INTRODUCTION

This booklet provides a comprehensive overview of our various panorama concepts including the high-end Logipix Panorama Cameras and the Virtual Panorama. You will have an exclusive insight on the hardware units, the embedded Artificial Intelligence and the advanced display technology, which together result in a complete solution that determine the future of video surveillance.

All images in this booklet were taken by Logipix cameras
CHALLENGES OF WIDE AREA SURVEILLANCE

Efficient wide area surveillance is a significant challenge. A video surveillance system comprising hundreds of traditional IP cameras is not able to effectively cover a vast area. If operators have to scan through a large number of camera images, important things might go unnoticed. Monitoring becomes exhausting really fast and accurate visual orientation is almost impossible. Archive playback can be also difficult from multiple cameras and in addition the individual image streams are not synchronized.

Furthermore those cameras deliver visual information of only a thin defense line. Installation and maintenance is also time-consuming and expensive with a traditional system.

Logipix, however, has effective Panorama solutions that solve many issues of wide area video surveillance.

Full coverage by 261 pieces of traditional 2 MP cameras

Full coverage by 6 pieces of 200 MP Logipix Panorama Cameras
Logipix engineered a leading-edge panoramic technology in order to make the video surveillance of vast areas more effective. The high-resolution panoramic images ensure better spatial awareness for operators, as the view is displayed contiguously that helps visual orientation within any immense area.

The essence of this technology is the precise 3D geometric stitching of images taken by individual image sensors. This development allowed our company to diversely design panorama solutions. We provide multi-sensor Panorama cameras in various concepts and also freely structurable Virtual Panoramas built from several individual high-resolution cameras.
# The LOGIPIX Panorama in a Complete System

<table>
<thead>
<tr>
<th>Camera Type</th>
<th>Panorama Cameras</th>
<th>Virtual Panorama</th>
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<tr>
<td></td>
<td>40°</td>
<td>180°</td>
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<td></td>
<td>320 MP</td>
<td>300 MP</td>
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<tr>
<td>Stitching</td>
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<td>Double row</td>
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<tr>
<td>Embedded Intelligence</td>
<td>Video Content Analysis</td>
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<tr>
<td>Related NVR</td>
<td>Network Video Recorder 4th gen</td>
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<tr>
<td>Complementary Components</td>
<td>Full HD Long-range PTZ</td>
<td>6 MP PTZ</td>
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<tr>
<td>Video Management Software</td>
<td>Control Center Professional or Ultimate</td>
<td>Command &amp; Control Center</td>
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- **Panorama Camera**: 40° 320 MP
- **Panorama Camera**: 180° 200 MP
A few Panorama cameras are able to effectively cover the airside areas of even the largest airports. Thanks to the enormous resolution, operators get a realistic visual representation of the entire airside and they can observe it just as in case of direct out-of-the-window observation. The Panorama cameras create the basis of the accurate Video Content Analysis functions, which increasingly facilitates monitoring at the airside.

The Logipix Panorama cameras can play a key role in border surveillance as they can cover long kilometers of border sections and also monitor the surrounding area of the defense line in depth. Using the Logipix Panoramas, human targets can be detected from even 3 kilometers away automatically.

The Panorama solution can aid the protection of critical infrastructures that hold great importance and may experience significant threat. Thanks to the panoramic images, critical situations can be understood more easily in context, which supports quick decision making and allows much better control of any threatening situation.

The Logipix Virtual Panorama camera was specially developed for video surveillance in stadiums. Its flexible camera structure is ideally suited for all stadium designs and sizes. The large panoramic images ensure face recognition at every seat in the stadium, resulting in safe and secured events in the venue.

As Panorama cameras are developed to cover large areas and provide intelligent surveillance functions, they are able to make cities safer and more secured. They can efficiently monitor huge city squares and green parks. Thanks to their resolution the panoramas deliver images that are suitable for human identification from more than 100 meters away.

Logipix Panorama Cameras are appropriate for diverse wide area surveillance tasks. Beside they effectively cover immense areas, they can be prepared to provide various computer vision functions in order to facilitate video surveillance.

