

Intelligent field devices in a plant: With FDT and HART via Profibus, more device information is available and less effort is required for installation and parameterization.

Remote maintenance via FDT

It all works out

These days, maximum flexibility is required in production plants. The nightmare of every production manager – a lot size of 1 – will probably never occur in the process industry. But even in this industry, production is taking place on smaller and smaller scales. This development calls for flexible automation strategies which enable rapid conversions and adjustments. Clariant and Eckart use FDT, Profibus and HART for this.

The pace of innovation and increasing cost pressures have placed tremendous demands on systems and plants in the process industry. The expectation is that production speed and reliability will continually increase, while the time and money required for flexible conversion, commissioning and maintenance will continually decrease. As a result, the automation systems used in process technology are constantly undergoing state-of-the-art upgrades. The significant advantages offered by open standards such as Hart, Profibus and FDT in this regard have helped these technologies become more established here. Clariant, a specialty chemical manufacturer in Gersthofen, and Eckart, a pigment manufacturer in Günthersthal, provide

two examples of innovative automation concepts using open standards. Both companies continually research and develop new products, which results in changing operating conditions and the need to frequently reconfigure their automation components. The companies primarily use intelligent Hart field devices from various manufacturers. These transmit and receive their main process values via Profibus remote I/Os and map the 4-20 mA main signal of the Hart devices to cyclic Profibus DP data. Since these are RS485 Ex-i-enabled devices, the remote I/Os can also be used in hazardous areas. The Ex-i-based Profibus leads out of the Ex area and into the non-Ex area, where it is converted into standard RS485 levels. This system offers certain operati-

onal advantages: A baud rate of 1.5 MBaud is possible in the Ex area as well, which allows for short bus cycle and system update times even when a large number of field devices are being used. The system also provides plenty of leeway for plant topology, since numerous field devices can be connected to one bus line, e.g., 10 remote I/Os with up to 40 Hart devices each.

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COMPACT

FDT/DTM versus EDD/EDDL is a hotly debated topic. Clariant and Eckart are achieving positive results with the open engineering tool, according to Jürgen Lange from Softing. Despite the proven maturity of FDT, prompt DTM certification is needed on the side of providers, and the FDT specification must be expanded quickly to include Interbus, DeviceNet and AS-Interface.

Intrinsic safety makes it easier to replace devices than protection through pressure-resistant encapsulation or a special design. And last but not least, Hart technology is more economical than other Ex-enabled bus systems, and maintenance technicians are less wary of handling these devices since they behave like 4-20 mA devices.

Automation concept with limits

This type of arrangement does have a few disadvantages or limits with regard to field device parameterization, however. In order to parameterize installed devices, technicians must always work on the device directly using a parameterization tool, such as a notebook with the corresponding software. But in many cases, the parameterization of installed devices is unavoidable. Formulas often change during research and preliminary development in particular, so parameters need to be continually adjusted. For example, the characteristic curves of a radar sensor can only be determined when the sensor is mounted on a container. And in order to be able use a notebook in the Ex area, it is necessary to have a work permit and to have completed the required tests. In extreme cases, a great deal of organizational effort is required to enter hermetically sealed areas. In certain circumstances, plants must be shut down for reconfiguration. To parameterize devices from different manufacturers, it is usually

necessary to have different software packages on hand. Proprietary tools do not all work in the same way, so training is necessary to use them. This makes plant conversion a very complex task. Concepts such as preventive maintenance using the data provided by the Hart protocol – including stroke rates and the results of self-diagnosis – are practically impossible under these conditions. Despite the numerous advantages of an automation concept using standard Hart and Profibus technology, the demand for a transparent parameterization and maintenance system outside of the Ex area is completely justified. Such a system makes it possible to access various Hart field devices in the most far-flung sections of a production plant using a standardized software environment and a single hardware interface.

FDT compensates for disadvantages

This is where FDT comes in. FDT enables the strict encapsulation of fieldbus, manufacturer and device specifications by using tools to integrate the device features. Parameters and functionality are not described in the device itself, but rather in a program. The device information is accessed via a standardized interface defined in the FDT specification. FDT thus enables the simple, standardized parameterization of devices while making full use of complex device features – regardless of the device type, manufacturer or communication protocol. This allows for the central engineering and asset management of Profibus and Hart devices using a universal FDT tool, which in turn opens up great savings potential. The principle of placing functionality behind standardized interfaces offers a number of advantages.

- Functional expansions can be carried out by adding new interfaces. This form of FDT expansion is fully upwardly compatible and does not negatively affect existing solutions.

- New device versions can grow in complexity and functionality and be placed on the market with no change to the way they are integrated in engineering tools. It is only necessary to provide the corresponding DTM update.

- Existing device descriptions of all kinds – Hart DDs or Profibus EDDs – can be converted to DTM and thus integrated directly in the FDT concept.

