

Gambling on Security

Pixim-Powered Cameras Help Casinos
Maintain Security Without Dampening
Guests' Enjoyment



Case Study:
Dallmeier's Pixim-Powered CasinoCams

“By taking the latest Pixim DPS technology and making it the basis of our own Cam_inPIX Technology, Dallmeier is applying cutting-edge video security camera capabilities to leading casinos worldwide. Our Pixim-Powered cameras perform masterfully even in the most extreme lighting conditions, providing a level of video security not possible with conventional technologies.”

Kai Leuze, General Manager, Dallmeier



Challenge

Casinos worldwide face similar security challenges: With enormous amounts of currency circulating, guests and employees alike can be tempted to try cheating the system. What's more, modern casinos face intense regulatory scrutiny that includes proof of security capabilities, as well as requirements to produce video evidence to settle disputes over payouts or liability. Security cameras must be able to capture details – including magnified images – of people, gaming tables and surroundings in the casinos' difficult lighting conditions.

Solution

Based on Pixim's Digital Pixel System® (DPS) technology, Dallmeier – one of the world's leading makers of security cameras – has created its innovative Cam_inPIX® image capture technology and integrated it into a line of specialized CasinoCam® security cameras. These Pixim-Powered Dallmeier cameras are helping casinos in Europe, Asia and North America to better protect their assets and ensure their patrons' safety and comfort, without detracting from their guests' gaming experience.

Regardless of their location, size, or focus, casinos worldwide all must pay close attention to security. Temptation is all around, and guests and employees alike must be watched carefully to prevent cheating or outright stealing.

Most modern casinos supplement their physical security force (including guards and security experts who patrol the casino floor and respond to reports of criminal or suspicious activities) with video security cameras connected to a networked closed-circuit television (CCTV) system, known as the “eye in the sky.”

The technical demands of these casino security cameras can be daunting, however. To be effective, the cameras must be able to capture details of people and gaming activities with high resolution and accurate color, even in variable and challenging lighting conditions and with zoom functions.

Some specific challenges facing casino security cameras include:

- › Clearly identifying individual playing cards and their suits, including distinguishing between red and black cards, in a wide range of lighting conditions.
- › Discerning detail in facial features, cards, chips, roulette wheels, slot machines, etc.
- › Capturing natural skin tones of casino guests and employees.
- › Performing with excellent resolution and color accuracy in the high-contrast lighting environment of casinos, which includes bright overhead lights, areas of shadow (e.g., beneath card tables), glare from metallic objects such as slot machines and decorations and decorative lighting.
- › Displaying accurate white balance of non-natural light sources, such as around slot machines.
- › Providing high resolution and color accuracy in both live and recorded (compressed) images.
- › Practically and cost-effectively enabling the casinos to maintain the regulated number of days' worth of recorded video.



Casino-Specific “Presets” Boost Effectiveness & Convenience

Dallmeier's Pixim-Powered CasinoCams include specially developed presets designed to optimize the cameras' effectiveness in casino settings. High-resolution, accurately colored images are made possible in all lighting conditions by the cameras' built-in Cam_inPIX technology, based on Pixim's Digital Pixel System (DPS) chipsets.

Casinos in the legendary gambling locations of Monte Carlo and Las Vegas, as well as the up-and-coming Macao and U.S. tribal casinos, are using the presets in Dallmeier's CasinoCams to help improve and simplify their security.

