DEVICE INTEGRATION STRATEGIES

Simplifying device-level networking with FDT

2015 - 4 Issue

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Major Pulp Plant Slashes Maintenance Costs and Downtime

Diagnostic data let technicians pinpoint valves that needed repair at Chilean Santa Fe mill.

Every facility shutdown for maintenance is a major investment of time and resources. However, new tools on the market can be used to optimize improvement of maintenance practices. This is especially true with valve maintenance.

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In This Issue

Chairman's Corner

FDT and OPC UA – Interoperability from Sensor to Cloud

The FDT standard has a unique position in the automation architecture. It sits at the intersection of the variety of networks attached to intelligent devices and the higher level systems requiring interaction with the devices. While the FDT standard is normally thought of as the enabling technology that allows interoperability across the variety of networks and devices, its position at this juncture makes it the secure central clearing house for topology, health, diagnostics, real time values, and other valuable information.

Architectures such as IIoT, and Industrie 4.0 crave access to information to which an FDT application has ready oversight. So how can we

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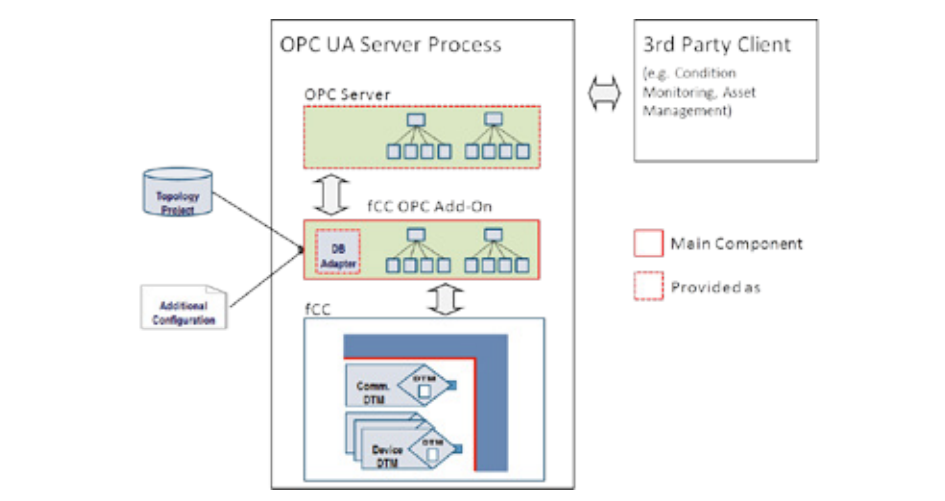
Chairman's corner *continued*

make this information more available across the enterprise? Enter another ubiquitous standard in our automation architectures – OPC UA (Unified Architecture). The OPC UA standard provides the secure and reliable exchange of data between client applications. The FDT Group and the OPC Foundation have been collaborating to provide off-the-shelf interoperability between these two great standards. Our joint technical working group committee has released a substantial body of work to the two organizations – it is my pleasure to give you a brief preview.

The FDT standard incorporates the notion of a plant hierarchy based on the physical network topology as well as a logical topology. The network protocols in the industry; as known to the FDT standard, allows an FDT enabled Frame Application to talk with any device. This includes the ability to transparently tunnel through any number of disparate networks to gain access to the end device. Beyond normal real time data, the FDT interface application also has access to commissioning, diagnostic, prognostic, and other higher level data. To make these rich data sources available to an OPC UA architecture, the data has been mapped to the OPC UA data model to present it in a standardized fashion. The FDT Frame or host application is then configured as an OPC UA server.

OPC UA based applications that wish to gain access to the information available from the FDT OPC UA server take on the characteristics of an OPC UA client. The client requests a secure connection with the FDT OPC UA server and begins to access topology, health, real-time, and other data from the well-connected FDT UA server. Any number of clients may gain access, limited by the capacity of the server and underlying network bandwidths.

It is interesting to think about the possible applications for the OPC UA client that is connected to the FDT Frame or host system. Consider an off-the-shelf OPC UA client mobile app that can be deployed on an Android or IOS based device. The user can then take their tablet, pad, or mobile phone into the field or onto the plant floor to gain access to device information critical to keeping the application running or bringing it back on line in an expeditious fashion. All of this is possible without any custom code or other applications thanks to the well defined interfaces between



FDT Tech Tip:

User Guide Eases Device Management for Operational Optimization

Putting FDT Technology to Work – Management of Multiple Smart Devices

Latest DTM Collection from Yokogawa Enhances Versatility

Yokogawa just released its latest DTM 2015 collections for its HART, FOUNDATION™ fieldbus and PROFIBUS PA field devices. To enable efficient device configuration and management, all DTM's feature an off-line and on-line mode. They also offer a clear, user-friendly navigation structure. Further, the configuration details both off-line and on-line, which can be printed using an integrated printing module.

Yokogawa

Chairman's corner *continued*

FDT and OPC UA. Of course the OPC UA client can also be bolted on or built into higher level applications to provide previously unrealized access to real time information.

While the FDT OPC UA server has been depicted so far as a source of information, the combination of the FDT standard and the OPC UA standard also allow the FDT Frame or host to receive information via the OPC UA client. This opens up the possibility of an OPC UA enabled commissioning or diagnostics tool to set values in the intelligent device without bothering with network cards, protocol stacks, and network topology, for example. Devices can be referenced from the FDT plant topology and have appropriate settings updated with the swipe of a finger.

Security in an interconnected architecture is a front and center topic that our architects have taken into consideration. While IIoT and Industrie 4.0 will bring more requirements and specificity to the topic, the current architecture supports authenticated and encrypted communication channels between the FDT Frame and the OPC UA client. The FDT role based security provides an additional level of authorization required for the various layers of the workforce in a typical customer environment. As additional standards and requirements emerge, we will continue to enhance our security posture.

Our next step in the melding of these two great standards is to integrate this body of work into our developers' toolbox known as FDT Frame Common Components. This will provide a highly engineered and well tested engine that can be easily deployed in all off-the-shelf FDT enabled products. Stay in touch with your automation supplier to take advantage of this lush source of portable information from your existing automation architecture.

A joint press conference and demonstration by the OPC Foundation and the FDT Group is scheduled at the upcoming 2015 SPS Fair press conference on **Wednesday, 25 November at 10:00 in Room Prag (NCC Ost, Level 2).** Join Glenn Schulz of the FDT Group and Tom Burke of the OPC Foundation as they demonstrate the seamless interoperability of FDT with OPC UA from the sensor to the cloud. Visit the FDT Group on the tradeshow floor, located in Hall 2, booth 550. We look forward to seeing you there.

