Airport planning, design, operation and safety

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Global Air Traffic Management Operational Concept, Doc 9854)
## 5.1 Certification of airports

ICAO Annex 14, as from amendment 4, (applicable from November 2001) requires an international airport to be certified for safety purposes. ACI supports the general principles put forward by ICAO, although it believes that standards (basic requirements) should be distinguished from recommended practices and only standards should be part of the certification process.

### ACI POLICY

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<td>5.1.1 The Recommended Practices (as distinct from Standards) for airport design in Annex 14 should NOT be made mandatory for certification purposes.</td>
<td>In 2001, ICAO introduced new requirements in Annex 14 to ensure universal safety certification of airports. As of 27 November 2003, States are required to certify aerodromes used for international operations, while, for all other aerodromes open to public use, this is a recommendation (Recommended Practice 1.3.2). As of 24 November 2005, all certified aerodrome operators must implement a Safety Management System (SMS) acceptable to their State. These international requirements form the basis for national regulations and their enforcement. ACI supports ICAO's general principles of safety regulation for airports, and welcomes ICAO's programme of Safety Audits of States. All States should adopt Regulations for Aerodrome Certification and for Safety Management Systems, based on the ICAO model. ACI believes that ICAO needs to further develop its documents (including the Manual on Certification of Aerodromes), to take account of aerodrome operators' comments, including the points below.</td>
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5.1.1a ICAO Recommended Practices should not be made mandatory by national regulators, when aeronautical studies show that the target level of safety can be achieved by other means (see policy 5.2 on target level of safety),

5.1.1b National regulations for the operational use of safety management systems (see section 5.24), should be based on international "best practice" and experience.

5.1.2 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.

5.1.2a National safety regulatory bodies (Civil Aviation Authorities) should be clearly separated from airport management to ensure independence.

5.1.2b There should be no excessive fees or unnecessary administrative requirements for certification.

5.1.2c ACI requests safety regulators to consult aerodrome operators on all matters relating to regulatory policy.

5.1.3 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-specific impediments at the airport.

5.1.3a When introducing new certification requirements for airports, Civil Aviation Authorities should recognize the difference between existing and new airports and engage in dialogue with aerodrome operators.

5.1.3b ACI members are encouraged to undertake relevant research and analysis to determine those safety initiatives which should be given priority. Any such exercise of common interest should in turn be brought to the attention of ACI and other members, to improve the relevant regulations and disseminate "best practice". Hazards may be mitigated through appropriate means of compliance, which must be agreed between the airport and its regulator.
5.2
“Target Level of Safety approach to design”

To enhance airport safety while ensuring optimum use of resources, airport design regulations should be developed to meet a generally accepted Target Level of Safety (TLS), as has been done for many years in the field of aircraft certification. However, it is important to note that the airport safety TLS should focus on preventing accidents, fatalities, injuries or significant damage.

**ACI POLICY**

5.2.1 Design standards should be based on hazard analysis, taking into account the probability and severity of all foreseeable and known hazards.

**ACI RECOMMENDED PRACTICE / COMMENT**

Present ICAO SARPs for airports are generally not designed to reflect specific risk levels. Their safety rationale is apparently not consistent across all airport facilities and systems. There are no clear links between airport design and aircraft operations in present regulations to satisfy the need for consistent and optimized safety improvement measures.

Recent analysis uses criteria such as those of the Joint Aviation Authorities (JAA) or the Federal Aviation Administration (FAA) (e.g. JAR/FAR-OPS) to evaluate risk. If the focus is kept on preventing accidents, fatalities, injuries or significant damage, the basic TLS should be as low as reasonably practicable (ALARP). Methods of calculating risk should be further developed, and should be referred to in regulations. This may be done by establishing criteria for carrying out aeronautical studies. (Risk = frequency x severity (Ref. ACI Airside Safety Handbook))

5.2.2 ICAO Annex 14 should reflect the TLS approach to design.

**ACI RECOMMENDED PRACTICE / COMMENT**

5.2.2a Safety Management Systems and “best practices” must not only be regarded as complementary to regulations, but be integrated in methods to calculate risk.

5.2.2b The TLS approach to design should be reflected in the following elements of ICAO Annex 14: the reference code, runway strips, separation criteria (RWY/TWY and TWY/TWY), RESAs and obstacle limitation surfaces. Revisions and supplements must also encompass New Large Aircraft (ICAO Aerodrome Reference Code Letter F).

