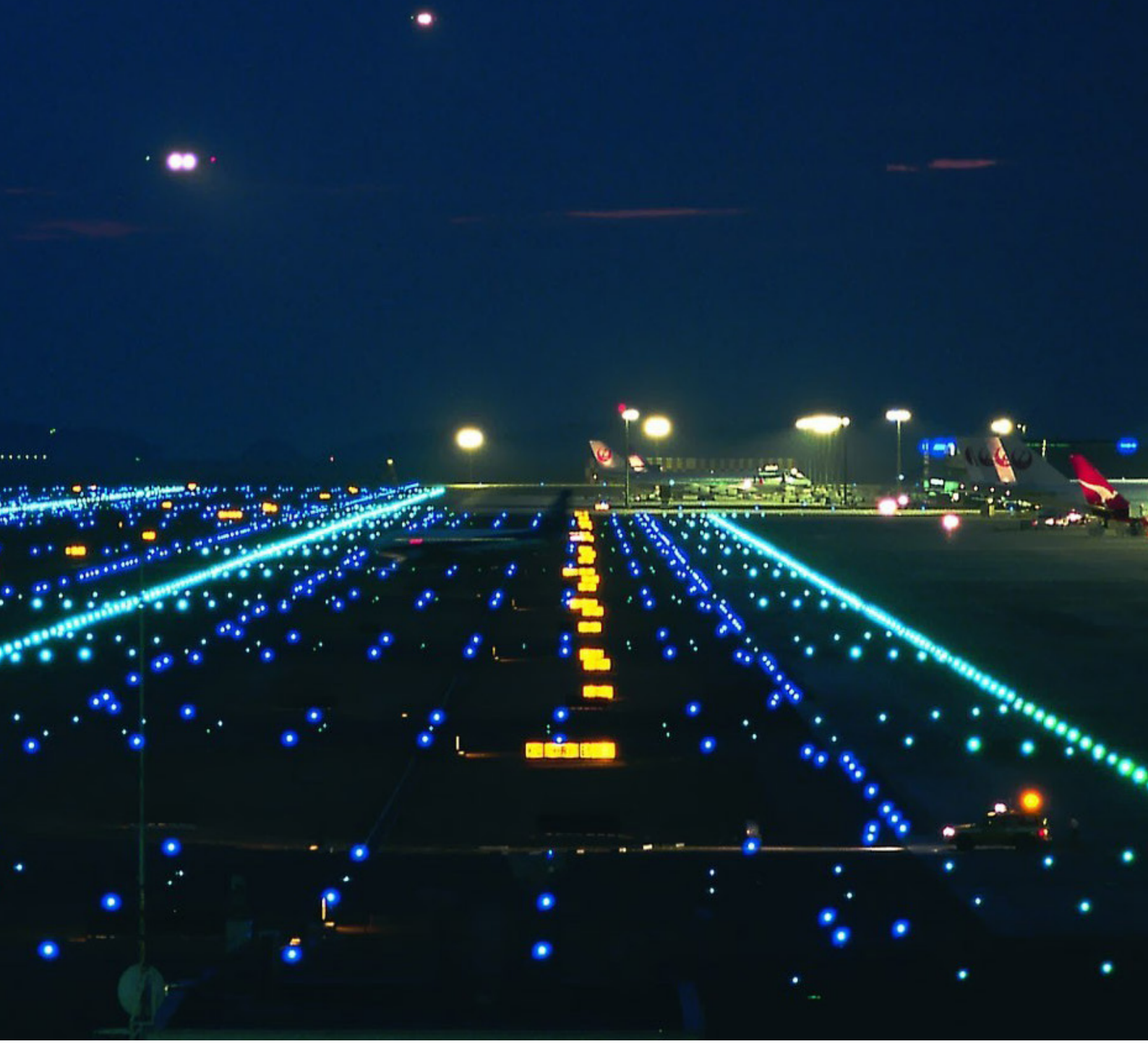
WHITE PAPER

RUNWAY CLOSURES AT COMMERCIAL AIRPORTS

Airport Lighting Systems



Avlite®

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Avlite Systems an international designer & manufacturer of complete aviation lighting systems; airfield, heli and obstruction

We believe technology improves navigation™

White Paper Overview

Topic:
Runway Closures at Commercial Airports and the Solar Solution

Product Focus:
Portable Airfield Lighting Systems

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Introduction

The global Aviation industry continues to grow rapidly, however consistent and robust profitability is elusive. Measured by revenue, the industry has doubled over the past decade, from US$369 billion in 2004 to a projected $746 billion in 2014, according to the International Air Transport Association (IATA).

