Automation India

Enabling Global Competitiveness

Issue 3 – March, 2005 A newsletter of the Automation Industry Association

Dear Friends,

Automation Tech 2004, AIA's flagship event held last November was a resounding success and many of you have expressed your appreciation at this endeavour, aimed at bringing out the value of automation technologies from a 'user' perspective. On behalf of AIA, I would like to express our sincere gratitude to Mr.Kapil Sibal, Minister for Science and Technology, our galaxy of distinguished speakers from across the industry spectrum as well as all the delegates who made the event worthwhile. I would also like to commend the cooperation of all AIA members who provided vision and leadership, working as a team in making the event successful. We remain committed to bring you more such events and are already working on a programme to showcase for you the latest developments in automation technologies, both from a generic or cross-sector perspective as well as in the form of industry-specific verticals.

India is gaining recognition as one of the fastest growing economies in the world and industry will play a vital role in achieving our macro ambitions of 7-8% GDP growth. Indian Industry is presently in growth mode as existing capacities get augmented & modernized and new capacities come on-stream. At the same time, global aspirations are bringing focus to critical aspects such as productivity, efficiency, quality etc. and automation technologies have a key role to play here. It is encouraging to see a positive trend, whereby Indian industry is becoming increasingly mindful of this, though we still have a long way to go in order to attain world standards. In this journey, the Automation solution providers look forward to partnering industry in an era of collaborative commerce as we work together in helping India realize its true potential.

The theme for this issue of AIA's newsletter, *Automation India is* ***'Advances in Field Automation'*** where we bring you a cross-section of related articles ranging from Real-time Asset Management and Fieldbus technology, to wireless technologies and Smart Refineries. We hope you find it interesting and informative and we welcome any feedback, comments or suggestions.

Meanwhile, AIA on its part, shall continue working towards increasing knowledge & awareness levels and helping Indian industry leverage cutting edge automation technologies for global competitiveness and we look forward to the ongoing support and cooperation of all stakeholders in pursuing this common cause.

Ravi Uppal
President, AIA

Field Systems Strategies

Overview

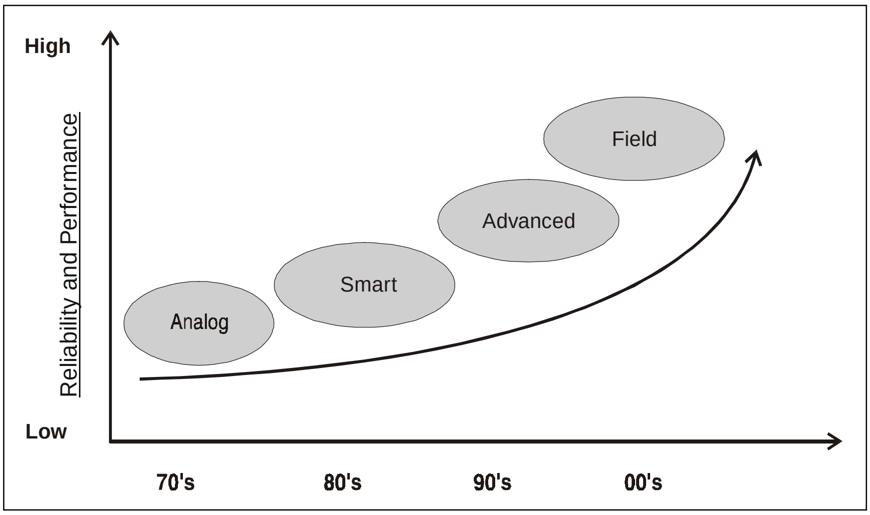
Increasing costs, global competition, and the need to enhance return on assets are prompting manufacturers to consider new investment strategies. These factors will spur manufacturing companies, the users of field systems, to consider capital investments in field systems – provided field system suppliers demonstrate that such investments improve productivity. While field systems have the capability to improve productivity, users of field systems have come to consider field devices as commodities, despite significant differences among countless suppliers and several generations of technologies currently deployed at manufacturing plants. Field devices can and do last for decades. This perceived immortality of field systems is lulling users into a false sense of security. Therefore, plant managers and operators are allowing these devices to work long past their useful life at the expense of productivity.

Navigating the way through the myriad of field system innovations undoubtedly taxes user resources. With the multitude of installed technologies from the slew of suppliers in a given plant, users are finding it difficult to tackle updation.

