

ARC WHITE PAPER

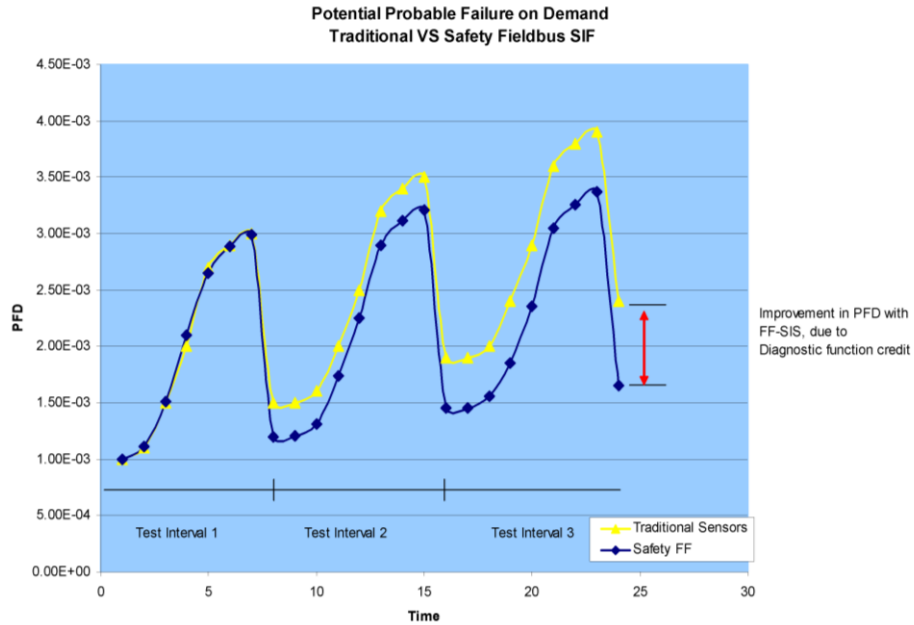
By ARC Advisory Group

SEPTEMBER 2008

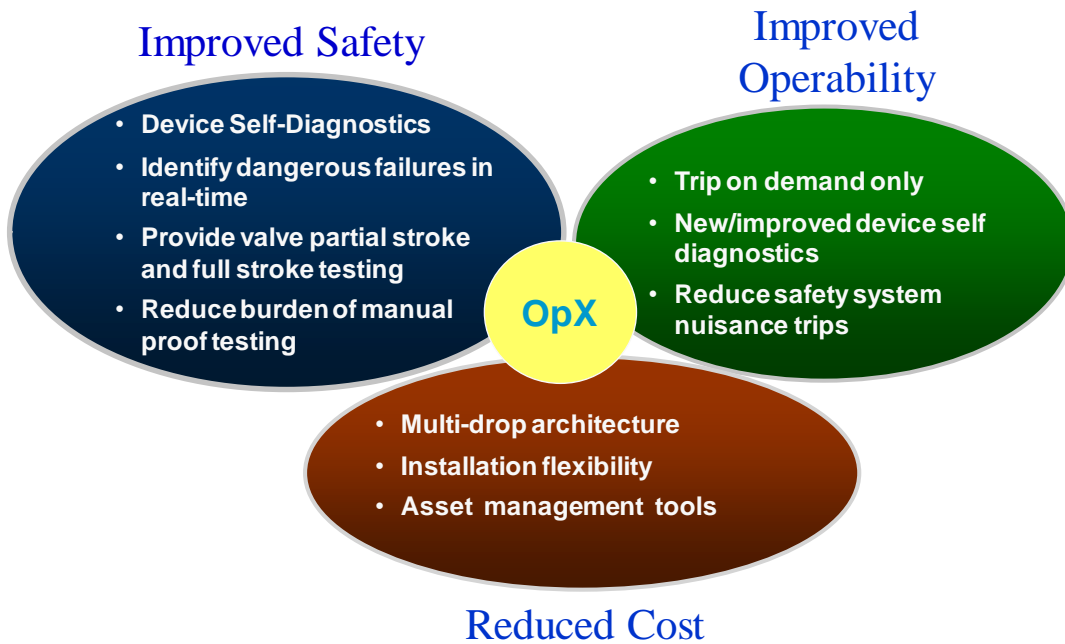
Foundation Fieldbus Safety Instrumented Functions Forge the Future of Process Safety

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Chevron's Analysis Shows that FF-SIF Greatly Reduces Potential Probable Failure on Demand Compared to Conventional Safety Systems



Saudi Aramco's Primary Criteria for Adopting FF-SIF

Executive Overview

FOUNDATION Fieldbus Safety Instrumented Functions have been successfully beta tested and products conforming to the FF-SIF specification will be available soon. This means big changes for the safety system market and a change in the way end users will approach safety instrumented systems (SISs). It is very clear that end users want this technology and are striving to include FF-SIF systems in their project specifications. Many major end

users will probably be specifying FF-SIF systems for their new projects starting in 2011.

