Real-Time Video Provides a Fourth Dimension for Intelligent Visualization and Control

By Craig Resnick

Summary

ARC feels that it is important for process and discrete manufacturers and automation suppliers alike to focus on tools that improve the interaction between systems and operators. Maximizing operator effectiveness is essential to minimize the risks of accidents, eliminate unscheduled downtime, and maximize production quality, all of which will increase overall equipment effectiveness (OEE). The global process industry loses $20 billion, or five percent of annual production, due to unscheduled downtime and poor quality. ARC estimates that almost 80 percent of these losses are preventable, with 40 percent largely due to operator error.

Manufacturers can also directly make money by increasing their OEE. ARC expresses this as "ergonometrics," where improved interactions between operators, the system, and the manufacturing process improve OEE and other plant-defined key performance indicators (KPIs), including productivity metrics. Since it's well accepted that "seeing is believing," integrating real-time live video into human machine interface (HMI) tools provides an excellent opportunity to maximize operator effectiveness and ergonometrics. Live video adds a "fourth dimension" to today's excellent intelligent visualization and control solutions. Integrated, recorded video can also improve operator training and provide cause-and-effect insight for process improvements.

> Integrating real-time live video into human machine interface (HMI) tools provides an excellent opportunity to maximize operator effectiveness and ergonometrics by providing a "fourth dimension" to intelligent visualization and control solutions.

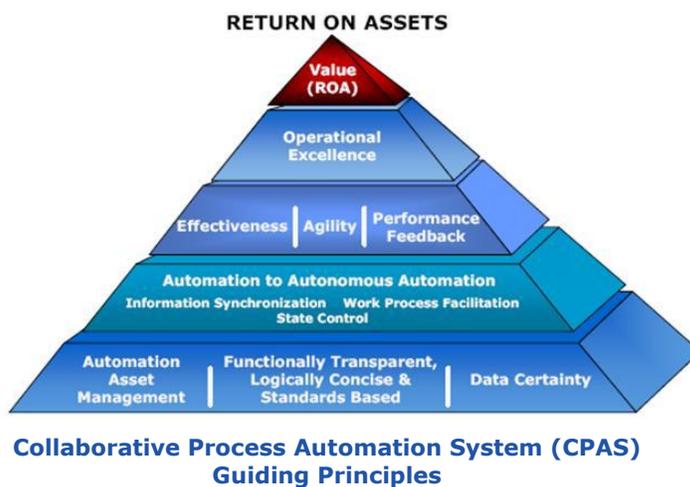## Integrate & Synchronize Real-time Live Video with HMI

Most HMI solutions only provide the operator with a partial view of what's happening across the entire process. When real-time live video and other external applications are not well integrated with the display, the operator is confronted with many different types of visualization tools and unsynchronized data. This breeds confusion.

ARC
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Manufacturers have always needed a powerful, synchronized visual over-view of their process. Thus, visualization systems should focus on operator tasks and responsibilities, not on the technology itself. For operators to make the correct decisions quickly, they require synchronized and appro-priately contextualized information, which can also reduce training requirements. This is only possible when the applications have been well integrated into the HMI, enabling all information – including live video, documentation and operator instructions, and maintenance and production data – to be presented on any screen at any time.

Real-time Live Video as an Enabler for ARC's CPAS Vision

ARC's Collaborative Process Automation Systems (CPAS) vision for achiev-ing operational excellence stresses a single unified environment for presenting timely, in-context information to operators and other appropri-ate plant personnel from any point within the system. Achieving operational excellence requires systems that provide operators with a good common overview of the plant operation and with on-line KPIs to encourage continuous improvements. OpX also requires appropriate opera-tor training and simulation tools.

Under the CPAS vision, systems should also provide synchronized alarm management, built-in do-cumentation management, tested and verified solutions, and asset optimization tools, plus real-time live vid-eo capability integrated and synchronized with the manufacturing process.

