



Located just eight kilometers southeast of downtown, Copenhagen Airport (CPH) is Scandinavia's busiest airport, serving almost 30 million passengers per year. CPH has been named the best airport in Northern Europe by the Skytrax World Airport Awards 2017.

CASE STUDY

Optimized check-in procedures at Copenhagen Airport

HOW THE XOVIS TECHNOLOGY HELPS AVOID COSTLY INVESTMENTS

CHALLENGE

With almost 30 million passengers per year, Copenhagen Airport (CPH) is Scandinavia's busiest airport. Like many other fast-growing international hubs, CPH has to deal with steadily increasing passenger numbers (10% more passengers in 2016) and additional load on the existing infrastructure such as security checkpoints, passport controls and check-in desks.

- How to accommodate growth in the smartest, most sustainable and cost-efficient way?
- How to improve passenger experience and increase passenger satisfaction by optimizing capacity utilization instead of having to make extremely costly investments?

SOLUTION

The system combining Xovis 3D Sensors and software solutions is installed at various sites. As the only technology to measure waiting times accurately and reliably in dynamic, unstructured check-in situations, the Xovis system covers the whole waiting area in check-in halls up to the desks and measures a broad range of crucial KPIs in real-time including:

- Queue length/ waiting time per check-in desk (including automated queue detection, see p. 3 for technical information)
- Average process time per check-in desk
- Passenger outflow rates
- Number of passengers processed

BENEFITS

By accurately measuring waiting times for dynamic queues in unstructured check-in situations (per flight/ airline/ sector), the Xovis system paves the way for streamlining check-in procedures including:

- Waiting time-related performance integrated with other KPIs
- Optimized number of open check-in counters
- Optimized opening hours of check-in counters
- Optimized desk allocation
- Reduction of purchased counter hours for airlines
- Optimized staff planning and management for ground handlers
- Comparison of common use set-up and self-service bag drop



"Xovis data forms an excellent

basis for discussions with airlines and ground handlers on how to optimize check-in procedures, focusing on the Total Cost of Operations. CPH has a high utilization of check-in capacity and the possibility of data exchange between various stakeholders has allowed us to postpone extremely costly investments. A solid data foundation, as provided by the Xovis system, has played a key role in the success of these initiatives".

Thomas Hoff Anderson,
Director of Passenger and Terminal Services

XOVIS

CASE STUDY

Focus on Total Cost of Operations

Being Scandinavia's busiest airport, CPH served approximately 30 million passengers (10% more than 2015) in 2016. In order to improve passenger experience and satisfaction without having to invest in new infrastructure to accommodate the remarkable growth, CPH counts on Xovis 3D Sensors and software solutions in various sites such as passport control, retail and check-in areas. In particular, check-in areas are a typical bottleneck to impair overall performance and frustrate passengers. The Xovis system is a powerful tool to use existing capacities in the most efficient way.

A TOOL FOR ALL STAKEHOLDERS

At CPH's Terminal 2 for example, the Xovis system covers the whole waiting area in the check-in hall up to the desks (56 desks, 1500 m²) and measures KPIs such as waiting times, queue lengths and passenger flows. The data gathered by the Xovis system is fully transferred to CPH Data Warehouse, integrated with other performance-related KPIs according to the Service Level Agreement and reported to all stakeholders (airlines, ground handlers, authorities etc.). Hence, the Xovis system prepares the ground for dialogue between these stakeholders.

It is also a powerful tool to proactively identify bottlenecks and avert passenger frustration. For example, the gathered real-time data is accessed by the border police and passenger duty manager and enables them to respond in close collaboration to the build-up of queues and to improve staff planning accordingly.

ADVANTAGES FOR ALL INVOLVED STAKEHOLDERS

Lowering total cost of operation for all stakeholders means: Opening times and the number of counters open during the day may be adjusted or advantages of the common use set-ups and self-service bag drops are evaluated. Thus, airlines may reduce the total number of counter hours purchased by ensuring that no agents are waiting for passengers.

Esben Kolind, Head of Operational and Business Analysis: "Xovis data forms an excellent basis for discussions with airlines and ground handlers on how to optimize existing check-in procedures, focusing on the "Total Cost of Operations".

On the other hand, ground handlers may reduce the peak demand for staff by distributing the load more effectively. Furthermore, Copenhagen Airports reduces the total demand for check-in counters in peak hours by ensuring that all counters are used efficiently. This concept enables stakeholders to effectively collaborate. As a result, waiting times and general costs are reduced while customer satisfaction increases.

COSTLY INVESTMENTS AVOIDED

Through the availability of accurate and reliable data that streamlines processes and collaboration between all stakeholders, the use of existing capacities has been optimized and the demand for additional capacity at CPH has been reduced considerably over the last few years. This has allowed CPH to postpone costly investments in building new check-in counters, as this would have required substantial rebuilding of existing terminal facilities.