FOUNDATION Fieldbus Safety Instrumented Functions have been successfully beta tested and products conforming to the FF-SIF specification will be available soon. This means big changes for the safety system market and a change in the way end users will approach safety instrumented systems (SISs).

What are the benefits of Fieldbus at the safety system layer? Over 90 percent of the causes for failure are due to the failure of field devices. Today, a safety system should address overall safety needs by checking the health of the I/O, field devices, and valves. The system should also incorporate components, such as sensor validation, environmental condition

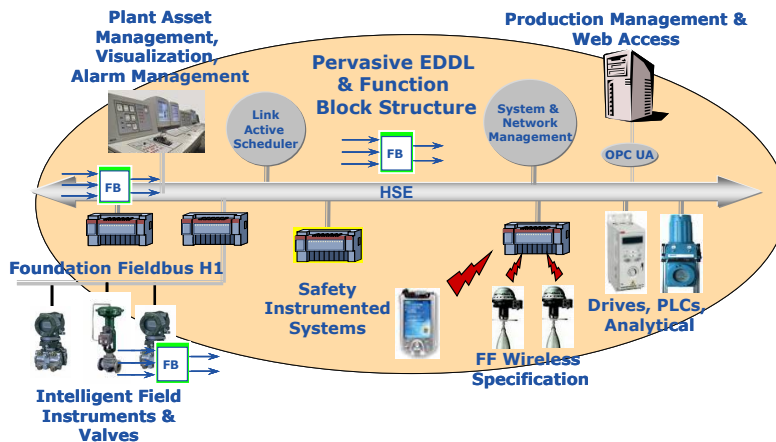
monitoring for conditions that can cause sensor degradation, and impulse line blockage monitoring.

FOUNDATION Fieldbus has always adhered to the international standard, and the SIF is no exception. FF-SIF meets the IEC 61508 standard for functional safety systems up to SIL 3, and allows users to build safety systems that adhere to the IEC 61511 standard for functional safety in the process industries. The protocol has already received TÜV approval, and suppliers are going to start submitting their products for certification by companies such as TÜV and exida over the next year. This means that we should see actual products that are certified available commercially some time in 2010.

Aside from product development and approval, future developments from the Fieldbus Foundation and member companies include developing best practices and guidelines for FF-SIF implementation, quantifying the reduction in total cost of ownership, and quantifying reduced installation costs associated with the technology. The Fieldbus Foundation also has to go through the process of testing devices from suppliers when they are available to ensure that they meet FF specifications (the Foundation “check mark” that everyone is familiar with).

FF-SIF Is a Crucial Part of FOUNDATION Fieldbus Automation Infrastructure

ARC strongly believes that FOUNDATION™ Fieldbus is more than just a network and was built from the ground up to be more than just a digital replacement for 4-20mA technology. This is just as true for safety systems and FOUNDATION Fieldbus Safety Instrumented Functions (FF-SIF) as it is for the application of FOUNDATION technology in basic process control systems (BPCS).



Safety Instrumented Functions Are a Natural Extension of the Foundation Fieldbus Automation Infrastructure

FOUNDATION technology is a unified infrastructure that manages data, communication, plant assets, and plant events while providing highly distributed control functionality and interoperability between devices and subsystems. Features and underlying technology are important, but these are not enough to justify their application, especially in today's capital-averse environment. End users today are highly focused on business issues and any technology under consideration must meet business value criteria. At ARC, we see the same business issues mentioned repeatedly in the process industries - increasing process availability, the need for actionable business intelligence, and the need for a common environment that can be scaled down to very small process applications, or scaled up to large, critical applications that require integration of multiple control domains. FOUNDATION Technology addresses all three of these issues, and should be approached as a system in order to achieve the benefits.

Process Integrity a Key Element of FOUNDATION Technology Value Proposition

Process integrity addresses the requirement to keep the plant up and running, but at the same time maximizing reliability and adopting a proactive maintenance strategy. If an abnormal situation arises, and the plant does need to shut down, it does so in a logical and controlled manner that avoids

the creation of waste and, more importantly, avoids damage to people and the environment. However, it is also important to avoid spurious nuisance trips that negatively affect productivity without enhancing safety. The need for business intelligence addresses the requirement for global data access and availability, allowing users in various roles in the plant to access the data they need, when they need it, from any point in the system. At the same time, this data should be presented in a manner that is easy to understand and act upon. Open, scalable integration addresses the need to drive out custom integration costs and the requirement for best of breed applications to work seamlessly together in an open environment. As an open automation infrastructure, FOUNDATION Technology addresses all of these requirements in several different ways.