Related panorama cameras:
- Logipix 200 MP & 300 MP Panorama
- Logipix 320 MP Panorama
- Logipix 200 MP & 300 MP & 320 MP Panorama
- Logipix Virtual Panorama
- Logipix 200 MP Panorama
- Logipix 200 MP & 300 MP & 320 MP & Virtual Panorama
WHAT DIFFERS OUR PANORAMA TECHNOLOGY

- Logipix geometrically merges images at the image borders resulting in a contiguous panoramic image just as if it were taken by a single sensor camera.
- Synchronized imaging ensures that stitched panoramic images remain glitch free near the stitching borders too without object duplication or hidden object anomalies.
- Logipix uses adaptable white balance and image tone correction algorithms to smooth gradient differences in the panoramic image.
- Thanks to the precise image synchronization and special stitching technology zooming and panning are seamless at the stitching borders as well.
- Logipix delivers 20 fps panoramic video streams with hundreds of megapixel resolution.
- We developed a special technology to handle large visual data and utilize the full resolution during monitoring.
- Intelligent Video Content Analysis (VCA) is performed on full resolution JPEG2000 image streams.
- Logipix VCA is able to seamlessly track objects even if they move across stitching borders in the panoramic image.
- Logipix Sensor Fusion Technology makes it possible to fuse the data of image sensors, thermal imagers and external surveillance radars, therefore realizing a more accurate analysis and reliable computer vision in complete systems.
- A worldwide unique PTZ control function allows operators to control additional PTZ cameras by selecting the area of interest on the panoramic image.

Border Surveillance - Automatic Target Detection at Dusk

Click to watch the video
**FINANCIAL BENEFITS**

- **Reduced infrastructure requirements**
  No need to install numerous poles or masts for individual cameras. The network infrastructure is far less complex and cabling is also fast and easy.

- **Long lifetime**
  Logipix technologies ensure the Panorama Cameras are prevented from both physical and technological obsolescence for a long time.

- **Uninterrupted operation**
  The Logipix Panorama Cameras are developed to operate with high MTBF.

- **Designed to last**
  Logipix Panorama Cameras can withstand intense weather conditions. They are full metal constructions with built-in heating and cooling systems, and they are also available made of marine grade materials.

- **No need for frequent maintenance using human resources**
  The Panorama Cameras are capable of self-maintenance, thanks to their built-in self-cleaning and deicing systems.

- **Low running cost, remote maintenance**
  Beside standard maintenance, which is well-planned and organized for the Logipix Panorama Cameras, Logipix provides remote maintenance as well. The system constantly gives feedback on the condition of the cameras and other components. By exploring early warnings, failures can be prevented.
Logipix created multi-sensor Panorama Cameras in three main designs. All of them provide hundreds of megapixels and 20 fps at full resolution to surveil vast areas from a single viewpoint. The Logipix Panoramas cover the largest areas possible with the highest resolution.

**Logipix 200 MP Panorama Camera**
- effective coverage area: 40 - 1170 meter
- blind area: 0 - 40 meter

**Logipix 300 MP Panorama Camera**
- effective coverage area: 10 - 1170 meter
- blind area: 0 - 10 meter

**Logipix 320 MP Panorama Camera**
- effective coverage area: 30 - 5900 meter
- blind area: 0 - 30 meter
UNBEATABLE RESOLUTION

Logipix applies several specifically developed, high-quality sensor-lens combinations within massive, purpose-designed camera units. Their enormous resolution ensure the cameras deliver useful visual information from even kilometers away.

