# USER GUIDE EASES DEVICE MANAGEMENT AND MAINTENANCE PRACTICES

*Putting FDT Technology to Work - Starting with a Single Device*

## OVERVIEW

When a device is suspected of having a problem, don't grab the work order and go out into the plant to "see what might be wrong." There is a more productive approach! This "user guide" outlines an alternative proactive maintenance method, using the smarts in your current installed intelligent devices with FDT® Technology doing the troubleshooting work for you! Focusing on brownfield applications using legacy 4-20mA systems, we will identify a path for you to jump start your maintenance strategy for your installed assets starting with just a single device (or point to point) connection. This paper will motivate maintenance team members and encourage them to use a PC and a FDT enabled configuration application (free), to configure and diagnose a single device enabling lower maintenance costs and increased plant reliability.

## INTRODUCTION

The challenges in the world of industrial automation can be overwhelming. Between the need to be competitive, the reduction in the experienced work force, the ever changing regulatory compliance landscape when combined with decreasing budgets to upgrade automation systems are enough to make you skeptical about trying something new. Most new solutions typically require a "rip and replace" mentality and come with a high degree of risk. What if you can reduce the risk, reduce the cost and implement a strategy that delivers significant return on investment – with little to no replacement?

Our focus is the 20-40 year old brownfield facility which is using legacy control systems (analog-only systems) and most likely has installed intelligent devices using HART communication which connects to the control system using the 4-20mA signal for the process variable. Discussions will show how these facilities can reap the benefits of changing to a better device management and maintenance strategy that uses a single measurement device – sometimes called point-to-point information access.

This paper will introduce you to FDT Technology by guiding you through the process of getting started with a single intelligent device. You will see that by better utilization of your current intelligent instrument assets, you can enable a maintenance strategy transition from "fixing what's broken" to "fixing before it breaks." With a click on your PC's keyboard, you will change the way you look at a smart device that is currently sitting "isolated" in your facility. Let's start with some basic information on this enabling technology and what it can do for you!

## ENABLING TECHNOLOGY

Like many technologies, FDT is not a technology you buy off the shelf. This standardized technology is embedded into applications and software that you specify as part of the automation products and host applications you use to monitor and control your facility. The technology enables access, visualization and use of information from intelligent or "smart" field devices on just a single point or single device application and is scalable up to thousands of devices depending on the facility and needs of the application.

> **Enabling Technology by Wikipedia**
>
> Equipment and/or methodology that, alone or in combination with associated technologies, provides the means to increase performance and capabilities of the user, product or process.

Enabling technologies are interesting because the benefits or results of using them are directly linked to the degree they are used. For example, the benefit of using a computer (an enabling technology) is a direct result of how you use it and the action you take as a result of the information obtained from its use. Likewise, the ability to configure a smart device for a specific application is just the beginning of the benefit that the enabling technology inside the device can deliver. The more you use the information to make informed decisions, the more benefits and value you will receive.

By selecting and specifying devices and applications that include FDT Technology, you are enabling the access and use of information from your intelligent field devices to help you better maintain your devices. Look for and ask your automation suppliers if they are a member of the FDT Group and if their products include FDT Technology.

## FDT TECHNOLOGY OVERVIEW

For more than 10 years, FDT Technology (IEC 62453, ISA103, and GB-T 29618) has been enabling plants of all ages and sizes, powering the information integration from a host to intelligent devices independent of the fieldbus/communication protocol, and system (host) and device supplier used. Simply put, FDT can integrate any device on any system over and through the majority of the open communication protocols. Maximizing investments in intelligent field measurement and control devices enabled with FDT Technology have been well documented by end users in "*A Broad Array of FDT Offerings Simplifying Any Industrial Installation*." This makes good sense to most engineers and plant managers, but they naturally gravitate to the next question – how does it work and, what are the basic components of FDT Technology?