Accurate Measurements Are the Foundation of Sound Business Decisions

Regardless of function, every automation and business system in the plant relies on data generated by the field systems. However, many manufacturers seem to have lost sight of the fact that accurate, reliable production measurements are the foundation for most business decisions. With so much of the focus on the bottom line, few manufacturers have kept abreast of the improved functionality available in today's field systems. Similar to the office worker who uses Microsoft Word on a daily basis yet remains unaware of its full functionality, plant operators are only familiar with the few functions they use regularly and little else. Consequently, manufacturers' outdated perspective of field device capabilities and limitations are fostering inaction and complacency costing enterprises resources and time that for the process and hybrid industries equates to untold dollars lost in productivity.

Manufacturers should take advantage of enhancements in field system technology to extend their leadership positions. Their installed base consists of older devices with questionable performance characteristics. Some users make a gallant effort to calibrate electronic converters and transmitters via annual checkups; however few users



Versatility
Standardization
Interoperability
Information Visibility
Validation
Autonomy
Zero Failures
ROI
Value
Dedicated Solutions
Field Systems Requirements

have the inclination to rip-out devices for an independent calibration lab to test, which would be necessary to fully assess device performance. Such less than rigorous work processes support the practice that devices are working well enough and that verification or upgrade would have little impact on productivity. This flawed logic is the reason why millions of aging field systems are still in place. The business case is even more compelling when the benefits of communication protocol enabled smart solutions are factored into the analysis. This includes continuously validating and correcting the real-life measurements while monitoring health of the field systems.

Factors undermining Adoption of New Field Systems

Years ago, when field devices represented a higher percentage of investment, manufacturers dedicated engineering specialists to Pressure, Temperature, Flow and Level as well as control valves and other related devices that comprise a field system. Test facilities and engineers charged with product performance and long-term reliability analysis supported the specialists and provided company-wide strategic direction, design, and standardization of field systems. Today, this infrastructure has effectively vanished.

The mantra of leading corporations, operating faster, better and cheaper, has spawned the unforeseen consequence of a diminished work force. The remaining staff must multi-task to complete the daily workload. Extinguishing fires is the norm, and any type of long–range strategic planning at the field system level is virtually non-existent. Important longer-term issues are forgotten, frequently spawning conflict between required infrastructure and production goals. Decisions made with little analysis are detrimental to long–term health and cannot continue.

Lack of experienced personnel and undocumented work processes are contributing to manufacturers' loss of competitive edge in terms of the field system expertise necessary to enable business systems that drive productivity efficiencies throughout the enterprise. It is no wonder that manufacturers consider field devices as commodities. One look at the increasing number of patents filed by leading field systems suppliers refutes this notion. As suppliers continue to make huge investments into enhancing current technologies they will undoubtedly need to improve field systems.

Manufacturers must realize that the field system is core to gaining control of the production floor operations and that old systems are of no help to them. They should consider resolving factors undermining field system adoption and reinstate dedicated technology specialists to keep abreast of significant field system developments.

Deploy Collaborative Field Systems Management

The lack of knowledge of the installed base and unfamiliarity with new solutions are the primary reasons legacy field systems are permitted to operate well beyond their useful life.

Manufacturers have few resources available to assist them in determining field system replacement and upgrade cycles. ARC's Collaborative Asset Lifecycle Management (CALM) asset management model identifies five stages of product lifecycle: Plan, Acquire, Install, Operate / Maintain, and Retire. Each stage requires appropriate actions designed to get the most out of the asset. PAM solutions help manufacturers extend asset availability in the lengthy operate / maintain stage, alert operators of potential problems, and predict equipment failures, but fall short in assisting operators in determining the appropriate time to retire outdated field systems.

It is infinitely easier for manufacturers to purchase new devices for new projects, but the challenge is when it comes to managing legacy devices. Automated documentation embedded in many PAM solutions can collect smart asset data and provide guidance regarding replacement due to a failing component, but users also need to decide when to repair, re-deploy, or replace the asset with newer technology. Manufacturers need to develop an internal Collaborative Field System Management solution that analyzes field systems in relation to the internal goals and objectives of the enterprise. With assistance from leading field system suppliers, such a tool will enable manufacturers to launch an unbiased solution independent of supplier and technology.

Ad-hoc field system management
Low priority
Lack of knowledge
Poor visibility
Lack of dedicated field system personnel
Multi-tasking
Undetermined ROI
Lack of management support
Few benchmarks
Lack of field system strategy
Factors Undermining Adoption of New Field Systems

Conclusion

- Manufacturers should assess the status of their field systems to ensure that current performance, reliability, and other attributes are aligned with the needs of the enterprise.
- Manufacturers should adopt a pro-active Collaborative Field System management strategy in lieu of assuming that operating field systems are operating optimally.