Lee Lane
Chairman of the FDT Board of Directors

Chemical Manufacturers Gain Operational Efficiency and Maintenance Predictability

Softing's broad portfolio includes diagnostics that reduce network failures. Softing's comprehensive and reliable portfolio of products for plant asset management and integrated PROFIBUS diagnostics let customers operate and maintain their industrial networks more efficiently while reducing the risk of network failures.

Softing

On Demand Webinar:

Integrating Device Intelligence: Providing the Competitive Advantage

Major Pulp Plant Slashes Maintenance Costs and Downtime *continued*

Metso is a valuable partner with specialized shutdown services that can identify which valves need attention, eliminating unnecessary maintenance work.

Putting experience into practice

Empresas CMPC S.A. is a Chilean integrated forest industry company and the world's fifth largest producer of pulp. The company's Santa Fe mill produces bleached eucalyptus on two fiber lines. When preparing for a general plant shutdown of fiber line 2, the mill asked Metso for help identifying which of the many valves in the mill needed service. The mill entered into a predictive maintenance contract with Metso's local service center.

Intelligent devices and FieldCare

On Santa Fe's fiber line 2, 74 control valves were identified as critical. With the help of Metso FieldCare, Metso Valve ManagerTM DTM and the Metso's Smart Device Check service, Metso service team collected data on the valve's performance.

Metso FieldCare is a stand-alone condition monitoring software for the configuration and diagnostics of any FDT/DTM capable intelligent device. All the selected valves had been equipped with Neles ND9000 intelligent valve controllers when the line was built. The ND9000 is a FDT/DTM enabled smart, reliable and future-proof positioner that supports the HART Communication Protocol.

Metso's Smart Device Check, based on diagnostic data collected by Metso's intelligent valve controllers and Metso expertise, reveals the condition of valves and focuses maintenance actions on those with the worst performance. This service is available for all valves equipped with Metso's controllers.

Only 10% of the valves needed extensive work

Of the 74 valves, Smart Device Check analysis showed that just seven needed to be taken out for maintenance and nine more required only minor servicing. Afterwards, Metso helped to develop the list of spare parts needed for shutdown so delivery could be quick, which further helped to reduce costs.

Good return on investment

Correct spare parts were ordered well in time for the shutdowns, and predictive maintenance costs were slashed by reducing the number of valves taken out of the process. The small number of valves removed from the piping also decreased incidents related to safety and environmental aspects. Additionally, Santa Fe reported savings by reducing the spare part stock and reducing the purchasing administrative time.
Javier Gonzalez, Electrical & Instrumentation Superintendent, comments: "The optimization of costs related to maintaining the control valves, based on the information delivered by a predictive maintenance philosophy, allows us to allocate resources to other important activities in the mill. The best was that this service was carried out during normal mill operation time without disturbing the process."

The following year, Metso analyzed information from 146 intelligent valve controllers. During shutdown, 27 valves were taken out for maintenance on site, based on information gathered through Metso FieldCare, Metso Valve ManagerTM DTM to Smart Device Check service.

SUPCON Asset Management Upgraded to FDT2

SUPCON announces the latest release of its DCS asset management application, SAMS, that includes full FDT2 functionality. The new SAMS application makes full use of the FDT Group developed and tested Common Components to ensure the best compliance and interoperability. SUPCON is a leading DCS supplier based in Hangzhou, China and is a member of the China FDT Group Association. Its business covers automation of the process industry, urban information, engineering design and consultation, digital medical, science instruments, robots, equipment automation, new energy, and energy saving fields.

SUPCON

FDT Group Video:

FDT Incorporates a New Standard, FDI

Glenn Schulz, Managing Director of the FDT Group provides an updated overview on FDT Technology and discusses how FDI is incorporated in the FDT Standard.

To Repair or Replace the Device - That's the Question!

Decisions in the final phase of the life cycle of a device can influence operations, quality and performance. This article identifies some of the pros and cons that should be considered when making the major device repair or replace decision and explores solutions that will significantly guide the decision making process.

Managing the forever evolving plant lifecycle infrastructure is a commitment and challenging job especially with business drivers such as: reduce downtime, improve plant reliability, lower operation costs and regulatory compliance in areas of safety and environmental issues. The balancing act is not an easy task, especially when it comes to a measurement and control device in the last phase of its lifecycle (article 3 of 3 in the lifecycle series) where possibly uneasy decisions must be made – do we invest in a major repair, or do we replace?

Both old and few facilities have their own rules or guidelines regarding the major repair or replacement of a device which makes it impossible to suggest hard-and-fast rules on the subject. This article identifies some of the pros and cons that should be considered when making the major repair or replace decision and discusses the role that a FDT enabled device and device management tool can play in helping you through the decision making process. Knowing that there are costs and risks associated with both options, it's important to be educated when pondering the "end of the road."

To Repair or Not to Repair

If the specific device falls into the category of being a "bad actor", then the decision to repair or replace becomes straight forward. But if a device shows early signs of potentially having a serious problem, like possibly causing a shutdown, how do you justify the cost and resources to repair or to replace?

There are many different strategies regarding this topic including "repair at any cost" or "run until it dies" and then replace. Also, common today is a deferred maintenance strategy which is a practice of deferring maintenance to the next month or next quarter or when more budget money may become available. Deferring needed repairs is risky and comes with its own set of issues as it might eventually lead to a higher cost, causing other assets to fail or in some cases might have safety or environmental implications.

Factors for Consideration

- As mentioned, the decision to invest in a major repair of a measurement device or to replace it can be based on a number of different factors:
- Maintenance history – count work orders to see if you have a problem child, bad actor, or if the device is just starting to show symptoms of a problem.
- Age of the device – has it outlived its usefulness or is it in need of some TLC.
- Availability and cost of spare parts – if parts are no longer available, no repairs are possible.
- Technology or capability of the device – newer technology may provide better performance and possibly more features or options.
- Labor cost - for removal and replacement compared to repairing, rebuilding and calibrating.
- Expertise required for device replacement or repair – repair in-house or bring in a specialist.
- Risk management based on the criticalness of the device – is there a significant risk that the device could shut down the plant or cause other problems?
- Equipment downtime – does the repair require a shutdown?
- Software or firmware updates – are updates available which may solve the problem. If so, what is the cost?
- Device ability to meet the required specification – due to age, wear-and-tear or just not being able to calibrate to required performance standards.

To Repair or Replace the Device - That's the Question! *continued*

Many companies use a 50-60 percent rule for repair or replacement decisions. If a repair cost is more than 50-60 percent of the cost of a new device, it is replaced. And, if the device performance (accuracy, drift, repeatability, etc.) is not acceptable, the device may need to be replaced. Each facility most likely has a policy that dictates this ratio based on a mythology or practical experience.

