

## Case Study

# High-tech remote tower: save in the present, prepared for the future



With HungaroControl's remote-tower concept and around 100,000 flight movements per year, the airport in Budapest is one of a few European airports that can be controlled remotely, if something happens at the real tower. For ATCOs working in the tower, it is extremely important to have a direct view at arrivals, departures as well as the ground traffic. In case of a technical incident at the real tower managing the ground, landing and departure movements from a virtual tower without a direct view of the airport terrain and the runways is an innovative approach. HungaroControl has tackled the challenge of creating a remote tower and has chosen StudioTech as their technical partner to implement G&D KVM equipment in one of Europe's most modern remote control centres.

HungaroControl provides air traffic control services (ACC and APP) and flight information services for the whole Hungarian airspace and for Kosovo upper airspace from its headquarters. In the tower at the airport, in turn, are working the controllers of Budapest airport. The remote tower operation room was built in 2015-2016 and it takes place in the building called ANS III. The location is relatively new, because for years HungaroControl was located in another buildings (ANS I and ANS II) and also has rented the tower of the airport. But in 2015, the HungaroControl management decided that it was time for some radical changes. With a 30 year old infrastructure, the tower of Budapest Airport had become rather outdated. The ATM systems had already been upgraded several times and the capacities for further modernization had been extensively exhausted. In addition, it had to be ensured that the entire airport could still be controlled

even if the tower would be shut down for renovations. Central requirements were increasing both the safety and the productivity. An entirely new control system, which is independent of the tower building itself and thus operated by HungaroControl, had to be set up for the flight operation at the airport Liszt Ferenc. The challenge of creating a remote tower was born.

### Remote Tower Budapest 2.0

The Budapest project created a powerful solution that continually piloted airplanes through the landing and take-off phases and took advantage of the satellite-based arrival and departure procedures. All of the above can be controlled in the future from a remote control room, if something happens at the real tower. For the technical implementation this meant the design of new, modern and efficient workstations for improved workflows as well



## Overview

### Customer

HungaroControl monitors the airspace over Hungary and provides air navigation services and training for air traffic control personnel. The mission of the company is to provide a safe and reliable service in an efficient, customer-oriented, cost-effective and transparent manner. For its latest project – the remote tower in Budapest – HungaroControl uses high-tech equipment and state-of-the-art solutions that offer 24/7 support to the ATCOs working there.

### Partner

StudioTech provides high-end media and IT system solutions for the professional broadcast and AV market. The Hungarian company is part of the StudioTech International Group and uses products from world-class manufacturers to deliver the best possible solutions quickly and reliably at any time.

### Challenges

- Visualisation of two runways, taxiways and two aprons on the video wall and five Controller Working Positions as well
- High demands with respect to safety, redundancy and productivity

### Products

**KVM extenders:** DVI-Vision

**KVM matrix & peripherals:**

ControlCenter-Digital, DVI-CPU-UC, DVI-CON-2

### Result & benefits

- Clearly-arranged and quiet CWP without noise and heat emissions
- Maximum reliability thanks to redundancy concepts
- Efficient processes due to improved working conditions
- Easy administration and maintenance for technical staff
- Flexible use of the video wall by being able to switch between different content and see different systems parallelly like A-SMGCS, camera system, MET and to change easily the layout.
- Automatic switch over to hot standby computers, without picture loss.

We are 100% satisfied with the performance of the G&D equipment and even plan an expansion

as the implementation of exact requirements for redundancy, safety, productivity and optimized maintenance possibilities. Here, the implementation of a huge video wall with 32 monitors, which display the monitoring images of cutting-edge PTZ cameras placed at the airport and monitor the airport operation around the clock played a central role. For the challenging task of designing a KVM concept for the project, the project managers of HungaroControl selected StudioTech, an integrator for high-end media and IT system solutions for the professional broadcast and AV market. It quickly became clear that only the best technology was worth considering – the KVM systems of the German manufacturer Guntermann & Drunck.

### Solution and technical implementation

Hungary's remote tower concept is based on the integration of a brand new A-SMGCS ground monitoring system, which is independent from the system used at the tower, and a camera network installed at several locations at the airport. Around the clock dozens of cutting-edge cameras are transmitting images to the video system servers. From here, a KVM matrix switch ControlCenter-Digital 160 switches the content to a huge video wall with 32 screens (10 x 3 m). This video wall does not only provide ATCOs with comprehensive

▼ Controller Working Position (CWP) in HungaroControl's remote-tower.



visual information, but also offers a complete overview of the entire airport. A mirrored, redundant video wall server system, which can be accessed via KVM matrix simply by pressing a button, ensures that the complete airport can still be monitored, even in case of a fault. If a Controller Working Position (CWP) or video

cure server room and is also made available at the workstations via the KVM matrix switch ControlCenter-Digital 160. Thanks to DVI-CON user modules, the operators can access the remote computers as if they were placed at the controller table. The KVM matrix switches and extends computer signals without any loss and in real time. In addition, all five CWPs have been equipped with DVI-Vision KVM extenders serving as a point-to-point extension between a workstation and a remote computer. Thus, the air traffic controllers can perform their tasks without noticing any difference when working with their computers. And for testing, based on ATCO request HungaroControl can easily change the CWPs between the physical positions without changing or rewiring the computers, thanks to the KVM matrix.