– Nidhi Chakravarthi
ARC Advisory Group

Into the future with
wireless technologies

The last few years have witnessed various advances in the field of *industrial* wireless systems. There is an increasing need to move away from the current, complex space, bound by wires, to a wire-free world with *high reliability* and *robustness* to perform *mission critical functions* in a harsh a industrial environment. This revolutionary technology would replace conventional field sensors by autonomous – *self-configuring*, *self-calibrating*, *self-identifying* and *self-reorganizing* wireless field sensors communicating with portable, wireless HMI stations powered with all the advanced features of a distributed control system.

At present, in a typical plant, one has extensive requirements of field cabling for communication of the field data to the main control room. This results in a complex network of cables spread over the entire plant spanning several kilometers. Apart from the inherent increase in cost of installation and maintenance, it is a significant reason for delays in commissioning and troubleshooting during a crisis.

In today's world, the *mantra* of the industry is *Value for money* and *Value for time*. People are realizing that it is not only the upfront investment that is important when selecting a solution but also the factors of time to commission and cost of maintenance, breakdowns, which need to be actively considered. Looking at the importance of these factors and the contribution of wireless technology to the overall ease of maintenance, time to commission, the US department of energy has placed orders on various automation companies worth several million dollars. *They estimate a first year saving of $1 Billion by using wireless technology.*

Principle forecasts:

Wireless technology, expanding from the field all way to the boardroom will become a ubiquitous tool for modern industry by 2010. Their reliability and robustness would be high. Sensors and control system in the wireless network will be smart, knowledge based and able to change in response to dynamic conditions. They will require practically no maintenance during their mission life. Wireless networks will outperform in many ways. Wireless systems will offer Operator independent (i.e. Autonomous) control for industrial processes; built in redundancy will facilitate anticipatory maintenance/fault recovery; ad-hoc applications, with self-configuring networks to meet temporary needs.

Future advances in wireless systems:

	By 2010	Post 2010
Power	Wireless systems would require less power. Cost of system operation and maintenance will decrease by 90%	System would be self-powering capturing energy from industrial environment.
Reliability Maintainability Availability	Maintenance intervals will increase ten fold.	Maintenance would be zero in wireless systems mission life
Cost	Installed cost of wireless system in 2010 shall be 1/10th of today's cost. Lifecycle cost will be half of present cost.	Will go down further.
Functionality	Wireless networks will be self-configurable.	Wireless networks will perform autonomously.
Integration Compatibility	Open architecture will allow seamless interoperability at data level regardless of manufacturer.	Interoperability will extend beyond data level to knowledge level, allowing system to analyze and act on information transmitted from any device.

The latest technology, which has generated wild fire interest amongst the automation and control system professionals, is wireless monitoring and control of equipment, processes and also household gadgets. The most time consuming and onerous task in any automation and control project is the laying of miles and miles of cables to transport process information regarding status, temperature and other parameters from the basic sensor to the Distributed Control system (DCS). This activity gets complicated when the monitoring is in hazardous areas or has to be done for 'hard to reach' locations such as an Acid Column monitoring or on top of distillation towers. To access information of the process at such locations, *wireless transmitters or sensors* are best-suited solutions.

The wireless sensors capture all the vital data without sacrificing any information fidelity. Traditional monitoring sensors are costly, time consuming and difficult to implement. Whether applications are remote, without access to power, difficult to reach, or in hazardous areas, the wireless transmitters can deliver needed information easily, flexibly, and affordably.

The instruments wirelessly transmit measurements to a base radio connected to a control system or data acquisition device such as a recorder or PC. Each base radio accepts the signals from multiple transmitters' upto a max. of 32 to 50 nos. The base radio provides Modbus or 4-20mA analog signal output for flexible communications.

Accurate, reliable and rugged, these instruments perform well in industrial environments. They offer exceptional accuracy of ±0.1% of full-scale reading at reference conditions and feature long battery life (3 to 5 years). An alarm warns of low-battery condition, and extensive self-checking software and hardware continuously monitor instrument operation. In addition, the instruments avoid signal interference by employing a Frequency Hopping Spread Spectrum (FHSS) technique. The new technology solution pushes the value on a much higher scale then the basic benefits such as-

- **Installation savings**
  By locating the wireless transmitter or sensor at the precise location of interest it not only saves the high cost of cables and the laying charges but also significantly saves on the installation time required. In any process plant, the reduction in time to start commercial production directly adds to faster start up and bottom line profits. It also translates into the ability to meet the demand upswing much before the competition.
- **Safer Operations**
  Wireless transmitters make data available in the control room and thus reduce human exposure to hazardous areas and products. In addition, more frequent measurements and early detection of problems can help reduce or even prevent incidents and accidents.
- **Maintenance & Operational savings**
  Process equipments such as pumps, motors and furnaces can be monitored to support proactive maintenance. Additionally, costly problems that lead to excess use of energy and raw materials can be identified.
- **Accurate, repeatable information**
  Replacing manual readings with automated measurement results in information that is more accurate, timely, and consistent

In addition to the above, the most important benefit in the global competitive village of today is faster re-location of plants from high cost regions to low cost production regions. The wireless advantage would enable quick transportation and set-up of plant to reduce input overheads and improve price competitiveness.