Clariant and Eckart benefit from advantages of FDT

The FDT frame application known as PACTware was chosen as the engineering tool. The basic version of this tool is available for free on the Internet, or it can be purchased at a low cost from the members of the PACTware Consortium. The CommDTM Profidtm and the FG-300 Profibus from Softing are used for Profibus access. Using the Ethernet Profibus gateway, the communication services are transmitted from Profidtm via Ethernet and implemented on Profibus in the gateway. The engineering tool can therefore be used on any office computer in the company network. Access to Profibus devices, and to connected Hart devices via a Hart-Profibus remote I/O, can be realized comfortably from an office outside the Ex area. Profidtm creates a complete live list by means of automatic topology generation. When a device in this list is selected, additional device information such as the hardware and software status, serial number and manufacturer information is displayed. The device DTMs of the various manufacturers are arranged in PACTware. Field device parameters can be read and modified, characteristic curves can be generated and diagnostic information can be displayed in their interfaces. Hart profile DTMs can be used for Hart devices from manufacturers who have not yet provided DTMs. These provide access to the standard profile parameters.

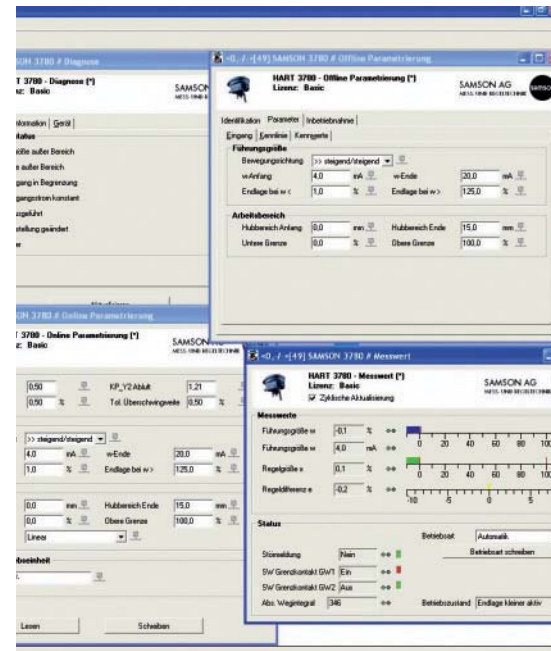
Double cost savings with FDT

The combination of hardware and software used by Clariant and Eckart enables the fast and easy parameterization and remote diagnosis of Profibus and Hart devices directly from an office. This makes it possible to respond more quickly to production requests - such as formula modifications – and it eliminates the administrative effort required to issue permits for working in the Ex area. Since the diagnostic device information provided by the Hart protocol can now be easily accessed at any time, this data can also be used for preventive maintenance concepts. Parameterization takes place in a standardized software environment using a single hardware adapter: the Ethernet connection of the PC. The central components here are the communication DTM and the Profibus Ethernet gateway from Softing. The flexibility that has been gained and the massive reduction in the amount of work involved have resulted in continuous cost savings. Another good reason for choosing the FDT concept is the lower cost of acquiring the automation components. The asset management systems of most renowned companies are not only closed systems, they are also up to ten times more expensive than the FDT concept implemented by Clariant.


Summary

FDT has proven to be a suitable parameterization and maintenance tool in a

heterogeneous network structure for Clariant and Eckart. It has considerably simplified and accelerated maintenance and conversion work. The number of diagnostic options have increased, while plant downtimes have decreased. As a result, significant costs have been saved in plant commissioning and maintenance. FDT is even suitable for asset management when using process control systems which do not support FDT. The hardware and software costs are minimal compared to traditional asset management systems.



The user interface of the DTM of a Hart positioner in the PACTware FDT frame.

	
FDT in Use	784
Softing www.softing.com	
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infoDIRECT	784iee0405
<ul style="list-style-type: none"> ■ Article on FDT technology and a discussion of DT/DTM versus EDD/EDDL ■ FDT products from Softing ■ Overview of gateway solutions 	

Clear advantages

The trend towards distributing greater intelligence in increasingly compact devices in the field will make it even more of a challenge to describe the complete functionality of devices in the future. FDT offers clear advantages over other solutions in this regard. By encapsulating manufacturer, device and communication specifications in software components which are accessed via standardized interfaces, there are practically no limits set on

device complexity. More and more automation companies are recognizing this, as the membership list of the FDT-JIG shows. The ongoing work to expand the FDT specification to include Interbus, DeviceNet and AS-I demonstrates that the benefits of FDT have been recognized and are in demand for other fieldbuses as well. With Rockwell Automation and the support of



Jürgen Lange, Softing AG

DeviceNet, a breakthrough on the other side of the pond is guaranteed. FDT has become established on the market. Users trust it. Four accredited certification bodies have initiated conformity tests to ensure the correct implementation of the standard and to guarantee the interoperability of the DTMs with one another and with the FDT frames.