In addition to the above, there are other issues or costs that are more related to the "total cost of ownership" that might have an influence on the decision. Focusing exclusively on the direct repair or replacement cost may lead to less-than-desired long-term results. Consider these other more indirect costs:

- Will a new device provide a change in product quality?
- Could a replacement device improve the efficiency of the process or production?
- Are there safety or environmental issues to consider?
- Can the failing device cause a loss of production – failing to meet customer expectations?
- Will a new device provide an opportunity to transition to a smart device to contribute to a more preventative maintenance strategy?
- Does the replacement better support corporate guidelines, policy or standards – i.e. drive toward the Industrial Internet of Things, or best-in-class production?
- Consider the life expectancy of the unit operation or plant.
- Will a replacement device improve measurement stability, accuracy and reliability?

Device Repair & Performance History

In an older brownfield plant (20+ years old), many devices may be reaching the end of their lifecycle. Repair may be a forced decision due to limited budgets for replacement or lack of resources to engineer and execute a replacement. If the device is analog or non-smart, a review of the maintenance history and repair logs for the device may be a good indicator of the condition and repair ability of the device. There may also be some historical repair experience among technicians that can shed some light on what it takes to repair the device.

If the device is smart (and the majority of devices deployed in the past 10 years are), meaning it can communicate and provide diagnostic information, it is best to start with asking or communicating with the device for its available status, diagnostic or performance information – indicating the health of the device based on digital data. This is where **FDT Technology** can have a significant impact on the repair or replace decision.

Using a **Device Type Manager** (DTM – the driver for a FDT enabled device) with one of 40+ available **device configuration or device management software applications that are FDT Technology enabled**, you'll have direct access to device diagnostics and troubleshooting functions that have a huge beneficial impact when analyzing the device over its lifecycle. FDT enabled configuration applications and FDT integrated host systems can "check-in" on device(s) looking out for maintenance needs throughout the life of the device(s) for both existing devices currently in the field and new devices as devices are replaced. **User's report 63% of maintenance checks result in "no action taken,"** so being able to reduce the number of checks will be a big benefit to the operation. The use of a FDT enabled device management application makes the decision to check, repair or replace a device much quicker and easier, saving time, money, and basing the final decision on actual data.

Replacing a Device Takes Work

Decommissioning and replacing a device takes work! You might find that the "decision" to replace is much easier than the actual work of procuring, checking, installing and commissioning the new device. And, you have the added cost and work of decommissioning the old device. Depending on the process and the specific application, the issues and process of

To Repair or Replace the Device - That's the Question *continued*

decommissioning a device might include:

- Review, planning, engineering, purchasing, calibration / configuration, and documentation of the new device.
- Device removal and replacement.
- Environmental handling of a device that has been in contact with certain fluids.
- Cleaning and disposal of a device that was in contact with hazardous material.
- Safety of employees and the environment if the device needs to be decontaminated.
- Installation work required for the new device - new wires, form and fit of the replacement device, new mounting or piping requirements, etc.
- Skill and experience with the removal and disposal of certain devices.

The Case for Replacement

On the bright side, if you decide to replace the device, you have an opportunity to significantly improve the application and performance compared to the old device. For example, you can now review the actual specifications and requirements of the application and select the most appropriate device for the job. In many cases, devices were specified years ago based on engineering design criteria and not on actual application requirements. Proper sizing and selection may indeed produce improved measurement, better stability, improved accuracy, better repeatability and more flexibility because of enhanced features and functions.

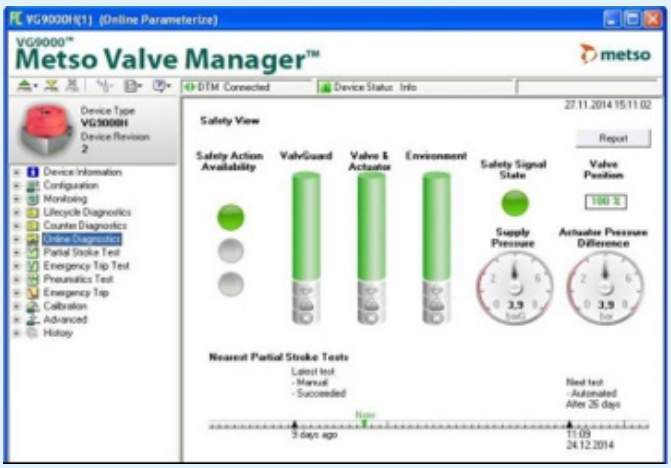
With the opportunity to replace a non-smart device with a smart device, you provide the opportunity to lower the total cost of ownership for the device. Selecting a smart device that has a DTM and using it as part of a device configuration or asset management application that accepts DTMs enables faster configuration and access to the valuable built-in diagnostic information.

Conclusion

So, the next time you are faced with the decision to do a major device repair or replacement, think about the benefits of a replacement and the opportunity of **specifying a FDT Technology enabled solution**. The benefit of device optimization through an FDT enabled device management tool provides many advantages for your immediate need and future use. Consider the ability to access information from the smart device from a remote or safe location – reducing or eliminating trips into the field! In addition to gaining access to device diagnostics, you can begin to **migrate to a predictive maintenance strategy, improve plant reliability and lower maintenance costs that will positivity impact the bottom-line.** If the decision is made to replace, select a device that will provide life cycle benefits today and well into the future.

This article is the last in a three part series addressing decision making factors for device repair or replacement in the device life cycle. **Part 1** identified the benefits FDT Technology delivers in the first few phases of the life cycle including planning, engineering, installation, commissioning and startup. **Part 2** took an in-depth look at the operational, service and routine maintenance phase. Be sure to review those articles to get the complete picture of how FDT benefits the entire plant lifecycle.

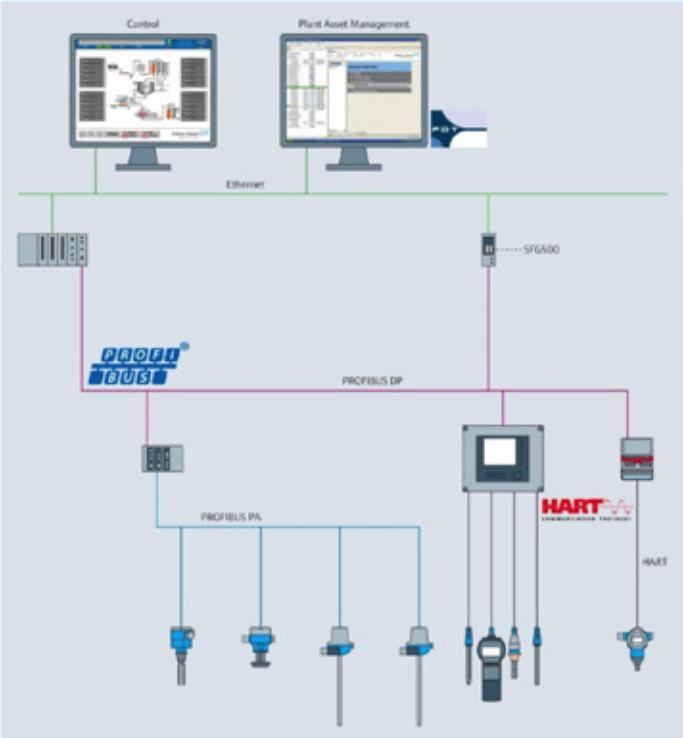
How do you get started improving management and operation of your forever evolving plant lifecycle infrastructure? Ask your automation providers for their FDT Technology based solutions. For more information, visit **www.fdtgroup.org.**



This DTM by Metso provides an easy to read graphical interface to help you migrate to a predictive maintenance.

