A Layered Approach to Plant Safety—From the Process Control Network to the Perimeter
Rely on Honeywell to Keep Your Industrial Facilities, People and the Environment Safe—From the Inside Out

Protecting your people, assets and profitability demands a holistic safety view. To achieve higher levels of plant safety, a comprehensive and integrated approach to safety is necessary. Such an approach must consider the following:

- Securing the process control network
- Responding quickly and accurately to abnormal situations
- Proactively monitoring asset health
- Moving the plant and assets into a safe state
- Protecting the perimeter
- Managing an emergency situation quickly and efficiently

At Honeywell Process Solutions, we look at the big picture of industrial safety—from a secure process control network to the perimeter of the plant. We employ a layered approach encompassing process and system technology, and the people that interact with that technology, to help you achieve your safety objectives.
Understanding How Safety Incidents Occur

Studies conducted by the Abnormal Situation Management® (ASM) Consortium have shown that 42 percent of abnormal situations or upsets occurring in modern-day processing plants are due to people or their work processes. Additionally, 36 percent are from equipment problems, and of those, one-half are a direct result of operating the equipment or process unit outside the operating standard.

In the aftermath of a serious event, it is common to find indicators which, had they been recognized and addressed earlier, might have prevented the event. "Near-misses" are often indicators of potential problems in basic operations, conditions, and practices. Near-misses can also reveal a previously unknown failure mode, and can help identify when an operation deviated from established procedure.

In today’s competitive environment, the stakes of plant safety have never been higher. A proactive approach to safety will improve a company’s performance, enhance the workplace, and save lives.

Honeywell offers a systematic, multi-phased safety solution aimed at reducing the risks involved with unsafe or potentially unsafe conditions. With over two decades of safety expertise, Honeywell approaches safety in an integrated and comprehensive manner.

Our solution includes independent, yet interrelated, layers of protection. The concept of layers of protection is widely recognized by the process industry, and the term is clearly defined in industry safety standards such as IEC 61508 and IEC 61511.

Plant Safety: Important to You and Your Business.

Why is safety important? According to the American Petroleum Institute and the American Chemistry Council, the largest accidents in chemical and hydrocarbon processing facilities have severely injured or killed hundreds of people, and contaminated the environment—resulting in greater than $8 billion in property damage losses. The actual cost of these accidents are much higher if associated business interruption costs, cleanup costs, legal fees, fines and losses of market share are also considered. So, improving safety is an essential part of protecting personnel, assets, the environment, and profitability.
Honeywell’s integrated approach implements tools and procedures for managing abnormal situations and reducing incidents. Operator training solutions can help prepare an operator for abnormal situations. When an abnormal situation occurs, our alarm management, early event detection, and ASM® designed displays help ensure the operator has the information they need in the context they need it. This allows operators to react to situations quickly and accurately, thereby avoiding safety incidents.

Properly designed emergency shutdown systems and automated procedures can move a plant to a safe state in the event an incident escalates beyond the inner layers of this sphere of protection. Should an incident occur, our fire and gas detection solutions coupled with rapid location of individuals and a carefully designed emergency response procedure will help contain the impact.

Finally, our layered solution protects the perimeter of your facility using physical security that secures access to structures, and monitors maritime traffic approaching a dock.

A Layered Approach to Protecting People, Facilities and Assets

At the core of this layered sphere of protection is a secure process control network—the embodiment of the business, safety, and production considerations necessary for effective operations. We help ensure that your processes are controlled by a secure process control network extending across the entire plant and business networks. Next, effectively managing assets ensures that the process design continues to function as intended, while protecting the plant from pending incidents with an early indication of failing assets.

Reduce Risks with Safety Assessment and Improvement

A safety and security improvement effort is a systematic, commitment intended to reduce the risks involved with unsafe or potentially unsafe conditions at a processing facility. First, this commitment includes an assessment that provides benchmarks of current safety work practices and competencies, while at the same time identifying and prioritizing opportunities for improvement. The effort can be focused plant-wide, but initially can be focused within a particular process unit. Next, the assessment focuses on the design and implementation. Depending upon the assessment’s outcome, this may include activities such as developing personnel, facilitating organizational and procedural changes, implementing a metric system for monitoring progress, and installing technology required to accomplish the job.

