Designing Smart Machine Operator Interfaces

Machine design considerations for optimizing operator interfaces

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Life Is On Schneider Electric

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Designing differentiated operator interfaces in a disruptive technology world

Designing differentiated operator interfaces in a disruptive technology world

Man-machine interface innovations can help OEMs and their teams of machine builders to differentiate themselves in the marketplace. Choosing or designing an intuitive interface allows for more efficient machine function and can provide new ways to increase operator productivity and agility. As older plant workers retire, new generation operators are coming on board with fewer skills. They require tools that are more mobile and that provide a level of operator interface visualization that incorporates data from multiple sources but that is clear and simple to understand.

Although most operator dialogue interfaces consist of hardware and software components, and the services necessary for information exchange between a human operator and an industrial machine, the look and feel can vary greatly depending upon machine function, size and complexity. For example, the interface can range from a simple push button or single-touch display mounted on a machine, to an advanced multi-touch control panel or industrial PC (IPC) capable of supervisory control and data acquisition, to connected mobile devices such as tablets or smartphones.

Important trends such as digitization are impacting the way that machine interface functions are being designed and used.

For an OEM, the way the machine operator interface is designed provides a window for achieving the productivity benefits of smart machines. Therefore, in addition to providing visualization and control, operator interfaces need to begin incorporating dashboards that reflect inputs from multiple external data streams and that present data analysis outputs.

Machine function no longer consists only of component control but should also encompass the monitoring and analysis of production and performance data. In this way, when operators and machines are interacting, adjustments to machine operations can be made more precise and efficient. In order to achieve this more advanced functionality, the OEM focus needs to shift from a machine-centric to an operator-centric point of view. Efficient dialogue between the machine and the operator will depend upon the ability of both man and machine to exploit the data so that the business as a whole becomes smarter.

For an OEM, the way the machine operator interface is designed provides a window for achieving the productivity benefits of smart machines.

> “Industrial IoT represents a shift away from a simple ‘run the operations’ mentality to use of real-time data analytics to rethink competitive fundamentals.”
>
> ARC Advisory Group

Trends in machine operator interfaces

A helpful first step in developing an industrial operator interface modernization strategy is to identify the trends that are influencing the behaviors of industrial machine buyers such as:

1. **Industrial Internet of Things (IIoT) proliferation** – As intelligence continues to spread across the entire chain of manufacturing infrastructure, the impact will force machine designers to rethink their design strategies. IIoT is the convergence of technologies from the Information domain with data and technologies from the Operational domain. This augments the depth of knowledge we can obtain on a process, a machine, or an asset, by applying pre-established IT models to the data it produces, delivering new insights that will allow the operator of a machine (or line manager, plant supervisor etc.) to make the best decisions, and for machine builders to drive new added values or services from it.

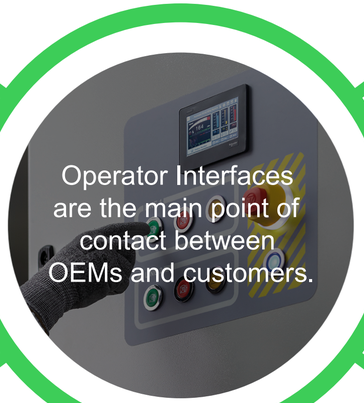
2. **Drive for increased machine efficiency** – Skilled human resources will become more scarce, and operator interfaces will need to be simplified in order to increase efficiency. This will be made possible through designing flexible and highly customizable operator interfaces that are highly connectable automation components which not only connects various field buses and sensors, but also integrates IT networks and services.

3. **An acceleration of disruptive technologies** – Operator interfaces will also be impacted by an ever-increasing wave of technological advancements. Breakthroughs in Cobots, Mobile cobots, 5G networks, Indoor Geo Localization, contactless HMI (motion detection & voice), cloud and edge computing, augmented reality, artificial intelligence and machine learning, to name a few of the most visible trends, will force a constant re-evaluation of the best way to approach machine interface design. These developments will further contribute to the creation, capture and processing of more big data and will drive the further convergence of Information Technology (IT) and Operations Technology (OT). For the machine builder, these changes will be reflected in the way humans converge with machines and will alter operator panel requirements.

4. **Growing concerns surrounding security and safety** – As machine interface systems become more connected, open, and as interface devices become more mobile (growing popularity of wearable devices), security and safety become a greater concern. New levels of protection from both physical and cyber threats need to be accounted for in the design of more modern operator interfaces.

Key role of human machine interfaces function for machine builders

A deeper understanding of the technological trends can shape modern manufacturing and help OEMs to grow their business



Machine design engineers: challenges and considerations

OEMs can successfully navigate these new challenges by developing multiple long-term strategies. For OEM Design Engineers, developing the ability to anticipate how end users will navigate through machine behavior data streams will be critical. Displays and functions will require creativity that incorporates the discipline of simple and efficient screen ergonomics that keep the overall user experience top of mind.

When assessing designs produced by the technical teams, emphasis should be on operator interfaces that favor overall effectiveness and a flexibility to accommodate a range of skill levels among end users. Adaptability to the conditions in which these machines are expected to perform is also key in the process of customizing interfaces. When dealing with such user interface diversity, it becomes important for technical design leaders and their teams to use development tools that simplify HMI programming and that are easy to integrate.

How can we help?

Schneider Electric helps the OEM Design Engineers shorten machine development time and to quickly address machine operation interface functionality challenges. By highlighting the most common machine operator interface scenarios and the use cases that define those scenarios, Schneider Electric makes it easy for technical design leaders to select the right combination of products based on specific use cases.

OEM marketing directors: challenges and considerations

OEM Marketing Directors can also reassess their marketing and sales efforts to reflect the changing digitization-driven end user needs. As workforces become more mobile and less skilled, this opens the door to offering end users new remote cloud-based support services. In addition, as end user systems become more connected, OEMs can further differentiate themselves by offering smart machines and operator interface solutions that are designed and built with cybersecurity in mind.