The Target Level of Safety (TLS) is the maximum level of risk considered acceptable, in the context of a particular activity or activities, of a given incident or a type of incident occurring. The severity of a potential incident should be borne in mind when considering the TLS. The TLS can be compared with the anticipated future risk of particular events or circumstances occurring, based on calculation. Safety regulations should be based on calculated risk (systematic anticipation of future risk). However, it is impossible to guarantee that a particular risk level will not be exceeded in practice.
5.3
New large aircraft (NLA)

ACI POLICY

As from the third edition of Annex 14, published in 1999, ICAO introduced Aerodrome Reference Code Letter F, covering a wingspan of up to 80 metres, and an outer main gear wheel span of up to 16 metres. Code F aircraft (e.g. Airbus A380) will in most cases have to use existing Code E airports, many of which have experienced difficulty in meeting Code F specifications in full.

5.3.1 The full implications of the introduction of new large aircraft need to be carefully studied.

5.3.1a Whilst ACI would encourage all airports to meet Code F specifications wherever possible, in the case of the Airbus A380, aeronautical studies have shown that meeting the full Code F specifications is not essential for safety. For example, the A380’s certification process has demonstrated its ability to operate safely on 45 metre-wide runways.

Operational requirements for NLAs and their justification are contained in ICAO Circular 301 on Accommodating NLAs at existing airports. For the A380 in particular, recommendations are contained in the Common Agreement Document of the Airbus A380 Compatibility Group.

5.3.2 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.

5.3.2a Pending further studies of the necessary modifications to airport infrastructure and their costs, the total capacity gains and losses, and the principles of cost recovery, manufacturers and airlines should take full account of other dimensions and characteristics of proposed NLA which may be critical for some airports, including length, fin height, wheelbase, outer main gear wheel span, outer engine span, jet blast, weight, aircraft classification number (ACN), seating capacity and ground power and handling requirements.

As regards any further NLA, airlines and aircraft manufacturers must involve aerodrome operators in their studies.

5.3.3 Aircraft manufacturers should design all future aircraft in a manner which does not provide greater stress to pavements than current aircraft.

5.3.4 The cost of modifications to airports to accommodate new aircraft types should be recovered from airport users.

5.3.4a In accordance with the ICAO principle that “users shall ultimately bear their full and fair share of the cost of providing the airport” (see ICAO Document 9082), ACI believes this principle should also apply to the introduction of NLA.

ACI RECOMMENDED PRACTICE / COMMENT
5.4 Width of runways and runway shoulders

ACI POLICY

The main factors affecting minimum runway width requirements and the need for shoulders are: the type and handling requirements of aircraft, such as cross-wind limitations; landing gear track; the overhang of engines outside the main-wheel bogies; and the prevention of ingestion of loose material by engines. ICAO Annex 14 recommends a runway width of 45 metres, where the Aerodrome Reference Code Letter is C, D or E (for reference field length over 1,800 metres).

5.4.1 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.

ACI RECOMMENDED PRACTICE / COMMENT

5.4.1a As regards Aerodrome Reference Code Letter F, for existing runways, ACI considers that a 45 metre width is acceptable provided that adequate shoulders are provided and the airport has installed adequate aircraft guidance systems, such as centreline lighting.

5.4.1b For new runways designed for Code Letter F operations, ACI supports a width of 60 metres.

5.4.1c Runway shoulders should be provided to minimize damage to aircraft running off the runway, to prevent ingestion of loose soil particles, to avoid erosion of the soil by jet engine blast, and to allow easy access by rescue and fire-fighting vehicles. The type and width of these shoulders, if any, should be determined by the characteristics of the most demanding aircraft serving the airport, the type of soil, local drainage and vegetation, and the requirements of rescue and fire-fighting vehicles. The total width of runway pavement including shoulders should not be required to exceed 60 metres for Code E, or 75 metres for Code F.

5.4.1d For Code Letter F operations at existing airports, an inner and outer shoulder may be provided, adding up to a total paved width of 75 metres. The function of the inner shoulder (extending from 45 to 60 metres width) is to provide sufficient strength for the occasional passage of an aircraft, while that of the outer shoulder is limited avoiding ingestion damage to outer engines, or erosion damage to the shoulder from jet blast.
5.5

Width of taxiways, taxiway shoulders and taxiway bridges

ACI POLICY

5.5.1 The taxiway width recommended by ICAO for Code Letter E is 23 metres, and 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 centreline lighting are provided.

5.5.1a For Code Letter F, ACI believes that a taxiway width of 23 metres is acceptable for operations on existing taxiways, provided that the taxiway is equipped with centreline lighting or other adequate guidance systems.

5.5.1b For new Code F taxiways, ACI supports a minimum width of 25 metres.

5.5.1c Taxiway fillets may be required on curves and at junctions for long wheelbase aircraft. The design of fillets should be studied to ensure that the additional paved area provides sufficient wheel-to-edge clearance, when aircraft are steered with the cockpit over the centreline.

5.5.1d Taxiway shoulders with appropriate bearing strength and surface characteristics may have to be provided. The total paved width on straight sections of taxiways should not be required to exceed 44 metres for Code E, or 60 meters for Code F.

