HMI Modernization
A new vision for connected, information-driven operations
The HMI’s Evolving Role

Light years ahead of the push-button controls and panel gauges of yesterday, the human machine interface (HMI) has evolved to become the central point for decision-making in manufacturing and industrial plants – whether for a standalone machine or across operations.

The demands put on HMI software only continue to grow as manufacturers and industrial operators seek to take advantage of new enabling technologies and distance themselves from competitors. Some of the factors driving the need for a more advanced HMI include the following:

• A growing number of companies are choosing to converge their information technology (IT) and operations technology (OT) solutions. Through this process, companies can access data that has long sat dormant in their controllers, machines and processes – and they will rely on their HMI to contextualize and visualize this data for better decision-making.

• Manufacturers are increasingly adopting a flexible manufacturing approach to create more products and product varieties at a single site. An information-enabled HMI can help them better understand their processes to accomplish faster changeovers, reduced downtime and consistent quality.

• Emerging technologies, such as mobile devices, virtualization and cloud computing, are helping manufacturers and industrial operators get critical information to employees faster and to more flexibly manage hardware. They need a visualization solution that supports and embraces these new technologies.

It’s also important to consider the relationship between operator and HMI. A modernized HMI – with easy-to-understand, graphics-based displays and instantly accessible information – can support the unique needs of a younger workforce for greater productivity even during their early days in the plant.

“There are changes in the way the leading edge of users are deploying HMI software, including smarter HMI design, broader use of HMI visualization to improve different categories of business decisions, and distributing real-time data to all levels of the manufacturing organization through workflow and other complementary technologies.”

1 Human-Machine Interface (HMI) Software & Services, ARC Advisory Group
HMI Modernization

Migrating to today’s more advanced HMI software can help you access the data buried in your operations, convert it into relevant and timely information, and ensure it is delivered to the right people. It can help speed up design and commissioning times, improve productivity and reduce maintenance demands. This e-book examines five key benefits that a modernized HMI can bring to your operation.

“From merely providing plant data on a mobile device, HMI now delivers real-time data and actionable insights to operators. The consequent benefits, such as lower plant operation costs, higher process efficiency and greater energy efficiency, will power the adoption of HMI solutions.”

1 Convergence of Industries Marks New Era in Global Human Machine Interface Market, Frost & Sullivan

Key Benefits

1. **Reduced** design and commissioning times
2. **Improved** uptime and productivity
3. More detailed and accurate alarm information
4. **Improved** visualization and ease of use
5. **Anytime, anywhere information availability**
Reduced Design and Commissioning Times

Modern HMI software can help machine builders, system integrators and industrial engineers more quickly develop and deploy applications.

Machine- and site-level HMI software that use a common development tool can help multiple users collaborate and create applications in a single, scalable design environment. Developers also can import either entire machine-level applications or their individual components into supervisory-level applications to help speed up the development process, reduce engineering costs, training costs and lower the total cost of maintaining the system.

Integrating the control system with advanced HMI software also allows developers to leverage tags in the controller as direct references instead of using HMI servers. This can help avoid duplicate design efforts, as well as increase accuracy in state-tracking and time stamps for alarms.

A core library where HMI faceplates or other global objects can be stored for re-use on graphic screens is making it easier to deploy and maintain common, tested interfaces and objects across lines and plants. Objects can be defined with parameters that are passed in at runtime for each unique instance, and edits to a base object will update all linked instances of the object.

In addition to these capabilities, edits can be made to applications during commissioning – even while the system is running. Once saved, the changes are rolled out across the system.
Improved Uptime and Productivity

Modern HMI software can help improve uptime and boost productivity by meeting the unique needs of users throughout the plant’s environment:

**OPERATORS**
Delivers easy-to-understand visual displays and browser-like commands that help operators quickly assess operational situations and more easily navigate systems.

**ENGINEERING AND MAINTENANCE**
Helps reduce machine downtime and minimize the likelihood of errors by updating linked instances of an object that has been edited. Additionally, HMI software with find-and-replace and cross-reference functionalities can reduce the time required to update tags and text located throughout an application.

**BETTER EVENT RESPONSE**
An advanced HMI system can also help you better prepare for and respond to critical events. For example, system-wide diagnostics enable you to store, route and report information about system events to the right people for faster, more collaborative troubleshooting.

**CONTINUOUS VISIBILITY**
An HMI that supports redundant server configuration can support system-wide visibility even following a hardware or network failure. If the primary server fails, the software will automatically switch over to the secondary server and bring all clients with it to keep operations running.

**INFORMATION TECHNOLOGY**
Integration between your production system’s security and IT infrastructure allows IT staff to leverage PC authentication services and other security-access procedures. Also, the ability to extend an HMI onto a Web browser can deliver visibility to key stakeholders located outside the production environment.
More Detailed and Effective Alarm Information

Operators depend on HMI alarming for reliable visibility into critical conditions and fast response to any issues that arise. Advanced HMI offerings fulfill this need with multiple alarm options, including traditional tag-based alarms and innovative device-based alarms.

Device-based alarms are defined and programmed in a project off the device and then downloaded to a controller. The controller monitors and detects alarm conditions, then it sends the event information to the alarm manager and alarm log. All alarm detection and management occurs in the controller, which helps reduce network traffic and results in more accurate time stamps.

Tag-based alarms monitor data points in a controller to look for stage changes, routing the information to the alarm manager and alarm log. All processing and alarm-management activities occur at the server level.