Finally, any improvement program focuses on retaining and sustaining the benefits of each recommendation. With periodic performance monitoring and reporting, reassessment and ongoing training and coaching, your investment in an improvement program is protected.

“We needed a reliable and affordable technology solution that could deliver immediate benefits while conserving resources and safeguarding processes. Honeywell proved the ideal partner for this project because it also offered extensive local support capabilities that we could count on now and in the future.”

—Mr. Steve Barber, Leader Engineer, BP
Honeywell Offers Layers of Protection that Keep Your Plant Safe and Secure—from the Process Control Network to the Perimeter.

Secure Process Control

Secure process control systems establish a safe networking infrastructure for the entire plant. Threats posed by cyber attacks put plant personnel, equipment and the environment at risk. Your process control network must provide a level of reliability and performance to ensure safe, uninterrupted operation.

Honeywell recognizes that cyber security is particularly important to industries reliant on process control systems. The dramatic transformation from proprietary to open control systems, coupled with the connectivity between open control systems and enterprise networks, has introduced unprecedented cyber vulnerabilities in process control systems.

To protect the network against potential cyber attacks, Honeywell integrates security into the system architecture. A hierarchical architecture establishes access restrictions at each network level while still supporting the business requirements for shared information. Each PC is deployed with a high security model that includes a process for locking down the node before software is installed. A Honeywell team is dedicated to quickly qualifying Microsoft security hotfixes and antivirus software to ensure they will not disrupt the integrity of the system.

Since people and processes are also an important part of securing the system, Honeywell’s Process Control Network Services suite evaluates vulnerability and risk, recommends appropriate changes, develops the best design for specific requirements, and implements the design. Our network security specialists understand the security requirements of modern industrial plants, and can deploy an integrated safety and security solution to mitigate the risks to your critical production assets.
Asset Management

No plant is truly safe or secure without the ability to effectively monitor and manage critical production assets, including field equipment and instrumentation, process control systems, emergency shutdown systems, and operator interfaces.

Honeywell’s asset monitoring solutions offer a comprehensive package for monitoring assets from field devices to process units. This integrated solution improves asset reliability and performance, and delivers increased process uptime, asset availability, and user productivity. Operational field data and diagnostic data are integrated with a decision support system interfacing directly with work processes.

For example, the Profit Suite™ Early Event Detection (EED) Toolkit, developed by Honeywell and the ASM Consortium, acts as an intelligent assistant to minimize the number and impact of abnormal situations that can result in serious safety, operational, and economic issues for a processing plant. It does this by providing early awareness and a measured response to abnormal situations, which can range from equipment-related faults and startup /shutdown-related problems, to major process upsets requiring human intervention.

Honeywell’s EED application provides early indications of an incipient event or malfunction that is threatening key process functions essential for achieving reliability, safety, and quality and production goals. The EED Toolkit provides a statistical modeling and application environment to identify, localize, and support the reduction of abnormal situations in processes and plant equipment. EED also includes a decision-support component to help identify and isolate the root cause of an event.

Honeywell’s field device diagnostic tools, such as Field Device Manager (FDM), transform data derived from field device diagnostics and control systems into focused actionable intelligence. FDM is designed to collect and organize data from a variety of sources, as well as analyze and identify processes and equipment systems and faults. The right personnel can be notified of potential failures in order to avoid incidents. Wireless tools expand the reach of operations and maintenance in order to take advantage of field data and expand diagnostic capabilities.

Abnormal Situation Management

Managing abnormal situations is at the heart of an integrated plant safety solution. An abnormal situation occurs when a disturbance in a process causes plant operations to deviate from the normal operating state to such an extent that human intervention is required.

The inability to control abnormal situations can have a devastating impact on your plant’s safety and economic performance. Honeywell takes this challenge seriously and offers solutions based on the work of the ASM Consortium. We incorporate ASM research findings into the real-time control environment through a suite of advanced asset effectiveness software applications within the Experion® Process Knowledge System (PKS). These applications continuously monitor the control system, plant equipment, and all affected processes.

Adopting a consistent alarm management philosophy is a key element of abnormal situation management since abnormal situations inundate operators with alarms, thereby complicating their daily operating duties. A good alarm system quickly provides appropriate information to operators to help them identify the cause and restore the plant to normal operations.
Honeywell’s advanced alarm management products help protect plant uptime and safety by reducing losses caused by ineffective alarming. By reducing the number of alarms requiring operator intervention, operators are more effective. In addition, time and effort are reduced to develop, deploy, and maintain an alarm system when ASM Consortium best practices are followed.

