Improve Manufacturing Performance with an Intelligent Embedded HMI

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Executive summary

Machines delivered with lacking HMI features cause operational issues which reduce manufacturing agility, hinders continuous improvement, decrease predictability and increase the total cost of ownership.

An intelligent embedded HMI can alleviate these issues by providing better information on the plant floor, connect to more controllers, run on standard hardware, and simplify the integration into your production svstem.

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Introduction

Do you want machine information to be more accessible to operations?

Do you want to give the operators on the plant floor better tools to run the machines?

Do you want to shorten the time to troubleshoot problems, download recipes and optimize how each machine is running?

If you answered yes to one or more of the questions above, then you should look at how an intelligent embedded HMI (Human Machine Interface) can help you. Most likely you are experiencing issues created by the limitations of your current HMI or the lack of a machine level HMI.

What is causing these limitations?

Many machines are delivered from the machine builder with a minimally functional HMI or an HMI tightly tied to a single PLC brand (Programmable Logic Controller). The problem with these HMIs is that, due to cost restrictions, they do not have the feature set needed to operate the machine as an effective part of the whole production system.

Operational limitations due to lacking HMI features

Some of the issues you may run into with these HMI systems are:

- Lack of communication drivers for other PLCs than the one installed on the machine: This limits the ability to modify the machine with new functionality.
- Lack of integration into line and plant supervision systems: This makes it difficult to access machine level information when operating the production line or the plant.
- Lack of recipe management capabilities: This makes it hard to introduce new products and adjust the recipes for existing products.
- Lack of tools for troubleshooting technical issues: This increases the machine downtime in case of failures.
- Lack of support for standard panel-computer hardware: This often means that overly expensive panel-computer hardware has to be bought and stocked in the event of a hardware failure.
- Lack of supervisory level functionality in the HMI pushes this functionality into the PLC where the hardware is more expensive and less powerful, and the configuration is more difficult.
- Lack of ability to determine, display and communicate standard defined machine states.
- Unable to provide root cause analysis data.
- Lack of the ability to calculate, display and communicate machine Key Performance Indicators (KPIs) such as overall-equipment-effectiveness (OEE), machine availability, production-rate, and product quality ratio.

The limitations have a significant business impact

The impact of these issues can be quite severe:

- Manufacturing operations becomes less agile:
  - The current HMI cannot be extended to communicate with other equipment than the PLC delivered with the Machine.
  - It is difficult and time consuming to introduce new products and recipes to the machine as the current HMI does not have a good recipe management system.

- You cannot improve what you cannot measure and visualize:
  - Automated data collection is extremely important to achieve operational excellence. Many machines still operate as poorly integrated members of the manufacturing value chain. Not only must the data be collected at the machine level, it must also be processed, aggregated, communicated, historized, and visualized. All of this is necessary to measure and visualize manufacturing performance.

- Increased downtime costs money, complicates planning and introduces business risk:
  - The lack of troubleshooting tools increases the time to resolve machine and technical issues.
  - Old HMI panel-computer hardware can increase the likelihood of an HMI failure. Lack of available hardware parts increase the downtime associated with failure.
  - In the worst situations, there is no compatible hardware available at the time of failure; the consequence is that the whole HMI application has to be rebuilt.

- The total cost of ownership goes up:
  - o Having to use PLCs for supervisory level functions, relying on proprietary and expensive closed panel-computer hardware and not having the right troubleshooting tools increases the total cost of ownership.

The Solution

The solution to this problem is to choose an intelligent embedded HMI that is being developed, delivered and supported by a software organization without tying you to a single hardware vendor.

Choose powerful HMI software

Wonderware InTouch Machine Edition is HMI-software for embedded operator-panels. Wonderware has a long history of delivering software that can be integrated with any PLC and run on any computer; Wonderware is now taking this capability to the machine level.

InTouch Machine Edition can be used wherever you would install an operator-panel and supports any hardware running an approved image of Windows Embedded Standard or Windows Embedded Compact (previously known as CE). InTouch Machine Edition can either be bought with Wonderware Industrial Computer hardware or with a panel-computer from one of our many certified hardware partners, we will even work with you to certify your preferred hardware supplier if you have special needs. This will ensure access to the right hardware at the right price.

Choose the hardware that fits your needs

InTouch Machine Edition can directly replace a traditional panel-computer HMI and provide the functionality normally found in larger PC based HMI systems. It offers more than 240 communication drivers with connectivity to almost any control hardware. InTouch Machine Edition has rich visualization, scripting, security, alarming, trending and recipe management empowering the plant floor operator to do a better job. Companies in FDA regulated industries will benefit from features that are powerful enough to be used as part of a 21 CFR part-11 compliant solution.

