INDUSTRIAL COMMUNICATION

REFERENCE PROFIBUS PA Implementation

Tracerco Benefits From Softing's PAeasy for Fast Implementation of PROFIBUS PA Functionality

Tracerco
Providing Insight Onsite

The British industrial technology company Tracerco offers unique and specialized detection, diagnostic and measurement solutions targeted to the petroleum industry as well as to security tagging niche markets. Its range of advanced nucleonic instrumentation includes instruments for level, density and phase measurement widely used in the oil and gas industry. One of Tracerco's main goals is to drive technical innovation which solves the most challenging process measurement and control problems of its customers, often providing major production, safety and environmental benefits.

Typically, implementing a PROFIBUS PA field device means developing custom hardware and device-specific software, requiring in-depth PROFIBUS knowledge. For fulfilling the demand to expand its portfolio by adding a PROFIBUS PA interface, the UK-based device manufacturer Tracerco has been looking for an easier approach. After evaluating different possibilities, the company identified the Softing Industrial Automation solution PAeasy as its product of choice. PAeasy allows the implementation of a PROFIBUS PA interface by using the existing device and without requiring any software development.

PROFIBUS PA Interface at a Fingertip

As a world leader in its field of products and services, the British industrial technology company Tracerco offers unique and specialized detection, diagnostic and measurement solutions targeted to the petroleum industry as well as to security tagging niche markets. Its range of advanced nucleonic instrumentation includes instruments for level, density and phase measurement widely used in the oil and gas industry. One of Tracerco's main goals is to drive technical innovation which solves the most challenging process measurement and control problems of its customers, often providing major production, safety and environmental benefits.

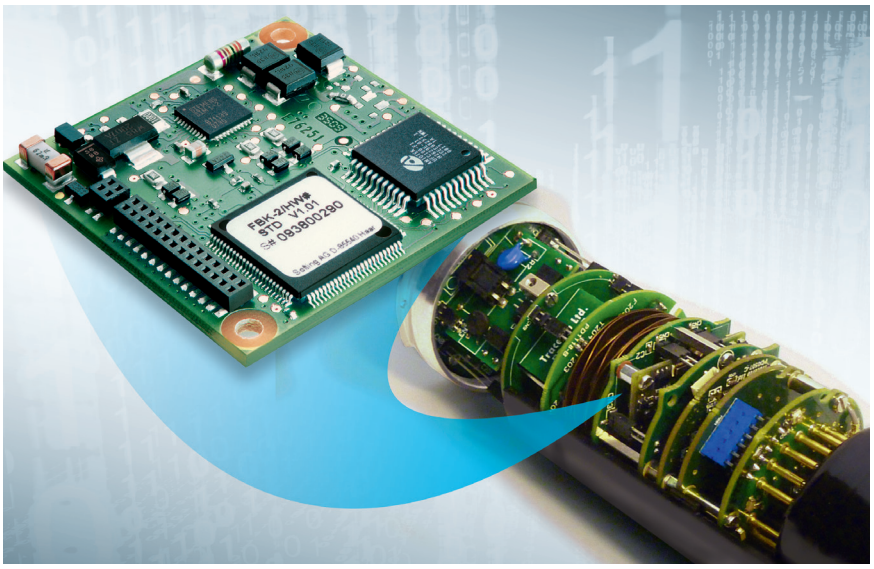

Image: Tracerco/Softing

Tracerco Hyperion™ Density Transmitter Supporting PROFIBUS PA Communication

optimize! softing

Tracerco realized that Softing's PAeasy solution offered a convenient implementation approach. Not only was it possible to easily integrate the ready-to-use communication module into the Tracerco instrumentation devices. Additional advantages were the reduced development process as well as a short time-to-market.

Requirements for Implementing a PROFIBUS PA Field Device

As a result of continuous customer communication and market observation, Tracerco identified the need to support PROFIBUS PA communication capabilities with its existing range of level and density transmitters and assigned priority to this request. Additional requirements included low power consumption as well as an industrial operating range of -40 °C to +85 °C. In a first step, the Tracerco engineers performed a thorough analysis and identified various options for implementing a PROFIBUS PA interface.

