AIRPORT GROUND ACCUMULATION

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MANAGING GROUND ACCUMULATION RISKS POST TRIPOLI!

In this white paper, Russell Group Limited focuses on Airport Ground Accumulation hazards and risks, which we believe are rising significantly due to a range of emerging social, environmental, economic and political factors.

In today's increasingly complex aerospace environment the paper starts by focusing on the most granular airport hazards and concludes with an overview of the challenging Political Risks environment and natural perils facing aviation, aviation, hull war and political risk underwriters in 2016.

It all Started on a Grassy Field!

The earliest aircraft take-off and landing sites were grassy fields. Later, concrete surfaces would allow landings 24/7. The title of "world's oldest airport" is disputed, but College Park Airport in Maryland, US, established in 1909 by Wilbur Wright, is generally agreed to be the world's oldest continually operating airfield.

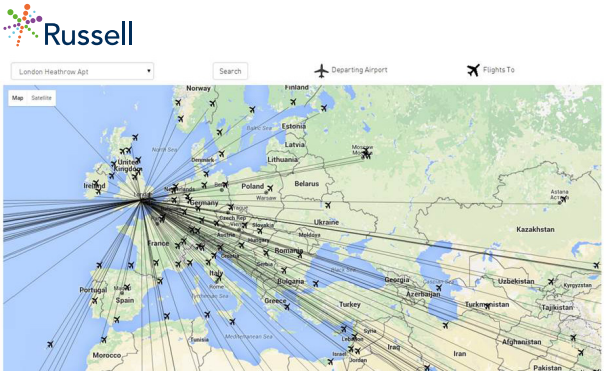
It's safe to say that Airports have moved on since then!

For example, Incheon International Airport, is the largest airport in South Korea, the primary airport serving the Seoul Capital Area, and one of the largest and busiest airports in the world. The airport has a golf course, spa, private sleeping rooms, ice skating rink, a casino, indoor gardens and a Museum of Korean Culture.

Rank 2014	Rank 2013	City	Total Flights	Percent Change
1	2	Chicago	881,933	-0.2%
2	1	Atlanta	868,359	-4.7%
3	3	Los Angeles	708,674	1.7%
4	4	Dallas/Fort Worth	679,820	0.3%
5	6	Beijing	581,953	2.5%
6	5	Denver	565,525	-2.9%
7	7	Charlotte	545,178	-2.3%
8	8	Las Vegas	522,399	0.3%
9	9	Houston	499,802	0.6%
10	12	London	472,817	0.2%

Top 10 Busiest Airports by Flights

The Airport's authorities claim that average departure and arrival takes 19 minutes and 12 minutes respectively, as compared to worldwide average of 60 minutes and 45 minutes respectively, ranking it among of the fastest airports in the world for customs processing.



Airports route map

An airport like Incheon International Airport is clearly a complex and potentially hazardous environment but all airports - large and small - share increasingly complex risks that underwriters need to understand, as we will learn in this white paper.

The need to understand exposures is becoming more pressing as international regulators take a closer look at airport safety management strategies – potentially a threat but also a major marketing opportunity for client-focused underwriters.

	Code	Airport	Country	Aircraft Total	Exposure
1	DXB	Dubai International	United Arab Emirates	252	$37,039,243,930
2	PEK	Beijing Capital Intl Apt	China	346	$34,692,819,653
3	PVG	Shanghai Pudong International Apt	China	311	$32,167,914,178
4	HKG	Hong Kong International Apt	Hong Kong (sar) China	226	$30,874,177,783
5	ICN	Seoul Incheon International Airport	Korea Republic of	225	$29,455,875,855
6	LHR	London Heathrow Apt	United Kingdom	337	$27,946,260,274
7	MIA	Miami International Apt	USA	296	$25,906,085,494
8	KMG	Kunming	China	419	$24,991,524,555
9	FRA	Frankfurt International Apt	Germany	230	$23,063,384,621
10	LAX	Los Angeles International Apt	USA	222	$20,519,789,564

Airport Exposure

Airport Safety Risk Management

The Airport Cooperative Research Programme (ACRP) recently published its ACRP Report 131: A Guidebook for Safety Risk Management for Airports (referred to from now on as ACRP Report), which provides guidance on conducting the safety risk management (SRM) process, one of the four components of a Safety Management System (SMS).

