The right destination: Using zenon to guide planes and baggage

Smooth operation at Budapest Airport

With 16 million passengers passing through it in 2019, Budapest Airport is the biggest international airport in Hungary and a central hub for Southeastern Europe. However, the airport's control and SCADA systems for operating critical infrastructure were aging and not standardized. In an attempt to simplify engineering, the control systems department decided to unify systems using the zenon software platform. This has enhanced reliability and ensures the airport's autonomy.

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Lao Tzu said, "The journey of a thousand miles begins with a single step." For airline passengers, the first step takes them to an airport. Airports are intermodal traffic hubs linking land and air traffic. Their tasks include processing arrivals, departures and transit for passengers and freight as well as guiding airplane movements in the air and on the ground.

Airports are often very large and certainly complex – not least because of the elevated security requirements. In direct contact with the control tower, each airplane is guided step by step to its gate or starting position. This is supported by an extensive, sophisticated air-ground light system (AGLS).

Passenger handling is similarly complex – from issuing all transport documents at the check-in counter all the way to clearance at the security checks and at the gates. In addition, the checked baggage needs to be registered, inspected and transported to the correct airplanes and retrieval stations. Within airport buildings, these tasks are usually taken care of by an automated baggage handling system (BHS).

The tasks of airports include guiding airplane movements both in the air and on the ground.

The baggage handling system at Budapest Liszt Ferenc Airport (BUD) has more than 1,000 conveyors.

MAJOR AIRPORT WITH A WIDE VARIETY OF TASKS

Budapest Liszt Ferenc Airport (BUD) is the international airport of Hungary's capital city, colloquially known as "Ferihegy". It is only 16 kilometers (ten miles) away from central Budapest. Before COVID, in 2019 over 16 million passengers used the airport for business or recreational trips.

Operated by a private consortium, BUD is also an important freight airport. BUD Cargo City is the country's central air freight hub. Because Hungary is a NATO member, its largest international airport also serves military purposes so BUD must be operational around the clock all year round.

A HETEROGENEOUS SYSTEM LANDSCAPE

Since it opened for business as a passenger airport in 1950, BUD has been frequently extended, redesigned and modernized. Many of these upgrades left some of the existing installations and systems unchanged. The various remodeling or extension contracts were often years apart and awarded to different contractors. All this resulted in a very heterogeneous system landscape for the airport's AGLS and BHS.

This heterogeneity extended to the various control systems. "For operation and monitoring, we had a total of six SCADA systems," says Géza Kulcsár, control systems group leader at Budapest Liszt Ferenc International Airport. "No less than four were in use for the BHS alone."

A DESIRE TO SIMPLIFY OPERATIONS AND MAINTENANCE

The incumbent systems had been implemented by different systems integrators for individual installations. Consequently, they had only the specific interfaces required for their defined, narrow purposes. Each system had its own, individual visualization. During operation, the different look and feel of the human-machine interfaces (HMI) was a nuisance. It also brought with it an added and unnecessary risk of misinterpretation.

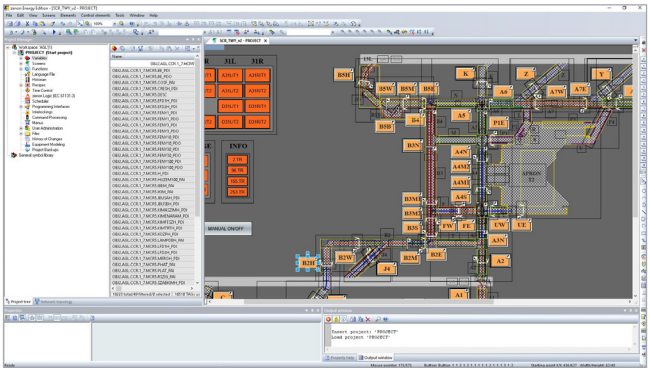
The lack of consistency also meant that maintenance staff needed to be trained on all of the isolated applications. For modifications, they had to fall back on the systems integrators. However, support was often difficult to come by because some of these companies had gone out of business or employees familiar with the airport installations had left.

"Comparably simple tasks such as operating system updates frequently turned out to be formidable challenges," Géza Kulcsár recalls. "Breakdowns of partial systems occurred regularly."

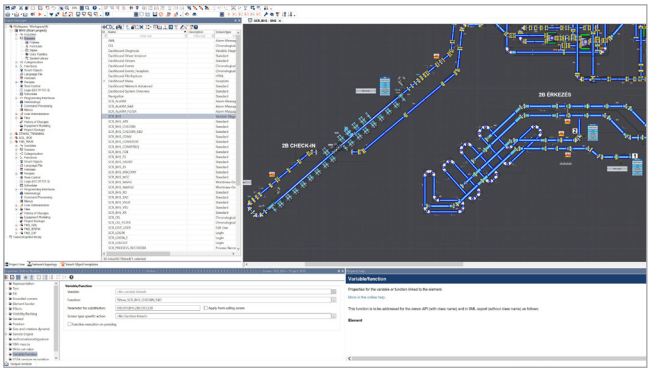
STANDARDIZATION USING ZENON

Quite understandably, these challenges spurred the desire to standardize systems. The aim was not full integration of all systems, but system unification within the AGLS and BHS.

