

Smart Factory in Nantou with Highly Integrated Multi-system (Including Electronic Fence)

Site Name	Taiwan Copper Foil, Co., Ltd.
Country/City	Taiwan/ Nantou
Industry	Factory
Solution	DTV Integrated Service (Video + Alarm + Electronic Fence) DTV 1080P Digital Full HD Cameras P100 VMS
Solution Provider	Ubiquity Smart Technology Inc.
Reasons of Adoption	<ul style="list-style-type: none">■Retrofit without re-cabling■Cabling cost reduction■Long-distance transmission■Full HD video quality■Hybrid (IP/DTV) system■Other (system integration & low total cost)



CUSTOMER NEEDS AND PROBLEMS

Founded in Sep. 1979 by Japanese Mitsui Mining & Smelting Co., Ltd, Taiwan Copper Foil Co., Ltd is the first Taiwanese professional electrodeposited copper foil manufacturer to supply for the printed circuit boards industry. Since established, because of its advanced process as well as high quality, the factory has made great contributions to the early-stage semiconductor industry booming in Taiwan. 15 years ago, in order to secure the factory and prevent stealing, dozens of CCTV cameras were installed at the factory fences, parking lots, and open spaces outside the factory. However, at that time, no camera was installed inside the factory buildings. In recent years, infrared electronic fence was added to part of the factory fences. Guards are sent to stand or patrol at the front and back gate, and places within the factory fences, while a security company was paid to ensure the security outside the factory walls.

Considering the progress of the image quality of security systems and the widespread of full-HD and even 4K products, the factory planned to upgrade its old 300- to 400-kilopixel CCTV system to HD system, and to add cameras on production floors for better management. The factory inquired three system installers including AHD, IP, and DTV (ccHDTV alliance member UST) providers. Each of the three installers proposed their solutions after learning the client's requirements.

PROFESSION IS TO UNDERSTAND THE CUSTOMER'S REAL NEEDS BETTER THAN HE DOES

After visiting the client, UST's system planner found that, although the client only asked to upgrade the system to HD, this upgrade cannot completely plug the security loopholes and solve the operational

problems. UST found some potential problems. First, CCTV's video quality can only show the happening of an incident, but cannot provide any further detail, because it is difficult to identify the characteristics of the suspect or the vehicle license number from the blurry video. In addition, the colors of the clothes or the cars of the video may be different from the actual colors due to the environmental light. All these shall affect the direction of investigations once something happened.

Second, electronic fences, which will automatically alarm the guards once any object crosses the fences, are designed for releasing humans from non-stop screen-watching. However, they do not solve all problems. For example, in the "two-way infrared electronic fence system" chosen by most people as well as the factory, two face-to-face transceivers send and receive infrared signals to form an invisible line. Any object crossing the line connecting the two transceivers shall block the infrared rays and trigger the alarm. This sounds sensible, but in fact, the false alarm rate is very high. Any dog or bird may trigger the alarm, which could exhaust the guards because they have to check on site whenever the alarm rings. Furthermore, even if the alarm is triggered correctly, the suspect may have already gone before the guards arrive. As another example, people go in and out through the front gate, while cargos through the back gate. When the back-gate guard takes his leave, the front gate guard has to run to the back gate to check the identity of the visitor to control the access. This is inefficient, too.

In addition to a proposal to improve the electronic fence system. UST's DTV solution also has features better than AHD and IP. For AHD system, it requires one cable for each camera and the transmission distance is limited. For a large factory, not only cables but also signal amplifiers are needed to make the system work. For IP system, optical fibers or network gears such as routers are required to extend the transmission range. Choosing IP implies that in the future, the in-house service staff are responsible for not only surveillance equipment, but also network equipment.

At that time, the other two installers did not have integrated solution of electronic fences, alarm, and video surveillance like UST did. After learning the details of what UST's integrated solutions can do, the client understood that UST can solve all the above-mentioned problems. They finally chose UST, even though the cost is several hundred thousand dollars higher than others'.

CUSTOMER BENEFITS

(1) Video Surveillance

The upgrade of video surveillance includes two parts. First, UST replaced the old and malfunctioned cameras with the new DTV digital HD cameras. Second, UST added additional cameras at the locations where the client requested, including the most important production line. The DTV full HD cameras installed there are for better production management. Because DTV products supports cable sharing, the signals from the newly installed cameras can be sent back to the 500-meter away control center using the existing cables, saving a great deal of re-cabling cost. The image to the fiber bus. The videos from several-dozen cameras all over the factory are further combined and sent to the control center through an optical fiber cable. The VMS system allows monitoring all channels from one single screen.

(2) Electronic Fence

UST improved the electronic fence by installing the fences fully surrounding the factory. They also introduce the DIDO devices in order to integrate the electronic fence system with the video surveillance system. When the infrared sensors are blocked and alarm is triggered, the related camera image will pop onto the screen and is zoomed-in. The system will also generate a sound to remind the guards to check the video to see if it is a real event or a fake alarm before rushing to the site.

(3) Access Control

As for the access control, people and cargos go in and out through both the front and back gate from Monday to Sunday. Currently, people shall first swipe their ID badges, and the guards shall check the guests' appearances to determine if the visitors can go in. UST first suggested the integrated DTV access control system, which uses face recognition to automatically confirm the visitors' identity. The client turned this suggestion down because this advanced technology requires higher costs. UST then proposed another solution: to install DTV full-HD cameras at the back gate. The front-gate guard can check the visitor's appearance from the camera video and control the access remotely. This compromised solution saves both equipment and labor cost for the client.

In order to remotely control the access, UST installed a "reed switch" at the back gate. The switch allows the front gate guard to open the back gate remotely. The guard can monitor the back gate through the real-time VMS images and open the back gate for the cargos remotely without running to the site.

Furthermore, since the factory was located at an area with frequent lightning. To ensure continuous operation, UST thoughtfully added two features. All cameras are equipped with lightning protection devices and the servers are equipped with UPS (uninterruptible Power Supply). The two features not only protect the equipment, but also prevent the system from interrupted by nature or man-induced accidents.

After the installation is completed and the system starts operation, the client is surprised to find that, with the full-HD image quality of the DTV cameras as well as the integration of monitoring, alarming, and electronic fence, the guards can work more effectively and concentrated without getting exhausted by running here and there; the shift schedule can be re-arranged more efficiently, saving money paid for the Security Company. The DTV integrated solution is no doubt a satisfactory choice.

Figure 1. Comparison of before and after the upgrade.

	(Before) image of CCTV cameras	(After) image of DTV cameras
Front Gate		


Back Gate		
Parking Lot		
Periphery		
License Plate No.	 <p>After zooming in the image, the license plate number is still unrecognizable</p>	 <p>After the zooming in the image, the license plate number can be clearly read as XX-4309.</p>

Figure 2. The two VMS systems have been integrated to be displayed on one single screen for convenient monitoring. Every camera has been linked to the alarming system. When an abnormal condition occurs, the system will give an alarm to notice the guards to check the image sent by related camera and make further decision.