The Value of Integrated Safety Functionality

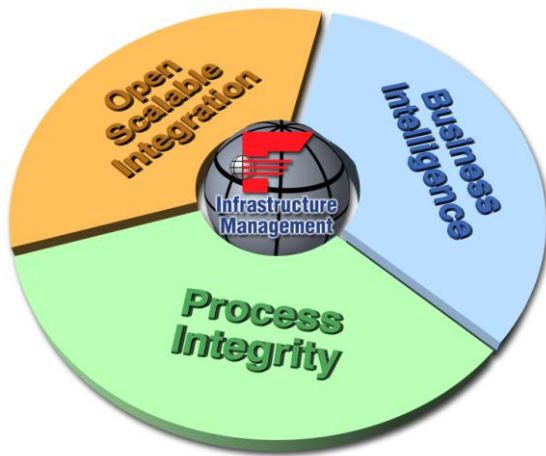
FF-SIF provides a common platform for SIS and process automation that ARC espouses in its “same but separate” model for safety systems, where the process automation system and the safety system share the same control network and are able to use common visualization, engineering, and asset management tools,

while the logic is executed separately for each system. Sharing a common platform reduces installation costs, eliminates the cost of custom integration, and provides a unified view of control and asset management that encompasses the SIS and the basic process control system.

Process safety in the traditional sense refers to add-on components that protect personnel working in or near hazardous manufacturing processes from injury or death and from economic loss. However, modern safety solutions go far beyond this notion.

Many end users now recognize that the deployment of intelligent, integrated safety solutions can directly affect their bottom line, while simultaneously improving process and personnel safety.

Standalone safety systems have been the traditional method of choice, which meant different design and operation requirements for BPCS and SIS. The primary function of a BPCS is to hold specific process variables to predetermined level in a dynamic environment. An SIS, on the other hand, is static, waiting to take action to bring the process to a safe state when a



Process Integrity Is a Key Part of the FOUNDATION Fieldbus Automation Infrastructure

process is out-of-control and the BPCS is unable operate within safe limits. As a result, separate systems were developed for process control and safety

Benefits:
No need for data mapping
Single set of engineering tools
Significant reduction in integration efforts
Lower lifecycle cost
Challenges:
Putting hardware and software barriers between safety and control systems
Ensuring proper access protections
Ensuring visual differentiation between control and safety environments at workstation level

Benefits and Challenges: Integration of Safety and Control Systems

and synchronize. It is a costly solution for end users, considering that an SIS has no definitive return on investment unless something goes wrong.

Until recently, users have had little choice other than to use completely different systems for control and safety. Some users even mandated that the BPCS and SIS be supplied from different manufacturers. There continue to be many other good reasons to put safety and control functions in different controllers. They include:

- Independent failures – minimizing the risk of simultaneous failure of a BPCS along with the SIS.
- Security – preventing changes in a BPCS from causing any change or corruption in the associated SIS.
- Different requirements for safety controllers – an SIS is normally designed to fail in a predictably safe way, whereas a BPCS is usually designed for maximum availability. An SIS also has special features like extended diagnostics, special software error checking, protected data storage, and fault tolerance.

Manufacturers today are under pressure to contribute value to a company's bottom line by continuously improving the performance of their manufacturing assets. Today's business drivers focus on metrics such as Return on Assets (ROA) and Overall Equipment Efficiency (OEE), both of which are

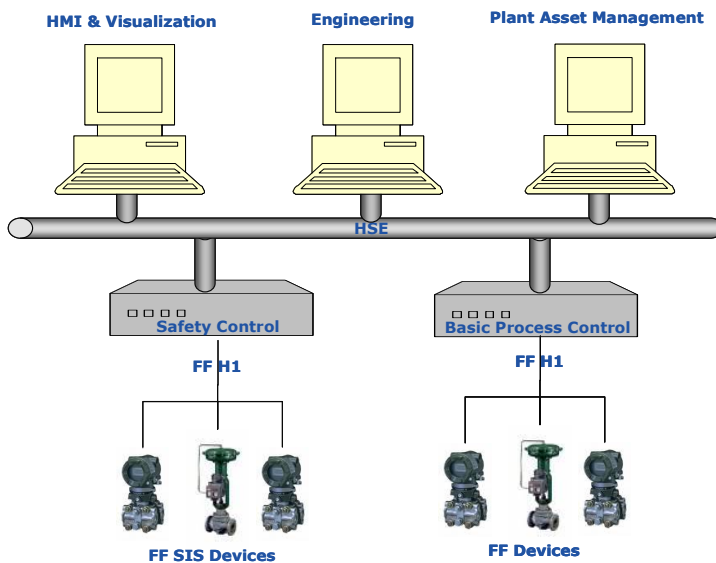
with separate operator interfaces, engineering workstations, configuration tools, data and event historians, asset management, and network communications. That adversely affected the cost of infrastructure acquisition, plant systems integration, control and instrumentation hardware, wiring, project execution, installation, and commissioning.

