

Case study: Singapore Changi Airport

Perimeter Protection System For World-Class Airport



Introduction

Singapore Changi Airport (SIN), the international airport of Singapore, is rated the World's Best Airport by Skytrax for the eighth consecutive year since 2013. It is one of the world's busiest airports by international passenger and cargo traffic, and ranked in the world's top 5 in security screening.

With globalisation, civil airports have become an interconnection hub of countries; an aerial gateway and border of a nation. Over the years, airports have increased interest and awareness in security systems to combat criminals and terrorist with ill-intentions.

Singapore Changi Airport places heavy emphasis on being reliable and ensuring public safety. In 2010, the airport management team started the search for an effective Perimeter Intrusion Detection System (PIDS), a solution that could meet stringent requirements to safeguard the perimeter of an airport.



CLIENT SITE INFORMATION

Perimeter length: > 30 km

Type of fence: Double-layered |
Welded-mesh | Concrete kerb

Height of fence: 3 m, 4.5 m for fence
above canals/ drains

Width of fence: 2.4 m

Challenges

- **Low Probability in Detecting “Silent” Climb**
Silent climb refers to intrusions with an aided climb (include ladder assist climbs) being relatively quiet with minimal force or movements. These small movements may not emit disturbances strong enough to trigger an alert upon the intrusion attempt on common vibration detection method.
- **Nuisance Alarms from Strong Winds and Aircraft Movements**
Wind, rain, storms, jet blasts are constant factors within an airport that could easily induce nuisance alarms in a PIDS. The usual market practice would be to decrease the level of its sensitivity to manage the high number of nuisance alarms. However, this would pose a trade-off in the detection and, as a result, a real intrusion may go undetected.
- **Inadequate Reliability for Critical Site Operations**
It becomes a liability when most systems installed in the field are susceptible to defeat or breach. Furthermore, solutions with limited agility and flexibility may require an extended downtime period during maintenance or when the fences are being repaired. Consequently, compromising the airport's operations and security.

Client's Requirements

- **Maintain Minimum Level of Nuisance Alarms with no Trade-off to Security**
Our client requires a system capable of adapting to the site conditions and differentiating a true intrusion from a nuisance alarm caused by environmental factors and aircraft movements. This would help the security force team to focus on real threats by reducing the occurrences of incidents from a nuisance alarm during the operational hours.

- **High-Performance Intrusion Detection**

Besides managing nuisance alarms, the system needs to be capable of detecting various types of intrusions attempts when deployed on fences or other barriers used to define the perimeter. This especially includes the intrusion attempts with minimal force such as a silent climb.

- **Strong Resilient to Operational Downtime**

The system should also stipulate an expected level of reliability and maximum acceptable proportion of downtime during maintenance, being able to operate for at least 99% at all times. If no downtime can be tolerated, there should be the provision of procedurals or secondary systems to bridge any periods of downtime.

AGIL™ Fence Solution

With AGIL Fence PIDS innovation-led solution and complete fibre-optic sensors, the fence line along the airport's perimeter is secured with intrinsic sensing capabilities. The key concern of silent climb is addressed by the principle of its operation to detect an intrusion based on the measurement of force. Hence, the various types of intrusion attempts from aided and unaided climb to a cable cut or any form tampering will trigger a true alarm as pressure is applied.

Designed with edge-cutting patented sensors and advanced system intelligence, its adaptive threshold capabilities can dynamically adapt to the different environmental conditions. Hence, there is no need to lower the level of sensitivity while managing the number of nuisance alarms caused by strong winds, aircraft movements and jet blasts.

In addressing an important aspect of airport security, having a system that operates 24/7 is especially important for an airport in safeguarding public safety. Through the robust AGIL Fence system architecture, the configuration is done so that having a cable cut, site expansion, or maintenance work in process will not compromise the performance and functionality of the entire system.

Why AGIL Fence?

During the evaluation phase, a comparative trial was held between AGIL Fence and two world-leading PIDS products, one microphonic-based and one phase interferometry-based, conducted by Singapore Police Force on the same stretch of the fence line. The operational trial revealed severe weaknesses in the microphonic solution and the phase-interferometry solution, particularly with respect to the systems' poor detection for both unaided and aided climb.

AGIL Fence Perimeter Intrusion Detection System (PIDS) results surpassed the competitors in terms of performance as well as the expectations of the Singapore Police Force and Changi Airport Group.

AGIL Fence PIDS has been deployed on > 30 km of the fence line along the airport's perimeter, including all crash gates and dormant side gates.

Paired with the PIDS solution is **AGIL Fence Integrated Perimeter Alarm Management System (iPAMS)**, capable of interacting with the airport's existing CCTV and Integrated Security Management Systems.



"We are pleased to have ST Electronics partner CAG in this effort to enhance the security of the Changi Airport airfield. At Changi, we take safety and security seriously and are committed to maintaining the highest standards. The implementation of AGIL Fence PIDS complements the security measures we already have in place to protect the airport perimeter. We are proud to support innovation by Singaporean organisations and be the first to use this groundbreaking technology."

Mr. Foo Sek Min, EVP,
Airport Management, Changi Airport Group

Key System Parameters

Fence-line	:	~3,000 discrete fibre sensors
CCTVs	:	x37 Low-light PTZ CCTV auto-triggered auto-slewed to intrusion location, < 60 sets to cover entire perimeter
PIDS Backend Equipment	:	8 sets, each comprising 1 Sensing Unit + 1 COTS PC Server (based on 22 km of perimeter)
User Interface	:	Fully integrated with a major commercial ISMS, Genetec Security Centre
Operation	:	System monitored in the Airport Operation Centre (AOC), fully managed by a single operator

Executive Summary

The > 30 km of fences that surround Changi Airport has been well-secured by the AGIL Fence Perimeter Intrusion Detection System since 2013. The system continues to monitor and detect intrusion attempts successfully. Some facilities that seek the most economical solutions for their perimeter security will quickly realise that when intrusions occur undetected, the implications that follow after can come at the cost of safety risks and a company's reputation. With the rise in global terror incidence rate, places with high human traffic such as airports can no longer ignore the importance of implementing strict security measures. Frequent news of perimeter intrusion are strong indications that there is still a huge potential for improvement for many facilities, and these critical infrastructures are urged more than ever to invest in a trusted system that actually works.

About ST Engineering

ST Engineering is a global technology, defence and engineering group specialising in the aerospace, electronics, land systems and marine sectors. The Group employs about 23,000 people across offices in Asia, Europe, Middle East and the U.S., serving customers in the defence, government and commercial segments in more than 100 countries. With more than 700 smart city projects across 130 cities in its track record, the Group continues to help transform cities through its suite of Smart Mobility, Smart Security and Smart Environment solutions. Headquartered in Singapore, ST Engineering reported revenue of \$7.9b in FY2019 and it ranks among the largest companies listed on the Singapore Exchange. It is a component stock of the FTSE Straits Times Index, MSCI Singapore, iEdge SG ESG Transparency Index and iEdge SG ESG Leaders Index. For more information, please visit www.stengg.com.

AGIL Fence by ST Engineering – Riding on the innovation-driven suite of intrusion detection solutions and our team of experts, we know what it takes to deliver unparalleled perimeter protection. AGIL Fence systems have been tested for use in airports and critical infrastructure including substations, military sites, correctional facilities and other high-security sites across the world. AGIL Fence, your trusted partner in securing key installations. For more information, visit www.AGILFence.com.