Much of that growth has been driven by low-cost carriers (LCCs), which now control some 25 percent of the worldwide market however profit margins are razor thin, less than 3 percent overall.

With vulnerability in the aviation industry and exogenous events that happen with great regularity, such as security concerns, volcanic ash clouds, severe weather storms, infectious disease and power outages airport owners and operators are fully aware of the financial implications of runway closures or even worse complete airport closures.

The costs of runway closure to an operator can be devastating to their bottom line, as penalties or fines can range from thousands of dollars to hundreds of thousand based on the length of runway closures.

Examples of Runway Closures due to Airfield Lighting Failures

Runway lighting failure - Australian Airport
May 22, 2009

Air traffic control (ATC) attempted to activate the runway lights; however, the runway 11/29 edge lights failed to turn on. Due to the lighting failure, ATC asked all aircraft intending to land to hold. After requesting the reason for holding, the crew of a Boeing Company 717-200 aircraft, registered VH-NXM, on a scheduled passenger service with 117 people on board, advised that they had 30 minutes of holding fuel available (equivalent to 1920).

Just prior to 1910, ATC notified the crew of the 717 the lighting was still unavailable and reported asking the crew if they could divert. Initially the crew advised ATC that they did not have diversion fuel. However, after further calculations, they determined that they had enough fuel for an immediate diversion to another aerodrome. The aircraft was diverted and landed without further incident. The pilot in command (PIC) reported that it landed with 1,000 kg of fuel remaining, equating to the fixed fuel reserve.

(Reference: Australian Transport Safety Bureau, Aviation safety investigations & reports, Investigation number: AO-2009-024)

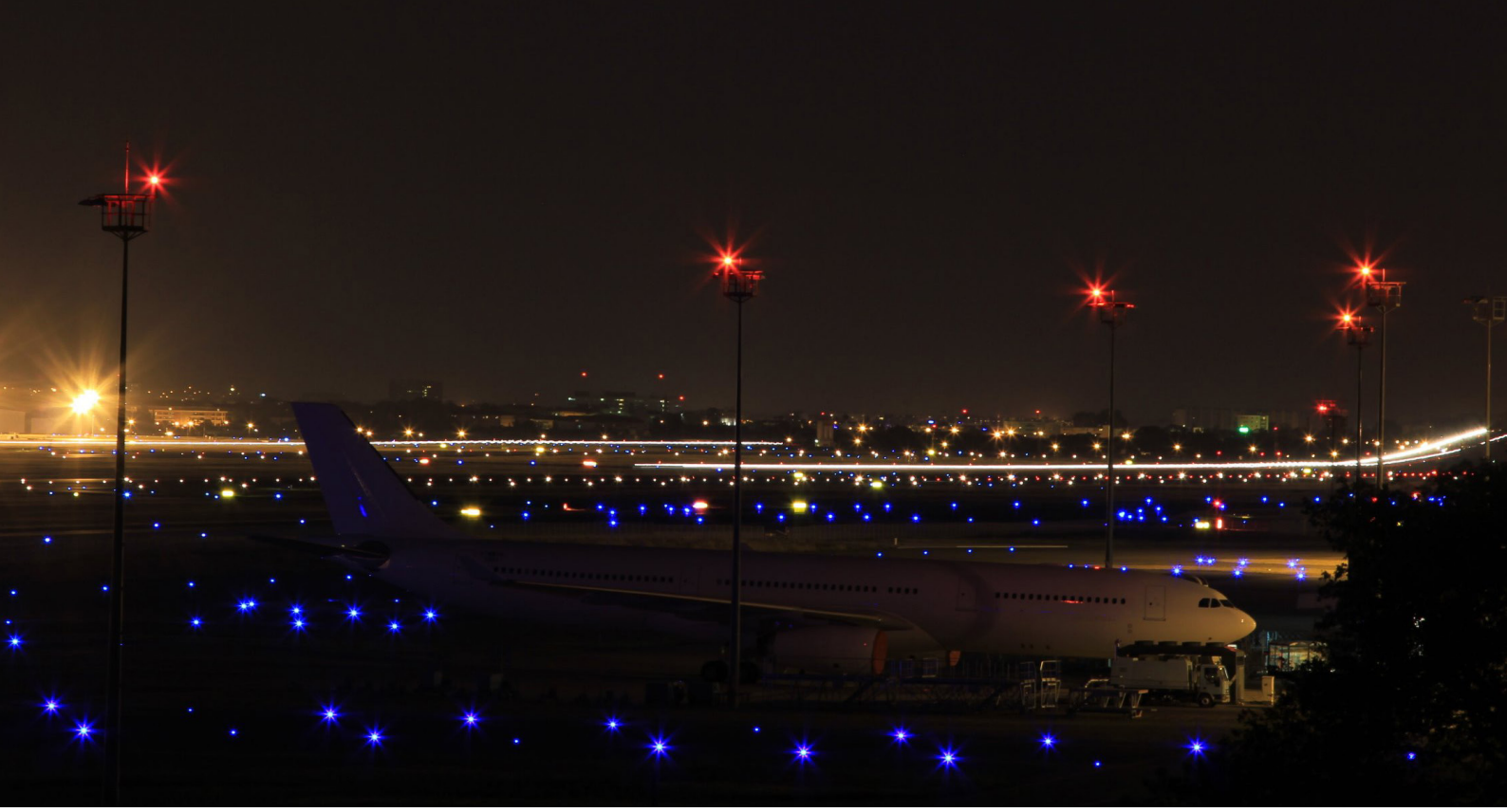
Airport Closes For Hours After Power Outage Kills Runway Lighting
June 29, 2012

