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Airside Safety
HANDBOOK
4th edition 2010

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AIRPORTS COUNCIL INTERNATIONAL

AIRSIDE SAFETY HANDBOOK
Fourth Edition 2010

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FOREWORD

Safety is top priority for the air transport industry.

ACI is proud to present the completely updated and expanded Airside Safety Handbook. Most of the text it contains has been distilled from excellent guidance material available from several large Civil Aviation Authorities around the world, ACI Member Airports' operational safety procedures, ICAO material and other international aviation and non-aviation organizations' publications pertaining to safety. The content of this Handbook also builds upon the existing guidance in the ACI Policies and Recommended Practices Handbook, with safety related policies included in this publication for easy reference. While remaining short and succinct, it provides checklists for action, as well as an explanation of risks to be assessed and means of mitigation available. As stated in the text, local risk assessments are inevitably necessary to the safe operation of an airport.

The subject of airside safety is of great importance to Airport Operators who want to prevent, or reduce as low as reasonably practicable all foreseeable risks of accidents. In addition to personal injuries, material damage, the possible impact on airport operations and a possible negative perception by the travelling public, there are also important liability issues in case of an accident. These risks and issues have been discussed many times at ACI conferences and committee meetings; therefore, ACI believes that it has the responsibility to put forward a guide to best practice, to assist its members and by extension the airport community to enhance airport operational safety.

It forms part of a coordinated approach to Safety Management Systems, which ACI recommends to its members. It complements the Aerodrome Bird Hazard Prevention and Wildlife Management Handbook (First Edition, published in 2005) and the Apron Markings and Signs Handbook (Second Edition, published in 2009).

In the area of staff development, ACI's Global Training offers several courses via classroom delivery and online, such as the Global Safety Network Diploma.

ACI would like to acknowledge the members of the ACI World Operational Safety Sub-Committee (OSSC) who have contributed to, reviewed and edited the contents.

Angela Gittens
Director General
ACI World

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INTRODUCTION

This Handbook has been produced to provide airside managers with a comprehensive set of guidelines to enhance safety and to prevent, or to reduce as low as reasonably practicable accidents, incidents and occurrences at their airports. The aim has been to produce a current 'best practice' guidance document without being overly detailed – therefore, of necessity, it cannot cover all situations. Further information is available from the expanded Useful Documents and Websites at the end of this Handbook. These best industry practices should be implemented in a manner commensurate with the type and level of aircraft activities at a particular airport.

This Handbook is a guide to airside operational safety. It is written for airside managers and builds on previous work by ACI – namely the Airside Safety Handbook 3rd edition. The remit of this Handbook has been widened to include a number of selected topics relating to safe operations in airside areas.

Aviation throughout the world continues to grow, airports become busier and more congested and the number of flights and the size of aircraft increase. The requirement for an airport operator is to facilitate this growth in a safe environment for airport users, staff and aircraft.

Various bodies have produced both regulations and guidance covering a number of aspects of airside safety, both nationally and internationally, including from within the industry. This Handbook is intended to complement such material by offering guidance in areas perhaps not covered in sufficient detail. It updates and brings together the best elements of managing airside operational safety from current experience of those involved in this important task from airports around the world.

1

AIRPORT SAFETY CONCEPTS

1.0   INTRODUCTION

"Flying is the safest form of transport" - a common expression of which the aviation industry is justifiably proud. The safety and security of our air transport system is no coincidence. Throughout the history of flight, safety has been top-of-mind. While most people know that the industry is safe, people who do not work in aviation are seldom aware of the extraordinary lengths gone to by airport operators, airlines, pilots, aircraft manufacturers, air traffic control organizations and service providers to retain this good record and continually strive for improvement.

This dedication to safe operations is seen across the whole aviation sector, from the huge progress in aircraft design including avionics, engine and system reliability, to less well-known matters such as dimensional standards for airfield layouts. The safety culture is an integral part of the industry and takes on many forms, including standard operating procedures, adoption of new technology and ensuring that safety is the driving force behind airport operations. ACI strongly believes that safety is who we are and what we do, not just any day, but every day.

1.1   CERTIFICATION OF AIRPORTS

ICAO Annex 14 – Aerodromes, Volume 1, Aerodrome Design and Operations, contains Standards and Recommended Practices that prescribe physical characteristics and obstacle limitation surfaces to be provided at airports, and certain facilities and technical services normally provided at an airport. It also contains specifications dealing with obstacles outside those limitation surfaces. *ICAO Annex 14 - Aerodromes, Volume 1* does not include specifications relating to the overall planning of airports, impact on the environment, or to economic or non-technical factors that need to be considered in the development of an airport. Information and / or guidance on these subjects is included in the *ICAO Airport Planning Manual Part 1,* respectively *Part 2*.

Further information can be found in the *ACI Policies and Recommended Practices Handbook*, **Sections 5.1** and **5.2.**

> **5.1**   *The Recommended Practices (as distinct from Standards) for airport design in Annex 14 should NOT be made mandatory for certification purposes. Safety regulations should be clear, practical, efficient and similar worldwide: safety measures related*

*to design and operations should be implemented where they give the highest
benefit, and with international consistency. Regulations should not be written in
an excessively prescriptive manner, but allow aerodrome operators the flexibility
to mitigate risk in different ways. Airports which have been certificated under pre-
existing arrangements should not be arbitrarily refused certificates, or required to
comply with new standards without due notice or a transition period, taking into
account any site impediments at the airport.*

5.2   *Design standards should be based on hazard analysis, taking into account the
probability and severity of all foreseeable and known hazards. ICAO Annex 14 should
reflect the Target Level of Safety (TLS) approach to design.*

1.2   AIRPORT OPERATIONAL REQUIREMENTS

In addition to the best industry practice guidelines contained in this publication, ACI has published a
number of policies, the full text of which can be found in the *ACI Policies and Recommended Practices
Handbook, **Sections 5.3, 5.4, 5.5, 5.7, 5.10** and **5.12**.*

New large aircraft present challenges to airport operators.
Geneva International Airport

New Large Aircraft (NLA)
5.3   *The full implications of the introduction of new large aircraft need to be carefully
studied. ACI considers that NLA should not be planned to exceed Code F wingspan
and wheel span, and in particular, wingspans of over 80 metres may prove
unacceptable. Aircraft manufacturers should design all future aircraft in a manner
which does not provide greater stress to pavements than current aircraft. The costs
of modifications to airports to accommodate new aircraft types should be recovered
from airport users.*

Width of Runways and Runway Shoulders
5.4   *The runway width recommended by ICAO for Code Letter E is 45 metres, and for
Code Letter F is 60 metres. ACI believes that existing 45 metre runways may also*

safely handle Code F operations, provided that adequate shoulder width and aircraft guidance systems are provided.

Width of Taxiways, Taxiway Shoulders and Taxiway Bridges

5.5 *The taxiway width recommended by ICAO for Code Letter E is 23 metres, and for Code Letter F is 25 metres. ACI believes that existing 23 metre taxiways may also safely handle Code F operations, on the condition that adequate aircraft guidance systems such as centre line lighting are provided. The width of a taxiway bridge should not be less than that of the pavement plus shoulder width of the connecting taxiways (exclusive of shoulder provided for FOD-protection).*

Visual Aids and Advanced Surface Movement Guidance and Control Systems (A-SMGCS)

5.7 *ACI supports efforts to develop and implement Advanced Surface Movement Guidance and Control Systems (A-SMGCS) to provide surveillance, alerting, guidance and control.*

Effects of New Developments on Airport Operations

5.10 *ACI recommends that the responsible authority should require an evaluation of all proposed new buildings and changes of landscaping which may affect the safety of aircraft operations. The evaluation should be carried out in conjunction with the airport operator and air navigation service providers. ILS and radar reflection problems should also be borne in mind, as well as reflection of sunlight. Obstacle limitation surfaces should be protected, including from obstruction by new developments and activities inside or outside the airport boundary.*

Simultaneous Operations on Parallel, Near-Parallel or Intersecting Instrument Runways

5.12 *ACI supports all efforts to achieve simultaneous operations on parallel or near-parallel instrument runways under visual and instrument meteorological conditions which are consistent with operational safety and efficiency. At airports with intersecting runways, to enhance capacity Simultaneous Intersecting Runway Operations (SIRO) may be allowed following appropriate hazard analysis and risk assessment.*

1.3   RISK ASSESSMENT AND CONTROL

Risk assessments allow airport operators to develop an objective assessment of the risk associated with a specific activity. Risk assessments should be conducted for every task to be carried out by staff and can also be carried out on a higher level of the operational business, for example concerning bird strikes or runway incursions.

Different countries will have separate requirements depending on their local legislation and environment. The 5 simple steps listed below are the basis of a risk assessment as outlined by the UK Health and Safety Executive (HSE):

1. Identify the hazards
2. Decide who may be harmed and how
3. Evaluate the risks and decide whether the existing control measures are adequate or whether more should be done
4. Record the findings
5. Review the assessment and revise if necessary

In practice, most sectors of the aviation industry have already had some form of risk assessment applied to them and already have some form of control measures in place. In this situation the following steps may be useful:

1. Identify the tasks / areas to be assessed
2. Analyze and break down the tasks into manageable pieces
3. Identify and list all the hazards
4. Record and review the existing control measures (starting with the most effective)
5. Assess the remaining level of risk using the risk assessment matrix (see below)
6. Decide whether further action is needed to reduce the level of risk as low as reasonably practicable
7. Complete and communicate the assessment results
8. Review the assessment regularly (not less than once a year), whenever there is a change to the circumstances, or when there is an accident, incident or serious occurrence

The process of carrying out a risk assessment involves a trained risk assessor and a group of experienced individuals familiar with the task. The hazards need to be identified and the probability of them occurring should be tabulated in a risk assessment matrix (an example of a risk assessment matrix is shown following).

CONSEQUENCE	PROBABILITY				
	Very High	**High**	**Moderate**	**Low**	**Very Low**
Very High					
High					
Moderate					
Low					
Very Low					

Green   *No further action required beyond measures currently in place.*
Amber   *The current residual risk requires a review of available options and possible action.*
Red   *The current residual risk requires further action to reduce it.*

Once the risk assessment matrix has been completed, the hazards with highest probability and severe consequences (located in the red squares) can easily be identified. These are generally the ones that need to be addressed first. The next step is to develop a plan for remedial action to eliminate or reduce the risk to a level as low as reasonably practicable. In some cases, when there is already a solution in place, the development of additional control measures can be the best way to further reduce and manage the risk.

There are a number of matrices currently in use with varying definitions for the values for probability and consequence. The template shown above is used by many entities worldwide and is considered to be appropriate for the purposes of a risk assessment. The actual detail of the risk assessment matrix is not so important; however, the value of this type of assessment is to prioritize certain risks for remedial action or review.

Risk assessments should be reviewed on a regular basis to ensure they remain valid. They should also be reviewed after any accident, incident or serious occurrence and compared with the initial assessment. This is particularly important to ensure any lessons learned from an accident, an incident or a serious occurrence are incorporated in the risk assessment. Sometimes these lessons learned may not have been thought of when action plans were originally written. Here are some suggested areas for assessment:

Staff Tasks:
- Aircraft marshalling
- Bird and wildlife control and use of firearms
- Runway inspections
- Airside driving
- Exposure to Man Made Mineral Fibres (MMMF)
- Runway change procedures
- Use of airport cleaning vehicles
- Use of airport snow removal vehicles
- Spillage clean-up process
- Use of air bridges
- Activation of low-visibility procedures (LVP)
- Removal of disabled aircraft actions

© Christian Bechir

Risk assessments allow airport operators to develop an objective assessment of the risk associated with a specific activity. In this case, the loading of a humanitarian flight.
Geneva International Airport

Business Risks:
- Runway incursions
- Adverse weather operations
- Aircraft-aircraft collision on the ground
- FOD damage to aircraft
- Aircraft fire
- Major bird strike causing accident

- Loss of supply of utilities (electricity, water, gas) or other essential services (telecommunications, fuel)
- ATC evacuation / loss of ATC service

Risk assessments should be appropriately documented to create an overall airport risk portfolio. Wherever possible, a follow-up and control process should be implemented allowing the safety manager to easily update and manage the airport risk portfolio. Furthermore, certain risks will also need to be reviewed in cooperation with third parties. The safety manager should ensure there are appropriate communication and cooperation methodologies in place with the third parties at the airport so that any risks identified are communicated in a timely and appropriate fashion.

1.4   WORKPLACE HEALTH AND SAFETY

The health and safety of all staff, airport or third party, working airside needs to be given careful consideration. Risk assessments should be carried out covering each task that airside staff are required to complete. An airport should also ensure that third party companies (including contractors) operating airside, have completed risk assessments for the activities of their staff. Once the hazards and residual risks have been identified, using a risk assessment matrix as in *Section 1.3*, the hazards identified should be eliminated or reduced as low as reasonably possible. One method to do this is to consider the following options (item 1 being the best and item 6 being the minimum):

1 *Eliminate*: cease doing the task; remove the hazard altogether
2 *Reduce*: reduce the time exposed to the hazard; substitute with something less hazardous (e.g. a 12V system to replace a 240V system)
3 *Isolate*: physically isolate people from the hazard – fit guards; enclose the hazard
4 *Control*: create a safer working environment; require work permits to be issued; ensure appropriate supervision is in place; train staff; require staff to follow procedures
5 *Provide Personal Protective Equipment (PPE)*: issue personal protective equipment appropriate to the identified hazard; provide training; do fit testing; monitor use; and perform regular maintenance
6 *Discipline*: put procedures in place requiring staff to behave in a particular way
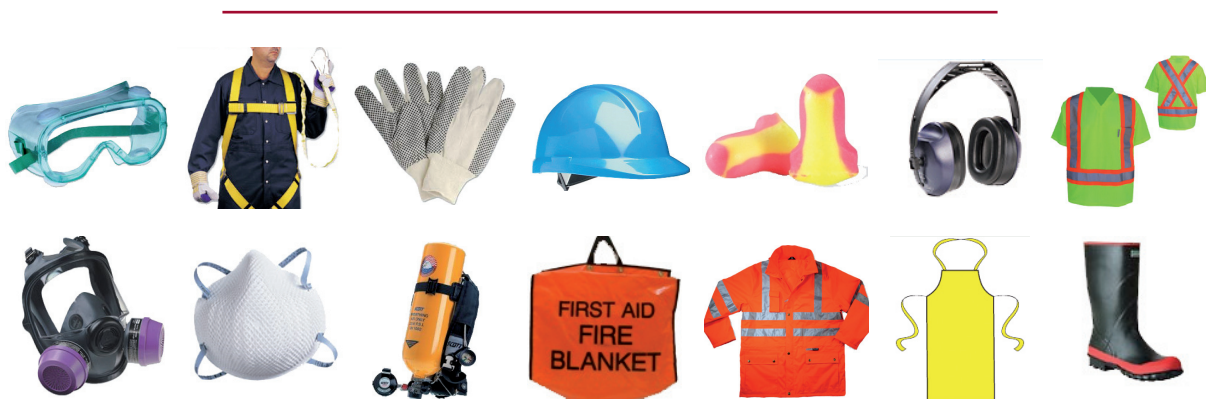
As regards PPE, it is a recognized best practice for an airport operator to ensure that staff wear the required PPE and follow the procedures when carrying out a specific task. Items of PPE may include:

ear defenders, hi-visibility tabards / jackets, safety shoes, gloves, goggles, hard hats, respirators, fall protection, etc.

Ideally, all people working on the airside areas should be presented with a general safety culture where it is expected that PPE is worn. In such a safety culture, any person identified without the appropriate PPE should be challenged by any other individual. In addition, this subject should be reviewed jointly by a number of companies that operate in the same area and joint responsibility should be undertaken to reduce exposure. This approach can be applied to issues such as noise, fumes, slips / trips / falls, as well as musculo-skeletal disorders arising from manual handling or ergonomic issues. Reviewing causes of staff absence / sick-leave can reveal trends that can usefully focus on preventative steps.

Removal of the source of the identified problem is the best method to bring about improvements in health and safety – wearing appropriate PPE, although highly recommended, is the last step to be taken when nothing else can be achieved to reduce the exposure.

It must be noted that some countries may have specific workplace health and safety legislation, which needs to be considered for each separate location. In addition, Workplace Health and Safety Committees could liaise with airport safety committees to discuss common concerns affecting several employers.

Further information can be found in the *ACI Policies and Recommended Practices Handbook,* **Section 5.21.**

Airside Safety Training
5.21 *Before receiving an airside security pass, all staff having access to airside, including contractors, should receive appropriate safety training, which highlights the hazards associated with that area.*

1.5 ACCIDENT, INCIDENT AND OCCURRENCE REPORTING

When accidents, incidents and occurrences are caused in airside areas, procedures and processes need to be in place to:

- Deal with the aftermath and effects
- Report and record all the pertinent details to enable subsequent investigation (*Section 1.6*)
- Ensure emergency services attendance
- Establish safe temporary closures of the area affected
- Clean up and return to service
- Communicate with other airport users

Ideally there should be a telephone number or radio reporting method for everyone involved in, or who is witness to an accident, incident or occurrence. It is recommended that a single, central, easily remembered telephone number be used. At some airports, online reporting (e-mail notification) has been implemented. There should be a clear requirement for everyone working airside to report accidents, incidents and occurrences in a timely manner. Non-punitive reporting should be encouraged.

The staff receiving these calls should have 'action sheets' or similar forms to record call details and subsequent actions such as notifying the fire service, airport operations and other relevant agencies. Operations staff should go to the scene to record all details and whenever possible, take photographs and make visual records.

At some airports an automatic computerized notification system may be in place, relaying key occurrence details over a computer network to interested parties. Safeguards should be established to address privacy concerns. Some airports are equipped with clearly identified and readily accessible emergency direct dial phones on the apron for timely notification of occurrences.

Once the immediate health and safety needs of the people involved have been dealt with, a more comprehensive report should be completed. This should include all relevant details in order to enable a full investigation to identify the root cause(s). Full details of all accidents, incidents or occurrences should be recorded in a database to enable queries and detailed analysis.

Consistent reporting is extremely important as it will allow trends to be observed. Research into general industrial safety indicated that for every 600 reported occurrences with no injury or damage, there are on average:

- 30 incidents involving minor property damage or minor injuries
- 10 accidents involving major property damage or serious injuries
- 1 major or fatal injury
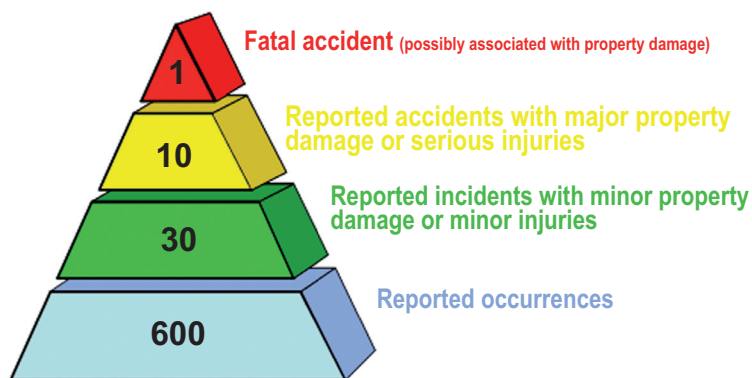
A typical accident pyramid, for every 600 occurences only one is fatal but 40 are worth reporting.

1.6   ACCIDENT, INCIDENT AND OCCURRENCE INVESTIGATION AND ANALYSIS

To the extent possible, all accidents, incidents and occurrences should be investigated in order to correctly identify the root cause(s). This is essential to finding solutions to prevent future accidents, incidents or occurrences. Often a number of factors occurring at the same time can cause an accident, incident or occurrence. These can be, for example:

- Misunderstood communication
- Inadequate signage, markings or lights
- Inadequate training of those involved
- Trained staff not acting in the way they were trained
- Too infrequent refresher training
- Inadequate equipment / mechanical condition / mechanical failure
- Tasks carried out too quickly with inadequate resources
- Failure to use PPE
- Inadequate risk assessment
- Human and organizational factors
- Non-adherence to Standard Operating Procedures (SOP)
- Inadequate response to changing circumstances

On a periodic basis an analysis of all accidents, incidents or occurrences in the database should be undertaken. A common taxonomy is to be used to describe the collision such as 'vehicle-vehicle' or 'vehicle-aircraft'. All occurrences including personal injuries, damage to vehicles, equipment, buildings and aircraft should be recorded. Classifications can also be used to denote the seriousness of accidents, incidents or occurrences.

Investigative trend analysis can examine the databases from a number of perspectives, which may include:

- Airline
- Handling agent
- Stand number / location
- Time of day / night / year
- Physical and weather conditions
- Staff training and experience
- Aircraft type / vehicle type / equipment type
- Type of accident, incident or occurrence – e.g. slips or trips, falls from height, jet-blast, baggage loader contacting aircraft fuselage, etc.

The primary use of this data is for prevention: understanding events in the past enables steps to be taken to prevent the recurrence of a similar event in the future. In general the data will reveal the magnitude of a specific problem; determine the overall costs; analyze trends to direct future preventative actions; and pinpoint particular tasks that are 'high risk'. If specific trends become obvious for any of the above factors these will point to aspects of the activities that are in need of review. Analysis can be presented in a number of ways:

- High risk area (including 'hot spots') maps of accidents, incidents and occurrence locations
- Graphs of numbers of accidents, incidents or occurrences per month
- Graphs of each type of accidents, incidents or occurrences per month
- Graphs of accidents, incidents and occurrences factored per 1,000 or per 10,000 aircraft movements

It should be noted that the greatest deficiency in accident, incident and occurrence investigation is the lack of competent follow-up.

1.7 DANGEROUS GOODS

Dangerous goods can be safely carried in aircraft holds. In order to be prepared for specific events related to dangerous goods, the fire services of an airport should be able to obtain, from the airline's cargo manifest, particulars of materials carried on a specific flight. Further details can be found in *ICAO Annex 18 – The Safe Transport of Dangerous Goods by Air*, as well as in the *IATA Airport Handling Manual*.

Airport fire services will require suitable personal protective equipment (PPE) to deal with aircraft damage incidents involving modern composites increasingly used in aircraft construction.

