

BACK TO THE FUTURE: LEARNING TO ENHANCE PRACTICES FOR AIRFIELD SAFETY DURING CONSTRUCTION

What can we learn from past accidents to tackle operational airside operations safety challenges? **Gaël Le Bris** provides an example of how stakeholders can learn to enhance practices during airside construction work.

KEY POINTS:

- **Questioning the status quo and enhancing safety isn't always expensive.**
- **A lot can be achieved through collaboration 'from the field to the field'.**
- **Airfield safety knows no border. Local progress needs to be advertised globally.**

while the rest was being used as a taxiway. They collided with construction equipment at high speed. Only 96 of the 179 occupants survived.

I heard this story, for the first time, when I was a graduate student. Many things went wrong on that day. But something that astonished me at that time was the absence of any visual warning of last resort to the crew. I did not know yet, but this issue was going to keep part of my mind busy for many years.

In 2011, I was appointed Airside Development Manager at Paris-Charles de Gaulle International Airport

Consider for a moment the horrific accident of the Singapore Airlines Flight 006 in Taipei, Taiwan in October 2000. The visibility was poor. The Boeing

747-400 was cleared for takeoff from Runway 05L. The crew mistakenly aligned Runway 05R instead, a portion of which was under maintenance

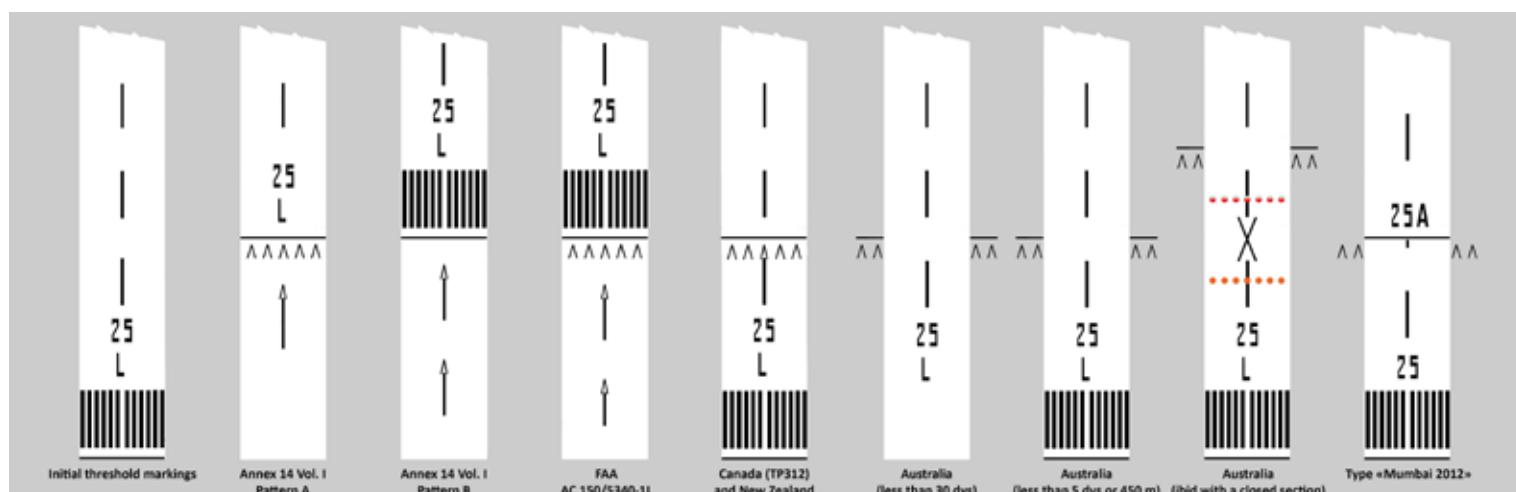


Figure 1. Mind the gap...existing standards and practices on temporarily displaced threshold markings around the world

"Several events that could have ended like the Taipei collision, were it not for the airmanship of the pilot-in-command in the last few seconds."

(CDG). The portfolio of projects was exciting. The 2011-2015 airside capital improvement programme was going to be one of the most extreme makeovers of the time. One of the projects was even going to require shortening a runway temporarily. My first thought was that such density of airfield construction projects would require us to think out of the box – beyond the standards – in order to keep flight operations safe and efficient.

When I started to investigate the potential hazards and search for past accidents and incidents worldwide, I identified several events that could have ended like the Taipei collision, were it not for the airmanship of the pilot-in-command in the last few seconds. Between 1997 and 2020, there were 60 accidents and incidents on runways during construction (excluding jet blast incidents and non-runway events).