To prepare for the system selection process, the control system experts at Budapest airport conducted a study to compare the advantages and drawbacks of all adequate control and visualization systems. They took experiences from real



Budapest Airport's control system department used the zenon software platform to create a high-level operating system for the air-ground lighting system with its twelve redundant PLCs.



The visualization for the baggage handling system with its more than 1,000 conveyors was created in two weeks purely by parameter setting.

operations into consideration. The SICAM-230, which had been in use since 2010, showed the best stability and the least inclination to crash. However, the original supplier no longer provides technical support for the software and proposed an alternative software product. This turned out to be unsuitable for the specific requirements of the airport, so it was dismissed early on.

At the core of SICAM-230 is the zenon software platform from COPA-DATA, a hardware-independent and non-consolidated software manufacturer based in Salzburg, Austria. So it was to COPA-DATA that Géza Kulcsár turned.

LOW-RISK SOFTWARE CHANGE

As the first step, the BUD experts transformed the AGLS control systems. They replaced all of the control technology, including twelve redundant control units (PLCs) and the associated peripherals. Only the power electronics remained untouched. The system had 30,000 datapoints. Above this, they established a superordinate control system using zenon. This also features a gateway to the airfield radar system (ARS).

"We only had six hours for the entire AGLS switchover and go-live and we performed it without external help," explains Géza Kulcsár. "Thanks to zenon's openness and easy handling, it was no hassle at all."

The experience acquired using SICAM-230 also proved valuable during later modifications. "We only need 16 minutes from importing the datapoint list to system commissioning, which leaves a lot of time for intensive testing," says Géza Kulcsár. He stresses the fact that zenon's hot reload ability yields a substantial benefit, particularly in case of the AGLS: "As we can test modifications using simulation, implementing changes takes no more than three seconds."

Full recording of all system parameters in zenon makes it possible to return to the previous state within two minutes. These system properties facilitate stress-free annual upgrades to the control systems at Budapest airport.

FLEXIBILITY AND SPEED

Budapest Airport control system engineers benefitted from zenon's great flexibility. Native drivers and interfaces to more than 400 third-party systems and components ease the task of integrating PLCs, drives and sensors from an unparalleled range of manufacturers.

The options for designing zenon projects provide a similarly high flexibility. The zenon principle is "parameter setting, not programming". There are libraries with Smart Objects that can be used to create pictures, functionalities and combinations thereof. They can be reused anywhere in the system and adapted for the individual purpose by setting parameters. It is, therefore, sufficient to store and maintain them centrally. Changes need be made only once. They automatically become effective in all relevant sub-projects without any further action.

A UNIFIED VISUALIZATION CONCEPT

These zenon properties considerably accelerate engineering work, at the same time as eliminating some notorious sources

> *Using zenon, we were able to create the visualization for the BHS, incorporating more than 1,000 conveyors, in only two weeks and with only six hours for the entire AGLS go-live.*

GÉZA KULCSÁR, CONTROL SYSTEMS GROUP LEADER BUDAPEST LISZT FERENC AIRPORT

of error. To refurbish the BHS, most of the work went into creating the datapoint list because some of the information found in the control system documentation did not correlate with reality.

"Using zenon, we were able to create the visualization for the BHS with its more than 1,000 conveyors in only two weeks," Géza Kulcsár reports. "For its configuration, we used standard zenon as is and did not need to write a single line of code."

DESIGNING THE FUTURE WITH ZENON

The zenon-based solutions proved effective and efficient in everyday operation. System stability has risen to a level hitherto unknown. Likewise, the effort required for adaptations and modifications has been greatly reduced. The airport team no longer needs to lean into third-party support. Moreover, the standardized screens have considerably improved the system's ease of operation.

Encouraged by these improvements, Géza Kulcsár now plans to use zenon to integrate the airport's building automation and power supply systems. "I consider it a major benefit of zenon that our team of seven now has all the technology in its own hands," he says. "This made it easier for us to ensure operational readiness in spite of access restrictions for non-company personnel during the COVID-19 pandemic."

HIGHLIGHTS:

zenon as a high-level control system for the air-ground light system and baggage handling system at Budapest Airport:

- High operational reliability even in non-standard situations
- System modifications without downtime
- Standardized user interfaces
- Rapid engineering without programming skills being required
- High degree of autonomy in operation and maintenance