It became obvious that specific hardware and firmware are necessary for addressing the PROFIBUS PA needs. On the one hand, this includes the implementation of the Manchester-coded Bus Powered (MBP) transmission technology which is used to connect field devices to PROFIBUS PA networks and allows powering the individual devices over the fieldbus. Together with the time-critical components of the PROFIBUS communication, the PROFIBUS PA interface is implemented in hardware. On the other hand, a full PROFIBUS PA implementation requires the PROFIBUS PA firmware to comprise the less time-critical part of the PROFIBUS PA protocol stack as well as the Function Block application. While the protocol stack is responsible for the mere PROFIBUS data exchange via the fieldbus, the Function Block application implements an interface to the specific Tracerco instruments and ensures that all device functions and parameters as well as the access to this data are standardized throughout the network using a block model. The Function Blocks cyclically access the dynamic process parameters while the Physical Block provides data related to the physical device properties. One or more Transducer Blocks map the process data specific to the Tracerco devices to the standardized Function Blocks. Therefore, the individual device parameters are accessed using the serial Modbus RTU protocol for internal device communication. As even a simple PROFIBUS PA transmitter supports at least 80 fixed and variable parameters, Transducer Blocks typically handle a high number of parameters. For many of these parameters, the Transducer Blocks not only perform the described mapping but also handle pre-processing and calibration of the device data. Thus, the Transducer Block implementation often involves comprehensive development and test efforts. Finally, as a key component of the Function Block application, the Function Block shell controls the execution of the individual blocks and links these to the PROFIBUS PA communication. Thus, the Function Block shell can be seen as a kind of operating system for the different PROFIBUS PA blocks.

Ready-to-Use Communication Module and Short Time-to-Market Drive Tracerco's Decision for Using PAeasy

The first option evaluated by Tracerco for implementing its PROFIBUS PA interface had been to set up a fully customized development, necessarily implying an extended development period, higher costs as well as high certification efforts. After some investigation, however, Tracerco realized that Softing's PAeasy solution offered a more suitable implementation approach. Not only was it possible to easily integrate the ready-to-use communication module into the Tracerco instrumentation devices. Additional advantages were the reduced development process as well as a short time-to-market. As a logical consequence, Tracerco decided to implement the PROFIBUS PA interface based on PAeasy. This decision was backed by Softing's reputation as industrial communication specialist in the automation industry, which is supported by the wide range of embedded solutions offered. Being an existing customer, Tracerco also knew that Softing would be able to deliver a suitable solution for the PROFIBUS PA interface project.

Implementing a PROFIBUS PA Field Device Using PAeasy

Softing's development of PAeasy had been driven by the analysis of a number of successfully implemented PROFIBUS PA projects and the goal to reduce the development costs and shorten the development and certification process of a PROFIBUS PA communication implementation for its customers. Of course, the solution offered had to address additional requirements like a small footprint on the device or an included ATEX certification for use in hazardous environments. As a result, PAeasy combines pre-engineered components suitable for implementing PROFIBUS PA transmitters with minimum engineering effort.

PAeasy comprises a communication module for interfacing with a PROFIBUS PA network, a PROFIBUS PA protocol stack designed and compiled for execution in the communication module, and a Function Block application. It allows the use of up to four Analog Input (AI) Function Blocks that provide read access to up to four process values. A Transducer Block supports reading and writing of up to 25 device-specific parameters while managing the PROFIBUS PA attributes Used/Not Used, Read-Only Access/Write Access, Out of Service/Automatic and performing individual range checks. Both the serial Modbus RTU and the HART protocols are supported for internal interfacing to the device parameters. For this purpose, an appropriate Modbus or HART master, respectively, was developed that, acting as the only master, initiates and controls the data exchange between the communication module and the device. As the bandwidth achieved here is usually smaller than that in the PROFIBUS PA network, the implementation uses a suitable strategy to ensure that the data available in the fieldbus is up-to-date and of good quality. This strategy guarantees a secure and deterministic data exchange.

Fast and Easy Customization by Excel Spreadsheet

The support of individual adaptations according to specific field device features is essential for a successful implementation of PAeasy. Thus, it is important not to base the Transducer Blocks' access to the internal device on fixed settings, but to allow a device-specific customization. This capability is achieved by using an MS Excel spreadsheet as a configuration tool for defining device-specific information such as the PROFIBUS identification number and the vendor ID. In addition, the communication commands and the device addresses for accessing the process values and device parameters are configured here. It also includes the data for creating the status information. Once all specifications have been made in the spreadsheet, these are converted to individual configuration data using a generation tool and subsequently transmitted to the communication module. This way, PAeasy provides a quick and easy possibility to implement a PROFIBUS PA interface for individual transmitters.

