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Safe airports of the future: Safety and security are today's priorities

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In spite of the global economic downturn, air passenger numbers and air freight traffic both continue to increase, and evidence points to the trend continuing or even accelerating. However, air travel is no longer simply a means of transporting goods and people from place to place around the world. Continued growth brings with it increased threats and so safety and security have become even more important and now demand an integrated solution approach.

The "Future of Airports 2030" is a study based on analysis of current statistics and trends together with the results of extensive interviews with over one hundred airport industry experts. The study revealed that airport system integration is, and will continue to be, at the heart of all future airport projects. This integration involves all aspects of airport operations including, amongst others, site-wide perimeter protection, efficient passenger-processing, luggage and cargo screening and handling, general operation and management.

Growing number of solutions

With vast numbers of people passing through the busy terminal buildings everyday, airports have long been targets for terrorist attack. In addition to this, the sheer number of people on today's large aircraft and the potential to use a hi-jacked plane as a flying missile, offer terrorists a means to attract huge media attention. Security within airports therefore remains a top priority and will continue to do so for the foreseeable future.

The ever present threat to air travel security and the many national and international regulations subsequently brought in to deal with it, has led to a dramatic increase in the number of security solutions deployed. Analysis carried out in 2011 by Frost & Sullivan puts the world's total expenditure at 19.1 billion USD for the year, as airport operators continue to update security procedures and systems to keep pace with technology and stricter legislation.

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Scanning for safety

Typically passengers at all airports are today screened by metal detectors when passing into 'secure' areas before boarding the plane. Both carry-on and checked luggage is scanned by high-resolution x-ray machines to verify the contents and explosive trace detection machines (ETD) are used to check for explosives using gas chromatography.

A more recent development is the use of body-scanners or whole body imagers. On Christmas Day, 2009, a passenger onboard Northwest flight 253 from Amsterdam to Detroit attempted to destroy the aircraft using plastic explosive concealed in his underwear. The device had been made with the express intention of avoiding detection by traditional scanning equipment. It had not been detected at any point throughout the passenger security control procedures. A major catastrophe was averted only as the explosives failed to detonate. As a result of this and other such incidents, the latest advanced imaging technology scanners continue to be deployed at a rapid rate. The TSA (Transport Security Association) in the USA reports that more than 670 imaging technology units are installed at 170 airports nationwide. Globally the installation of the new technology continues at a similar pace. The advanced imaging technology facilitates the screening of passengers for everything from weapons to explosives without any physical contact. If a threat is detected, the location of potential threat items are shown on an outline of a person on a monitor attached to the machines.

The scanners fall into two types: millimetre wave and backscatter. The first directs radio waves and measures the reflected energy to form a three-dimensional image. The second is a low-level x-ray machine using Compton scattering of ionizing radiation to create a two-dimensional image. Both can detect concealed, non-metallic weapons and explosives on the body but do not detect items hidden within body cavities.

Strategic solutions

Of course, terrorism is not the only factor currently concerning airport security, and as a result the Siemens portfolio of cutting-edge security solutions is based on dynamic airport-focused modular platform. It is continually evolving to adapt to location-specific concerns as well as international trends. For large and complex sites such as airports, the implementation of comprehensive security therefore involves a focused, layered strategy usually comprising intrusion detection, wide-area video surveillance, access control and management through an integrated command and control platform for the day-to-day running of the site as well as the coordinated and timely response to any incident.

The intelligent identification and tackling of suspicious and unusual behavior is especially vital within the airport environment. It offers security personnel the ability to prevent potential threats before any incident takes place and follow an audited pre-defined plan of action. Access control, often integrated with video surveillance technology, is equally essential, not only to manage

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vehicular and pedestrian access to the airport apron and other critical areas but also to all restricted zones within the terminal and other buildings. Advanced technology, adopting a variety of software analytics based options, can be employed in the latest video surveillance solutions providing constant automated monitoring of all system cameras. This can help to overcome the age-old problem of rapid operator fatigue when studying monitor screens. By using software to automate the detection process rather than simply relying on the operator, it is possible both to enhance detection and make better and more efficient use of the trained security personnel to deal with any incidents.

Airport perimeters, which can extend to over 50 km in length, require special consideration. To restrict and detect unauthorized access, physical measures, together with external motion detection systems, long-range conventional and thermal surveillance and ground radar tracking can be deployed and effectively managed through Siemens's Siveillance Site IQ Wide Area surveillance solution. Extended detection and warning of all activity in runway and aircraft taxi areas has recently become a major focus in the airport world. Siemens has created bespoke airport specific packages with customizable policy zones to tackle such incidents.

Biometric technology features significantly in the Future of Airports program and is showcased in the advanced Siemens palm-vein identification and verification readers. Utilizing possibly the most effective form of biometric identification available, the readers scan contactlessly the unique blood vein patterns within a person's hand, verifying the blood flow at the same time to ensure the life-status of the individual. Siemens has already successfully piloted installations of the readers within a major European international airport.