RETURN ON ASSETS

Value (ROA)

Operational Excellence

Effectiveness | Agility | Performance Feedback

Automation to Autonomous Automation
Information Synchronization   Work Process Facilitation
State Control

Automation Asset Management | Functionally Transparent, Logically Concise & Standards Based | Data Certainty

Collaborative Process Automation System (CPAS) Guiding Principles

Longwatch is in a Unique Position to Deliver Real-Time Live Video Solutions

Most companies in the fast-growing remote video monitoring space have plenty of expertise in basic video technology. However, providing real-time video that effectively integrates and synchronizes live visualization with industrial applications to provide operators with contextualized in-formation requires significant additional expertise. Specifically, it requires

expertise in specialized areas such as HMI hardware and software, manufacturing execution systems (MES), data recording and historization systems, and industrial networks. It requires a thorough understanding of how industrial plants operate, specific safety and security requirements, and regulatory compliance issues. The company must also understand distributed system architecture, automation industry standards, and Microsoft software development tools. Ideally, the company should also understand the manufacturing-related business drivers across a wide range of industries, such as water & wastewater, power utilities, oil & gas production, food & beverage, pharmaceuticals, and discrete parts manufacturing.

Longwatch, Inc., based in Norwood, Massachusetts, fits all these criteria. Founded in 2004 by the same team of engineers that founded one of the world's largest HMI software providers, privately held Longwatch began by providing integrated video surveillance for operational and security applications. The Longwatch Video System transmits video over existing HMI/SCADA networks as well as over most high-speed information networks.
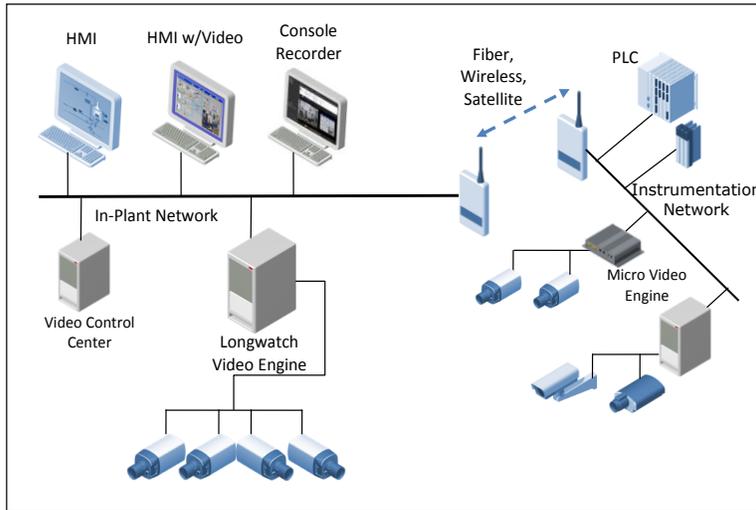
Today, Longwatch's focus has shifted to providing integrated, synchronized live video solutions designed to help manufacturers make faster, more informed decisions and eliminate guesswork. This can improve productivity and enable manufacturers to achieve required levels of safety and regulatory compliance. Longwatch solutions combine distributed system architecture with video camera and data management. Longwatch integrates these solutions with HMI/SCADA systems and provides functionality such as quality monitoring and process verification, troubleshooting and servicing, and security and surveillance to create what, in essence, is a "video MES" platform.

Solutions Leverage Standard Hardware and Software

Longwatch offers three primary families of solutions. The company's **Operator's Console Recorder** solution enables automatic recording of HMI/SCADA operator's console displays. Its **Video System 5.0** solution integrates video for compliance and safety needs. Finally, its **Video Historian** solution links video with a variety of factory automation data. All leverage standard hardware and software.

The **Longwatch Operator's Console Recorder** archives exactly what the operator sees and does, recording the actual video sent to the display and capturing and recording mouse movements. Playing this back can aid in troubleshooting, training, and process improvement. The software, which requires no special hardware, automatically links video playback to synchronize with the HMI/SCADA and MES systems alarms, events, and application messages.

The **Longwatch Video System 5.0** solution distributes video recording using standard computers; networks via IP and instrumentation network protocols; and communicates via high speed fiber, cable, satellite, cellular, radio, or serial technologies. The system utilizes commercially available analog (NTSC, PAL) or digital (IP) cameras, supports pan-tilt-zoom servos, and integrates into HMI/SCADA, MES, and other applications. The cameras can operate autonomously, as video engines continue recording video and responding to events while the network is down. This ensures that no data is lost. The system delivers video to users via e-mail, cell phone, or internet browser.

