High-Performance Control Room Services

Benefits

- Focuses on plant control within normal ranges
- Increases awareness of process changes
- Provides easy identification of critical performance indicators and enables faster response to process anomalies
- Improves detection, diagnosis and management of abnormal situations
- Supports proactive rather than reactive culture
- Avoids event escalation to significant damage
- Reduces operator fatigue and stress
- Promotes collaboration between plant personnel
- Reduces control room traffic and distractions

Introduction

Abnormal conditions often occur as a result of mechanical failures, instrumentation malfunctions or plant process disturbances. If left unattended, the failures can quickly escalate into costly accidents. When a control room operator is unaware of a potential problem, the likelihood that an accident may occur is increased, which could lead to reduced plant production, availability and reliability.

Operators are constantly challenged with being keenly aware of emerging plant process situations and reacting quickly to resolve those issues before they escalate. Compounding circumstances can be difficult to identify due to a combination of distractions in the control room including unmanageable alarms, a multitude of crowded graphic displays and other avoidable conditions.

High-performance control room services, provided by Emerson for users of Ovation™ automation technology, include unique design characteristics, functions, tools and features to help optimize operations. A high-performance control room focuses operator awareness on plant activities that can improve information analysis, provide easy identification of critical conditions and enable quick response to mitigate undesired consequences. Those who implement high-performance principles can strategically improve operations by embedding human performance elements into graphics, alarm management and control room design. Simplifying methods for how operators view and perceive information allows them to quickly prevent or correct emerging issues. The principles used enhance operator performance by reducing stress and fatigue.

High-performance control room services optimize the overall operator experience by using governing documentation, integrating comprehensive overview displays with simplified process graphics, mitigating annunciation, embedding alarms into graphics and improving control room display features and ergonomics.

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Services within the high-performance control room program include:

- Consultative workshop
- Governing documentation
- Operator displays
- Alarm management
- Control room design

Consultative Workshop

The high-performance control room workshop helps to uncover operator needs and determine the best work settings to optimize the operator experience, allowing them to recognize, understand, and respond quickly and precisely to critical plant events. This is accomplished by first training key personnel on high-performance principles and best practices.

The workshop is led by an Emerson subject matter expert. In-depth information on how humans respond to images, color and data is presented to help explain the methodology used in high-performance principles. Industry standards, case studies, best practices, research and publications that further illustrate the methodology and its ability to maximize situational awareness and operator effectiveness are reviewed. Additionally, this workshop presents some of the methods used by best-in-class facilities that resulted in dramatic improvements in the design, development and implementation of a high-performance control room.

The workshop continues with a detailed overview of operator display and alarm management philosophies. Both governing philosophy documents are presented, reviewed and discussed with the purpose of tailoring each to meet customer specifications. Discussions continue with facility-specific examples including pre-design of operator displays and alarm rationalization. Emerson experts share high-performance display concepts that provide operators a clear understanding of how process areas can be illustrated. Existing plant alarm performance is reviewed, focusing on nuisance alarms and common mitigating actions. The workshop ends with a collaborative exercise where operators help to identify the key graphics to be redesigned using high-performance guidelines. Creating new overview displays based on operator process knowledge helps to customize startup, shutdown and steady-state illustrations that best represents plant operation.

Governing Documentation

Operator Display Philosophy

The operator display philosophy defines the framework, general principles and fundamental objectives of a high-performance control room.

During the workshop, key plant personnel and Emerson experts collaborate to define the guidelines that will be used when designing the operator interface points within the control room such as the control room layout, features, facilities, operator console, workstations and graphics. These guidelines help to ensure that all vendors and contractors provide high-performance materials, technology and styles centered around ANSI/ISA-101.01 and EEMUA-20 industry standards.

The guiding principles of the operator display philosophy are intended to increase awareness of abnormal conditions and reduce operator fatigue and stress that can often occur from working within a traditional control room configuration.

