In a World of Choices, FOUNDATION™ Brings it All Together.

www.fieldbus.org
Today, end users want to remove the constraints of closed, proprietary control systems and free their plant’s profit potential. They’re seeking an automation solution that helps them see their process in high definition, manage information effectively to make the best decisions about their operations, and optimise their overall plant performance — all while protecting valuable investments.

In a world of automation technology choices, the Fieldbus Foundation’s solution “brings it all together.” FOUNDATION fieldbus provides an all-digital communication infrastructure for process automation, with powerful multivariable measurement capabilities, robust device diagnostics, and the ability to integrate wireless devices across multiple networks. The block structure of FOUNDATION fieldbus is unique, and provides true distributed functionality for implementing control in the field, improved data management, and alarm and alert management.

FOUNDATION technology was specifically designed for the process industry from the ground up to provide CAPEX and OPEX advantages throughout the plant lifecycle. It is a technology with a solid value proposition for your business.

FOUNDATION Technology — Key to Operational Excellence

Analogue and digital device networks provide communication capabilities, but stop there. Fully digital FOUNDATION technology is about much more than just communication. It is a forward-looking automation solution providing a foundation for outstanding operations: from engineering, to operations and maintenance. FOUNDATION fieldbus allows you to view your process in high definition; manage information effectively; and optimise people, processes and technology.

FOUNDATION fieldbus provides expanded visualisation of plant operations through a purely digital network that also features an object-oriented block structure. Multivariable measurement capability, multiple diagnostics per device, and peer-to-peer communications between devices are all part of our standard. With close to 750 registered devices and 10 registered hosts that have gone through our testing process, it will not be a problem finding products and systems to meet your requirements.

If you really want to bring your plant into the digital age with an open, interoperable standard, FOUNDATION fieldbus is the way. This solution goes beyond digital measurements, however, by helping you manage your data more effectively. Support of standard Electronic Device Description Language (EDDL) technology means that we provide all the persistent data storage and data visualisation benefits of EDDL. FOUNDATION technology also provides time stamping of data; supports alarms and alerts; and can tell you if the quality of your data is good, bad, or uncertain.

FOUNDATION fieldbus also supports the NAMUR NE 107 recommendations for managing data from intelligent devices. This ensures that diagnostic data is managed effectively, and you only see the information you need to see, when you need it. Whether you are an operator, maintenance
technician or engineer, the NAMUR NE 107 recommendation built into FOUNDATION fieldbus will help you do your job more effectively.

The FOUNDATION solution helps you get the most out of your people, your processes, and your technology investment. Most companies today are short on people resources. Using digital diagnostics can help you implement a more advanced instrument maintenance strategy that relies less on routine maintenance and more on predictive maintenance that will address a problem before it becomes an incident.

"Our move towards adopting FOUNDATION fieldbus was a natural consequence of improved process stability, better knowledge of asset status, and decreased downtime provided by this technology. Interoperability, and the means to implement control at the field level, were also key factors during our evaluation phase."

Carlos Henrique Wildhagen Moura
Technical Consultant
Petrobras

The Only Complete, Interoperable Fieldbus Solution

FOUNDATION technology is an all-digital, two-way communications system interconnecting field equipment on a single process control network. It offers a complete, interoperable solution in a single engineering environment: H1 fieldbus for continuous control; and seamless integration with COTS-based High Speed Ethernet (HSE) for advanced process control, hybrid control, or as a backhaul network for remote operations management applications.

FOUNDATION technology makes it possible to "mine" important information from the plant floor. Delivering robust and relevant information to the right person at the right time helps to eliminate the flood of nuisance alarms and improve overall performance, while empowering operators, technicians and process engineers — making plant operation easier, faster and better.
The information you need is displayed instantly, so you won’t have to look for it.

Only FOUNDATION technology enables control in the field, as well as device and subsystem interoperability, without the need for customisation, which accounts for a huge amount of spending in process automation projects.

A Solution for New Plants and Modernisation Applications

FOUNDATION fieldbus makes headlines with large new plants that incorporate tens of thousands of devices, but it’s also making inroads in modernisation applications around the world. There is a large installed base of legacy process automation systems that desperately need refreshing, and many end users are choosing FOUNDATION technology as part of these projects as they develop their automation strategy for the coming decades. One reason is that FOUNDATION technology is adaptable, and has changed to accommodate new developments in the world of information technology as they are adopted by the process industries.