The new generations of plant workers coming in expect the technology interfaces to change quickly to accommodate a constant flow of software updates and improvements. In addition, the screens they see, the buttons they push, and the panels they stand next to will need to link to related processes and documentation that can be accessed easily. When attention is paid to ergonomics and the ability to deliver contextual information, such interfaces will translate to overall machine operation simplicity. They will also be looking for machines that are less passive and more proactive. That is, operator interfaces that are designed to anticipate next steps, to train, to send gentle reminders and allow operators to exercise more freedom of both movement and decision-making.

How can we help?

Schneider Electric helps OEM Marketing Directors to identify new operator interface trends and can also assist in helping to achieve the proper balance between attractive design and development costs, regardless of machine size and complexity.

Aligning modernization requirements to solution designs

Attributes of Smart Operator interfaces

Recognized as a global leader in operator interfaces, Schneider Electric comprehensive portfolio involves from simple pushbuttons to the most complex HMI and digital services.

For OEMs ramping up smart machine projects, Schneider Electric offers a wide range of hardware, software and services solutions that help accelerate efficiency and digitization transition initiatives. This portfolio of solutions addresses the following critical pillars that allow for the development and deployment of smart machine operator interfaces:

1. **Environmental adaptability** – Investing in high reliability HMIs and push buttons technologies which are designed for use in severe, harsh environments, can limit incidences of surprise failure. By selecting quality user interface products that have been tested to adhere to endurance standards and which have attained the proper global certifications, OEMs can be assured of longer smart machine lifetimes. Schneider Electric Harmony HMI & pushbuttons ranges meet these criteria and are extremely robust products that allow continuous operation under harsh environments. Let's take for example Harmony flush push buttons that

Attributes of Smart Operator interfaces (cont'd)

are designed to be flat to allow for easier cleaning of control panels. Or even, Harmony GTUX, eXtreme Terminal that can operate in harsh environments with a high brightness to be sunlight readable and support wide temperature range -30°C/ 70°C.

2. **Customized aesthetics** – The better aesthetic is, the more efficient and productive the operator can be. The flush pushbuttons aesthetics are now considered as getting more modern look & feel and are becoming the standard for all types of machines.

And when designing HMIs, quality screens with high resolution definition, strategic use of colors, and thoughtful quality icons are all factored in. Also, important to consider, is the homogeneity and the reusability of screen data and reduce the time and effort required for HMI design by using theme templates for appearance (look & feel), color set for color tone, and navigation for screen change.

Finally, if standard products are not answering to your needs, Harmony push buttons & HMI interfaces can be customized, both by providing specific images for your touch screen software or by customizing the hardware of the products.

3. **High efficiency** – Efficiency is highly considered in manufacturing and design with both ranges of Harmony pushbuttons and HMI. Intuitive products, tool-free fastening and common accessories enable fast and easy mounting. As part of a push to increase user efficiency, layout and template features in the software now give users new-found freedom and flexibility to create a better interface faster, ultimately getting the HMI up and running more quickly and efficiently. Secure dual IP connections allow effective integration into the overall operating system, enabling operators to be more efficient, sooner. Less time and effort mean lower costs and greater productivity.

4. **Connectivity** – Schneider Electric HMIs provide a simple and effective means of connecting systems. This connectivity is critical for collecting data and presenting information in meaningful formats. Connectivity openness, via a variety of panel sizes, touchscreens and keypad interfaces makes integration work much easier and assures the end user of robust access to important data. For example, many of our HMIs feature two RJ45 ports offering double Ethernet connectivity as standard to enable better IT/OT convergence. Regarding push buttons, the installation of USB and RJ45 ports on the control panel makes it possible

Attributes of Smart Operator interfaces (cont'd)

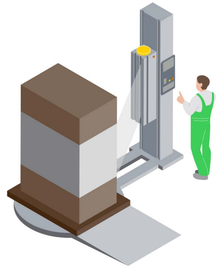
to connect without having to open the electrical cabinet. This enhances safety and, in harsher environments, avoids the collection of dust inside of panels.

5. **Mobility** – When machines are distributed across geographical areas and manufacturing cells and lines, mobile machine interfaces become important productivity tools. In the context of IoT, Harmony includes intelligent, connected products that gather and process data, enabling customers to make informed decisions. Compatibility with wireless protocols for Harmony devices also help to enhance operator flexibility.

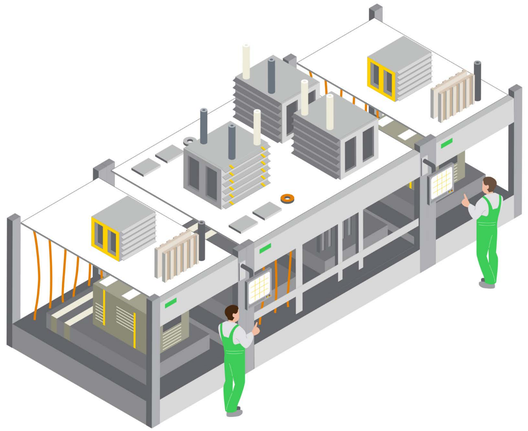
Another productivity enhancing mobile offering, the EcoStruxure™ Augmented Operator Advisor, digitizes machine information in an augmented reality format, and the data is viewable from a standard portable tablet.

