CONTROL

WHITE PAPER

Improve business results at the operator interface

Powerful connectivity, integration and visualization lead to better decisions in real time.

The traditional role of the human-machine interface (HMI) or operator interface (OI) in process control applications has been to simply display information from the process instrumentation and control system on a screen, and convey the operator's key-strokes, clicks or touches to the appropriate external hardware for execution. Though it may be configured and endowed with powerful software that eases and speeds those basic tasks, the HMI itself adds little value beyond a pretty picture and reliable means of operator input.

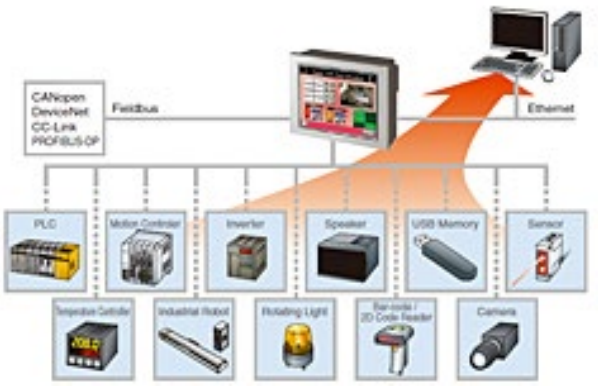
But much as the capabilities of yesteryear's workstation can be found in a modern tablet, today's HMI hardware and software now have the power to do much more. A lineup of full-function HMIs includes a tremendous toolset that applies across all models, from lowest to highest size, capability and cost. They can capture data, load recipes and do deterministic control without specialized hardware, which allows users to make updates as needs change, and to try new things using the same development package.

Most users are not taking advantage of the potential of today's HMIs to improve operations and business results by bringing real-time information to the right people so they can make good decisions and take appropriate actions at the right time. The modern HMI supports this by performing critical tasks in the areas of connectivity, integration and visualization.

Improvement starts with communication

To better fulfill their traditional roles, over the past few years HMI hardware and software has evolved to accept a wide variety of inputs and produce a full range of outputs. Ports are available for direct connection to devices from I/O, robots and inverters to industrial controllers including PLCs, motion controllers and temperature controllers.

Where needed, drivers and adaptors allow straightforward connection to virtually any industrial network protocol or networked device. Software scripts allow users and vendor programmers to support custom communications for specific applications, and to improve drivers as needs change. Outside the driver realm, OPC allows even the most obscure smart instruments to be included, as most now support it.



In the IT side, Ethernet, Internet Protocol (IP) and WiFi enable instant connections to business systems, starting with supervisory PCs and ranging up to corporate and enterprise servers and clouds. Some HMIs can perform the vital role of separating control and information systems—the most advanced can support two independent Ethernet networks, one for the factory floor, the second for IT data acquisition and supervisory control.

Their highly evolved connectivity makes the HMI a logical focus for adding sensors and communicating between plant floor and business systems – the essential capability required for gaining the benefits of the industrial information revolution embodied in Industrie 4.0 and the Industrial Internet of Things (IIoT).

Integration enables applications

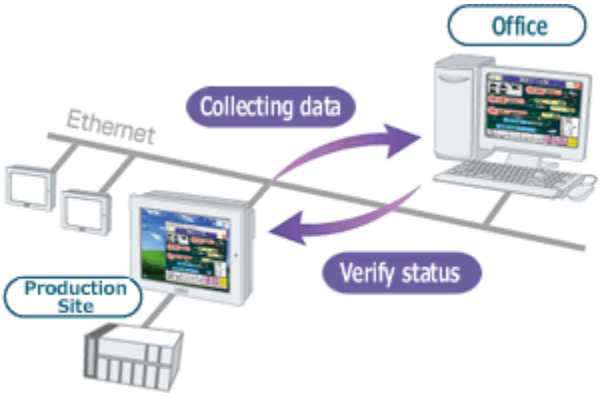
Concentrating data from diverse smart instruments through versatile communication ports and drivers, and offering it up through IT systems allows it to be accessed and used by connected and external memories, servers and applications.

Advanced HMIs can connect to Windows applications via on-site smart portals to store and access documentation such as manuals, troubleshooting guides, and maintenance schedules. Remote HMI capabilities allow offices and off-site facilities to remotely monitor and control applications.

When business systems can quickly and easily access plant-floor information, it can be analyzed to find efficiencies and help optimize production performance.

Plant floor information can be processed at the HMI level to provide insights into operations

and improve reliability. The HMI can track productivity data to support key performance indicators (KPIs) such as overall equipment effectiveness (OEE).



The HMI can also track equipment usage and notify operators or maintenance supervisors when preventive maintenance is due. For example, motor hours can be recorded and used to alert operators when bearings should be lubricated. Performing preventive maintenance on an equipment hours rather than calendar basis can reduce maintenance expenses and prevent costly unscheduled shutdowns.