CPH measures waiting times with the Xovis system at various sites



Waiting times are displayed on screens

CASE STUDY

How does it work?

Long queues make airports look bad and frustrate passengers. Xovis provides airports with a powerful tool to move passengers more smoothly through their facilities, optimize staff and infrastructure planning and ultimately increase customer satisfaction. The combination of Xovis 3D Sensors and software solutions helps improve efficiency all over the airport and prepares the ground for innovative business models.

Counting and tracking passengers anonymously, the Xovis system combines 3D sensors with software solutions to measure the targeted KPIs in real-time. A broad portfolio of Xovis 3D Sensors with ultra-wide viewing angle accommodates the specific architectural conditions of any airport. Mounted on the ceiling, one sensor covers up to 100 m² or 1100 sq.ft. and can be mounted from 2.2 to 30 m or 7.5 to 130 ft. high. A high-resolution 3D image, often also referred to as stereo image, of the covered/ recorded area is calculated up to 30 times per second, providing the basis on which every person that is entering the covered area is counted and tracked anonymously.

Based on the 3D images computed on the sensor, the software receives data streams from all the installed sensors, calculates and visualizes KPIs such as waiting times and passenger throughput on real-time dashboards. An unlimited number of sensors can be connected into a Multisensor

According to the study "Rise to Challenge – The Risks and Opportunities of Digitization for Airports," from Roland Berger, a five-minute delay for 25 percent of passengers at the security checkpoint could induce a drop in retail sales of 2 to 3 percent. People that wait more, spend less.

to continuously track passengers through large areas anonymously. The system also features an automated queue detection that measures waiting times only for passengers excluding staff, meeters and greeters even in unstructured, dynamic multi-queue areas.

Passengers are recognized individually even if they are standing shoulder to shoulder. Constant sample rates of 98% are guaranteed, meaning that 98% of passengers in the covered area are registered. The 3D stereo vision technology does not depend on signal-emitting devices and is highly robust against all kinds of external influences such as shadows, light changes and heat emissions.

Power over Ethernet (PoE), combining data connection with power in one cable, and a Mean Time Between Failure (MTBF) of 25 years simplify installation/maintenance and keep total cost of operation low. Implementing FPGA technology, the image processing is performed on the sensor. No video stream leaves the sensors and data privacy is guaranteed. Only a constant stream of moving dots, representing the counted passengers, is sent out. Only one server is needed to run the system with up to 600 sensors. The Xovis system can easily be integrated with other software solutions. For example, waiting times can be exported automatically from the system and displayed on screens at the airport or on the airport's mobile app.



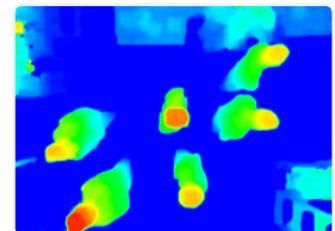
PC2R with WiFi-Module



PC3



Web and mobile clients of the software are also available



3D image computed by Xovis sensor indicating heights and distances by different colors

CASE STUDY

Technical Data

WORKING PRINCIPLE:	3D stereo vision / distance measurement
INSTALLATION ANGLE:	+/- 15° in x-axis +/- 5° in y-axis
OPERATION TEMPERATURE:	0°... 50 °C
WITH OUTDOOR HOUSING:	-20°... 50 °C
STORAGE TEMPERATURE:	-20°... 70 °C
AIR HUMIDITY:	20 ... 80%
CONNECTION:	RJ-45 Ethernet
POWER SUPPLY:	PoE Class 0 / (IEEE 802.3af)
POWER CONSUMPTION:	< 5W
REQUIRED ILLUMINATION:	min. 2 lux
SIZE (LxWxH):	PC2/ PC2R: 13.0 x 9.4 x 3.0 cm PC3: 33.0 x 6.1 x 4.0 cm PC3-0: 38.5 x 9.0 x 8.6 cm
WEIGHT:	PC2: 350 g/ PC2R: 250 g PC3: 600 g/ PC3-0: 1700g
MOUNTING HEIGHT:	PC2/ PC2R: up to 6 m PC3/ PC3-0: up to 20 m



Taxi Ranks



Duty-free



Check-in



Gates



People Movers



Baggage Reclaim



Terminal Entrances



Emmigration & Immigration



Security



Customs



Escalators



Transfer Security

ABOUT XOVIS

Swiss-based Xovis is the market leader in people flow monitoring. More than 65 international airports count on Xovis to measure numerous KPIs such as waiting times, process times and passenger throughput. Based on the gathered data airports optimize the planning of resources and the use of infrastructure. The combination of 3D sensors and software solutions stands out with unmatched accuracy, reliability and ease of use. The system includes a sophisticated data privacy concept and does not depend on signal emitting devices. Founded in 2008, Xovis has evolved from a three-man start-up to a high-tech company with more than 80 employees.