Lifecycle costs, such as spare parts, support, training, maintenance, and service are also higher with this approach. Added costs are incurred because these interfaces are engineering intensive and expensive to maintain

critical contributors to the overall goal of achieving Operational Excellence (OpX). The nemesis of all manufacturers is unscheduled downtime – unexpected stoppage resulting from equipment failure, operator error, or nuisance trips. FF-SIF offers improved diagnostics that minimize the chance of nuisance trips. More importantly, FF-SIF also has the potential to integrate directly into standard control architectures, allowing improved asset and event management thus minimizing the chances of failure.

FF-SIF History and Development Path

In early 2006, Fieldbus Foundation announced that TÜV had granted Protocol Type Approval for the Fieldbus Foundation Safety Instrumented Systems specifications. The specifications outlined by the Fieldbus Foundation comply with the IEC 61508 standard for functional safety of electrical/electronic/programmable electronic safety-related systems requirements up to, and including, Safety Integrity Level 3 (SIL 3).



The Common Architecture Enabled by the FF-SIF Reduces Installation and Operational Costs and Increases Availability

TÜV Protocol Type Approval extends FOUNDATION technology to provide a comprehensive solution for Safety Instrumented Systems in a wide range of industrial plant applications. The specifications enable suppliers to build FOUNDATION devices in compliance with IEC 61508. Suppliers are going to start submitting their products for certification for use in safety instrumented systems by companies such as TÜV and exida for approval over the next year. This means that we should see actual products that are certified available commercially some time in 2010,

with implementation on large projects probably in 2011. End users will be able to choose devices meeting the requirements of IEC 61511 (functional safety: safety instrumented systems for the process industry sector) from multiple suppliers, instead of being restricted to devices designed specifically for a proprietary safety system platform.

FF as the Black Channel

The two primary approaches for communication networks in safety systems are the white channel and the black channel. The white channel is essentially an entire communication scheme that is designed from the bottom up for safety applications. Of course, all of this specialized equipment requires certification and implies added cost, including hubs switches, and so on. The black channel, which comes from the “black box” concept and uses a regular transmission system and regular network hardware. The safety layer is essentially built into the network and exists between the communication stack and the application according to the IEC 62280-1 standard. The safety layer of the black channel approach handles all the safety related applications and requirements. With the black channel concept, end users can even connect non-safety devices to the safety network, because the protection layers are built in to the network. Everything can share a common network and costs are greatly reduced.



**Certification of Supplier Devices
Is the Next Major Step Toward
FF-SIF Availability**

FF-SIF uses the existing H1 protocol as the “Black Channel” network between the logic solver and the SIS devices. It is important to note that no changes were made to the fundamental H1 protocol for implementation in SIS, but additional device diagnostic functions and fault detection capabilities were required. In addition to the device diagnostics, the primary advantage to using FF-SIF as the black channel for safety applications is the network diagnostics that are possible. Traditional analog-based networks lack the ability to detect noise, corruption, and faults in the network.

FF-SIF Registration and Certification

Having registered products for FF-SIF is just as important as having the appropriate certification. Just as FOUNDATION Fieldbus devices must be tested for interoperability, the impending release of devices to be used in safety instrumented systems must also undergo a registration process. Concept and type approval for FOUNDATION Fieldbus devices to be used in safety instrumented systems (SIS) has been approved by TÜV, but the suppliers themselves must start producing devices and having them certified as well.

This process is totally separate from Fieldbus Foundation registration. After safety certification, SIF devices and hosts can then be registered by the Foundation. FF-SIF specifications are managed separately from the standard Foundation specifications. There is a separate change management process. These files are maintained in different source control repositories. Any technical change to the documents requires analysis by the Safety Review Committee. Typically, these changes will require a validation by the Foundation before they can be incorporated into the next version of the documents. This is the primary role of the Safety Review Committee.



The Foundation has augmented their registration process for SIF devices. At the user layer, the Foundation is developing a registration kit due to the new test requirements because of safety. During the process of creating the system demonstration, which culminated in the live demonstration in Amsterdam in May, they have been developing parts of the test tool, which should be released within a year. When the suppliers put their devices through the safety validation process, they can go through test requirements and test cases and auditing functions from the Foundation, which will grant a registration mark.

Just like standard Foundation H1 Process Devices, a Foundation for SIF device must undergo a rigorous test process before it can use the Foundation's product registration mark (aka the "checkmark"). This requires testing at all layers including interface electronics (physical layer), stack communication and finally the device application (function block layer).

