



AIRSERVICES AUSTRALIA

# RUNWAY INCURSION SURVEY

## WHAT IS A RUNWAY INCURSION?

The International Civil Aviation Organisation (ICAO) does not hold to a standard definition of a runway incursion. Different organisations use different definitions.

Airservices Australia defines a runway incursion as an “unauthorised entry to an active runway strip by an aircraft, person, animal, vehicle or equipment.”

## RUNWAY INCURSION SURVEY

Following concerns about the issue of runway incursions within Australia and discussions between Air Navigation Service providers worldwide, Airservices Australia undertook to develop an action plan to address the issue of runway safety in Australia.

As part of that action plan Sydney Operations developed the Sydney Runway Incursion Survey based on a similar survey developed by Eurocontrol in late 2001.

The purpose of the survey was to collect data on safety issues related to runway operations at Sydney Airport (runway incursions especially) and use this data to propose recommendations for improvement.

Several other sources of data were used in this process including:

- Data from existing safety databases
- Incident and accident investigations and their recommendations
- Surveys from other airports and airlines

**This brochure provides information collated from the Sydney Runway Incursion Survey.**



*The world's worst aviation accident took place in March 1977 and involved the collision of two Boeing 747 aircraft on a runway at Tenerife in Spain's Canary Islands. A total of 583 lives were lost.*

## *Thank You*

*The success of the Sydney Runway Incursion Survey required the active cooperation of all organisations, groups and people associated with Sydney Airport operations.*

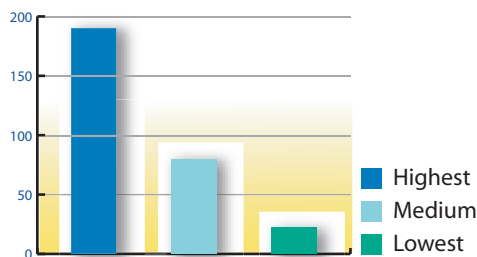
*Airservices Australia Sydney Operations wishes to thank those 300 people who responded to the survey and provided their feedback and insights to this important airport safety issue.*

# SYDNEY RUNWAY INCURSION SURVEY RESULTS

## 1. What is your main involvement with Sydney aerodrome operation?

93% of respondents were pilots, 5% were Air Traffic Controllers and the balance included airside drivers and airport management.

## 2. How would you rank runway incursions among other safety concerns (eg bird strikes, Foreign Object Debris (FOD) etc)?

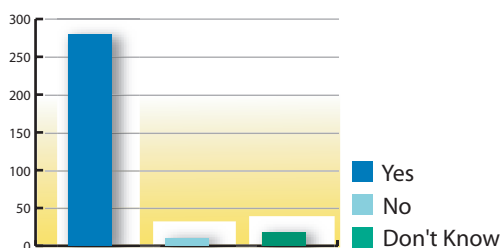


The majority of respondents ranked runway incursions as their highest runway safety concern.

### If runway incursion is not your highest safety concern, what is?

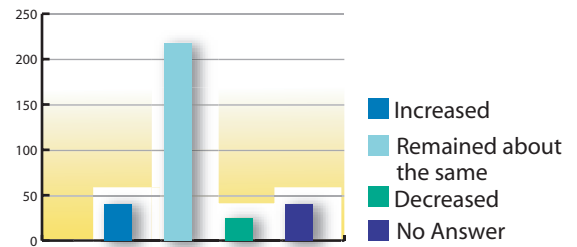
Respondents indicated that if a runway incursion wasn't their highest safety concern, then they considered that birdstrike, FOD, runway selection and parallel runway operations were of concern.

## 3. Does your work area have a method of reporting runway safety problems?



More than 93% of respondents indicated that their work area had a method of reporting runway safety problems. This is a very high figure which could indicate that Australia has a very mature and well understood safety management system. Given that 93% of respondents were pilots then the figure isn't that surprising.

## 4. Within the last year, do you think that the number of runway incursions has increased, remained about the same or decreased?



This question gauges whether the respondents thought that the number of runway incursions had increased, remained the same or decreased. A number of respondents didn't provide an answer which perhaps indicates that they didn't have the information to make an informed judgement.

## 5. Which of the following do you think contributes to the cause of runway incursions?

In this question respondents were asked to choose from a picklist of 19 items including an "others" option. Respondents could individually choose each item and some respondents selected a majority of the items whilst others selected the "others" option to indicate that there is no single factor.

The items from the pick list were aerodrome layout and complexity, aerodrome construction, aerodrome lighting, aerodrome signs, aerodrome documentation, runway and taxiway markings, ATC experience, ATC procedures, ATC equipment, pilot experience, pilot procedures, vehicle drive experience, vehicle driver procedures, A/G phraseology, A/G frequency congestion, language proficiency, traffic volume, weather conditions and "other".

Significantly, 67% of respondents indicated that they thought "Aerodrome layout and complexity" contributes to the cause of runway incursions.

The following list includes those items where 40% or more of respondents thought that the item contributes to the cause of runway incursions.

Aerodrome layout and complexity	67%
Pilot experience	61%
Aerodrome signs	56%
Runway and Taxiway markings	48%
Aerodrome lighting	45%
ATC procedures (including LTOP)	41%
Language proficiency	41%
A/G frequency congestion	40%

**6. Within the past two years, have you seen or been involved with a runway incursion (regardless of aerodrome)?**

13% of respondents indicated that they had seen or been involved with a runway incursion within the last two years. There were 14 respondents to the survey that indicated that their main involvement with Sydney aerodrome operation was as an air traffic controller and significantly 12 of these respondents indicated that they had seen or been involved with a runway incursion in the past two years. So 86% of ATC respondents had seen or been involved with a runway incursion in the past two years compared with 13% of all respondents.