5.5.2 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).

5.5.2a The width of a taxiway bridge should if possible extend to the strip width of the connecting taxiway. Jet Blast protection and other forms of shielding (e.g. for security purposes) should be considered, based on the use and service characteristics of the area under the bridge. Attention should be paid to the possible role of the bridge regarding access by rescue and fire fighting vehicles, and the width required for potential deployment of emergency chutes on the bridge.

5.6

Runway End Safety Areas (RESAs)

ACI POLICY

5.6.1 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.

5.6.2 At airports where adequate distance and suitable terrain is available, a greater length of RESA than the ICAO Standard should be provided.

ACI RECOMMENDED PRACTICE / COMMENT

5.6.1a ACI endorses the Standard in ICAO Annex 14 that a runway end safety area (RESA) must extend beyond the end of a runway strip, to a minimum of 90 metres (for code number 3 or 4 runways), which corresponds to a minimum of 150 metres beyond a runway end or stopway.

5.6.1b ACI endorses the recommended practice in Annex 14 that a RESA should extend to a distance of at least 240 metres beyond the runway strip for a code number 3 or 4 runway (i.e. any runway with a reference field length of 1,200 metres or more), which corresponds to a minimum of 300 metres beyond a runway end or stopway.

5.6.2a ACI endorses the recommended practice in Annex 14 that a RESA should extend to a distance of at least 240 metres beyond the runway strip for a code number 3 or 4 runway (i.e. any runway with a reference field length of 1,200 metres or more), which corresponds to a minimum of 300 metres beyond a runway end or stopway.

5.6.2b Where it is not possible to comply with the ICAO recommendation of 240 metres, for space and other development reasons, alternative solutions may include providing an arrestor bed, or other equivalent mitigating measures.
5.7 Visual aids and Advanced Surface Movement Guidance and Control (A-SMGCS) for aircraft operations at airports

ACI POLICY

It is necessary for visual aids installed at airports to be designed in accordance with recognized standard specifications and to have high reliability. The lighting system should include a secondary power supply, in case of failure of the primary supply.

Visual aids need to be supported by careful and effective preventive maintenance and monitoring. They should be designed to achieve effective operation under the worst visibility conditions during which it is intended that an airport will remain operational. Special care should be taken to avoid confusing pilots by the excessive brightness or proliferation of visual cues, especially during night operations at busy airports.

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

5.7.1a A-SMGCS can provide a means to enhance airport capacity while maintaining safety levels and mitigating the possibility of runway incursions

ACI encourages efforts to bring airport capacity during Instrument Meteorological Conditions as close as possible to the capacity achieved during Visual Meteorological Conditions, without prejudice to safety standards.

Satellite and ground-based navigation systems may have the potential to provide high precision taxi guidance under low visibility conditions, when this is necessary.

5.8 Aerodrome emergency planning

ACI POLICY

ICAO Annex 14, Chapter 9, Section 9.1, contains Standards and Recommended Practices covering emergency planning and the testing of plans through periodic exercises. The cooperation of external agencies which play a role in handling emergencies is essential, and these should be involved in training as well as the testing of the system to ensure that the planning is adequate to cope with different types of emergencies.

5.8.1 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.

5.8.1a ACI advocates that regular training drills with individual agencies be undertaken several times a year, and that a full-scale exercise embracing the critical elements of the emergency plan be held at intervals not exceeding two years, with the participation of all relevant agencies.

Reference: ACI Handbook on Emergency Procedures

ACI agrees with ICAO Annex 14 that the emergency plan should be commensurate with the airport's traffic.
5.9 Airfield pavement surface unevenness and profile measurement

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<td>The longitudinal profile of a section of airfield pavement greatly affects the &quot;ride quality&quot; experienced by aircraft. The occurrence of long wavelength bumps or dips with relatively small amplitudes cannot easily be detected by ground vehicles; however, aircraft can incur severe dynamic loads, especially at various critical speeds. The repetitive dynamic effect can also be transmitted into the pavement structure, and may reduce pavement life.</td>
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ACI supports continued efforts to develop profile measurement techniques. It also supports correlation studies with aircraft dynamics and pavement response.

5.9.1 ACI supports the development of airfield pavement profile measurement techniques.

5.9.1a Periodic profiling can detect conditions which could easily be overlooked when relying exclusively on reports from pilots. This is especially true of surface conditions on parts of the runway which only experience the passage of high-speed aircraft during unusual operations such as rejected take-offs. See ICAO Annex 14 Guidance material
5.10 Effects of new development on aircraft operations (including aerodynamic, optical, electromagnetic, and obstruction effects)

ACI POLICY

Severe wind turbulence on, or in the vicinity of, the runway threshold may endanger landing or departing aircraft. Such turbulence can be caused by terminals, buildings, engine test sites, other facilities or landscape changes in the vicinity of runways. The problem is increasing, due to the enlargement of built-up areas around airports and changes of landscape or terrain due to infrastructure improvements. Hills in the approach paths to runways may also cause turbulence.

