

WRONG PROCEDURE, WRONG RESULT



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We Haven't Always Done it this Way?

Fox Harbour Aerodrome's Runway 15/33 in Nova Scotia is 1489 meters long and 23 m wide. On the afternoon of November 11, 2007, on approach to this runway the pilots of a Bombardier Global 5000 under-shot, skidded over the runway and came to rest just short of a nearby housing complex.

The pilots landed on this short and, on this occasion, damp runway many times before. However, this time they got it wrong: the glide path was too shallow and the pilot-in-command had adopted a non-standard, right-wing, low crosswind correction on short final approach.

Canada's Accident Investigators concluded the captain had used a wrong crosswind technique. We are not going to explore this lead in this "Safety Sense". We'll focus on two other aspects that the investigation report revealed: The operator had replaced its previous airplane, a Challenger 604, with a Global 5000 and the pilots intentionally flew below the on-path indication provided by the runway's abbreviated precision approach path indicator (APAPI).

In fact, the operator's Standard Operating Procedures (SOP) specified

that a below on-path indication provided by the APAPI was suitable to good airmanship in order to compensate for the marginal landing distance available on that particularly short runway.

Understanding the System

Certain meteorological conditions or characteristics of the area surrounding a runway may impede the pilot to correctly judge the approach path. In such cases, ICAO Annex 14 (5.3.5.1) requires an aerodrome to provide a visual approach slope indicator. Various indicator systems have been installed and used over the time. Today, precision approach path indicator (PAPI) systems are widely used. On smaller runways, APAPI systems are used. Both systems consist basically of a wing bar with either four or two sharp transition multi-lamp units, which assist the pilot to execute the approach on a standard three degree approach slope.

Such a standard approach slope is calibrated to lead the most demanding aircraft using the runway on a regular basis to a safe runway threshold crossing height (TCH). As a consequence, the Eye-to-Wheel Height (EWH) correlates with the TCH, since the optical signal from the PAPI is what the pilot uses as guidance. The higher the pilot sits over the main wheels in the approach pitch attitude, the higher the optical signal must be at the threshold to ensure a safe TCH. PAPI systems

must be calibrated to meet the EWH of the worst case airplane using it. In the case of Fox Harbour's APAPI, it was slightly out of the three degree slope calibration due to poor ground maintenance, but had the pilot followed the on-path indication, he would have crossed the threshold with sufficient clearance. However, by doing so he would have lost some 50 meters past the runway threshold. Since his Global 5000 needed 1310 meters out of the 1489 meters available for landing, he deliberately chose to "land short". In combination with the non-standard crosswind correction and the powerful high pitch approach, the EWH simply became too great to avoid impact of the main landing gear before the runway threshold.

During interviews with a group of pilots, the Transport Safety Board discovered they did not fully understand the limitations of a visual approach slope indicator system (VASIS). They obviously were not fully aware of the fact that an on-path indication might not always ensure a safe glide path for every aircraft type using it.

Keeping Up with Changes

The operator previously operated a Challenger 604. Its EWH is about 1.5 m lower in the normal approach attitude than that of the Global 5000. This means that, by flying the same APAPI indication, the Global 5000's main gear was about 1.5 m lower than

CROSSWIND

Never a routine!

A correct procedure has to be applied when landing in crosswind conditions.

the Challenger 604's, for which the SOPs had originally been written. By adopting the same approach technique on the short runway in Fox Harbour, the pilots ended up not just at the beginning of the runway, but short of it. Geometry made it impossible for the main landing gear to touch down on the runway.

The operator's operation manual stated: "When operating on short runways or when braking action is reduced by contamination on the runway, landing as early as conditions permit is generally considered to be good airmanship."

It seems the operator had not thoroughly considered the consequences of such an instruction. We won't discuss whether the procedures defined for the operation of the CL 604 were appropriate. Certainly they weren't for the Global 5000. We will also not discuss the issue of wrong assumptions about the APAPI guidance and the decision to use the runway.

