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Introduction

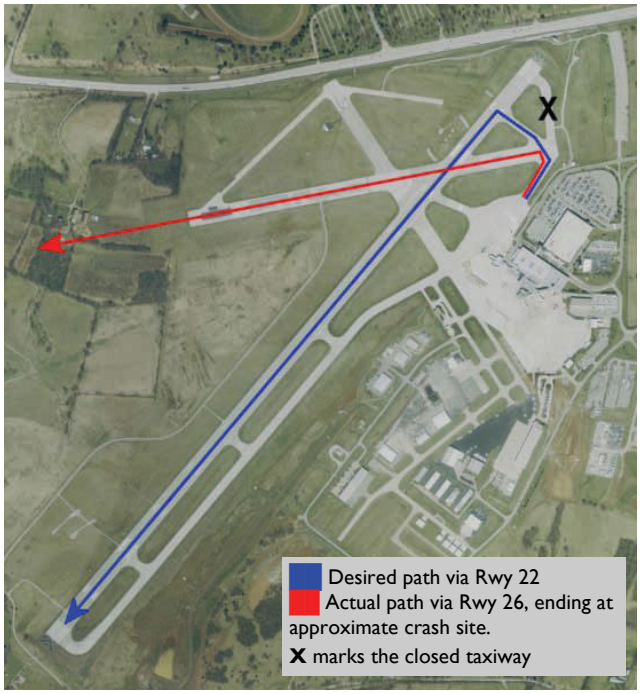
Welcome to the thirteenth issue of our newsletter. The newsletter is now an year old and looking back, we hope it has served the purpose for which it was created. Our endeavor is to appraise and update you on various issues related to flight safety.

Your feedback is very important. We welcome your feedback, suggestions and contributions to this newsletter in the form of articles, anecdotes, pictures, etc. which can be sent to the address given below.

The Crash of COMAIR RJ at Lexington

Based on various reports

On August 27, 2006, about 6:07 a.m. eastern daylight time, COMAIR flight 5191, a Bombardier CRJ-100, N431CA, crashed upon takeoff from Blue Grass Airport in Lexington, Kentucky. The airplane ran off the end of Runway 26. The CRJ was unable to attain sufficient speed for takeoff on the short runway and became airborne briefly before stalling, crashing into a field, and impacting trees about ¼ mile off the departure end of runway 26. The flight had been cleared to takeoff from Runway 22. Of the 47 passengers and 3 crew members onboard, 49 were fatally injured and one (the first officer) survived in critical condition. The flight was operating under the provisions of 14 Code of Federal Regulations Part 121 and was en route to Atlanta, Georgia.



Flight 5191, from Lexington, Kentucky to Atlanta, Georgia was the third of three airplanes scheduled to take off in the early morning. The previous two flights took off without incident from runway 22. Flight 5191 was also cleared to taxi to runway 22 and subsequently cleared to takeoff; however the aircraft attempted take off from runway 26 (see the path marked in the adjascent picture).

According to the recorded information, the aircraft began its takeoff roll, accelerated to about 137 Knots, ran off the end of the runway through the airport perimeter fence, and impacted trees on an adjacent horse farm. The entire sequence took around 36 seconds. The airplane was destroyed by impact forces and post crash fire.

Witness marks on the scene indicated that all three landing gear were on the ground as the airplane exited the runway. The main wreckage was located approximately at 1800 ft from the end of the runway. The examination of the engines at the crash site showed no evidence of pre-impact failure and the thrust reversers were stowed. The flaps were in takeoff position and no problems were noted with any other airplane system or structure.

In this issue

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Analysis of the CVR data indicated that the aircraft was cleared to takeoff from runway 22, which is 7003 ft. long as compared to runway 26 which is 3500 ft long. The captain after confirming "Runway two two", taxied on to runway 26 without stopping, a common occurrence during light traffic periods, and turned the controls on to the first officer for take off. The ATC in the control tower was not required to maintain visual contact with the aircraft. After clearing the plane for take off, he turned to perform administrative duties and did not see the aircraft taxi to the runway. While accelerating the pilots voiced concern that there were no lights bordering the runway. This should have been an immediate tip-off that they were on the wrong runway!

As shown in the blue grass airport picture, the taxiway to runway 22 end had been closed due to construction work and the aircraft had to proceed through the end of runway 26 to reach runway 22.

On Sept. 12, 2006, COMAIR announced that all their pilots were using an air port map with outdated information at the time of crash. A new diagram was received by the airline on Sept.8, 2006. At the same time, the airline issued warning to pilots to exercise extreme caution when taxiing to appropriate runway. The update on the taxiway would have been available in the NOTAM released when the construction began. NTSB, USA is investigating the accident.