The electronics are tested against such requirements as minimum operating voltage and signaling. The stack conformance, tested exclusively by Fraunhofer IITB, verifies the device can properly construct and interpret fieldbus messages. The final test, using the Foundation Interoperability Test Kit (ITK) for SIF, will validate the conformance and interoperability of the device application, including function blocks. It is important to stress that the registration process does not address safety. Safety related aspects of the device are handled by the manufacturer and third party services like TÜV.

FF-SIF Conforms to International Safety Standards

Foundation Fieldbus has always adhered to international standards, and the SIF is no exception. FF-SIF meets the IEC 61508 standard for functional safety systems up to SIL 3, and allows users to build safety systems that adhere to the IEC 61511 standard for functional safety in the process industries.

Since the publication of IEC 61508 and IEC 61511 standards, interest in rigorous safety analysis and applying certified safety instrumented systems have increased considerably among the user community. The safety standards give guidance on good practice and offer recommendations, but do not absolve its users of responsibility for safety. The standard recognizes that safety cannot be based on retrospective proof, but must be demonstrated in advance. Therefore, the standards not only deal with hazard and risk analysis and specifying safety system requirements, but with the whole safety lifecycle, which include validation of installed system, operation and maintenance, and finally decommissioning. Thus, the standard deals with

IEC 61508	IEC 61511
Generic safety standard for broad range of applications	Sector-specific for the process industries
Applies to all safety-related systems & external risk reduction facilities	Applies only to safety-instrumented systems
Mainly for suppliers of safety systems & devices	Mainly for system designers, integrators and users of safety systems

Key Differences Between IEC 61508 and IEC 61511

However, SIS users are increasingly demanding that the certification be done by competent and certified individuals or organizations. Today, there are a number of national and international organizations that are setting up procedures and guidelines for compliance, training and certifying the competence of individuals and companies that perform such audits. They include The 61508 Association and ISA.

the management of safety throughout the entire life of a system.

The standards require evidence of competence of those who perform assessments but do not require that they be formally authorized or accredited.

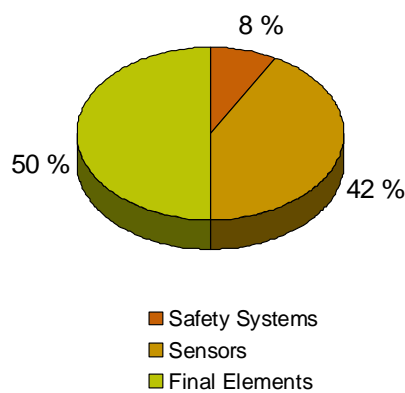
FF-SIF Diagnostic Functions and Benefits

What are the benefits of Fieldbus at the safety system layer? Over 90 percent of the causes for failure are due to the failure of field devices. Today, a safety system should address overall safety needs by checking the health of the I/O, field devices, and valves. The system should also incorporate components, such as sensor validation, environmental condition monitoring for conditions that can cause sensor degradation, and impulse line blockage monitoring.

Common cause failures of electronic components are frequently due to environmental conditions. Many electronic device failures are due to elevated humidity and temperature, which need to be monitored closely. Sensor calibration is also becoming an integral part of safety systems. FOUNDATION Fieldbus allows for remote monitoring, diagnostics, and validation.

The Value of Partial Stroke Valve Testing

When overall loop performance, from system to final element, is quantified, it is easy to see that the weak link of most safety loops is the potential non-operability of safety valves, since they alone account for roughly one half of the probability of a dangerous failure. Emergency shutdown (ESD) valves are the final line of defense and are critical to minimizing the chance of fire or explosion during process upsets. As shutdown valves are rarely cycled, however, there is always concern over whether they will operate if actually needed. In fact, if these valves are not periodically stroked, it can almost be guaranteed that they will not work when called upon.



Safety Loop Failure Sources

Although their importance to safety loops has often been overlooked in the past, IEC standards are forcing instrumentation technicians to significantly increase the frequency of their safety valve testing procedures. In order to meet and maintain desired SIL requirements up to SIL3, it has become necessary for manufacturers to test many of their safety valves several times a year. Faced with these increased valve testing requirements, end users are realizing that they must improve upon their conventional safety valve testing methods to avoid significant recurring labor costs.

Conventional safety valve testing procedures employed at most end user companies involve sending a technician out in the field to attach either a mechanical stroke limiting device or pneumatic switch to each safety valve. With these devices attached, the movement of the safety valve is limited, which allows them to be partially stroked without interfering with the process. Once the safety valves' movement is restricted, technicians send a signal from the control room to determine if the valve would respond if called upon.

