

# Four steps to HMI screen design

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**T**he task may sound intimidating, but designing a human-machine interface (HMI) screen actually isn't too different from creating a word document or presentation. Just follow some basic rules:

- Remember your audience;
- Stick to the point (task-oriented displays);
- Avoid unknown jargon (If advanced control is not understood, use simple terms); and
- Use a template (keep your information/functions in consistent locations).

Designing HMI screens doesn't mean copying a piping and instrumentation design (P&ID) onto a graphic. It means

*simplifying* the process so an operator can easily see what's going on in a particular area. Before developing a screen, talk to your users! Console operators are the best source of information for designing an HMI screen.

Here are four basic steps to follow to achieve effective HMI screen design:

## 1. Create, define standards

Take into account operators' physical environments, such as control room lighting, how many screens they monitor, and how close they sit to the screens. These factors help determine standards, such as font sizes, symbols, and colors. A shape or picture library will help ensure consistency in the desired images. Consider these tips:

- Make wise use of colors. Make primary data (process values) stand out with high contrast. Secondary or support data (text descriptors) should be smaller and/or blended with the background. Alarm data must be easily recognizable with bright colors. Dedicated colors should be chosen for each alarm priority.
- Make sure process lines flow left to right. Avoid line bends and crossings when possible.
- Be consistent. Maintain absolute consistency in detail, layout, symbols, and abbreviations.
- Indicate major process flows with wider

lines (from feed to principal products). This approach helps differentiate between major product/process flows and utility lines.

## 2. Gather, review data

Data sources may be any combination of P&IDs, existing displays, procedures, incident or near-miss analyses, and operator interviews.

A P&ID might seem the most complicated element. But remember that while all components outlined in a P&ID are vital to that process, they're not all vital for an HMI display.

Sometimes the most basic of tools—a box of colored pencils—is the most helpful. When studying a P&ID, use pencils to determine instrumentation and flows. Don't worry about lines that don't have instrumentation connected to the DCS; color in the ones that do.

## 3. Create a first draft

The first draft can be a markup of existing displays, a Microsoft Visio or a CAD drawing, or even a paper sketch.

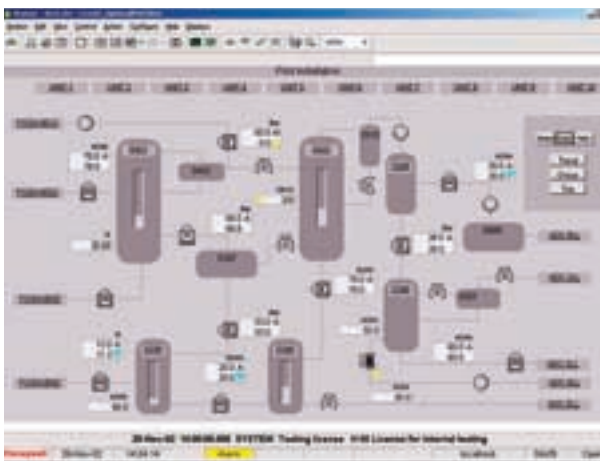
When beginning with a paper sketch, draw the diagram lines you've marked on the P&ID, straightening and uncrossing lines as you go. The result should yield a complete picture of everything that needs to be included on the HMI screen. And you'll minimize room for error by eliminating unnecessary lines and data.

Base equipment representation on importance or value, not on physical size. Give objects the prominence they deserve. The largest object isn't always the most important.

## 4. Refine, approve

Cluster, but don't clutter, information/functions. Make sure related information is visually positioned in easily understandable groups. Evenly distributing information and drawings across the screen will reduce clutter. Finally, graphics and flow charts are usually easier to read if the core task/function is in the center. Apply this logic to your display screen.

In the end, all these suggestions are based on the principles that an operator should be able to easily understand an HMI display, prioritize tasks, and focus on required information. Clear, organized, and uncluttered information help an operator respond to an alarm more quickly and better understand a process.



*This example of an HMI display was designed to Abnormal Situation Management (ASM) Consortium guidelines and created in Honeywell's HMI interface technology, Experion HMIWeb.*

For more on HMI screen design, visit the following Web sites: Abnormal Situation Management Consortium at [www.asiconsortium.com](http://www.asiconsortium.com) and International Engineering Consortium at [www.iec.org/online/tutorials/hmi](http://www.iec.org/online/tutorials/hmi)