CAN YOUR HMI DO WHAT YOU NEED?
• SCADA and HMI software needs ports for smart devices (i.e. Ethernet, CAN, fieldbus) and a driver to talk the protocol (Ethernet/IP, Profinet) for communication.
• Evaluate the hardware, ports and software. Are you limited to OPC, or are there direct drivers? That's an important difference. If it's OPC, then you need OPC and it's a different thing to deal with.
• Once you get at the data, will you just see it on a screen, or put it into an SAP database? Look for database connectivity in the software package. Can you save files in different formats from .txt to .xml, to save as a spreadsheet? What is the mechanism, how does it work?
• Will you connect to a cloud? Traditionally, you connect to a server or USB stick. Can the software push and pull data to and from a cloud?

Visualization improves understanding

Today's HMI hardware and software offers large, high-resolution displays and powerful processors capable of rendering instant, crisp and colorful displays of complex and rapidly-changing process information.

Large-capacity CPUs render visually pleasing displays even when the amount of information on the screen increases. Motion and other position information, for example, is displayed at high speeds with realistic animations, and complex recipes are processed at high speeds with clear display of flowcharts and other detailed information.

Wide-screen displays allow the use the right and/or left space for a landscape-oriented

graph as well as a menu providing clear access to additional information. Smaller displays can be connected via Ethernet, and use the same software and programming to show an appropriate level of detail for their local application.

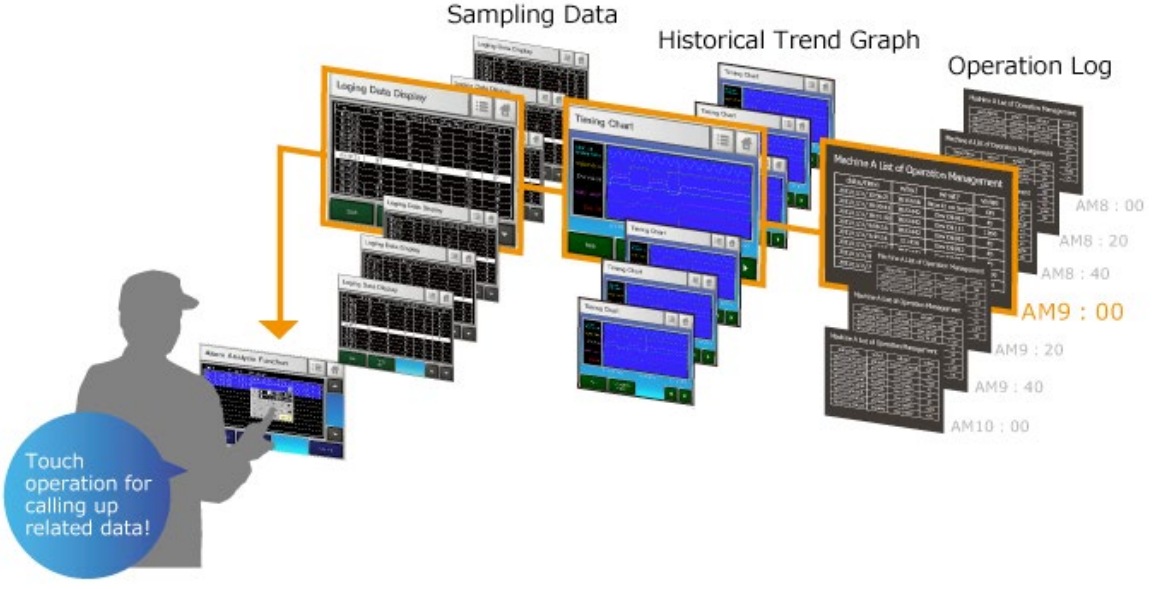
Integration with vision systems allows displays of video images from multiple cameras on the same screen with independent adjustment of exposure time, focus, lighting and brightness.

Transparency supports good decisions

When process and equipment information is presented clearly to the operators, as well as to support staff, supervision and off-site experts, the odds of making good decisions materially increase.

Alarm functions can alert operators with different colors according to current status. Alarm status and histories can be checked locally or remotely without affecting operations. Meanwhile, data can be sampled, historical trends can be graphed, and operator logs can be reviewed to see who did what, when, and the consequences.

This information can be accessed remotely, both historically and in real time. Remote monitoring and maintenance can be done from an office by viewing the information of alarms and device addresses on a browser. Alarm notifications also can be sent in real-time through RSS feeds.



The more advanced HMIs can provide comprehensive programming and log analysis functions to aid the development of more sophisticated systems. They can display error logs in graph form, making it easy to analyze the causes of a problem, and support features such as enlarged/reduced display, auxiliary line display for upper and lower limits, and XY scatter graphs.

Operation logs can be obtained for each operator on a part-by-part or batch-by-batch basis, allowing management to convert just the needed sections for easy management. Security settings, passwords and security level IDs can be configured for each user and product.

Production losses can be minimized with an “alarm analysis” function: When an error occurs, an operator can easily seek and check the condition on-site by touching the alarm message to call up various error-related data in chronological order. An alarm analysis screen with timing chart of alarm-related device addresses can be quickly and simply configured for easy troubleshooting, debugging and/or design changes of production equipment to reduce downtime for enhanced productivity.

By conveying detailed process and production information to managers, support staff and domain experts throughout (and when needed, outside) the enterprise, then clearly presenting analytical results alongside the current process status, today’s powerful HMI hardware and software enable operators to make the best possible decisions in real time. What better way could there be to improve operations and business results?

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