Pilot plants to production unit scale up time would also significantly reduce thus closely bonding the research labs and the commercial production facilities. The wireless devices can be readily programmed using a 'wireless' programmer.

The next step in wireless... ...thought control!

– Amol Chaubal and Vinod Bambarkar

Maximizing benefits of Fieldbus Technology – Uniform solution for

Process & Discrete Applications

The demand for seamlessly networked production environments is constantly becoming stronger. Fieldbus technology plays major role for such requirement. Today, Fieldbus technology delivers much more than perceived savings in terms of installation & cabling.

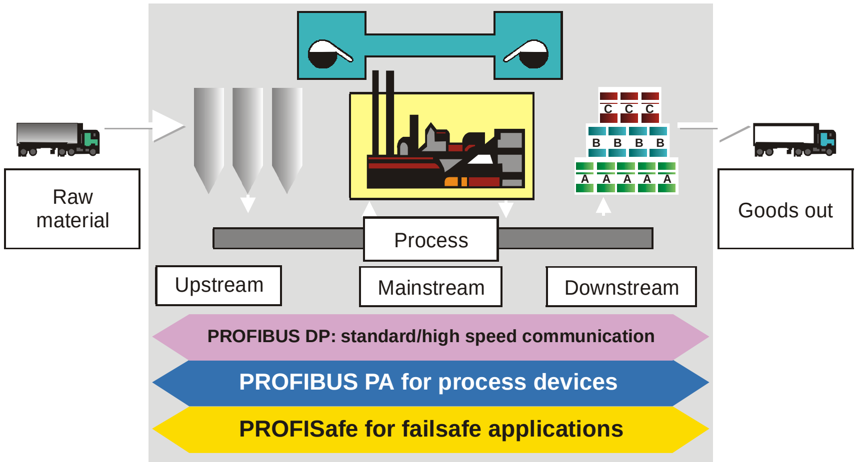
Benefits of Fieldbus technology can be maximized by the unifying connection between Process & Discrete components. Profibus is the only Fieldbus which more than exceeds this requirement. The growing number of Profibus installations is proof of this.

Value proposition of Fieldbus technology has changed over time

Use of Fieldbus technology & intelligent field devices in Plant Automation continues to grow rapidly. Users are realizing the benefits of uniform Fieldbus architecture which covers simple sensor / actuator to complex instrumentation, across all areas of plant covering inbound / outbound logistics to process area.

Perceived value of Fieldbus technology has also changed over a period of time. Earlier, Fieldbus technology was compared with conventional technology in terms of cost benefits during installation and saving in cabling. This approach often sidelined major benefit of Fieldbus technology, realised during maintenance after the plant is commissioned, through effective asset management. New benefits are still being realized as users are gaining experience with this technology.

Asset management – implies the management of the fixed and current assets of an enterprise. Production facilities are part of the fixed assets; together with plant components such as equipment, machinery, piping, etc. and the instruments / field devices. Asset management in a manufacturing environment can be implemented to work in a proactive manner, to increase value of plant assets, through use of Fieldbus technology.



Fieldbus based Automation calls for Uniform connection of Process & Discrete components

The value-added chain of a company rarely consists of "pure" discrete factory tasks or continuous / batch process tasks. Even in the automotive industry, the perfect example of factory automation, there are process applications, such as in automotive body finish. Refineries as a classical representative of the process industry require the integration of drive engineering next to continuous processing of liquid raw materials. Modern beer breweries are at home in both worlds and consist of a colorful mix of process engineering, drive and control engineering, as well as safety and handling technology.

Process oriented parts typically use field instruments such as transmitters, actuators, analyzers, etc. and often call for installation in explosive environments. Network speed is not the deciding factor. However, discrete side of the application, typically inbound & outbound logistics, demands speed. From another perspective, a typical manufacturing process consists of a variety of devices such as instruments (transmitters, analyzers, actuators), electrical devices (variable speed drives, motors, MCC) other devices such as remote I/O's, weighing scales, energy meters etc.

