

IP Video Surveillance Technology for Manufacturing Facilities

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Abstract:

The purpose of this white paper is to provide an overview of IP-based video surveillance including manufacturing-specific requirements. This paper also contains a section on potential cost savings when using an IP surveillance system.

Overview of IP Surveillance Systems

Manufacturers have traditionally relied on Closed Circuit Television (CCTV) to provide plant security, assure site safety, and remotely view material transport. Historically, CCTV systems have proved to be expensive and inflexible, which has limited their wide-spread use and kept them from becoming part of quality control and the daily safety monitoring processes. A key cost factor for CCTV is the expense of the long-distance, dedicated cabling from the cameras to the viewing station.

Networked (Internet Protocol or IP-based) camera systems are now replacing traditional CCTV. Most large manufacturers are finding that the newer IP Surveillance systems are significantly lower in cost. Upgrading an existing CCTV system usually produces direct dollar savings in lower operating costs, more than offsetting the one-time upgrade capital cost. In addition, the flexibility and the remote monitoring inherent in IP Video Surveillance systems provides significant safety and manufacturing process benefits.

An IP video surveillance system consists of the following:

- One or more digital "network" cameras
- A standard Ethernet network, either shared or dedicated
- A central server
- One or more client viewing stations
- A digital storage unit

Cameras

IP cameras contain a digital CCD or CMOS sensor with an embedded microcomputer to do image processing and interface to the network. Both the digital video output frames from the camera and camera control information flow through a standard Ethernet connector.

Network

The standard computer network that supports the digital video flow and the camera control information are identical to those that support the data flow between office computers, servers, and printers. Network cable, switches and wireless interfaces are standard hardware products, widely available and inexpensive. The network for the IP surveillance cameras is often shared with an existing, installed data network. This is appropriate if the current network is 100base-TX or 1000base. Some companies may desire to run a dedicated network, or a partially dedicated network for the IP surveillance system. Sometimes manufacturers choose to upgrade an older network, providing improved computer functionality as well as supporting networked cameras.

Server

The central sever is often a standard Windows-based desktop computer, typically running the camera server software as a dedicated application. The server may physically connect to the network at any point. A standard mouse, keyboard and

“Our primary goal is monitoring production for quality control and to improve productivity. The new IP video surveillance also helps us handle issues about employee occupational safety: it gives us the evidence of captured images in areas where accidents happen, allowing us to find the explanations so as to address and eliminate them.”

-- Sam Tamayo, Plan Manager at La Tortilla Factory

computer monitor connected to the server typically function as a real-time monitoring station.

The combination of the server plus storage is often called a Network Video Recorder.

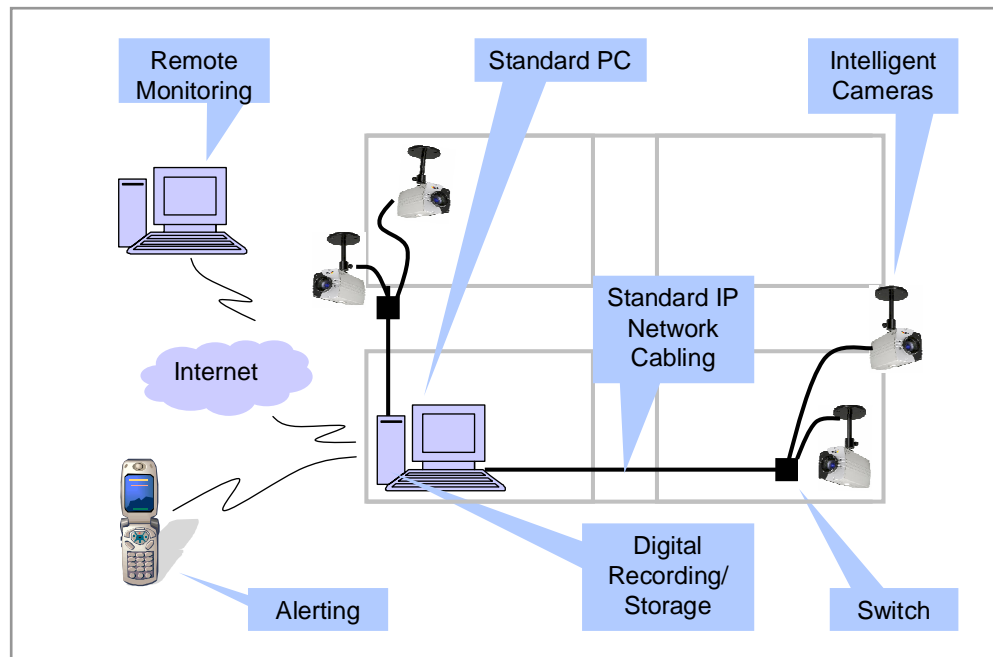
Viewing Stations

The client viewing stations are standard office PCs or laptop computers. The client viewing stations are standard office PCs utilizing a simple Windows application or a standard web browser. Multiple client viewing stations are easily supported anywhere on the network, or anywhere on or off site, connected to the server via the Internet.

Storage

The digital storage unit is a standard disk subsystem, consisting of one or more disk drives. Often, multiple disks are used to provide fault tolerant video storage and to store many days of video automatically. A RAID-5 system that holds 14 days of video is the most common configuration. The disk subsystem is normally connected to the server; however it may be placed anywhere on the network, or even remotely via the Internet.

Figure 1: IP video surveillance components



The Need for IP Surveillance in Manufacturing Facilities

Regulatory compliance and site safety is important for all types of manufacturing, whether it is OSHA standards in production facilities or the FDA/Health Department for food handling facilities. IP Surveillance can help make sure that quality is high, employees are conforming to regulations, and that dangerous working conditions can be quickly corrected.