A lesson in Runway Identification

Based on an article of the same title by Capt. Jimmy Ho in IFALPA News, Sept.-Oct.2006

The COMAIR crash reminds us of a similar incident that occurred earlier. In 1993, a commercial jet was cleared for takeoff on Runway 22 but mistakenly took Runway 26 instead. Tower personnel noticed the mistake and cancelled the aircraft's takeoff clearance just as the crew realized their error. The aircraft subsequently made a safe departure from Runway 22.

In 2000 in Taipei, Taiwan, Singapore Airlines flight 006, a Boeing 747-400 attempted to take off from a wrong runway (closed for repairs) during heavy rain and hit the construction equipment parked on the runway resulting in the destruction of the aircraft and death of 83 on board.

The taxi route taken by COMAIR on that fateful day is a route that many aircraft have taken before this flight. So why did the error happen on this particular flight? While the short answer could be "lack of situational awareness", there is more to it. Let us look at the issue of identifying the correct runway for takeoff.

For guidance one has to look at the operating procedures Manual (OPM) of the airlines. Under the section on "Briefings" the Departure and Approach briefings require the review of expected taxi route to/from the assigned runway in accordance with the published charts and taking into account any NOTAMS and the ATIS (Automatic Terminal Information Service). It is important to adhere to this practice for the following two reasons.

- In reality, day-to-day operations often result in the assignment of an unplanned or unexpected runway for departure or arrival. Therefore, pilots should be aware that the actual situation could be different from that established during the pre-taxi or pre-landing planning stages, if given the occasional unexpected clearance.
- An overall familiarization of the airport layout is valuable in the self briefing stage. One should look for the runways and their orientation to the airport staging areas and identify where the assigned parking bay is located. One should look for any pattern in the naming of the taxiways and apron areas, and locate the control tower. "Hot Spots" indicated should be taken note of and understand why they are there.

Current industry opinion identifies ground operation as one of the most critical part of a flight. In this, the most critical part is the taxi to takeoff segment, and the ability of the crew to identify the correct runway. With this in focus, let us look at the key points.

Pilots should progressively follow airplane taxi position on the airport chart by cross checking signs and markings. *This is necessary in order to maintain situational awareness.* There should be cross communication between the pilots to maintain a closed loop. During low visibility conditions, all signs should be called out to verify position. Wherever deemed necessary pilots should practice this in normal operations. Other than at inter-sections, signs at intervals on a particularly long taxiway, and a minor divergence in a taxiway with another taxiway designation, can be considered a situation requiring signage call outs.

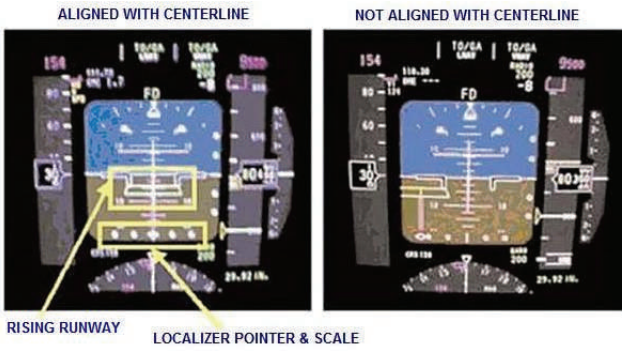
Runway identification should be done by signage and/or runway markings; use of aircraft heading and the airplane symbol on the ND; and check on the PFD. Pilots having carried out countless takeoffs in both benign and challenging conditions, have a tendency to feel the task familiarity. Task familiarity can lead individuals into certain human factor traps. One such trap in human factors terms is known as *planned continuation*. In such a situation the external cues perceived may indicate that the aircraft has arrived at the correct location and may therefore safely proceed with the plan to takeoff. In other words, you see what you expect to see, just as you have many times in the past. In this scenario there is no actual loss of situational awareness since the crew has a mental picture of where they believe they are. However, it so happens in this instance that the picture is incorrect. In reality, the phrase "loss of situational awareness" is only a convenient, modern way of saying "pilot error" and it avoids having to explain how the external

factors determined the crew's assessments and actions. Pilots must be mindful of this constant & compelling challenge and attempt to develop a simple safety strategy. When it comes to identifying the correct runway, pilots must train themselves to use as many cues as possible.

The key cues the pilots must observe are:

Before entering the runway check the mandatory (red) runway sign, usually collocated with the location sign of the taxiway. The runway markings should be white, and you should see the threshold markings and the runway designation marking. When taking off from a displaced threshold you might not be able to see these markings. In that case there should be solid white arrows pointing ahead to the threshold.