The trend towards transparent and unified automated business and production processes, from goods receipt via manufacturing to quality control, requires uniform communication. The more similar the system architecture and the more seamless the transition of the industrial networks, the lower the cost of investment, operation and maintenance.

Profibus – *THE* Fieldbus bridging the gaps

Profibus, based on international IEC 61158 / EN 50170 standard, is the most widely used and accepted Fieldbus technology today due to its unique position. Profibus is capable of connecting Process & Discrete components with a common Protocol thus bridging the barrier between various Automation islands.

Profibus is the only Fieldbus capable of connecting Process Devices like transmitters, analyzers, actuators, Electrical devices like variable speed drives, MCCs, breakers, motion control devices, other devices like remote I/O systems, operator panels, weighing scales, energy meters etc on a common protocol.

Profibus – Unified from A to Z

The extremely flexible PROFIBUS modular system masters all segments of production: from upstream via mainstream to downstream, from material delivery and goods delivery, from warehousing via production up to bottling, packaging and shipping.

Based on a uniform PROFIBUS communication protocol, the user selects the suitable transmission technology to connect discrete field devices, such as drives, I/O devices, valve terminals or typical process field devices. In PROFIBUS, different application and system profiles allow for an individual tailor-made solution.

PROFIBUS DP is most suitable for discrete automation as it supports connection of remote I/Os and intelligent devices like variable speed drives, intelligent MCCs, weighing scales, energy meters etc. It is a simple 'master-slave' protocol with very high communication speed typically required for such discrete applications.

Special properties are required for use in continuous processes or for batch applications when connecting complex measuring instruments. This includes two-wire technology for data transfer and energy supply using the same cable, intrinsically safe behavior as well as non-interacting removal and addition of bus nodes, even in potentially explosive atmospheres. PROFIBUS PA has the right solution ready for all of these requirements. The profile formation allows for interoperable operating field devices from different manufacturers and classes, such as pressure, forward, level or temperature transducers, actuators, drives, analysis devices or remote I/Os. PROFIBUS transfers cyclical data, such as the respective measured values, and acyclic data for parameter setting, diagnostics and maintenance. For this purpose, the MBP-IS (Manchester-Coded Bus-Powered Intrinsic Safety) transmission technology corresponds to all demands for potentially explosive atmospheres. The respective PA segments are connected via transparent segment coupler and extend the PROFIBUS network into the potentially explosive zones of the system.

With PROFIsafe, users create an additional safety level that allows them to meet the stringent fail-safe requirements of international safety standards without any problems. The concept allows its use in safety-oriented controls in mechanical engineering and production automation as well as in process automation; it allows for the "peaceful" coexistence between secure and operational data on one bus cable. This avoids cost-intensive solutions for safety-oriented requirements even in process automation. Based on a homogenous bus system, PROFIsafe offers the same performance – simple, safe and extremely economical.

Profibus International, representing more than 1200 companies worldwide, announced in April 2004 that at the end of 2003 PROFIBUS devices installed in factory and process automation applications had surpassed a historic 10 million benchmark— a total substantially higher than any other Fieldbus solution. The number is expected to be doubled by 2008. Approximately 1.3 million PROFIBUS devices are installed in process plants, of which 290,000 are PROFIBUS PA devices with the MBP (Manchester-Encoded Bus Powered) interface conforming to IEC 61158-2 required for hazardous area use.

– Pradeep Karnik

Real-time Asset Management

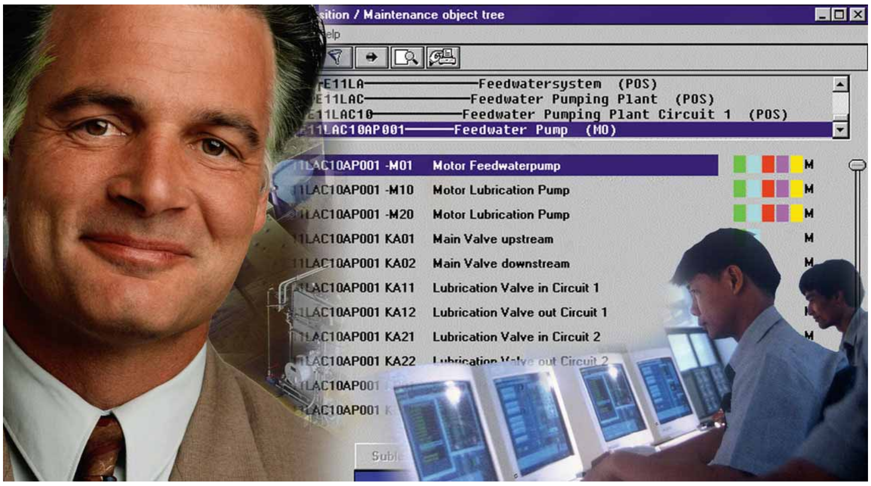
FDT bridges the gap between real-time asset management and field devices

The primary objective of real-time plant asset management is to reduce downtime, optimize maintenance activity and reduce system operating costs. Early detection of changes such as reduced system performance, faults and component wear make a major contribution towards achieving this objective.