We'll start with a new way for you to visualize device health and diagnostics and enable ease of



configuration facilitating a more productive maintenance strategy. All this starts with a software application known as a device DTM.  Like a printer driver, devices have a device driver that provides all the internal knowledge of the device (DTMs are created/supplied by the device supplier). A device DTM can be specific to a device or a family of devices and to any number of communication protocols such as HART, FOUNDATION fieldbus, Profibus, etc., that the device uses for communication to a FDT enabled host application (more on this below). In essence, the device DTM is a
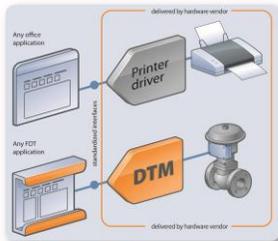
software file that contains the user interface and any diagnostics and processing functions the device manufacturer chooses to provide.

The device DTM is used by the Frame Application (supplied by the system supplier). The Frame Application is somewhat analogous to an internet browser – one browser of your choice to access many websites and applications – and is the interface for all your intelligent devices. A DTM is represented within the Frame Application (see graphic at right) as a graphical interface to allow the user to manage the device. A Frame Application typically renders one device at a time, with most supporting multiple windows allowing simultaneous interaction with multiple devices. The Frame Application stores or hosts the device DTM(s) and supports management of all connected smart devices. The Frame Application is generic so the user can select the best Frame Application independent of device or system supplier. In this paper, we will refer to the FDT enabled Frame Application as a configuration application.
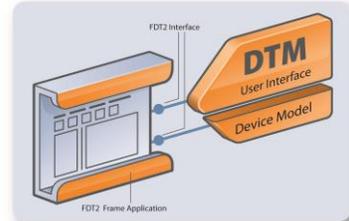
Engineers and managers have a natural affinity for understanding the components of the technologies they deploy. While it is helpful to understand how something works, it is clear that the basic components and concepts of the FDT Technology are quite familiar (browser and driver) and simple to use. FDT Technology can truly simplify how you manage and maintain devices deployed in your facility.

## GETTING DTMS

To see if your installed intelligent devices have DTMs, check the FDT Group DTM product catalog where you can find 7,500 device types supported by certified DTMs. DTMs are available from the device supplier or may be included with their device or application. Another option is to ask your suppliers if their DTMs are available from their website. In most cases DTMs are available as a download. There are two use cases to consider – DTMs for your exiting devices and DTMs for new devices as they enter the plant. Your suppliers will identify the best way for you to request or download DTMs for both use cases.

## GETTING AN FDT CONFIGURATION APPLICATION

Now, you need to select a configuration application that meets your needs. There are more than 40 FDT enabled configuration applications available today ranging in price, flexibility and capability. If this is your first attempt to communicate with an intelligent device using a PC, you might want to download one of the free or evaluation applications available from some automation providers. PACTware, fdtCONTAINER Application, FieldCare and FieldMate Lite are examples. These applications come standard, out of the box enabled to perform on-line/off-line device configuration, diagnostics and device reports and most applications have quick start features or wizards
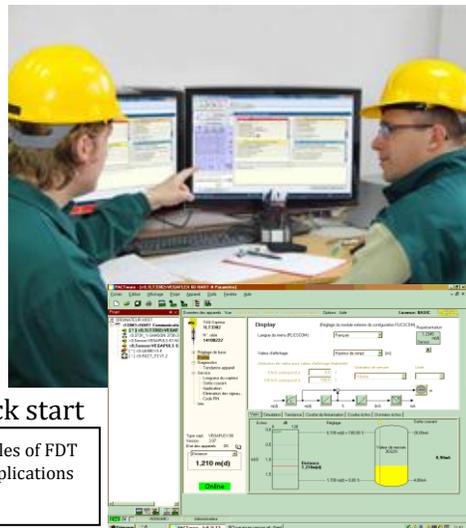
Screenshots show examples of FDT enabled configuration applications with DTM.

that will quickly help you connect and configure the attached device. Be sure to have the specific application requirements for your device such as; device tag, measurement range, alarm set points, failure mode, etc., which are needed for configuration.

The cost of the configuration application is often a deciding factor. As mentioned above, these applications come in many sizes, capabilities and flexibilities. Costs range from free and no-charge evaluation trial versions to +$5,000 depending on factors such as tag count and capability. It is important to note that these applications are scalable and can expand as your needs change – without having to start from the beginning.