According to the 2015 ACRP Report's authors, with traffic growth, the number of accidents tends to increase if the level of safety remains constant. In such an environment there is a more pressing need to preserve public confidence so the aviation industry, using new technologies and approaches like SMS, needs to further reduce the chances of accidents.

The ACRP notes that: "As the industry becomes more complex and aircraft become more sophisticated, demands on airports will increase. The FAA is developing regulations to require 14 CFR Part 139 certificated airports to develop and implement SMS. This is a result of the International Civil Aviation Organization (ICAO) requirement for all member states (the United States being one) to develop and implement SMS for the regulator and the international airports of member states."

Safety Management Systems: A regulatory Requirement?

A key point that underwriters will note is that "The airport industry knows that SMS will become a regulatory requirement. SMS will require more knowledge and training for airport staff and stakeholders."

This point appears to be backed up by Joseph Strickland, global head of aviation for Allianz Global Corporate and Specialty Americas, one of the largest insurers in the world with operations in 14 countries, who is quoted in AIN online as saying: "The invitation for an insurer to visit the insured doesn't happen as often as it should, especially with single-aircraft operations, said Strickland.

Sometimes dubbed "safety engineering visits," these onsite meetings are typically reserved for the larger operations. But one reason to invite the insurer out is when a flight department wants to implement a safety management system (SMS). Insurers often have experienced people who can walk the flight departments through the SMS process.

"A growing number of flight departments are implementing SMS," said Strickland. "It's becoming another key area where pilots can enhance their operations through standardization and best practices. It's important, and it should be seen that SMS is a path toward safer operations."

The Federal Aviation Authority (FAA) recommends a 5-Step Safety Risk Management (SRM) process used by many airports carrying out an SMS. The 5-Step SRM process follows this sequence:

1. Describe the System
2. Identify Hazards
3. Analyze Risks
4. Assess Risks
5. Mitigate Risk

At a very granular level, airports are subject to numerous hazards and risks that require large Checklists on a risk register: checklists prepared for self-inspections may include the presence of Foreign Object Damage (FOD), pavement deterioration, and faults in the lighting system and signs.

An airport operations inspector is continuously searching for anything that may pose a safety risk to airport operations. Examples of hazards in this category include vehicles speeding on the ramp and equipment parked outside designated areas. For example, an airside driver striking an aircraft and causing minor damage during a ground handling operation.

Or take another example (ACRP report) - an airport decides to build a new terminal. "During the planning and design phases, the location and the size of the terminal are defined, and any impacts to the airfield. Many potentially, permanent hazard conditions can be avoided through an effective planning phase SRM—line-of-sight limits on the Air Traffic Control Tower (ATCT) personnel, airspace impacts, potential interference with existing and/or proposed surveillance equipment are just a few."

Often it is important to analyze a range of outcomes. For example, when dealing with bird strikes, control actions to address large birds causing damage to aircraft may not mitigate risks associated with smaller species.

Smaller airports may find the National Transportation Safety Board (NTSB) database useful. The NTSB keeps records for all aircraft accidents investigated in the United States and its territories and for aircraft registered in the United States. From January 2008 to April 2014, there were more than 7,800 General Aviation (GA) aircraft accidents in the United States; presumably, most of the aircraft involved were operating to and from GA airports. (NTSB aircraft accident database)

Micro Ground Accumulation Risks

These ACRP Report examples highlight a number of potential hazards including foreign Object Damage (debris) and even faded or removed pavement markings.

Having many workers and much equipment in a confined area, often under substantial time pressure, creates an environment in which injuries and aircraft damage may occur. Major system changes at the airport are sources of risks.

Some typical examples of such changes include: airfield improvements: runway rehabilitation and extension, construction of new taxiway, renovation of terminals, operation of a new large aircraft: B747-800, A380, changes to airport management, and rapid airport growth as aircraft operations and passenger numbers increase.