Fire fighters with personal protective equipment handling dangerous goods. Auckland International Airport

Further information can be found in the *ACI Policies and Recommended Practices Handbook, **Section 5.26.***

Dangerous Goods

5.26 *Airports should facilitate the transportation of properly documented and packed consignments of dangerous goods but should also have appropriate contingency measures in place to handle incidents involving them.*

1.8 HUMAN AND ORGANIZATIONAL FACTORS

'Human factors is about people in their living and working situations; about their relationship with machines, with procedures and with the environment about them; and also about their relationship with other people. In addition, it also includes interactions among individuals and groups and the organizations to which they belong and to the interactions among the organizations that constitute the aviation system' *(ICAO Doc 9683)*. ICAO has also included Human Factors' requirements in *ICAO Annex 14 - Aerodromes, Volume 1*, more particularly in *Chapters 9.1.6, 9.2.39* and *10.1.2*.

Airport operators should take into account human and organizational factors in all aspects of operational safety:

- Stress, fatigue, environmental, ergonomic, health and safety considerations
- Alcohol and substance use (including some prescription drugs)
- Training, certification, awareness, information management
- Change management (new job requirements, staff turnover)
- Procedures, rules, regulations and policies
- Equipment, tools, machinery
- Human attitudes, knowledge and performance limitations
- Teamwork, leadership, communication
- Responsibilities and accountabilities
- Time constraints, shift work
- Motivation, feedback, approval and respect
- Errors, violations, omissions and mistakes

1.9 STAFF COMPETENCIES, TRAINING REQUIREMENTS AND COMPETENCY CHECKS

Individual employers are responsible for ensuring that all staff is trained for each task they are required to carry out. The details of such training will vary depending on the person's experience and background and the complexity of the task. Key elements of training to be addressed include:

- Theoretical training
- Practical training including demonstration
- Testing understanding and demonstrating ability

In order to demonstrate competence in a specific task, the individual should need to show that the theory, practical training and local knowledge can be applied together in a satisfactory way. Competency checks can easily be completed during day-to-day activities by having a qualified individual accompany the staff member on a task they are required to complete. Records of all the steps taken to achieve the task should be made and an evaluation should be completed. An example of a competency check sheet for aircraft marshalling is included in *Annex A* .

Depending on the frequency of a task, refresher training should be arranged at suitable intervals. For a team or section to be recognized as competent, periodical audits or checks need to be carried out and recorded. All shortfalls should be addressed by reviewing and updating the training material, refresher training or the frequency of refresher training. Similarly, after any accident, incident or serious occurrence, it may be prudent to review training to ensure it remains appropriate.

1.10 AIRSIDE INSPECTIONS AND AUDITS

Conducting regular inspections and audits is a key aspect of ensuring the safety of airside operations. All airside areas need to be periodically checked to ensure they are serviceable and available for use. Particular attention should be paid to the aircraft movement area, namely runways, taxiways and aprons including airside roads and grass areas. The purpose of such inspections is to ensure that:

- No FOD is present
- The surface condition is suitable (no loose material)
- No birds or other wildlife are present (bird and wildlife presence is monitored and controlled)
- The paint markings are visible and correct
- The signs are visible and correct
- The lighting is serviceable
- Equipment provided is safe for use and serviceable

An airside safety operative conducting a safety inspection.
BAA plc

It is often beneficial to repeat these inspections during low visibility conditions (e.g. after dark or during adverse weather) to check the lighting, signs and markings.

The importance of diligence and accurate recording of these inspections and audits cannot be overstated. To reinforce this, it is good practice to confirm that the checks have been carried out and that the duty supervisor has performed quality control of the checks. Furthermore, senior management should also carry out a periodic check to ensure that the reports have been completed, all deficiencies noted and passed on for rectification, as well as visit airside to check that everything has been reported. Records should be kept according to national requirements, but not less than five years, and negative or exceptional reporting will not be accepted.

1.11   ASSET MANAGEMENT

Asset Management is a structured method that addresses maintenance responsibilities, ownership of items on the airside as well as removal from and return to service procedures. All assets on the airport should have a clear owner within the organization; this owner should be a named individual. One of the benefits of this type of system is that a clear responsibility for each asset is assigned, therefore preventing possible gaps in ownership. The owner of any asset on an airport is required to ensure that:

- Each asset is registered, with a unique identification
- Levels of serviceability are agreed upon between all the stakeholders
- Operating instructions are produced to enable staff to make safe use of the asset and checks are made to ensure that they are followed
- Training for staff is in place to ensure competency – both by operators and maintenance personnel

- A maintenance strategy is in place and can be carried out by trained and competent personnel
- A maintenance inspection regime is in place and is carried out in accordance with a specified scheme and schedule
- An access strategy has been developed to ensure integrity when out-for-maintenance, recognizing that even vital pieces of equipment need to be off-line for maintenance
- A process has been identified to agree how modifications should be designed, authorized and introduced
- Operational time windows should be agreed upon defining when maintenance work can occur
- A clear, positive and unambiguous written hand-over process occurs when assets are removed from and returned to service
- A works authorization and control procedure is in place
- Contingency plans exist to deal with any failures
- Any legal or statutory checks are complied with, including fire strategies, certification requirements, etc.
- Safety records are maintained
- Change control processes are in place, including subsequent communication to affected parties
- Funding for maintenance and capital replacement is acquired

All the above processes and activities should be recorded and documented, and records should be kept according to national requirements, but not less than five years.
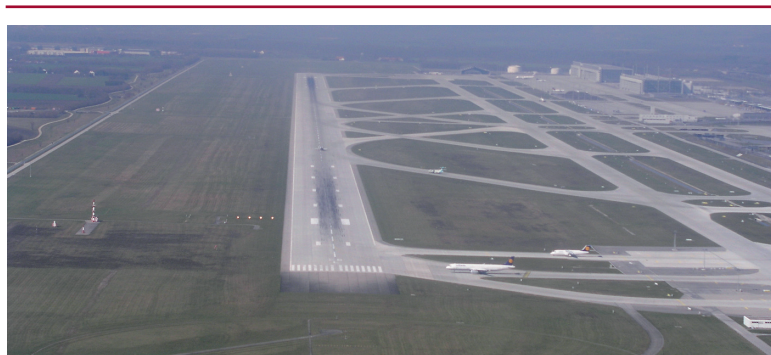
Airports cover vast areas, so it is important to have appropriate asset management procedures in place. Munich International Airport

1.11.1   Fault Reporting

Fault reporting should be easy to conduct in order to ensure that all observed faults actually get reported. The process should include a specific location and adequate detail to ensure the correct location or piece of equipment is identified along with the exact nature of the reported fault. Furthermore, it should be possible for those involved in airport safety to subsequently track the progress of the rectification work and to be aware when the fault has been completely rectified. Documents should be disseminated explaining the type of fault (e.g. cracks, rips), whether these are acceptable or not (after a risk assessment), or have to be rectified within a certain period of time. This type of document will enhance awareness of desired levels of safety within the airport community.

Specific fault reporting software and products exist on the market to allow the development of adequate procedures as well as the management and storage of data. Historical records should be kept according to national requirements but not less than five years; these can form a useful database of fault tracking and trend analysis.

1.12 AIRSIDE VEHICLE PERMITS (AVPs)

Some airports issue an airside vehicle permit for any vehicle and / or mobile equipment operating airside including to airport authority, emergency response, security and police vehicles, as well as other vehicles required for airport operations. This would allow the airport operator to better control the number of vehicles and / or mobile equipment on the airside, to better monitor compliance with safety requirements, to keep maintenance records up-to-date, and to compile computerized records for any vehicle and / or mobile equipment involved in an accident.

Some airports use a colour coded sticker (each colour giving access to a specific area), which is time sensitive (expiry with year and month), which has to be affixed to the vehicle and / or mobile equipment in a highly visible location. Temporary visitor permits could be issued for a limited duration and escort requirements would apply.

The granting of a permit should require:

- Suitable livery and marking of the vehicle and / or mobile equipment
- Presence of an obstruction light (as required)
- Inclusion of the vehicle height within the cab visible to the driver
- Proof of serviceability and maintenance of the vehicle
- Provision of third party insurance cover to the required level established by the airport operator

Note: at some airports, private vehicles are allowed to operate airside. However, the same stringent conditions mentioned above should also apply.

1.13 OPERATION OF VEHICLES AIRSIDE

Local rules for vehicle operations on the airport should be made available and distributed to all users. Requirements should include:

- Airside vehicle permits (AVP)
- Establishment of 'NEED and RIGHT'
- Speed limits in defined areas
- Vehicle serviceability standards
- Environmental or emissions standards
- Parking and NO PARKING requirements
- Livery or markings
- Use service roads (and to the extent possible public roads)
- Requirements for obstruction lights
- Use of lights in darkness or day-time running lights
- Security of loads
- Use of taxiway crossings

- Limitations on the numbers of trailers towed
- Rules for operating vehicles on stands and around aircraft
- Right of way
- Penalties for non-adherence to the rules
- Height restrictions
- Specialist vehicles, such as fire fighting vehicles, may need variations on the standard rules depending on their nature. Any non-standard operations will need clear communication to all other road users. ATC needs to be involved in agreeing on the development and dissemination of such procedures.

Aircraft tugs in particular require special procedures due to their size, manoeuvrability and nature of operation moving aircraft on the manoeuvring area.

Requirements may include:
- Communication between the tug crew and the flight deck, and between the tug crew and ATC must be maintained (Tug drivers must constantly listen to the appropriate ATC frequency and be capable of clear use of RTF).
- Coordination of actions must be achieved covering the following points:
  - Application / release of the aircraft brakes
  - ATC permission to push back
  - Aircraft engine start
  - Tow bar disconnection / raising or lowering of the aircraft if towbarless tug used
- Removal of steering pins and gear locks
- Tug crew at a safe distance for aircraft to taxi

Tug and pushback operations require training, communication and coordination. Hong Kong International Airport

Further information can be found in the *ACI Policies and Recommended Practices Handbook,* **Section 5.22.**

5.22 *Aerodrome operators should publish comprehensive rules and introduce a permit system governing all vehicles and mobile equipment to be operated airside, and their drivers.*

1.14   FOD PREVENTION

Debris on the airport presents a hazard to aircraft in a number of ways. Education of all airport staff about the hazards posed by debris is important – ideally this can be incorporated into the process to grant staff airside access (issuing an ID card). Prevention through education is the first step; however, it is also necessary to have a process to regularly clear parts of the airport of debris, especially the apron areas. Removing FOD should be the responsibility of everyone.
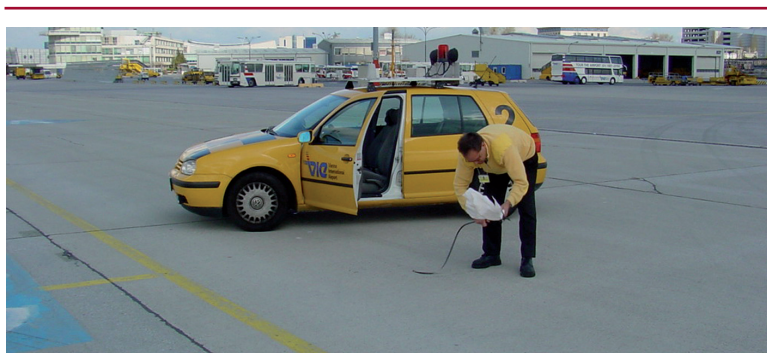
Removing FOD is everybody's responsibility. Vienna International Airport

Special FOD bins should be provided in specific locations for debris to be deposited. FOD bins should not be used for aircraft rubbish bags, oil cans or other non-FOD rubbish. Specialist teams of staff with sweeper vehicles and brushes may be required at some airports. Other measures can help reduce the risks from FOD. These include:

- Ensuring all airlines / handling agents check an aircraft stand prior to the arrival of the flight and are committed to active FOD prevention
- Maintaining good housekeeping practices
- Ensuring tenants pick up FOD within the areas under their control
- Installing catch fencing in open areas of the airport to trap wind-blown debris such as newspapers and plastic sheeting
- Organizing regular joint airport, airline, handler apron FOD walks to check for FOD and to identify its source
- Organizing campaigns and publicity to remind staff of the dangers presented by creating FOD
- Ensuring that contractors involved in construction projects are aware of the need to contain all their materials on-site and not allow spillages to enter the aircraft areas
- Setting up a runway / taxiway / stand inspection or sweeping schedule of suitable frequency.
- Analyzing items of FOD to identify the likely contributors
- Reviewing items of FOD at Airside Safety Committee meetings involving airlines, handling agents, support companies and aircraft maintenance organizations

Airport operators should include aircraft maintenance organizations in their FOD reviews as there have been reported incidences of tools and chocks accidentally left in aircraft, which have subsequently fallen out and become hazardous FOD items.

FOD bins should be provided in specific locations and not be used for non-FOD rubbish. Brussels International Airport

Further information can be found in the *ACI Policies Handbook and Recommended Practices,* **Section 5.18.**

> **5.18** *In order to protect aircraft against Foreign Object Damage (FOD), and in particular the risk of ingestion of debris by aircraft engines, aerodrome operators should ensure that active measures are taken to keep airside areas clear of loose objects and debris. A written programme should be established, setting out the practices and procedures as required. Regular consultation should take place with the Airside Safety Committee, to obtain widespread support for FOD prevention measures. It is recommended to collect and measure the amount of FOD found on the airside at regular intervals.*

1.15   AIRSIDE DRIVING

As the airside portion of an airport presents a number of challenges not encountered groundside, the airport operator should ensure that safety training is provided. Training can be given by the employer or by the airport operator (possibly online) and successful completion is required before a security pass will be issued.

Further information can be found in the *ACI Policies and Recommended Practices Handbook,* **Section 5.21.**

> **5.21** *Before receiving an airside security pass, all staff having access to the airside, including contractors, should receive appropriate safety training, which highlights the hazards associated with that area.*

It is the responsibility of the airport operator to have a formal training, assessment and licensing programme in place for all drivers operating airside. Statistics have been gathered indicating that vehicles and their drivers have caused runway incursions at a number of airports and the trend is currently continuing.

A local hazard analysis will most probably indicate that the operation of vehicles on the airport can be a potentially high risk activity, which demands a number of formal control measures to be put in place to manage this risk. A driver training programme is one of the many control measures that can be implemented and should form part of the airport's overall safety management system.

The airport operator will take the lead in developing an agreed upon standard for the driver training programme. Air traffic control, ground handling agents, airlines and other airside service providers will be required to cooperate and comply with the standard set by the airport operator so as to ensure the continued operation of the training programme.

Airside driving is a complex task requiring appropriate training. Hong Kong International Airport

Depending upon the scale and complexity of the airport and the individual requirements of the driver, the programme should take into account the following main areas:

- A generic airside driver training programme, which covers operational as well as health and safety aspects of the operation of vehicles, plant and equipment in close proximity to aircraft on aprons, stands and airside roads
- Specific training on the vehicle, plant and equipment, e.g. car, tug, high loader, coach
- Where the specific job function requires the driver to operate on the manoeuvring area, additional training on the hazards associated with runways and taxiways should be covered
- Training in the correct usage of VHF radio communications and standard phraseology with ATC

The material in *Chapters 1.15.1, 1.15.2, 3.15* and *3.16* describes what is considered as 'good practice' guidance and is applicable to the majority of airports, with different requirements for different areas of the airport. Each airport will need to apply those areas of training that are applicable to their local legislation, geography, conditions and type of operation and should be regularly reviewed against programmes and documentation available across the industry. The guidance is a compilation of material drawn from many sources including ICAO, ACI, IATA and a large number of airports that already have driver training programmes in place. The aim of this guidance is to ensure consistency and standardization in the delivery of an Airside Driving Permit (ADP) to a driver.

All the above mentioned training programmes should consist of two main elements: a classroom and theoretical module, which should include the use of prepared presentations, maps, diagrams, video, documentation and checklists as appropriate, as well as practical tuition and visual familiarization on the airport with a suitably qualified person. This practical tuition will be conducted for a predetermined period of time depending upon the complexity of the airport. Following initial training, a programme of refresher training should be organized after a specific duration - three years is recommended.

Where responsibility for driver training (apron and manoeuvring area) and RTF is delegated to a third party provider, the airport operator should institute a programme of audits, as part of its SMS, to ensure that agreed upon standards are being maintained.

1.15.1   Airside Driver Training Programme

All airports should have an airside driver training programme that is to include both initial and recurrent training, testing and licensing of staff, vehicular standards, emergency procedures and more. The framework described below should be used when developing an airside driver training programme.

The Airside Driving Permit (ADP)

The ADP should be issued by a valid issuing authority (normally the airport operator, or in some countries ATC department), outlining rules for its validity in terms of time, conditions of use, restrictions and / or endorsements (night time, low visibility), and its transferability. An ADP should abide by the local enforcement and driving offence procedures. These procedures can be specific to the airport but should be related to the national legislation. In addition, the issuance of the ADP should be in accordance with the national or state driver licensing system.

National Legislation and Regulation

Government and state regulations related to general vehicle driving licences should be considered and when possible leveraged to develop the ADP. State, regional and local government requirements as well as any additional requirements and guidance for driving airside established by the national aviation safety authority or civil aviation authority should be adhered to.

Airport Regulations and Requirements

The airport operator should develop specific regulations and requirements, and local instructions for airside driving such as rules of air traffic services as they relate to vehicles, particularly right of way. The airport operator should have a framework in place to disseminate general information and instruction to drivers as well as information regarding works in progress and other potential hazards on the airport.

Personal Responsibilities

Airport operators should ensure that all airside drivers meet stringent fitness and health requirements as dictated by the national or airport standards. Also, all airside drivers should be issued with and use personal protective equipment (PPE) such as high visibility clothing and hearing protection (as determined by relevant specific labour legislation); should adhere to the NO SMOKING requirements airside; should understand and take responsibility with respect to FOD control and fuel / oil spillage reporting and should ensure that the vehicle being used is suitable for the task and handled correctly.

Vehicle Standards

Airport operators should develop and maintain specific standards for the condition and maintenance of airside vehicles in accordance with requirements established by local or national authorities. The standards should include:

- Requirements for vehicles to be marked and, if they are used at night or in conditions of low visibility, lighted. When marked by colour, a single conspicuous colour, preferably red or yellowish green for emergency vehicles and yellow for service vehicles, should be used
- Requirements to display obstruction lights and company insignia
- Requirements and content of daily vehicle inspections
- Agreed standards of airport and company vehicle fault reporting and rectification
- Local requirements for the issue and display of Airside Vehicle Permits (AVPs)

General Airport Layout

When driving airside it is important that all drivers are familiar with the airport and general aviation procedures. Airside drivers should be required to know:

- General geography of the local airport
- Aviation terminology used such as runway, taxiway, apron, roads, crossings, etc.
- All standard airport signs, markings and lights for both vehicles and aircraft
- Specific reference to those signs, markings and lights used to guard runways
- Specific reference to any controlled / uncontrolled taxiway crossing procedures

Hazards of General Airside Driving

The hazards that may be encountered on an airport need to be considered when training airside drivers. Some of the hazards that should be observed are:

- Speed limits, prohibited areas and NO PARKING regulations
- Danger zones around aircraft
- Engine suction / ingestion; blast, propellers and helicopters
- Aircraft fuelling
- FOD and spillages
- Vehicle reversing
- Staff and passengers walking across aprons
- Air bridges and other services such as fixed electrical ground power (FEGP)
- General aircraft turnaround process
- Aircraft emergency stop and fuel cut-off procedures
- Dangerous goods
- Towing
- Driving at night
- Driving in adverse weather conditions, particularly low visibility.

Local Organizations

When developing an airside driver training programme the roles and responsibilities of the local organizations should be considered. For example, the role of the airport operator in setting and maintaining standards, the role of the national aviation safety authority and national and / or local Police and their involvement with airside driving, as well as other enforcement authorities dealing with vehicles, driving, health and safety.

Emergency Procedures

The airport operator should develop emergency procedures, which all airside drivers should be familiar with and understand. These should include:

- Action to be taken in the event of a vehicle accident
- Action to be taken in the event of a vehicle breakdown
- Action to be taken in the event of a vehicle striking an aircraft
- Action to be taken in the event of fire
- Action to be taken in the event of aircraft accident / incident / occurrence
- Action to be taken in the event of personal injury

Communications

Communications on the airside are a very important safety issue that must be addressed. *Section 3.16* covers the use of radio communication methods. In order to address this issue, airport operators should develop procedures and regulations on:

- Requirement to possess a radio certificate
- Radio procedures to be used, if applicable
- Light signals used by ATC, if applicable
- Procedures to be used by vehicle drivers if lost or unsure of position
- Local emergency telephone numbers
- How to contact the local airport safety unit

Practical Training (Visual Familiarization)

It is very important that all airside drivers receive practical training on the airside before being issued with an ADP. This practical training should include specific instruction on:

- Airside layout, including runways, taxiways, service roads, taxiway crossings and any restrictions during low visibility
- Aprons and stands
- Surface paint markings, signs and lights for vehicles and aircraft
- Surface paint markings, signs and lights that delineate the boundary between aprons and taxiways
- Surface paint markings, signs and lights used on the taxiway that help indicate runways ahead
- Parking areas and restrictions
- Speed limits and regulations
- Hazards during aircraft turnarounds and aircraft movements
- Situational awareness, especially at night or during low visibility operations

1.15.2   Refresher training

Refresher training and / or testing should be undertaken by all airside drivers – a three year cycle is recommended. In addition, refresher training and / or re-testing will be required in case of a serious infraction or accident.

A number of runway incursions have been caused by vehicles unintentionally entering a runway, therefore the need for thorough training and excellent geographical awareness is very important. It is equally important to note that drivers may require a minimum amount of apron driving experience before being permitted to drive on the manoeuvring area.

The airport operator should have procedures in place to determine if vehicle operators still have a need and right to drive a vehicle airside and not renew the airside driving permit if these conditions are not met.