FOUNDATION fieldbus was the first of the major automation protocols to adopt standard Ethernet technology for its HSE control network. FOUNDATION for Remote Operations Management (ROM) provides seamless connectivity with wireless networks such as ISA100.11a and WirelessHART®. As an open standard, the technology can continue to evolve and provide a sustainable development path for the long term.

An Industry Standard — Implemented Worldwide

Since its introduction in 1994, the Fieldbus Foundation’s open, non-proprietary technology has gained unprecedented industry support. Tens of thousands of fieldbus control systems, and multiple millions of fieldbus devices, are now in service around the world.

According to the ARC Advisory Group, FOUNDATION fieldbus is the leading digital fieldbus communications solution for the process industries. The technology, which is fully compliant with all established international fieldbus standards, including ISA S50, IEC 61158, IEC 61508, IEC 61804 and CENELEC EN50170, now accounts for nearly three-quarters of the total digital process fieldbus marketplace. ARC also predicts growing demand for process fieldbus products, with continued double-digit growth over the coming years.

As well as the advantages regarding installation costs, fieldbus technology also offers considerable added value with diagnostics and device parameterisation. Furthermore, the savings potential in maintenance costs should not be forgotten.”

Michael Schwibach
BASF AG

Designed to Handle Mission-critical Applications

FOUNDATION technology is intended for mission-critical control applications, and is the only fieldbus solution meeting all critical end user requirements: high-speed communications; intrinsic safety, including the Fieldbus Intrinsic Safety Concept (FISCO); support for bus-powered devices; and utilisation of existing plant wiring.

Typical applications include:
- Closed-loop continuous control (H1, HSE)
- Remote operations (FOUNDATION for ROM)
- Process safety applications (FOUNDATION for SIF)
- Batch sequencing (Flexible Function Blocks)
- Information integration
- Recipe management
- Plant asset management applications
- Legacy system integration

Improved Business Results – Wherever You Operate
The first commercial FOUNDATION fieldbus applications were undertaken in 1997. Since that time, millions of fieldbus devices have been sold and installed, and countless person-years of project expertise and best practices have been accumulated.

Today, 68 percent of all new industrial automation projects in the process industries globally utilise FOUNDATION fieldbus in some fashion. While many Greenfield sites incorporate the technology, an ever-increasing number of control system modernisation and migration projects are also benefitting from FOUNDATION technology.

Growing Selection of Registered, Interoperable Products

With FOUNDATION technology, end users have the freedom to choose best-in-class control products meeting their specific application needs — and the power to integrate those tools into their enterprise model.

The Fieldbus Foundation’s rigorous device testing and registration programme allows you to choose from a growing selection of interoperable fieldbus products offered by the world’s leading automation equipment suppliers. More than 750 device registrations have now been completed, with a growing number of host systems also registered.

Instruments bearing the official foundation registration mark will work on the same digital control network without loss of integration or functionality. This means you can select the best device for the job, regardless of the manufacturer.

Continuous Technology Evolution Provides New Solutions

The Fieldbus Foundation’s technology continues to evolve based on changing market demands. Increasingly, industrial organisations are turning to solutions like FOUNDATION fieldbus to optimise their operational performance, reduce CAPEX and OPEX, ensure regulatory compliance, and gain an overall competitive advantage.

For example, the FOUNDATION for Safety Instrumented Functions (SIF) programme was launched to provide commercial, standards-based, Safety Instrumented Function (SIF) products incorporating FOUNDATION fieldbus. The SIF protocol was approved by TÜV Anlagentechnik GmbH to meet the requirements of IEC 61508 up to, and including, Safety Integrity Level (SIL) 3.

The FOUNDATION for ROM initiative provides a unified digital infrastructure for asset management in a wide range of remote applications. It enables fieldbus connectivity to remote I/O, wired HART®, and the leading industrial wireless protocols WirelessHART® and ISA100.11a. The solution allows users to seamlessly combine devices on all of these networks within the FOUNDATION fieldbus infrastructure to manage device data and information in a unified infrastructure specifically built for the requirements of remote applications — from oil and gas field applications to water treatment facilities, offshore platforms, and even OEM skid-mounted equipment.

The Fieldbus Foundation has also joined leading automation technology consortiums, suppliers and end users in the Field Device Integration (FDI) Cooperation Project. This effort is aimed at a uniform device integration solution for the process industries across all host systems, devices and protocols. It is based on rigorous use case requirements, incorporates the best aspects of each member technology, and eliminates redundancies where they may exist. The FDI solution does away with double efforts for customers and vendors, and preserves backward compatibility and operating system independence.