ACI also recommends that suitable text be developed and incorporated in ICAO Annex 14 and the ICAO Airport Services Manual.

5.10.1 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,

5.10.2 ILS and radar reflection problems should also be borne in mind, as well as reflection of sunlight.

5.10.3 Obstacle limitation surfaces should be protected, including from obstruction by new developments and activities inside or outside the airport boundary.

ACI RECOMMENDED PRACTICE / COMMENT

5.10.1a ACI recommends that, in cooperation with the air navigation service provider and civil aviation authority, wind tunnel testing and/or simulation are performed on models of proposed new buildings and changes of landscaping which may affect the safety of aircraft during approach and departure, including for one-engine out operations

In case new construction may cause significant wind shear and turbulence, ACI supports the provision of NOTAM or AIP warnings to aircraft operators and/or implementation of systems to allow real-time information to pilots. Such systems may include Automatic Wind Shear Warning Systems

5.10.2a Proposed developments may have other effects on aircraft operations, ranging from optical (e.g. reflection of sunlight from windows of buildings), to electromagnetic (e.g. reflections or other interference with radio transmissions, radar signals or other Navaids such as ILS). The authority responsible for ground based navigation aids should model all such effects to determine their impact on the safety of aircraft operations.

5.10.3a Aerodrome operators should also be consulted on all developmental planning applications, both inside and outside the airport boundary, which have the potential to conflict with the ICAO obstacle limitation surfaces (OLS), with particular attention to take-off climb and approach, transitional and inner horizontal surfaces for each runway. If planned developments or activities including temporary construction cranes would infringe these latter surfaces, permission should be refused by the responsible authority.
5.11  Increase of airport and airspace capacity

ACI POLICY

5.11.1  ACI believes that technical and operational means should be developed to improve airport and airspace capacity at existing facilities, as well as the building of new capacity.

ACI supports closer cooperation with ANSPs to develop better models, tools and procedures to determine capacity.

ACI considers that a useful measure of the performance of airports or airspace management can be derived from a careful assessment of delay information.

ACI RECOMMENDED PRACTICE / COMMENT

The capacity of a given airport and runway system is determined by many factors, such as airfield layout, the air traffic control system and its management, the type and mix of aircraft, traffic peaking, weather conditions, environmental considerations, etc. Some of these factors can be accurately assessed, while others are site specific, very difficult to quantify and subject to rapid change. In order to make realistic judgments and comparisons with regard to capacity, there would have to be universal agreement on the specific details of each factor and, since there are so many variables, it is doubtful whether any uniform operational measurement of potential capacity could be developed.

Measurement and analysis of runway occupancy and pilot performance may also be appropriate. Runway occupancy should be defined as in 5.11.4 below.

Improvements in system capacity cannot be achieved by any one sector acting in isolation. The air transport industry must work in close cooperation with governments, regulatory agencies and air navigation service providers to achieve the full capacity potential of existing facilities and to enhance them, where possible, through the adoption of new technologies and enhancements to procedures which permit higher movement rates in a safe operational manner. In addition, major initiatives will be necessary to develop new facilities required for airports to meet growing demand. New technologies and practices which provide the means of increasing capacity should be assessed and implemented whenever there is proven economic benefit.

5.11.2  ACI supports the further development and the introduction of ICAO’s CNS/ATM (Communications, Navigation and Surveillance/Air Traffic Management) systems concept*, as well as the continued use of the Instrument Landing System where essential, until its replacement by new precision approach and landing systems.

ACI strongly supports accelerated deployment of the Global Navigation Satellite System (GNSS), including related Augmentation Systems and procedures to support precision approach and landing capability, and thereby optimize system capacity.

ACI supports equipage of aircraft with Multi-Mode Receivers (MMR) to enable aircraft so equipped to operate flexibly during the transition period from existing precision approach and landing systems to new systems, regardless of the system deployed at a particular airport to support all-weather operations.

ACI supports the development of standard criteria for certificating procedures using GNSS, as already developed for RNP/RNAV. These may enable more flexibility in SIDS and STARS, including curved approaches, which may assist in noise mitigation.

5.11.3  ACI supports further research programmes and activities aimed at mitigating the effect of wake vortices, in order to reduce aircraft separations while maintaining safety.

5.11.4  To minimize runway occupancy times by aircraft, the runway and taxiway infrastructure should be optimized, including studies of elements such as the optimal location of rapid exit and access taxiways and their lighting and marking.