1.16   AIRSIDE CONSTRUCTION WORKS

Construction and heavy maintenance activities need to be performed from time to time in airside areas. If aircraft operations are to continue around the site, or access is required through airside areas, there are a number of precautions that should be taken to enhance the safety of the works, the construction

workers and the airport community. It is recommended that a 'Works Permit' system be used to ensure permissions are recorded and agreed between the airport and ATC, and communicated to the contractors so they are fully aware of what they can and cannot do. An example of a Works Permit form is included in *Annex B*. Aspects of the control and procedures for airside works may include:

- Pre start-up and regular site meetings should be held to ensure safety requirements are met and possible conflict situations dealt with:
  - Workplace Health and Safety requirements should be monitored and enforced
  - Security requirements should be monitored and enforced
  - Precautions should be taken to protect construction workers from jet blast
  - A notification system should be in place to quickly summon emergency responders in case of a fire, spill, an accident or similar event
  - A communications plan should be drafted
- All contractor drivers must be escorted by a qualified vehicle operator or undergo airside driver training and testing
- Access routes should be agreed to and clearly identified to minimize interference with the operation on the airport
- Staff access routes should also be agreed to and if such a route does not exist, then a risk assessment should be undertaken to ensure access can be achieved safely
- Hours of operation should be agreed upon
- Service clearance checks (underground locates) should be undertaken before work commences to ensure cables or pipes are not damaged
- Suitable site fencing should be installed to protect from jet blast and to ensure FOD is contained within the site; the fencing should be clearly marked and / or lit at night or during reduced visibility
- Smoking restrictions should be described, monitored and enforced
- Hot works restrictions (possibly involving a separate hot works permit) should be described, monitored and enforced
- The use of look-outs and / or a listening watch on the appropriate ATC frequency may be required, along with suitable training for this task
- Any cranes must be suitably lit and operating heights must not infringe the protected surfaces, inside or outside the airport property limits
- Should the construction activity continue into darkness or in low visibility conditions, procedures should be in place to possibly discontinue or modify the activity, depending on its location
- The road layout may require changes depending on the vehicle traffic levels
- Procedures should be in place for taxiway crossings
- All works in progress should require specific lighting, markings and signs
- All contractors should have adequate FOD, noise and dust control measures in place to cover all eventualities
- Vehicles entering or exiting the worksite may need to be cleaned to prevent mud or debris being deposited in the airside area
- In case of possible lightning strikes, high winds or aircraft emergencies, an appropriate alerting mechanism should be in place and activities may have to be suspended
- Precautions should be taken to ensure that worksite flood lighting does not hamper aircraft and ATC operations

In terms of customer service and the availability of facilities, a scheduling process should be in place to ensure that construction or maintenance works do not close or restrict too many stands or operational areas at the same time.

Resurfacing in progress. BAA plc

Information about all proposed construction projects affecting all airside areas should be discussed at the regular Airside Safety Committee or other appropriate forum (*Section 3.8*) at which point a work permit should be signed off and local communications and Notice to Airmen (NOTAMs) issued as required.

A checklist for establishing works sites and returning them to operational use is included in *Annex C*. In addition, excellent guidance on safety issues related to airside works can be found in the *FAA AC number 150 / 5370-2E – Advisory Circular pertaining to Operational Safety on Airports during Construction. Section 3.6* details the assessment and authorization of cranes and other obstacles.

1.17   ADVERSE WEATHER OPERATIONS

Adverse weather presents particular difficulties in maintaining normal operation in airside capacity and safety. Local procedures should be in place for a controlled and measured response to varying conditions. These procedures may result in a reduction of capacity but they should never result in a reduction of safety. Close cooperation between airport operations and ATC will contribute to a safe and smooth operation during adverse weather.

1.17.1   Snow and / or Ice

The presence of snow and / or ice on an airport results in reduction in surface friction and a covering of surfaces, lighting, pavement, markings and signage and can cause a serious risk to the safety of operations. Airports affected by snow and / or ice should have procedures in place for clearing runways, taxiways, emergency response routes, and aprons as well as de-icing pavements *(Section 1.17.7)*. Equipment and resources will need to be provided depending on the size of the airport, the amount and occurrence of snow, and the required time to the resumption of operations after runway sweeping.

Runway friction readings should be taken after snow removal to check the effects of the removal and to assist decisions if further treatment is required. When clearing snow off the pavement areas specific attention should be paid to keep snow banks to the sizes specified in *ICAO Annex 14 – Aerodromes, Volume 1*.

Detailed local procedures are required for the planning, activation and operation of snow clearing equipment and training of staff. Typical priorities are to clear the runway first, including any rapid exits, then the taxiways, then the apron areas. Fire stations should also receive special consideration because

of their emergency response requirements. Separate teams can achieve a quicker return to service than a single team. Safety of both aircraft and staff (especially on the apron areas) is important.

Large amounts of snow can obscure lights, signs and markings. Geneva International Airport

Adequate surface water run-off controls must be in place to prevent large quantities of pavement and aircraft de-icing fluid reaching the local rivers or water supplies (*Section 1.17.6*). Further details are to be found in *ICAO Doc 9137 Airport Services Manual Part 2 – Pavement Surface Conditions.*

Using multiple snow ploughs greatly reduces the time to remove snow from airport paved surfaces. Munich International Airport

Specific activities will vary from airport to airport and are too detailed to itemize here. General principles include:

- Preparation and planning – equipment availability, staff rosters, etc.
- Communication of the snow removal plan to airlines, handlers, ATC and other parties laying out preparation and clearance activities that will take place when different types of weather forecast are received
- Communication of snow warnings when snow is forecast
- Identification of snow removal areas / dumping locations
- Communication of runway opening estimates to ATC, airlines and other parties
- Establishment of snow committees
- Activation of a 'snow desk' using the principles of Collaborative Decision Making (CDM)

1.17.2   Strong Winds

Strong winds can cause significant disruption to operations on the airport. The main hazards are aircraft engine ingestion of FOD, airframe damage and personal injury. A system should be in place to bring to the attention of all staff any forecast conditions of strong winds. To minimize the hazard it is good practice for the airport to publish a set of requirements detailing actions other parties should take upon receipt of strong wind warnings. These can be graded depending on the forecast wind speed and maximum gust speeds and should include appropriate restrictions, examples of which are as follows:

- Use of air bridges and mobile steps for passenger boarding / deplaning
- Loose cargo and baggage containers secured and tied down
- Additional chocking requirements of parked aircraft
- Parked aircraft oriented into wind or secured, if necessary
- FOD and rubbish containers securely fastened
- Vehicle parking brakes set or chocked
- Arriving aircraft to receive positive chocking communication from ground crew before releasing parking brake
- Restrictions on working at height
- Wind milling propellers secured
- Early fuelling of aircraft to increase ballast
- Restriction on extension of catering and other scissor lift vehicles and use of stabilizers
- Restrictions on aircraft towing
- Aircraft doors not to be opened
- Aircraft rubbish to be immediately removed and not left on stand
- Suspension of aircraft fuelling
- Contractor works areas to be secured
- Immediate reporting of any items seen being blown by the wind

1.17.3   Storms – Lightning

As lightning strikes at airports are of concern to personnel working airside, fuelling operations, passengers boarding or deplaning aircraft at ground loading positions, construction workers and possibly to people evacuating buildings in an emergency situation, airport operators should carry out a risk assessment. Where appropriate, airports should ensure that they have lightning protection systems in place following building code requirements.

Airport lightning warning system. Hong Kong International Airport

Lightning warnings should be issued based on forecasts of lightning in the surrounding area or measurement of actual lightning in close vicinity of the airport. The so-called 'bolt from the blue' is a cloud-to-ground lightning flash which typically travels a long distance from the thunderstorm cloud, thus appearing to come from a clear sky, which is very difficult to detect.

Depending on the results of the above risk assessment, mitigating measures could include ceasing activities on the apron (and sometimes airside and groundside), if there is a potential for a lightning strike. It should be mentioned that the decision to cease and / or resume operations can be made by the employer (air carrier, ground handler, fueller, catering services, construction company), the airport operator, or is the result of a general legislated duty to ensure the health and safety of employees at work.

The notification methods vary widely ranging from a combination of audible and visual notification at different locations on the airport, a call-out system where stakeholders would be notified, company specific radio broadcasts and other. These can be initiated automatically or manually. All staff working airside should be trained to recognize those warning signals. Notification can be initiated by the airport or by a service provider, possibly on a subscription basis. Airports should assess the reliability of their lightning detection and warning systems, as well as their notification procedures on a site specific basis.

Some airports have a system based on three levels of warning that are triggered due to the proximity and likelihood of a lighting strike at the airport or close proximity thereof. Different measures should be taken by the airport community during each level of warning. The following precautions can be taken in case of a lightning warning:

Level 1 (strong possibility of lightning or thunderstorms)
- Weather warning notification
- General awareness of the risk is communicated to stakeholders

Level 2 (lightning activity within an 8 kilometre radius of the airport)
- No specific action is taken but stakeholders can prepare and plan their activities so as to be ready in case of a Level 3 alert

Level 3 (lightning activity within a 5 kilometre radius of the airport)
Specific actions should be taken by the concerned parties, which may include:
- Suspension of non-essential activities in open areas
- Keeping clear of any tall or metal objects
- Restrictions on working at height
- Suspension of aircraft marshalling service except when the driver can stay inside the car giving light signals to the aircraft
- Suspension of placing / removing chocks
- Suspension of headset communication between tug crew and cockpit
- Suspension of loading and unloading of aircraft
- Suspension of remote stand passenger boarding or deplaning
- Suspension of refuelling of aircraft
- Suspension of construction activity

Additional information can be found in *ACRP Report 8 Lightning Warning Systems for Use by Airports.*

1.17.4   Storms – Sand, Dust and Volcanic Ash

Sand and dust storms are a reality in certain regions when strong winds pick up loose sand and dust from a dry surface, thus reducing visibility. The vertical extent of the dust or sand that is raised, is largely determined by the stability of the atmosphere above the ground as well as by the weight of the particulates. Dust and sand may be confined to a relatively shallow layer, but dust may be lifted more than 5,000 feet up in the air. In addition to issues like visibility, health problems (broncho-pulmonary, ophthalmic, skin abrasions) and impact on operations, these contaminants, when combined with rain, can form mud, thus affecting runway friction values.

Volcanic ash consists of fine particles of pulverized rock created by volcanic eruptions, which are very hard, abrasive, electrically conductive and mildly corrosive. The *ICAO Doc 9691 – Manual on Volcanic Ash, Radioactive Material and Toxic Chemical Clouds,* provides additional information about the impact on aircraft operations, airports and ATC.

Airport operators should take consider the following:

- Possible contamination of electronic, electrical, mechanical ground equipment and parked aircraft, requiring cleaning and sometimes replacement
- Availability of materials (duct tape, plastic sheeting) needed to cover or seal openings on aircraft, engines, ground equipment, certain strategic buildings and electronic / computer equipment
- Availability of cleaning materials, additional heavy equipment, large volumes of water, a suitable and approved area for dumping and covering (or at least stabilizing) contaminants away from the airport
- Accelerated and intensive programme of inspection, maintenance, cleaning and monitoring
- Special aircraft ground operating procedures (restricted operations)
- Conduct risk assessment of equipment and facilities
- Wet ash has the consistency of wet cement and can cause buildings to collapse, or markedly shift the centre of gravity of parked aircraft, causing it to tip over
- Special provisions in the Airport Emergency Preparedness Plan (Natural Disasters)

1.17.5   Storms – Rain

Heavy rain storms (or torrential rain), are sometimes the result of a fast on-set or can last for a long period of time. Hazards may include runway, taxiway, apron and roadway contamination (standing water), reduced friction, problems with water run-off, flooding, drainage problems and ground saturated with precipitation. Heavy rain events can also be accompanied by strong winds (*Section 1.17.2*) and lightning (*Section 1.17.3*) and cause reduced visibility (*Section 1.17.6*). Airport operators should ensure runway design is such that water runs off as quickly as possible and that drainage systems can handle run-off. Rapid intervention by maintenance crews may be required to remove standing water, to build temporary dams and to declog stormwater drains.

1.17.6   Low Visibility Procedures (LVP)

Airport procedures based on specified visibility and cloud base criteria should be in place to ensure adequate separation is maintained between aircraft, vehicles and other users of the manoeuvring area. Under these conditions certain navigational aids will require additional protective measures. Depending on the visibility, restrictions may be required concerning runway capacity. Operations in Category II or Category III conditions will depend on the availability of suitable navigation, lighting, surface control and monitoring aids, meteorological observations, secondary power supplies and authorized procedures.

Additional restrictions on the airport may include:

- Physical protection of the ILS (glidepath and localizer)
- Extension of the runway protected area to avoid interference with the ILS
- Possible physical closure of some access routes to the airport for vehicles, such as taxiway or taxi-lane crossings
- Changes to the way taxiway crossings are to be used
- Restrictions on vehicles operating on the taxiways, allowing only those qualified to operate under positive ATC RTF control
- Restrictions on the towing of aircraft in certain areas
- Restrictions on the types of work and areas of the airport where contractors or maintenance staff can work

In order to maintain both safety and capacity it is preferable to take some preparatory actions for operations in low visibility conditions before the actual weather conditions deteriorate. Thus when visibility does drop further there is no time wasted in establishing Low Visibility Procedures (LVPs).

LVPs may include a warning system that is used to reflect the airport's status. In this case, a luminous panel on the building provides the necessary information. Incheon International Airport

Detailed steps to be taken will depend on many local factors at each airport, such as runway geometry, lighting systems and ATC facilities. To advise vehicle drivers of the onset of these procedures it may be necessary to activate a number of signs around the airport, or have a radio based method of notification both for activation and de-activation of these procedures. On airports where the safe manoeuvring of aircraft and ground vehicles on aprons during low visibility is not warranted, a low visibility procedure (including special taxi routes, driving rules, reduced speed and information of apron users) should be established.

1.17.7   Aircraft De-icing

Aircraft de-icing is often carried out by airlines or their handling agents to specific standards identified by control authorities such as national aviation authorities. These typically cover product approval, methods of application and holdover times. Airports need to consider this activity and provide facilities such as space or areas for de-icing, including fluid capture and treatment, as well as spillage protected storage areas. Some airports collect and recycle the used fluid. Preventative steps must be taken to ensure that large quantities of fluid do not enter the local rivers or contaminate water courses. This may be done through the designation of certain areas for de-icing aircraft and defining specific procedures on accomplishing the task.
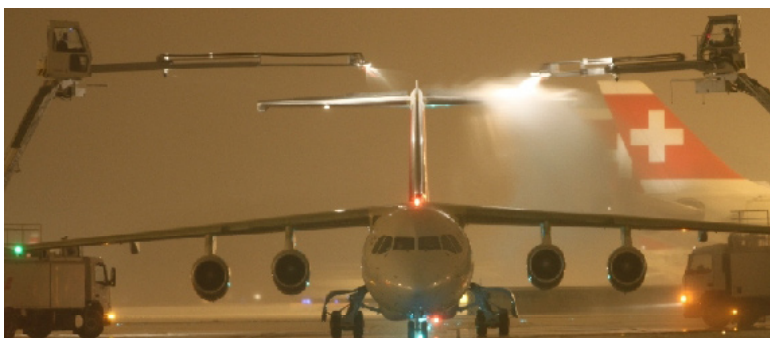
Aircraft de-icing in progress. Zurich International Airport

Further information can be found in the *ACI Policies and Recommended Practices Handbook, **Section 5.16.***

Pavement anti-icing and aircraft de-icing operations

5.16 *The greatest care should be exercised in the use of chemicals for anti-icing operations on paved surfaces and the de-icing of aircraft. The decision to de-ice an aircraft is entirely the responsibility of the aircraft operator, working within whatever rules or guidance may be set by the appropriate regulatory authority.*

1.18   PROMULGATION OF INFORMATION, LOCAL AIRPORT INSTRUCTIONS TO USERS

Procedures should be established to enable the dissemination of aeronautical information to airport users. NOTAMs including temporary restrictions due to conditions such as snow clearance or works in progress, may need to be issued. Other mechanisms may be appropriate for local dissemination such as using ATC to broadcast on Automatic Terminal Information Service (ATIS).

An effective method of communicating local rules or instructions to airport users is required at each location. Temporary changes to procedures, road layouts, aprons, etc., need to be communicated to the relevant users. This can take the form of separate notices or instructions circulated electronically to users when required, or one large manual – also possibly in an electronic format - that is updated whenever there are changes to be made. This manual should be widely available to all airport users. A suggested list of subjects is as follows:

- Aircraft blast hazards
- Aircraft arrival and departure from stand
- Stand entry guidance / Marshalling
- Air bridges
- Fixed Electrical Ground Power (FEGP)
- Minimum safety induction training and testing for staff operating airside
- FOD prevention
- Disposal of rubbish

- The handling and storage of hazardous materials
- Spillages
- Aircraft fuelling
- Accident, incident and occurrence reporting
- No Smoking airside
- Adverse weather – snow plan, ice, strong winds, storms, lightning, etc.
- Low visibility operations
- Pre-winter awareness and preparation
- Airside driving, operation of vehicles, airside vehicle standards
- Engine ground running safety
- Maintenance of aircraft on stand
- Disabled aircraft removal
- Radio communications
- ATC communications
- Helicopter operations
- Procedures for working airside
- Procedures for the approval of crane operations at or near the airport
- Airport development procedures (safeguarding)
- Personal Protective Equipment (PPE)
- Safety of passengers on the apron
- Aircraft turnaround monitoring
- Noise abatement procedures

1.19   EMERGENCY PREPAREDNESS AND CONTINGENCY PLANNING

ICAO Annex 14 - Aerodromes, Section 9.1 Aerodrome Emergency Planning, states that "Aerodrome emergency planning is the process of preparing an aerodrome to cope with an emergency occurring at the aerodrome or in its vicinity. The objective of aerodrome emergency planning is to minimize the effects of an emergency, particularly in respect of saving lives and maintaining aircraft operations". More detailed information can be found in *ICAO Doc 9137, Airport Services Manual, Part 7 – Airport Emergency Planning.*

Effective emergency preparedness and contingency planning for all eventualities will result in better coordination between the various organizations when they are required to respond to an emergency. Airport operators should coordinate all the emergency services. Depending on legislation, local authorities have the responsibility for dealing with the emergency. In this case, it is very important that the airport operator assists the local authority to ensure a cooperative approach is used to handle the emergency. Airport operators should involve ATC, airport fire fighting and rescue services, airlines, ground handlers, harbour patrol or coast guard, police and security services, the military and civil defence, local fire services, hospitals and ambulance services, trauma centres, government agencies, clergy and other relevant agencies in any training and exercises. Many members of the airport management, including the media / public affairs teams and passenger support teams in the terminals will need to be included.

Agreed categories of response should be identified and simple itemized action sheets for the duty staff of each organization should be developed. These can be distributed to those involved in a set of instructions, typically called 'Emergency Orders / Plan' and should observe human factors principles to ensure optimum response by all agencies participating in emergency operations. Command,

communication and co-ordination functions should be taken into account. Specific provisions should be incorporated for those airports located close to water and / or swampy areas and where a significant portion of approach or departure operations takes place over these areas.

Emergency Preparedness and contingency planning are very important components of airport operations. Munich International Airport

Categories of occurrences may include:

- Aircraft accident on the airport
- Aircraft accident off the airport
- Aircraft or building fires
- Full emergency
- Local / standby
- Non-aircraft accident (building collapse, loss of power, heating or communication)
- Unlawful acts against civil aviation (bomb alert, sabotage, and hijack)
- Occurrences involving dangerous goods and HAZMAT (including radioactive materials)
- Natural disasters and weather related events (floods, storms, earthquakes, seismic sea waves, volcanic ash)
- Other significant events (potentially) having a serious impact on airport operations (strikes and picketing, labour unrest, demonstrations, industrial accidents, public health emergencies (communicable diseases, collective food poisoning), security incidents, airspace closures.)

Further information can be found in the *ACI Policies and Recommended Practices Handbook*, **Sections 7.16, 8.1** and **8.4.**

7.16 *States need to ensure that contingency plans are developed in conjunction with airports (and other stakeholders) and resources are made available to safeguard airports and civil aviation operations. States need to ensure that authorized and suitably trained personnel are readily available for deployment at its airports to assist in dealing with suspected, or actual, cases of unlawful interference with civil aviation. Airports should develop their own contingency plans to dove-tail with the State plans. Staff need to be trained in these plans and procedures and the effectiveness of these plans should be verified through regular tests and exercises involving all relevant stakeholders.*

> **8.1** *Emergency medical services should be provided for passengers and other persons and arrangements should be made for supportive medical facilities, locally and regionally, in accordance with national regulations.*
>
> **8.4** *As regards provision for the management of any outbreak of communicable disease in which airports are involved, ACI and ICAO have prepared guidelines for airport operators, available from ACI. These are based on the principles set out in the World Health Organization's International Health Regulations.*

Local rendezvous points (staging areas) should be agreed upon with safe procedures for access to all parts of the airport with a predefined minimum delay. These should be clearly signed and marked (even if some States refrain from doing this because of security concerns) and kept clear at all times. A reliable activation and communication process is needed to rapidly ensure all relevant parties are informed as soon as possible, including basic information about the occurrence.

Contingency planning for major incidents should include consideration of how the airport will continue to operate while the incident is dealt with. Additional information pertaining to disabled aircraft removal can be found in *Section 3.14.*

Airport operators should ensure a fixed emergency operations centre is set up to support and coordinate operations during emergency situations. A mobile command post should be deployed to coordinate all command and communication functions and should be easily recognizable.

Emergency response personnel should understand the importance of preservation of evidence for aircraft accident investigations. Whenever possible, the wreckage should remain undisturbed until the arrival of the first accident investigator. However, when absolutely necessary for the rescue and fire suppression activities, the wreckage may be disturbed. However, any such disturbance should be kept to a minimum.

It is recommended that airport operators carry out regular exercises (tabletop exercises, partial and bi-annual major exercises) to test part or all of the above procedures with all the organizations involved. After-hours response, night-time and low visibility scenarios are an essential part of emergency preparedness. The purpose of an exercise is to ensure the appropriate response of all personnel involved, currentness of emergency plans and procedures, proper operation of emergency equipment and efficient communications.

Further information can be found in the *ACI Policies and Recommended Practices Handbook,* more particularly in **Section 5.8**.