This testing method suffers from a number of drawbacks, most importantly its highly labor-intensive nature and high operational costs. Using these conventional methods, personnel have to manually perform safety valve testing as well as maintain adequate records documenting the tests performed and their results. Consequently, if companies continue using

Manual testing	2 pers. x 2 h x 60 USD	= 240 USD
Reporting	1 pers. x 1 h x 60 USD	= 60 USD
Management	1 pers. x 1 h x 80 USD	= 80 USD
Data handling	1 pers. x 1 h x 60 USD	= 60 USD
Testing equipment & safety permits etc.		= 60 USD
 TOTAL to carry out testing for one valve		 = 500 USD =====

To meet and maintain SIL 3 level it may be necessary to test valves several times a year.

Cost of Conventional Safety Valve Testing

of an emergency. Concern over the reliability of conventional safety valve testing procedures is due to a number of reasons including the lack of real-time data and the absence of trending data.

Another significant drawback to conventional testing methods is that they render the valve unavailable during testing if a real safety issue is encountered. Conventional valve testing procedures also put the burden on technicians to manually return safety valves to their proper operating mode after completing the tests. If an emergency were to occur during the testing procedure, or if a safety valve were to be left with its range of motion restricted, the valve would be unavailable to prevent a fire or explosion during a process upset. Because of these risks, and its highly labor-intensive nature, many end users feel they must improve their safety valve testing procedures.

Through the remote diagnostic capabilities of FF-SIF, end users can achieve a real time view into the overall health of their safety valves by monitoring

conventional valve testing procedures, they would face enormous recurring labor costs to comply with IEC standards.

Not only is the manual work associated with conventional testing methods expensive, it is also unreliable. There are a number of deficiencies in conventional testing methods, which raise the uncertainty over whether safety valves will actually be available in case

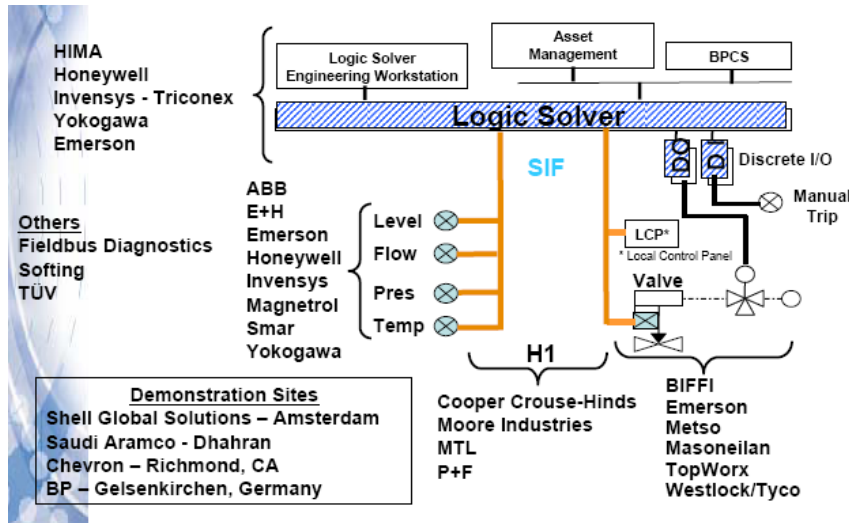
and testing them online, as often as desired by performing partial stroke tests online while the process is running.

FF-SIF Demo Is a Success

The introduction of a fieldbus based safety system, otherwise known as Foundation Fieldbus Safety Instrumented Functions (FF-SIF), was one of the most anticipated events in the world of process automation this year. The successful first demonstration of the system at Shell Global Solutions in Amsterdam was conducted on May 20th, with Saudi Aramco, BP, and Chevron also conducting simultaneous demonstrations of their own.

A Multivendor System

The demo system itself was comprised of products from several vendors. The actual safety system was provided by HIMA, while Yokogawa provided the basic process control system and plant asset management software.



FF-SIF Rollout Team and Demonstration Sites

Other suppliers included, RuggedCom and Softing. The demos running at Aramco, Chevron, and BP included other systems and products from all of the major process automation suppliers. Other supplier representatives on hand at the demo included people from Honeywell, Invensys, Moore Hawk, Biffi, MTL, Topworx, Azbil (Yamatate), Dresser Industries, MTL, Pepperl + Fuchs, and Risknowlogy.

Demo Highlights the Value of Predictive Diagnostics in SIS

The demonstration of the system itself provided a glimpse into the primary value proposition of FF-SIS – the advanced diagnostics functions. There was some palpable tension in the air as the system itself was demonstrated live, but everything was executed flawlessly. Functions demonstrated included high and low level trips, partial stroke testing of valves, and a partial stroke test that was interrupted by the ESD. The last example showed that even in the middle of a partial stroke test the ESD could successfully take over and shut down the system during an abnormal situation.