Common machine operator interface scenarios for configuring the right solution

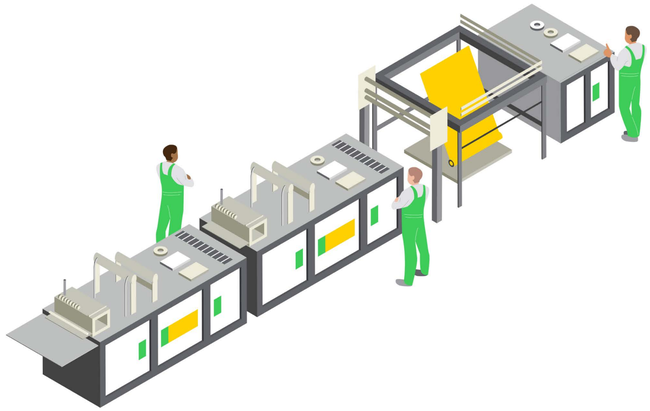
While recognizing trends and injecting innovation into the machine operator interfaces are great first steps, it is important to establish a method for properly sizing opportunities and for building machine interface solutions around core marketplace scenarios. The following sections of this guide focus on three separate and distinct scenarios that cover most opportunities encountered in the marketplace today. The 3 following machine scenarios explain the main encountered challenges and trends and illustrate the recommended best Schneider Electric price/performance product combination.



First scenario:
Small machines with easy human operator access



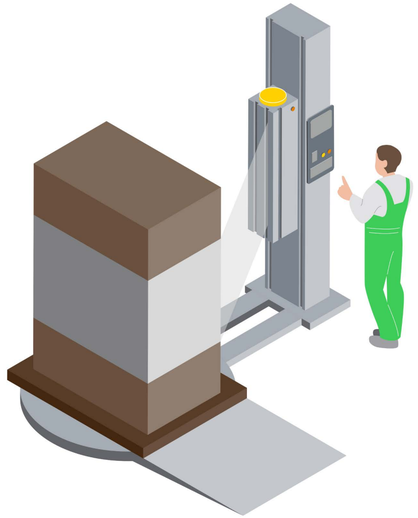
Second scenario:
Larger machines with difficult access and dual operator interfaces



Third scenario:
Very large and complex multi-function line machines

Small machines with easy human operator access

Small machines with easy human operator access



When a machine on the plant floor is small, it is typically run in a standalone fashion, and is not part of an integrated process.

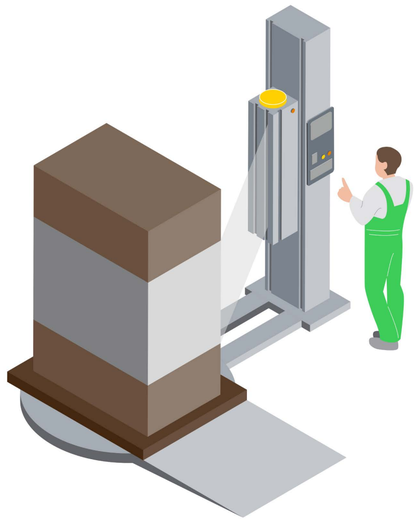
Roll your mouse over the grey panels below to reveal more information

Machine scenario | Challenges and trends | Recommended configurations

- A simple example would be a machine that folds a flat sheet of cardboard into a box of pre-defined dimensions.
- The machine is typically monitored and adjusted, either part-time or full-time, by a single human operator who is standing nearby.
- The machine does not perform a mission critical function. If the machine fails, the overall processes in the plant are not impacted.

Small machines with easy human operator access

Optimum configuration



Small machines with easy human operator access

RECOMMENDED CONFIGURATION **DISCOVER THE BENEFITS**

1

Harmony ST6, basic HMI panels

WATCH THE VIDEO

2

EcoStruxure™ Operator Terminal Expert

WATCH THE VIDEO

3

Ø 22 mm Harmony XB4 (metal) / XB5 (plastic) Flush pushbuttons

WATCH THE VIDEO

4

Harmony Customization tool (pushbuttons / legend panels/ legend holders)

WATCH THE VIDEO

5

Harmony XVU, Ø 60 mm modular tower lights

Small machines with easy human operator access

Optimum configuration benefits

This optimum configuration offers:

1. Modern and cost-effective design whilst boosting operational efficiency

- **Harmony ST6** – Superior high-resolution multi touch screen with 16M colors, and an attractive look and feel powered by intuitive new-generation software EcoStruxure Operator Terminal providing a superior user experience with latest UI design and gestures.
- **Harmony Flush XB4/XB5 and Harmony XVU tower light** – Modern look and feel, delivers a highly contemporary appearance to your machine and operator's comfort through a clearer view of control features, a pleasant touch and a vibrant color pallet of pushbuttons and switches, plus a high visibility of machine status thanks to the brightness of the tower lights.

2. Powerful customization options for better differentiation and adaptability to customer needs

- **Harmony Customization software tool** – Markings on pushbutton, illuminated pushbuttons, and pilot lights caps; markings on the bezel for all built-in flush products; markings on accessories, like legend plates and legend panels.
- **Language selection for HMI User Interfaces** – fewer programming steps and fast customization with unique software. Batch conversion of themes and color setting functions.

3. Quick and easy installation that keep costs down and speed up design

- **Harmony ST6** – secure dual IP connections for effective integration into the overall operating system. Quick mounting without screwdriver: QR code on the product label with link to the online user manual, helps easy maintenance in the field.
- **Harmony XB4/XB5 flush pushbuttons** – Self-holding function of actuator when mounting

4. Robustness and reliability, ensuring operator panel longevity

- **Pushbuttons** – performance to withstand even the harshest environments. Featuring IP ratings of IP66, IP67, IP69 and IP69K, and extended temperature ranges from –40°C to +70°C.
- **HMI** – Aluminum alloy front panel providing IP 66/67 protection. Operating temperature: up to 50 °C/22 °F, Low maintenance thanks to the 1,000,000 times resistive touch panel, 50,000+ hours LED backlight.