Honeywell’s alarm management applications include Alarm Configuration Manager to actively manage the alarm system, Alarm and Event Analysis to provide regular monitoring of alarm system performance and configuration, and UserAlert™ to provide an alternative notification mechanism for those abnormal situations that really should not be alarms. UserAlert also provides notifications to non-operators via e-mail or paging. These applications are available as an Advanced Alarm Management Suite and as individual applications.

**Operator Environment**

Training operators and engineers how to respond during upset conditions will reduce potential incidents and improve plant safety. Furthermore, well-trained personnel react more quickly and diffuse process situations before incidents occur. Experience has proven that simulators train new hires more quickly and efficiently than traditional methods.

Honeywell leads the industry in providing solutions to improve the operator environment. Our UniSim™ suite enables operator training in a unified simulation architecture, and can also be used for control system checkout. UniSim delivers an expandable solution featuring a common instructor station and control execution environment. This architecture supports Honeywell as well as third-party systems.

With Honeywell solutions, operators and engineers can be more effective with flexible tools for building process display graphics. Our graphics are developed in accordance with guidelines set forth by the ASM Consortium to ensure optimum operator effectiveness. Those guidelines span:

- Display contents, such as the organization of various displays, what information to include, appropriate level of detail, and relation to the process.
- Display features, such as use of color, use of symbols, information encoding, flow and navigation.
- Appropriate user guidance and training relative to the user interface.
- The display development approach, such as how to identify information content required, appropriate staff, and establishing appropriate guidelines for displays.

Honeywell has applied decades of integrated process control and safety experience to improving your control room design. Our experts will work with you to optimize your control room layout, operator station configuration, and other physical considerations that make an effective, safe operator environment.

**Boundary Management**

Many plants have processes requiring repeatable tasks to be performed, such as changing a mode of operation, or starting up or shutting down a unit of operation. Because shifts and operators change, these tasks may not always be performed consistently. As a result, variability may occur in the process and safety may be jeopardized.

Honeywell’s Procedural Operations solution implements consistent best practice procedures for repeatable tasks for each phase of your operation. Our Procedural Operations solution provides your operators with automated and semi-automated steps for each task, with checkpoints that help ensure that the operator stays within the given procedure.

Honeywell’s boundary management solution reduces supervision and the need for control, while ensuring overall performance. It creates a setting in which individuals and groups can manage their own activities to achieve a defined set of results. Boundary management improves organizational performance and accountability by redefining the principles of delegation and group structure. Jobs and tasks become more of a group function based on what works for overall performance rather than a static job description. Process improvement becomes a natural outgrowth of individuals recognizing that their performance is based on everyone managing their part.

Honeywell’s Boundary Manager is a function of our advanced Alarm Configuration Manager application. Alarm Configuration Manager enables users to explicitly record any plant constraint and to map that constraint to alarm limits, UserAlert™ limits and operations management limits. This assures that limits in any application are consistent with the fundamental plant limits. Violation of those fundamental limits has been found to be a cause of incidents.
Emergency Shutdown

With more than 15 years of process safety expertise, Honeywell set the standard for plant operational safety. Our Fail Safe Controller® (FSC) and Safety Manager™, the world’s leading process safeguarding solutions, are integrated with Experion or can be deployed in stand-alone configurations. These safeguarding solutions form the basis for functional safety, providing protection of people, plant equipment and the environment while maintaining optimum plant availability.

Honeywell’s commitment to plant safety extends beyond the boundaries of the traditional safety system. Honeywell Safety Systems integrate SIL-rated transmitters and safety valves with comprehensive field device diagnostics, and the overall control and safety solution to improve field asset management and elevate plant maintenance and operational performance.

FSC and Safety Manager have gained global acceptance as the process industry’s premier safety management solutions with more than 5,000 systems installed worldwide. Safety Manager is a SIL 3-level system meeting the most stringent functional safety standards such as ISA S84.01 and IEC 61508, and is approved by independent agencies including UL and TÜV.