Prior to the mid-2010s, very few countries had national standards on the matter. ICAO documents still lack adequate provisions; this was something identified in the accident report of the Taipei accident. And there are nearly a dozen different practices just on the temporarily displaced runway threshold markings, many of them raising safety concerns (Figure 1). So, we explored options for developing innovative features and discussed them with the airside community as part of our aviation safety risk assessments. These meetings involved all concerned parties, including air traffic controllers, airline pilots, and construction management, to make sure the safety devices were going to be both effective and implementable in the field.

Among these novelties was a special information sign for announcing the reduced TORA 26R before taking off toward the modified runway end that was going to be implemented from April to June 2012. Perhaps thanks to a



Figure 2. Innovative devices and systems for increasing safety during construction

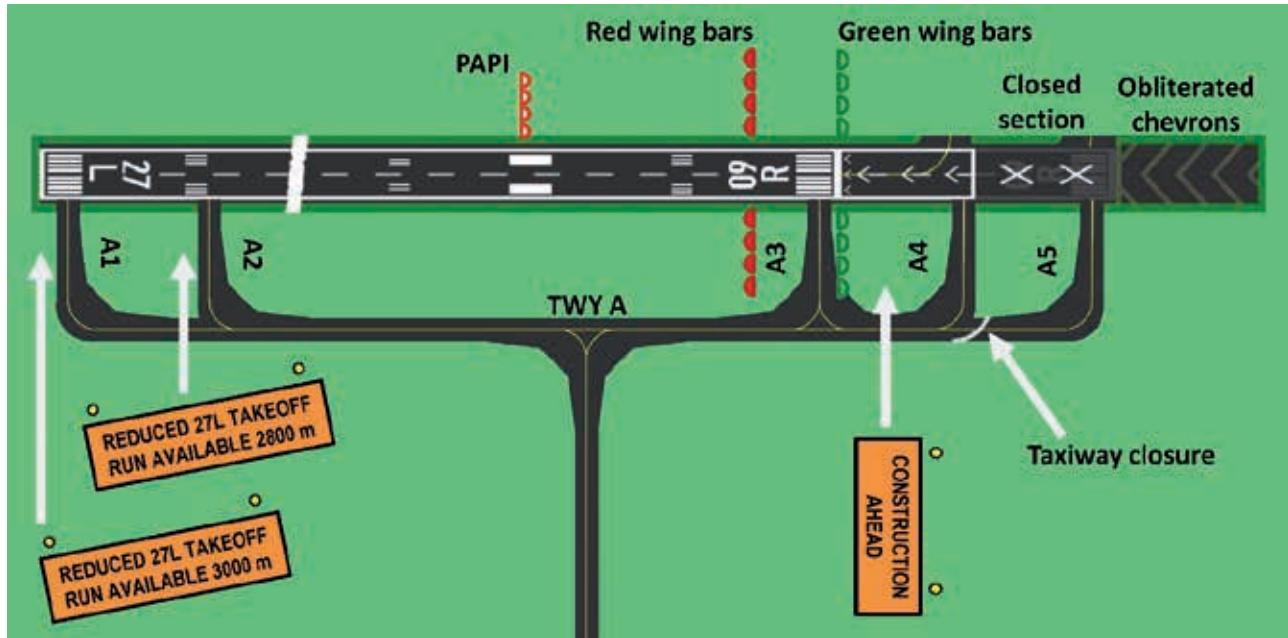


Figure 3. Temporary safety devices recommended for temporarily displaced thresholds by the Infrastructure WG of The French-Speaking Airports (UAF&FA)

comprehensive safety risk management approach, a markings and signage plan, enhanced phraseology for controllers, and the outreach we did to the pilot community and the flight data providers, we did not have any accident on the runway during this period (Le Bris, 2013).

The most critical part of the 2011-2015 construction program was behind us. But this was just the beginning of the journey for improving operational safety during construction.

In November 2012, I met with the FAA Airport Construction Advisory Council (ACAC) and learned that ORD and JFK faced very similar issues when preparing for runway maintenance projects they conducted few years earlier. Despite detailed preparation and an outstanding safety risk management effort, some serious incidents happened (Rosenkrans, 2009). Coordinated initiatives were quickly initiated on both sides to correct these deficiencies. In particular, we conducted parallel research efforts and human factors studies to develop temporary information signage also known as 'orange construction signage' (OCS) (Figure 2), which was presented in a previous issue of *HindSight* (Le Bris, et al, 2016).