Gateway Provides a Bridge Between Measurement and Maintenance

Networked communications simplify operations in hazardous areas.



For many automation systems, direct intervention into device parameterization and online diagnostics while the plant's operating brings significant challenges with respect to cost and effort. In the past, maintenance technicians had to apply for a work permit/allowance for activities in hazardous or difficult access areas. The same was true for the on-site connection with an intelligent sensor or actuator in the field.

The Fieldgate - SFG500 PROFIBUS gateway from Endress + Hauser can simplify maintenance. The SFG500 is a system component of Endress + Hauser, which acts as a gateway interface between PROFIBUS DP, PROFIBUS PA and HART communication protocols, even in the hazardous areas. It can be linked through the embedded web server to any existing PROFIBUS automation topology; even during plant operation; quickly and without parameterization in operation. This retrofit property is one reason that many users rely on the SFG500 of Endress + Hauser. On the one hand, the gateway represents a parallel data transfer to the control system installed. On the other hand, it provides physical separation from the PLC infrastructure without any changes, giving the supervising on-site staff more flexible application scenarios.

In short, the SFG500 gateway is the key for Plant Asset Management. The central element is a PC that runs an FDT-based software tool, FieldCare. This will allow maintenance staff permission to perform the relevant tasks remotely with this maintenance station via FieldCare. Whether users are commissioning a new radar-field device, a Coriolis mass flow meter, or a positioner, the FieldCare project contains all the relevant field device data. Each SFG500 physically connects a complete PROFIBUS segment with help from FDT Technology. The associated nested communication allows access via Remote I / O`s and linking devices with HART and PROFIBUS PA devices.

Modern infrastructure (FieldCare PAM, SFG500, Remote I / O) Benefits:

1. Devices can be used from any manufacturer, thanks to DTM (FDT) and iDTM (EDDL) support.
   - Cross-vendor operation with a single maintenance tool.
2. Equipment parameter changes are now also possible from a local maintenance station.
   - Significant time savings during commissioning and diagnostics.
3. Graphical representations of measurement signals for radar and ultrasonic field devices are now available without restriction.
4. Partial Stroke Tests and Advanced Performance analyses can be performed
   - This commissioning function allows a full measurement performance test.
5. Device diagnostics can be viewed through the SFG500 web interface or delivered as an e-mail. Here the SFG500 provides detailed information about the cause of the failure and associated remedial actions to solve the failure. This goes far beyond the scope of diagnosis as defined by NE107.
6. With the FDT based FieldCare tool, DTMs and iDTMs are used for detailed analysis and solving problems.

For more information, please visit: **www.endress.com/SFG500**.

Configuring, Calibrating HART Devices Made Easy

One environment functions for both on- and off-line setups.

1756 HART I/O Modules and the Modern DCS

The FactoryTalk® AssetCentre software includes everything needed for effective asset management of HART field devices. It includes the communication DTMs and drivers needed to configure and manage HART instruments attached to the PlantPAx® Process Automation System.

Because the asset management software is based on the open FDT standard (IEC-62453 and ISA103), you can configure and manage any HART device using this software. Simply load the software onto a computer residing on the control network and you're ready to go. Configure, calibrate, tune, analyze and optimize HART devices connected to 1756 HART I/O modules installed in your PlantPAx Process Automation System from a central location.

FactoryTalk AssetCentre Process Device Configuration provides a single environment to perform both offline and on-line modification of the HART device parameters. Device status and alarms from various devices can also be easily monitored. The ability to upload and download HART device configurations allows for faster replacement of failed devices to get your plant back up and running.

FDT Technology standardizes the communication interface between field devices and host systems to reduce integration efforts. FactoryTalk AssetCentre Process Device Configuration is enabled by FDT Technology. FactoryTalk AssetCentre optional capabilities extend the value of your PlantPAx Process Automation System and allow you to optimize your investments independent of protocol and device supplier.

IO module DTMs provide access to a device and allow a quick overview of all field devices connected to the module with the associated device, process data and diagnostic information. DTM's can be obtained directly from the device manufacturer (for example, Endress+Hauser, Metso, Dresser Mason Neilson and others) for online configuration or for advanced device configuration. The iDTM can also be used when the device manufacturer does not supply DTMs for asset management solutions.

New to the 1756 HART family are 1756-IF8IH and 1756-OF8IH 8-channel isolated modules with a dedicated HART modem per channel. All 1756 HART modules are supported by DTM's.

The 1756 HART I/O modules are just one piece of a modern DCS — the PlantPAx system. In today's competitive economy, you need to consider forward-thinking possibilities and utilize technology and innovation to your advantage. It's time to rethink what to expect from a DCS. In order to drive productivity, increase efficiencies and reduce costs you need to integrate all of your automation operations to achievethe Connected Enterprise.These goals are in reach using the PlantPAx system.

The PlantPAx distributed control system offers:

- Plant-wide control and optimization for better business decisions
- Scalable and modular system architectures to meet your exact needs
- Open, secure and information-enabled networking capabilities
- Flexible delivery and support options allowing you to choose

The PlantPAx modern DCS helps reduce your total cost of ownership by reducing the tasks and costs associated with engineering, inventory, maintenance, expansion and operation.