A key part of the flying process is landing (and taking off, for that matter), and no one is going to be doing much of that when there are no lights on the runway, especially at night. A US Airport had to shut down for almost four hours last night after a equipment failure on the part of the electric company resulted in the power being cut to the runway lights.

The airport closed down about 9:10 p.m. after a problem in an airfield lighting vault cut power to runway lights, officials said. Around 85 flights had to be canceled or diverted, said a spokeswoman for the Department of Aviation. Power was restored to the runways at 1:19 a.m..

A spokeswoman indicated it was a problem with equipment but had no other details.

(Reference: http://consumerist.com)



International US Airport Lighting Outage, USA April 12, 2013

The failure occurred during a planned changeover from one power source to another, at about 9:30 p.m. The switch had to be done manually, and an Aviation Department spokesman said that took 10 minutes to complete.

Officials at the airport said they are still trying to pinpoint where the failure occurred, but said it happened as power was being switched automatically from one source to another.

The failure occurred at about 9:30 p.m. Thursday, and affected runways 9-Left/27-Right and 9-Right/27-Left, said an Aviation Department spokesman. Both runways are on the north side of the airport.

As a result, he said, power had to be switched manually, a process that took about 10 minutes.

The power failure caused delays for more than half an hour to inbound flights. Since then, he said, the power has not failed and runway lights have been fully operational.

During the outage, planes expecting to use those runways were forced to circle and wait for another runway to open up.

(Reference: CBS Chicago)

Analysis

Analyse these events, and the evidence is clear that these closures have a negative effect on airports, airlines, passengers and associated services. The costs increase hour on hour and creates havoc for ATC with additional workload in order to divert flights to other runways or worse yet other airports. The closures create delays and cancellations for airline operators and reduces customer satisfaction.

How can an airport operator avoid runway closures? Allowing the airport to continue operation, insuring revenue streams are maintained, avoiding fines and penalties. Allowing Airlines to continue to operate seamlessly and not affecting customer travel schedules.

The Problem

Major Domestic and International airports with hardwired lighting systems have advanced redundancy equipment designed for power outages or circuit reconfiguration. But in some cases, even these redundancy systems can fail causing closures.

Dispatching airfield lighting teams and engineers to locate a damaged cable and repair it can take hours if not days. If the problem can't be repaired in a timely manner it leaves no other choice to the airport operator but close the runway or completely close the airport.