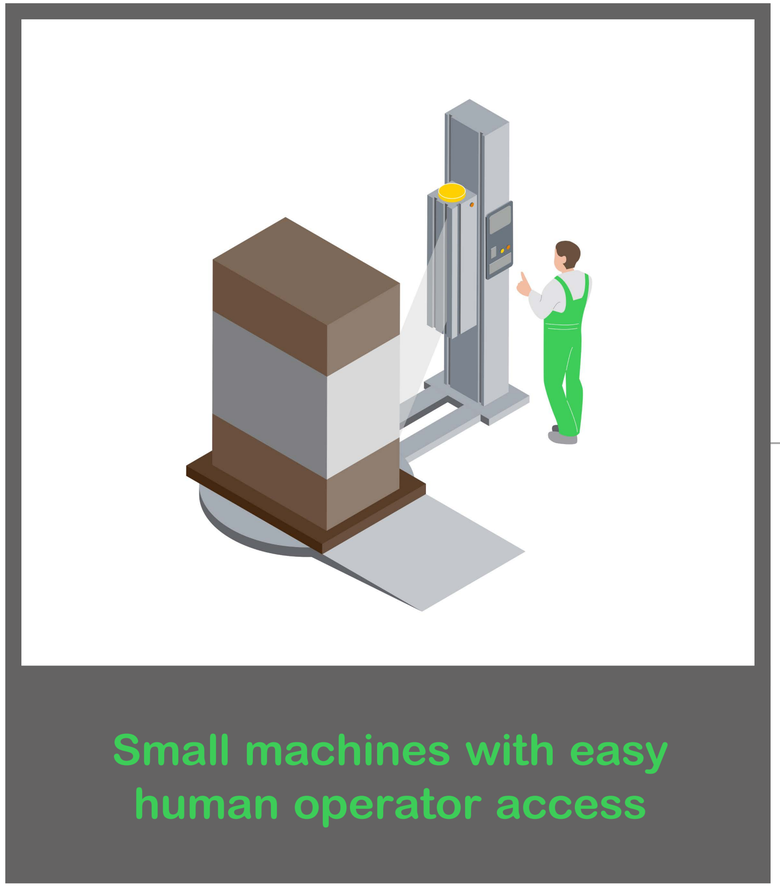
5. Secured connectivity even for simple machines

- **Harmony ST6** – provides best in class user interface for multi-device connection: 2 x Ethernet ports with Dual IP, 2 x COM / USB host and device
- **Enhanced cybersecurity** – from application to firmware level

OPTIMUM CONFIGURATION

Small machines with easy human operator access

Recommended enhancements



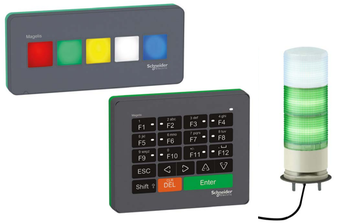
Small machines with easy human operator access

RECOMMENDED CONFIGURATION DISCOVER THE BENEFITS

1

Basic web HMI panels Harmony STW6

2



Harmony USB accessories: Harmony HMIZ, Harmony XVGU

3

Harmony XB4/XB5 Ø 22 mm pushbuttons for harsh environment

WATCH THE VIDEO

Small machines with easy human operator access

Recommended enhancements benefits

Those recommended enhancements offer additional benefits such as:

1. **Greater connectivity**
   The Harmony STW6 Web version has a pre-installed browser that provides a ready-to-use agnostic terminal that allows all devices to be visualized within an HTML5 server, giving clear visual of diagnostic and maintenance data.
2. **Clearer operation view**
   With a range of plug and play USB accessories (Illuminated switch, USB keyboard, Tower light) that add functionality and reduce installation cost.

3. **Peace of mind in a harsh environment**
   Outdoor use of machinery, high pressure cleaning, and exposure to extreme temperature conditions are common…and can adversely affect the performance of operator interface devices.

   Harmony XB4/XB5 pushbuttons for harsh environments are designed for the most difficult of applications: Rugged design and protection (IP66 and IP69K ratings) / Unique and innovative marking system (high-contrast symbols or text; UV resistant).

Small machines with easy human operator access

OEM Design Engineer

Easily select and configure your operator interfaces. Online tools will help you design faster, easier, and with fewer errors. Click on the digi-cat to find out more.

DISCOVER MORE

OEM Marketing Director

Identify the new operator interfaces trends and upcoming technologies to make your machines a cut above the rest and meet customer needs.

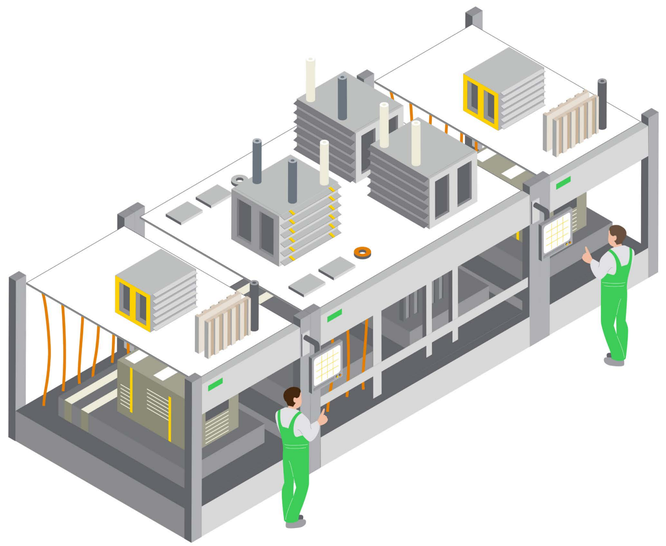
- Differentiation by design…Machine Builders see how your machines can stand out
- Even more practical tips for enhanced ergonomics and design for operator interfaces
- Practical tips for enhanced ergonomics and design for operator interfaces

Explore other comprehensive offers

1. Basic HMI panels, ideal for performing diagnostics, adding control and adjusting system settings on simple or compact applications
2. Harmony SCU, Small HMI controllers
3. Harmony push buttons, switches and pilot lights
4. Harmony signaling devices including tower lights, stack lights and sirens

Larger machines with difficult access and dual operator interfaces

Larger machines with difficult access and dual operator interfaces



Large machines with difficult access points may require two operators working simultaneously or one operator who may have to move to different locations around the machine.