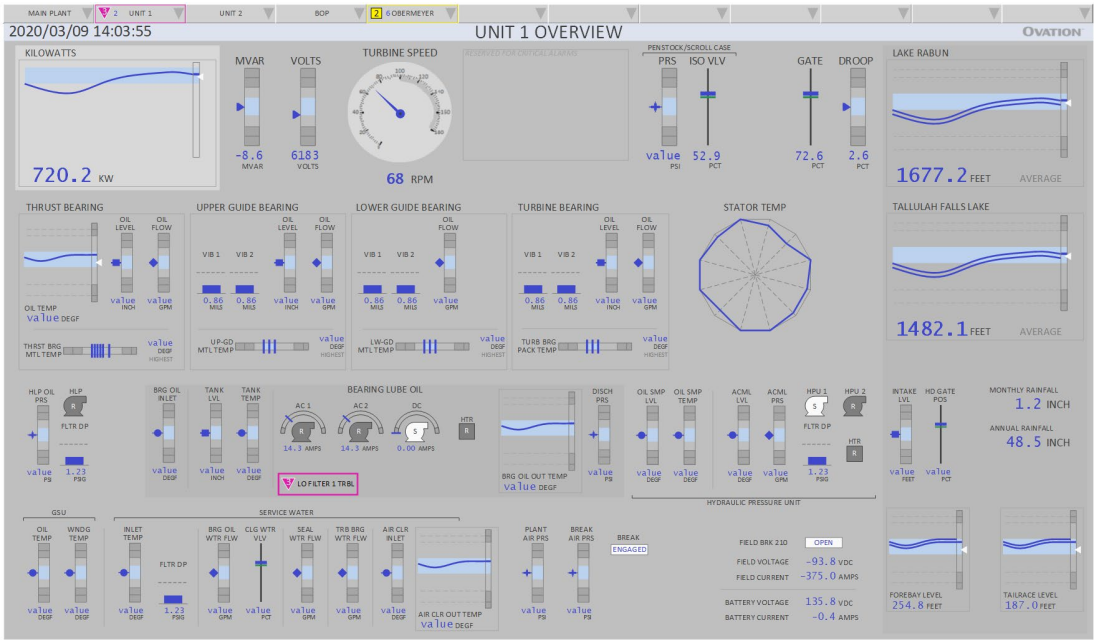
Alarm Management Philosophy

Rationalizing and mitigating alarms are key to optimizing situation awareness and the alarm management lifecycle. A custom alarm management philosophy is developed during the workshop that leverages ANSI/ISA 18.02, IEC 62682 and EEMUA 191 standards to define the principles, structure and objectives when evaluating, designing, implementing, operating and maintaining an alarm system.

Operator Displays

The use of high-performance principles improves the operator's ability to detect, analyze and correctly respond to changes in process conditions. Operators can keenly observe and efficiently manage all plant processes through larger, simplified and consolidated views. High-performance control room services reclassify display graphics using a hierarchy focusing on high-level information overviews for quick assessment. Additional details are provided in lower level displays, available as required for operating, troubleshooting or diagnostic actions. Emerson applies the principles and guidelines defined within the governing documentation to add human performance elements to the graphics. Once all customer feedback and data has been collected, the required high-performance displays can be identified, characterized, organized, designed and implemented to fit operator needs.

While significant changes to the operator displays can be worrisome, operator feedback reveals that the learning curve is nearly equivalent to a single work-week spent understanding startup and shutdown procedures. Operators report that learning how to read and navigate through the new displays is easier, faster and provides greater comprehension of overall plant performance. The ability to quickly determine process status and clearly see a process instability or oscillation aids in responding to abnormal conditions and preventing the escalation of an issue.

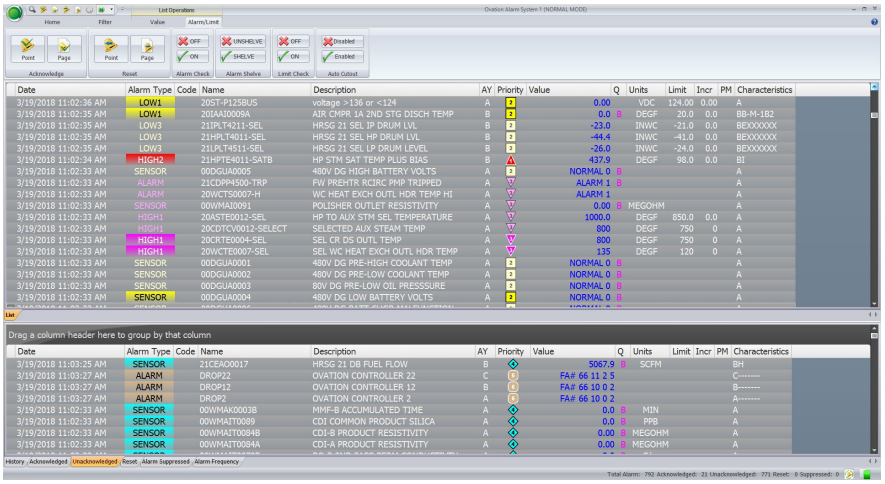


Example of a high-performance graphic using standard colors, shapes and symbols

Alarm Management

Integrating an advanced alarm management system within a high-performance graphic display system allows operators to identify problems early and take quick, corrective action. High-performance alarms are created using existing customer data, such as an alarm database and historian reports. The data is analyzed, compared to ANSI/ISA 18.02, IEC 62682 and EEMUA 191 industry standards and used to establish an alarm baseline which provides the foundation for defining expectations and alarm enhancements such as prioritization, mitigation and suppression logic.

The alarm management philosophy is added to the alarm baseline to further organize, mitigate and suppress alarms. Applying significant changes to the alarm system may be drastic for operators, however, involving them in the alarm design process builds confidence and reduces the learning curve.



Example of high-performance control room alarm list display

Control Room Design

Optimized control room design and ergonomics improve situational awareness by minimizing operator distractions and reducing fatigue and stress. Emerson employs the latest technologies and concepts to design and construct high-performance control rooms that are focused on situation awareness, collaboration and overall enhancements to the operator's working environment. Control room modifications take into consideration customer feedback and data uncovered during the workshop. Each control room design is tailored to meet customer specifications and can include alterations to layout, lighting, audio, operator consoles, video walls and large screen displays. Emerson leverages EEMUA 201 and ANSI/ISO 11064 industry standards for operator console and ergonomic control center design. Many control room designs use a limited quantity of monitors and computers as compared to traditional control room layouts. Minimizing the number of monitors and displayed alarms enables an operator to quickly recognize and respond to a process anomaly or priority alarm.