> **5.8** *ACI fully endorses the ICAO requirement to conduct a full-scale emergency exercise at intervals not exceeding two years, with partial exercises in the intervening year and exercises which may involve night-time and poor weather conditions as well as table-top exercises to ensure that any deficiencies have been corrected.*

1.20   AIRSIDE SECURITY

Most airports have security staff to meet the requirements of national governments and civil aviation authorities. Airside operations teams can work together with security staff in a number of ways:

- Perimeter fence inspections can be performed by airside operations staff while carrying out airport patrols
- Detection of any intruders can be reported to security
- The presence of any wildlife (including birds) at or in the vicinity of the airport must be reported to airside operations by security staff
- Cross-training could be considered to enhance operational safety, respectively security awareness

1.21   PERSONS WITH DISABILITIES AND PERSONS WITH REDUCED MOBILITY (PRM)

In addition to the requirements of the *ACI Airports and Persons with Disabilities Handbook* (see below), safety and dignity of persons with disabilities should be taken into account when they are present on the apron during the boarding and deplaning process, as well as when they are being transported between the terminal and the aircraft. Safe routing should be discussed with airport safety personnel.

Further information can be found in the *ACI Policies and Recommended Practices Handbook,* **Section 3.16** and the *ACI Airports and Persons with Disabilities Handbook.*

3.16   *Airport facilities should include arrangements to meet the needs of persons with disabilities and those with special needs.*
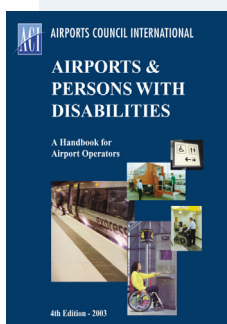
Airports and Persons with Disabilities Handbook *
Airport operators and planners should consider that larger numbers of persons with disabilities now travel by air. Architects and planners involved in the design of airport terminals must be fully aware of what people with disabilities require and expect of airport facilities. Responsibility for planning and implementing organizational and operational measures to help passengers with disabilities rests with the relevant service providers undertaking to provide passenger handling services e.g. the airport, the airline, or a ground handling agent, or a combination of these actors. All of these need to ensure that they offer people with disabilities easy access to their facilities and that they operate these facilities with every attention to the convenience and well-being of their customers with disabilities.

In air bridges connecting the aircraft to the terminal, steps or narrow passages should be avoided. Similar care should be taken when mobile lounges are used. If an aircraft is parked on a remote stand, and mobile lounges are not used, a vehicle with a ramp and / or lifting device should be available to transport wheelchair users. Vehicles of this type allow a wheelchair-bound passenger to be lifted directly into an aircraft.

* Note: only excerpts pertaining to the airside portion of the airport are reproduced here.

2
APRON SAFETY

2.0   INTRODUCTION

There are a large number of activities taking place on airport aprons, mainly within a congested and time-sensitive environment. Whereas a number of accidents, incidents and occurrences fall under Workplace Health and Safety, others would be more airport specific. The airport community, under the leadership of the airport operator, should carefully examine all safety issues and implement corrective measures in a timely manner.

Apron markings. Dubai International Airport

Ensuring a high level of safety on the apron by identifying the hazards and implementing mitigation measures in collaboration with the airport stakeholders falls under the auspices of the safety management system. The responsibility of ensuring a high level of safety for all aviation related operations lies with the airport operator but must be shared with all involved parties.

Further information can be found in the *ACI Policies and Recommended Practices Handbook*, **Section 5.20**

> **5.20** *All apron operations require absolute attention to safety. ACI supports the establishment of an Apron Safety Committee to coordinate campaigns, workshops, seminars and meetings to enhance apron safety.*

2.1   APRON LAYOUT AND MARKINGS

The safety of operations on an apron area can be enhanced if the area is planned from the start with adequate space. However, many airports develop over time and face planning challenges as they grow. Guidance on the apron layout and markings is provided in *ICAO Annex 14 – Aerodromes, Volume 1*, the *ICAO Aerodrome Design Manual, Part 2 (Taxiways, Aprons and Holding Bays)*, as well as in the *ACI Apron Markings and Signs Handbook*. Factors in apron layout and design include the clearances around the aircraft, airside roads, clearways and vehicle parking space.

2.2   APRON INSTALLATIONS

Various services may be installed on an apron in preference to mobile services. These can include:

- Fuel hydrants
- Fixed electrical ground power (FEGP)

Other services such as the movement of baggage, water supplies etc., are possible but remain relatively uncommon.

Fuel hydrants offer improvements to the aircraft turnaround process and can deliver greater volumes of fuel than fuel tankers. The cost and benefits of such a system will however have to be evaluated at each airport given the traffic levels (including share of traffic between long-haul and short-haul flights). Awareness of the hoses and electrical connectors should form a part of apron safety training and efforts should be made to highlight them visually to reduce the chances of accidental contact. Emergency fuel cut-off switches should be provided and clearly signed at the head of stand and remain unobstructed at all times.

Fuel hydrant emergency cut-off switches must be clearly signed and remain unobstructed at all times. Hong Kong International Airport

Fixed electrical ground power (400Hz) is often provided at airports as a cost-effective and environmentally friendly alternative to stand-alone generators. Supplying the cable to the aircraft can be done in two ways, either via underground pits or on wheels from a storage area at the head of stand. Whichever method is used, the cable must be stored away after each use to reduce the risk of damage.

Pre-conditioned air is an alternative to an APU running to cool or heat the cabin of parked aircraft, saving on fuel burn and reducing noise and emissions. Hoses used for the air supply to the aircraft should be highly visible when extended out to the aircraft to avoid accidental damage by vehicles or being a tripping hazard to staff. If the airport provides these facilities, then it will be necessary to produce training material for users to be trained and tested in the safe, correct and proper use of this equipment.

Highly visible pre-conditioned air hoses. Zurich International Airport

2.3   AIRCRAFT VISUAL DOCKING GUIDANCE SYSTEMS (VDGS)

Stopping an aircraft in the correct location to enable the air bridge and various services to successfully connect to it requires precise guidance. In order to achieve this, visual docking guidance systems (VDGS) have been implemented at many airports. *ICAO Annex 14 – Aerodromes, Volume 1* refers to the requirements for VDGS. The basic elements involved in the systems are to provide left / right guidance as well as stopping position guidance. The calculation of the aircraft stopping position needs to take into account:

- The movement envelope of the air bridge (if provided)
- The location of the fuel hydrants and length of hose available
- The location of any other fixed services (e.g. Fixed Electrical Ground Power – FEGP)
- The space required around the aircraft for apron servicing
- Clearance from the taxiway or roads

An example of a VDGS. Vienna International Airport

The aircraft type itself is a key factor. Details will need to be provided by the manufacturer on the overall aircraft docking and stopping position. Many different systems are in use around the world and it is recommended that details of the systems in use at your airport are made available to users. Whichever system is used, there remains a need to keep it up to date with airline fleet changes.

2.4   OPERATION OF AIR BRIDGES

The safe operation of an air bridge should require specific training. It is recommended that operators receive theoretical training followed by a practical test and successful demonstration in order to receive a permit for a specific air bridge type. Training should include:

- Manoeuvring, steering, and speed of operation
- Adverse weather conditions
- Approach to the aircraft
- Setting the auto leveller
- Security and safety procedures concerning any doors
- Backing off the aircraft
- Correct parking
- Use of cameras, mirrors and visual checks for any obstructions (including parked mobile equipment and vehicles)
- Emergency procedures

Training can be provided by the airport directly or given by third party companies including handling agents. If other organizations deliver training, audits should be carried out by the airport operator to ensure that defined standards are being met. If new air bridges or models with different controls are installed then suitable training material and specific permits will need to be developed. Periodical retraining is required as well after every accident, incident and occurrence involving an air bridge. An example of an air bridge check form is in *Annex D*. An example of an air bridge operator audit form is in *Annex E.*

Tyre protection for extra safety. Brussels International Airport

The area used for the movement of the air bridge should be kept free of vehicles and / or equipment to ensure its safe operation. When not in use, the air bridge should be parked with the wheel base in the designated position prior to the arrival of aircraft at the stand. Detailed information on markings can be found in the *ACI Apron Markings and Signs Handbook.* Operators should do a visual check (camera, mirrors or looking out of the window) before moving the air bridge in order to ensure there are no obstructions.

Height restriction signage. Aéroports de Paris

Airport operators should consider installing height restriction signage, markings to indicate difference in level, instructing users not to leave any garbage in the rotunda or on the top landing of the outside stairs and ensuring emergency exits remain unobstructed at all times. In addition, some airport operators have installed tyre guards for extra protection.

2.5   AIRCRAFT PUSHBACK PROCEDURES

Airport operators should establish guidelines to ensure aircraft pushbacks are done as safely as possible. The following should be considered prior to or during the operation:

- Ground crews are to ensure areas behind the aircraft are clear, and that the aircraft is positioned in such a way as to avoid concentrating break-away blast at buildings, parked or taxiing aircraft or persons on the apron
- Do not commence a pushback if it will conflict with another pushback already in progress or with an aircraft that is ready to taxi
- Vehicle operators should be aware of dangers associated with passing behind an aircraft being pushed back
- For those airports providing apron management services, airport operators should ensure good cooperation and exchange of information between apron management services, ATC and ground service providers

2.6   AIRSIDE ROAD MARKINGS AND SIGNS

Road markings and signs should, as far as reasonably possible, replicate those used on the public roads. This will ensure driver familiarity and reduce the chances of misunderstandings. Markings should remain in good condition to ensure they are visible to all road users in all conditions – especially at night or during low visibility.

Signage should be provided to agreed standards, be of an adequate size and placed in good locations with clear lines of visibility to those expected to see them. Checks should regularly be undertaken to ensure that no confusion in signage has appeared or that sightlines have been blocked and that paint markings remain in good condition.

Particular care should be taken when establishing temporary road diversions or alternative road layouts.

Clear new signage should be used and any superfluous paint markings should be blacked out or removed. The changes should be widely promulgated to all road users in advance, especially if any lower vehicle height restrictions are introduced. Where appropriate, height restriction signage should be installed on air bridges, underpasses, and at other locations where vehicles may travel.

For further information, see the *ACI Apron Markings and Signs Handbook.*
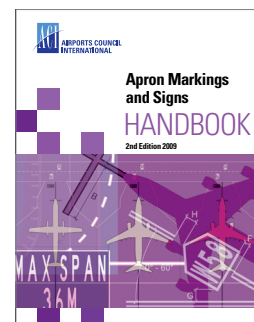
2.7   APRON MANAGEMENT AND STAND ALLOCATION

The apron is a complex area of often intense activity as many different organizations attempt to turn an aircraft around in a limited space. Good apron management will contribute towards reducing the hazards ALARP. This involves allocating aircraft to stands to ensure there is sufficient clearance between the aircraft, vehicles or buildings.

To achieve this and meet customer requirements it is common for airports to have an agreed process for allocating stands. The safety aspects of this involve ensuring that aircraft can only be allocated to stands that are large enough to accommodate them with the required margins.

Procedures and communications with interested parties will be needed to close and re-open stands for planned maintenance work (air bridge repairs, apron slab replacement, and line painting) or due to accidents, incidents or spillages.

2.8   APRON CLEANLINESS

Keeping the apron clean from FOD is an important aspect of housekeeping and will prevent FOD damage to tyres and engines. All apron staff should remove and dispose of any FOD found on the apron if they can do so safely. If they are unable to do so, location of FOD should be reported in a timely fashion to airport operations and / or maintenance for their follow-up.

Different types of sweeping and cleaning equipment used for maintenance. Vienna International Airport

FOD bins equipped with an attached lid can be an effective part of this process but they then need emptying periodically. Aircraft stands should be inspected before the arrival of aircraft. In addition to these procedures, it may be necessary to sweep / clean the stands, airside roads and equipment areas to ensure the removal of all debris. Magnetic pick-up devices can be used to remove most metal objects.

Sweeping and cleaning can be done by dedicated staff or third party contractors. Particular care and attention should be given to work sites and contractor compounds. Joint airline, airport, and handling agent FOD walks and / or audits should be undertaken to jointly check the amount of FOD on the apron areas and also to jointly try to identify its sources.

Some airports have a published process for implementing penalties if companies or staff do not maintain a FOD free area. FOD (quantity and location) should also be a standing agenda item on the Airside Safety Committee (Section 3.8) agenda to ensure its importance is not forgotten.

2.9   AIRCRAFT FUELLING

Fuelling procedures for aircraft are technical and detailed. Fuelling can occur from fuel tankers or from an underground hydrant system. At airports with a hydrant system it is prudent to ensure that some fuel tanker capacity is retained as this will be required if it becomes necessary to defuel an aircraft for any reason. The key points to be considered for safe fuelling procedures include:

- A single person should be in charge of the fuelling process
- All staff in the vicinity of the fuelling operation should be trained in the operation of any hydrant emergency shut-off system and appropriate fire fighting equipment
- Fuelling zones should be established around all filling and venting points in use on the aircraft and vehicle
- The aircraft should be chocked
- All hoses used in fuelling should be electrically bonded
- Personnel should not be able to generate sources of ignition accidentally
- Equipment used should be intrinsically safe
- Escape routes for staff, passengers and vehicles should be free of obstructions
- Aircraft APUs should not be started during fuelling
- A fuelling safe zone should be established (a minimum radius of 3 m is recommended) around the aircraft fuelling receptacles, fuel vents and fuelling equipment within which the use of Portable Electronic Devices (e.g. mobile telephones, handheld radios, pagers, photographic flash bulbs or electronic flash equipment), as well as other sources of ignition or fire are prohibited. Where passengers are boarding or deplaning during refuelling, the fuelling safety zone should be avoided and their movement should be under the supervision of a responsible person.

Note: As more and more airlines accept the "mobile boarding" practice i.e. using a mobile phone as a boarding card, some passengers board the aircraft with their mobile phone still switched on. This mobile boarding practice should only be allowed outside the fuelling safety zone.

If passengers are on board during fuelling, precautions may be required by the CAA, airport operator, aircraft manufacturer or airline operator to reduce risks ALARP. These precautions may include:

- Flight crew and ground staff should be made aware
- Aircraft emergency chute deployment areas should be clear of obstructions and cabin aisles and emergency exits must be kept clear
- If attached to an air bridge, main door must remain open
- The aircraft internal 'NO SMOKING' and 'EXIT' signs must be illuminated
- Seat belts should not be fastened
- Passengers should be advised that fuelling is taking place
- Adequate numbers of cabin staff must be present to assist with a possible evacuation
- Communication should exist between the flight deck and the staff member in charge of fuelling
- Airport fire fighting staff may need to be informed and possibly, RFFS vehicles parked on scene in a stand-by mode

NFPA Standard 407 (Standard for Aircraft Fuel Servicing) Section 5.11 (Aircraft Occupancy during Fuel Servicing Operations) contains additional information on this subject.

Safe aircraft fuelling requires training, appropriate signs and markings and detailed procedures. Amsterdam International Airport

Fuelling activities should be included in apron safety awareness training for all staff and especially in driver training to make staff aware of the risks associated with high pressure hoses delivering fuel to the aircraft from fuel hydrants and the presence of the electrical bonding wire.

It is important to note that an aircraft should not be de-fuelled when passengers remain on board or are boarding or deplaning. The normal surge tanks and automatic shut-off features of the fuelling process are not incorporated in the de-fuelling systems on aircraft. This presents a greater potential for an accident from the sources described in Section *2.9.1*.

2.9.1 Sources and dissipation of electrical energy that may develop during aircraft fuelling operations

Distinct types of electrical potential difference, with the accompanying hazard of spark discharge, are possible during aircraft fuelling operations. A description of each type together with the practices used to prevent its occurrence is given in the following paragraphs.

2.9.1.1 Electrostatic charge, which may be accumulated on the surface of the aircraft or fuelling vehicle, when conditions are favourable

The hazard of sparking can be eliminated by ensuring that the fuelling vehicle is electrically connected to the aircraft so that a difference in electrical potential cannot occur between the two. This appears to be a world-wide accepted practice. Bonding between the aircraft and vehicle is made by connecting a conductor between designated points on clean and unpainted metal surfaces of the aircraft and the fuelling vehicle. Electrically conductive fuel hoses normally provide a back-up conductive path for discharge, but aircraft fuelling procedures recommend that conductive hoses should not be regarded as adequate bonding between aircraft and fuelling vehicle.

Where the over-wing fuelling is employed, the nozzle is normally bonded to the aircraft before the filler cap is removed; however, where under-wing fuelling is employed, the automatic metal-to-metal contact between the aircraft fitting and the coupling eliminates the need for separate bonding connection.

Drag chains on fuelling vehicles or conductive tyres on fuelling vehicles and aircraft are often used as additional safeguards but are not considered effective by themselves. They are useful however, since in the event that the aircraft / vehicle bonding is broken or faulty, the electrostatic charge could be discharged from the aircraft or vehicle through their respective tyres or drag chains.

Electrostatic charges can be dissipated by grounding the fuelling vehicle and the aircraft. Amsterdam International Airport

As an additional safety measure, some practices specify individual electrical grounding of aircraft and vehicle. This measure would prevent any possible hazard caused by a broken or faulty bonding. It appears however, that this possibility is negligible if proper maintenance and testing of the wire used for bonding purposes between aircraft and fuelling vehicle is carried out.

In summary, where no electrical grounding is specified, the normal order of procedure to eliminate electrostatic discharge during fuelling operations is as follows:

1 Bonding of aircraft and fuelling vehicle to one another
2 Bonding of fuel nozzle to aircraft for over-wing fuelling arrangements

Where electrical grounding is specified, the normal order of procedure is as follows:

1 Grounding of fuelling vehicle
2 Grounding of aircraft
3 Bonding of aircraft and fuelling vehicle to one another
4 Bonding of fuel nozzle to aircraft for over-wing fuelling arrangements

On completion of fuelling operations, all disconnections should be made in reverse order.

2.9.1.2 Electrostatic charge, which may build up in the fuel during the fuelling operation

If of sufficient potential, it can cause sparking within the aircraft tank. The charge density in the fuel and the possibility of sparks inside the tank are not affected by bonding or grounding of the aircraft or the fuelling vehicle. Manufacturers and fuel suppliers have studied this matter and have concluded that the use of anti-static additives in fuel can contribute to reducing the risk involved.

2.9.1.3 Stray currents

These may occur because of short circuits or other faults in the electrical power supply for the aircraft. Stray currents are dissipated by ensuring an effective bonding between the fuelling vehicle and the aircraft.

When the aircraft is bonded to the fuelling vehicle and the latter is grounded, large currents may flow through the wire via the vehicle to the ground. When the grounding wire is disconnected, severe sparking can occur at the break point. To avoid this, it is normally recommended that grounding of an aircraft, if prescribed, should be direct and not through the wire connected to the fuelling vehicle. When a hydrant system is used, the fuelling hydrant pit should not be used for the aircraft grounding because the sparks from stray currents could be dangerous. Moreover, it is not advisable to connect the grounding device of the fuelling system, particularly where a hydrant system is used, to the grounding devices of an electrical system used for supplying electrical power to the aircraft since if a short circuit were to occur in the electrical system, damage could occur to the aircraft.

2.10   SPILLAGE PROCEDURES

Spillages during fuelling operations can occur and a procedure to absorb the spilt fuel followed by proper disposal should be devised. At some airports it is possible to wash the fuel into the drainage system but at others an absorbent material needs to be used to soak up the fuel and ensure correct disposal. Local or national environmental protection guidelines should be adhered to at all times. A

Fuel spill clean-up. BAA plc

requirement should exist for those involved to report all spillages to the relevant authorities and the airport. Those responsible for the spill should be given the opportunity to proceed with containment, clean-up and disposal. If they are unable to do so in a timely fashion, airport maintenance and / or specialized contractors can be used and a cost recovery process should be initiated.

Additional procedures may be required for spillages of:

- Toilet waste
- Water (particularly during freezing conditions)
- Ice cubes from aircraft galleys or catering trucks
- Oil and hydraulic fluid
- Other chemicals or HAZMAT

2.11   AIRCRAFT MARSHALLING

An aircraft marshalling service should be available to aircraft on request. Standard marshalling signals are included in *ICAO Annex 2 – Rules of the Air (App. 1-5) and the IATA Airport Handling Manual (AHM 631).*

Marshalling training can be provided by the airport or third party companies. Appropriate training and competency checks should be given to ensure that staff remains current. Note that different signals are required for helicopter marshalling.

Aircraft are permitted at some airports to 'power-back' or self manoeuvre without the use of a push-back tug. In permitting this type of operation a number of factors will need to be considered in the risk assessment:

- Jet-blast or propwash
- Surface conditions
- Noise levels
- Communication with other users that a power-back is about to take place (especially if there is a tail of stand road)
- Manoeuvring space
- Conflict with other traffic (pushback, power-back or taxiing)
- Impact on pedestrians, buildings, vehicles, mobile equipment and other aircraft

Marshalling signals should be performed at a steady pace and should not become stylized with local variations from the standard. Illuminated marshalling wands are available for marshalling in darkness or low visibility. If sight lines from the approaching aircraft become obstructed during a manoeuvre, then two-man marshalling should be used to ensure continuity of safe guidance.

2.12   AIRCRAFT TURNAROUND PROCESS AND AUDITS

The aircraft turnaround process is the key activity on the apron. It requires the coordinated effort of aircraft as well as many vehicles and staff from different organizations to work together in a time pressured and constrained space. (See *UK Health and Safety Executive* document, *HSG 209 Aircraft Turnaround* as well as the *Co-Activity during a Scheduled Turn-around of an Aircraft* publication). Equipment left in unsafe locations continues to be a safety issue for staff and other vehicular activity.

To proactively monitor the turnaround process and adherence to procedures, a simple step can be taken, i.e. sample a number of turnarounds per day and record the findings. This can be completed by video or by completing a check-sheet while observing the turnaround process. (See *Annex F* for an example of such a sheet). Records of overall scores and averages for different companies over time could be kept. Common themes might reveal areas of focus for refresher training. There are also a number of software systems that assist in planning and real-time allocation of staff to tasks involved in the turnaround process which can highlight potential conflicts.