Section 5 of PANS-OPS Vol 1 (ICAO Doc 8168) provides the basis for the writing of Standard Operating Procedures and Checklists:

1.3 SOPs DESIGN

1.3.1 To ensure compatibility with specific operational environments and compliance by flight operations personnel, SOPs design should take into consideration:

- a) the nature of the operator's environment and type of operation;
- b) the operational philosophy, including crew coordination;
- c) the training philosophy, including human performance training;
- d) the operator's corporate culture, including the degree of flexibility to be built into SOPs design;
- e) the levels of experience of different user groups, such as flight crews, aircraft maintenance engineers and cabin attendants;
- f) resource conservation policies, such as fuel conservation or wear on power plants and systems;
- g) flight deck automation, including flight deck and systems layout and supporting documentation;
- h) the compatibility between SOPs and operational documentation; and
- i) procedural deviation during abnormal/unforeseen situations.

1.3.2 Flight operations personnel should be involved in the development of SOPs."

Had the SOPs been adapted to fit operations with a Global 5000 in Fox Harbour, it would have become obvious that an approach technique involving a flight path below the on-path indication of the APAPI would not have been appropriate.

Getting the Best out of Change

Those who write procedures must be able to bring with them a substantial amount of knowledge and experience. The actual procedure should be validated by a comprehensive risk assessment process. A Safety Management System provides the framework for the conduct of such a formal safety impact assessment of revised SOPs (Doc 9859 Ch. 9.8).

The Management of Change implies that safety reviews are being conducted and safety cases are being developed when any change is being experienced by an operator.

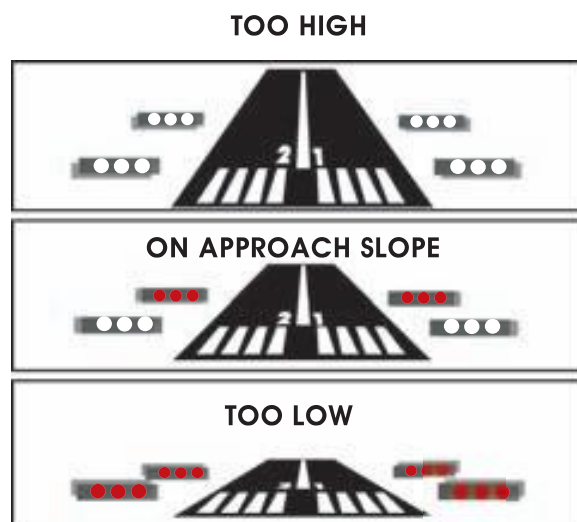
The introduction of the Global 5000 would have been an excellent chance to change for the better. When considering the consequences of change, three considerations should be taken into account: criticality of systems and activities, stability of systems and operational environments and, finally, past performance.

Criticality of activities asks about the contribution an activity makes to safe operations. The operator, in this case, could have answered to "how critical is the use of the APAPI for the approach to Fox Harbour?". The answer may not be to simply continue a procedure tested on the CL 604 and not rationally understandable, since undershooting the on-path indication simply shallows the approach angle and alone does not move the touch-down point further up the runway.

To maintain the stability of the operation during changes, managers must update key information more frequently than otherwise. This includes reviewing and amending SOPs in the Operations Manual.

Past performance does provide a proven indicator on how future performance will be. To learn from past performance and enhance future performance, effective safety assurance measures are required.

Finally, as ICAO's Safety Management Manual suggest, a formal management of change process



should support and standardize such considerations. The goal is to always have defined the best possible standards to achieve the highest possible safety level.

The result of such an approach inevitably becomes a written document, mainly the Operations Manual.

In the case of operators holding an Air Operator Certificate, Appendix 1 to EU-OPS 1.1045 outlines the content of an Operations Manual. However, this Appendix is not a comprehensive table of contents. It leaves a big burden on the shoulders of the responsible managers to define procedures and select information that the pilots require to safely operate an airplane. Regarding flight procedures, Chapter 8 of Operations Manual Part-A is the core procedural chapter of the Operations Manual in conjunction with the aeroplane-type specific Part-B.

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ASSISTANCE

Precision approach path indicator (PAPI) systems offer a visual approach slope indicator.