According to one white paper - The Wingman – A Portable Wingtip Collision Avoidance System – "Wingtip collisions have a wide variety of causes as well as levels of severity. They occur in taxi, hangar, and runway areas, and are a problem in both GA and Commercial Aviation. The causes of these incidents, although varying, can often be traced back to a loss of situational awareness by the operator in either of these situations."

The cost of even a small number of significant wingtip collisions can be enormous for an airline. Other indirect costs such as the cost of cancellations, loss of public image, and investigations can be far greater or more impactful than the direct physical damage. (Source: Vandel, 2004)

The cost for GA pilots is also a significant burden on the industry. Smaller scale incidents such as hangar rash are frequent but also more likely to go unreported in hopes of avoiding responsibility. Hangar rash is an aviation term that refers to minor incidents involving damage to aircraft that typically originate due to improper ground handling in and around a hangar, other aircraft or objects on the ground. Such aircraft are typically considered as good as new once repaired or re-skinned. Nevertheless, the occurrence of such incidents can cost thousands of dollars due to various replacement fees.

Wingtip collisions are very frequent. Each incident results in a loss of time and money for customers, operators, and owners. Presently, there are 27,000 recorded ramp incidents annually in commercial aviation, equal to approximately 1 for every 1,000 departures (Flightcom, 2013). Collisions on a small scale between aircraft and hangar walls occur daily and incur large costs for repairs as stated previously.

The direct costs of ramp damage to a Boeing 737 wingtip, for example, are estimated to be circa $256,000.

Hangar Losses

The total insured loss from a hangar that collapsed under the weight of snow at Dulles airport in 2010, crushing the aircraft inside, was estimated at up to $440mn at the time. The collapsed building was condemned following the incident.

The extreme weather conditions in 2010 caused a string of further hangar collapses across the eastern US and prompted catastrophe modelling firm Equecat to estimate the total insured cost of the storms at over $2bn.

The storms also took out Dulles Aviation's hangar at Manassas Regional Airport, but there were no people or planes in the 24,000 square foot building. Meanwhile, according to an Insurance Insider report from 2010, the landmark hangar at Salisbury airport in Maryland was destroyed by the snow. About 85 percent of the roof on the wooden building - the central piece of the area's first full-service airport - caved in.

Jonathan Stern of Schnader Harrison Segal & Lewis discussed the insurance ramifications of the Dulles Hangar incident in AIR Online remarking that several aircraft were insured at stated values higher than the actual market value of the aircraft. While this provided windfalls in the millions of dollars to some owners whose aircraft were totalled in the hangar collapse–and caused at least one other owner to sue his insurer when the insurer refused to total the aircraft–this practice could have insurers looking more closely at bringing stated values closer to market values.

"The stated value is intended to be an estimate of the aircraft's fair market value in used condition," said Stern. "[Stated values] tend to be overstated, creating a moral hazard because the aircraft owner actually stands to gain by a total loss of his or her airplane...This was a lesson learned for the

insurance companies, which might pay out $45 million on a given airplane because of the stated value, but only have a potential right of recovery of $32 million against the responsible parties because they're entitled only to fair market value in a tort suit."

Macro Ground Accumulation Risks

As we have seen, the role of the modern day underwriter is becoming more complex as the increasing relevancy of systemic risk focuses attention on more sophisticated exposure management techniques.

Globalisation, interconnectedness of economic, environmental, social and political factors, and new technologies and aircraft designs place the onus on underwriting professionals to be better informed.

War and Terror Risks

Looking at the wider picture, in Libya two years ago, militias armed with shoulder-launched missiles battled for control of the country's main airport. In Africa, the entire Sahel region is awash with weapons that include portable air defence systems leftover from the ousting of Moammar Gadhafi.

Before Tripoli, underwriters had not been thinking too much about ground accumulation, there had been very few events that had involved aircraft in the same place. There was an event in Jordan in the 1970s where three planes were high jacked and destroyed, Sri Lanka in 2001, and 9/11 but very few airport attacks so Tripoli has been a game changer.