The *IATA Airport Handling Manual (AHM615)* contains both *Guidelines for Aircraft Turnaround Co-ordination,* as well as *Guidelines for a Turnaround Plan.*

2.13   PASSENGER EVACUATION PROCEDURES

Passengers may need to be evacuated from aircraft, buildings, terminals, or other structures at any time. To reduce the hazards as low as reasonably practicable (ALARP) in these time-constrained activities involving a large number of people, an evacuation plan should exist, which will also contain provisions to stop aircraft from entering the apron area.

Fire Assembly Point sign. Hong Kong International Airport

The plan should include designated evacuation routes from buildings into safe areas on the apron. Both routes and safe areas must be kept clear of vehicles, mobile equipment and other obstructions at all times to enable their safe use by passengers who will not be in familiar surroundings. Ideally they should be well signposted or painted on the ground. As re-entry into the building may not be possible for some time, arrangements must be made to safely escort passengers and staff to an alternate, sheltered location in a timely fashion. Special consideration should be given to adverse weather conditions, including possible lightning strikes.

Procedures for dealing with evacuations of aircraft or airport infrastructures should be covered in the Airport Emergency Procedures. Should an evacuation occur, staff should muster passengers in a safe area until the fire services arrive.

2.14 BOARDING AND DEPLANING PASSENGERS DURING FIRE ALARMS

The airport operator should have a policy in place in the event fire alarms sound during the passenger boarding or deplaning process, or for aircraft arriving at the terminal while the alarm is in progress. In the event of a full or partial evacuation of the terminal, the following should be considered:

a) Deplaning of passengers at an air bridge or ground loading position should cease immediately. Passengers on board the aircraft should remain there. The entrance doors to the air bridge and / or terminal, as well as the aircraft doors should be closed, thus creating a safety zone.

b) If the boarding process has been completed and the aircraft has not yet been cleared for push-back (baggage loading, etc., still in progress), the entrance doors to the bridge and / or terminal, as well as the aircraft doors should be closed, thus creating a safety zone.

c) If an immediate evacuation is required of the zone adjacent to where the aircraft is positioned, the boarding process should cease immediately and the entrance doors to the bridge and / or terminal, as well as the aircraft doors should be closed, thus creating a safety zone.

If the source of the alarm is on the air bridge, with resulting fire, smoke, or fumes, both boarding and deplaning of passengers should cease immediately. The entrance doors to the air bridge and / or terminal, as well as the aircraft doors should be closed, thus creating a safety zone and if possible, the aircraft should be pushed back from the bridge clear of the terminal. Push-backs should be done with the utmost care and aircraft should be pushed back an appropriate distance before applying thrust in order not to compromise the safety of passengers that may be evacuating onto the apron.

Ground operations personnel should advise inbound aircraft to either hold short of the air bridge or ground loading position, or, if the aircraft has just docked, to keep its doors closed as required. Passengers on board the aircraft should remain there for the duration of the alarm.

When the cause of the alarm has been identified and the situation deemed to be safe, the airline and ground operations personnel should be advised so normal operations can resume.

2.15 EMERGENCY EQUIPMENT

Standards have been developed by the National Fire Protection Association (NFPA) for the usage and types of emergency equipment to be found on an airport. These standards are recommended to airport operators. See *NFPA 10 – Standard for Portable Fire Extinguishers*, which contains information on Wheeled Fire Extinguishers.

Wheeled fire extinguishers at an aircraft parking stand. Hong Kong International Airport

2.16   BAGGAGE MAKE-UP AREAS

Baggage make-up areas are an integral part of airport operations and time-sensitive activities take place in a sometimes very congested environment. The airport operator should do the following:

- Regularly inspect automatic breakaway features, inductive loops, electric eyes or strips, manual opening devices, as well as pneumatic safety edges or bumpers to ensure rapid roll-up overhead doors open quickly and cease operating when detecting or hitting an obstruction
- Assess if reflective markings on vehicles or mobile equipment may affect some of the safety features of overhead doors (false signal)
- Install audible and visual alarms (both inside and outside) that will be activated when the overhead door closes
- Establish procedures so that staff will not go onto conveyor belts, flat belt or sloped carrousels unless these are locked out
- Install height restriction signage
- Establish maximum driving speed (usually not to exceed walking speed)
- Ensure drivers prior to exiting baggage halls stop, look both ways and only proceed onto the roadway or apron when it is safe to do so

Maximum driving speed in baggage hall not to exceed walking speed. Geneva International Airport

2.17   OUTDOOR LIGHTING FOR THE AIRPORT ENVIRONMENT

Airport operators should consider the *Illuminating Engineering Society North America (IESNA) Recommended Practice for Outdoor Lighting for the Airport Environment (RP-37),* which is scheduled to be published in 2011. This Recommended Practice (RP) is being prepared as a guide for the application of fixed outdoor lighting in and around the airport environment with respect to the airport's special requirements. Well lighted apron areas will not only enable ground service providers to perform operations safely, but also allow aircraft crew members and passengers to safely board and deplane aircraft. It should also be noted that national legislation (workplace health and safety or building code) may contain provisions governing lighting standards for the workplace.

3

AIRSIDE SAFETY

3.0   INTRODUCTION (AIRSIDE SAFETY)

Previous chapters in the *Airside Safety Handbook* have dealt with general safety concepts applicable to airports as well as more detailed guidance pertaining to apron safety. In this chapter, best industry practices for the manoeuvring area will be discussed with some reference to *ICAO Annex 14 - Aerodromes, Volume 1.*

3.1   AIRSIDE INSPECTIONS

The Airside Safety and Operations Department of the airport has the prime responsibility for carrying out periodic inspections and audits of the movement area. Good operational practice suggests that a three level inspection system is a useful approach to ensure that the highest standards of safety are maintained for all airside users and customers.

A typical three level inspection system has the following main elements:

LEVEL 1: Routine (daily) inspections carried out by Airside Operations staff covering the entire movement area and zones adjacent to the airport boundary.

LEVEL 2: Detailed airside inspections carried out by Airside Operations and / or the associated departments (technical, maintenance, electrical, infrastructure, etc.) whereby all runways, taxiways and aprons are divided up into a number of areas and inspected in more detail.

LEVEL 3: Operations' management inspection / audit carried out by senior management. These cover all areas and facilities on a planned basis. The main aim of this level is to provide a wider aviation safety oversight perspective and introduce an element of audit to ensure that the other two levels of inspection are carried out to the required standard.

LEVEL 1 - ROUTINE DAILY INSPECTIONS

Level 1 routine (daily) inspections are specifically designed to provide an overview of the general condition of all airside areas and facilities. This level of inspection should be carried out principally by the Airside Operations Department. Due to the potentially large areas and distances covered, the inspections will

necessitate the use of vehicles. All staff carrying out inspections should keep their speed as low as reasonably practicable, as the lower the speed the more effective the inspection will be. Under special circumstances (ATC, SMR, and implemented SMGCS System) runway inspections can be carried out in the same direction as runway movements, provided that a risk assessment has been done taking into consideration local conditions as well as safety measures applied. It is recommended that these inspections be carried out a minimum of four times per day. However, the frequency should be based on local regulations and legislation. The typical times to conduct inspections are:

- A first-light inspection prior to daytime operations
- A mid-morning inspection
- A mid-afternoon inspection
- A last-light inspection prior to night operations

Further information can be found in the *ACI Policies and Recommended Practices Handbook, **Section 5.17***.

Runway inspections
5.17 *ACI supports the ICAO recommendation of a minimum frequency of every six hours during operating periods, in particular at dawn, morning, afternoon and dusk. The method employed for such inspections should be carefully considered in terms of number of staff, their training and the vehicle used. Special attention should be paid when construction works are in progress at the aerodrome and immediate checks should be made when pilots advise sightings of debris, etc.*

Additional Level 1 inspections, particularly of the runway, may be carried out depending on local circumstances and the airport's hazard analysis and risk assessment process. Inspection teams should report anything that affects the serviceability and safety of the following:

Runways
- The runway condition, including cleanliness, rubber build-up and pit / drain covers
- The runway friction course, particularly for cracking and loose material
- Runway signs, lights and paint markings for damage and wear
- The runway strip, RESA, and CGA, including drainage
- PAPI units and Runway Guard Lights and any other runway lights and wing bars
- Any obstructions infringing the runway strips and its protected surfaces
- All areas of work in progress on / or adjacent to the runway system
- Condition of all windsleeves for day / night operations

Taxiways and Taxilanes
- All taxiway pavement surfaces particularly with regard to cleanliness and FOD
- All taxiway signs, lights and paint markings for damage or wear
- Any obstructions and excavations that may affect the taxiway strip
- All areas of work in progress on or adjacent to the taxiway system
- All taxiway centre line light fittings and markers
- General condition of drains, and covers
- The state of the grass edge, including any water-logged areas

Grass Areas (or other areas adjacent to the taxiway system)
- General condition of the vegetation, particularly any areas of blast erosion
- Grass length and the amount of weeds, particularly near lights and signs
- Any areas of standing water
- Depressions or aircraft wheel tracks
- Excessive difference in levels at the edge of paved surfaces
- Cleanliness of these areas with regard to FOD
- All areas of work in progress

Apron Areas
- General surface condition and any pavement damage
- Apron cleanliness particularly fuel / oil spillages, debris and FOD
- Cleanliness of all paint markings and signs
- All apron signs, lights and markings, including apron-taxiway intersection lights
- Any incorrect parking of aircraft, vehicles, equipment, air bridges, etc.
- All areas of work in progress

Airport Lighting
- All runway approach lighting (including any CAT III supplementary systems) should be inspected every evening at dusk prior to night operations and any defects reported immediately.
- All runway lighting shall be checked as soon as practicable after the lighting has been switched on. Individual light outages and circuit failures should be reported immediately.
- All taxiway lighting should be checked as soon as practicable and should include all centrelines, edge lights, stop bars, runway guard lights and lead on / lead-off lights. Outages should be reported immediately.
- All apron lighting should be inspected and any outages reported immediately.
- In order to maintain safety, all repairs and / or replacements should be done in a timely fashion

Zones outside the Airport Boundary
A regular inspection of the areas adjacent to and surrounding the airport boundary should be made to ensure that there are no obstructions affecting protected surfaces, particularly in the approach and departure areas of all runways. Items such as cranes should be dealt with immediately. Any agricultural activity that may attract concentrations of birds to the vicinity of the airfield should also be noted and reported.

LEVEL 2 - DETAILED DAILY INSPECTIONS

Level 2 inspections are more detailed checks of the condition on the movement area and its associated facilities than those carried out at Level 1. The Level 2 inspections are best carried out on foot or by using a vehicle operating at a very slow speed thus enabling a far more comprehensive assessment to be made.

Within the Level 2 process the movement area should be divided up into a number of zones depending on the size of the airport. One zone should be inspected in detail each day or depending on the amount of traffic in the area to be inspected. The Level 2 inspections can be carried out at a time on each day that best suits the stand demand, runway in use or other operational requirements. The areas covered by the Level 2 detailed inspections are as follows:

Runways

All runways should be inspected in detail on a quarterly cycle. Typically the runway can be divided up into a number of sections. Dependent upon the movement rate on the day of the inspection, a number of sections can be checked. The following should be inspected:

- **Surfaces**

  The full length and width of the runway should be inspected during the cycle. The inspections should record cracks, and general break-up and any other surface failure particularly if there are signs of debris. Particular attention should be paid to the touchdown zones and those areas that are highly utilized by aircraft. The touchdown zones should also receive particular attention to assess the degree of rubber build-up that may affect the runway surface friction co-efficient. Attention should also be given to rapid exit and access taxiways.

- **Signs, Markings and Lights**

  All signage along the runway should be checked for general condition. All runway markings should be checked for visibility, particularly in the touchdown zones where rubber deposits may have blackened certain markings. A selection of light fittings should be checked for general safety particularly with regard to fixing nuts.

- **Runway Strip**

  The area surrounding the runway, including the Strip, Clear and Graded Area (CGA), and Runway End Safety Area (RESA) should also be checked. Attention should be given to its general bearing strength, the nature of the surface, any obstructions (frangible) and any other features that could cause damage to an aircraft should it overrun or undershoot into these areas.

- **Runway Approach Light Systems**

  In addition to the runway surface inspection process, typically twice a year, each full approach lighting system, its cables, light fittings, masts and other support structures must be checked for its general safety and serviceability, by a physical check on foot. During the lighting check a general assessment of the lighting pattern should be made and any outages or gross misalignments noted and reported immediately.

- **Zones Surrounding the Airport**

  Once a week senior operations staff should make a tour of the areas adjacent to and surrounding the airport boundary to check that there are no obstructions infringing protected surfaces particularly in the approach and departure areas. Items of concern should include tall trees, cranes, lights that may create glare or cause confusion to pilots and agricultural practices that could cause an increase in bird activity.

Taxiways

The airport's taxiway system should be inspected in detail each day, at a time dictated by traffic movements, runway in use, etc. One section of the taxiway should be inspected on foot and all defects noted on a specialized map / diagram of the area. The following should be inspected:

- **Surfaces**

  All taxiway surfaces including any hard shoulders should be checked. Surfaces should be inspected for cracks, deterioration and debris.

- **Signs, Markings and Lights**

  All taxiway paint markings should be checked and any needing repainting noted. All signs should be checked for their visibility and stability particularly where they may be affected by jet blast. A selection of taxiway light fittings should be checked for general safety.

- **Surrounding Areas**

  All taxiway strips and associated grass or other paved areas should also be checked for their general safety, particularly with regard to obstructions and surface conditions in a similar way to the clear and graded area of the runway.

Aprons and Stands

The airport aprons and stand areas should be inspected on foot and all defects noted on a specialized map / diagram of the area. The following should be inspected:

- **Surfaces**

  All aprons, stands and associated equipment parking areas should be checked for surface break-up particularly where debris and FOD is being created.

- **Signs, Markings and Lights**

  All surface paint markings associated with aircraft manoeuvring and parking, as well as pedestrian crosswalks should be checked and any repainting requirements noted. Additionally all signs, markings and lights associated with the Visual Docking Guidance Systems (VDGS) should be checked for correct functionality.

Other

All emergency telephones should also be checked for proper functioning. Visibility and accessibility of fire fighting equipment, fuel shut-off valves and emergency exits, parking of air bridges, compliance with NO PARKING restrictions, as well as audible and visual warning systems should also be verified.

Surrounding Areas

All service roads and equipment parking areas serving each stand should also be checked for general serviceability and condition particularly where the surface may cause damage to vehicles or injury to passengers or personnel. These areas should also be checked for general cleanliness and parking discipline.

LEVEL 3 - MANAGEMENT INSPECTIONS AND AUDITS

The Level 3 management process is essentially an audit of the Level 2 detailed inspections and it also ensures that senior Operations and Engineering management are fully involved in the overall airside inspection process. The Level 3 process should be carried out typically on a weekly basis and cover the aprons, stands and taxiways in such a way that each area is audited / inspected on a quarterly basis. The audit team should log their findings on special report forms. Any major problems that are found should be reported immediately. Prior to the Level 3 inspection, the previous Level 2 detailed inspection reports of the particular areas to be covered should be examined. This will allow senior Operations management to audit the detailed Level 2 inspection for content.

Additionally, twice a year the senior Operations / Engineering management team should walk the full length of all runways. This will allow managers to keep an up–to-date working knowledge of their

surface condition. This inspection should be recorded and photographs taken where appropriate. This semi-annual inspection will also allow an audit of the detailed Level 2 inspections of the runway to be carried out. In addition to the runway inspections, there should be a semi-annual physical inspection of the runway approach light systems. This inspection will check for the general pattern, security and light output of each system.

All Level 3 management inspections should be undertaken on foot and should be co-ordinated with ATC. The forms filled out as part of the Level 3 inspections should be kept for at least five years as well as for audit purposes, for example by the National Aviation Authority or other external bodies.

The three level inspection system, as part of its SMS, should allow each airport operator to:

- Ensure compliance with the *ICAO Annex 14 – Aerodromes, Volume 1*, and the Airport Certification requirements of the National Aviation Authority
- Ensure that any failures, unserviceable facilities, or obstructions that may affect the safety of aircraft and personnel on the airfield are promulgated appropriately and planned rectification initiated
- Ensure compliance with the requirements of Workplace Health and Safety legislation of some States

3.2   PROTECTION OF NAVIGATION AIDS (NAVAIDS)

Key aids to navigation need to be protected to ensure their continued reliable operation, particularly during adverse weather. Examples include:

- ILS localizer and glide path critical areas
- ILS sensitive areas (for Low Visibility Operations)
- MLS antenna, if any
- IRVR transmissometres
- On airport VORs or other beacons
- Antennas for Global Navigation Satellite Systems (GNSS)

Protection of NAVAIDS is important for safe operations of an airport. Vienna International Airport

The exact protection required will vary from location to location. The general principles involve:

- Keeping vehicles, contractors and other airport staff away from the facility
- Providing warning signs, markings or lights at the edge of the sensitive area to prevent accidental intrusion into the sensitive areas
- Providing clear surface markings or fences (that do not interfere with the facility itself)
- Physically placing temporary barriers across certain routes
- Planning roads and access routes to stay clear of such facilities
- Implementing procedures to ensure snow clearing vehicles, sweeping vehicles or grass cutting vehicles do not infringe the areas without permission and coordination with Air Traffic Control

3.3 PREVENTION OF RUNWAY INCURSIONS, EXCURSIONS AND CONFUSION

Runway incursions, excursions and confusion present one of the greatest aviation hazards with potentially very serious consequences. A number of fatal accidents have occurred around the world resulting from these events.

In recognition of the seriousness and growing frequency of these events, a number of years ago the FAA and Eurocontrol began a concerted industry-wide review to seek to reduce the numbers of runway incursions. This work gave rise to the Eurocontrol "*European Action Plan for the Prevention of Runway Incursions*", which involved many industry sectors. Additional information can be found in the *ICAO Doc 9870 Manual on the Prevention of Runway Incursions*.

One of the conclusions was that a Local Runway Safety Team should be established at each airport. Some airports have gone beyond this recommendation and have established a Manoeuvring Area Safety Team (MAST). The topic of runway incursions, excursions and confusion should be discussed on a regular basis by the Airside Safety Committee or Local Runway Safety Team or Manoeuvring Area Safety Team (*Section 3.8*).

ACI has been actively participating in the development of a Runway Excursion Toolkit and supports the findings of the *FSF Report of the Runway Safety Initiative 'Reducing the Risk of Runway Excursions.* Some of the recommended mitigations include: RESAs, runway closure criteria, compliance with *ICAO Annex 14 – Aerodromes, Volume 1*, availability and training of RFFS personnel, and means for flight crews to visually determine runway distance remaining.

Further information can be found in the *ACI Policies and Recommended Practices Handbook*, **Section 5.6** and **5.23.**

> **5.6** *A runway end safety area should be provided to mitigate the consequences of overruns and undershoots, which may result from a combination of adverse operational factors. At airports where adequate distance and suitable terrain is available, a greater length of RESA than the ICAO Standard should be provided.*

3.4 USE OF FOLLOW ME VEHICLES DURING REDUCED / LOW VISIBILITY OPERATIONS

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Airport operators should consider the use of FOLLOW ME vehicles during reduced or low visibility operations when the RVR is less than 2,600 ft, respectively less than 1,200 ft. The use of any such vehicles during normal operations will be decided by the airport operator, based on operational safety requirements. The following elements should be considered:

- Vehicle with flashing or rotating lights and / or the words 'FOLLOW ME', clearly identified, and equipped to operate in the movement area
- Importance of radio communications, more particularly clearances and read-back
- Enhanced situational awareness
- Both vehicle operator and the pilot should know where marshalling begins following landing, or ends prior to take-off
- ATC taxi routing instructions should be given to, acknowledged and read-back by the vehicle operator and monitored by the pilot

3.5 RUNWAY FRICTION MEASUREMENT

Runway friction is a key aspect of aircraft performance on landing or departure. Newly built or surfaced runways should have a design specification to achieve high friction. With use, the friction of a runway surface will deteriorate due to weathering, rubber build-up or contamination by materials such as ice, snow, sand or other contaminants. Therefore, there are two reasons for measuring friction:

- Trend monitoring of the runway surface over time
- Checking friction values in periods of contamination

Friction should be measured periodically to ensure the friction value remains acceptable and resurfacing or treatment is considered when the value is low. The friction should also be measured when the surface is contaminated. After the surface is cleared, measurements should be made to ensure the effectiveness of the clearing operation.

There are various different types of friction measurement devices in use around the world. Measurement may involve straightforward use of the equipment between aircraft movements or may involve a calibrated application of water ahead of the measurement device to obtain standardized readings for a wet runway.

Results from friction measurement should be retained to reveal trend information over time and to identify any particular areas requiring attention, e.g. rubber deposits in the touchdown zones.

Further details can be found in *ICAO Doc 9137 Airport Services Manual Part 2 – Pavement Surface Conditions*, as well as in the *ACI Policies and Recommended Practices Handbook*, ***Sections 5.14*** and ***5.15.***

> **5.14** *Runway surface friction readings should be measured on a uniform scale, and there should be consistency between the scale used for maintenance testing and that used for operational testing. ACI supports the Joint Winter Friction Measurement Programme, as well as a new ICAO task force which aim to gather data on which a review of the consistency of operational testing results could be based.*
>
> **5.15** *The effectiveness of different means of improving friction coefficients of wet runways should be assessed. ACI advocates adequate surface drainage, as well as removing rubber and contaminants from the runway surface on a regular basis. Any methods used for this purpose must meet local and international requirements.*

3.6 AIRPORT SAFEGUARDING

ICAO has defined surfaces around a runway which should be kept free of obstructions (details can be found in *ICAO Annex 14 – Aerodromes, Volume 1, Chapter 4*) and should be protected from developments that may infringe them. To achieve this, a safeguarding or checking process is needed through which applications for new developments in the specific areas around the airport are verified by the airport operator. Checks should be made to ensure proposed new buildings do not infringe the protected surfaces. Evidently, it is far easier to resolve these issues at the planning stage than after construction has started.

During construction, crane operating heights should be checked to ensure no protected surfaces are infringed.
Dubai International Airport

During construction of new buildings on or off the airport it is possible that cranes will be used and in some cases these may be erected to a height greater than the finished building. If this is the case, a process should be established to check the crane operating heights during on or off-site construction to ensure that no protected surfaces are infringed. Crane heights should also be checked during the

planning stage of all construction, as outlined in the process above. In addition, crane operating heights should be checked during construction to ensure that changes have not occurred since the plans were approved resulting in the crane operating at a greater height.