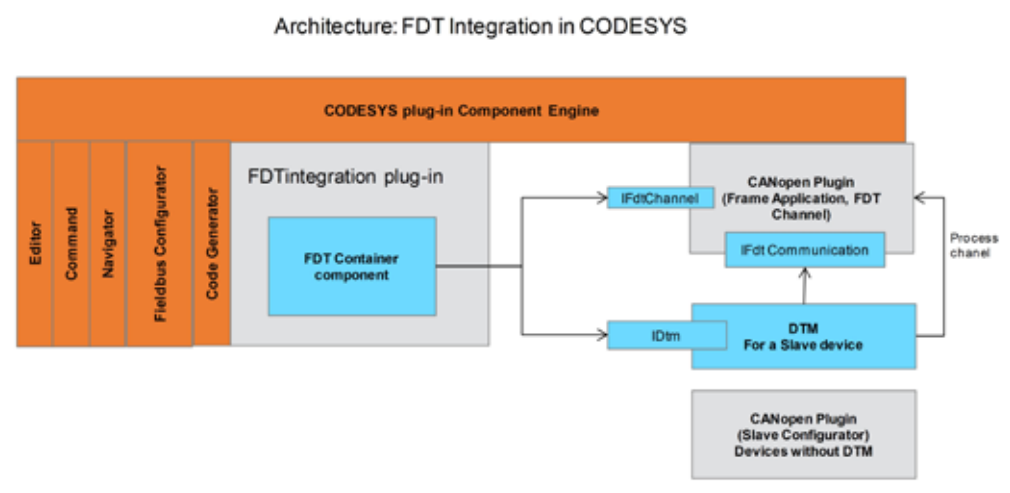
It may be time to rethink what you should expect from your distributed control system. Download our whitepaper to learn more: **http://literature.rockwellautomation.com/idc/groups/literature/documents/wp/proces-wp010_-en-e.pdf**

One Software Environment, Myriad Functions

Plug-ins help add functionality, speed installations.

SoMachine from Schneider Electric is a unique software solution for developing, configuring, and commissioning an entire machine in a single software environment. Many enhanced features are now available using predefined templates via plug-ins including logic, motion control, HMI, and related network automation functions that allow users to save engineering time by applying complete libraries or even a new machine module.

The SoMachine programing environment is based on CODESYS. CODESYS is an IEC 61131-3 development environment which allows customized plug-ins with additional functionality. It provides the full development environment, from IEC 61131-3 Editors (FBD, LD, IL, ST, SFC), compilers for many CPUs, libraries, comprehensible device integration, with editors and catalog manager.



Plug-ins are used to add specific functionality to the original environment, such as new commands, editors, menus, project data, etc. The FDT integration into CODESYS uses this plug-in concept. The figure gives an architectural overview. The plug-in component engine loads all the plug-ins functionality templates. The FDT integration module uses the FDT container component to manage the FDT project and the related DTMs.

The plug-in also uses other plug-ins like the navigator to manage the project tree view. To have access to the DTM in CODESYS, a device description is needed. For this, a catalog scan is done, to read the attributes of each DTM and creates the CODESYS standard device description. With these descriptions the devices are seen in the device repository as other devices which do not provide a DTM.

Communication DTMs can be added. When one is installed, the integration plug-in receives an event and a FDT project is created with the newly added Communication DTM. The data is stored inside the same CODESYS project, providing a single data source. The topology is managed by the standard mechanisms used for any other device.

Every device in CODESYS has a corresponding editor. The plug-in concept makes it possible to add editors and in case of a DTM the UI is loaded side-by-side with other editors for the device as a new tab. For example, a CANopen device will have an input/output list, plus other PLC relevant information such as the node ID. The editor configuring the node ID will also pass the node ID to the DTM.

The communication to the field can be done either by a Communication DTM or the built-in communication channels, which are provided by CODESYS for some protocols. The built-in communication channel uses the PLC fieldbus interfaces to send data to the device. To achieve this, the connection PC-PLC is used to send data which is processed on the PLC level, providing a transparent access to the devices.

The integration of FDT into SoMachine and the plug-in concept of CODESYS permits the re-use of existing DTMs. This allows users to fully exploit all the features provided by such DTMs, e.g. for drives with enhanced user interfaces for configuration, commissioning and diagnostics.

For more details see: **http://www.schneider-electric.com/en/product-range/2226-somachine/?filter=business-1-automation-and-control&parent-category-id=3900**

CODESYS® a trademark of 3S-Smart Software Solutions GmbH

FDT Offers Device Setpoint Confidence

For one chemical intermediate manufacturer in Switzerland, FDT Technology and the company's chosen FDT Frame Application, have provided the peace of mind that its measurement device setpoint documentation is always up to date.

The Swiss site of the SI Group, a developer and manufacturer of chemical intermediates, phenol resins, alkylphenol resins, and alkylated phenols, is based in Pratteln, where the company produces a range of intermediates for the plastics industry.

The site relies on FDT (Field Device Tool) Technology used in the Endress + Hauser Frame Application FieldCare, the plant asset management tool. FieldCare enabled with FDT Technology and TH LINK PROFIBUS Gateways provides this site access to the majority of its field measurement devices, providing diagnostic data from a central location.

Janos Horvath, head of instrumentation and control for SI Group in Pratteln, explains how this came about: "Our introduction to FDT was really through the use of Endress + Hauser's FieldCare plant asset management tool," he said.

This FDT-based asset management tool, FieldCare was the first to pass the FDT Group's conformance test. It offers a solution to configure intelligent devices and offers a simple method of checking the continuing health of devices that support FDT. The tool provides a range of functionality – from device parameterization, through to engineered condition monitoring. Using device status information it is able to provide a simple tool for checking the health of a device.

The plant installed its first radar level transmitters that supported FDT Technology over 10 years ago. Horvath went on to explain that the facility also makes use of the manufacturer-independent PACTware software (Process, Automation, Configuration Tool). Its independence is possible because of the standardized interface description of the FDT concept and using an appropriate DTM (Device Type Manager) to set up and adjust field instruments including pressure transmitters and radar level sensors.

"We find this tool to be easy to use and it makes it easy to document the setpoints etc.," said Horvath.
"Work processes have changed for engineers at the plant," continued Horvath. "In the past we would take measurements manually or would need to use different tools for each instrument. With FDT-enabled solutions we are able to use just one tool for almost every device. The capability of FieldCare and the DTM to be product, supplier, host system and protocol independent makes it a universal tool allowing standardized work processes

Remote Measurements

"We now take field device measurements remotely, usually from the central office at the facility, so we do not have to travel around the facility to the same extent that we did in the past and data is more quickly available to use." Because the Pratteln facility consists of three production buildings and two infrastructure buildings, being able to access data remotely can offer some impressive manpower time-savings. "We are now able to connect with every part of the plant from the office," said Horvath. "This is a particular benefit because some areas of the plant are hazardous areas, and a permit is needed to access these areas to collect data manually."

FDT Offers Device Setpoint Confidence *continued*

For Horvath, the real benefit, however, is not the manpower time he has saved, it is the fact that the last setpoints are now properly documented that is one of the biggest benefits of the system. “We are always confident that we have the latest setpoint data,” he said.

To access and collect data, a four strong engineering team uses two laptops for data collection around the facility, and one fixed PC for use when in the office.

At present, around 70% of plant measurement devices at the facility are connected to the FieldCare asset management tool. Although the plant does still employ some older equipment, and also some very specialist devices used for water treatment, the majority of devices used in the facility are now supported by a DTM or have available DTMs and this percentage is growing. “Today, when we look at purchasing new devices we will look more favourably on devices that support FDT. Currently we are changing around two or three devices every week,” he said.