Here is another epiphany... A few years later, when preparing a runway rehabilitation project, I got suspicions that the ICAO runway closure markers were underperforming as aircraft were too often overflying and even landing on closed runways. Perhaps the colour was not right. After all, white is used for regular, active runway markings. Adding red and yellow markers could do the job. Also, most runways under rehabilitation become unprotected at some point. Indeed, how can we maintain the markers on or along the runway when the pavement is being replaced? The solution was to create mobile markers on wheels that are resistant to wind. Our local runway safety team (LRST) loved these ideas. We started to apply them in the field in 2014 (Le Bris, 2019).

In 2016, I proposed to the Infrastructure Workgroup of The French-Speaking Airports (UAF&FA) to develop a guidebook to promote best practices and standardisation. We worked relentlessly for about six months, and we 'boldly went where no CAA has gone before' for our guidebook on markings and signage during airfield construction (The French-Speaking Airports [UAF&FA], 2017). This publication features exhibits with comprehensive safety mitigation systems and visual aids

for pilots. They cover about 20 different situations on runway, taxiway, helipad, and service road. They introduce many innovations and they address practical questions that can have consequences for safety, such as the notion of 'short term' closure, the type of safety device to use, or the separation distance between them.

Most importantly, they propose a mature configuration for runway closures and shortened runways (Figure 3). For the latter, we recommend a temporary PAPI as well as runway end (red) and threshold (green) wing bars among the items of our 'minimum equipment list'. Unlike for the runway end lights, there is no wing bar alternative for the threshold lights in the standards (ICAO, EASA, or FAA). In other words, the threshold wing bars are non-standard. They should be justified in a safety risk assessment and might be subject to approval by the national aviation authority.

To date, it is still the most advanced publication on the matter.

Shortly after the release, opportunities arose for these best practices and recommendations to go to the next level. They were introduced in the EAPPRI V3.0 (EUROCONTROL, 2017),

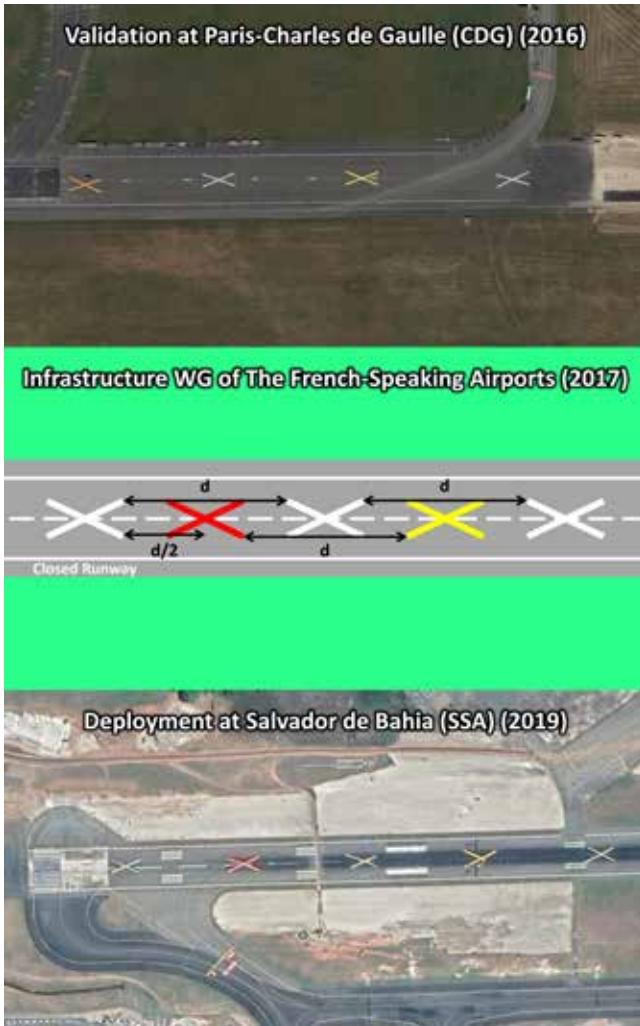


Figure 4. From the field to the field: The enhanced runway closure markers

the DGAC (France) 2017 National Symposium on Runway Construction Safety (2017), ACI's guidebook on Managing Operations During Construction Airports Council International (2018), and ANAC (Brazil)'s Manual of Maintenance and Airfield Construction (2018). Most importantly, airports effectively adopted these items: Paris-CDG, London Heathrow, Milano Malpensa, Québec City Jean Lesage, Oslo Gardermoen, Salvador da Bahia... The list grew pretty quickly.

What's next? By the end of this year, the Infrastructure Workgroup will release a new version of the guidebook, in both English and French, with new features. We will continue the promotion of these best practices with an emphasis on the developing and less developed regions. Also, there is still a lot to do about safety management, the aeronautical information, and the phraseology that could justify a new guidebook. To be continued... **S**



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