If cranes are operated in the hours of darkness, they should be lit with red obstruction lights. If an infringement does occur, the authority responsible for instrument approach procedures should verify that the procedures are not infringed and that safety is not compromised.

To assist in this process, airports should inform city planning departments and / or crane operating companies about the requirements for operations taking place in the vicinity of airports. Some airports use a Crane Permit system that gives authorization for cranes to operate up to a specific height in a specific location. An example of a crane permit form can be found in *Annex G*.

Surveys may need to be conducted periodically to ensure the safeguarding process outlined above is functioning and tree growth monitored to ensure the surfaces are not penetrated. These surveys should cover the areas within the protected surfaces.

3.7   WILDLIFE HAZARDS

Wildlife around airports can present serious hazards to aircraft operations. The most obvious of these is the presence of birds, but other animals such as mammals can also present a hazard. One key method to control and limit the dangers presented by wildlife on an airport is to ensure that adequate fencing is put up around the airside areas. This is fundamental to keeping mammals off the aerodrome.

Specially trained and equipped staff manage wildlife on the airport. Brussels International Airport

Birds present a hazard to aircraft in flight. They easily adapt to human development and make full use of the many opportunities that human activity provides. The built-up areas of airports offer these birds a variety of nesting and roosting sites, as well as sources of food. It is impossible to guarantee no bird strikes will occur, but there are a number of activities an airport can undertake to reduce the probability of this happening. These include:

- Collecting accurate information on all bird strikes that occur, including details of the species involved
- Observations of bird species and bird behaviour both on the airport and in the surrounding areas

- Identifying the hazard presented by each species by carrying out a species-based risk assessment
- Prioritizing efforts towards the most hazardous species

It is necessary to carry out risk assessments, as noted in *Section 1.3*, in order to better understand the risks posed by wildlife on an airport. The biggest hazard is presented by large birds that fly in flocks. Practical steps that can be taken to reduce the attractiveness of an area to birds include:

- Cutting the grass so it does not attract invertebrates, but not too short that it provides a resting area for the birds
- Reducing the area where top soil stripping takes place, exposing worms and insects
- Ensuring no new water features or waste dumping sites are placed around the airport that might generate hazardous flight lines across aircraft arrival or departure routes
- Not providing perches, ledges, holes, overhangs or other structures favourable to nesting, roosting or perching of birds
- Screening or blocking holes and openings in hangars
- Installing flexible netting across the base of rafters
- Installing vertical plastic blinds in doors of hangars and buildings that are frequently left open.
- Installing netting, sheet metal, or other barrier materials under overhanging eaves and ledges
- Installing spikes on ledges or fine parallel wires stretched across ledges or on the roof
- Placing nets or other systems over water features to prevent access
- Ensuring that where raptors or hawks are present, there is no food source e.g. rabbits or mice
- Ensuring no bushes or shrubs are planted as part of airport landscaping that produce fruit and seeds which might attract birds

The airport operator should advise the airport community that nobody should feed wildlife (including birds), expose food waste or purposely let wildlife in their facilities by providing nesting or other attractive forms of habitat. In addition to steps outlined above, it is good practice to have a bird detection and dispersal team on duty to detect and disperse any birds seen on the airports with the use of bird distress calls, shell-crackers or 'bangers' and eventually by shooting, if the other methods do not deter the birds adequately. Accurate logging of all bird species, numbers, location and behaviours is essential.

On occasion, animals transported as cargo (domestic animals, racing horses, livestock, etc.), may escape from their cages or enclosures and gain access to the movement area. Ground handling agencies should report these occurrences in a timely fashion and work closely with the airport operator to rapidly contain these animals in a timely fashion.

Further detailed guidance is available in the *ACI Aerodrome Bird Hazard Prevention and Wildlife Management Handbook* as well as in the *ACI Policies and Recommended Practices Handbook*, **Section 5.19.**

> **5.19** *Aerodrome operators must remain permanently vigilant to assess the risk in real time and take the necessary measures immediately. It is crucial to either implement a bird hazard prevention and wildlife management unit, or specially trained and equipped staff to manage wildlife on the airport.*

3.8   AIRSIDE SAFETY COMMITTEE

An Airside Safety Committee should be hosted by the airport to review safety in the airside areas. Its purpose is to:

a) Provide a safe environment for the travelling public, airport users, airport employees and aircraft
b) To eliminate and / or reduce hazardous conditions, acts and situations ALARP, as well as to prevent and / or reduce accidents, incidents and occurrences ALARP

The Committee should consist of different airport divisions, airlines, handling agents, aircraft catering companies, aircraft cleaning companies, fuelling companies, ATC, government agencies, policing and security organizations, FBOs, emergency response services – ideally all large organizations that operate in airside areas. The Terms of Reference for an Airside Safety Committee should include:

- Promotion of safety awareness through training, licensing and the publication of safety bulletins
- Establishment and discussion of local safety procedures and guidelines
- Accident, incident and occurrence reporting and investigation, subsequent data analysis and dissemination of trends, common causes etc.
- Generation, evaluation and recognition of safety suggestions
- Preparation of regular joint safety campaigns
- Discussion of forthcoming airside works programme

The meeting should be held in a relaxed and open atmosphere conducive to discussion and sharing so as to maximize the learning and development of ideas. It is suggested meetings are held either monthly or quarterly. Depending upon the size of the operation at the airport, the subject could be covered under an Airside Safety Committee or be separated into a Local Runway Safety Team / Manoeuvring Area Safety Team and an Apron Safety Committee.

3.9   AIRSIDE SAFETY PROMOTION

Every airport should continuously improve its safety culture. To promote positive safety attitudes, it is essential to have the collaboration of all organizations working airside. Promotion can be done in a number of ways:

- Emphasis on the safety component in the training of new staff. New staff must understand the importance of strict adherence to procedures when carrying out tasks
- Short-cuts, improper or unsafe execution of tasks should be pointed out and strictly discouraged
- Periodic promotion to call attention to different aspects of safety
- 'Road Shows' or safety promotional vehicles could be used to tour the airside areas and rest rooms or staff restaurants to draw the attention of ramp staff to the latest safety message

3.10 INTERFACE WITH STAKEHOLDERS

A close working relationship at a professional level between the various duty managers of organizations such as ATC, the airport, control authorities and airlines is vital. This should be an on-going process and ideally, joint daily meetings should be held, in order that individuals dealing with an accident, incident, occurrence or aircraft / airport related emergencies will be able to work together much more effectively.

A close working relationship between the airport operator and stakeholders will enhance safety at the airport. Geneva International Airport

When major developments occur in airside areas, Project Managers can be introduced to the forum to deal directly with any issues arising from the activities taking place.

Airport requirements should be clearly stated and disseminated to all companies operating airside. These may require each company to:

- Document and implement its own Safety Management System (SMS) covering all safety aspects of its operation
- Provide proof of an insurance policy (aviation liability insurance) or the equivalent and a tracking system to ensure adequate insurance is maintained
- Demonstrate that all staff are properly trained and tested to carry out the tasks expected of them
- Comply with legislation, airport notices, directions, safety alerts
- Put in place a named safety manager appointed to oversee all matters of training, testing and maintenance of equipment
- Co-operate in the implementation of airport-wide safety programmes
- Provide a safe, efficient and high quality service without undue disruption to the operation of the airport
- Allow access to documents (within legal restrictions)
- Participate in regular joint inspections or audits of service areas with the airport operator
- Conduct risk assessments
- Ensure clean and tidy storage and proper disposal of materials
- Notify the airport of any particular hazards
- Ensure dangerous goods are properly stored, labelled and handled
- Ensure all plant and equipment is appropriately and safely stored in adverse weather conditions

The third party safety processes listed above can be used in a number of ways:

- In a contractual relationship between the supplier and the airport
- As a transparent process enabling comparison of different companies' compliance with each element
- As an assessment process for awarding future contracts

3.11   ENGINE RUN-UPS

Engine testing is handled in many different ways at different airports. Key factors include whether or not a maintenance organization is based at the airport and the proximity of nearby residential areas. Engine testing should be limited for environmental reasons to:

- Only low power tests at night with a maximum duration per run-up and a maximum total number of durations for each night
- Only to take place in specific acoustic enclosures at night
- Only to take place in remote parts of the airport at night
- Only to be conducted on aircraft needed for an early morning departure the next day

Safety aspects to be considered during engine tests can include:

- A wing-man on the ground (possibly two in busy situations) to ensure no third parties are affected by the jet blast or prop wash
- Continuous contact with ATC while the run-up takes place
- Prior permission from the airport operator to carry out a run-up
- Assessment of the wind speed and direction
- Assessment whether balancing thrust is needed from other engines on the other wing
- Use of anti-collision and navigation lights when the run-up occurs
- Use of cones or other physical deterrents around the aircraft to improve safety
- Check for FOD in the area concerned before the run-up takes place, both in front of and behind the aircraft
- Ensure the aircraft brakes are applied and / or the aircraft is secured with chocks
- Ensure engine blast does not present a hazard to any nearby staff or to property
- Ensure engine blast is directed away from active arrival / departure paths and areas where aircraft may taxi

3.12   HELICOPTER OPERATIONS

Rotary wing aircraft could possibly enter an airport that is designed for fixed wing aircraft. In this case the requirements for signs, markings and lights will be the same as described in *ICAO Annex 14 – Aerodromes, Volume I, Airport Design and Operations*. Where a Heliport is used, the requirements of *ICAO Annex 14 – Aerodromes, Volume II, Heliports* should apply.

Some airports may be equipped with helicopter runways and aprons: in this case, there will be particular requirements for helicopter approach lighting and runway markings.

The airport should liaise with local ATC to ensure that procedures exist for helicopter air taxi routes, helicopter marshalling, and safety requirements for parking helicopters near light fixed wing aircraft. Any airport staff expected to work in close proximity to helicopters should be given specific training.

Helicopter operations have special requirements, such as designated landing zones and markings. Geneva International Airport

There should also be safety procedures for companies that allow boarding or deplaning of passengers with rotors running.

For all helicopter runways, taxiways and aprons, the same requirements for inspections, bird control, and vehicle activity should apply as for a fixed wing operation.

3.13   SPECIAL FLIGHTS

The airport operator should have procedures in place to deal with flights of an unusual nature. These may include:

- Outsize cargo flights
- VIP flights (royalty, heads of state, Government Ministers, religious leaders, sports teams, sports and entertainment celebrities)
- Major sporting events (World Cup Soccer, Olympics)
- Major religious events (pilgrimage e.g. the Hajj)
- Ammunition or firearms flights
- Military flights
- Flights shipping specialist livestock such as racehorses
- Space shuttle emergency landing sites

Procedures should be planned well in advance to include all the handling companies, ATC, control authorities, and other stakeholders to ensure that all parties understand the specific requirements of the flight and anticipate all unusual matters.

The following should be considered in a situation where there is a deviation from normal procedures and processes:

- Any special approach procedures
- Aircraft routing from the runway
- Aircraft parking place
- Access to airside for any third parties not familiar with airside
- Vehicular routes
- Marshalling requirements
- Specific signage
- Specialist cargo handling facilities
- Spacing from other activities
- Other aircraft arrival or departure routes affected
- Involvement of Public Affairs teams to handle media interest
- Involvement of Government agencies
- Policing and security arrangements

All parties should work closely together and understand the specific requirements of a special flight. Munich International Airport

3.14   DISABLED AIRCRAFT REMOVAL

The airport operator should establish a plan for the safe removal of an aircraft, disabled on or adjacent to the movement area of the airport, and should designate a coordinator to implement the plan, when necessary. Information concerning the office of the airport coordinator for the removal of the disabled aircraft should be made available to aircraft operators. Safety will remain the guiding principle during the whole process. Further information can be found in *ICAO Doc 9137, Part 5, Removal of Disabled Aircraft.*

The plan should identify key parties, their responsibilities and the lines of communication, be based on the characteristics of the aircraft that may normally be expected to operate at the airport, or use it as an alternate and also include:

- a list of equipment available on or in the vicinity of the airport
- a list of additional equipment available from other airports on request (mutual aid agreements)
- a list of nominated agents acting on behalf of each aircraft operator at the airport
- a statement of the airlines' arrangements for the use of pooled specialized equipment
- a list of local contractors (with names and phone numbers) able to supply heavy removal equipment for hire

The airport operator should request a copy of the disabled aircraft removal plan from each aircraft operator prior to the latter commencing regular operations at the airport. The airport operator should maintain and constantly update its database of relevant contacts in aircraft operators' operations centres. Key parties to the disabled aircraft removal plan are: the airport operator, aircraft operators, ground handlers, State accident investigators, aircraft manufacturers, Customs officers, Dangerous Goods / HAZMAT specialists, environmental specialists, Workplace Health and Safety officers, insurance representatives, cargo specialists, RFFS personnel, air traffic controllers, MET information providers, specialized equipment operators, construction crews, security staff, NAVAIDS personnel, planning and engineering staff, contractors and consultants, police having jurisdiction, and other interested parties. Good communication between the airport operator and other parties is essential.

Contingency plans need to be drawn up to handle an event where a disabled aircraft needs to be moved. This can involve a relatively simple task such as an aircraft with deflated tyres to a full accident recovery requiring lifting and moving of large aircraft. Often this can be a time-pressured situation as the re-opening of the airport can depend on the timely removal of the disabled aircraft. To assist in this process, it is helpful to have detailed layout blueprints of the airport showing the locations of electricity cables underground, telecom wires, network cables, fuel pipes, water pipes, fire mains, airport lighting circuits etc. These can be important in dealing with the recovery.

Disabled aircraft removal must be done in a timely and efficient manner, taking into account safety and operational requirements. Munich International Airport

The airport operator should, as part of the emergency preparedness training cycle, include a disabled aircraft removal partial and / or tabletop exercise taking into account the size of the aircraft to be moved and the recovery equipment available. This will provide an excellent training and learning opportunity allowing all participants to exchange information, identify gaps in the different plans and responses and initiate corrective action. Other benefits include:

- Staff familiarity with specialized equipment that is rarely used
- Increased experience in team-work with the above key parties
- Testing of communication protocols with other organizations
- Practical knowledge of how to move the aircraft, where to park it
- Availability of cranes and other heavy equipment and locating them airside
- Experience with chains, pulling gear and aircraft tugs in moving the aircraft
- Impact on obstacle limitation surfaces or interference with radio NAVAIDS

Key aspects of disabled aircraft recovery include:

- Exact location and height of the aircraft. This may necessitate re-declaring distances for aircraft operations to continue from a reduced runway length
- Recovery can only begin once the passengers have left the aircraft and the accident investigators give permission for the aircraft to be moved
- Recovery can only begin once the airside lighting system is off
- Airlines insurers need to give permission
- Requirement to provide matting or a temporary road surface to either enable the aircraft to power out of the grass or for a tug to pull it out
- Requirement to offload cargo and bags in-situ before the recovery commences
- Importance of preventing secondary damage
- Requirement to de-fuel. Airports should ensure that there are sufficient empty containers or fuel tankers available to do this
- Requirement to have flat-bed trucks to transport parts of the aircraft
- Requirement to have sweepers to clean the area afterwards
- Prevention of secondary damage

The disabled aircraft must be removed in a timely and efficient manner, taking into account safety and operational requirements (e.g. number of movements, single runway operation and other considerations), subject to authorization by the State accident investigation authorities. If the aircraft operator fails to take responsibility for the removal operation within a suitable time period, the airport operator may take over the responsibility, contract the removal to a third party and pursue cost recovery from the aircraft operator. Written permission or a 'hold harmless' document should be sought from the aircraft operator either as part of the operating agreement between the airport operator and the aircraft operator, or at the latest prior to commencing the disabled aircraft removal operation. Failure to obtain such a document should not unnecessarily delay this operation. The airport operator should ensure visual records of the disabled aircraft removal operation are made and kept.

Note: In addition to a Disabled Aircraft Removal Plan, airport operators should also have procedures in place to remove any obstacle, obstruction, vehicle, equipment (including GSE), aircraft and similar items, abandoned or not, whether or not they affect operational safety.

Further information can be found in the *ACI Policies and Recommended Practices Handbook,* **Section 5.25.**

5.25 *The safe and timely removal of a disabled aircraft and rendering the movement area fully operational are critical elements of the airport's operational readiness plan. Especially at a single-runway airport, it is vital to minimize any closure period, for safety, continuity of operations and economic reasons. The airport operator, in conjunction with aircraft operators, should - as part of its emergency preparedness training – organize an exercise covering all aspects of disabled aircraft removal.*

3

3.15   MANOEUVRING AREA DRIVER TRAINING PROGRAMME

It is anticipated that all drivers with a need and right to operate a vehicle on the manoeuvring area of an airport will obtain an ADP, which has been covered in *Section 1.15*. It is also anticipated that any driver with a need and right to operate on the manoeuvring area will have obtained a minimum of experience in general airside driving before training to operate on the manoeuvring area.

The number of drivers permitted to drive on the manoeuvring area should be kept to the minimum necessary, and the functions they perform should normally be within the following areas of responsibility:

- Runway inspections
- Wildlife control
- Rescue and fire fighting
- Essential engineering
- Air traffic control
- Airside maintenance, including electrical systems and NAVAIDS
- Winter operations, including snow clearing and de-icing
- Airline / handling agent for aircraft towing and runway crossings
- Security and policing

All drivers should be trained initially and be provided with refresher training at agreed intervals with particular additional emphasis on the following areas:

Airport Regulations and Requirements
- Rules of Air Traffic Control, right of way of aircraft
- Definitions of movement area, manoeuvring area, aprons, stands
- Methods used to disseminate information regarding works in progress

Air Traffic Control (ATC)
- Function of air traffic control and its area of responsibility
- Function of ground movement control and its area of responsibility
- Normal and emergency procedures used by ATC relating to aircraft
- ATC frequencies used and normal handover / transfer points for vehicles
- ATC call signs, vehicle call signs, phonetic alphabet, standard phraseology
- Demarcation of responsibilities between ATC and Apron Control if applicable

Personal Responsibilities
- Fitness to drive with particular emphasis on eyesight, colour perception and hearing
- Correct use of personal protective equipment (PPE)
- Responsibilities with respect to FOD
- Responsibilities with respect to escorting other vehicles on the manoeuvring area

Vehicle Standards
- Responsibility to ensure vehicle used is fit for purpose and task
- Requirements for daily inspection prior to operating on the manoeuvring area
- Particular attention to the display of obstruction and general lights
- Serviceability of all essential communications systems with ATC and base operations

Airport Layout
- Situational awareness
- Particular emphasis on standard ICAO signs, markings and lights used on the manoeuvring area
- Special emphasis on those signs, markings and lights used to protect the runway
- Description of equipment essential to air navigation such as ILS
- Description of protected zones related to ILS antenna
- Description of ILS protected areas and their relation to runway holding points
- Description of runway instrument / visual strip, cleared and graded area (CGA)
- Description of lights used on the manoeuvring area with particular emphasis on those related to low visibility operations

Hazards of Manoeuvring Area Driving
- Engine suction / ingestion and blast, vortex, propellers and helicopter operations
- Requirements for driving at night
- Requirements for operations in low visibility and other adverse weather conditions
- Procedures for vehicle and / or radio becoming unserviceable while on manoeuvring area
- Right of way for aircraft, towed aircraft and RFFS vehicles in emergency

Emergency Procedures
- Actions to be taken in event of vehicle accident / incident
- Actions to be taken in event of aircraft accident / incident
- Actions to be taken if FOD or other debris is found on runways and taxiways
- Procedures to be used by vehicles if lost or unsure of position
- Local emergency telephone numbers

Aircraft Familiarization
- Knowledge of aircraft types and ability to identify all types normally operating at the airport
- Knowledge of airline call signs
- Knowledge of aircraft terminology relating to engines, fuselage, control surfaces, undercarriage, lights, vents, etc.

Practical Training (Visual Familiarization)
- All runways (including access and exit routes), holding areas, taxiways and aprons
- All signs, surface markings and lights associated with runways, holding positions, CAT I / II / III operations
- All signs, surface markings and lights associated with taxiways
- Specific markings that demarcate the boundary between aprons and manoeuvring area
- Navigation aids such as ILS, protected area, antenna, RVR equipment and meteorological equipment
- Hazards of operating around aircraft landing, taking off or taxiing
- Any locally used naming convention for particular areas or routes

3

3.16   RADIO TELEPHONY (RTF) TRAINING PROGRAMME

Radio phraseology has been developed to provide clear, concise, and unambiguous communications. In addition to *ICAO Doc 9432 - Manual of Radiotelephony*, some States have published specific study guides with aeronautical qualifications. A radio operating certificate issued by a national authority may be required to operate certain types of radios.

The movement of vehicles on the manoeuvring area is subject to authorization by ATC. Depending upon the complexity of the airport, ATC may operate a number of frequencies. At some airports, the airport (tower) controller will be responsible for all vehicles operating on the runway(s), and the ground controller will be responsible for all vehicles operating on the other part of the manoeuvring area. It is essential that all vehicles that operate on the manoeuvring area (runway(s) and taxiway(s)) are fitted with the appropriate radio communication frequencies.

A high degree of competence with respect to RTF phraseology is required. Denver International Airport

Vehicle drivers on the manoeuvring area should maintain a constant listening watch, not only in case of further instructions from ATC, but also so that drivers can be aware of movements, intended movements and presence of other traffic, thereby reducing the risk of conflict. They should need to display a high degree of competence with respect to use of RTF phraseology and aviation English.