ACI encourages the appropriate location along runways of rapid exit and access taxiways whose design complies with ICAO specifications and whose layout does not increase the risk of runway incursions.

Runway occupancy time is an increasingly important factor in determining airport capacity. Another important factor in minimizing runway occupancy time is the maintenance of adequate runway surface friction characteristics (see also sections 5.18 and 5.19).

* (ICAO has published, in 2005, the Global Air Transport Management Operational Concept (Doc. 9854), which guides the implementation of CNS/ATM technology by providing a description of how the emerging and future ATM system should operate.)
5.12
Simultaneous operations on parallel, near-parallel or intersecting instrument runways

To improve airport and airspace capacity, simultaneous operations on parallel or near-parallel instrument runways should be considered as a means of optimizing the use of new or existing parallel runways.

ACI POLICY

5.12.1 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.

ACI RECOMMENDED PRACTICE / COMMENT

5.12.2 At airports with intersecting runways, to enhance capacity
Simultaneous Intersecting Runway Operations (SIRO) may be allowed following appropriate hazard analysis and risk assessment

SIRO should be performed only when the necessary safety measures are effective, for instance as proposed in the ICAO European Air Navigation Plan (EANP). SIRO may include both take-offs (intersection take-offs, multiple line-ups) and landings (Land and Hold Short – LAHSO)

5.13
Aerodrome Safety Management Systems and safety auditing

Aerodromes should establish a Safety Management System encompassing an audit process covering all safety-critical operations at the aerodrome, encompassing those conducted by other companies.

ACI POLICY

5.13.1 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.

ACI RECOMMENDED PRACTICE / COMMENT

5.13.2 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.

5.13.3 Safety audits should be carried out regularly to ensure that international as well as national and local procedures and standards are fully observed.

5.13.3a Audits, in cooperation with local management and personnel, are an effective method of checking the actual level of safety and detecting flaws or hazards. The establishment of a regular audit process is a core element of a Safety Management System.

5.14  
**Measuring and expressing runway surface friction**

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<td>5.14.1 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.</td>
<td>It is theoretically possible to convert the output from each recognized friction measuring device to a common scale, when used for maintenance testing of a dry surface using self-wetting. It is highly desirable that agreement be reached on the use of this common scale when measuring runway friction. It is also desirable that information on the reproducibility of surface friction measurements (i.e. the maximum difference to be expected between measurements by different devices of the same type on an identical surface) should be available. Further work in this area is essential if the global consistency of reported friction readings is to be significantly improved.</td>
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5.14.2 ACI supports the Joint Winter Runway Friction Measurement Programme, as well as a new ICAO task which aim to gather data on which a review of the consistency of operational testing results could be based.

5.14.2a The use of continuous friction measuring devices for operational testing on runways contaminated by snow or ice is accepted by ICAO, but the guidance provided for the interpretation of the readings is in need of review.

5.14.2b Reports from pilots of landing aircraft are a valuable source of information.

5.15  
**Means of improving friction coefficients on wet runways**

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<td>5.15.1 The effectiveness of different means of improving friction coefficients of wet runway surfaces 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.</td>
<td>5.15.1a The surface drainage of a runway is one of the most important factors in optimizing the coefficient of friction between tyres and wet pavement. Improvements in drainage processes (e.g. grooving) should therefore be sought. Other means of improving the braking action of landing aircraft, such as the use of tyres with appropriate profiles, could be further developed. ACI recommends that further studies be carried out on the design of runway surfaces, including grooving, pavement composition, surface texturing and the effect of tyre and landing gear design on runway braking action.</td>
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5.15.1b Rubber and contaminants must be removed from runway surfaces on a regular basis. ACI suggests that aerodrome operators endeavour to use practices that are both effective in restoring friction coefficients and minimize environmental impacts.
5.16  
Pavement anti-icing and aircraft de-icing operations

ACI POLICY
5.16.1  The greatest care should be exercised in the use of chemicals for anti-icing operations on paved surfaces and the de-icing of aircraft.

5.16.2  The decision to deice an aircraft is entirely the responsibility of the aircraft operator, working within whatever rules or guidance may be set out by the appropriate regulatory authorities.

ACI RECOMMENDED PRACTICE / COMMENT
5.16.1a  ACI encourages the use of effective anti-icing and de-icing chemicals that are environmentally acceptable and non-hazardous, as well as non-destructive to pavement (especially asphalt flexible pavement surfaces) and aircraft.

5.16.2a  Aircraft de-icing facilities should be located so as to minimize taxiing time to departure runways and ensure that holdover times for de-icing fluids are not exceeded. These locations may be on the apron or on specifically designed de-icing pads which may be located on aprons, taxiways or at the runway end. Their operational use, as determined by the aerodrome operator, will depend on a number of variables, in particular the runway and taxiway layout and the mode in which the aerodrome is currently operating. If there are no such facilities, procedures should be developed to take proper account of safety and environmental concerns.

