damage occurs.
- **Monitoring filter fouling.** Strainers used to collect particulates in pipes can become plugged over time. Instead of having operators manually check the strainers periodically, you could add wireless sensors to measure differential pressure across the strainers and send the information back to the control room – so operators can clean each strainer only when necessary.
- **Monitoring rotating equipment.** Typical maintenance procedures for fans, motors, and pumps in process plants call for technicians to collect vibration and other machinery-health information on a periodic basis – for example, once a month. The longer the period between data collection rounds, the greater the risk of unexpected changes or even equipment failure. With wireless vibration and temperature sensors, on the other hand, you can get a real-time indication of anomalies to help prevent unplanned shutdowns.

Any temperature, pressure, level, flow, or analytical measurement is a possibility. Less traditional but still valuable applications might include monitoring corrosion in pipelines to help predict where leaks may occur, or current draw in motors to help optimize energy usage.

Summary

In this course you've learned that wireless technology lowers the cost barrier to accessing additional information – information that enables you to reduce costs, solve problems, and improve your operation. Key points include...

- Wireless technology not only avoids cable costs, but also associated costs for engineering, installation, commissioning, and related infrastructure.
- Automating data collection can eliminate labor-intensive, error-prone manual methods of gathering the information.
- Diagnostic data from existing HART instruments can also be collected wirelessly, increasing maintenance productivity and enabling early detection of potential problems.
- Remote inventory monitoring, easier environmental compliance, and improved record-keeping are only a few of the potential applications that answer the question "Why wireless?"