The framework shown below is to be used as a model in the development of a Radio Telephony training programme. This programme should include the following points:

Hierarchy of Message Priority
- Message priorities, understanding of distress, urgency, alerting, control, information messages
- Imposition of silence on one, or all stations

Use of the Phonetic Alphabet
- Correct pronunciation of letters, words and numbers

Use of Standard ICAO Phraseology
- Emphasis on drivers using standard phraseology
- Do not use certain phrases such as 'cleared', and 'go ahead'

Use of Call Signs for Aircraft, ATC and Vehicles
- Knowledge of terminology and acronyms used by ATC and pilots
- Knowledge of the airline call signs used at the airport
- Vehicle call signs should be appropriate to their function e.g. 'Operations', 'Fire', 'Engineer'. Where there is more than one vehicle performing the same, or a similar function, numbers should be added e.g. 'Fire 2'

Use of Read-back Procedures
- Read-back requirements have been introduced in the interest of flight safety. Strict adherence to read-back procedures not only ensures that the clearance has been received correctly, but also that the clearance was transmitted as intended.
- Vehicle drivers should use standard read-back in the same manner as pilots for instructions such as 'enter / cross the runway', and if conditional clearances are used.
- Do not use certain phrases such as 'ROGER' or the call sign only, nor activate the PTT (Press-to-talk) button on the microphone instead of giving a complete read-back.

Test Procedures
- Test transmissions should contain the identification of the station being called, the caller identification, the words 'RADIO CHECK', and the frequency being used.
- Replies should contain the readability of the transmission

Readability Scale
- Knowledge of the readability scale from 1 - 5 (unreadable; readable now and then; readable but with difficulty; readable; perfectly readable)

Lost or Uncertain of Position
- Knowledge of the local procedure for vehicles lost or uncertain of position on the manoeuvring area

Vehicle Breakdown
- Knowledge of the local procedure for vehicle breakdown on the manoeuvring area
- Knowledge of the local procedure for advising ATC of vehicle breakdown

Radio Fail Procedure
- Knowledge of the local procedure if radio failure occurs on the manoeuvring area
- Knowledge of the light signals (different colours with different meanings) that may be used by ATC to pass instructions to vehicles

Correct Transmitting Technique and RTF Use
- Knowledge of the reasons for listening out prior to transmitting (to avoid interference with transmission from another station)
- Using normal conversational tone, even rate of speech, with speaking volume at constant level
- Using standard ICAO phraseology and aviation English (be aware of the special difficulties faced by non-native speakers)
- Avoiding certain words and sounds (hesitation sounds)
- Correct positioning of microphones to avoid voice distortion (noise-cancelling capability)
- Avoiding 'clipped' transmissions
- Being aware of regional accents and variations of speech and rhythm
- Use of portable radios

3

- Correct use of radios
- Effective range and battery life
- Screening / shielding effects on the airport ('dead spots')
- Use of correct call signs, either related to a vehicle or a person
- Safety while using radios or phones
- Knowledge of the local procedure regarding the use of portable radios and hand held microphones while driving a vehicle airside
- Knowledge of the local procedure regarding the use of mobile telephones (cell phones) while driving a vehicle airside

3

4

SAFETY MANAGEMENT SYSTEMS

4.1   INTRODUCTION

Safety Management Systems (SMS) represent a systematic, explicit and comprehensive process for managing risks to safety. Each system is based on the airport operator's in-depth knowledge of its organization, and integrates safety into policies, management and employee practices, as well as operating practices throughout the organization. As each organization integrates safety into daily operations, management and employees can continuously work to identify and overcome potential safety hazards that could cause accidents.

Airport safety management systems are very specific to their particular industry segment and must allow all the airport stakeholders to interact in a joint effort to improve safety. An SMS has to be modular and commensurate with the airport size and operations. It has to be practical and efficient so as to ensure a high level of safety and not become counter productive.

Airports play a crucial role in ensuring operational safety at their specific location. In most cases, the airport authority is responsible for the safety of all aeronautical operations taking place on their territory and in the surrounding airspace. For this reason, the airport SMS is a key component, which will greatly enhance the overall safety of civil aviation.

In addition to the requirements of *ICAO Annex 14 – Aerodromes, Volume 1, Chapter 1.5 (Safety Management)*, ICAO has also published a very comprehensive *Safety Management Manual (Doc 9859)*, intended to provide States with guidance to provide the regulatory framework and the supporting guidance material for the implementation of an SMS by service providers.

The responsibility for the implementation of an SMS lies with all line managers and employees. Organizations may also have a specifically designated safety manager who monitors and assists in the implementation and audits compliance. Depending on the size and complexity of the organization, the safety manager function can either be a dedicated position, or include other responsibilities. Some organizations may also create a Safety Office that will be responsible for the implementation and development of the SMS.

Further information can be found in the *ACI Policies and Recommended Practices Handbook, **Section 5.13.***

> **5.13** *ACI recommends that aerodrome operators should move away from the simple monitoring of compliance with rules and regulations to the development of a safety management system. Self monitoring and control should be the basic principle underlying all safety of work routines at aerodromes. All personnel should be aware of and adhere to the safety standards for their work set by management. Safety audits should be carried out regularly to ensure that international as well as national and local procedures and standards are fully observed.*

4.2   SAFETY MANAGEMENT MANUAL (SMM)

A Safety Management Manual should be developed to record all safety management processes. This manual can be integrated into the Aerodrome Manual or be developed as a stand-alone handbook. The manual should contain appropriate documentation on all processes related to SMS such as the reporting process, hazard identification process, risk management process or change management process.

4.3   POLICY

An airport should have a formally adopted safety policy and / or safety objective in place, endorsed by the Accountable Executive (Chief Executive Officer, Chief Operating Officer or Chairman of the Board) to confirm senior management commitment to safety.

This policy should clearly state its objective, identify accountabilities, provide a timeframe and a detailed plan (processes). It could also define a strategy to implement the organization's workplace health and safety policy, which may be a stand-alone or part of a comprehensive safety policy. The safety policy should incorporate measures to assess and control (eliminate or reduce as low as reasonably possible) the hazards associated with airport operations. A general policy should include, but not be limited to measures that will:

- Eliminate or reduce as low as reasonably practicable accidents, incidents and occurrences
- Protect the safety of airport employees
- Assess all risks to health and safety associated with airport operations
- Assess all risks to the safety of aviation operations at the airport
- Provide adequate hazard controls for affected parties (including airport users, airport staff and the airport community at large), whether these are health or safety related or not
- Encourage consultation with airport employees and the airport community
- Provide safety guidelines for purchasing and maintaining equipment
- Provide suitable instruction, training and other information

The safety policy will need to be reviewed on a regular basis to ensure that the changing safety requirements of airport operations are always met and that suitable hazard assessment and control measures are in place. Some organizations confirm their commitment to safety on an annual basis.

4.4   PERSONNEL

Personnel should be given initial and recurrent training in all tasks they can reasonably be expected to carry out to ensure a high level of proficiency. As part of the organization's training strategy, a training matrix should be developed for each position, training recorded, recurrent intervals set and gaps identified. In addition, they should demonstrate their continuing ability (competency based) to carry out the tasks required of them. Appropriate records should be kept by the organization for each employee during the term of employment and retained according to national requirements, but not less than five years after ceasing to be an employee (*Section 1.9*).

Properly trained and equipped employees will add to the value of an airport's SMS.

4.5   PROCESSES

Processes should be in place to accomplish the organization's safety policy objectives. These cover a wide spectrum of activities – from airport duty teams to the review of overall airside safety trends – and form a key part of the Airport Manual.

Processes need to be rigorously followed to meet set standards and procedures. A competent person in a supervisory capacity should be in place to ensure these standards and procedures are followed, positive reinforcement principles are used and appropriate feedback is given. These processes should be documented to form the basis of training for new recruits or refresher training for current staff. As business requirements change at the airport, the processes will need to be reviewed and updated to ensure they remain current.

4.6   REPORTING

Safety reporting serves two purposes: firstly to monitor that the required processes or activities have been completed (to demonstrate safety assurance) and secondly, to check progress against set targets, monitor accident, incident and occurrence rates and measure improved safety as a result of changes in processes. Reporting of both these aspects are useful in an SMS as one measures the 'input' and the other one measures the 'output' or results.

4.7 RECORDS

Records of all aspects of safety processes followed and completed should be carefully logged, with dates and personnel concerned, and kept according to national requirements, but not less than five years. Training records should be kept by the organization (*Section 4.3*).

4.8 THE FOUR ELEMENTS OF A TYPICAL SMS

The structure of a typical SMS

PLAN Airside Safety
- Understand existing legislative, best industry practice and organizational requirements
- Identify safety objectives
- Establish contingency plans and business continuity / recovery plans
- Confirm airside procedures are documented and up to date for all activities
- Check all risk assessments are complete

DO Airside Safety
- Provide initial training and testing
- Ensure competencies and refresher training processes are in place
- Confirm infrastructure and equipment checks are being carried out
- Discuss safety during staff meetings and consultation processes
- Check if all accidents, incidents and occurrences are reported
- Investigate all accidents, incidents and occurrences and proceed with trend analysis
- Confirm deficiency reporting process is in place
- Confirm behavioural reporting is in place
- Ensure appropriate records are kept
- Comply with all rules, regulations, policies, SOPs and other requirements

CHECK Airside Safety

- Ensure senior management regularly audits or inspects all airside areas
- Audit trainers and trainees – including any third parties
- Confirm different levels of checks take place for all airside areas
- Validate risk assessments
- Identify deficiency trends and accident, incident and occurrence trends
- Measure safety performance

REVIEW Airside Safety

- Identify root causes of accidents, incidents and occurrences
- Ensure preventative actions are taken and documented
- Share safety information with the airside community
- Work with others to identify and understand best industry practices
- Understand the regulator's future requirements in good time
- Establish future safety objectives

The themes of leadership, communication, consultation and delivery are covered above. These are key themes to be introduced in the development of an SMS.

In order to achieve the goal of having a safe airport, certain steps must be taken. These include the development and implementation of a clear organizational structure as well as the setting out of roles, responsibilities and accountabilities for the key individuals involved in airport safety. Also, risk assessments form a vital part of safety management. More details on this are found in *Section 1.3*.

The successful implementation of an SMS at an airport will result in the suitable and appropriate management and delivery of safety to both people and aircraft in a shared workplace environment. Once implemented, an SMS will ensure legal compliance, allow airports to retain their operating licence, improve business performance as well as enhance safety levels. In addition, it is considered proactive, not reactive.

4.9 SAFETY PERFORMANCE INDICATORS (SPIs)

Traditionally, airport safety work was based on accident data. However, as accidents are relatively rare, there is a need to establish safety performance indicators (SPIs) (both leading and lagging), which are causally related to accident and incident frequency and severity. In order to have a sound and comprehensive set of safety performance indicators covering the whole spectrum of airside operations, it is crucial to include system failure, as well as human error.

The following harmonized and comprehensive set of airport safety performance indicators (impacting aviation safety) allows both the airport operator and other major airport partners to review and enhance operational safety at airports. It is not necessary to use all of the SPIs, but choose those that are deemed to be relevant to operational safety and / or SMS. These may include:

- Number of aircraft occurrences (*)
- Number of runway crossings
- Number of runway incursions
- Number of taxiway incursions

- Number of occurrences resulting in damage to aircraft
- Number of occurrences (*) in the manoeuvring area and on aprons
- Number of fuel and other spills
- Number of prop wash or jet blast events
- Number of vehicle / mobile equipment occurrences (*), including non-compliance with site specific rules
- Number of critical systems' failures (electrical, communications, A-SMGCS)
- Number of FOD events (runways, taxiways and aprons)
- Number of passenger / staff injuries (minor, serious) and / or fatalities
- Number of completed inspections, audits and investigations (including those action items not completed within the anticipated timeframe)
- Number of signs, markings and lights not in compliance with ICAO SARPs
- Number of risk assessments carried out
- Efficient reporting, data collection and analysis system in place
- Number of wildlife events and / or bird strikes at or in the vicinity of the airport
- Number of occurrences (*) at airside construction sites
- Number of airside infrastructure events (e.g. damaged pavement)
- Number of events where access to life safety devices, emergency exits, fuel shutdown devices, etc., is blocked
- Number of airport employees trained, tested and competency demonstrated (including refresher training)
- Number of training courses, safety briefing sessions, tool box meetings, etc., planned
- Number of safe behaviours observed
- Number of safety reports received, assessed and followed up
- Number of safe work procedures established and cyclically reviewed
- Demonstrated commitment by management to safety
- Number of job descriptions having specific safety responsibilities and accountabilities

 (*) occurrences can include accidents, incidents and other events

Note: the rate can be established in function of the number of movements and / or events within a given timeframe

The concept of acceptable level of safety responds to the need to complement the prevailing approach to the management of safety based upon regulatory compliance, with a performance-based approach. The acceptable level of safety reflects the safety goals an airport operator should achieve while conducting their core business functions (minimum acceptable to the regulator). In determining an acceptable level of safety, it is necessary to consider such factors as the level of risk, cost / benefit analysis and risk acceptability by society.

To define an acceptable level of safety two elements are required i.e. airport safety performance indicators and safety performance targets (which may be different).

- *Safety performance indicators* are a measure of the safety performance of an airport. Safety indicators should be easy to measure and be linked to the major components of the airport's SMS.
- *Safety performance targets* are determined by considering what safety performance levels are desirable and realistic for airports. Safety targets should be measurable, acceptable to stakeholders, and consistent with the airport's SMS.

4.10   JUST CULTURE

Just Culture is an atmosphere of trust in which employees are encouraged to provide essential safety-related information (confidential, voluntary and non-punitive reporting, feedback), but in which it is also clear where the line must be drawn between 'acceptable' behaviour (actions, omissions or decisions taken by them that are commensurate with their experience and training) and 'unacceptable' behaviour (gross negligence, wilful violations and destructive acts).

An effective reporting culture depends on the way organizations handle reports of error and hazardous situations (*Section 4.6*). However, a completely no-blame culture – even if desirable – may not be feasible, as society may expect some level of accountability.

Taking into account the requirements of the civil aviation authorities and the State specific legal system, airport operators should endeavour to establish a 'Just Culture' policy considering the following:

- Errors will occur and the system must be continually monitored and improved to accommodate those errors. Management and employees must work together in a climate of mutual trust, respect and understanding.
- Where do we draw the line between 'acceptable' and 'unacceptable' behaviour?
- Who will draw the line between 'acceptable' and 'unacceptable' behaviour?
- How do we protect safety data, including those resulting from investigations?
- *ICAO Annex 13 – Aircraft Accident and Incident Investigation (Chapter 3.1)* states that: 'The sole objective of the investigation of an accident or an incident shall be the prevention of accidents or incidents. It is not the purpose of this activity to apportion blame or liability', but qualifies (*Chapter 5.12*) that "records shall not be made available for purposes other than accident and incident investigation, unless the appropriate authority ... determines that their disclosure outweighs the adverse ... impact such action may have on that or any future investigations'.
- Shared perception of the importance of safety
- Look at the bigger picture (systemic failures)

Note: In order to assist airport operators to evaluate if their organization has, or is on its way to have a good safety culture, Transport Canada has an interesting self-assessment tool (based on work by James Reason) on their website "Score your Safety Culture" (TP13844).

4.11   BEST INDUSTRY PRACTICE SAFETY MANAGEMENT (SMS) GAP ANALYSIS AND AUDIT TOOL

ACI has developed the "*ACI Best Industry Practice Safety Management (SMS) Gap Analysis and Audit Tool*" (*), as well as the associated Guidelines in order to assist airport operators to assess their SMS programme.

The following components are covered:

- Safety Management System
- Corporate Safety Policy
- Non-Punitive Reporting
- Roles, Responsibilities and Employee Involvement

- Communication
- Safety Planning, Objectives and Goals
- Safety Performance Measurement
- Management Review
- SMS Committee
- Identification and Maintenance of Regulations and Best Industry Practice Documents
- SMS Documentation
- Records' Management
- Proactive Process
- Reactive Process
- Investigation and Analysis
- Risk Management
- Training, Awareness and Competence
- Operational Quality Assurance
- Emergency Preparedness and Response

(*) *This document is based on work done by Transport Canada and ICAO and contains a number of questions that will guide auditors through the process.*

ANNEXES

ANNEX A
Competency Check Sheet for Aircraft Marshalling

Aircraft Marshalling			
Date:	Day / Night:	Marshaller:	Auditor:
Aircraft Type:		Stand:	Weather:

s - satisfactory	n/s - not satisfactory	n/a - not applicable

PART ONE
Preparation for the Manoeuvre

PRIOR TO ARRIVAL OF AIRCRAFT							
1	Timely arrival of marshaller	s	n/s	2	Stand size limitation check?	yes	no
3	FOD if any removed?	yes	no	4	Parking of adjacent aircraft	s	n/s
5	Parking of vehicles / equipment	s	n/s	6	Position of air bridge	s	n/s
7	Are SEG's used to assist?	yes	no	8	Position of personnel	s	n/s
9	PPE worn - Hi-visibility, feet, ears?	yes	no	10	Surface condition check?	yes	no

PART TWO
The Aircraft Manoeuvre

MARSHALLING OF AIRCRAFT								
11	Aircraft recognition	s	n/s	12	Manoeuvre planned?		yes	no
13	Awareness of blast / downwash?	yes	no	14	Adequate wingtip clearance		s	n/s
15	Aircraft parked in the wind?	yes	no	16	Assistance from 2nd marshaller?	yes	no	n/a
17	Marshaller visible to pilot at all times?						yes	no

ANNEX B
Aerodrome Works Permit

AIRFIELD WORKS PERMIT No.	

	Start date:	Time:

Contractor / department:	Description of works:

Works to be conducted as per works schedule		Close stand
DO NOT obstruct aircraft / vehicle movement		Taxiway
Withdraw as necessary to allow aircraft to pass		Block
Beware of aircraft blast		Other
Be prepared to clear at short notice		Site markings
Work only within coned area		RTF Call sign
Leader in attendance when working outside coned area		Access route
Works to be conducted as per works schedule		Vehicle equipment parking
Men to proceed on foot with handtools only		
Site to be cleared at cessation of work (backfill trenches, remove spoil etc.)		Equipment to be used
Mark working area at cessation of work		Other details
NO work within 47.5m of TAXIWAY		
Dedicated LOOKOUT or RTF man required		Low visibility restrictions
Work only outside clear & graded area		

Hot works	yes	no

ATC Initials	ODM Initials	A / OPS Initials

Remain CLEAR of ILS restricted areas as per PARA 12 of Safety Instructions	
DO NOT ENTER ILS restricted area without permission of ATC / TELS	

Time Issued	Contractor Initials	

Maintain listening watch on GMC 12.8 OR TOWER 124.22	

No work if RUNWAY	26L / 08R ■	
	26R / 08L ■	

No equipment / CRANES above.......... metres

Hot works	time	initials
First Visit		
Second Visit		

ANNEX C
Work Site Checklist

WORKS SITE LIST: SETTING UP SITE

Date:	Time:	Work Permit No:	Location:

Task		Task Complete:
1	Ensure Works Permit clearance with ATC Watch Manager and Apron advised of stand affected	
2	Close area with ATC on RTF - either ground or tower	
3	Inform Ops Control Desk of area closed, who will advise Fire Service by land line	
4	Isolate area with barriers	
5	Ensure green centre line routes are suppressed through works area	
6	Ensure taxiway centrelines are blacked out	
7	Ensure taxiway sign boards are amended	
8	Check clearances from taxiway centreline to work site fencing and height	
9	Check work site lighting	
10	Safe route for contractor to site	

WORKS SITE LIST: RE-OPENING UP SITE

Date:	Time:	Work Permit No:	Location:

Task		Task Complete:
1	Check that pavement surface is sound and clean	
2	Check that light fittings are secure and clean	
3	Ensure all pit lids are closed	
4	Check grass areas are clear of debris	
5	Check grass areas are reinstated and secure from aircraft blast	
6	Inspect reinstated taxiway lighting routes	
7	Ensure painted taxiway centrelines are reinstated	
8	Ensure taxiway sign boards are reinstated	
9	Final sweep of area	
10	Remove barriers and reopen area with ATC on RTF – either ground or tower	
11	Inform Ops Control Desk of re-opening, who will advise Fire Service via land line	

ANNEX D
Air Bridge Check Form

Air Bridge Checklist Prior to Arrival of Aircraft

APRON LEVEL			
	s - satisfactory	n/s not satisfactory	COMMENTS
Cable tray hanging			
Paint			
Rust			
Safety hoop			
Tyre condition			
Lighting - floodlight			
Loose nuts / bolts			
Stairs			
Stair light			
Doors - swipe			
INTERNAL			
Condition of flooring			
Patio door			
Lighting			
Signage			
Telephone			
Monitor - camera			
Alarm - strobe			
Water ingress			
Canopy			
Graphics - graffiti			
Driving			
Height indicators			
Floor			
Heaters			

	s - satisfactory	n/s - not satisfactory	COMMENTS
Inspection doors			
Auto leveller			
Control Panel			
SEG Controls			
CLEANLINESS			
Carpet			
Glass panels			
Remote console			
Walls			
Ceiling			
Tunnel runners			
Drainage			
Obvious leaks			
Stairs			
Cabin area			

Annexes

ANNEX E
Air Bridge Operator Audit Form

Air Bridge Operation Safety Audit – Checklist				

Date:	Time:	Auditor:	Airline / Handling Agent:

Aircraft Type / reg:		Stand:	Operator name:
Permit Number:		Air bridge type:	

s - satisfactory	n/s - not satisfactory	n/a - not applicable

PART ONE - PRE-AIR BRIDGE OPERATION

1	Air bridge parked in appropriate box / circle	s	n/s
2	Check control panel for faults / deficiencies / alarms	s	n/s
3	Air bridge internal lighting on	s	n/s
4	Air bridge floodlighting on	s	n/s
5	Barriers / doors are closed	s	n/s
6	Operator has checked outside for any infringements	s	n/s
7	Operator / essential staff only on air bridge	s	n/s

PART TWO - DOCKING THE AIR BRIDGE

1	Aircraft anti-collision lights off	s	n/s
2	Aircraft chocked	s	n/s
3	Align floor bumper to aircraft	s	n/s
4	Check of auto leveller operation	s	n/s
5	Operator / rep remained in the vicinity until all pax embarked / disembarked	s	n/s
6	Air bridge stopped 1-2m from aircraft	s	n/s
7	Floor level 150-200mm below aircraft door sill	s	n/s
8	Key removed	s	n/s