The fieldbus independence offered by FDT Technology was also a bonus for Horvath. He said: “One of the benefits of FDT is that we can use one tool across a wide range of different devices which means that we are not tied into one vendor for our device selection. Having this independence makes it easier for us to choose the best device for us for each application. Being FDT enabled is not our main requirement when specifying new equipment. However, it is a big bonus – and we will generally choose a device with an available DTM, where practicable. We do need to choose the best device for an application and the fieldbus is not our main criteria. So, it is a benefit for us if all our devices can use the same independent bus.

Moving Forward

Moving forward, Horvath hopes to be able to use FDT more proactively to gain further value from the technology that already exists in devices at the plant. He said: “We are currently looking at using more of the diagnostic capabilities offered by the intelligent device and using FDT Technology to access it. A diagnosis tool that will alert us automatically if a device is going to have problems will enable us to ensure that it is replaced or fixed before it has an effect on productivity. Making better use of this capability will allow us to be more proactive with maintenance.”

Offering a specific example of the benefits this could offer in his plant, Horvath said: “For example, we have some temperature transmitters with two PT100s and if one is damaged it will automatically switch to the other, without letting us know that the change has occurred. The diagnosis tool in FieldCare will alert us to the fact that one of the PT100s has been damaged, and will give us an opportunity to ensure it is changed when the plant is next shut down.”

Although the engineering team at SI Group in Pratteln do appreciate the benefits that FDT can offer, the move to remote working was quite a drastic change for many of the technicians. Horvath explains: “Any IT or network issues can be frustrating for the engineers as they are not IT experts and may not recognize the problem or be able to rectify it. However, we do need them to work with the equipment to ensure that we do not lose the latest setpoint data. It would be very problematic if a device needed to be replaced and we did not know which setpoints to use. The documentation element of the system is vital and this is the reason that we insist that the engineers always use the remote technology supplied to them, even if they are out in the plant and standing next to the device they are working on.”

Author: Suzanne Gill, Control Engineering Europe

Seamless Data Exchange Across All Network Layers and Protocols

Gateway DTMs make it easier to talk to equipment linked to many different network layers.

FDT® offers proven architecture for data exchange between software and automation components, regardless of the network layers or protocols used in communication. Point-to-point connections and manufacturer-specific protocols are also supported. This article describes the FDT communication principles and provides examples that illustrate how they can be used in practice.

Figure 1: Communication protocols supported by FDT

In factory automation, different fieldbuses and protocols have been established over time for various reasons. Experts estimate that network structures will be flatter and more Ethernet-based in the future. However, not all current communication structures will completely disappear. Manufacturers of automation components must therefore continue to support different communication methods for various applications now and for several years, for example the connection of a commissioning tool via a services interface or the connection of an engineering tool via an Ethernet network.

Basic principle of FDT communication

Communication components such as PC plug-in cards, modems or gateways are mapped in FDT by communication DTMs (Device Type Managers) and gateway DTMs. Similar to device DTMs for sensors and actuators, these DTMs also include specific configuration logic and user interfaces, for example for configuring communication parameters such as baud rates, timeouts, etc. In addition, such DTMs include so-called communication channels. They provide the protocol-specific services via corresponding FDT software interfaces.

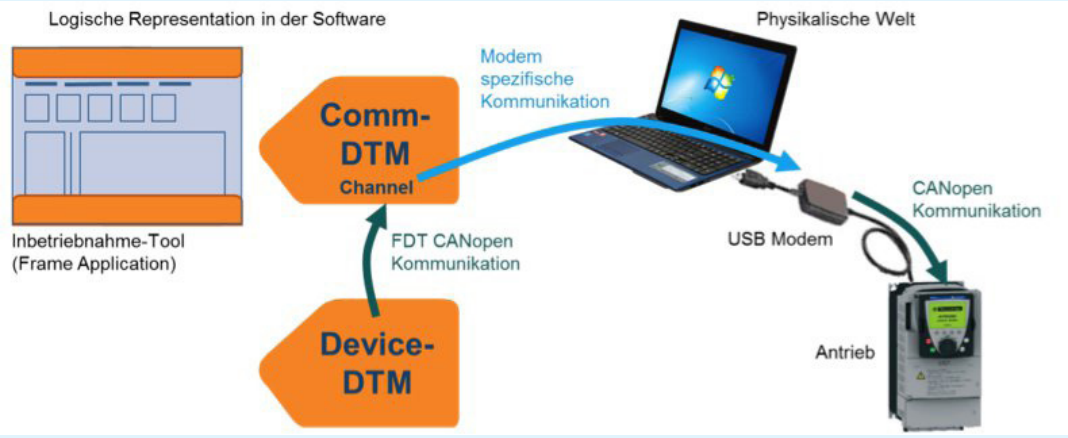


Figure 2: FDT communication principle

Just like device DTMs, communication and gateway DTMs can be used in a software tool and therefore integrate the network or fieldbus support into the tool via “Plug & Play.” Figure 2 illustrates this principle, showing the connection of a drive via CANopen.

For the drive itself, the device DTM supplied by the manufacturer is started in the tool along with the corresponding communication DTM for the CANopen modem. The device DTM uses the software interfaces made available by the communication DTM in order to communicate with the drive. In this example, CANopen SDO read and write commands are used. The so-called annex to the FDT specification determines how the specific services of a protocol in FDT are mapped.

Figure 3 shows the use of the CANopen Communication DTM in the commissioning tool SoMove by Schneider Electric.

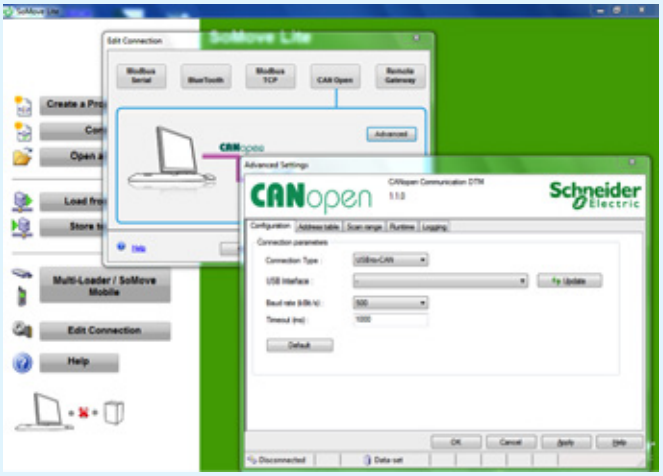


Figure 3: Screenshot – CANopen communication DTM in Schneider Electric SoMove

The communication DTM user interface is shown in a separate dialogue box when the user selects “Edit Connection” on the main display. In this dialogue box, the user can then configure the CANopen communication parameters. Beyond this, the communication DTM does not appear again in this tool.