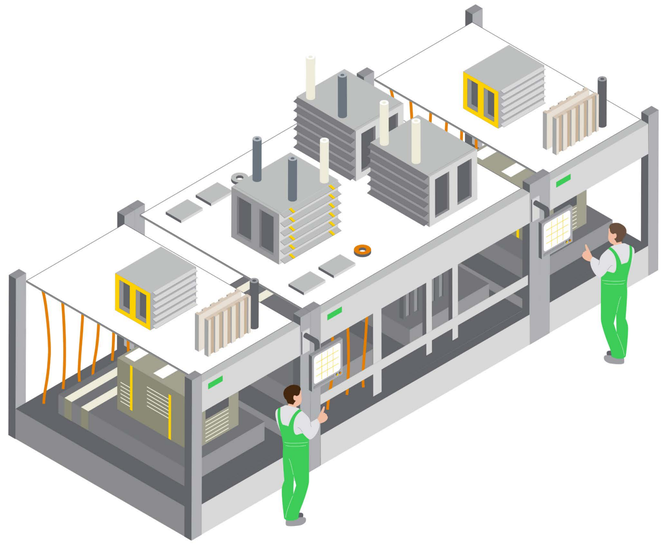
Roll your mouse over the grey panels below to reveal more information

Machine scenario | Challenges and trends | Recommended configurations

- Machines that operate under such a scenario require human interfaces that can accommodate users of various experience levels.
- OEMs are typically engaged with the end user throughout the lifetime of the machine providing diagnosis, troubleshooting, maintenance and upgrade support.
- The level of customization within this category of machine is typically higher than for the smaller machines.
- In this scenario, the operator interfaces provide the right information at the right location to the operator, operation manager and maintenance worker, including intelligent functions, such as alarm management, access control, or data logging. It will also be connected to a network for remote maintenance via Ethernet and will give historical and production information beyond simple machine status.

Larger machines with difficult access and dual operator interfaces

Optimum configuration



Larger machines with difficult access and dual operator interfaces

RECOMMENDED CONFIGURATION | DISCOVER THE BENEFITS

1

Harmony GTU, High performance IoT-ready modular HMI panels with remote Ethernet screens

2

WebTerminal browser HMISTW6 linked to Harmony IPC + EcoStruxure™ Machine SCADA Expert, Lite SCADA software for Harmony GTU/iPC including data management

WATCH THE VIDEO

3

Harmony XB4, XB5 flush Push buttons Ø 22 mm modular metal and plastic

WATCH THE VIDEO

4

Harmony legend panel customization

WATCH THE VIDEO

5

Harmony XB5 Illuminated emergency stop push button

WATCH THE VIDEO

6

Harmony XVU, Ø 60 mm modular tower lights

7

XIOT Cloud Connected Sensor

WATCH THE VIDEO

Larger machines with difficult access and dual operator interfaces

Optimum configuration benefits

This optimum configuration offers:

1. Fast data access and user identification to optimize machine operations, settings and maintenance efficiency

- **Easy-to-use, comfortable and good visualization** – beautiful 16M color high resolution screen, Harmony GTU gives a crystal-clear view. Access data via Microsoft® Office viewer, Adobe viewer, IE, and multimedia player, etc.
- **Clear information** – multilingual online support so users can quickly understand and set up email notifications, monitor and acknowledge alarms, and comment.
- **Clear view of control features and high machine status visibility** with Harmony XB4/XB5 pushbuttons, and XVU ultra brightness tower light. Harmony XB5 illuminated emergency stop quickly identifies the cause of the production downtime.
- **Consistency of operator interfaces across different locations** – up to 3 Harmony GTU displays connected to the Open Box host or multi-display adapter in with touchscreen technology.
- **Secured access and identification** – HMI's accessibility level can be configured to provide view only mode or full control as well as secured by requiring user authentication for login. Authentication options include the Harmony XB5S biometric switches with fingerprint recognition.

2. Connectivity for remote access, data management, and real-time diagnostics

- **Harmony GTU** offers a high level of communication with dual serial and dual Ethernet plus third Wireless Ethernet, including remote access to the machine thanks to mobile apps and Web Gate function.
- **Harmony GTU W-LAN** enhances machine connectivity with a wireless connection
- **IIoT-ready** – Open Box Harmony GTU panels enable EcoStruxure Machine SCADA Expert for database link and traceability.
- **EcoStruxure bundled with Harmony iPCs and STW6 web terminal** – for smart SCADA solutions.
- **XIOT Cloud connected switch** – signals significant/abnormal changes of state with real-time, reliable alerts on your PC, tablet or smartphone.

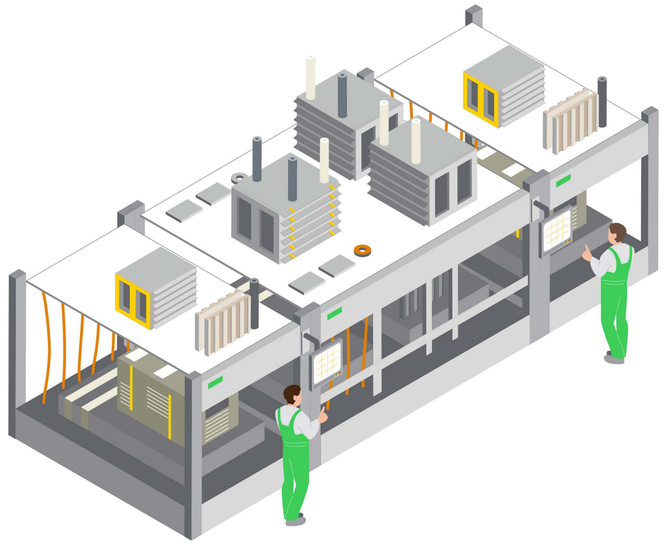
3. Flexibility for reducing design time, with customization to meet changing user needs

- **Harmony GTU** – offers flexibility with its combination of a CPU box with multiple display options.
- **Minimize design time** – with pre-defined navigation, easy tab management, customizable properties, flexible screen templates and smart libraries.
- **Harmony Customization software tool** – for customized markings on push buttons, on bezels, on legend plates and panels.