PART THREE - RETRACTING THE AIR BRIDGE

1	Aircraft door closed and air bridge doors / barriers closed	s	n/s
2	Parking of vehicles / equipment	s	n/s
3	Operator has checked outside for any infringements	s	n/s
4	Air bridge parked in appropriate circle / box	s	n/s
5	All air bridge doors closed	s	n/s
6	All non-essential personnel have left the air bridge	s	n/s
7	Wheels are aligned correctly before retracting from aircraft	s	n/s
8	Air bridge parked below horizontal unless stated otherwise	s	n/s
9	Air bridge floodlighting off	s	n/s
10	Cleanliness of air bridge	s	n/s
11	Air bridge internal lighting off	s	n/s

GENERAL COMMENTS / ACTIONS TAKEN

Annexes

ANNEX F
Turnaround Check Sheet

Aircraft Turnaround Safety Audit Checklist

Date:	Time:	Print names:	Airline / Handling Agent

Aircraft Type / reg:	Stand:	

s - satisfactory	n/s - not satisfactory	n/a - not applicable

PART ONE - AIRCRAFT ARRIVAL

CHECKS PRIOR TO ARRIVAL OF AIRCRAFT

1	Is the turnaround co-ordinator clearly identifiable?	yes	no
2	Has stand been checked for obstructions / FOD?	yes	no
3	Have adjacent aircraft parked on the correct centreline?	yes	no
4	Parking of vehicles / equipment	s	n/s
5	Position of air bridge	s	n/s
6	Correct SEG selection	s	n/s
7	Position of personnel	s	n/s
8	Is high–visibility clothing worn?	yes	no
9	Adequate PPE – ears / feet / hands?	yes	no

Comments / Actions taken:

SHUTDOWN OF AIRCRAFT

10	Is dispatcher still in attendance?	yes	no
11	Has the aircraft parked on the correct centre line?	yes	no
12	Were the anti-collision lights off, engines / propellers stopped before being chocked?	yes	no
13	Were crew / dispatcher / 3rd parties advised that the aircraft was chocked?	yes	no
14	Did staff / vehicles / air bridge approach aircraft before it was chocked?	yes	no
15	Overall approach of turnaround service teams	s	n/s

Comments / Actions taken:

PART TWO – AIRCRAFT TURNAROUND

PASSENGER OFF-LOAD

16	Air bridge in use (If yes, go to 19)?	yes	no
17	Are pax being escorted?	yes	no
18	Are adequate staff positioned to ensure pax safety (either airline or handling agent)?	yes	no
19	Vehicles / equipment parked in starburst?	yes	no
20	Positioning / use of air bridge	s	n/s
21	Positioning of vehicles – e.g. obstructing, parked in starburst	s	n/s
22	Are assembly routes clear of equipment?	yes	no
Comments / Actions taken:			

SERVICING OF AIRCRAFT

23	Is dispatcher still in attendance?	yes	no
24	Has the aircraft parked on the correct centre line?	yes	no
25	Were the anti-collision lights off, engines / propellers stopped before being chocked?	yes	no
26	Were crew / dispatcher / 3rd parties advised that the aircraft was chocked?	yes	no
27	Did staff / vehicles / air bridge approach aircraft before it was chocked?	yes	no
28	Overall approach of turnaround service teams	s	n/s
Comments / Actions taken:			

GENERAL

1	Check various operators understanding of risk from those working around them?	yes	no
2	Are they aware of the turnaround plan?	yes	no
3	Can they identify the turnaround co-ordinator?	yes	no
4	Are all staff aware of actions to be taken in an emergency?	yes	no
Comments / Actions taken:			

PASSENGER ON-LOAD				
33	Are pax being escorted	n/a	s	n/s
34	Is pax route clear	n/a	s	n/s
35	Pax guidance equipment used	n/a	s	n/s
36	Freight / hold baggage loading	n/a	s	n/s
37	Are adequate staff positioned to ensure pax safety (either airline or handling agent)	n/a	s	n/s
38	Is high-visibility clothing worn?		yes	no
39	Adequate PPE - ears / feet / hands?		yes	no
Comments / Actions taken:				

PART THREE - AIRCRAFT DEPARTURE

40	Is stand checked for FOD prior to pushback?	yes	no
41	Air bridge / FEGP / other services stored correctly before pushback	s	n/s
42	Is traffic alerted to pushback on 'back of stand roads'?	yes	no
43	Is tug positioned ahead of the aircraft after disconnect?	yes	no
44	Is return route taken by pushback crew safe and expeditious?	yes	yes
Comments / Actions taken:			

PART FOUR - STAND CHECK AFTER DEPARTURE

45	Equipment parking	s	n/s
46	Vehicle parking	s	n/s
47	Stand cleanliness	s	n/s
48	Positioning of air bridge / FEGP etc.	s	n/s
Comments / Actions taken:			

GENERAL COMMENTS e.g. Staff attitude, cooperation, coordination

ANNEX G

Authorization Permit For Cranes And Other Tall Construction Equipment				

Crane Permit No:				

SECTION 1 - TO BE COMPLETED BY APPLICANT (Block Capitals)				

NOTE: A MINIMUM OF 3 WORKING DAYS NOTICE IS REQUIRED TO PROCESS AN APPLICATION TOWER CRANES AND OBSTACLES IN CRITICAL LOCATIONS MAKE TAKE UP TO 4 WEEKS TO PROCESS				
1	Crane / Equipment Registration Number			
2	Crane / Equipment Hire Company (as liveried)			
3	Type of Crane / Equipment (e.g Tower, Mobile, etc.)			
4	Maximum WORKING HEIGHT of Crane / Equipment	Metres AOD / AGL (delete as appropriate)		
5	LOCATION (e.g OS Grid Ref, Address, Road Name, Building, Stand No, Terminal, etc.)			
	RADIUS OF OPERATION (of fixed crane / equipment)			
	AREA OF OPERATIONS (of fixed crane / equipment)			
	AIRSIDE / LANDSIDE / OUTSIDE AIRPORT BOUNDARY (delete as appropriate)			
	PROJECT NAME (If applicable)			
6	Date(s) of Operation (inclusive) :			
7	Local times of crane operation (inclusive) :			
8	Name of Sponsoring Company :			
9	Contact name and phone number ON SITE:			
10	I CONFIRM THE DETAILS GIVEN ABOVE AND SHALL COMPLY WITH ANY ADDITIONAL OPERATIONAL REQUIREMENTS SPECIFIED BY THE SAFETY & OPERATIONS DEPARTMENT IN SECTION 2 BELOW:			
	Name of Applicant		sign:	
	Applicant's Contact details	Phone:	Fax:	email:

SECTION 2 - TO BE COMPLETED BY AIRSIDE SAFETY & OPERATIONS			
11	Obstacle light		
	Obstacle light to be attached to top of jib and / or highest point of crane during darkness	yes	no
	Intensity:	yes	no
	Type:	yes	no
	Colour:	yes	no
	Airfield Operations to be notified BEFORE operation commences on Tel:	yes	no
	Operation subject to runway is being:	yes	no
	Other:		

12	NOTAM action required by Airside Safety & Operations	yes	no	NOTAM No.	
13	Details of Crane / Equipment Position :			Issued by:	
		metres from ARP (Aerodrome Reference Point)			Initials:	
		nautical miles	bearing		Date:	
		degrees True / Magnetic (delete as appropriate)		Feet ASML	Local Time:	
14	Authorized By (Signature):		Date:		

USEFUL DOCUMENTS

The following list contains select publications (*) from civil aviation authorities, national, regional, international and professional organizations, as well as other industry stakeholders providing important information on safety.

AAGSC

Working Around Aircraft during Refuelling
Use of Portable Electronic Devices Airside
High Visibility Clothing

ACI

ACI Policies and Recommended Practices Handbook (2009)
Aerodrome Bird Hazard and Wildlife Prevention Handbook (First Edition 2005) Airports and Persons with Disabilities (2003)
Airport Greenhouse Gas Manual (2009)
Apron Markings and Signs Handbook (Second Edition 2009)
Best Industry Practice Safety Management Systems (SMS) Gap Analysis and Audit Tool (2010)

ACRP

01-01	Guidebook for Managing Small Airports
02-02	Managing Runoff from Aircraft and Airfield De-icing and Anti-icing Operations
04-01	Aircraft Overrun and Undershoot Analysis for Runway Safety Areas
04-02	Lightning-Warning Systems for Use by Airports
05-01	An Airport Guide for Regional Emergency Planning for CBRNE Events
06-01	Helping Airport and Air Carrier Employees Cope with Traumatic Events
07-03	Developing Improved Civil Aircraft Arresting Systems
Synthesis 11	Impact of Airport Rubber Removal Techniques on Runways
Report 1	Safety Management Systems for Airports, Volume 1: Overview Safety Management Systems for Airports, Volume 2: Guidebook
Report 5	Quarantine Facilities for Arriving Passengers: Identification of Planning Needs and Costs

L'Assurance Maladie

Co-Activity during a Scheduled Turn-around of an Aircraft

DOT

Development of Contingency Plans for Lengthy Airline On-Board Ground Delays

EASA

Guidance on Organizational Structures
Guidance on Hazards Identification
Guidance on Operational Risk Assessment

Safety Culture Framework for the ECAST SMS-WG

Eurocontrol
European Action Plan for the Prevention of Runway Incursions

FAA

150 / 5200-12C	First Responders' Responsibility for Protecting Evidence at the Scene of an Aircraft Accident / Incident
150 / 5200-18C	Airport Safety Self-Inspection
150 / 5200-30C	Airport Winter Safety and Operations
150 / 5200-37	Introduction to Safety Management Systems (SMS) for Airport Operators
150 / 5210-5C	Painting, Marking and Lighting of Vehicles Used On an Airport
150 / 5210-20	Ground Vehicle Operations on Airports
150 / 5220-24	Airport Foreign Object Debris (FOD) Detection Equipment
150 / 5300-14B	Design of Aircraft De-icing Facilities
150 / 5370-2E	Operational Safety on Airports during Construction
150 / 5380-5B	Debris Hazards at Civil Airports

Known "Best Practices" for AIRFIELD SAFETY

FSF
Reducing the Risk of Runway Excursions: Report of the Runway Safety Initiative
A Roadmap to a Just Culture: Enhancing the Safety Environment

HSE
Aircraft Turnaround: A guide for airport and aerodrome operators, airlines and service providers on achieving control, co-operation and co-ordination

IATA
Airport Handling Manual
ISAGO Checklists
ISAGO Standards Manual

ICAO

Annex 13	Aircraft Accident and Incident Investigation
Annex 14, Volume 1	Aerodromes: Aerodrome Design and Operations
Annex 14, Volume 2	Aerodromes: Heliports
Annex 18	The Safe Transport of Dangerous goods by Air
Doc 6920	Manual of Aircraft Accident Investigation
Doc 8126	Aeronautical Information Services Manual
Doc 9082	ICAO's Policies on Charges for Airports and Air Navigation Services
Doc 9137	Airport Services Manual, Part 1 – Rescue and Fire Fighting
Doc 9137	Airport Services Manual, Part 2 – Pavement Surface Conditions
Doc 9137	Airport Services Manual, Part 3 – Bird Control and Reduction
Doc 9137	Airport Services Manual, Part 5 – Removal of Disabled Aircraft
Doc 9137	Airport Services Manual, Part 6 – Control of Obstacles

Doc 9137	Airport Services Manual, Part 7 – Airport Emergency Planning
Doc 9137	Airport Services Manual, Part 8 – Airport Operational Services
Doc 9137	Airport Services Manual, Part 9 – Airport Maintenance Practices
Doc 9150	Stolport Manual
Doc 9157	Aerodrome Design Manual, Part 1 - Runways
Doc 9157	Aerodrome Design Manual, Part 2 –Taxiways, Aprons and Holding Bays
Doc 9157	Aerodrome Design Manual, Part 3 – Pavements
Doc 9157	Aerodrome Design Manual, Part 4 – Visual Aids
Doc 9157	Aerodrome Design Manual, Part 5 – Electrical Systems
Doc 9157	Aerodrome Design Manual, Part 6 – Frangibility
Doc 9184	Airport Planning Manual, Part 1 – Master Planning
Doc 9184	Airport Planning Manual, Part 2 – Land Use and Environmental Control
Doc 9184	Airport Planning Manual, Part 3 – Guidelines for Consultant / Construction Services
Doc 9261	Heliport Manual
Doc 9284	Technical Instructions for the Safe Transport of Dangerous Goods by Air
Doc 9332	Manual on the ICAO Bird Strike Information System (IBIS)
Doc 9426	Air Traffic Services Planning Manual
Doc 9432	Manual of Radiotelephony
Doc 9476	Manual on Surface Movement Guidance and Control Systems (SMGCS)
Doc 9481	Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods
Doc 9683	Human Factors Training Manual
Doc 9691	Manual on Volcanic Ash, Radioactive Material and Toxic Chemical Clouds
Doc 9734	Safety Oversight Manual
Doc 9735	Safety Oversight Audit Manual
Doc 9774	Manual on Certification of Aerodromes
Doc 9830	Advanced Surface Movement Guidance and Control Systems (A-SMGCS) Manual
Doc 9859	Safety Management Manual (SMM)
Doc 9870	Manual on the Prevention of Runway Incursions
Doc 9911	Recommended Method for Computing Noise Contours around Airports
Circular 305	Operation of New Larger Airplanes at Existing Aerodromes
Circular 315	Hazards at Aircraft Accident Sites

NSC

Aviation Ground Operation Safety Handbook (6th Edition)

OTHER

| Airport Operations | Ashford N., Stanton H., Moore, C., 2nd edition, 1997, McGraw-Hill |

TC

TP312	Aerodrome Standards and Recommended Practices
TP2228E-2	Aircraft / Vehicle Conflict
TP8606	Inspection and Audit Manual
TP11500	Wildlife Control Procedures Manual

TP12863	Human Factors for Aviation – Basic Handbook
TP12864	Human Factors for Aviation – Advanced Handbook
TP12865	Human Factors for Aviation – Instructor's Guide
TP13029	Evaluation of the Efficacy of Products and Techniques for Airport Bird Control
TP13095	Risk Management and Decision-Making in Civil Aviation
TP13739	Safety Management Systems
TP13844	Score Your Safety Culture
TP14343	Safety Management Systems Implementation Procedures Guide
TP14693	Civil Aviation Integrated Management System Standard
TP14572	Fatigue Risk Management System for the Canadian Aviation Industry – An Introduction to Managing Fatigue
TP14573	Fatigue Risk Management System for the Canadian Aviation Industry – Fatigue Management Strategies for Employees
TP14574	Fatigue Risk Management System for the Canadian Aviation Industry – Employee Training Assessment
TP14575	Fatigue Risk Management System for the Canadian Aviation Industry – Developing and Implementing a Fatigue Risk Management System
TP14576	Fatigue Risk Management System for the Canadian Aviation Industry – Policies and Procedures Development Guidelines
TP14577	Fatigue Risk Management System for the Canadian Aviation Industry – Fatigue Audit Tools
TP14578	Fatigue Risk Management System for the Canadian Aviation Industry – Trainer's Handbook

UK CAA

CAP 168	Licensing of Aerodromes)
CAP 382	The Mandatory Occurrence Reporting Scheme
CAP 642	Airside Safety Management
CAP 683	The Assessment of Runway Surface Friction Characteristics
CAP716	Aviation Maintenance Human Factors
CAP719	Fundamental Human Factors Concepts
CAP726	Guidance for Developing and Auditing a Formal Safety Management System
CAP728	The Management of Safety
CAP748	Aircraft Fuelling and Fuel Installation Management
CAP760	Guidance on the Conduct of Hazard Identification, Risk Assessment and the Production of Safety Cases
CAP772	Birdstrike Risk Management for Aerodromes

WHO

International Health Regulations
Guide to Hygiene and Sanitation in Aviation

(*)   ACI provides the above list of publications for informational purposes only and does not take any responsibility for the accuracy of the publication, nor the contents thereof.

USEFUL WEBSITES

The following list contains select links (*) to civil aviation authorities, national, regional, international and professional organizations, as well as other industry stakeholders providing important information on safety.

Airport Cooperative Research Program (ACRP) www.trb.org/acrp/public/acrp/aspx
Airports Council International (ACI) www.aci.aero
Australasian Aviation Ground Safety Council (AAGSC) www.aagsc.org
Bird Strike Canada www.birdstrikecanada.com
Canadian Airports Council (CAC) www.cacairports.ca
Civil Air Navigation Services Organization (CANSO) www.canso.org
Civil Aviation Safety Authority - Australia (CASA) www.casa.gov.org
Direction Générale de l'Aviation Civile (DGAC) – France www.dgac.fr
Eurocontrol www.eurocontrol.int
European Aviation Safety Agency (EASA) www.easa.eu.int
European Civil Aviation Conference (ECAC) www.ecac-ceac.org
Federal Aviation Administration (FAA) www.faa.gov
Flight Safety Foundation (FSF) www.flightsafety.org
Health & Safety Executive (HSE) www.hse.gov.uk
Helicopter Association International (HAI) www.rotor.com
(The) International Air Cargo Association (TIACA) www.tiaca.org
International Airlines Technical Pool www.iatp.com
International Air Transport Association (IATA) www.iata.org/index.asp
International Association of Airport Executives (IAAE) www.iaae.org/index.htm
International Association of Air Traffic Controllers' Associations (IFATCA) www.ifatca.org
International Aviation Handlers' Association (IAHA) www.iaha.info/home/index.php
International Bird Strike Committee (IBSC) www.int-birdstrike.com
International Business Association Council (IBAC) www.ibac.org
International Council of Aircraft Owner and Pilot Associations (IAOPA) www.iaopa.org
International Civil Aviation Organization (ICAO) www.icao.int
International Federation of Air Line Pilots' Associations (IFALPA) www.ifalpa.org
International Helicopter Safety Team (IHST) www.ihst.org
International Organization for Standardization (ISO) www.iso.org
Joint Aviation Authorities (JAA) www.jaa.nl
National Fire Protection Association (NFPA) www.nfpa.org/index.asp
National Safety Council www.nsc.org
Transport Canada (TC) www.tc.gc.ca
UK Civil Aviation Authority (CAA) www.caa.co.uk
World Health Organization (WHO) www.who.int

(*)   ACI provides the above links for informational purposes only and does not take any responsibility for the accuracy of the link or the contents of the web page.

ABBREVIATIONS INDEX

AAGSC	Australasian Aviation Ground Safety Council
AC	Advisory Circular
ACI	Airports Council International
ACRP	Airport Cooperative Research Program
ADP	Airside Driving Permit
AGL	Above Ground Level
AHM	Airport Handling Manual
ALARP	As low as reasonably practicable
AMSL	Above mean sea level
AOD	Above ordnance datum
APP	Appendix
APU	Auxiliary Power Unit
ARP	Aerodrome Reference Point
A-SMGCS	Advanced Surface Movement Guidance and Control Systems
ATC	Air Traffic Control
ATIS	Automatic Terminal Information System
AVP	Airside Vehicle Permit
CAA	Civil Aviation Authority
CAC	Canadian Airports Council
CANSO	Civil Air Navigation Services Organization
CAP	Civil Aviation Publication (UK)
CASA	Civil Aviation Safety Authority (Australia)
CAT	Category
CBRNE	Chemical, biological, radioactive, nuclear or explosive
CDM	Collaborative Decision Making
CGA	Cleared and Graded Area
DGAC	Direction Générale de l'Aviation Civile (France)
DOC	Document
DOT	Department of Transportation (US)
EASA	European Aviation Safety Agency
ECAC	European Civil Aviation Conference
FAA	Federal Aviation Administration (US)
FBO	Fixed Base Operator
FEGP	Fixed Electrical Ground Power
FOD	Foreign Object Damage / Debris
FSF	Flight Safety Foundation
GMC	Ground movement control
GNSS	Global Navigation Satellite Systems
GSE	Ground Service Equipment
HAI	Helicopter Association International
HAZMAT	Hazardous Materials
HSE	Health and Safety Executive (UK)
HSG	Health and Safety Guidance
Hz	Hertz (frequency)
IAAE	International Association of Airport Executives

IAHA	International Aviation Handlers' Association
IAOPA	International Council of Aircraft Owner and Pilot Associations
IATA	International Air Transport Association
IATP	International Airlines Technical Pool
IBAC	International Business Association Council
IBIS	ICAO Bird Strike Information System
IBSC	International Bird Strike Committee
ICAO	International Civil Aviation Organization
ID	Identification
IESNA	Illuminating Engineering Society North America
IFALFA	International Federation of Air Line Pilots' Associations
IFATCA	International Association of Air Traffic Controllers' Associations
IHST	International Helicopter Safety Team
ILS	Instrument Landing System
IRVR	Instrumented Runway Visual Range
ISAGO	IATA Safety Audit for Ground Operations
ISO	International Organization for Standardization
JAA	Joint Aviation Authorities
LVP	Low Visibility Procedures
MAST	Manoeuvring Area Safety Team
MET	Meteo
MLS	Microwave Landing System
MMMF	Man Made Mineral Fibres
N/A	Not applicable
N/S	Not satisfactory
NAVAIDS	Navigation Aids
NFPA	National Fire Protection Association (USA)
NLA	New Large Aircraft
NOTAM	Notice to Airmen
NSC	National Safety Council (US)
ODM	Operations Duty Manager
OS	Ordnance Survey
OSSC	Operational Safety Sub-Committee
PAPI	Precision Approach Path Indicator
PPE	Personal Protective Equipment
PRM	Person with Reduced Mobility
PTT	Press to talk
SARPs	Standards and Recommended Practices (ICAO)
RESA	Runway End Safety Area
RFFS	Rescue and Fire fighting Service
RP	Recommended Practice
RTF	Radio Telephony
RVR	Runway Visual Range
S	Satisfactory
SEG	Stand entry guidance
SIRO	Simultaneous Intersecting Runway Operation
SMGCS	Surface Management Guidance Control System
SMM	Safety Management Manual
SMR	Surface Movement Radar

Abbreviations

SMS	Safety Management Systems
SOP	Standard Operating Procedure
SPI	Safety Performance Indicators
TC	Transport Canada
TIACA	The International Air Cargo Association
TLS	Target level of safety
UK	United Kingdom
US	United States
V	Volt
VDGS	Visual Docking Guidance System
VHF	Very High Frequency
VIP	Very Important Person
VOR	VHF Omnidirectional Range
WG	Working Group
WHO	World Health Organization

FOLLOW ME