Nested communication

Through the use of gateway DTMs, the FDT communication principle also works across several layers. Figure 4 shows an example of communication with an IO-Link sensor via Profibus.

The device DTM uses the software interfaces made available by the communication DTM in order to communicate with the sensor. In this example, IO-Link index/sub-index read and write commands are used. The gateway DTM generates the corresponding Profibus read and write commands and sends them to the corresponding fieldbus coupler via the superimposed communication DTM. The coupler converts the commands back into IO-Link and sends them to the sensor.

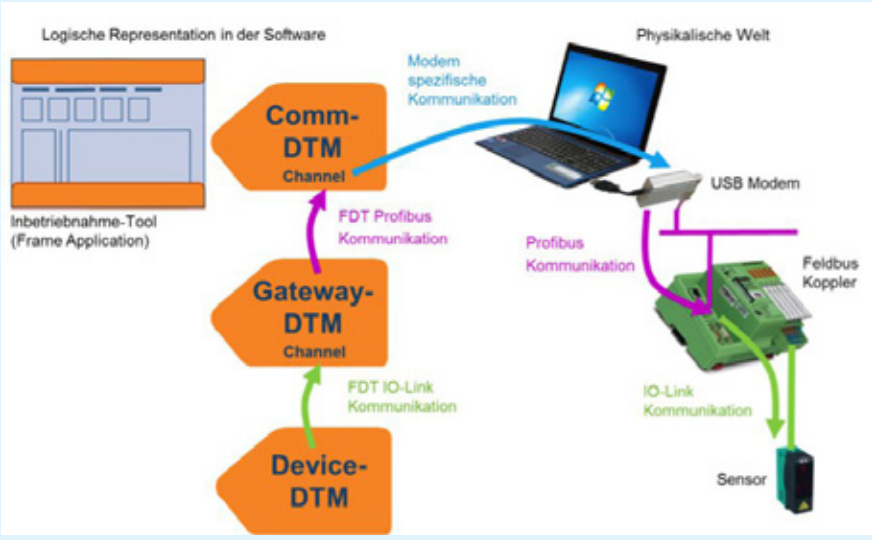


Figure 4: Nested communication

The gateway DTM is supplied by the coupler manufacturer so it knows the translation logic. This can be infinitely complex and is programmed in the exact opposite direction in the gateway DTM to in the coupler. For example, a series of Profibus commands can also be generated from an IO-Link command in the gateway DTM. These are then reassembled to constitute a single command in the coupler and then sent.

Manufacturer-specific protocols

If software tools and automation components are provided by the same manufacturer, then proprietary communication protocols are often used. A programmable logic controller (PLC) is not normally programmed via a fieldbus. However, this form of communication is possible with FDT, as shown in Figure 5.

In this case, the communication DTM and the DTM for the PLC are provided by the same manufacturer. The commands between the two DTMs are manufacturer-specific. No annex to the specification is provided by the FDT Group and as a result this communication cannot be used by DTMs from other manufacturers.

Why does it make sense to use FDT here, specifically to map a PLC? Here’s the answer: The DTMs can not only be used in their own software tool, but also in other tools. For a PLC, this means the corresponding DTM can be used both in its own programming tool as well as in simple commissioning or diagnostic tools, for example. These tools use only the diagnostic user interfaces provided by the DTM or the gateway communication to the connected sensors/actuators. The actual PLC programming function is normally not included in such a DTM.

Conclusion

FDT defines a communication architecture that has proven reliable in numerous practical applications. FDT supports communication across all layers and protocols. It can also support manufacturer-specific protocols.

The software tools supported by FDT can be enhanced to include more communication methods by integrating corresponding communication and gateway DTMs. DTMs are available for numerous PC plug-in cards, modems, and couplers available on the market. They are easy to use, saving developmental costs.

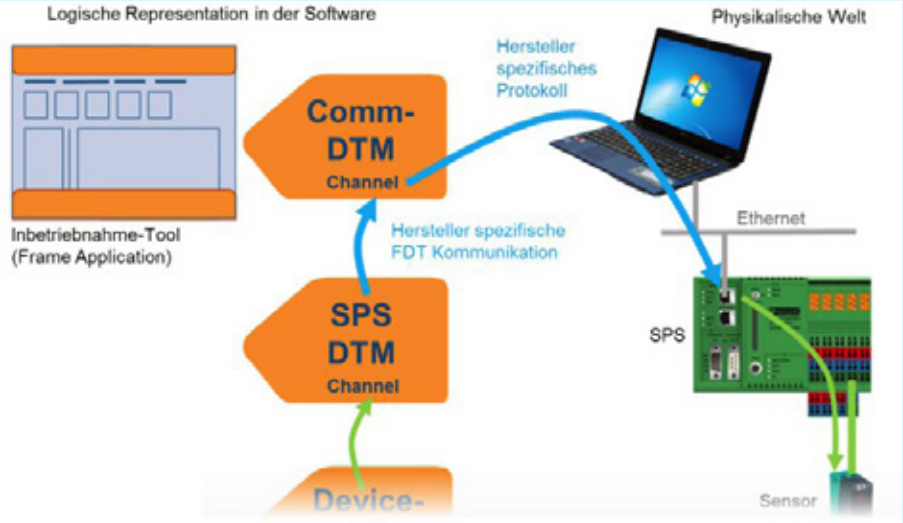


Figure 5: Manufacturer-specific communication with a PLC

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Frank Schmid, Head of Consulting
M&M Software GmbH & member of the "Executive Committee" of the FDT Group

How to Make FDT Better this Winter? FDI.

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For more information, please visit: **www.endress.com/SFG500**

