

SCADA Human Machine Interfaces (HMI)

SCADA Human Machine Interface (HMI) is the primary interface through which Controllers monitor, control, and manage pipeline operations. It translates complex, real-time system data into visual displays that allow Controllers to understand system conditions, identify abnormalities, and operate. The HMI is the operational lens of the pipeline system. It is where data becomes insight and where decisions are made. For Controllers, the HMI is not just a tool, it is their primary working environment.

The effectiveness of the HMI directly influences Controller performance. A poorly designed interface can:

- Increase cognitive load
- Obscure critical information
- Delay response time
- Contribute to human error

A well-designed, high-performance HMI supports Controllers by:

- Reducing cognitive effort by presenting only relevant, prioritized information
- Highlighting abnormal conditions so they stand out immediately
- Supporting faster, more accurate decision-making
- Improving consistency across displays, reducing confusion
- Enhancing performance during abnormal and emergency conditions

The Challenge

In high-consequence environments, the difference between a cluttered screen and a well-structured one can be the difference between early intervention and escalation. Even the most advanced SCADA system is only as effective as its HMI. Controller performance depends on how easily they can scan, interpret, and act on the information presented. Poor HMI design increases workload, fatigue, and reduces situational awareness, while growing system complexity makes thoughtful, tailored design essential, there is no one-size-fits-all solution for control rooms.

Many Operators recognize the need to implement or modernize their SCADA HMI but face uncertainty in how to do so effectively. Balancing system complexity, industry standards, and Controller usability requires a structured, user-centered approach.



Pipeline Performance Group (PPG)

We Partner with You To:

- Assess gaps between your current SCADA HMI and industry best practices, including alignment with API RP 1165 (SCADA Displays) and API RP 1167 (Alarm Management)
- Capture direct feedback from Controllers, identifying strengths and opportunities for improvement within the existing HMI
- Translate stakeholder input into practical screen designs, developing clear, implementation-ready blueprints
- Establish a SCADA HMI Design Philosophy, providing a consistent framework to guide development decisions
- Standardize your HMI through a company Style Guide, ensuring consistency, usability, and long-term sustainability across all displays
- Evaluate and refine SCADA HMI displays to ensure they deliver clear, consistent, and integrated information that supports effective Controller performance

Our SCADA HMI specialists engage directly with Controllers and other key users to capture practical, experience-based feedback, which is then translated into targeted, control room-specific design improvements. By actively involving Controllers in the process, we strengthen change management, increase user acceptance, and deliver HMI displays that are intuitive, efficient, and aligned with real-world operational demands.

PPG leverages decades of interface design expertise and Ph.D.-level Human Factors knowledge to guide a Controller-centered HMI design process. We have served on the API committees that developed:

- The first edition of API Recommended Practice 1167 for Alarm Management
- The second edition of API Recommended Practice 1165 for Pipeline SCADA Displays

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