Below are some additional FDT enabled software applications you may consider: Field Device Manager (Honeywell), FieldMate (Yokogawa), FactoryTalk AssetCentre Process Device Configuration (Rockwell Automation), Foxboro Field Device Manager (Schneider Electric), FieldCare (Endress+Hauser), PACTware, fdt CONTAINER application (M&M Software) and several others. Ask your automation provider for their offering.

## GETTING STARTED WITH A SINGLE DEVICE – WHAT YOU WILL NEED

Okay, so you know you have an intelligent device and you want to do more with its information. Chances are you have been using a handheld configuration tool to do the device configuration. That's a good start but in addition to being 'difficult' to navigate, it does not easily enable the full capability of the device. With a few additional items including some you might currently have on hand, you can be on your way to better asset utilization.  For this step-by-step example, we will use a device that has HART protocol and show how you can make better use of the device's available information.

***Here's what you will need in addition to your HART enabled, 2-wire measurement device:***
- Power supply – usually 24VDC
- Modem – typically a USB or Bluetooth HART modem for our example
- Dropping or load resister – typically 250 ohm
- PC or notebook and a device configuration application (Frame Application in FDT terms)
- A DTM for the specific device



How to hook-up and connect to a HART device
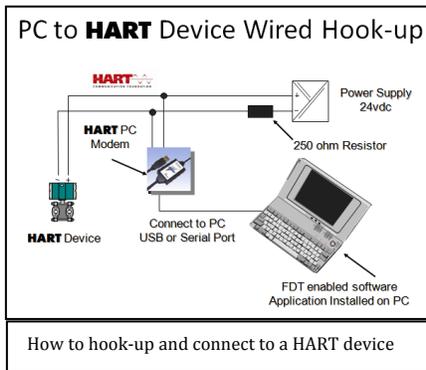
***Here's what you do:***
1. Install the Configuration Application on the PC.
2. Install the modem (usually a USB external modem) and the associated software driver.
3. Connect the dropping (or load) resister in series on one leg of the power supply.
4. Connect a 24VDC power supply to the device and to its power source (USB or 110-220VAC).

Open and run the configuration application as instructed. If necessary, install the device DTM into the application and follow the instruction wizard on how to access / communicate with the device to see the device parameters. You are now connected! And remember, FDT Technology is an open standard, meaning the configuration application is independent of device supplier, protocol and system supplier providing greater interoperability.

If the device is already installed and is loop powered, another new way to access information is to use a wireless Bluetooth modem communicating to a device configuration app on your Android mobile tablet. By connecting the modem as stated above, this solution makes accessing device status and diagnostics quick and easy.

If you are feeling comfortable with your first device, hook up another device using its DTM, and then another. Soon you're going to be considering other solutions to connect to more than one device at a time.  Remember FDT is flexible and scalable based on your needs.

## INFORMATION IS KEY

Now that you have the ability to download and install DTMs on your application and can connect to an intelligent device, you should be able to configure the device. But again, remember that your FDT enabled software application is capable of much more. In addition to device configuration, you gain access to device diagnostics, troubleshooting tools, enabled applications (Partial Stroke Test of Valves – see image - or Echo Curves for radar level), diagnostic wizards, process information (plugged impulse lines or temperature to high / low), device status (over range or output hold) and in many cases an interpretation of how each of these types of faults can affect device operation.

Your challenge is to use this information to avoid unplanned shutdowns, early detection of pending problems, the opportunity to fix a problem when it is small and fixable, remote access to the device avoiding unnecessary trip to the field and more. Using this information is the key to lowering operational costs and improving plant reliability.
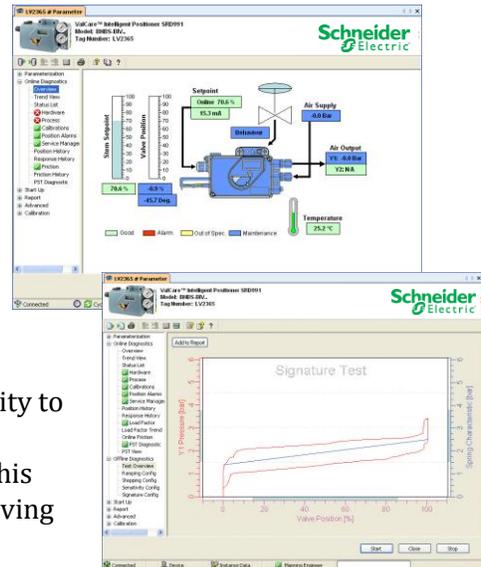
## CHANGING THE WORK PROCESS