5.16.2b  Certain aircraft de-icing substances may have a tendency to make paved surfaces slippery and special arrangements may need to be made to ensure that this does not cause a safety hazard.

5.17  
Runway Inspections

The major purpose of inspecting the runway is to check for debris such as aircraft parts and fluids and any loose material, as well as wildlife remains. Other purposes include to check lighting, markings and signs, and check for obstacles.

ACI POLICY
5.17.1  ACI supports the ICAO recommendation of a minimum frequency of every six hours during operating periods, in particular at dawn, morning, afternoon and dusk.

5.17.2  The method employed for such inspections should be carefully considered, in terms of number of staff, their training and the vehicles used.

5.17.3  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.

ACI RECOMMENDED PRACTICE / COMMENT
5.17.1a  Each aerodrome operator should establish a programme for carrying out regular runway inspections in line with local conditions and both national and international regulatory requirements. The aerodrome operator should periodically review the frequency of such inspections, based on the aerodrome’s on-going risk assessment process.

5.17.1b  The frequency of inspections should be based on the scale of operations and the local risk assessment. The condition, age and maintenance levels of runways and the likelihood of deterioration of their surface will also affect the frequency of inspections.

5.17.2a  Other important factors are the effective planning of inspections with ATC, and communications with ATC before, during and after inspections are carried out. Inspections and communications should be recorded for corrective action and audit purposes.
5.18
Foreign Object Damage prevention measures on the airside

ACI POLICY

5.18.1 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.

ACI RECOMMENDED PRACTICE / COMMENT

5.18.1a The aerodrome operator should carry out frequent cleaning of the entire airside area, using techniques such as sweeping (magnetic and broom), vacuuming and washing.

5.18.1b Appropriately designed FOD bins should be made available.

5.18.1c High power engine ground runs should only be carried out in designated areas.

5.18.1d Special consideration should be given to operation of aircraft and maintenance of the airside under adverse weather conditions such as high winds and snow and ice.

5.18.1e Consideration may be given to installing an automatic FOD detection system for the runway. Where such a system is installed, it should be integrated into the airport’s FOD management programme.

5.18.2 A written programme should be established, setting out the practices and procedures required. Regular consultation should take place with the Airside Safety Committee, to obtain widespread support for FOD prevention measures.

5.18.2a A programme should be established by the aerodrome operator, setting out preventive measures to be taken by all users to eliminate or minimize FOD. This should include the practices required of aerodrome users such as airlines, handling agents, aerodrome tenants, and contractors, to minimize FOD.

5.18.2b Contractors should be expected to sign a contract clause taking responsibility for FOD containment.

5.18.3 It is recommended to collect and measure the amount of FOD found on the airside at regular intervals.

5.18.3a Collected FOD should be examined to ascertain its origin, and appropriate feedback given to the Airside Safety Committee for appropriate improvement measures. Records should be kept of all incidents where damage has occurred due to FOD, and the follow-up measures taken by all parties concerned.
Wildlife management at airports - operational aspects

Despite dissuasive environmental measures (which are covered in the following chapter on airports and the environment), some elements of wildlife hazards to the safety of aviation are likely to remain. Aerodrome operators will therefore need to take operational steps to manage these hazards in a humane and responsible manner.

**ACI POLICY**

| 5.19.1 | Aerodrome operators must remain permanently vigilant to assess the risk in real time and take the necessary measures immediately. It is crucial either to implement a bird hazard prevention and wildlife management unit, or specially trained and equipped staff to manage wildlife on the aerodrome. |

**ACI RECOMMENDED PRACTICE / COMMENT**

| 5.19.1a | The bird hazard prevention and wildlife management unit, as well as other staff members, should constantly monitor the risk through site observation and should take appropriate measures to scare away species that constitute a risk and implement more long term pro-active measures which prevent such hazardous situations from re-occurring. |

| 5.19.1b | Aerodromes should equip themselves with bird dispersal devices, such as pyrotechnics, lasers, dogs, birds of prey, acoustic and visual systems. In general, the greatest threat to aviation related to wildlife is caused by birds, although the risks related to mammals should not be underestimated. Birds may be resident or migratory, which might also have a major impact on the risk level and the ways in which it must be addressed. These consist of cartridges and shell crackers, as well as audio systems to produce noise and bird distress calls. In certain cases, the use of natural predators, e.g. falcons or border collie dogs (perceived by birds as natural predators) may prove to be an interesting option. Sometimes it may be necessary to remove certain species, although in most cases this method has shown its limitations, as the birds that are targeted may be replaced by an even greater number of other species. Such removal of birds can only take place with the prior knowledge and approval of governmental nature conservation and environmental authorities, where applicable. Bird-scaring methods must be used in an appropriate manner to avoid habituation, which considerably restricts the long-term effectiveness of such methods. |