This is where a contingency plan or strategy is required to overcome the reliance on main power and the associated hardwired equipment and infrastructure, to ensure that the airport operator can continue to service incoming flights without the need for diversion or costly delays.

The Solution

Portable Airfield Lighting System, based on solar power can be deployed quickly to overcome a runway and/or taxiway lighting failure. For an even faster response, critical runways can be backed up with the permanent installation of collocated solar runway lighting that can be switched on automatically or manually in case of a failure.

Utilising either of these solutions offers a rapid to immediate response, reducing and/or eliminating the need for runway closure(s) so airfield operations remain minimally or completely unaffected. These solutions minimize airport delays, cancellations and the need to divert aircraft to other runways or even other airports.

The return on investment is quickly recaptured when one assesses the financial implications of closing a runway or airfield potentially costs the operator tens of thousands, if not even hundreds of thousand in potential fines and penalties per incident.

Avlite Solar Portable Airfield Lighting System

Avlite Systems' Solar Portable Airfield Lighting System (Solar PALS) is a convenient, fully transportable, autonomous lighting system for easy, rapid deployment supporting temporary or long term operations for both civil and defence airfields.

Once deployed, the lighting system can be controlled via a 2.4GHz encrypted mesh network capable of being operated from the tower, ground, or approaching aircraft by a Pilot Activated Lighting Controller (PALC).

The Solar PALS trailer contains all lighting and ancillary equipment required to support temporary or sustained fixed and rotary operations. The standard configuration is suitable for an airfield with a 5000ft/1500m runway.

- 52 x RF Controlled Runway Edge Lights (AV425-RF)
- 12 x RF Controlled Threshold Lights (AV425-RF)
- 4 x RF Controlled Runway End Identifier Lights (AV425-RF)
- 24 x RF Controlled Taxiway Edge Lights (AV-70-RF)
- Pilot activated lighting controller (PALC)
- Handheld controller(s)
- Mounting accessories

Avlite offers completely customizable solutions for their customers, Avlite trailers can be designed in a range of configurations for any application.

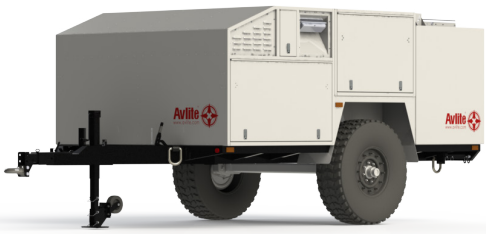
The Avlite Solar PALS Trailer has been built to military grade standards with an integrated charging system that allows for the full complement of lights to be simultaneously charged using standard external mains power feeds. A solar auxiliary system with battery backup provides power to the critical control equipment during deployment.

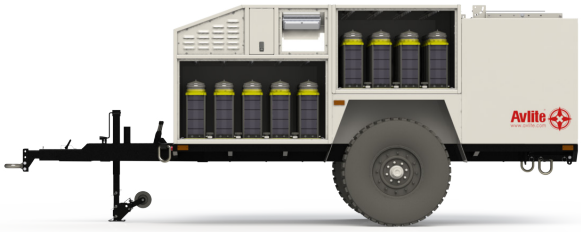
Features

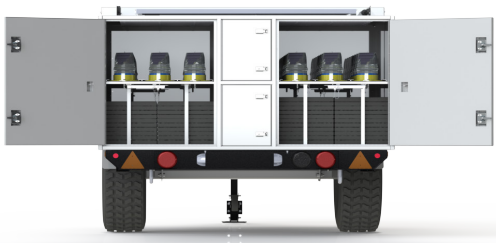
- All-in-one portable solar airfield lighting system
- Heavy-duty trailer design for transportation and storage
- In-trailer charging system for all lights when in storage
- Complete wireless control of airfield lighting once deployed
- Other trailer configurations available on request
- Customisable lighting configurations available to suit various applications
- Optional Infrared (IR) Mode, illumination invisible to the naked eye to support enhanced vision and NVG operations

Typical Applications

- Emergency airfield lighting
- Stand-by system in event of power failure
- Helipad Lighting
- Military Camps & Bases
- Humanitarian Aid Operations
- Medivac
- Resources







Solar Stand-by Airfield Lighting System

The Stand-by Airfield Lighting is permanently collocated with constant current runway lighting. The solar stand-by lights are controlled via an encrypted mesh wireless network capable of being operated from the tower, ground, or approaching aircraft when a Pilot Activated Lighting Controller is installed. The solar airfield lighting control can easily be integrated into existing airfield lighting control systems for automatic operation upon failure of the main lighting.