Modern HMI software also can utilize advanced alarming functionalities to improve operator efficiency and ease troubleshooting:

- **Associated tags** delivered with an alarm message can provide valuable additional information and help operators or technicians understand what a system’s environment looked like when the alarm was triggered for faster issue resolutions.

- **Alarm commands** can more quickly bring an operator to the point where corrective action is needed, eliminating the need to click through multiple screens or open new programs.

- **Pre-configured control-status alarms** deliver deeper insights into environmental factors, such as controller problems or connectivity issues, to help operators better understand how a system is operating.

- **Alarm-class configuration** streamlines the otherwise time-consuming task of organizing and viewing similar alarms together for an alarm summary or report.

- **Remote alarm access** can expand the alarm-notification process to alert operators of alarms via phone, text or email, as well as escalate an alarm to other personnel if an operator is unreachable.
Improved Visualization and Ease of Use

As manufacturing and industrial processes continue to grow in complexity and rely on a growing abundance of data, operators need a visualization solution that delivers vital information in a clear, easily understandable manner.

**Graphics-Rich Displays:** A modern HMI that delivers enhanced graphical presentations of operations provides an intuitive format for monitoring performance and quickly responding to issues. Web-browser-style navigation buttons also can help users quickly navigate between screens or easily select a specific screen from the history list.

**Consistent Look and Feel:** Modern HMIs also are designed for use across different platforms, including industrial operator terminals and PC-based operating systems. This can help ensure all operators use a consistent environment whether within a single plant or across multiple facilities. Similarly, centralized administration can support consistent HMI designs and functionality across plants.

**Multiple Language Support:** Applications maximize ease of use for individual operators when developed with multiple language versions, including the ability to dynamically switch between languages while a machine is running. The use of Microsoft® Arial Unicode font, which includes virtually all Unicode character ranges, eliminates the need for cumbersome font-linking. Additionally, the text used in alarms, messages and graphics objects can be easily translated.

“Applying two coatings at one time is already quite complex, and we would be asking them to put four coatings on during a single pass,” said Chris Stogbauer, vice president of technology at Wausau Coated Products. “Now, by consulting an HMI graphic diagram, a machine operator simply pushes the button for a programmed application. The screen shows a drawing of the equipment, with all the information needed to run and monitor that Web path or production method.”
Anytime, Anywhere Information Availability

As the convergence of IT and OT solutions provide manufacturers and industrial operators unprecedented access to information, they also need greater flexibility in how and where they can view and act on that information. Modern HMI software can deliver that flexibility through mobile-device support.

Extending an HMI to a tablet or smartphone can give operators and plant managers instant access to information, whether they’re roaming the plant floor or even outside the plant. The HMI software is compatible with the latest technology like HTML5 and popular mobile platforms – including Apple®, Android™ and Windows® – and provides responsive and configurable views that can be tailored to a user’s preferences.

Operators also have more flexibility for how and where they deploy technology. Virtualization is a key example. Virtualization breaks the traditional link between hardware and its operating system, allowing hardware changes without replacing an operating system or applications. HMI software that is designed to support virtualization allows you to extend your HMI life cycle while also reducing the risks of downtime and maintenance.

LORAM Taps Mobile Technology to Help Reduce Downtime Costs

LORAM, a leading supplier of track maintenance machinery and services, needed to better monitor the performance of its rail grinders – machines that grind off rail to remove cracks and help trains more efficiently run. Without remote access to data, troubleshooting component failures was difficult and sometimes required a team to travel on-site.

The company leveraged the Microsoft® Surface™ tablets running the FactoryTalk mobile app to access on machine HMI displays. Technicians now have remote visibility into 45,000 tags from the tablet.

“Locating necessary information for troubleshooting used to take a significant amount of my time, but now only takes a few minutes,” said Nathan Moyer, field application technician for LORAM. “This level of remote access gives LORAM and our customers a competitive edge.”
The Information-Enabled HMI

An HMI’s value doesn’t end at the operator interface. Rather, it can and should extend into your information architecture for easier and more robust information-sharing and decision making.

When an HMI can directly integrate with plant floor systems, you gain access to real-time information from a controller along with information stored on the plant floor. This data can be delivered as actionable information via the HMI software to help plant personnel better analyze production, optimize equipment performance, improve fault detection, track product quality and more.

This integration does not require custom communication points. The data delivered on open standard Ethernet technology, such as EtherNet/IP™, requires no additional configuration or routing.

Information-enabled HMIs also can efficiently store data across machines and production lines using a historian. This allows plant managers and operators to analyze complex process data over a long period of time with ease. In fact, a standard, consistent historian infrastructure allows for data storage, retrieval and analysis over periods of several years.

“Our production facilities – and our supply chain – literally cover the globe. The tools that FactoryTalk provided us gave us the visibility we needed to identify areas that needed improvement and to collaborate on problem-solving. It’s made us much more responsive and able to get ahead of potential issues before they can affect production.”

1Case Study: Excellent Visibility Drives Consistency and Quality Improvements as Manufacturer Goes Global, Rockwell Automation
Summary

Gaining access to the abundance of information that lays waiting in automated-control operations and using it in meaningful ways is an evolutionary leap forward for manufacturing and industrial organizations. Modernized HMI software should be a cornerstone in your approach to bringing this next-generation capability to life in your operations.

To learn more about how a modern HMI can benefit your operations, contact a Rockwell Automation sales representative or visit www.rockwellautomation.com/rockwellsoftware/hmi.