OPTIMUM CONFIGURATION

Larger machines with difficult access and dual operator interfaces

Recommended enhancements



Larger machines with difficult access and dual operator interfaces

RECOMMENDED CONFIGURATION | DISCOVER THE BENEFITS

1

EcoStruxure Augmented Operator Advisor, augmented reality applications

WATCH THE VIDEO

2

Harmony XBT GH
Hand-held panel for mobility, operability and safety duties

3

Harmony GTUX,
Outdoor HMI panels

4

EcoStruxure™ Secure Connect Advisor, secure remote access solution

WATCH THE VIDEO

5

Vijeo Design'Air and Vijeo Design'Air Plus

6

Harmony Pocket Remote,
Pocket-sized wireless industrial remote control

WATCH THE VIDEO

7

Harmony XB5R Ø 22 mm battery-less and wireless pushbuttons

8

Harmony XVS,
Multifunction electronic alarms

9

Harmony XB5S
Ø 22 mm biometric switches

Larger machines with difficult access and dual operator interfaces

Recommended enhancements benefits

Those recommended enhancements offer additional benefits such as:

1. Enhanced Mobile HMI enabling remote notification and diagnostics to quickly identify and solve problems

- Vijeo Design'Air app enables to be connected to the HMI remotely for an interactive mirror-view of your application and Vijeo Design' Air Plus app enables to get a fully operable view of your application from wherever you are.
- EcoStruxure Secure Connect Advisor, all Harmony GTUs serve as a service enabler and access point for remote maintenance to your machine.

2. Operator Mobility for remote control and comfort

- Harmony Pocket remote range of wireless remote control systems provides mobility solutions to help improve operator efficiency and reduce installation time.
- Harmony XB5R wireless and batteryless pushbuttons enable remote control of a relay with a pushbutton allowing wiring simplification, installation flexibility, operator mobility.
- Harmony portable graphic terminal Handheld HMI enables operator mobility around a machine. It is ideal for machine setup and troubleshooting as well as normal operation.

3. Augmented operator

EcoStruxure Augmented Operator Advisor allows immediate access, in real time, to relevant information in the field (variables of process and documents) for operations and maintenance: machine history, variables of process, documents (products, installations, instructions, electrical diagrams, etc).

4. Peace of mind in a harsh environment

with Harmony GTUX Outdoor HMI panels for harsh outdoor environment and certified for hazardous locations.

It can operate with a high brightness to be sunlight readable, support wide temperature range -30°C/+70°C, high water protection IP66/67, resistance to chemical gas with conformal coating and are certified for Hazardous Location.

Larger machines with difficult access and dual operator interfaces

OEM Design Engineer

Easily select and configure your operator interfaces with online tools to design faster, easier, and with fewer errors. Access to Digi-cat and products selector to find out more.

DISCOVER MORE

OEM Marketing Director

Identify the new operator interfaces trends and upcoming technologies to make your machines a cut above the rest and meet customer needs.

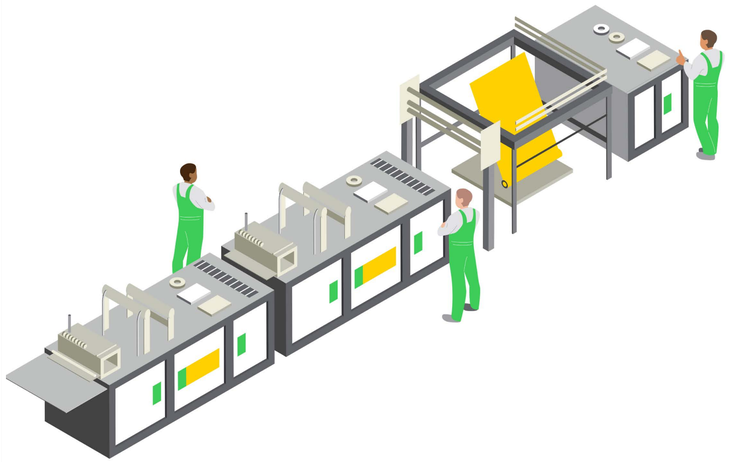
- The Relation between IIOT, SCADA and HMI Explained
- How Machine Builders Apply Augmented Reality to Solve End User Business Problems
- Everything you need to know about HMI software

Explore other comprehensive offers

1. Advanced HMI panels that allow users to manage demanding application requirements.
2. Harmony XBT GC, compact and flexible HMI controller range.
3. Harmony signaling devices including tower lights, stack lights and sirens.
4. Harmony push buttons, switches and pilot lights from the world-leader.

Very large and complex multi-function line machines

Very large and complex multi-function line machines



When a factory floor scenario consists of an assembly of several multi-function line machines, multiple human operators are required to move across several locations along the full production line.