| 5.19.1c | To be effective, aerodrome operators may find expert opinion, including a baseline audit, useful if making significant changes to bird hazard prevention procedures, which should be adapted to the specific situation of each aerodrome. Wildlife control operatives have to be trained and motivated. Technological developments should be monitored for continuous adaptation of the active measures used. The environmental monitoring of the site should, in turn, provide the basis for the adaptation or introduction of new passive long term ecological measures. |

| 5.19.1d | Regular audits need to be carried out to monitor the effectiveness of the active and passive wildlife management methods adopted at aerodromes. The compilation of precise statistics of wildlife observations and wildlife strikes should allow for effective analysis of the data and help improve wildlife hazard management. The collected data should be included in international statistics, such as the ICAO IBIS system. |

| 5.19.1e | Natural environments and agricultural activities in the vicinity of the aerodrome should also be monitored by the aerodrome staff responsible for bird hazard prevention and wildlife management. Depending on the region, aerodrome operators may have the possibility to participate and be consulted in the management of areas within a predefined radius and in the vicinity of the airfield. It is generally agreed that a radius of 13 km / 8 miles should be considered for constant monitoring purposes. |

| 5.19.1f | The aerodrome site should be fenced to limit the possibility of mammals on the airfield as much as possible. Where necessary, fences should be extended underground, sloped outward to prevent mammals from digging underneath the fence and be strong and high enough so that animals cannot break through or jump over it. |
5.20
Apron safety

ACI POLICY

5.20.1 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.

ACI RECOMMENDED PRACTICE / COMMENT

5.20.1a ACI recommends the Apron Safety Committee (under the umbrella of an overall Safety Committee for the airport) should coordinate initiatives such as local apron safety campaigns and workshops, highlighting awareness among all stakeholders, who should also be made aware that accidents and the consequent financial losses can be prevented.

5.20.1b ACI has targeted and will contact a number of aerodrome operators to participate in the annual ACI Apron Safety Survey.

5.21
Airside safety training

ACI POLICY

5.21.1 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.

ACI RECOMMENDED PRACTICE / COMMENT

5.21.1a Recurrent training on airside safety should be an established element of an airport’s airside safety management program for all airside operators – ground handlers, caterers, fuellers, etc.

5.21.1b For those contractors and visitors who have a need and authorization from the aerodrome operator to access the airside, the requirement for safety training may be waived if they are escorted by appropriately trained personnel.
### 5.22

**Airside vehicle operations**

**ACI POLICY**

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

**ACI RECOMMENDED PRACTICE / COMMENT**

5.22.1a Aerodrome operators should publish comprehensive rules and regulations governing the driving and operation of all vehicles and mobile equipment on the airside. They should also establish a system for monitoring airside driving and enforcing regulations, including a range of penalties for more serious or repeated infringements, while favouring to the extent possible voluntary, non-punitive reporting.

5.22.1b All vehicles should display an Airside Vehicle Permit (AVP). The aerodrome operator should ensure through an audit process that vehicles are safe for intended use and regularly maintained.

5.22.1c All staff who are required to drive vehicles or operate equipment airside should be trained and when qualified issued with an Airside Driving Permit (ADP).

Note: unless there is a legal requirement to grant an exemption to certain operators, the above also applies to police and security forces, the military, civil aviation authority staff, rescue and firefighting personnel, air traffic controllers or other staff. Non-qualified vehicle operators are only allowed to drive airside if they are under escort by an ADP permit holder, or when given a temporary exemption by the aerodrome operator, subject to satisfactory segregation measures, which meet safety standards. Specific training for specialist equipment must be provided by the employer.

5.22.1d All airside drivers should obtain a standard ADP, however those required to operate on the manoeuvring area should undertake additional specific training including RT as appropriate. A system should be established for the training and qualification of drivers. At many airports, the aerodrome operator has delegated training and testing for drivers on the aprons to airlines and handling agents. However, the aerodrome operator should issue all ADPs, and should periodically audit or check the training and testing systems of the companies.

5.22.1e Drivers should be required to prove medical fitness to their employer, particularly with regard to eyesight (including colour perception) and hearing.

5.22.1f The employer of any person having a need and a right to drive airside should obtain and maintain an insurance policy and provide the aerodrome operator with a certificate of insurance. The aerodrome operator should establish the minimum coverage of any such policy. Failure to obtain or to maintain the insurance policy may result in the cancellation of the employer’s ADPs. Alternatively, the Airport Operator may take out generic insurance cover, and charge the cost back to companies operating on the airside.
5.23
Runway Incursions, Excursions and Confusion

There have been many serious incidents and accidents on runways at airports worldwide. Runway incursions, defined by ICAO as: "any occurrence at an aerodrome involving the incorrect presence of an aircraft, person or vehicle on the protected area of a surface designated for the landing and take-off of aircraft", have been of particular concern. More recently, the risks of runway excursions and runway confusion (wrong runway operations) have been highlighted.