Functional Area Expansion
“End users should not forget the real objective of implementing fieldbus: reliable operations and improved profitability. At Shell, the technology improved asset utilisation, lowered fixed and variable costs, and reduced maintenance expenses.”

James Rhame
Asset Development Manager
Shell Chemical

Resources for Every Phase of the Plant Lifecycle

FOUNDATION technology was specifically designed to help end users and owner/operators optimise every phase of the plant lifecycle, providing reliable, deterministic performance over time. Engineering and commissioning times are significantly shortened, along with reduced wiring and overall footprint. All of these benefits also translate to faster time to startup, which can easily make up for the cost in the automation system investment.

How End Users Benefit from FOUNDATION Technology

FOUNDATION fieldbus has been rigorously proven at industrial sites worldwide, making it a low-risk choice for end users. Because of the lower effort and space required to install the technology, you can commission it faster. The predictive intelligence it delivers helps reduce maintenance overhead, and its performance ensures better control than asynchronous systems. Users also benefit from a much more reliable system — one with a built-in backup capability to minimise costly downtime issues.

Today, FOUNDATION fieldbus is controlling the largest plants in the world in some of the most critical processes.

Reliance Industries Ltd., India

Recognised as one of the most extensive refinery projects for FOUNDATION technology to date, with over 22,000 fieldbus tags spread across more than 3,500 segments, Reliance Industries’ Jamnagar Refinery & Petrochemical complex is India’s largest private sector enterprise. The Jamnagar facility has a capacity of 580,000 barrels-per-day (bpd), and together with Reliance’s neighbouring 660,000 bpd existing refinery, form the world’s largest refining complex with a 1.24 million bpd capacity.

Duke Energy Carolinas, LLC, United States

At its Oconee nuclear station, Duke Energy chose FOUNDATION technology as a robust, scalable, long-term control solution with widespread industry support. Unlike analogue technology, which is now reaching obsolescence, fieldbus is a state-of-the-art automation platform that will be serviceable well into the future. Fieldbus also is more process-oriented than typical manufacturing networks.

CNOOC and Shell Petrochemicals Company Ltd. (CSPC), China

The CSPC petrochemicals complex is a joint venture between Shell Nanhai B.V. and CNOOC Petrochemicals Investment Limited (CPIL). The complex employs real-time device management and diagnostics software connected to 16,000 FOUNDATION fieldbus devices. The system continuously monitors the health of field instrumentation, resulting in increased reliability and fewer suspect measurements. With this preventive maintenance capability, plant operators can have greater confidence that their facility will perform as expected.

The advanced diagnostics capabilities that FOUNDATION technology provides are probably the biggest benefit from a lifecycle perspective. It has the ability to transmit multiple process variables as well as a wealth of diagnostic information related to the device. The technology’s peer-to-peer communication capabilities make it possible to support advanced diagnostic applications that combine and coordinate real-time measurements from multiple devices.

Even more important, however, is how FOUNDATION fieldbus is able to manage data. Alarms and alerts...
Petrobras, Brazil
Petrobras — Brazil’s national petroleum company — recognised that FOUNDATION fieldbus provided an open, decentralised digital control architecture to reduce process downtime and subsequent losses at its offshore facilities.

Petrobras has announced some of the most ambitious capital spending plans of any major global oil company, and FOUNDATION technology is going to be a big part of its automation strategy moving forward.

Qatar Shell GTL Ltd., Qatar
Pearl GTL, the world’s largest gas-to-liquids (GTL) operation, needed process instrumentation and gas analytics to provide relevant data directly from the plant. This would allow the control system to run processes at optimal productivity and efficiency. Thanks to FOUNDATION technology, Pearl GTL transforms data from fieldbus device diagnostics into focused, actionable intelligence. Applications collect and organise data from various sources, as well as analyse processes and identify faults. The right personnel are then notified of potential failures in order to avoid incidents.

Nederlandse Aardolie Maatschappij BV (NAM), The Netherlands
The NAM gas field is located in Groningen province, in the far northeastern corner of The Netherlands. A recent upgrade project at the field made extensive use of FOUNDATION technology. The combination of fieldbus networking and advanced asset management strategies helps keep track of thousands of valves and instruments. When problems arise, maintenance engineers can get a quick picture of what is happening with the equipment.

Suncor Energy, Canada
The Athabasca Oil Sands in Northern Alberta, Canada, are the largest oil reserves in the world, and Suncor Energy, Inc. is the original and single largest investor in the region. At Suncor’s Firebag in-situ operations, FOUNDATION fieldbus has proven to be an excellent tool for asset management and predictive maintenance for plant instrumentation. Currently, there are over 8,000 fieldbus devices in service at the Firebag facilities.