Longwatch Video System 5.0

The company designed the **Longwatch Video Historian** to be a video MES platform to enhance productivity. The Video Historian automatically associates stored video with automation system events and data for operations analysis, recordkeeping, and regulatory compliance. It retrieves video based on HMI/SCADA system alarm times and embedded message texts, including plant area, batch ID, operator ID, and type of activity or alarm. It also enables personnel to view video and data trend graphs simultaneously, synchronized by time. Built-in mapping of video to alarm messages shows video before, during, and after an alarm occurred. Video clips can be pre-tagged with SQL data and video can be associated with operational information such as batch IDs, operator name, line IDs, etc. Operators define post-view tagging of video clips, along with operator comments, to organize collections of videos.

The Video Historian can be interfaced with other database applications, including SQL stored procedures library, an OPC interface, FTP file transfer, and HMI/SCADA and process historian software. Common applications include quality control, process validation, regulatory compliance and recordkeeping, workflow validation, and troubleshooting.

Longwatch solutions can be deployed in applications such as overall process monitoring, operator replacement, visualizing difficult process areas, and connecting process data to DVR video. For example, many areas of the process cannot be seen from the plant floor. Using Longwatch solutions, operators can remain at their respective stations while viewing critical, yet hard-to-reach process elements or areas. In addition, linking the HMI's historical trends along with HMI alarms enables plant personnel to view the process at the exact time an alarm or critical event occurred. Having the ability to review DVR video enables plant personnel to see what actually occurred and take corrective action to prevent reoccurrence.

Applications Deliver Fast Return on Investment & Assets

Longwatch solutions, which have been implemented in a number of industries and applications, typically provide quick ROI and ROA by helping to eliminate unscheduled downtime, minimizing accident risks, and maximizing production quality and OEE. Several examples follow.

Metals Industry Example

Longwatch Solutions Found in Metal Forming

An example in the metals industry includes a company that processes exotic metals used by aerospace suppliers. This metals processor uses video as a "virtual operator" to monitor its specialized forge press used to shape the metal crystals prior to machining. This process can take about a week. If the operator does not mount the mold properly, the forge will be damaged. This can result in several months of exceedingly costly downtime. Longwatch solutions collect the video and stream it live to the operator's display, providing an integrated view of both forge parameters as well as video of the ingot being loaded. Since the cost of the solution represents a tiny fraction of the cost of a single incident, avoiding just one incident results in immediate ROI.

This metal processor also uses video for quality control and review as well as for troubleshooting. The company previously used VHS tapes to video-record the processing of the metal. When a problem cropped up with a particular ingot, the process operator had to search back through a roomful of VHS tapes to find the one associated with that ingot pour. With Longwatch solutions, the process operator can associate the ingot mold ID with particular cameras and points in time by clicking on the SQL messages in the Video Historian's "Process" tab. This provides immediate access to the right video for review and analysis, saving a great deal of time and money, enabling the problem to be solved and production up and running faster.

In another part of the process, metal is melted using an electric arc. If a problem occurs, the arc shuts down. The constantly recording video provides a documented record of what happened in the furnace before, during, and after the problem occurred. Hence, personnel can get the arc back up and running and resume production much faster than in the past.

Energy and Utilities Leverage Accident Avoidance and Security

A power company experiences sporadic leaks at its pumps that transfer #6 fuel oil from the tank farm to the boilers. In the past, due to problems with the sensors, the company lost a significant amount of oil before the leak sensors triggered. In addition to the cost of the oil, this resulted in expensive fines and required time-consuming paperwork for environmental agencies. This company now uses Longwatch solutions to monitor the pumping area, enabling the operator to see any leaks immediately. The company also uses the recorded video to provide documentation to the environmental agencies to help avoid expensive fines. By helping to avoid just one incident, thus saving the costs of oil and fines, the Longwatch solution can pay for itself immediately.


Longwatch Solutions Found in Energy and Utility Applications

In another energy industry example, a major natural gas transporter experienced compressor station vandalization, causing supply interruptions, neighborhood concern, and costly repairs. The company installed Longwatch solutions in conjunction with a smart fence to be able to send video back over existing instrumentation networks to its operations center. This significantly reduced both supply interruptions caused by vandalization and subsequent repair costs, providing ROI by avoiding a single incident.