Integrate with the world's best manufacturing software

Not only is InTouch Machine Edition a great machine level HMI, it is also tightly integrated with other Wonderware products. This enables production line supervision, MES (Manufacturing Execution Systems) and business integration.

InTouch Machine Edition is natively integrated with Wonderware Historian so that data can be securely and reliably saved and retrieved. This includes store-and-forward capabilities that will save the information locally if the connection to the historian is lost, and forward it to the historian when the connection is re-established.

Figure 1

Example topology of InTouch Machine Edition used with System Platform and Wonderware Historian.

One InTouch Machine Edition node for each Machine
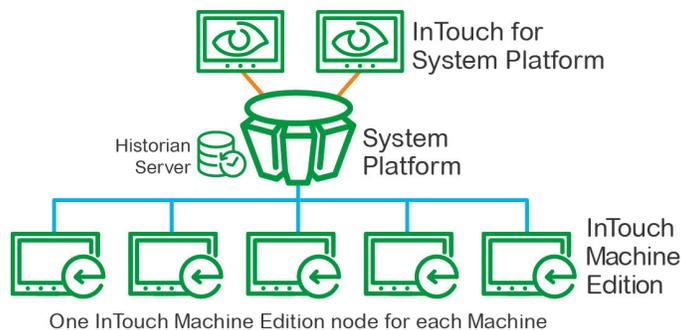
Live data can be communicated to Wonderware System Platform, InTouch Standard and InBatch. Data can be used in scripts, alarms, history, recipes, graphics, etc. This enables you to monitor machine status and performance information such as OMAC PackML data and OEE (Overall Equipment Effectiveness).

InTouch Machine Edition can act as a communication gateway for live data on the machine. The advantages are:

- It reduces the communication load on PLCs as only a single system would need to connect to each PLC. All other systems could connect through InTouch Machine Edition.
- It abstracts higher level systems from complexity associated with different PLC brands and different configurations on machines from different suppliers. All machines can now provide the same live data interface even though they have different PLCs and configuration.

- It provides an additional level of protection by abstracting the PLC from the plant network. Most PLCs do not have functionality that limits what can be accessed, with InTouch Machine edition only the necessary data will be exposed to the plant network.

- It provides a communication path between control systems within a machine such as motion controllers and PLCs. This communication path can reduce the cost and simplify the integration of devices where high speed deterministic communication is not needed.

- It provides machine to machine communication within a production line.

Switch to InTouch Machine Edition

You can switch to InTouch Machine Edition anytime; it makes specially sense to evaluate switching to InTouch machine edition at the following stages or your machine lifecycle:

- **When you buy a new machine:** Talk to your machine supplier (OEM) about the advantages of InTouch Machine Edition and ask them to include InTouch Machine Edition with the machine. When InTouch Machine Edition is used correctly, it can improve the machine capabilities, increase machine performance, and increase machine reliability. Your local Wonderware organization can help you specify what the machine builder needs and help them get up to speed with the right tools and knowledge.

- **When it is time to replace the current panel computers:** A panel computer typically lasts 5 to 10 years depending on use and environmental factors, your machine will likely last many years longer. Talk to your internal engineering team and your local Wonderware team about replacing old panel computers with new and modern hardware and software.

- **When your current HMI is not providing the needed functionality:** A few percent in increased production-output, reduced waste, increased quality or reduced downtime can easily pay for the cost to switch to a software solution that can help you address these issues.

Wonderware can provide training and consulting to reduce the time and cost of switching and converting applications.

Contact us so that we can get a better understanding of your needs and help you become more agile in manufacturing, enable continuous improvement, and increase manufacturing performance.

✎ About the author

Niels Andersen describes himself as "a curious engineer with business and leadership experience". Niels has worked in the industrial software and automation industry since 1991. He holds a BEng first-class honours degree in Electronic and Electrical Engineering from University of Salford and an MSc and DIC in Industrial Robotics and Manufacturing Automation from Imperial College and University of London, England. Niels has spent most of his career in the Wonderware family after he joined the Norwegian distributor in 1992. He has worked with technical support, product development, training, marketing, sales, product management, industry management, and M&A business integration. Niels had a 6 year hiatus from the Wonderware brand from 1998 to 2004 when he was the CEO of Repant, a Norwegian environmental technology company. Niels is also interested in corporate culture, strategy and leadership and is a Kaplan-Norton Balanced Scorecard Graduate.