Roll your mouse over the grey panels below to reveal more information

Machine scenario

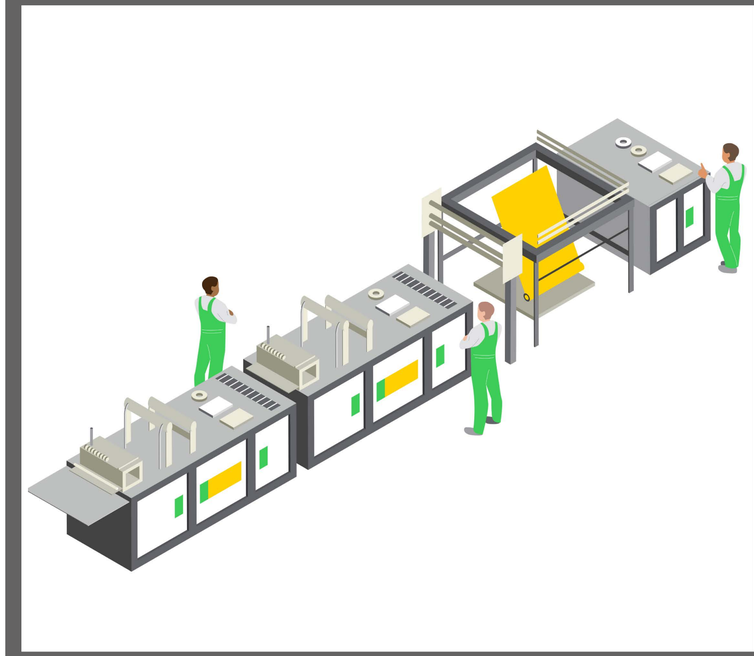
Challenges and trends

Recommended configurations

- An example would be a 300-meter bottling line operation consisting of machines that feed the bottles with liquids, affix caps to the bottles and package multiple bottles into cases.
- Due to quality control issues, operator interfaces may need to be placed on both sides of the machine at intervals of 20 meters each so that two operators can provide the proper coverage as the bottles make their way down the conveyors.
- If an issue occurs, the operators are guaranteed quick access to the interface so that any machine downtime can be avoided.
- In these cases, the end users are concerned with ensuring the coherence and consistency of operational interfaces all along the line. The machine has to be designed in a way that, even if the connections to an MES is temporarily broken, recipe management can still be executed in a simple and straightforward manner.
- End user expectations also include a homogeneous experience for operators along the line, including monitoring of internal machine components and production KPIs.
- Other important elements include digitization of documentation for an easy access to information, and an ability to perform quick diagnostics

Very large and complex multi-function line machines

Optimum configuration



Very large and complex multi-function line machines

RECOMMENDED CONFIGURATION | DISCOVER THE BENEFITS

1

Harmony IPC, Industrial PC, Edge Box and Display

WATCH THE VIDEO

2

EcoStruxure™ Machine SCADA Expert, Lite SCADA software

3

Harmony STW6 Basic Web HMI

4

Ø 22 mm Harmony XB4 (metal) / XB5 (plastic) Flush pushbuttons

WATCH THE VIDEO

5

Harmony XVU Ø 60 mm modular tower lights

6

Harmony legend panel customization

WATCH THE VIDEO

7

Harmony XB5 Illuminated emergency stop push button

WATCH THE VIDEO

Very large and complex multi-function line machines

Optimum configuration benefits

This optimum configuration offers:

1. Modern design for a clear picture of machine performance and maintenance efficiency

- **Enhanced user experience** – Harmony iPC offers intuitive, multitouch gesture support (similar to smartphones) through full HD displays.
- **Clear Information** – with multilingual support and online help.
- **Clear view of control features and high machine status visibility** – with Harmony XB4/XB5 pushbuttons, and XVU ultra brightness tower light. Harmony XB5 illuminated emergency stop quickly identifies the cause of the production downtime.
- **Secured access and identification** – secure password boot and TPM encryption module afford a high level of cybersecurity by design.

2. Smart application design for reduced implementation time, maintenance and consistency of operator workstations

- **Get peace of mind** – the bundle Harmony Industrial PC, STW6 web server as client and EcoStruxure Machine SCADA Expert, saves your time and resources on validation of hardware, software and OS.
- **Modular design and homogeneity** – Harmony iPC enables a configurable hardware with millions of possible combinations.
- **Empower your application** – Intel CPUs and large RAM enable smooth integration of software applications.
- **Minimize design time** – with customizable, flexible screen templates, smart libraries , ready-to-use PackML and OEE templates.
- **Harmony Customization software tool** – for customized markings on push buttons, on bezels, on legend plates and panels.

3. Robust design for long-life, engineered for manufacturing conditions

- **Harmony iPCs** – feature Atom dual core CPUs up to Core i7. Fan-less, solid-state drives provide maintenance-free operation, with H7 level hardness.
- **Harmony pushbuttons** – meet IEC and UL international standards with IP66, IP67, IP69 and IP69K, and operating temperatures of –40°/+70°C.

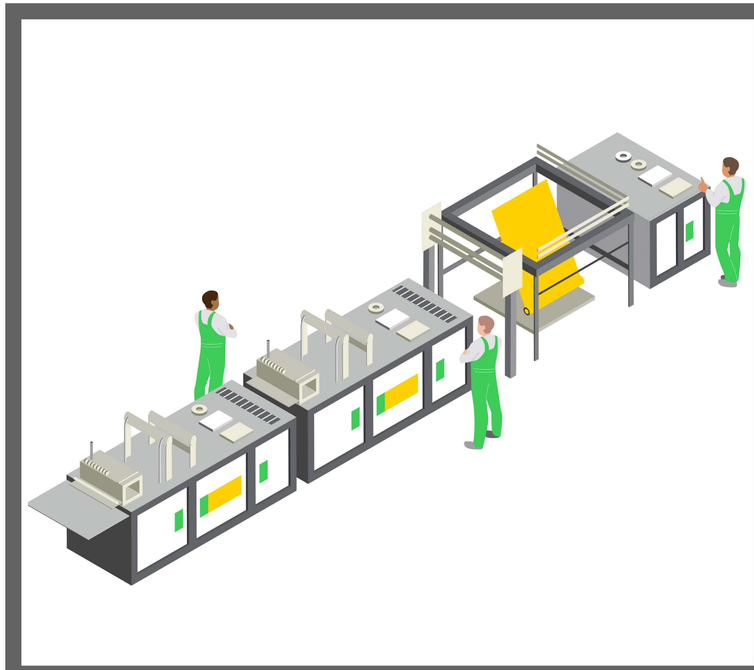
4. Connectivity and cybersecurity for real-time data management, simple integration and speed-up maintenance