Future applications include one for an energy company that sends workers into the field each day to check the status of its wells and collection stations. Longwatch solutions will bring this information back via video over the instrumentation network, saving labor costs, and travel time and costs.

Building Products Applications Leverage Process Visualization

Lack of visibility into its process cost a particular building products manufacturer valuable time and profits. To solve this problem, the company
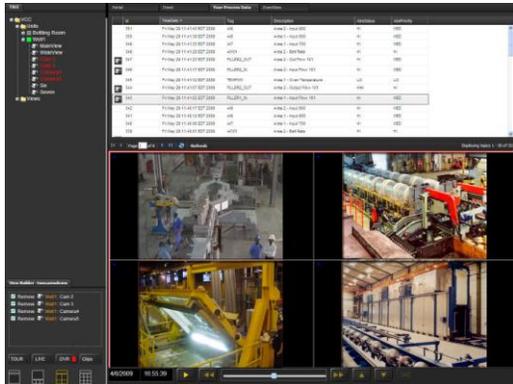
Longwatch's Solutions Found in Building Products Applications

deployed Longwatch's cameras to enable control room operators to see into the hard-to-reach, process "trouble spots." These included one spot where product enters the dryers. Here, improperly aligned product reduced yields and increased downtime. With the Longwatch solution, cameras acting as "virtual operators" quickly identify product delamination on the line, enabling personnel in the central control room to dispatch technicians before jams can occur. This company estimates that an hour of downtime costs $60,000, creating an almost immediate ROI for Longwatch's solution.

The company also deployed Longwatch's Video Historian to provide a before-and-after view of line problems to help identify the causes. Engineering and operating improvements based on video review helped increase productivity. The data mapping capability of the Video Historian also enables users to tag video with lot numbers, machine IDs, and other information to simplify and speed up access to important information.

Improving DCS Operations and Operator Training

A number of distributed control system (DCS) and simulation companies are considering using Longwatch's Console Recorder to help train operators, especially for power plants and pipelines. The Console Recorder automatically records as video everything on the computer screen, including mouse movements. The instructor can annotate the video with a simple keystroke, or software can automatically annotate the video. Instructors can then immediately access the video of interest by clicking on any alarm or event message in the event list, or by clicking on the annotation bookmark. The Console Recorder can also serve as a useful tool for troubleshooting plant and operating issues.

Conclusion

ARC feels strongly that manufacturers and processors that deploy solutions focused on improving ergonometrics will improve OEE, KPIs, and other productivity metrics and, in this manner, enhance productivity, profitability, and operational performance. Clearly, real-time, synchronized live video integrated into HMI and other plant operations management applications and properly contextualized can play an important role in improving a company's ergonometrics, while also enhancing safety, security, and regulatory compliance.

> Longwatch, Inc. has demonstrated that it is in a unique position to provide real-time live video that enables synchronized visualization, integrates applications, and delivers contextualized information.

Longwatch, Inc. has demonstrated that is in a unique position to deliver these capabilities and that its solutions can provide rapid, if not immediate, ROI. Longwatch bases its solutions on distributed system architecture, automation industry standards, and Microsoft operating system platforms. Finally, Longwatch understands appropriate manufacturing business value drivers such as productivity, OEE, ROI and ROA in a wide variety of process, hybrid, and discrete vertical industries.

The primary challenge for Longwatch, Inc. is to demonstrate to manufacturers and processors that its solutions can "bolt on" to their existing HMI/SCADA and MES installed base with minimal effort. Longwatch needs to convey its success stories demonstrating the three- to six-month ROI and ROA that these companies seek in select applications.

Longwatch also needs to work with major HMI/SCADA and MES suppliers, who would all benefit from including Longwatch's solutions as components within their software suites. This would raise the value of their respective HMI/SCADA and MES solutions, providing their customers with that critical "fourth dimension."

This paper was written by ARC Advisory Group on behalf of Longwatch, Inc. The opinions and observations stated are those of ARC Advisory Group. For further information or to provide feedback on this paper, please contact the author at cresnick@arcweb.com. *ARC Briefs are published and copyrighted by ARC Advisory Group. The information is proprietary to ARC and no part of it may be reproduced without prior permission from ARC Advisory Group.*