# HUMAN FACTORS NEWS

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## THEME — AUTOMATION

Human Factors Training Solutions

Our company is the leading on-line Human Factors training provider to the Australian aviation industry.

We provide training modules for flight crew, maintenance engineers, cabin crew and ground crew as well as specialised investigation and helicopter courses. Our suite of products includes discussion activities for toolbox meetings, templates for CASA, assessment tools and regular newsletters.

All students undertake the initial training course when they commence training, then progress to refresher training courses in subsequent years.

HFTS course developers produce new refresher training courses **every** year, ensuring that content is relevant, up-to-date and reflects the latest evidence-based research in Human Factors. As part of the recurrent training programme, customised modules based on actual incidents supplied to HFTS from client companies are also provided.

## Mobile phone interference?

**Read this pilot's account of becoming distracted.**

On being vectored for an ILS approach to runway 08, we were given our final localiser intercept heading, and cleared to intercept. I was the pilot flying and had the autopilot engaged. The mode control panel was set up in the heading mode. Once I turned to the intercept heading using the bug, I selected vor/loc to capture the localiser.

Both the pilot not flying and I observed the localiser captured and the aircraft turning to intercept it. As the aircraft approached the inbound course, I glanced at the altimeter to calculate where my altitude callouts would be made. When I looked back over to my primary flight instruments, I noticed we had flown through our inbound course, and the aircraft was in a 30 degree left-hand bank. I noticed it showed control wheel steering in the lateral mode. At approximately the same time that I was calculating my callouts, the pilot not flying was tuning in the tower frequency. We both looked up to notice the discrepancy at the same time. I immediately initiated a 30 degree bank right-hand turn back toward the inbound course. We were approximately 30 degrees off course. Before we could tell Approach we were going to miss the approach, the controller assigned a climb and heading. We were vectored back around and landed without incident.

I feel the most important factor was the fact that I allowed myself to become distracted during a critical phase of flight. We all have seen the autopilot capture a localiser numerous times without incident and I feel this lead me to take it for granted. I should have done all my calculations before beginning the approach. I am not sure why the mode control panel went from a vor/loc capture to control wheel steering mode. We later talked to the flight attendants and they observed a passenger who may have been using their mobile phone. I suppose radio interference is possible. I believe this incident has taught me to take my sense of awareness to a higher level, especially during a critical phase of flight.

## Autopilot wanted to land

ON 3 August 2016 Emirates flight EK521 returning from Thiruvananthapuram India, crash landed at Dubai International Airport after the pilot attempted to go around after briefly touching down. All 286 people managed to escape, however one fire fighter was killed responding to the accident.

The UAE General Civil Aviation Authority (GCAA) has released a preliminary report which found the crew received a wind shear warning as the plane approached Dubai. As the aircraft neared the ground, a headwind started to shift to a tailwind and back again. A 'long landing' warning prompted the crew to initiate a go-around. However, at about 85 feet off the ground the aircraft began to lose altitude and with the landing gear retracted, it hit the runaway at 125 knots.

Although the preliminary GCAA report does not address the cause of the accident, there is speculation that the aircraft's landing gear sensors informed the auto-flight system computers that the aircraft had landed. When the pilot clicked TOGA (take off/go-around), the computers inhibited the TOGA as part of their landing protocols and refused to spool up the engines. When the pilots realised the engines were still at idle they attempted to override the auto-throttle. In the seconds it took for the engines to deliver the required thrust, the aircraft sank to the ground.

Pilots are trained to rely on and trust the automatics. Incidents like this one can lead to pilot confusion by not providing the pilots with enough information to respond to a time-critical event. It also emphasises the need for pilots to fully understand the systems their aircraft is using.

For the full GCAA interim report see:

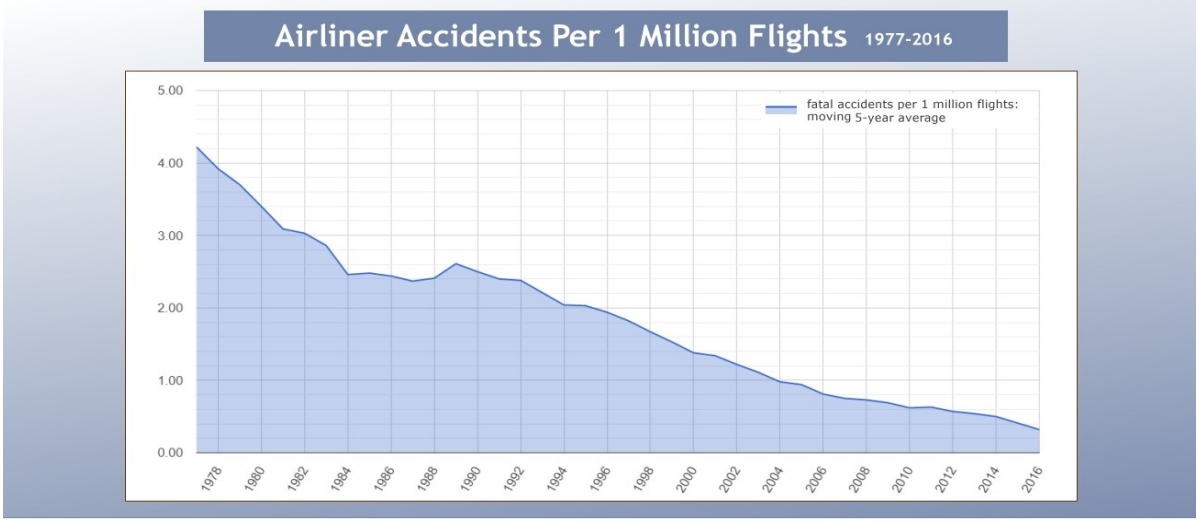
https://www.gcaa.gov.ae/en/

**The initial touchdown and transition from air to ground mode, followed by the lift-off and the changes in the aircraft configuration in the attempted go-around, involved operational modes, logics and inhibitors of a number of systems, including the auto-throttle, the air/ground system, the weather radar, and the GPWS.**

# Automation: Here to stay but at what cost?

Improving safety in aviation has been an unparalleled success story. Increasing automation has been a tremendous safety boon to aviation, contributing to the lowering of accident rates around the world.