Fraud and theft protection from either employees or non-employees is often a consideration for installing an IP surveillance system, particularly in warehousing applications. Using cameras in the shipping area allows filming of the contents of pallets and packages as they are transported and staged. This video can help mitigate any fraudulent claims by customers regarding the contents of, or damage to, their shipment.

Employee protection is a priority for most manufacturers. IP surveillance helps monitor working conditions and watch for safety issues. In areas where employees work late shifts, surveillance of exits, entrances, and parking lots can provide peace of mind to employees.

Quality control is sometimes difficult as new employees are learning their jobs. A surveillance system allows a quick way to catch errors and use the images to retrain employees.

Manufacturing-Specific Requirements for IP Surveillance

Each manufacturing facility will have its own unique needs based on the size of the facility, the type of business, and integration with existing process.

Ease of Installation for Large Facilities

Many manufacturers found that cabling for older CCTV systems to be cost prohibitive. Since IP surveillance systems use standard networking cable, it is less expensive and easier to install cameras in a large facility.

Ease of Storage and Retrieval

Digital images are easy to search, share, and archive. Unlike older CCTV-video tape based systems, finding a desired video sequence is quick and easy. Since the images are completely digital, they can be easily stored or viewed remotely.

Remote Monitoring

IP surveillance systems can be set up to provide monitoring for remote warehouses. Additionally, for facilities that are not active at night, the cameras allow managers at home to check facilities in the case of an alarm situation. Video images may be sent in real time to PDAs, improving response time to on-floor or in-field employees. Facilities that are part of a national organization can show work-in-process, provide cross-training, and keep remote management informed of progress. Large manufacturing and integration operations use remote video to assure smooth supply-chain and customer communication.

Ease of Expansion

Following the successful integration of a new IP surveillance system into operations, it is common for manufacturers to want to expand their installation to include more cameras and add advanced capabilities. IP-based surveillance systems are easily expanded to meet these needs.

The indirect costs of a workers' compensation claim to a company are more than two times the cost of medical and lost wages.

-- Workers' Compensation and its Impact on Your Company's Net Profit By: Steven Odell

Flexible Monitoring

IP video surveillance systems allow monitoring from any PC. Managers can monitor production from their desks or even conference rooms. These systems can be set up so that only certain cameras can be monitored by certain individuals if desired.

Alerting

For night-time monitoring, in the case where cameras are not monitored in real-time, an IP surveillance system can be set up to send an alert to a pager or a cell phone when certain cameras detect motion. Alerts are flexible, sophisticated and programmable. Unlike passive motion or noise sensors, camera and computer-based motion detection is able to distinguish between significant events and normal movement.

Cost Justification

In order to calculate potential cost savings, numbers can be assigned to the many “hard” cost benefits associated with installing these systems (such as reduced theft). However, there are also “soft” costs savings (such as a feeling of safety for employees) that must be considered, but may be more difficult to quantify.

Calculating Hard Cost Savings

The following costs can be used to evaluate the potential savings gained from installing an IP surveillance system:

- Annual cost of theft – If you already have costs associated with theft, either from break-ins or internally, these costs are very easy to quantify.
- Annual cost of customer fraud – Video system recording shipping and receiving can accurately identify quantity of product and point of damage to minimize false claims.
- Compliance – Whether it is OSHA or FDA, being out of compliance can cost your company fines, time, and loss of productivity.
- Decreased cost of security personnel – You may be able to use cameras where you were forced to use security personnel before. Depending upon the type of manufacturing business, this can be a substantial cost savings.
- Fire prevention – A fire is devastating to any manufacturing business. Cameras can help identify potential hazards as a part of a larger safety program.
- Improved quality – Real costs can often be associated with mistakes in both the manufacturing areas and shipping areas.

Incorporating Soft Cost Savings

Soft cost savings cannot be directly quantified, but must be considered when justifying an IP surveillance system. These soft costs savings include:

- A feeling of safety for employees – Employees who feel safe are more likely to stay with the company.
- Customer/Vendor perception – When customers or vendors are brought in to tour a facility, the use of the latest in video surveillance technology leaves a very favorable impression of the manufacturer.

Special Considerations

When designing an IP surveillance system, there are special conditions that may dictate a specific type of camera equipment or a unique site design. These conditions include the following:

- Covert or semi-covert operation
- The requirement for real-time monitoring
- The requirement for the need to see a long distance
- Retrofitting of an existing CCTV camera or system
- Cameras in a hard to access or high location
- Unusual lighting conditions including
 - Sodium lamps
 - The need for auxiliary lighting
 - Ultra-sensitive night vision
- Cameras requiring wireless networking
- Cameras requiring Pan-Tilt-Zoom capability
- The requirement for a camera to monitor more than one area
- Cameras requiring special enclosures
- A vandal-prone location

An experienced installer of IP surveillance systems can help you with site design and work through any special conditions that may exist at your site.

Summary

IP surveillance systems are being installed in manufacturing facilities around the world in order to protect both employees and the manufacturer. Since each manufacturing facility will have specific requirements, it is important to consult with a company that can provide guidance and will design a system that addresses the unique needs of your facility.

About Ojo Technology, Inc.

Ojo Technology is a solution provider and systems integrator with expertise in both security and in data networking. Ojo specializes in complete customer specific solutions for IP surveillance systems in manufacturing facilities, local governments, and educational institutions. Whether developing a completely new IP surveillance solution, or upgrading and enhancing an existing analog video surveillance platform, Ojo Technology delivers the complete solution including consultation, design, hardware, software, data cabling, electrical, installation, maintenance, and support services. Ojo Technology also provides complete user training. Learn more about Ojo Technology online at www.OjoTech.com.

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