Buses 203

HART, FOUNDATION fieldbus, analog, or a combination?

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Overview

Which communication protocol is right for me?

Both HART and FOUNDATION fieldbus carry digital information that can make a real difference in your plant's bottom line. So which should you use for your next project?

Although some feel FOUNDATION fieldbus is best in new construction or major expansions, and HART is best in existing plants, the choice is not necessarily an either-or decision. For many new projects and existing plants, the best choice will include both HART and FOUNDATION fieldbus.

This course outlines several factors that should guide your decision — including both plant and project considerations.

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

- *In an existing plant, what factors may influence your choice of protocols?*
- *What project factors may make HART most cost effective on a new project?*

- *What conditions would justify the cost of training personnel to use new technology?*

Existing hardware

Many process automation projects involve upgrades to existing plants. Compatibility with existing equipment and other hardware infrastructure will therefore be a factor in your choice of communication protocol.

Host system compatibility. Many plants have process automation systems that don't currently support FOUNDATION fieldbus.

In some cases upgrading the existing system to support FOUNDATION fieldbus is cost-effective. If so, both HART and FOUNDATION fieldbus should be considered.

If upgrading such a system isn't practical — or possible — then HART is usually the first choice.

Wiring compatibility. FOUNDATION fieldbus and HART both use the same type of wiring — typically individually shielded, twisted wire pairs.

If existing wire infrastructure is near or at capacity, however, adding a significant number of HART devices may require pulling additional cable or even installing additional cable trays or conduit.

In those cases, converting some small number of existing analog or HART twisted pairs to FOUNDATION fieldbus can expand wiring capacity and eliminate the need for additional wiring infrastructure.

Inventory. Existing plants may have an inventory of spare devices that already use HART protocol. Adding FOUNDATION fieldbus devices can increase the types of spare parts needed.

For new plants, however, a FOUNDATION fieldbus implementation may result in fewer total spare parts than with HART alone

Existing skills and practices

Hardware isn't the only form of "infrastructure" that will shape your choice of protocols. There's also a human and procedural infrastructure to consider.

Plant skills. Existing plants have engineering and maintenance skill sets based on installed equipment, which has traditionally been 4-20 mA and HART. Installing equipment that uses a different protocol may require training and expanded skill sets.

If using a new protocol doesn't bring significant project or operational benefits, it may be more efficient in the short term to stick to what you know. But if project or operational benefits are greater using the new protocol, then it's well worth training plant personal in the new skill sets.

Even if your plant already uses HART, you may find that its digital information is either not available or not used. In that case, additional training is required regardless of protocol choice to achieve the value either HART or FOUNDATION fieldbus can deliver.

Plant practices. Traditional plant practices are designed around 4-20 mA analog. Using FOUNDATION fieldbus in an existing plant will therefore require some changes.

Many plants have HART installed, but are using it as though it is 4-20 mA. In these plants, plant practices will also need to change to realize the most value from the HART protocol.

That shouldn't prompt you to choose analog-only instruments, however. There's generally no cost difference between HART devices and comparable analog devices, and the HART benefits can be obtained at a later time.

But don't wait too long. Both HART and FOUNDATION fieldbus benefits are ongoing. Postponing use of the digital information will therefore cost the plant money on an ongoing basis.

The PlantWeb advantage

In PlantWeb architecture, HART and FOUNDATION fieldbus can be used individually or mixed in the same plant, on the same controller, or even on the same loop. Control configuration uses the same tools, and configurations can be moved freely between HART and FOUNDATION fieldbus. AMS Suite: Intelligent Device Manager software is also available for both HART and FOUNDATION fieldbus.

The net result is that your choice of protocol is determined by your plant needs, not by limitations in your process automation architecture.

Special equipment and information needs

Process or operational requirements may determine the choice of protocol in parts of a plant.

For example, HART has been available much longer than FOUNDATION fieldbus and may offer device types not yet available in FOUNDATION fieldbus.

FOUNDATION fieldbus, on the other hand, provides process parameter status information and some diagnostics that aren't available using HART. If this information is important to plant operation or maintenance, FOUNDATION fieldbus may become the protocol of choice.

Project costs

For major plant expansions or "green-field" projects, compatibility with existing infrastructure is less important. Project costs become major drivers in protocol selection.

Project infrastructure costs. Reductions in infrastructure cost using FOUNDATION fieldbus have been well documented. These costs usually center on the cost of wiring, cable trays and conduit, control room space, and junction box space.

The size of these savings will depend on the geographic size of the plant and the number of points in the process. This is because wiring costs increase as distances increase. Control room costs increase with I/O count, due to marshalling panel and rack room space requirements.

If wiring runs are short and total I/O count small, HART may be more cost effective. There are project savings estimators available that can help you calculate project savings.

Total installed costs. Total installed cost takes into consideration not only infrastructure costs, but also device costs and engineering and labor to implement the project. FOUNDATION fieldbus can reduce engineering and commissioning costs, while HART may reduce device cost.

Total installed cost for FOUNDATION fieldbus can be up to 30% lower than using analog, and also lower than HART. For upgrading an existing all-analog plant, however, using HART may cost less than using FOUNDATION fieldbus due to reduced host-system upgrade requirements.

Project schedules

Project labor hours — as well as total time to startup — also impact costs and therefore the choice of protocol.

FOUNDATION fieldbus can speed project schedules by reducing engineering and commissioning time and resource requirements.

This may translate into an earlier startup. Incremental production due to faster startup may justify a FOUNDATION fieldbus project independent of total installed cost.