IS THE AIRPLANE SYMBOL SITTING ON THE RUNWAY SYMBOL? IS IT ALIGNED WITH THE INTENDED RUNWAY



The airplane symbol on the ND should be sitting on the runway symbol on the ND. At this point the ND scale should be set to the smallest possible(e.g.5Nm). Check that the heading under the Heading Pointer on the ND is the same as the heading set in the Heading Window. If it is not the same, check to see if you have set the correct heading in the window. If the set heading is correct then one should question why there is a mismatch between the heading on the ND and the heading set in the window?

When the ILS is tuned for the departure, the PFD will also have the "LOC" indicator and the "Runway" indication. On some aircraft types there will also be the "Yaw Bar".

A simple mental exercise that can be done after every departure (perhaps during cruise) is to recall the entire takeoff sequence, counting the number of cues that were used from the list above. In so doing, over time the individual pilot will develop a "natural instinct" to identify the runway correctly. By consciously training to look out for these multiple cues before accepting on every takeoff the paved strip ahead to be the correct runway, one can greatly reduce the error of taking off from the wrong runway.

KAC Operations Policy Manual (OPM) under Section 4 Operating procedures at 4.9.5 Runway Identification clearly states that "Prior to each takeoff the Pilot-in-Command must positively identify aircraft position as being at the commencement of the runway designated for takeoff. Regardless of weather conditions all available nav aids shall be used for the purpose of identification."

ATIS is defined as: "The continuous broadcast of recorded non control information in selected terminal areas. Its purpose is to improve controller effectiveness and to relieve frequency congestion by automating the repetitive transmission of essential but routine information."
ATIS broadcasts originate from most major airports. The frequency can be found on any aeronautical chart next to the symbol for the airport. If an ATIS exists, the frequency will be shown next to the letters "ATIS".

Tunnel vision

Based on the article "Rushing to die: The crash of Singapore airlines flight 006" by Robert J.Boser, in airlinesafety.com

In medical terms, Tunnel vision is the loss of peripheral vision with retention of central vision, resulting in a constricted circular tunnel-like field of vision. Pilots and accident investigators use 'Tunnel vision" to describe a pilot's mental state, which apparently focuses on a single goal or outcome with such intensity, that other important information is blocked out of the mental process. Such blocked-out information can be crucial to a safe operation and lead to the pilot ignoring innumerable other cues that could indicate the mistake or error. To understand this, let us look into the crash of Singapore Airlines flight SQ006 in Taipei, Taiwan on Oct.31, 2000. Here the Singapore Airline B747-400 attempting to takeoff in heavy rain conditions from a runway that was closed resulted in a crash.

All airliners have safety crosswind limits for both takeoff and landings. on Oct.31, 2000, the eye of Typhoon Xangsane was moving toward the Taipei airport producing winds up to 90 mph. The reported winds and visibility at the airport were still below the plane's safety limits, when it pushed back from the gate. But, as time elapsed, the winds were bound to increase as the eye of the storm moved closer. The captain knew that longer it took them to taxi out and takeoff, the more likely it was that those winds might reach or exceed the airplane's safety limits. If that happened before he commenced the takeoff roll, he would be forced to return to the gate. This means many hours delay, resulting in transfer of passengers & crew to hotels as the legal duty times of the flight crew would be exceeded. That would cost Singapore Airlines a lot of money and would probably produce hostility among many passengers who deemed it imperative to arrive at their destination on time. Thoughts like that were likely paramount in the captain's mind and the key to why he failed to see the "red flags" all around him as he moved from the gate to the takeoff roll. Following are the red flags.

1. Taxi chart warning: The TPE airport pilot information chart has the cryptic warning, for pilots encountering limited visibility conditions : "When runway 05R/23L is used as a taxiway, the green centerline lights are illuminated. When it is used as a runway, both the green centerline lights and the white runway edge lights are illuminated. Exercise extreme caution during periods of reduced visibility when taxiing to, from or on runway 05R/23L and runway 05L/23R. Ensure proper taxi-

way/runway identification before proceeding."

