Smooth talk among disparate devices

BY DAN DUMDIE

Interoperability allows instruments from different suppliers to openly communicate and run standard control configurations on a single Foundation fieldbus (FF) segment.

Interoperable fieldbus devices all speak the same language, regardless of the manufacturer. They communicate and operate without costly, complex translators, or "gateways." This enables "plug and play" operation.

Devices achieve interoperability without limiting the instrument supplier to a fixed set of control algorithms. Interoperability does not limit manufacturer innovation, nor does the FF specification. No other competing bus on the market today offers these capabilities or level of instrument interoperability.

Let's look at how users can achieve this and be assured interoperability will work as advertised.

DEVICE DESCRIPTIONS

Device descriptions (DDs) come with every fieldbus instrument and provide supplier specific information about the device. DDs are analogous to device drivers in a PC.

Using device drivers, a PC operates different peripheral devices such as printers and video adapters. Likewise, using DDs, a fieldbus host operates and communicates with any supplier's fieldbus instrument.

DDs supply information about the field device, including its operating procedures and the parameters associated with its function blocks. For example, DDs provide descriptions of any additional parameters associated with a vendor-specific, proportional-integral-derivative control algorithm, possibly including parameter engineering units, menus for diagnostics or data calibration, help information, and other data pertinent to the application.

Instrument suppliers provide incremental DDs for function blocks that contain additional parameters than those defined by the specification. These become a supplement to standard function block DDs.

Suppliers typically provide them on a CD-ROM, which users copy to their host's hard drive. However, DDs can also be stored in field devices for upload over the fieldbus to the host, if the instrument supports this service. In short, DDs provide additional device information needed for instrument interoperability.
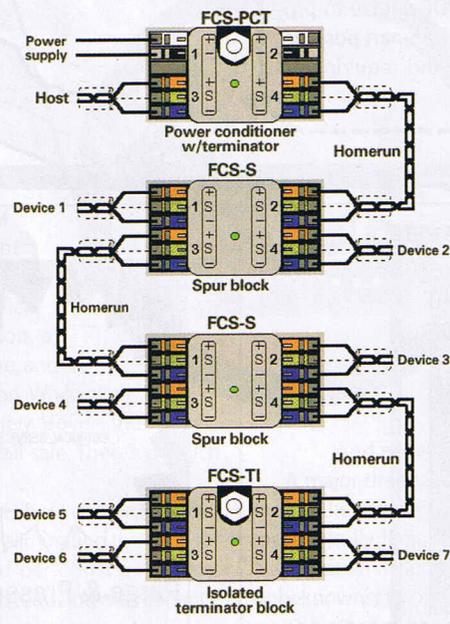
FUNCTION BLOCK SPEC

Because DDs provide information regarding function block operation, it stands to reason there must be a standard function block specification to implement control configurations. Only then can you achieve true interoperability.

The function block is a common structure that defines input, output, and contained parameters required for each specific block's algorithm. In addition, function blocks standardize handling alarms and events. They even standardize the diagram used for control configuration. Function blocks also support built-in schedules to synchronize control configuration execution times and bus communications.

With a standard function block specification and DDs, the host computer consistently downloads control configurations and other data to field instruments. Likewise, the host can also access field information regardless of instrument supplier. In effect, the function block specification and DDs become the essence of fieldbus interoperability.

Fieldbus connection system (FCS)

FCS-PCT

Power supply

Host

Power conditioner w/terminator

Homerun

FCS-S

Device 1

Device 2

Spur block

Homerun

FCS-S

Device 3

Device 4

Spur block

Homerun

FCS-TI

Device 5

Device 6

Device 7

Isolated terminator block

Source: Relcom

INTEROPERABILITY TESTING

Software development errors, or specification misinterpretations, can lead to problems affecting an instrument's interoperability. Therefore, each device introduced into the market must go through rigorous testing to ensure its compatibility and adherence to the fieldbus specification. After completing and passing the test, the FF awards its logo "check mark" indicating device registration.

Instrument manufacturers can write their own communication stack software, or they can buy it. Once a stack has passed the conformance test, any manufacturer's instrument may use it. However, each new revision must resubmit for conformance testing.

Interoperability testing is function block specific, and testing takes place on each block in a field device. The Fieldbus Foundation requires devices from two different suppliers that contain the same function block but different communication stacks to pass the interoperability testing process before it will register any device with that block.

This overall fieldbus device testing checks virtually all aspects of hardware and software integration. In the eyes of the end user, this adds integrity to each instrument that passes the rigorous testing process.   IT

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