For maximum work-flow effectiveness, the results obtained from real-time plant asset management data should be forwarded directly to the computerized asset management systems. They should also be sent to the responsible persons no matter where they are.

Continuous monitoring of assets must be in place to enable detection of changes. The process control system and its communication structure play a pivotal role by providing access to information about intelligent field devices, frequency converters, motor controllers, machines, system components and the control system itself.

The latest control systems feature a new approach to device integration. They support HART, Profibus and Foundation Fieldbus, covering a wide range of applications, which have gained market acceptance. The decision to use one of these protocols is usually influenced by the customer's regional preferences or requirements.



Since Field Device Tool (FDT) provides standardized interface and device-specific software components, the Device Type Managers (DTM) can use simple, efficient mechanisms to provide access to all device functions in the system. DTM performs device management and configuration functions, both online and offline, holding all the necessary device specific rules and graphics user interfaces.

Real-time asset monitoring acquires and analyzes the status of the assets (eg. devices) on a cyclical basis via OPC. Any irregularities immediately trigger transmission of an alarm to maintenance personnel. The message can be sent to the control system's alarm page, by SMS to a mobile telephone or by e-mail to virtually any recipient.

If an alarm is raised, the system status can be viewed on the Internet. The asset condition document contains the source of the alarm in plain text and provides information on how to rectify the undesired condition. Maintenance personnel are able to access detailed information from any location when they are on call, enabling them to initiate corrective action.

With a click of the mouse, they can, for instance, route information about the defective asset to the CMMS in case further maintenance or repair activity must be initiated.

The security of the company network and the control system remain intact because access to the systems remains restricted. Direct access is still available on site.

With enhancement of the FDT interface, DTMs can be used in an OPC server, giving asset management applications simple and standardized access to device data. This bridges the communication gap between real-time asset management and field devices.

– Achim Laubenstein and Wilhelm Wiese

The "SMART" refinery

Advances in sensors, automation, and information technology have significantly changed the way refineries operate. High performance computing in physically small devices and high speed communication technology developments have been the foundation for many of these advances. Advanced analytical and optimization methods based on this infrastructure can simultaneously lower costs, increase profitability and improve customer service across the supply chain. The collective changes are sometimes characterized as constituting "smart refining." They allow the refinery staff to better analyze the past, assess the current state, and predict future behavior under alternative scenarios.

What is a "smart refinery?" We are all aware of the extraordinary developments that are occurring in the computer and communication area. It seems that almost every day there is another report of the continuing decrease in the cost and size of computing elements and the continuing increase in the availability of communication bandwidth. Advances in software and mathematical analysis have built on these developments to significantly increase our ability to model and optimize refining activities. Many new developments in process sensor and measurement devices have also appeared. These developments have led to new methods and procedures for operating production facilities. The new procedures utilize more comprehensive and frequent measurements of the current state of the refinery, increased use of models and other analytical techniques to compare what the refinery is currently producing against what is expected and to understand the differences, earlier detection of anomalous conditions, and tools to plan future operation with increased confidence. While we may be aware of these developments as individual advances, their cumulative and combinatorial aspects are perhaps less well recognized. Combination of these technologies has led to an evolutionary change in the way refineries can operate. This change is to decisions and actions based primarily on the best available *prediction* of expected future conditions rather than *reactions* principally triggered by what has just happened. This shift in focus is the defining characteristic of "smart refining."

The link between technology developments and improved economic results including increased productivity is not always apparent. Many unsupportable claims on potential benefits are made. Correspondingly, there are many technology developments that are believed to be beneficial but it is not clear how to translate this belief into realistic monetary values.

Operational excellence is the goal of most refineries and this excellence has many components. Among these components are some key objectives that have a direct and significant impact on the financial performance of the site. These include:

- Produce the highest valued product mix possible
- Maximize production from existing equipment
- Maximize equipments' on stream operating (service) factor
- Continually reduce costs and pursue operational efficiencies
- Keep inventories as low as possible
- Minimize Health, Safety and Environmental incidents

Where are the opportunities for operational improvement:

1. Energy
2. Reliability
3. Maintenance
4. Inventory

The components of "smart refining" provide some of the most cost effective investments available to achieve the operational excellence objectives listed above.