When a device is suspected of having a problem, the current maintenance culture might be to grab the work order and go out into the plant to "see what might be wrong". Does this sound familiar? Let's change the work process to first connect on the 4-20mA signal wire with your PC application and your modem (no power supply of load resister needed because the device is now line-powered). Since the HART signal is everywhere on the 4-20mA wire (remember we chose HART devices for the purpose of this paper), you can attach to the HART signal from the device in a nearby junction box, relay or marshalling cabinet or panel, control panel or, if necessary, at the device. You

will not disturb the analog signal to the control room and if there is another HART host system connected, the protocol allows for a secondary host to be attached to the loop.

Now you are enabled and can look into the diagnostics of the device to see what it knows about itself, the process or its environment. Some applications also provide tips or suggestions as to what might be wrong and suggests possible corrective actions.

## INTELLIGENT MEASUREMENT AND CONTROL DEVICES AS PART OF A MAINTENANCE STRATEGY

It is reported that an estimated 80%-90% of all process measurement and control devices shipped today are intelligent. These microprocessor based devices enable configuration, diagnostics, troubleshooting and many other functions.  As mentioned, their benefits do not stop when you simply configure the device for its intended application. True, these devices tend to be more reliable, accurate and require less adjustment than analog-only devices were in the past. Now, think about the added benefit they could provide if they helped you avoid an unscheduled shut down!

There are several maintenance strategies that can influence the operation, performance and reliability of the plant.  When looking at maintenance practices, the following definitions can help align your newer maintenance strategy approach:

- Reactive - fix it when it breaks, Preventative – scheduled maintenance activities,
- Predictive – based on diagnostics or alerts and is an optimized preventative schedule using historic and statistical data,
- Proactive – based on actively modifying or designing out bad acting or poorly implemented assets.

As you transition your maintenance strategy from fixing what is broken to a strategy that is driven by the condition of the device, you enable your operation to avoid unnecessary shut downs and circumvent added cost to the enterprise. This will most likely require a change in the maintenance culture.

## CULTURE CHANGE

A maintenance strategy transition requires a shift in the way you look at your assets including your intelligent devices.  It is common for maintenance organizations to set their work priorities based on what is not working rather than what is working and telling you that you potentially have a critical pending problem. Early detection or notification is more likely to be a lower total cost to repair and faster to employ. But this shift requires a change in the culture of the entire operation – not just the maintenance or instrumentation shop. Operations and unit management must buy into this change and encourage more work to be done based on predictive or proactive information – not based simply on a reaction to what is broken.

Changing the culture is difficult but it can be done. Recent HART Plant of the Year award winner, **Shell Scotford Upgrader** in Alberta, Canada documents their journey in the Automation World article, "*Asset Management + Work Procedures = Value for Shell*" describing how they changed the culture and as a result experienced significant improvements to the bottom line. Changing the maintenance culture is a process that does not change overnight. Be patient because it is a change worth taking!

## THE VALUE PROPOSITION

Starting out small is a fast, low-cost, low-risk value proposition. We all know that nothing is likely to change if we keep doing things the same way. There are many well documented success stories where users are saving millions by tapping into and using the information from their intelligent field devices. Be sure to check out the recent article on "*The Hidden Layer of Device Interoperability*," describing user benefits gained from FDT Technology enabled devices and applications. You too, will gain valuable information and knowledge about measurement assets that are running your plant.

Change is hard, but enabling technology like FDT gives you the ability to start small with low cost and low risk, while retaining the ability to expand. In future papers, you will learn that the same configuration application can grow and expand to be used when you transition to multiple device solutions such as multiplexer, remote IO and even wireless gateways that are used for more advanced asset management applications.

Start putting FDT Technology to work today! Visit the FDT Group website to learn more about the technology and then contact your automation and device providers to see how their FDT solutions can be part of your maintenance strategy as you transition from a "fix when broken" approach to "monitor, maintain and fix before it breaks" scenario to maximize your installed assets.

**References –**
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