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Runway incursions happen when a pilot or driver enters a runway without a valid ATC clearance. Often a misunderstanding/communication breakdown between operational staff e.g. pilots, vehicle drivers on the manoeuvring area and air traffic controllers leads to a loss of situational awareness and a ground navigation error. The majority of runway incursions occur during taxiing out and departure operations.

Air Navigation Service Providers are invited to review the materials put forward, and where necessary, amend their Standard Operating Practices with regard to ground operations.

Principle points to highlight for air traffic controllers include:

1. The most frequently occurring contributory factor is misunderstanding.

2. Failing to see or hear information clearly or correctly is a frequent cause of incursions when left unchallenged.

3. Who Saves the Day
   Air Traffic Controllers typically catch the errors of pilots, drivers and their peers. Pilots also make a contribution to catching the errors that they have made themselves and of other colleagues such as other pilots and air traffic controllers.

4. Communication
   In today's air traffic management system, compliance with ICAO requirements to use aviation English on the manoeuvring area is a vital safety net. A major contributory factor of runway incursions is the use of non standard ICAO phraseology.

5. Incomplete or incorrect read-backs feature frequently when conditional clearances are used, see separate section for examples .

6. Conditional clearances on the manoeuvring area.
   There has been a general reduction in all RT Phraseology related incursions following ICAO provisions to limit the use of conditional clearances and the number of subjects being instructed. Lining up out of sequence, has also reduced at high complexity airports.

7. There is an increased risk of incursion or other ground navigation error such as a taxiway departure when there is a change to an air traffic control instruction near the runway.

8. Reference to other aircraft in an instruction is a cause of pilot confusion whether it is by airline name or aircraft type. Certain phrases such as "follow" should be used with care.

9. Misuse of air ground lighting e.g. stop bars, can lead to runway incursions and loss of situational awareness.

10. ICAO compliant signage helps to obtain situational awareness on the ground. Some Towers place photographs of hot spots near to the working position so that Air Traffic Control can relate to what a lost pilot or driver is seeing.

11. Transition into and out of Low Visibility Operations is a concern. Low cloud where the visibility under the cloud is good can be misleading, and aircraft exceed their clearance limits into the localiser sensitive area.

12. Go-around/missed approach events are a regular feature of runway incursions, see next page.

13. Shift handover may create information gaps, especially at locations where all handovers are made at the same time i.e. approach, tower, ground.

14. Landing Without a valid ATC Clearance. In the cases of landing without a valid ATC clearance, the subject aircraft had either not been transferred to the Tower frequency, had forgotten to check in on the Tower frequency when transferred, selected the wrong frequency or not received the instruction for some reason even though they were on the correct frequency (communication error).

15. Crew involved in take off without a clearance are quite often private pilots, on flight training details. There is a link between these types of occurrences and departure clearances, or amended clearances, being passed whilst aircraft are taxiing, backtracking or lining up (e.g. an aircraft expecting to follow a SID climb to altitude 6000 ft for traffic reasons is passed a tactical amendment to maintain 3000 ft. The crew having acknowledged this

as they line up then take off without a clearance). For great awareness of Sterile Cockpit guidance available to pilots, see Appendix D, Flight Crew Best Practices, Sterile cockpit.

16. Work in progress changes the surface of the aerodrome temporarily or permanently. The infrastructure you leave behind you at the end of your shift or flight, may be different when you return. Controllers should expect to provide 'real-time' significant aerodrome information which may affect operations on or near the runway when NOTAMS and ATIS which are normally used to advise pilots of significant information regarding runway operations are not available.

Incorrect and Incomplete Read-backs

Approximately half of all reported runway incursions involving a conditional clearance, also reported an incomplete read-back. It is important to differentiate between an incomplete read-back and an incorrect read-back.

For example:

Air Traffic Control: "XXX123, AFTER THE Busy bee A320, LEFT TO RIGHT, TAXI TO…"

XXX123: "ROGER, AFTER THE Blue sky 737, TAXI TO…"

With an incomplete read-back, the controller has not received a signal that there is a misunderstanding.

Everything he/she has heard is technically correct. This confirms the belief that their plan is in place and all participants understand their instructions. However, some details are missing and it is related to these missing parts than an error can occur.

For example:

Air Traffic Control: "XXX123, AFTER THE Blue sky A320 FROM RIGHT TO LEFT, TAXI TO HOLDING POINT…"

XXX123: "AFTER THE A320, ROGER" OR "AFTER THE Busy bee, TAXI TO HOLDING POINT…"

When the aircraft then follows a different A320 or Busy bee aircraft to the one specified and moves out of sequence, the controller is taken by surprise.