Programs have become so complex that they can hardly be tested for all eventualities. If situations arise that computers haven't been programmed for, such as structural damage or extreme weather, pilots can become




**This graph depicts the downward trend of aircraft accidents over a 40-year period.**

Automation has changed the relationship between pilots and planes, presenting new challenges while offering many benefits. Automation can increase passenger comfort, improve flight path control and fuel efficiency while relieving pilots of repetitive tasks to which humans are less well suited. Systems monitoring displays enhance pilots' understanding of aircraft systems states. Good automation reduces workload and frees attentional resources to focus on other tasks. However, when faced with a systems failure, information can swamp the crew and distract them from the principle task of 'FLY THE AIRCRAFT'.

There are over 2000 computers in an Airbus A320. If a computer malfunction occurs, pilots may have only seconds to respond. Unanticipated automation behaviours requiring manual override are difficult to process and manage, can create a surprise or startle effect, and can induce peaks of workload and stress. Also, pilots can make data entry errors which may have critical effects.

overwhelmed by the barrage of alerts, checklists and audible alarms emanating from computer systems. With computerized systems controlling a majority of some flights there are also real concerns that pilots' basic manual and cognitive flying skills can decline because of lack of practice and feel for the aircraft. The accident report of Air France 447 which crashed into the Atlantic Ocean on 31 May, 2009 killing 225 people, noted the captain of the flight had logged 346 hours over the preceding 6 months but only for four hours was he in control of the aircraft; just take-offs and landings.

FAA chief investigator Kathy Abbott has found that pilots habitually "rely too much" on auto-flight systems and are "reluctant to intervene, even when they suspect the systems are not performing as they should. The sophistication of automation in the aviation industry will continue to progress and no doubt be attractive to airline operators if increased efficiencies are realised. The challenge will be to configure a cockpit environment which can ensure pilots can identify and use the appropriate level of automation for the task at hand.

## Sometimes it helps, sometimes it doesn't.

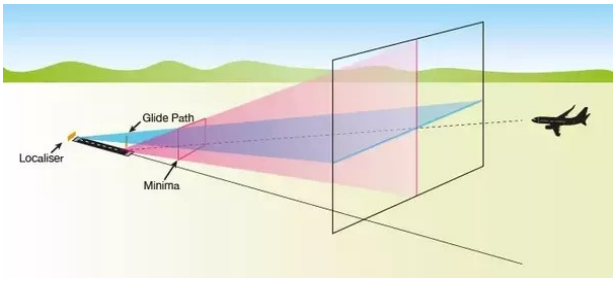
Air Traffic Control assigned a descent for our ferry flight to FL230. My pilot monitoring read back and configured the autopilot for a descent to 2,300 meters. I requested that he verify the descent clearance but this was not done.

Shortly afterwards, ATC handed us off to Hong Kong control. Upon check in with Hong Kong, the pilot monitoring reported descending to 2,300 meters again. I asked him to confirm 2,300 meters with ATC because normally Hong Kong altitudes are in feet, not metres.

As we were approaching FL180, Hong Kong control assigned a descent to FL180 at which time I re-adjusted the altitude selector quickly to enable levelling of the aircraft at that height. Hong Kong control gave us a shortcut with a radar vector and a descent to 3000 feet. This shortcut drastically reduced our track miles to the airport, forcing an expedited descent (2,600+ feet per minute).

The arrival was rushed requiring multiple FMS programming changes. My pilot monitoring became more of a distraction than an assisting crewmember, contributing to the deterioration of CRM and situational awareness.

The aircraft did not capture the localizer, requiring me to disengage the autopilot and manually intercept it. Upon localizer capture I started the descent. The pilot monitoring was asked for the next altitude on the approach; his reply was: "5000 missed approach, altitude set". I was not asking for the missed approach altitude as we had not intercepted the glide-slope at that time. Being distracted by the pilot monitoring's reply and looking to confirm the next altitude while manually flying the aircraft, the descent was continued without glide-slope intercept.




Due to these factors, fatigue, and hazy conditions on the approach, I did not realize our descent had continued below the glide-slope.

We then received multiple GPWS warnings of "Too Low – Gear" and "Pull Up" at which point I initiated a climb.

After climbing approximately 400 feet the warnings ceased and I levelled the aircraft. At the same time as the GPWS warnings the tower asked for our altitude and the pilot monitoring replied: "Correcting". On the tower's second request for our altitude, the pilot monitoring reported airport in sight and we were cleared to land on runway 07L.

The combination of a high-speed descent, reduction of track miles to the airport due to shortcuts, the autopilot's failure to capture the localizer, and an inexperienced first officer set up a chain of events that resulted in loss of altitude awareness. The chain was broken by the EGPWS alarm sounding.

Automation resulted in the failure to capture the localiser. It also resulted in a warning of an impending impact with the ground. Sometimes it helps, sometimes it doesn't.

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**Contact us:**

**Phone: 0412 542 859**

**E-mail: info@hfts.com.au**

**Web: www.hfts.com.au**