2. Runway Lighting System:The correct runway (05L), had high intensity white lights (HIRL) marking both edges of that runway and also white centerline lights, turned on for the full length. Both the edge and centerline lights were required for takeoff and landings after dark and, additionally, because of the very limited visibility. In addition, the touchdown zone lights (TDZ) would also be visible to any pilot lining up on runway 05L for takeoff. The wrong runway (05R), where SQ 006 crashed, should have had only *green* centerline lights turned on, indicating to all pilots it was being used solely as a taxiway, *not* a runway. One lady who survived the crash stated that she enjoyed night takeoffs because she loved to watch the runway edge lights speed by as the takeoff roll accelerated. But, she didn't see any such lights this time; it was dark as she looked out her window while the plane raced down the runway, prior to impact.
3. Approach Lighting System (ALS): Since the active runway (05L), was in use for both landing and departing aircraft, the approach lighting system for that runway would have been visible (it's very bright and can penetrate fog) to the captain of SQ 006, out his left cockpit window as he made a right turn onto what he thought was runway 05L. But, he would not have seen any ALS lights, for the runway he selected, because none was installed on the approach to runway 05R. That runway can be used only for landings in visual conditions and only with special permission (usually for smaller aircraft).
4. Runway Number Designations: Both runways were properly marked with very large white numbers painted on the surface at the end. SQ Flight 006 had to taxi over the numbers that read "05R" to begin its fatal takeoff roll. Those numbers could be clearly read by the pilots as they were illuminated with the taxi headlights on that 747-400.
5. NOTAMs: The flight papers, that provided all the necessary information to plan and conduct that flight, included the NOTAM that runway 05R was closed for construction work and that only a portion of it could be used for taxi purposes. The captain planned for and knew that he was required to use runway 05L for takeoff.

Yet, with all these red flags, all three pilots in that cockpit failed to recognize that the plane was lined up to takeoff on 05R, instead of the planned and required runway, 05L.

The captain was highly experienced and had operated through the Taipei airport many times before. It is a very common operation, at Taipei, for planes to push back from the gate and then to taxi down runway 23L/05R, on their way for takeoff on runway 05L. It is likely those pilots had done so numerous times before. When that procedure is followed, the plane makes a right turn off of the end of 23L, at taxiway N1, and then stops short of 05L until cleared to taxi onto 05L. Most importantly, when that common taxi procedure is followed (using 23L as a taxiway, as opposed to using it as a runway), the plane *does not have to cross any other runway* before arriving at runway 05L.

But *if*, after pushing back from the gate, they taxied down the NP taxiway (sometimes called the "ramp" taxiway), instead of down runway 23L, and *if* the minds' of the captain and the two first officers were highly preoccupied with the deteriorating weather while also calculating the crosswind component -- to determine if the wind was still below the safety crosswind limit of that 747-400 -- then they might have mentally reverted to the habit pattern of taxiing down 23L. *If* so, then they subconsciously expected to turn right off that taxiway and then make another *immediate* right turn into the takeoff position on runway 05L. In other words, their common previous experience, at the Taipei Airport, might have overruled their awareness that they were following a different taxi route than normal and that they had to first *cross* runway 05R, before they would be in position to turn right onto runway 05L.

Pilots carry a wind component chart to determine if the crosswind is reaching or exceeding the maximum demonstrated safety limit of the airplane. That is probably why it took the captain a full minute to actually start the takeoff roll, after the tower gave him that takeoff clearance: they were diligently plotting the tower's reported wind on their component chart to ensure it was still below the crosswind safety limit of 30 kts. And, that is probably the most important ingredient in the witch's brew which created their severe case of *tunnel vision*. They were so intent on being certain the winds were within the maximum safety limits, that they somehow lost track of where the plane really was on the ground. They "saw," not reality, but what they expected to see, what their past experience told them to see. They weren't actually aware of the route they had taken to get from the gate to the takeoff position, for they would have known they were on the end of 05R, if they had been cognizant of the plane's position at all times.

Tunnel vision is a form of distraction -- a very severe form. It has been causal in many previous accidents.

ECAM Warning on Control surface deflection

Communication from Airbus

In the July 2006 issue of flight Safety we had addressed an A320 spoiler disconnection. The AAIB UK in their accident report on this incident had observed that the Flight Crew must hold the full flight control deflection for appropriate duration of time - 3 seconds- so as to enable the triggering of ECAM warning.

Airbus has confirmed that maintaining the side stick in a full lateral position for 3 seconds is sufficient to reach the full travel of the spoilers and trigger an associated ECAM warning due to the non extension of a spoiler.

Airbus also confirms that to reinforce the spoiler extension detection, the SEC has been amended (SEC standard 98 certified about near 1995) to detect a spoiler fault within 0.5 second delay. Now, all checks performed by the flight control computers on any surfaces are done within 0.5 seconds on all aircraft in service (A320 family and A330 / A340).

So maintaining, during the flight control check, the side stick in full lateral position until the green spoiler arrows are displayed on the correct side on the ECAM, is enough to check the integrity of spoilers. Doing that leaves enough time to the flight control computer to perform the check. Therefore, for the flight control check, with this SEC standard (worldwide retrofit), there is absolutely no reason to maintain the side stick for 3 seconds in full deflection.