The general conclusion is that there is a significant need for improved operation in the refining industry and that "smart" automation technology can be a significant contributor to the improved operation.

Prediction Versus Reaction

What is meant by decisions based on intelligent *prediction* rather than *reaction*? The concept can perhaps best be understood in the context of the normal decision process in the refinery. We measure a condition in the refinery or detect a change of state, analyze the data to potentially spot an anomaly, predict the effect of alternative action scenarios, decide which scenario to implement, and then actually implement the scenarios. After this, the cycle repeats. Examples of decisions made in this framework include what products to produce and when to produce them, decisions on the resources required for production including feedstocks and manpower and decisions on when to perform maintenance on a particular item of equipment.

What are the characteristics of the steps in this process?

- Measure
- Analyze
- Predict
- Decide
- Implementation

How do we move towards "smart" operation?

We can improve the overall decision process by:

- Knowing better what the refinery is doing now – this implies more accurate measurements with less delay and more frequent measurements of previously difficult to measure conditions.
- Comparing better what the refinery is doing against what it is expected to do and understanding the differences – this leads to model based analysis and techniques which promote comprehension of the information
- Predicting the effect of alternate decisions in the future

Enabling Technologies

What are the enabling technologies that permit refineries to move from *reacting* to *predicting*? There are certainly dozens and perhaps even hundreds of new developments that could be discussed. The ones listed below have the most important impact on operations:

Measure
- Smart Field Devices
- Digital Plant Networks
- Comprehensive Plant Database

Analyze
- Data Mining
- Model Based performance monitoring

Predict
- Predictive Analytics

Decide
- Optimization
- Real Time simulation
- Expert systems

Smart Refinery : Economic Benefits – an example

One of the most important process units in a refinery is the Fluid Catalytic Cracking Unit. It operates by contacting a fluidized stream of hot granular catalyst with a vaporized hydrocarbon feed in the reactor which induces a reaction to convert the feed into a variety of lower molecular, weight higher valued products. The catalyst is separated from the hydrocarbon and sent t o a catalyst regenerator where the heavy reaction byproducts, “coke,” are burned off the catalyst so that it can be reused.

Supporting the process operation is a hydraulic circuit of catalyst as it passes through the reactor and regenerator. This hydraulic circuit generally operates with a relatively low pressure gradient with some major valves, called slide valves, controlling the flow. To ensure that hot hydrocarbons don’t enter the regenerator, the pressure drop across the regenerated catalyst slide valve is monitored. An upset condition, where hydrocarbons do enter the regenerator, is called a “reversal” and is both dangerous and expensive to correct. As a result, if a low pressure drop is detected across the valve indicating that hydrocarbon might be about to flow in the wrong direction, the unit is automatically shut down. Restarting the unit after a shutdown is expensive and the lost production from the unplanned shutdown is also an economic loss. Avoiding unnecessary shutdowns while maintaining safe operation is therefore a challenge. With the circulating granular catalyst, small particles, catalyst “fines,” are produced. Occasionally these fines can plug the leads to the pressure drop transmitter, simulating a low pressure drop and causing an unnecessary shutdown.

The diagram below shows how a modern smart transmitter with automatic detection of a plugged transfer line can be used to correct this problem. The standard deviation of the current measured signal is calculated and compared with the values when it was first installed. If there is a significant reduction in the standard deviation, it is an indication of the possibility of plugging. The alert is sent to the operator who can investigate and avoid an unnecessary shutdown without any loss of safety. One major refining group estimated
that installation of this technology across their group of refinery FCCU’s would save at least Rs. 50 million per year in shutdown / startup costs and Rs. 150 million per year in lost production operating margin !