In each situation, the controller believed that the clearance issued was unambiguous; the controller had a clear idea of his or her plan and believed that it had been delivered correctly. The information contained in the subsequent read-back, although incomplete, was correct.

Go-Arounds/Missed Approach - Runway Incursion Events

Go-around/missed approach events are a regular feature of runway incursions:

- The majority of Go-Arounds are ordered by the Runway Controller.
- Few Go-Arounds are decided by the Pilot.
- Note that not all Go –Around instructions are executed

Example 1:
Runway Controller initiated & Go-around carried out

XXX123 crossed a CAT 1 hold and went onto the runway having had line up/take off clearance cancelled by the Runway Controller prior to approaching the holding point. XXX456 having been given prior clearance to land by the Runway Controller was then instructed to carry out a missed approach.

Example 2:

Almost immediately after entering LVP's the RIMCAS alert sounded to warn of an infringement within the localiser sensitive area around the vicinity of a work site. The Runway Controller instructed the next aircraft on final approach, XXX123, to execute a missed approach. The runway was closed for approximately 15 minutes whilst the work site, which had not been evacuated during safeguarding, was cleared of all vehicles and personnel.

Example 3:

The Runway Controller thought that XXX123 had vacated the runway after landing and then cleared XXX456 to land. However, the rear of XXX123 was still obstructing half the width of the runway. There was no immediate reply from XXX456 but shortly afterwards the Pilot reported initiating a missed approach.

Example 4: Go-around not carried out

A Runway Controller noticed that the separation between XXX123 and the following aircraft XXX456 was reducing. He instructed XXX123 to expedite vacating the runway and then cleared XXX456 to land. XXX456 was instructed to reduce to minimum approach speed and was warned to expect a late landing clearance.

When XXX456 was on short final, the Runway Controller decided that he would not be able to issue a safe landing clearance and issued a go-around instruction. Although it was intended for XXX456, it was addressed to 'YYY456'. Despite this error, the Captain of XXX456 replied that he was going around.

However, the Co-Pilot who was the handling Pilot, decided that the go around instruction was not directed at his aircraft and because he could see that XXX123 was about to vacate the runway, decided to land.

When XXX456 landed, XXX123 had vacated the runway.

Take-Off without Clearance

Best Practice procedures now encourage controllers to pass air traffic control clearances before the pilot begins to taxi, when possible. However, there is still the potential for confusion when a late-notice tactical change to the clearance has to be issued when the aircraft is lining up or has lined up.

For aircraft that are still taxiing, 'Best Practice' is for air traffic control to reiterate the requirement to hold at the clearance limit, after having passed the amended clerance.

Procedures, Practices and Documents

In the majority of runway incursions, although the respondents were trained to carry out procedures, they were not experienced in their use.

Issue of en-route clearance

Whenever possible an en-route clearance should be passed to an aircraft before start of taxi. If this is not possible, controllers should try and avoid passing the clearance to a pilot taxiing due to the possibility of distraction.

An ATC en-route clearance is NOT an instruction to take off or enter an active runway. The words "TAKE OFF" are used only when an aircraft is cleared for take-off, or when cancelling a take-off clearance. At other times the words "DEPARTURE" or "AIRBORNE" are used.

Read-Back requirements

Read-back requirements have been introduced in the interests of flight safety. The stringency of the read-back requirement is directly related to the possible seriousness of misunderstandings in the transmission and receipt of ATC clearances and instructions. Strict adherence to read-back procedures ensures that the clearance or instruction has been received and understood correctly by the correct aircraft.

The flight crew shall read-back to the air traffic controller safety-related parts of ATC clearances and instructions that are transmitted by voice.

The Air Traffic Controller is responsible for checking the completeness and accuracy of the read-back.

The following items shall always be read-back:

a. ATC route clearances;

b. Clearances and instructions to enter, land on, take off on, hold short of, cross and backtrack on any runway; and

c. Runway-in-use, altimeter settings, SSR codes, level instructions, heading and speed instructions and, whether issued by the controller or contained in ATIS broadcasts, transition level;

d. Other clearances or instructions, including conditional clearances, shall be read-back or acknowledged in a manner to clearly indicate that they have been understood and will be complied with.

An aircraft must include its call sign in the read-back, and a failure to do this shall be challenged by the controller.