Here are the presets available for casinos:

- › “Gambling” preset, for video surveillance of gaming tables. The clear color playback makes it possible to reconstruct disputed situations and resolve problems. Thanks to Pixim's DPS technology, the reflections from shiny chips are almost completely suppressed, and all the markings and items on the roulette or craps tables appear accurate in color.
- › “Wheel” preset, for surveillance of fast-turning roulette wheels. Pixim DPS technology enables the Dallmeier CasinoCams to superbly compensate for light reflections and eliminate the blurred, “wiping” effects that other cameras record during the rapid movements of roulette wheels.
- › “Poker Table” preset, for card tables including poker, blackjack (21) and baccarat. With the high resolution, wide dynamic range and true-color accuracy of the Pixim DPS technology, Dallmeier CasinoCams can perfectly identify playing cards on a variety of felt surfaces (including green, blue, black and brown) and in any lighting condition.
- › “Slot Machine” preset. The wide dynamic range of the Pixim DPS technology, along with its superior color rendering, high resolution and lack of image artifacts (e.g., vertical smear, pixel blooming, color aliasing) allows the CasinoCams to perfectly process the slot machines' bright colors, dazzling graphics, flashing lights and reflections from their shiny surfaces. As a result, camera operators no longer have to continually adjust camera settings, and the cameras are able to last longer (which saves money for the casino operators).

Fully Digital Surveillance in California Casino

The Barona Valley Ranch Resort & Casino, near San Diego, California, is one of a growing number of Native American tribal casino developments dotting the U.S. landscape. Since the award-winning resort and casino opened in 2003, Barona Valley Ranch has been heralded in the gaming industry for its early development and adoption of a number of technological innovations.

The casino furthered its reputation for innovation by installing the first digital matrix security system in the United States. The casino's new security solution included replacing existing cameras with Dallmeier CasinoCams with Cam_inPIX technology, based on Pixim's DPS technology. Pixim's DPS technology enables every part of a high-contrast scene – including both bright light and dark shadows, simultaneously – to be captured and documented with a level of picture quality not previously possible.

Using the CasinoCams' presets, the security staff at the Barona Valley Ranch Casino can now get a constant, clear picture of what is going on in every corner of the casino, all the time. For example, the casino uses the “Gambling” preset for surveillance of roulette tables. Reflections from shiny chips are suppressed, and the clear color playback enabled by the Pixim DPS technology helps with the accurate reconstruction of events, to settle disputes and resolve disagreements about what actually happened.

With the new cameras' high-contrast and true color playback with the “Poker Table” preset, Barona Valley Ranch Casino can identify the print on playing cards dealt onto felt surfaces of any color.

With its new security system, the Barona Valley Ranch Resort & Casino can easily monitor all its gaming and card tables, slot machines and roulette wheels, as well as all the casino's guests and employees, to make sure that everyone is enjoying the gaming activities legally, safely and fairly.

Macao Casinos Take Center Stage

Macao – known as “the Monte Carlo of the Orient” and “the Las Vegas of Asia” – features more than two dozen world-class casinos with lavish designs and

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exciting gaming floors. Recently, The Venetian Macao Resort Hotel – a mega-resort mirroring its Las Vegas namesake – opened as the anchor property of the Cotai Strip of Macao, styled after the Las Vegas Strip.

The high-profile new Venetian Macao, which cost more than US\$2 billion to build, covers approximately 10.5 million square feet, with 3,000 hotel suites, 350 shops, an 1,800-seat conference center, a 15,000-seat entertainment arena, more than a dozen restaurants – plus a casino with more than 1,000 gaming tables and 7,000 slot machines.

The Venetian Macao also boasts the biggest real-time IP (Internet Protocol) video system in the world. The Dallmeier Casino solution for The Venetian Macao provides high-resolution, real-time, 24/7 video security – an essential requirement for all casino environments. Thousands of Pixim-Powered digital cameras monitor the casino – the world's biggest – as well as the hotel and restaurants.

The security cameras are monitored from The Venetian Macao's sister casino, the Sands Macao, which also has a full-resolution Dallmeier digital security system in place. The Sands Macao was the first substantial casino in Asia when it opened in 2004. The Pixim-Powered Dallmeier security solution for the Sands Macao combines full-resolution surveillance within a digital matrix environment to provide comprehensive coverage while ensuring ease of management.