– Rohit Bharadwaj

Example – Using Device Intelligence to Predict Failure

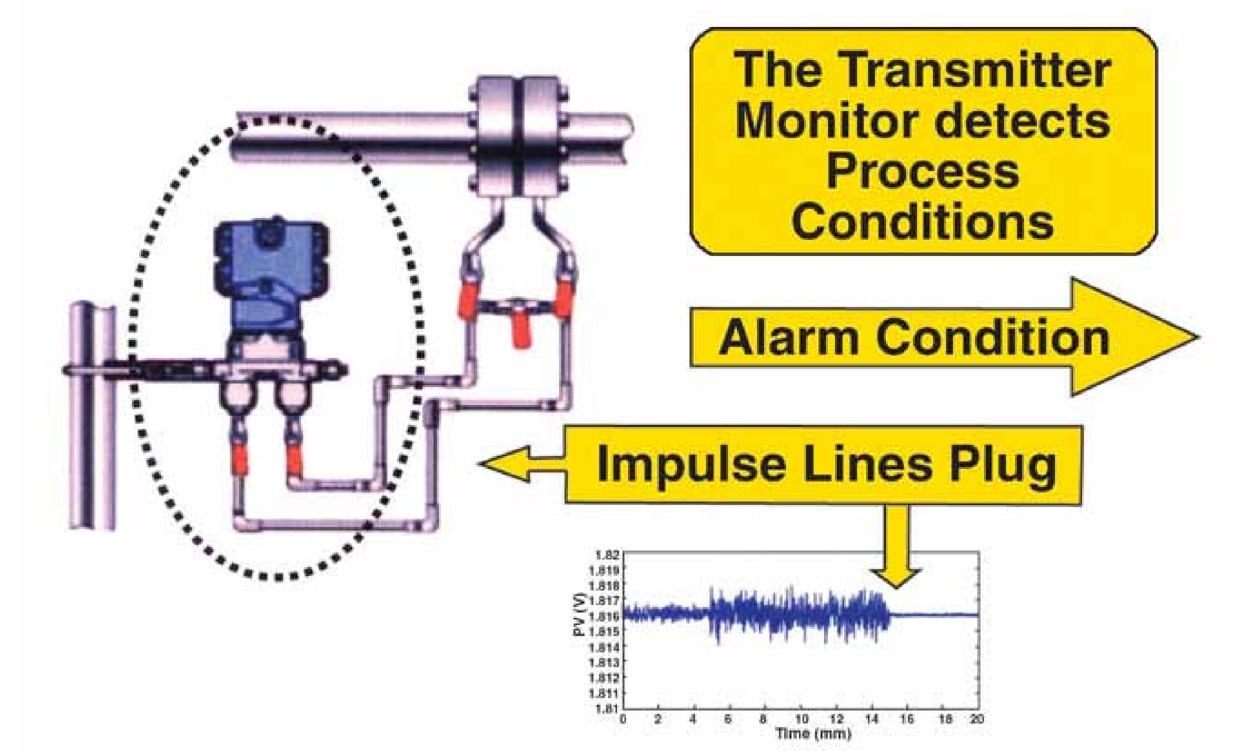


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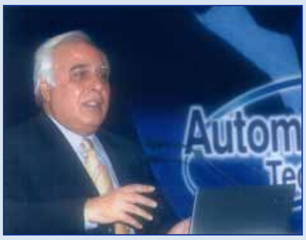
Photo Gallery

Automation Tech 2004 – Opening Session



Mr. Kapil Sibal, Minister for Science & Technology, Govt. of India – Keynote Speaker

Ravi Uppal, President, AIA

An appreciative audience

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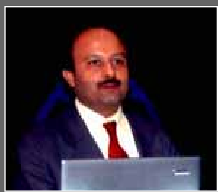

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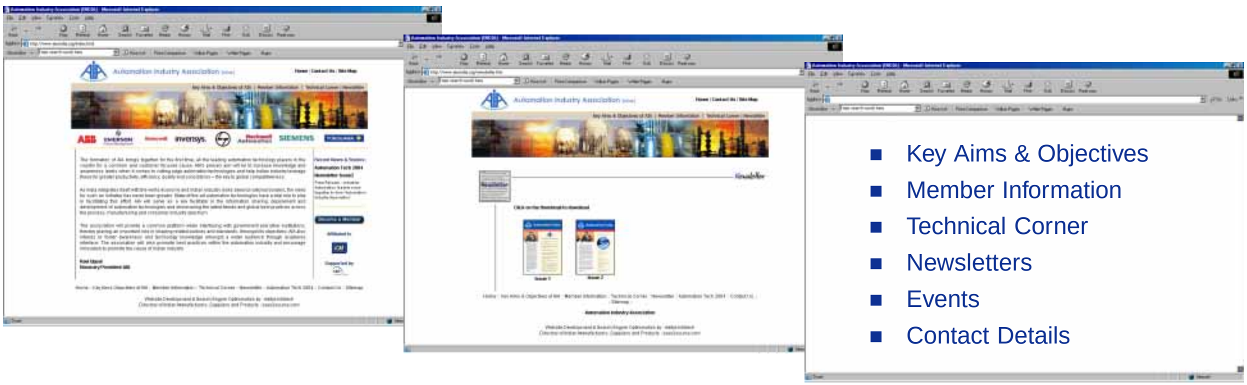

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