<table>
<thead>
<tr>
<th>PANORAMA CAMERA</th>
<th>Human (23 ppm)</th>
<th>Light vehicle (12 ppm)</th>
<th>Heavy vehicle (8 ppm)</th>
<th>Airplane (2 ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>320 MP</td>
<td>3 000 m</td>
<td>5 900 m</td>
<td>8 860 m</td>
<td>35 400 m</td>
</tr>
<tr>
<td>300 MP</td>
<td>600 m</td>
<td>1 170 m</td>
<td>1 760 m</td>
<td>7 048 m</td>
</tr>
<tr>
<td>200 MP</td>
<td>600 m</td>
<td>1 170 m</td>
<td>1 760 m</td>
<td>7 048 m</td>
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</table>

Distance of the excavator: 180 m

Device: Logipix 200 MP Panorama Camera  Image info: detail (59% of the full image)
PIONEERING TECHNOLOGIES TO PRODUCE HIGH-END QUALITY

High-quality lens
Sharp details in the image corners too, which further improve the quality of the stitched panoramic image

Multiple 1” size CMOS sensors
Exceptional dynamic range, details in both shady and bright areas

Custom-designed chip
Full control over image processing, effective computing performance utilization

Embedded AI
High-performance environment for calculations and data processing on the full resolution raw video

JPEG2000 image compression
Dynamic resolution scalability for smart display of large panoramic videos

High-grade materials
The Panorama cameras are built to last. The all-metal construction of the camera housing with quality glass windows and sunshields result in a massive, robust, reliable construction that can withstand extreme environments. The Logipix Panoramas are also available made of marine grade materials.

Advanced thermal control
The cameras are equipped with a complex thermal control system in order to operate properly in intense temperatures and both humid and dry conditions. The fans, heat pipes and glass heating make ensure that the inside temperature of the camera always remains within the operational value.

Self-maintenance system
All Panorama cameras can clean their own front glasses, thanks to their built-in water tank and wiper system. The high-quality rubber blades and the cleaning liquid ensure the wear-free cleaning of the windows. Even heavy dirt can be washed with this technique. The procedure can be scheduled and automatically started, so maintenance of the camera is easy, fast and effortless. The devices are able to send warnings if their water tank needs to be refilled, which is a one-man action, thanks to the smartly designed water pump system.

De-icing
In some environments the extreme cold may cause operational difficulties for video surveillance systems, but not for the Logipix Panoramas. Remotely controlled concentrated glass heating and zone-divided, contact-based house heating ensure to melt down ice, frost or accumulated snow from the surface of the device.
Logipix recognized there are certain areas that can be covered more effectively if the number and also the position of the cameras can be freely customized. As our panorama technology allows to stitch the images of individual Logipix cameras, we created the Virtual Panorama.

The solution is based on several individual 20 MP Logipix camera images that are stitched together to create expanded panoramic views with resolutions up to hundreds of megapixels. There are neither hidden nor redundant areas in the stitched images. As the devices are installed individually, the structure of the camera system is easily tailored to newly emerging needs.
Having an extremely high-resolution video of a vast area is just the first step in making video surveillance more effective. We realized the potential in computer vision technologies whereby we were able to upgrade the security and video surveillance in many industries.

We developed embedded Video Content Analysis algorithms considering the specific tasks of different application areas. As Logipix analyzes the video content as close to the image sensor as possible, resolution reduction or software-based visual enhancement algorithms do not disturb the calculations. High-resolution panoramic images and accurate VCA together create a powerful combination that provides reliable automatism in video technology.

<table>
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<tr>
<th></th>
<th>Airside</th>
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<th>Critical infrastructure</th>
<th>Safe &amp; Smart City</th>
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<tbody>
<tr>
<td>Object detection</td>
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<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Object / target tracking</td>
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<td>+</td>
<td>+</td>
<td>+</td>
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<tr>
<td>Object classification</td>
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<tr>
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<tr>
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<td>Local traffic enforcement</td>
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</table>

Device: Logipix 200 MP Panorama Camera  
Image info: detail (27% of the full image)
SENSOR FUSION

Logipix created a special technology whereby the information of the image sensor and external sensors can be fused. Sensor Fusion results in a more accurate analysis as algorithms can rely on a broader spectrum of reality. The extreme high-resolution visible-light data can be augmented by thermal sensor data or the data of integrated surveillance radars. Thermal sensors are able to deliver useful visual information even when visible-light and IR electromagnetic radiations are less informative. Surveillance radars see behind dense vegetation and can be also useful in pitch darkness. Logipix analyzes the data of several sensors together for accurate detection, classification, geopositioning and speed measurement. It is able to visualize layered images together and always highlight the most relevant objects with regard to the current monitoring task.