Mitiga International Airport in Tripoli is still closed – there are aircraft in the airport that are reparable but deteriorating because they can't be maintained. Tripoli showed underwriters that they did not have a good understanding of their accumulation.

Then there's Syria's civil war, in which thousands of soldiers have defected and set up new battalions that have shot down military helicopters and jets. Volatile territories stretching from West Africa to Central Asia are putting at risk both commercial and light GA flights from ground-based weapons. The destruction of Malaysian Airlines Flight 17 demonstrates the dangers of flight across unstable territory where sophisticated weapons might be available to militants.

When it comes to airport ground exposures, the Aviation specialty insurance class is confronted with the emergence of new political and terror risks, which are increasingly volatile and often connect a range of different event scenarios.

What these risks have in common is that hostile states, terror groups and individuals frequently employ terror tactics that disrupt transport hubs, lines of communication and methods of travel, which is why airlines and airports are often a target, as happened in Tripoli recently.

Corruption

Can corporate and institutional corruption be an airport/aerospace risk? The answer is yes, potentially. We are currently witnessing a global interplay of risk drivers overlaid by corruption. In markets globally - whether you call them emerging markets, growth markets, the N11 and so on - we see medium or extreme risks of corruption. Systemic corruption drives societal and political risk, which can often lead to civil unrest. This is obviously something that for every sector, including the aviation sector, is a major risk.

How might this manifest itself as an airport hazard? Corruption and fraud divert essential resources and capital away from infrastructure and investment. Whether the investment is in the tools and assets needed to maintain an aircraft or training required to maintain ground crew quality standards the impact is potentially the same. If essential resources are therefore diverted away from an airport's infrastructure or people the results could be potentially catastrophic, which is why more underwriters are becoming interested in local social, economic and political changes – often represented by risk maps - on the ground.

Airports are complex and increasingly stressful environments not just for the passengers that pass through them but also for the workers that work there 24/7. Physiological Stressors can include early shifts, night shifts, weekend shifts, changing working hours, long working hours, and very intensive work conditions.

Airports in Areas of Political Risk

Corruption alone is not solely responsible for poor working conditions – other economic factors, including inequality and political strife play their part but alert underwriters will need to factor such hazards into their global risk map.

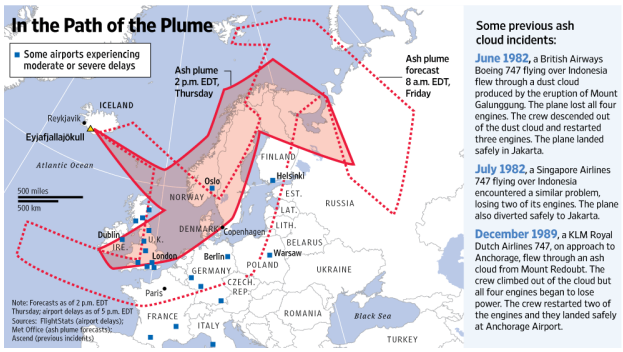
Connected World, Connected Risk

In today's increasingly connected world, technological disruptions have the potential to cause major Business Interruption issues. Insurers will need to factor IT disruption event scenarios into their risk and exposure models. As digitalization continues apace and global networks insinuate their way into all walks of commercial life, the threats and damage caused by deliberate or mistaken breakdowns in Information Technology systems are likely to increase exponentially.

From an airport operator's point of view, they might want to consider the use of augmented cyber insurance products to safeguard against such risks. The key word here for Underwriters is "connected." There is a wider concern about cyber exposures more generally and the impact on business interruption. A UK Cabinet Office spokesman has said that cyber-attacks are one of the "top four" threats to the UK's national security.

Natural Perils

According to the 2014 book Volcanic Hazards, Risks and Disasters, volcanic activity also has caused significant adverse effects to numerous airports worldwide with local to far reaching effects on travellers and commerce. The most common effect is temporary operational disruption ranging from flight cancellations to airport closures for periods of hours to weeks.