Two out of three (2oo3) voting was demonstrated using Yokogawa, Smar, and E+H devices. The system also reacted successfully to a loss of temperature probe, and the system reacted successfully to a measurement validation alarm and a diagnostic alarm generated from a dry probe on a Magnetrol level device. Rich Timoney, President of Fieldbus Foundation, put it nicely when he stated that the difference between an FF-SIF system and a conventional emergency shutdown system is the same as doing a forensic analysis on a patient after he is dead versus performing proactive diagnosis to address problems before death occurs. Advanced diagnostics ensure that many issues can be addressed proactively before the ESD needs to step in and do its job.

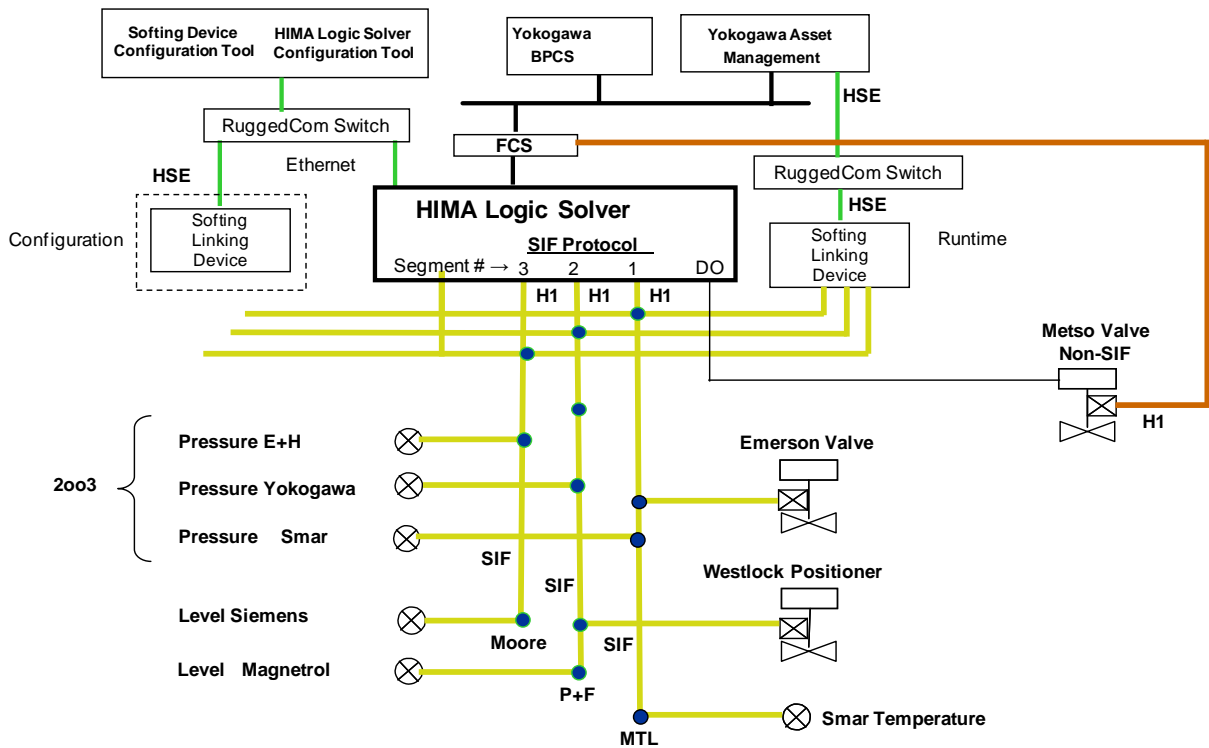
While the demo at Shell Global Solutions was going on, there were three other demos featuring systems from a wide range of suppliers at Chevron in Houston, Saudi Aramco in Dhahran, and at BP in Gelsenkirchen, Germany.

The Chevron site was done in partnership with Emerson, and included a DeltaV safety system with DeltaV SIS software, Emerson AMS plant asset management software, Emerson ValveLink Snap On software, Pepperl + Fuchs power conditioners with fieldbus diagnostics, devices from Rosemount, ABB, Siemens, and Magnetrol, and valves from Fisher and Westlock.

According to Chevron, the potential Probable Failure on Demand (PFD) was greatly reduced with the FF-SIF approach versus a traditional safety system, primarily due to what Chevron calls the diagnostic function credit, which really means the value of predictive diagnostics.

Chevron cited easier detection of both random and systemic failures with FF-SIF, and operating reliability and safety through a reduction in spurious trips. Having an integrated process control system and safety instrumented system allowed for partial stroke testing through the HMI. Chevron also cited improved asset management capabilities through the integration of device diagnostics with the HMI and faster turnarounds due to easier commissioning and testing of devices. The smaller footprint, reduced amount of hardware, and faster commissioning times will also be significant contributors to reduce capital costs.