ACI is participating in the Runway Safety Initiative (RSI), an industry group chaired by the Flight Safety Foundation, which is working on prevention and mitigation measures related to runway incursions, excursions and confusion at aerodromes. Within this framework, ACI has submitted the following definition of a runway excursion: "Any occurrence at an aerodrome of an aircraft leaving the surface designated for landing or take-off at an incorrect or unauthorized position".

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5.24
Radio frequency spectrum protection

ACI POLICY

5.24.1 The availability of protected Radio frequency spectrum for air navigation systems is extremely important to aerodrome operators, to achieve high levels of capacity and safety.

ACI RECOMMENDED PRACTICE / COMMENT

The capacity of systems used for aircraft navigation, together with other technical (aircraft, air route and air traffic control) factors, can be a determinant of the arrival and departure capacity of runways. Major aerodromes are under unrelenting pressure to increase annual passenger and flight movement capacity, while maintaining the highest level of safety and service quality. New areas of radio frequency spectrum have been allocated for CNS/ATM, and these will be of great value to improve navigation, safety and runway capacity under all weather conditions, especially to provide improved precision approach and landing guidance. The necessary frequencies must therefore be safeguarded. Similarly, spectrum reserved for MLS is important to aerodrome operators, where such equipment is installed.

5.24.2 The necessary frequencies must therefore be safeguarded.

In addition to navigation frequencies, aerodromes have other frequency spectrum protection needs including radio communications for police, fire, medical response, ground handling, airport maintenance and for radar systems used in Automatic FOD Detection Systems and Wildlife Tracking. In addition, a variety of commercial requirements must be catered for.

5.25
Disabled Aircraft Removal

ACI POLICY

5.25.1 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.

ACI RECOMMENDED PRACTICE / COMMENT

5.25.1a ICAO Annexes 9, 13 and 14, as well as the Airport Services Manual, Chapters 5 and 8, provide information pertaining to the removal of a disabled aircraft. ACI has been involved in the drafting of these provisions, and agrees with them. Some significant points are set out below.

5.25.1b The airport operator should establish a plan for the removal of an aircraft, disabled on or adjacent to the movement area, for the airport, and should designate a coordinator to implement the plan, when necessary. The plan should identify key parties, their responsibilities and the lines of communication. In addition, 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. Good communication between the airport operator and the aircraft operator is essential. The airport operator should maintain and constantly update its database of relevant contacts in aircraft operators’ operations centres.

Note: “aircraft operator” is the ICAO terminology for the owner and/or the operator of the aircraft.

5.25.1c The disabled aircraft removal plan should 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 include among other things: a) a list of equipment and personnel on, or in the vicinity of the airport, which would be available for such purpose; and b) arrangements for the rapid receipt of aircraft recovery equipment kits available from other airports. Mutual aid agreements between airports should be considered.
5.25.2 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.

5.25.2a The airport operator should, as part of the emergency preparedness training cycle, include a disabled aircraft removal partial and/or tabletop exercise. 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.

5.25.2b 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, ARFF personnel, air traffic controllers, MET info providers, specialized equipment operators, construction crews, security staff, Navaids personnel, planning and engineering staff, contractors and consultants, police having jurisdiction and other interested parties.

5.26
Dangerous goods

ACI POLICY

5.26.1 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.

ACI RECOMMENDED PRACTICE / COMMENT

There are sufficient regulatory agencies monitoring the documentation, packing and handling of dangerous goods to make it unnecessary for ACI to produce guidelines in this area. However, ACI believes that there is a need for procedures governing the movement of dangerous goods from an airport operations standpoint, especially for cases where these goods exceed the quantities allowed in UN, ICAO or IATA regulations. For shipments in excess of the quantities specified in these regulations, shippers, handling agents and airlines should notify airport operators officially in order to make appropriate arrangements. Local manuals enumerating contacts within airlines would be advantageous, in case of incidents or accidents.

ACI recognizes the potential hazard created by the carriage of dangerous goods in aircraft. Airport emergency plans should consider the problem created by dangerous goods as defined in ICAO Annex 18 and the Technical Instructions on the Carriage of Dangerous Goods by Air (Doc. 9284). Airports should liaise with airlines and handlers to ensure they are providing adequate facilities and training to deal with the spillage of dangerous substances. Procedures should be developed for dealing with situations in which the presence of dangerous goods is detected by security staff.