Designed to increase safety performance using proven and reliable diagnostic-based technology, Safety Manager:

- Increases staff productivity with tools that enable faster, more accurate engineering, automatic documentation, and validation.
- Reduces off-line testing requirements, shortens mean time to repair (MTTR), and enhances online modifications functionality for improved maintenance.
- Improves process safety with a comprehensive suite of services that enhance lifecycle process safety and safety system design, resulting in optimal operational performance.
- Improves operability with a common process control and integrated safety platform that improves process management, operability, production and safety.
- Reduces lifecycle costs with complete solutions that address overall process safety performance, reduce process risks and extend system life.

Safety Manager is built on the proven Quadruple Modular Redundant® (QMR) technology. QMR is a diagnostic-based technology that enhances system flexibility, increases diagnostic messaging capabilities and improves system fault tolerance for critical applications.

Safety Manager delivers enhanced safety assurance for plant operators who oversee industrial processes. It helps lower the cost of safety and improves plant performance by reducing the risk of safety incidents, maximizing production up-time, reducing the cost of compliance, and providing productivity tools that help manage safety in your plant.

Physical Protection

Honeywell’s extensive offering of products and services can automate, control and integrate virtually every critical facility operation to ensure physical security at your most sensitive sites around the world.

Honeywell’s advanced physical security systems can seamlessly integrate with your process control system for a comprehensive, plant-wide control and safety solution. For example, our Asset Locator™ tool is a comprehensive solution that monitors the real-time location and status of equipment and people throughout a facility. Added to the Honeywell’s industrial security systems, it provides your organization with the benefits of reliable single-point access to asset management security and facility management in one easy-to-use system with the same look
and feel for operators and security staff. Asset Locator uses high-performance wireless technology to provide robust, reliable operation.

The Honeywell Security Manager is a highly configurable security management system providing unprecedented control and management over security operations such as perimeter control. Security Manager offers integrated handling and monitoring of electronic access control, visitor management, security management and closed circuit television systems. It provides one-window access to, and integration with, other building and enterprise systems.

Honeywell Digital Video Manager (DVM) is a scalable, digital closed-circuit television (CCTV) surveillance solution setting a new standard in cost effectiveness, flexibility and performance. DVM is the first digital video system to support integration with your process control system, and take full advantage of standard networking products to deliver high-performance digital video capabilities. Honeywell’s DVM puts advanced functionality at your fingertips, helping to increase operator productivity and responsiveness. Operators can control individual cameras’ pan-tilt-zoom functions, enter recording commands and simultaneously view high-quality live images, as well as record and play stored images from their Experion station.

Emergency Response

In the event of an emergency, your response hinges on the mechanisms in place to protect your plant and personnel. Effective handling of a crisis situation requires tools to continuously track and monitor mobile assets and people throughout the facility.

Honeywell can improve your emergency response capabilities with a suite of powerful solutions. Knowing where the people in your plant are in the event of an incident is critical to ensuring their safety. A best-in-class automated mustering solution tracks employees, visitors, and contractors on site through the integration of process control and business systems. In the event of an incident, a mustering solution can direct your employees, visitors and contractors to the safest area. Then the system automatically tracks where they are located with up-to-the-minute information so that managers are not required to walk through a dangerous plant looking for their employees. First responders can then be directed to the exact location to find those who need help immediately.

Honeywell Asset Locator updates the position of your tagged assets every four seconds, giving you an accurate, up-to-the-minute record for use in building and personnel security, utilization trending, budget allocation, vendor management, regulatory compliance, and more. This robust solution combines industry-leading local positioning subsystems with the facility-wide control, monitoring, and integration capability of Honeywell systems. The architecture consists of a Honeywell Asset Locator server with the capacity to add 40 workstations to your facility’s Local Area Network to enable personnel to search, locate, and track tagged assets.

Data is at the heart of a process control system and represents a plant’s intellectual property. This data needs to be protected in the event of a disaster and available for quick restoration. Honeywell’s Experion Backup and Restore (EBR) software provides uncompromising protection against the possibility of PC failures. EBR reduces server and PC restoration times by up to 80 percent over traditional methods. Because EBR creates an exact replica of the system, you can recover a failed node to an exact point in time, with all data and applications intact.
For More Information
Honeywell can help you achieve your safety objectives. It begins with an assessment of your safety solution. To learn more about Honeywell’s layered approach to plant safety, or to schedule an assessment, call your Honeywell account manager or visit www.honeywell.com/ps

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