Saudi Aramco is testing two separate FF-SIF systems from Yokogawa and Triconex. Although we do not have many details on the rest of the systems, they include field instrumentation, valves, and other devices and software from a wide range of suppliers. Although Patrick Flanders was not there to present Aramco’s vision of FF-SIF, John Rezabek of ISP did an admirable job delivering his presentation.



Shell Global Solutions Amsterdam FF-SIF Demo System

The BP Gelsenkirchen demo includes a Honeywell Safety Manager logic solver with devices from Siemens Milltronics, Magnetrol, ABB, Endress+Hauser, Emerson, Smar, and Yokogawa. Control valves were

provided by Biffi, Dresser-Masoneilan, Emerson, Metso, TopWorx, and Westlock.

Shell Global Solutions, Saudi Aramco, and others are creating the best practices and guidelines document for FOUNDATION Fieldbus Safety Instrumented Functions, and will attempt to put together metrics that will quantify OpX savings. The Best Practices document will follow the IEC 61511 lifecycle model and will include safety requirement specifications (SRS) development, design and commissioning, operations, maintenance, modification, and decommissioning best practices as well as tips and tricks. The FF-SIF demo unit at Shell has also since been moved to a live plant environment.

Pent Up End User Demand for FF-SIF

According to an ARC end user survey for safety systems, there is a pent-up demand for FOUNDATION Fieldbus for process safety applications, which was reflected in the survey results. Over a third of the respondents indicated they were willing to use the present FOUNDATION Technology for safety applications.

The difference between the demo of basic fieldbus functionality at Shell many years ago and last week's safety system demo is the high level of end user commitment that is already behind the technology. Most of the large integrated oil companies have already begun large-scale adoption of FOUNDATION Fieldbus technology, and the availability of FOUNDATION Fieldbus-based safety systems has been widely anticipated. Shell has stated that they plan to use FF-SIF on their new projects starting in 2011.

Recommendations and Challenges

Several hurdles must yet be passed before FF-SIF products are available on the market. Aside from product development and approval, future developments from the Fieldbus Foundation and member companies include developing best practices and guidelines for FF-SIF implementation, quantifying the reduction in total cost of ownership, and quantifying reduced installation costs associated with the technology. The Fieldbus Foundation

also has to go through the process of testing devices from suppliers when they are available to ensure that they meet FF specifications (the Foundation “check mark” that everyone is familiar with).

ARC expects, however, that once products are available, the adoption and implementation of FF-SIF systems should be accelerated by the fact that many end users are specifying FF-based systems and devices for their large grassroots projects today, so we will not have the same gradual bell curve of acceptance that we saw in the early days of fieldbus. Many systems integrators have also shied away from implementing fieldbus systems because safety systems account for a large portion of the I/O on major

projects. With an FF-SIF system available, it will be increasingly difficult to make that argument.

ARC expects that once products are available, the adoption and implementation of FF-SIF systems should be accelerated by the fact that many end users are specifying FF-based systems and devices for their large grassroots projects today, so we will not have the same gradual bell curve of acceptance that we saw in the early days of fieldbus.

ARC also sees a lot of potential for FF-SIF in existing facilities. There are a number of older safety systems installed in plants today that will require upgrading just as there are a large number of ageing basic process control systems. Availability of FF-SIF and its promise of reduced spurious trips, advanced diagnostics, reduced lifecycle and operational costs, and compatibility with existing hardware infrastruc-

tures, could provide many end users with the impetus to convert to these systems more rapidly. The large amount of end user support around the Amsterdam demo is a strong indicator that FF-SIF has a strong future.

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Editor: Dick Hill

Acronym Reference: For a complete list of industry acronyms, refer to our web page at www.arcweb.com/Research/IndustryTerms/

API Application Program Interface	IOP Interoperability
B2B Business-to-Business	IT Information Technology
BPCS Basic Process Control System	MIS Management Information System
CAGR Compound Annual Growth Rate	OpX Operational Excellence
CAS Collaborative Automation System	OEE Operational Equipment Effectiveness
CMM Collaborative Manufacturing Management	OLE Object Linking & Embedding
CPG Consumer Packaged Goods	OPC OLE for Process Control
CPM Collaborative Production Management	PAS Process Automation System
CRM Customer Relationship Management	PFD Probable Failure on Demand
DCS Distributed Control System	PLC Programmable Logic Controller
ESD Emergency Shutdown	PLM Product Lifecycle Management
EDDL Electronic Device Description Language	RFID Radio Frequency Identification
FF-SIF Foundation Fieldbus Safety Instrumented Functions	ROA Return on Assets
HMI Human Machine Interface	RPM Real-time Performance Management
	SI Systems Integrator
	SIL Safety Integrity Level
	SIS Safety Instrumented System

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