**7. If you answered yes in Q6, which of the following do you think contributed to the cause of the runway incursion(s)?**

This question finds out what respondents thought had contributed to the cause of the runway incursion.

The same items as used in question 6 were used for this question. Once again, respondents were able to choose items from the pick list and were able to select one or more items.

The following list includes those items where 20% or more of respondents thought that the item contributed to the cause of runway incursions.

Pilot experience	39%
ATC procedures (including LTOP)	29%
Pilot procedures	29%
Aerodrome layout and complexity	24%
Language proficiency	20%

Whilst aerodrome layout and complexity was rated by 67% of respondents as being a cause of runway incursions, it was ranked 4th (behind pilot experience, and significantly, ATC and pilot procedures) by those respondents who had seen or been involved with a runway incursion.

10% of pilot respondents indicated that they thought the weather conditions had been a factor in the cause of the runway incursion they had seen or been involved in whereas no ATC had marked this as a factor.

Significantly pilots had also indicated that aerodrome lighting, aerodrome signs, and runway and taxiway markings were a factor in the cause of the runway incursion they had seen or been involved in. This was significantly higher than the ATC respondents who nominated ATC procedures (including Long Term Operating Plan)

as the major cause of the runway incursions that they had seen or been involved in. If we look at the Sydney Airport experience, given that 98% of runway incursions in the last few years involved RWY 07/25, it is hardly surprising that 67% of ATC respondents selected ATC procedures (including LTOP) as a factor that contributed to the cause of the runway incursion that they had seen or been involved in.

**8. If you answered yes in Q6, how would you rate the collision potential of the runway incursion(s).**

Thirty six percent (36%) of respondents indicated that they rated the collision potential to be “significant” whereas 39% of respondents indicated that they rated the collision potential to be “good”. So, 75% of those who had seen or had been involved with a runway incursion rated the collision potential as good or significant.

**9. Do you have any other comments or suggestions to make regarding runway incursions or other runway safety issues (eg FOD or bird strikes)?**

This question allowed respondents to make comments or suggestions regarding runway incursions or any other runway safety issues.

29% of respondents made a comment in this section. A number of comments relating to the use of conditional line-up clearances, runway selection and frequency congestion. There were some other suggestions that warrant further consideration and these included:

- the use of stop/go lighting systems controlled by the Tower
- the use of graphical presentation of aerodrome works and taxi routings

## RECOMMENDATIONS

- That the survey be conducted again in 2003.
- That Airservices establish a Runway Incursion Task Force to monitor overseas developments and analyse runway incursion events so that any lessons learnt can be passed to Air Traffic Control service providers and industry.

# CAUSES OF RUNWAY INCURSIONS

Sydney Operations has been reviewing worldwide reports and their own local reports in an attempt to find and reduce the causes of runway incursions.

## 1. HUMAN PERFORMANCE INVOLVEMENT

In an analysis of Runway Incursion Reports Worldwide from 1990 to the present, 70% involved pilot error and 46% air traffic controller error.

In Australia's case, the majority of runway incursions reviewed in ATSB reports identified a failure to follow ATC instructions as the major cause of runway incursions.

The Sydney Airport experience for the years 1999-2002, is that 68% of runway incursions were due to pilot error, 29% due ATC error and 3% other (cars, people, animals).

When was a pilot error causing a runway incursion a failure to comply with an ATC instruction? From the worldwide study mentioned above, 56% was a failure to comply with an ATC instruction. In the case of Sydney, this percentage was 54%.

## 2. WEATHER

In the majority of cases weather is not a factor in runway incursions. In the US for 89% of runway incursions, reduced visibility was not a factor. This percentage is also similar for Sydney. In runway incursions causing loss of life, poor visibility has been a contributory factor.

## 3. AIRPORT LAYOUT

In a recent survey of airline pilots in Canada, "inadequate and/or confusing airport signs and markings" were identified as the most important factor contributing to runway incursions.

## 4. TRAFFIC VOLUMES

Increasing traffic volume increases the risk of a runway incursion. This relationship is exponential.

For example, Transport Canada states that for single runway operations a 5% increase in traffic means a 35% increase in runway incursions. This is backed by US statistics which show a similar relationship.

# INCIDENTS OF RUNWAY INCURSIONS AT SYDNEY AIRPORT

Since 1998, the number of runway incursions at Sydney Airport has increased by 25%. Nine separate incursions were recorded in both 1999 and 2000 and in the year 2001, 12 incursions took place.

Some might suggest that 12 is not a high number considering that approximately 300,000 movements occurred at Sydney Airport during 2001. However, each and every runway incursion has the potential for disaster.

The United States Federal Aviation Administration notes: "Historical data clearly demonstrates that runway incursions most likely to cause accidents generally occur at complex, high volume airports characterised by parallel / intersecting runways; multiple taxiway / runway intersections; complex taxi patterns; and the need for traffic to cross the active runway."

All these conditions are prevalent at Sydney Airport. So, while Australia has not experienced an airline fatality due to runway incursions, we cannot afford to be complacent.

## WHERE IS SYDNEY DIFFERENT?

- LAHSO (Land And Hold Short Operations) is used in the US but not in Europe. LAHSO is not used in Sydney but is used at some airports in Australia.
- The amount of aviation activity generated by General Aviation in the United States is significantly greater than Australia and Europe. General Aviation aircraft are involved in 69% of all runway incursions in the United States.
- Traffic levels are different

## MORE INFORMATION

Further information on the survey and the results can be obtained from:

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