IN THE MONITORING ROOM

Utilizing the full resolution of large panoramic images during live monitoring or archive playback is not a straightforward task. If we would transmit full panoramic images constantly, it would take an unmanageable load on the network infrastructure.

Otherwise, as our Panorama Cameras use the JPEG2000 image compression we were able to overcome this issue. Utilizing the resolution scalability of this compression standard the Video Management Software displays only the relevant pixels in the monitoring room. The resolution of the transmitted images always adapt to the screen resolution. This way full panoramic overviews are transmitted in lower resolution, but when users zoom in, the system sends the cropped image in higher resolution. As the zoom value increases, so does the transmitted image resolution.

Operators can use multiple zoom windows on a single panoramic image. They can perform monitoring tasks just as if they were using multiple PTZ cameras, but at the same time they also get a large overview. Working with this technique operators have better spatial awareness in the whole monitored area and they are able to surveil and understand situations in a more complete context.
ADVANCED ZOOM FUNCTIONS

- **Panorama and PTZ camera cross mapping** – This specially developed function allows the Panoramas and PTZ cameras to be assigned by registering common spatial points that are visible to both cameras. The function allows operators to control the PTZ cameras by selecting the area of interest in the panoramic image.

- **ePTZ** – ePTZ is an automatic zoom function whereby operators get detailed visual information on situations in no time. In case the VCA or any configured external source triggers an alarm, a close-up appears immediately of the detected object in an individual zoom window. The system tracks the motion of the source object automatically. Both the Panorama Camera itself and an assigned PTZ camera can deliver the tracking zoom image of the detected object.

- **Zoom tour** – Several predefined zoom positions can be assigned to the panoramic view. Operators can step these presets and navigate the zoom position within the panoramic image and they can even step between several Panorama cameras. This way the entire covered area can be inspected easily. Also automatic tours can be configured from these presets that scan through the desired area in a specified sequence.

ASSOCIATED INTERACTIVE MAP

Logipix allows to associate interactive maps with the panoramic image. The map shows the objects that are visible in the panoramic view as real-time moving, color-coded icons. This way operators can monitor situations in a more extensive context and they can easily select objects to display close-ups of them in automatically tracking zoom windows.
MULTI-USER ACCESS

Multiple users can access the Logipix Panoramas at the very same time. This allows synchronous work for operators in the same monitoring room or even simultaneous operation of different monitoring rooms, which are set up for different monitoring purposes.

RECORDING

Different models of the 4th generation Logipix Network Video Recorders are specifically designed to handle the huge amount of data that the Panorama cameras produce. Logipix NVRs have up to 256 TB storage capacity and can be customized to individual needs. Some models of the 4th generation design can be further expanded with our specially-developed external storage units, reaching a total of 768 TB capacity. Logipix always considers the specific surveillance task and designs the most suitable storage system and storage management that helps keep costs at bay.
STRENGTHS OF THE LOGIPIX PANORAMAS

- Our specially-developed stitching technology provides a seamless panoramic view without object duplication or hidden objects and disturbing color gradient differences at image borders.
- The Logipix Panoramas provide large panoramic images with a resolution high enough for face recognition and also for automatic detection of humans even from kilometers away.
- Logipix uses the scalable JPEG2000 image compression standard, which makes it possible to utilize the full resolution of the Panoramas during monitoring.
- Large panoramic images ensures better spatial awareness for operators within the monitored area, as the space is not split by individual cameras on a confusing monitor profile.
- Operators can use multiple zoom windows for the Panorama camera just as if they were using several PTZ cameras simultaneously. They can utilize the benefits of hundreds of megapixels during live monitoring and archive playback.
- Combining high-end panorama technology with computer vision algorithms enables the effective video surveillance and accurate analyses of even compound situations within an immense area.
- Logipix Panorama and VCA makes it possible to accurately track hundreds of objects at the same time. Maintenance procedures are easy and cost-effective as less resources are needed.