- **Data tracking** – EcoStruxure Machine SCADA Expert's extensive IT and OT driver library and data management capabilities (connection between ERP, MES, third-party historians, and the plant floor).
- **Remote access** – with EcoStruxure™ Machine SCADA Expert to monitor and adjust process variables anywhere from your PC, smartphone or tablet.
- **IT integration-ready** – Harmony iPCs run on Microsoft® OS for seamless integration into IT structures.
- **Predictive maintenance with advanced analytics** – IIoT wiring with Node-RED, for shared operational data.
- **End to end Cybersecurity** – ISA/IEC-62443 approved, even for remote connections with EcoStruxure Secure Connect Advisor.

OPTIMUM CONFIGURATION

Very large and complex multi-function line machines

Recommended enhancements



Very large and complex multi-function line machines

RECOMMENDED CONFIGURATION | DISCOVER THE BENEFITS

1

EcoStruxure Augmented Operator Advisor, augmented reality applications

WATCH THE VIDEO

2

EcoStruxure Secure Connect Advisor, secure remote access solution

WATCH THE VIDEO

3

EcoStruxure Equipment Efficiency Advisor, manufacturing intelligence software system

4

Harmony iPC Edge Box

5

Harmony Pocket Remote, Pocket-sized wireless industrial remote control

WATCH THE VIDEO

6

Harmony XB5R Ø 22 mm battery-less and wireless pushbuttons

7

Harmony XB5S Ø 22 mm biometric switches

8

Harmony XVS, Multifunction electronic alarms

Very large and complex multi-function line machines

Recommended enhancements benefits

Those recommended enhancements offer additional benefits such as:

1. Remote access, program and monitor machines

EcoStruxure Machine Secure Connect Advisor, maintenance personnel can access software and update it remotely and securely via the Harmony iPC and Harmony Edge Box, and other connected devices as if they were on site.

2. Operator Mobility for remote control and comfort

- Harmony Pocket remote range of wireless remote control systems provides mobility solutions to help improve operator efficiency and reduce installation time.
- Harmony XB5R wireless & batteryless pushbuttons enable remote control of a relay with a pushbutton allowing wiring simplification and operator mobility

3. Augmented operator

EcoStruxure Augmented Operator Advisor allows immediate access, in real time, to relevant information in the field (variables of process and documents) for operations and maintenance: machine history, variables of process, documents (products, installations, instructions, electrical diagrams, etc).

4. Manufacturing performance in real time

with EcoStruxure Equipment Efficiency Advisor, a manufacturing intelligence software system collecting, measuring, analyzing and reporting operational performance. This allows identify and deliver performance improvements in OEE in real time.

5. Avanced IIOT

Harmony Edge Box meets IIoT challenges at the Edge Control level by enabling secured communication from connected products on the shop floor to the required software and applications on the top floor. Versatile Edge Control software Open operating system for any software (HMI, EcoStruxure Machine SCADA Expert, engineering and maintenance tools, thin clients, IT/OT connections, etc.)

6. Secured access

Harmony XB5S biometric switches enable a control and secure access to machines by checking users' authorization through fingerprint recognition. The user level definition is done directly on the HMI.

Very large and complex multi-function line machines

OEM Design Engineer

Easily select and configure your operator interfaces with online tools to design faster, easier, and with fewer errors. Access to Digi-cat and products selector to find out more.

DISCOVER MORE

OEM Marketing Director

Identify the new operator interfaces trends and upcoming technologies to make your machines a cut above the rest and meet customer needs.

- Human Machine Interface (HMI): a comprehensive solution for bridging the IT/OT divide
- HMI Software and its Technological Implications in Machine Learning
- Three Major Challenges faced in Installing HMI for Industrial Units

Explore other comprehensive offers

1. Advanced HM panels and softwares
2. Harmony push buttons, switches and pilot lights from the world-leader
3. Harmony signaling devices including tower lights, stack lights and sirens.

Final thoughts

Final thoughts

The three machine scenarios presented in this e-guide offer simple illustrations on what is involved when designing an operator interface solution that is based on function. In most cases, OEM design engineers will identify an optimal approach through the process of elimination.

However, to gain differentiation, knowledge of machine function must be coupled with a clear vision that anticipates how the operator will react under most of his daily circumstances. This will help clarify the constraints faced by machine user interface designers.

Key questions that need to be answered when analyzing user interface function include:
Is an operator needed for this machine to work? Where does the operator have to be in order to properly operate the machine? What will be his frequency of interaction with the machine?

How big is the machine? What is the nature of the operator access to the machine? Answering such questions helps to speed up elimination as the designer focuses on a solution that best addresses the interface function needed.

How the questions are answered, will lead the designer down an optimal solution based on function, and will help ensure the design and build of an efficient operator interface for the machine.

Final thoughts (cont'd)

Across the globe, the way that machine builders are designing their machine operator interfaces is changing. In the past, frequent change was costly but thanks to digitization, it is now possible to achieve more with less.

Changing behaviors in the workforce thanks to a younger generation of operators will also require rapid change especially in the realm of machine/operator interfaces.

That's why we offer efficient operator interfaces, with modern design and based on IIoT that empowers human operators. We want to enable them to be connected from, help simplify their decision-making process, boost maintenance skills, increase collaboration as well as motivate them further in their workspace.

At Schneider Electric, our objective is to help machine builders achieve their machine operator interface goals, assembling the collection of products that best align to the identified function scenario. In this way, we hope to propose not just a product list, but products that fit within a defined parameter and with features that complement the design needs of the OEM as well as the functional needs of the machine operator.

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