Stand-by airfield lighting is not only a reliable method of insuring runway lighting availability but comes with low Total Cost of Ownership. The lights are built with long lasting LEDs, solar radiation maintains battery charge, and there are no associated energy costs with the exception of battery replacements. Battery life is estimated at 4-7 years depending on the type of battery, environment and usage.

Conclusion

Portable or Stand-by Airfield Lighting is an ideal contingency solution for commercial airports. These systems provide airport operators with security and knowledge that there is an immediate solution to an airfield lighting failure. Leaving everyone dependent on the lighting less vulnerable.

The Stand-by lighting system is typically controlled via integrations with an existing Airfield Lighting Control System, separately via an encrypted mesh wireless network capable of being operated from the tower, ground, or approaching aircraft by a Pilot Activated Lighting Controller.

The real questions you need to ask yourself:

- **Do we have a contingency plan?**
- **Can we afford not to have this solution?**

Be proactive before there's an emergency and contact Avlite Systems today.

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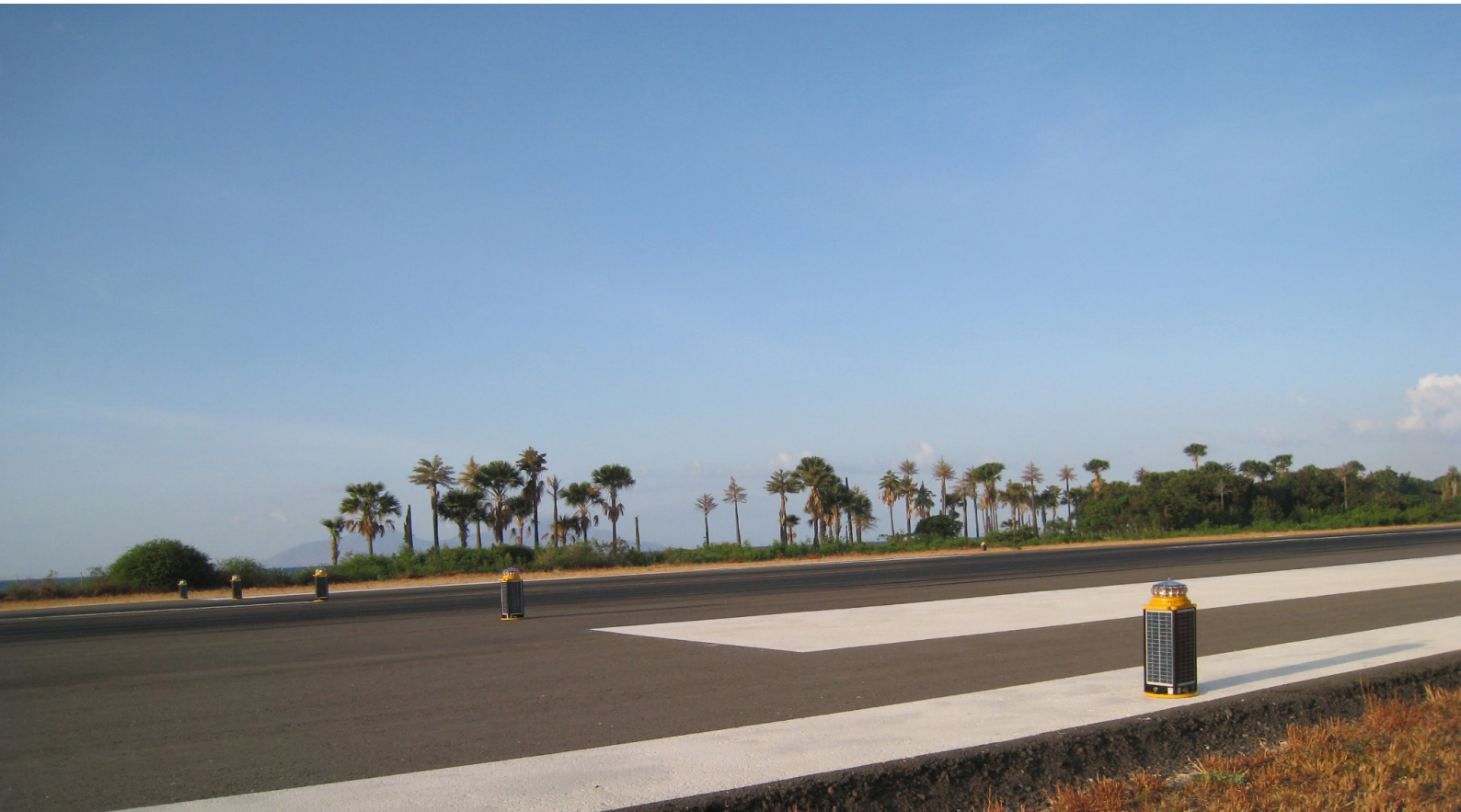