We've appreciated StudioTech and G&D's continuous and valuable support with the configuration and the necessary modifications



▲ The KVM matrix switch ControlCenter-Digital 160 switches the content to a huge video wall.

wall server fails, the matrix switch ControlCenter-Digital (which is also redundant) does an automatic switch to the hot standby pair of the faulty computers, providing a continuous operation without picture loss in front of the ATCOs. In order to optimally implement the requirements for safety, redundancy, productivity and optimized maintenance, StudioTech also developed a concept for the redundant KVM setup of the control computers and their spatial removal from the control room. The remote tower control room of the Hungarian air traffic control includes five controller working positions, each of which has access to several computers. A part of the computer equipment has been moved to an air-conditioned and se-

What sounds self-evident and intuitive to use is only made possible by the KVM equipment running in the background. KVM systems relieve air traffic controllers of their work without being perceived by them - like an invisible wingman behind the scenes who works perfectly around the clock. But not only the video wall servers and control computers were built redundantly in the remote tower in Budapest. A second, completely mirrored matrix switch ControlCenter-Digital 160 backs up the installation if, in the event of a fault, the other matrix fails. The full redundancy therefore ensures that the controllers can continue their work as usual.

## Preventive health management

The SNMP monitoring of the operating conditions of all KVM components ensures the automatic switching between main and redundant computer. The monitored values are sent as SNMP trap and are then made available to the technical personnel. The technicians can use SNMP-GET to query values and thus monitor the system conditions of the KVM devices and the connected peripherals. HungaroControl additionally uses the IP-Control-API. This communication interface allows not only the visualization of status messages, but also the control of the matrix meaning the remote switching over network structures. This ensures that the ATCOs have full remote access to their computers at all times. Moreover, the video wall provides them with a perfect overview of the whole airport. In the next step, additional expansions are planned, for example the integration of a scenario switching via ControlCenter-Digital or the implementation of TradeSwitches to save keyboard and mouse devices at the controllers' workplaces in order



▼ Four ATCOs and a supervisor control airplanes from a remote tower.

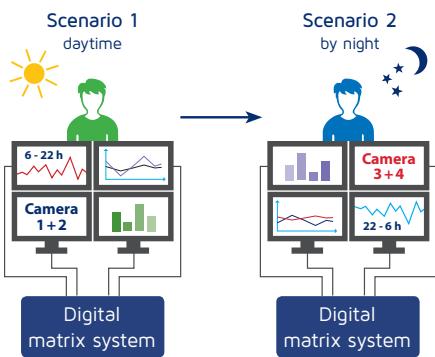


the maintenance team get easier by providing keyboard and mouse for systems where the ATCOs are just monitoring the display.

to increase the user friendliness even further. Scenario switching makes it possible to use a single command to send 32 new images or a modified setup such as, for example, day and night to the video wall.

In the next step, the workplaces of the controllers are „liberated“ from the many mouse and keyboard devices. Both the accesses to the matrix (DVI-CON) and the local computers at the CWP can be combined into one integrated workstation, which can be operated with only one keyboard and one mouse.

Further plans include the implementation of G&D TradeSwitches, which would allow the switching between several computers simply by moving the mouse pointer. CrossDisplay-Switching switches only keyboard and mouse signals, video signals remain unaffected since the monitors are connected directly to the computers and permanently display their image. This peripherals-saving solution allows the use of several computers via a single keyboard and mouse and ensures clearly-arranged workstations. Moving the cursor from the active to an inactive display, the keyboard-mouse focus automatically switches to the connected computer. With special key combinations on the TradeSwitch the work of



▲ Example for day and night scenarios: With one single command, all computers required for day or night shifts can be switched at once.

## Customer benefit and outlook

By moving the computer equipment into separate server rooms, HungaroControl has significantly reduced the noise and waste heat emissions in the control room and now benefits from efficient, ergonomic and user-friendly work processes. At the same time, the work of the IT staff has been considerably facilitated since the computers can now be maintained and configured in the server room. Another decisive customer benefit has been achieved by the full redundancy of the systems and the associated maximum safety. Whether arrival, departure or managing ground traffic – for every flight movement G&D's KVM equipment offers reliable and invisible support for ATCOs who can now fully rely on the technology in the background while working on their responsible tasks.

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