Shell Deer Park Refining Company (SDPRC), United States
Shell Oil believes FOUNDATION technology is the key to reduced operations and maintenance costs, increased plant performance and efficiency, and resistance to obsolescence at its facilities worldwide. Thanks to a fieldbus-based control solution, the company achieved a significant performance improvement in reliability and unit utilisation at its Deer Park refinery in Pasadena, Texas.

Better Performance Boosting Your Bottom Line
By installing FOUNDATION technology, you can create a knowledge-based system empowering your workforce to implement continuous improvements in plant operations. Accessing information from the plant floor, channelled through modern fieldbus control systems, makes it possible to run your plant more efficiently. The true benefits of fieldbus occur after start-up and commissioning!

These include:
- Increased availability
- Reduced downtime
- Greater manufacturing flexibility
- Reduced process variability
- Increased productivity
- Improved asset utilisation
- Reduced maintenance costs
- Higher quality products
- Improved safety and regulatory compliance

are supported along with diagnostic data. All information is time-stamped. There are mechanisms for data quality, which tell you if your data is good, bad, or uncertain. This can help you tell the difference between a problem with your process and a problem with your device, which is another source of unplanned shutdowns.

FOUNDATION technology, combined with asset management software, eliminates the high cost of preventive and unnecessary maintenance such as periodic valve rebuilds. Resources are spent on equipment requiring repair or service — not wasted on devices that don’t need it. You can build advanced predictive and proactive maintenance strategies with FOUNDATION fieldbus that allow you to do more with your limited resources.
**Certified Training: Expert Technology Instruction**

Getting started with FOUNDATION technology is easy: the Fieldbus Foundation offers a wide range of technology instruction opportunities across the globe. Our FOUNDATION Certified Training Programme (FCTP) establishes uniform standards for fieldbus educational curriculum and instructors, and defines acceptable levels of learning for students of the technology.

Certified training ensures professionals with a strong knowledge of FOUNDATION principles, a consistent understanding of fieldbus fundamentals, and a proven ability to implement fieldbus-based control systems. All FCTP sites offer certificates showing a student’s competency within that certification level.

FCTP-approved training facilities have a close working relationship with the Fieldbus Foundation, and as such, continually receive updates on FOUNDATION fieldbus as it continues to improve and develop capabilities. These sites are always on the leading edge of the technology.

Through the FCTP, training facilities, curriculum, and instructors are all audited to ensure they meet programme requirements. Certified sites are required to maintain multiple FOUNDATION fieldbus hosts and devices onsite in order to demonstrate competence with fieldbus technology. They must also demonstrate to auditors that their course material adheres to set instructional standards.

The FCTP currently offers three types of certification: FOUNDATION Certified Professional, FOUNDATION Certified Support Specialist, and FOUNDATION Certified Technical Specialist. Students completing a certified training programme are listed in the Student Registry Catalogue on the foundation’s web site.

Certified training is currently available at the following sites:

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**End User Councils: Let Your Voice Be Heard**

You can have a voice in the future of the Fieldbus Foundation by participating in an End User Council (EUC). Regional EUCs, established worldwide, provide an open forum for the exchange of information about the application and development of FOUNDATION technology in a wide range of industries.

Current EUC locations include:

**Americas**
- South America
- United States
- Western Canada (Contact: americas_euc@fieldbus.org)

**EMEA**
- Europe
- Middle East
- Africa (Contact: emea_euc@fieldbus.org)

**Asia/Pacific**
- China
- Japan
- Singapore
- India (Contact: asia_euc@fieldbus.org)

**Oceania**
- Australia
- New Zealand (Contact: oceania_euc@fieldbus.org)

**Educational Seminars: Hands-on Experience for End Users**

FOUNDATION technology seminars are offered in key locations around the world — from North America and Europe/Middle East/Africa (EMEA), to Latin America and Oceania.

Oriented towards process industry end users and engineering firms, the one-day seminars cover all aspects of FOUNDATION technology business value, project execution and system design. Leading end users, systems integrators, and trainers discuss successful installation and commissioning practices, control strategies, and operational and maintenance practices.

**Foundation Membership: Gain a Competitive Edge**

The Fieldbus Foundation offers a significant number of benefits through membership. Whether you are a manufacturer, systems integrator, educational institution, end user or other professional in the business, join the foundation and gain a competitive edge!