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Clean Process Control for Biodiesel

Universal Fieldbus Infrastructure with FieldConnex

Leading biodiesel provider VERBIO uses a universal fieldbus infrastructure based on PROFIBUS PA and PROFIBUS DP for process automation at its plant in Schwedt.

Pepperl+Fuchs was able to provide all interface components from a single source. The impressive FieldConnex product range is the key factor in ensuring the quick and easy installation, commissioning and ongoing reliability of the fieldbus infrastructure. FieldConnex enabled ELCON, the engineering service provider in charge of the project, to complete the entire job within an extremely short timeframe of just six months.

Based in Leipzig, VERBIO (Vereinigte BioEnergie AG) is a leading provider of biofuels and the only company in Europe producing biodiesel and bioethanol on a large-scale industrial basis. VERBIO constructed its first biodiesel plant back in 2001, establishing itself as a pioneer in the field of biodiesel production. The company developed its own production process to convert vegetable oil and methanol into fatty acid methyl ester and glycerin. More commonly known as biodiesel, fatty acid methyl ester is added to mineral diesel by oil companies and then sold as a “clean” fuel. Glycerin is predominantly used in the consumer goods, pharmaceuticals and cosmetics industries.

VERBIO Diesel Schwedt GmbH & Co. KG operates a biodiesel plant in Schwedt, Germany with an annual capacity of 250,000 tons of biodiesel and 25,000 tons of pharmaceutical-grade glycerin.

All the automation technology in the plant was implemented in close cooperation with ELCON Automation & Engineering, an engineering service provider based in Gelsenkirchen. ELCON are specialists in the field of chemical and industrial plant construction and can draw on a comprehensive knowledge base covering process automation technology for these

fields. In Schwedt, ELCON was responsible for the entire project from planning and engineering right through to commissioning the electrical and the instrumentation and control equipment.

The fieldbus infrastructure in the plant consists of 10 PROFIBUS PA and 6 PROFIBUS DP networks alongside 1300 I/Os that were used at the field level, of which 530 were PROFIBUS PA field instruments. The remaining equipment included 6 controllers, 90 fieldbus barriers, 10 gateways and 44 segment protectors.

A Very Good Reason for PROFIBUS

For ELCON, PROFIBUS was the perfect platform for a process plant with a large number of measuring points. VERBIO shared this opinion having already had positive experiences using this fieldbus technology. One of the main benefits of a bus system is its significantly simpler structure. A standard 2-wire bus that can be connected more quickly and easily now replaces the 2-, 3-, or 4-wire connections that were previously required according to the type of field device.

There are considerably reduced falsification of measurement errors as there is no need for multiple analog to digital conversions. On top of that, status and additional information can be easily incorporated in the same way as it is with the majority of field devices. The information can also be transmitted via the databus and can either be integrated seamlessly into the process control or used as part of a comprehensive monitoring and diagnosis system for the entire process plant.

Universal Compatibility as a Key Decision-making Criterion

ELCON chose Pepperl+Fuchs as the supplier of the interface technology. They were most impressed by the fact that the FieldConnex range matched their own product philosophy. "The decisive factor for us was the fact that, using FieldConnex, we could design a standard, homogenous system architecture," explained Thorsten Bille, managing director of ELCON. "There was no other manufacturer at the time from which we could source all the necessary PROFIBUS PA interface components," he added.

FieldConnex is a range of fieldbus power supplies and installation components that complement each other perfectly. They are designed to make installing, commissioning and operating the fieldbus infrastructure as quick, easy and reliable as possible. An additional benefit is the fact that scalability is not a problem. "This is most important for subsequent projects to increase production," explained Bille, "as the plant can be flexibly expanded using the structures that are already in place."

Accelerated Installation and Commissioning

Compared with PROFIBUS, installing and commissioning a conventional 4...20 mA infrastructure is both difficult and time-consuming. Not only does each measurement device display only limited diagnostics on the local control, the different connection methods must also be taken into account. Documenting the entire infrastructure involves a lot of manual work.

By contrast, PROFIBUS field devices are easily programmed from a PC. An intuitive user interface ensures unproblematic configuration and diagnostics. Loop checks and commissioning are carried out in a quick and targeted manner, during which the entire design is electronically documented, including I&C numbers, comments, etc., and then saved. By configuring the field devices offline during the planning phase, the time needed for commissioning is reduced dramatically. After the devices have been connected to the bus, all that remains is to download the parameters that have already been prepared.

The fact that the automated system at VERBIO Diesel Schwedt was implemented in just 6 months speaks volumes for how quick and easy the FieldConnex concept truly is.

Intrinsically Safe and Intelligently Implemented

Pepperl+Fuchs provides a segment coupler to connect the PROFIBUS DP in the process control system to the PROFIBUS PA in the hazardous area. As a result, several PA segments can be connected via a single gateway, a highly cost-effective solution. The power supply is fed to the FieldBarriers via a high-power trunk with "Ex e" explosion protection and is converted to up to four intrinsically safe outputs for field devices in hazardous areas, Zones 1 and 0.

Field signals in the hazardous area without a PROFIBUS PA interface are bundled using Remote Process Interfaces (RPIs). This approach enables conventional field devices to be seamlessly integrated into the fieldbus environment.

Individual RPIs can be replaced during operation. In addition, they provide a range of diagnostic options by using the HART functionality of the HART field devices that are connected to the remote I/O. A redundant design of the power supply, external bus and internal bus ensures a high level of availability.

ELCON managing director Thorsten Bille is most impressed by the numerous sophisticated features of FieldConnex: "The Pepperl+Fuchs components have proved to be exactly what we wanted. The entire project was completed without any problems whatsoever. This made

our job far easier and was a key factor in enabling us to hand the plant over to the client within the agreed time limit.”

Key words: FieldConnex, PROFIBUS, Application, VERBIO, ELCON, High-Power Trunk, Segment Checker, Fieldbarrier, Segment Coupler

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Fig. 1: Verbio Diesel Schwedt – a biodiesel process plant with 100% PROFIBUS



Fig. 2: Intrinsic safety in the field. Fieldbus barriers limit the power in trunks in the vicinity of field devices. The maximum number of field devices and cable runs can thus be achieved.



Fig. 3: A process control cabinet with the SK2 segment coupler is a model of tidiness and an efficient use of space. Up to Zone 1 field devices can be connected to each segment.