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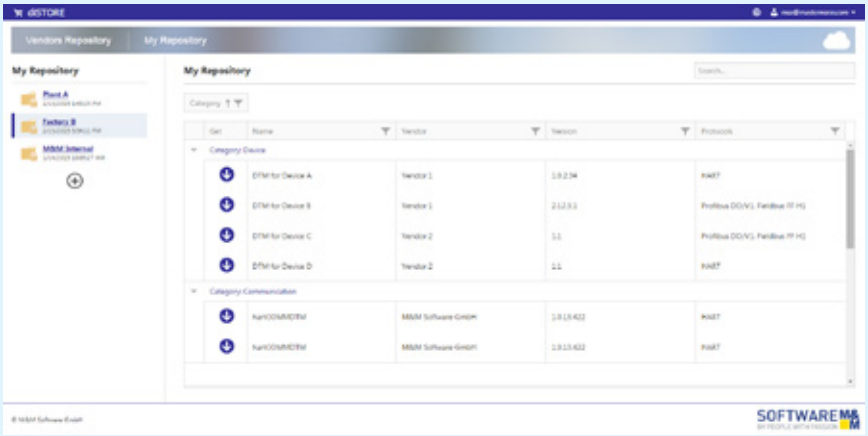
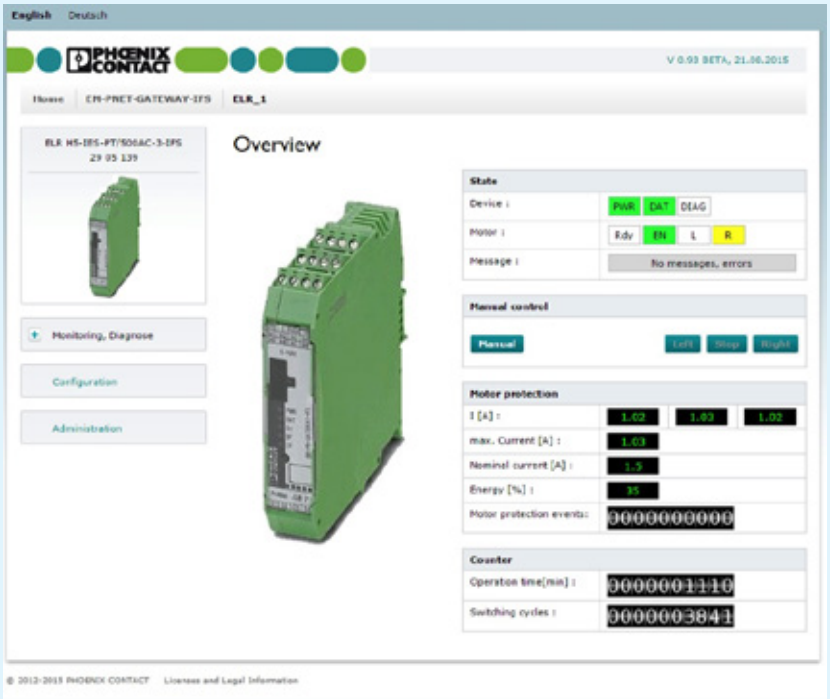


M&M Software developed a new cloud-based product called diSTORE. This new cloud-service enables plant operators and device vendors to manage and share their DTMs in private and public repositories using the diSTORE web portal. Device vendors will be able store their DTMs in customized areas where clients can access them for easy installation.

Please visit **mm-software.com** for more information on diSTORE.

DTM Simplifies Motor Starter Setup

Simplifying setup for networked motor starters.



Phoenix Contact is shipping bus-capable motor starters based on the tried and tested CONTACTRON hybrid technology, which uses FDT/DTM for operation and parameterization. In Ethernet-based bus systems, all relevant functions are additionally available via web interface. The use of additional web technologies in the DTM offers new graphical possibilities, resulting in a uniform user interface for the two environments. The web interface facilitates the drives' startup even without a PLC or control system; the only software tool required is a web browser.

The network is set up by means of gateways that support the following fieldbuses: PROFINET, PROFIBUS, Ethernet/IP, CANOpen, DeviceNet, Modbus/TCP, and INTERBUS Inline. The system enables the user to transfer relevant process data such as motor current, number of cycles, and motor protection status to the control system.

Phoenix Contact's line of CONTACTRON hybrid motor starters offers a wide selection of products for controlling and monitoring electric drives. It covers motors operating at up to 500 VAC at nominal motor currents of 0.075 through 7 A. The integrated emergency stop function was designed for SIL 3/PLe safety; the devices comply with the ATEX directive.

Options for connecting the devices include both screw terminal blocks and PT terminal blocks. The devices have all relevant approvals for worldwide use.

For more information, please visit:
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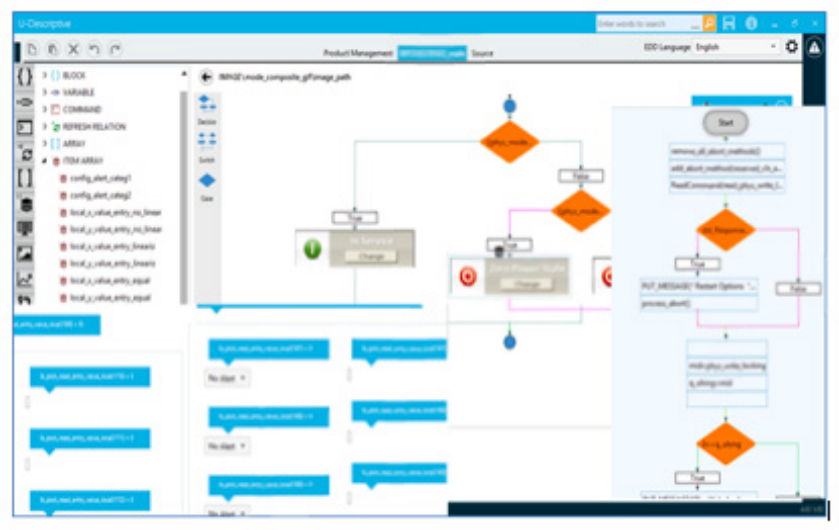
Utthunga Presents First Collaborative Graphical Editor for DD/ DTM Development



Utthunga's Device Integration Suite DDStudio makes FDI-enabled DD Development and DTM generation easy for instrument manufacturers. It reduces time to market by 35% and total ownership cost by 50% while still providing 100% compliance to standards.

DDStudio offers a clue driven graphical editor, flow chart based method creation and a debugging tool. It minimizes errors during development cycle, ensuring savings in testing effort, time to market and total cost of ownership. DDStudio enables new DD creation and updates to existing DDs. It also verifies the IEC compliance of legacy DDs.

DDStudio generates DDs and converts them to DTMs while providing enough flexibility to optimize the DTM code for supporting special algorithms, graphics, etc. DDStudio provides proven host-based templates for both Windows and handheld platforms, greatly minimizing the testing effort. With common data models for both FDI-compliant DDs and DTMs, DDStudio is the single point solution for all the device Integration needs.

With DDStudio, instrument manufacturers & OEMs are guaranteed to achieve best in quality device integration components at reduced cost & time to market.

For more information or a demo, please write to us at **contact@utthunga.com**

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Contributors

FDT Events

>> FDT Exhibits at Rockwell PSUG Event
Nov 16-17
Chicago, IL

>> SPS/IPC/Drives
FDT Booth Hall 2, Booth 550
Nov 24-26
Nürnberg, Germany

>> JEMIMA Measurement & Control Show 2015/ System Control Fair
Dec 2
Tokyo, Japan

>> Hannover Messe
Apr 25-29
Hannover, Germany

>> FDT Group Press Conference at the 2015 SPS Fair

Nov 25
Time: 10:00
Room: Prag
(NCC Ost, Level 2)
Nürnberg, Germany

Press Conference Summary
Join Glenn Schulz of the FDT Group and Tom Burke of the OPC Foundation as they demonstrate the seamless interoperability of FDT with OPC UA from the sensor to the cloud.

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Solid Technology, Strong Membership

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