By combining central management for both the Sands Macao and Venetian Macao in one facility, the owner of both properties reaps additional cost savings and operational efficiencies.

Easier-to-Manage Security

Built overlooking the sea in 1863, the Monte Carlo Casino in Monaco – with its breath-taking marble-and-gold atrium and unique elegance – is synonymous with high class in the world of casinos. Standing witness to numerous significant events in Monte Carlo's illustrious history, the world-famous casino also imposes exacting requirements on all aspects of its operations.

And while Monte Carlo has made its name on games of chance, when it comes to the security of its

guests and gaming tables, the casino leaves nothing to chance.

A Dallmeier video security system is responsible for monitoring and operating the Monte Carlo Casino's approximately 400 cameras, as well as for the centralized monitoring of other casinos in the vicinity. After a thorough evaluation of available options, Monte Carlo Casino chose the Pixim-Powered Dallmeier system for its excellent picture quality, scalable design, and extreme ease of operation and management.

The camera management system includes a fast, easy-to-use, high-precision jog-shuttle tool for picture searching in the system's high-resolution digital recordings. This tool, which takes full advantage of Pixim's DPS technology, makes it easier to manage security by letting operators quickly spot decisive detail in scenes with fast-moving action, such as the hand movements involved in positioning and counting at the casino gaming table.

Image Quality and Easier Regulatory Compliance

The glamorous yet modern Admiral Casino in Mendrisio, Switzerland is that country's number-one gaming location in terms of turnover levels. Located near the Italian border, the Admiral Casino attributes its success to its geographic location, its commitment to providing excellent, customer-oriented service and its adoption of modern technologies.

The Swiss casino required that its surveillance system exhibit the same degree of high-tech sophistication and friendliness that the casino itself embodies. The Pixim-Powered Dallmeier security cameras fit the Swiss casino's requirements, including high picture quality, easy operation and flexible expandability.

The Admiral Casino's video camera security system also provides 24-hour recording with enough storage capacity to meet the 28 days of storage required by Swiss law. The high image compression of the Pixim DPS technology – which improves image quality while reducing file size – allows the Dallmeier system to record with higher frame rate or higher resolution, or both, while maintaining the same total recording time. As a result, the Admiral Casino can easily and cost-effectively meet this legal requirement.

At-A-Glance

Common video security problems for casinos include:

- › Inadequate color reproduction, including inability to distinguish red vs. black playing cards
- › Lack of detail in facial features, cards, chips, roulette wheels, etc.
- › Unnatural skin tones of gamblers and casino employees
- › Poor white balance, making it difficult to identify cards, especially when illuminated by halogen, fluorescent, neon, or argon lights
- › Poor clarity of images with glare or other high-contrast lighting situations
- › Poor resolution and signal-to-noise ratio (SNR)

Pixim's DPS Technology

Pixim's Digital Pixel System® (DPS) ultra-wide dynamic range technology, a true breakthrough in imaging technology, delivers unprecedented image quality in all lighting conditions. Cameras powered by Pixim's specialized image capture and processing chipsets can significantly enhance casino security through the following capabilities:

- › **Widest dynamic range:** Captures highlight and shadow detail – including faces, hands, cards, and roulette wheels – in the same scene.
- › **Highest total resolution:** Makes it easy to distinguish image features and details, even at high magnification or zoom.
- › **Superior color rendering:** Accurately displays colors of cards, roulette wheels, chips, and skin tones even in difficult lighting such as glare, low light, high-contrast scenes, and neon or argon lighting.
- › **Minimal image artifacts:** Eliminates common problems, such as pixel blooming, vertical smear, color aliasing and interlace artifacts.
- › **High image compression:** Improves image quality with smaller file size – allowing DVRs to record with higher frame rate or higher resolution, or both, while maintaining the same total recording time.



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|--------------------|--------------------------|
| › Pixel saturation | › Accurate white balance |
| › Unnatural color | › Natural color |



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