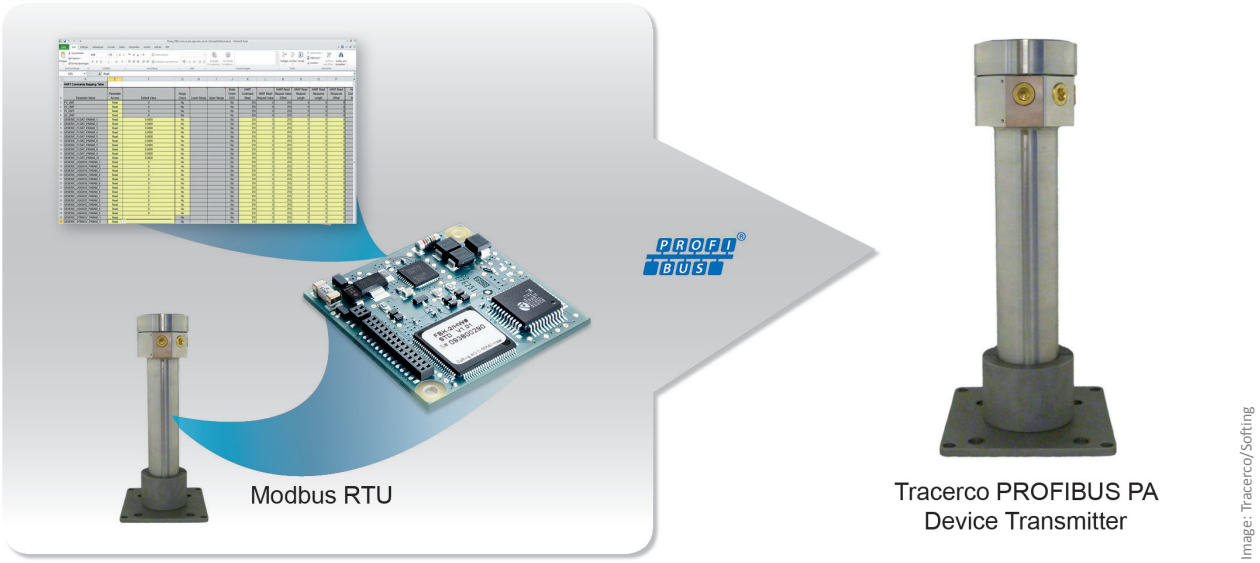

Image: Tracerco/Softing

Implementation of Tracerco's PROFIBUS PA Interface by Configuring PAeasy Firmware

"Softing engineers, the support and service provided made the implementation of this communications interface a smooth process."

Al Jones, senior science & technology specialist at Tracerco

Successful Implementation Project

Following the decision of Tracerco to implement the PROFIBUS PA support on its instruments based on PAeasy, a project has been set up aimed at realizing a PROFIBUS PA-capable nucleonic density transmitter which is used as a prototype for extending the PROFIBUS PA functionality to the full range of Tracerco transmitters. During this project, Tracerco closely collaborated with Softing engineers to evaluate their PAeasy solution for addressing individual requirements. The main challenge faced during the implementation was to re-design part of the software used in Tracerco's device to fully utilize the features implemented in PAeasy without compromising the performance and features of the original instrument. As part of the evaluation, Softing provided a firmware upgrade making it now possible not only to read, but also to write device-specific parameters like engineering units via the PROFIBUS PA network. As an outcome of this project, the required hardware and software have been successfully integrated into Tracerco's existing equipment. Now, Tracerco can offer existing and new customers a unique measurement and diagnostics instrument which is able to communicate in a variety of standardized networks like Modbus, HART, PROFIBUS PA and FOUNDATION™ fieldbus (which, by the way, can be implemented using Softing's FFeasy product, resulting in an identical hardware implementation that leverages a major part of the PAeasy development work).

Overall, Tracerco sees the PROFIBUS PA implementation as a success. "Softing engineers, the support and service provided made the implementation of this communications interface a smooth process," summarizes Al Jones, senior science & technology specialist. And the project manager, Edgar Sanchez, describes the collaboration: "The experience of working with Softing was fantastic. The support provided by Softing has been exceptional. The engineers at Softing are knowledgeable and professional. Overall, it was a great co-operation experience for Tracerco."

Author
Dipl.-Inform. Georg Suess,
Operational Marketing,
Softing Industrial Automation GmbH

http://industrial.softing.com

optimize! softing

© Softing Industrial Automation GmbH
All brand and product names used in this document are trademarks or registered trademarks and legally protected as such, even if not explicitly labeled. | Version April 2016
Softing Industrial Automation GmbH | Richard-Reitzner-Allee 6 | 85540 Haar | Germany | Tel.: +49 89 456 56-340 | Fax: +49 8945656-488
info.automation@softing.com | http://industrial.softing.com