All Avlite Systems products are manufactured to exacting standards under strict quality control procedures. Avlite's commitment to research and development, investing in modern equipment and advanced manufacturing procedures has made us an industry leader in solar aviation lighting.

By choosing Avlite Systems you can rest assured you have chosen the very best.

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Agile Manufacturing

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Precision Construction

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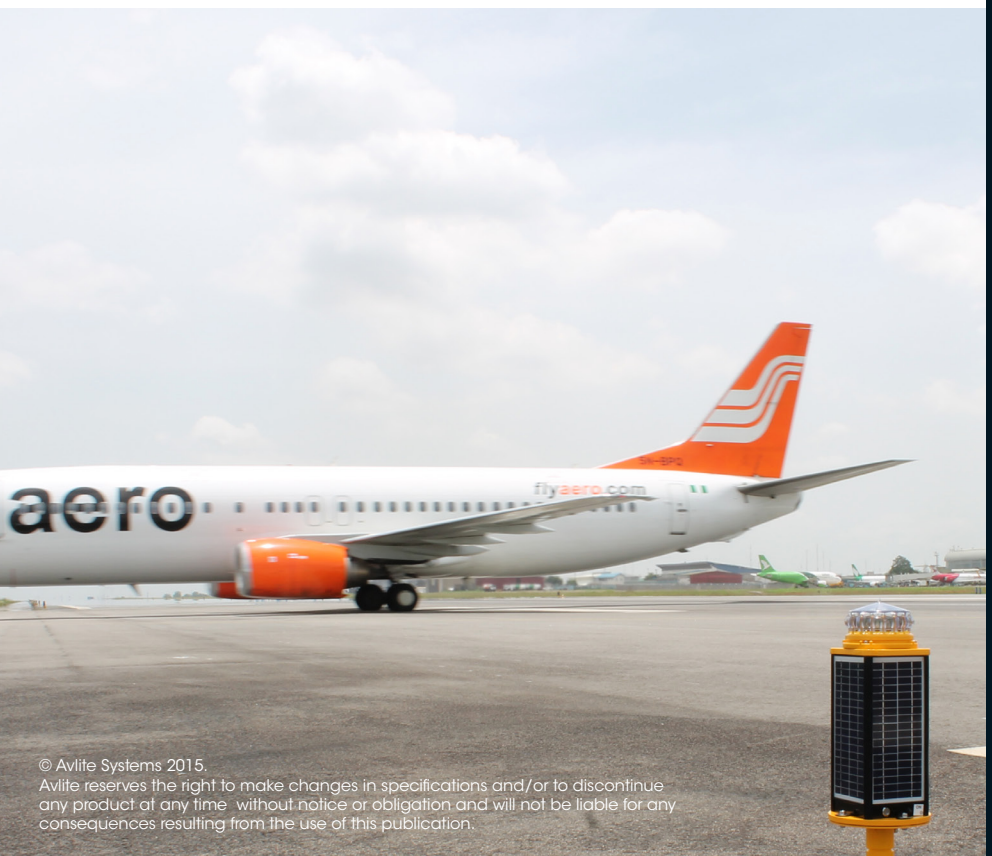

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