The demand for the strictly-controlled, efficient and automated transfer of passengers within airports is also changing rapidly, typically illustrated by projects such as that in central Europe for the transfer of passengers from Schengen to non-Schengen areas in a controlled and compliant way. This has resulted in unique measures being installed by Siemens within existing terminal and concourse elevator infrastructure, facilitating the transit between only predefined and pre-approved areas. The comprehensive scanning of the elevator cabins both before and after the departure of travelers ensures that no unauthorized items or personnel can pass from one area to another. The airport is also able to scale back and deploy its human resources more efficiently in other areas of the airport's operation.

Fire safety within airports

It is obviously important that airports are also thoroughly protected against fires. Airports offer a fire risk because of the presence of both potential ignition sources in the electrical systems and cabling, along with the flammable materials found within the airport buildings. The earliest and most reliable detection of smoke and the activation of the appropriate extinguishing processes are important factors in any protection system. Intelligent algorithms in today's leading detection

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systems recognize the potential for fire at the earliest possible point. They calculate if there are unusual levels of smoke particles present, well before the flame stage is reached, quickly and reliably triggering fire safety systems. At the same time, false alarms can be prevented, an important factor when the consequences and disruption involved in any evacuation of an airport are considered.

By contrast, aspirating smoke detectors continually sample air at various locations throughout the terminal building and other large internal spaces. Depending on the concentration, a pre-alarm or alarm is triggered when smoke particles are detected. When set at the appropriate sensitivity-level, they will detect the earliest stages of smoke generation and, following verification of an alarm, will initiate the relevant extinguishing system. Leading fire safety systems can be fully integrated with other security disciplines such as video surveillance, access control and intrusion detection systems, as well as building automation systems.

Gas detectors will also trigger an alarm with the discovery of dangerous carbon monoxide concentration caused by exhausts in airport car parks for example, defective heating devices or chemical and production processes. The threshold levels for alarm are precisely configurable and can be adjusted to environmental conditions. Using new architecture based on IP (Internet protocol) technology, it is also possible to connect fire alarm control units already networked in clusters via a fiber glass backbone. Standard IT technology is used and the existing network infrastructure can also be used.

Safe evacuation: adopting an intelligent response

In the event of an airport emergency, rapid and orderly evacuation of a crowded terminal building will save many lives. However, investigations have shown that many people no longer react to conventional alarms, believing them to be simply tests or false alarms. Even if they do react, it is sometimes not in an appropriate way, with confusion often a problem, particularly when just tone-based alarms are employed. This is leading to a more intelligent response-based approach to incidents. State-of-the-art evacuation systems can combine functions such as voice alarms, public notification, video surveillance and emergency lighting, as well as supporting systems such as smoke extraction or lift and door controllers. “Intelligent Response” systems from Siemens already process information from such sources, as well as many others, including data from building management systems. These systems support the evacuation and the auxiliary personnel in their activities by increasing the amount of information and the availability of that information in real time to those who are tasked with dealing with an incident. In this way the speed and effectiveness of the response can be significantly improved

Technical progress will further stimulate advances in safety and security solutions. One example is 3D modeling, which could make future emergency response and evacuation planning even more

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efficient and dynamic by ensuring that information from all parts of the airport are effectively integrated.

Future-proofing airport systems

Behind airport procedures is complex architecture characterized by interdependencies between the many different parts of the passenger process flow such as check-in, security, retail areas and landside, as well as airside operations. There are also multiple stakeholders involved: management; aviation, local and national authorities; airlines and travel companies; supporting services and commercial or retail organizations. All rely heavily on the fast and efficient turnaround of hundreds of flights and the throughput of thousands of passengers.

The implementation of security systems within this highly synchronized processing is critical as delays and shutdowns inevitably result in lost revenue for airlines, operators and most supporting suppliers. Therefore, it is important today, just as it will be in the future, that airports employ integrated security solutions. Making security more effective but also more efficient, is crucial in terms of passenger confidence, enhancing the passenger experience and in seeking to minimize potential financial losses.

By adopting an integrated approach, airports will help increase the efficiency and operating reliability of the site, reduce operational risks and costs and optimize all processes. For long-term operability of complex systems – such as baggage handling, passenger control, safety and security – the best way to ensure the future viability of electronic processes is with systems that are flexible and scalable. This flexibility should accommodate expansion and prevent system redundancy, with the capacity to add more devices and interoperate with other disciplines, as well as integrate with emerging technologies. Airport systems need to be capable of accommodating future growth without the need to replace entire systems, with a planned migration.

The Siemens Future of Airports 2030 project has highlighted the challenges facing the airport sector in its quest to ensure an efficient, effective, safe and secure program to keep pace with tomorrow's demands. Siemens continues to further develop its airport solutions far ahead of the fundamental requirements, ensuring that it is able to deliver and exceed, globally, the aspirations and ambitions of airport operators and associated stakeholders around the world and ensure their continued success.

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