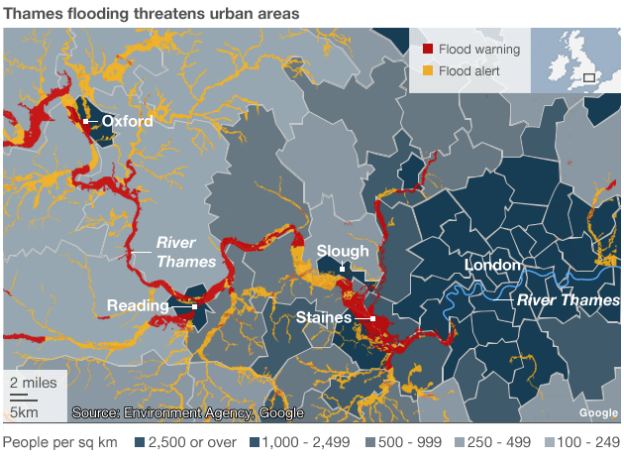


Icelandic Volcanic Activity

The main hazard is ash fall. The accumulation of only a few millimetres of ash on runways is sufficient to force temporary closure of an airport although disruptions have also been caused by air-born ash in the vicinity of airports without the deposition of ash on the ground. The accumulation of more than a trace amount requires removal of the ash in a manner that prevents it being remobilised by wind and aircraft.

More than 300 people were killed when devastating floods hit the Indian state of Tamil Nadu in December 2015. The rains have now stopped but businesses have been decimated, with factories, shops and offices destroyed. Photographs of Chennai's airport showed planes grounded by floodwater with many passengers stranded. The airport was closed with flights cancelled and diverted. The estimated insurance bill is $30 million caused by the floods.

Lloyd's has tested the scenario where Heathrow airport is flooded. This scenario is based on a heavy rainfall event moving from west to east across south-east England resulting in extensive flooding of the River Thames from Oxford to Teddington with secondary flooding on the River Colne from Ruislip south and surface flooding on the western and southern edges of Heathrow. The total flood extent covers 194 km2 and would cause significant impact on the major populated areas of Oxford, Reading, Slough, and the Henley areas of western London.



Heathrow and South West Floods

Surface flooding will cause disruption to Heathrow Airport with flooding from the west encroaching into Terminal 5 and the end of both runways. Further flooding from the south will affect cargo transit and handling facilities. The impact of pollutants should also be considered for indirect losses at London Heathrow airport, however, the Liability associated with potential pollution episodes will be difficult to calculate.

The other point to make here is that as demand for international air travel grows, Governments come under increasing pressure to build new terminals, runways (Heathrow) or even new airports (Thames Estuary aka Boris Island). Political pressures do not always lend themselves to good policymaking particularly when it comes to environmental decisions about airports.

A New Peak Aggregate Exposures Solution

Many of the issues that we have raised above require an integrated approach to underwriting risk management. It will become more important to have real-time knowledge of underlying accumulated exposure at the time of risk pricing, to encourage more informed risk selection decisions.

Russell Group is currently developing a cloud-based Ground Accumulation service that caters to the requirements of Aviation and Political Risks underwriters concerned about their Ground Accumulation war and natural perils peak aggregate exposures. The Aviation Hull War market is written by both Aviation and Political Risk teams and it is for them to understand where their peak accumulation exposures exist.

The data that underpins this new Ground Accumulation service shows where underwriters' peak exposure accumulations lie.

Russell Group is a leading risk management software and service company that provides a truly integrated risk management framework for (re)insurance clients operating across the specialty classes through its ALPS suite of products. Underwriting risk is, or should be, the primary concern of specialty (re)insurance companies in quantifying portfolio exposure, pricing risk, optimising reinsurance purchase and evaluating the amount of capital needed to support the portfolio.

Russell through its ALPS product provides an underwriting risk framework which delivers a complete and integrated understanding of underwriting exposure, capital utilisation and portfolio return on equity. If you would like to learn more about Russell Group Limited's ALPS solution for aerospace loss exposure management, please contact sbasi@russell.co.uk or rborg@russell.co.uk

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