It is NOT possible for a person to understand two things at once. In attempting to do so the brain processes a single audible input at a time and switches between inputs many times per minute, filling in the 'gaps' from each audible input with what is believed to be the missing data. When simultaneously listening to RTF, telephone and direct face to face exchanges, the perception that a complete or correct read-back has been received may not be reliable. **For this reason, Controllers should not allow themselves to be interrupted when listening to read-backs.**

Taxi instructions

Taxi instructions issued by a controller will always contain a clearance limit / reporting point, which is the point at which the aircraft must stop until further permission to proceed is given. For departing aircraft the clearance limit will normally be the holding position of the runway in use, but it may be any other position on the aerodrome depending on prevailing traffic circumstances. When intersection departures are used, the appropriate holding positions shall be clearly stated by ATC.

When a taxi clearance contains a taxi limit / reporting point beyond a runway, it shall contain an specific clearance to cross that runway, or an instruction to hold short, even if the runway is not in use.

Communication with any aircraft using the runway for the purpose of taxiing, should be transferred from the ground controller to the aerodrome controller prior to the aircraft entering / crossing a runway.

It is strongly advised, when practicable, to use standard taxi routes.

Pilots require a general overview of the expected taxi routing. For more complicated taxi instructions, it may be appropriate to provide the overview and then divide the message into segments, placing the clearances and instructions in sequential order, to avoid the possibility of pilot misunderstanding, while still providing the complete picture.

Further guidance on this subject can also be found in Appendix A - 'Communications Guidance'.

It should be noted that the ICAO phraseology " taxi to holding point and hold …" may be misunderstood by some pilots due to the use of non ICAO phraseology within the North America, where "taxi into position and hold…" is used by ATC when issuing a line up clearance. There have been a number of runway safety occurrences due to this misunderstanding, and the read-backs should be very carefully monitored.

Multiple line-ups on the same runway

Line-up instructions may be issued to more than one aircraft at different points on the same runway, using the ICAO criteria contained in ICAO Doc7030. In addition to the standard phraseology in Chapter 12 of PANS-ATM the following ATC phraseology shall be used:

ATC KLM123 LINE UP AND WAIT RUNWAY 22, INTERSECTION ALPHA ONE, NUMBER 2 FOR DEPARTURE, NUMBER ONE AN AIR FRANCE B737 DEPARTING FROM BRAVO.

A/C LINING UP AND WAIT RUNWAY 22, INTERSECTION ALPHA ONE, NUMBER 2, KLM123

Stop Bars

All access to a runway (even if inactive) should take place only after giving a positive clearance and receiving a correct read-back, and after the stop bar (where provided) has been switched off; providing a clearance in a timely manner, as the aircraft is approaching the relevant runway, will help to prevent runway incursions.

Recommendation 1.5.6 states that an Aircraft shall not be instructed to cross illuminated stop bars when entering or crossing a runway unless contingency measures are in force. The objective of this recommendation is to maintain the integrity of the stop bars, which are intended to protect the runway at any airport the pilot may fly to.

Contingency

Contingency plans and suitable instructions should be implemented in the case of a stop bar failure and could include, for example:

When an alternative, suitable taxiway is equipped with a functioning stop bar, and is available, close the taxiway where the failure happened, use the taxiway with the functioning stop bar.

Exceptionally aircraft may be instructed to enter or cross a runway with an inoperable stop bar if taxiing behind a follow-me car, if available, with RTF confirmation.

The communication used is to leave the manoeuvring area driver and / or pilot in no doubt that the crossing instruction applies only to the faulty stop bar. Conditional clearances should not be used.

Take-off procedures

At aerodromes with separate GROUND and TOWER functions, aircraft shall be transferred to TOWER at or approaching the holding position.

Since misunderstandings in the granting and acknowledgement of take-off clearances can result in serious consequences, care should be taken to ensure that the phraseology employed during the taxi manoeuvres can not be interpreted as a take-off clearance.

Hand-over

It is apparent that a number of runway safety occurrences take place soon after a controller hand-over takes place (either of the operational watch or a single operational position). There is evidence that a significant percentage of incidents involving ATC operational errors take place around this time. To ensure that the complete traffic situation is included in a hand-over, the use of a hand-over check-list should be considered.

Briefing Sessions

Recommendation 1.5.13 in this document, states that Runway Safety Issues should be included in team briefing or debriefing sessions that may occasionally be held at unit level, as part of a lesson learning process. From best practice, this should include not only the scenarios that have led to actual runway occurrences, and also other situations that almost resulted in a runway incursion.

Training

Air Traffic Controller training, ab initio and refresher, should include information about how to prevent runway incursions.

Adequate practical training should follow theoretical training in runway safety procedures.