HUMAN FACTORS NEWS

Issue 12 June 2015

THEME — AUTOMATION

Human Factors Training Solutions

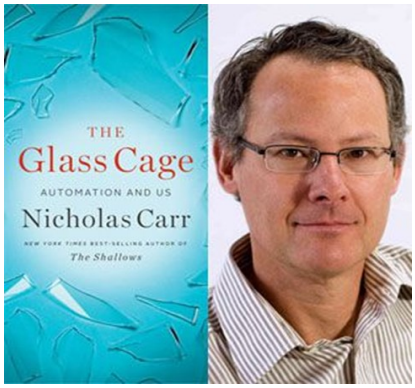
Welcome

Welcome to another edition of Human Factors News.

Automation is examined in this year's refresher program for Flight Operations staff. It has also been chosen as the topic for this newsletter because incidents from around the world continue to highlight the need to thoroughly understand your automated systems.

Becoming an Observer

In Nicholas Carr's latest book, *The Glass Cage*, the author looks at aviation automation, among other targets.



According to Carr: "Automation turns us from actors into observers. Instead of manipulating the yoke, we watch the screen. That shift may make our lives easier, but it can also inhibit the development of expertise. As commonly designed, automation ends up reducing both the challenges a pilot faces and the intensity of his or her engagement in their work. Essentially, it turns the person into more of an observer and a less of an actor. Rich skills aren't given an opportunity to develop, or rich skills, if already developed, start to become rusty."

Carr believes designers and programmers try to shift as many tasks as possible to the computer, and then allocate to the human worker only those tasks that the computer is not yet capable of doing.

One of the great problems with an automated system is that a failure can quickly overload the pilot.

Apart from having to deal with the failure, the pilot may also be faced with a torrent of messages and information. In the QF32 incident, the ECAM displayed messages much more quickly than they could be attended to. Added to this was the pressure of trying to quickly enter information via a keypad. Typing skills then became vitally important.

PACDEFF

Australia's premier human factors event, **PACDEFF** (http://www.pacdeff.com/) will be held in Brisbane from 25th to 27th August. HFTS will be in attendance to hear speakers from around the world including Dr Nicklas Dahlstrom (Emirate Airlines), Brenton Hayward (Dedale Asia Pacific) , and Samah Kamal (Qatar Airways).

Mind Wandering

In an experiment by Casner and Schooler (reference: **The Retention of Manual Flying Skills in the Automated Cockpit**), sixteen very experienced pilots flew exercises in a Boeing 747 simulator. During each flight, the researchers altered the level of automation in use. At a pre-determined point in the flight, they discreetly disabled the alert systems and introduced errors into the instrument readouts.

After the changes, the pilots were generally capable of scanning the instruments and technically flying the aircraft. However their ability to make complex cognitive decisions (tracking the aircraft's position without the use of a map display, deciding which navigational steps come next, recognizing instrument system failures) was severely impaired.

Only one pilot was able to complete the simulator flights without making an error.

The researchers also found that when pilots reduced their monitoring of an automated system and began to think about something else, their performance declined and that pilots made more errors when the flight was more automated. Even though most could detect something was wrong, they didn't cross check other instruments or effectively diagnose the problem or consider the consequences of inaction. In essence, they demonstrated a loss of situational awareness. They concluded that the retention of cognitive skills needed for manual flying may depend on the degree to which pilots remain actively engaged in supervising the automation.

As automated systems have improved, and as pilots have come to increasingly rely upon them (particularly younger pilots, who have trained with those systems from the outset of their careers) they have begun to abandon some responsibility for the control of the aircraft.

"If a buzzer goes off, I'll do something about it. If it doesn't, I'm good."

100 ton Error

An Air France Boeing 777-200 freighter, taking off from Paris Charles de Gaulle was accelerating for a balanced take-off when the crew detected the aircraft wasn't accelerating quickly enough and firewalled the engines.

The crew had used 243 tons as their take-off weight instead of 343 tons for calculation of their take-off performance. The resulting speeds were entered into the flight management system.

They just managed to get airborne and landed safely in Mexico City about 11 hours later.

Flying and Texting (Flexting?)

Pilots and controllers texting while flying!

It sounds dangerous but may actually improve safety in the sky. Instead of using radio calls, international aviation agencies are trialling digital message communication systems for controllers and pilots.

Instead of listening and speaking, typing and reading replaces some conversations between pilots and controllers. The text message is entered by controllers. The message is then routed through ground or satellite communication systems into the cockpit displays, where pilots can respond with a click of a button.

Electronic Flight Bags

The electronic flight bag (EFB) is designed to replace the pilot's carry-on kitbag full of airway charts, airport maps, company operations manuals, aircraft operating manuals, checklists, logbooks and numerous other paper documents required by the company and the regulator. The typical pilot's paper kitbag weighs approximately 15 kgs.

Crews can access electronic documentation of the above items as well as data - linked advanced weather graphics without having to shuffle through numerous paper documents. During flight it has been common for the pilots to have a number of these different paper documents open and spread out on the flight deck. If these documents have not been secure they have slid around, particularly on take-off and landing. The portable EFB can be effectively secured and can become both a data display and data input device in the cockpit. The portable EFB also assists timely distribution of updated aeronautical charts, approach plates, airport diagrams, manuals and information.

Terrain ... Terrain

As a result of EGPWS, the risk of controlled flight into terrain (in Western Europe and North America) is now 50 times less than it was in 1991, making this one of the biggest safety success stories in the history of aviation.

Auto-throttle Scenario

Assume that an airline crew is executing a visual, obstruction-free approach to a lengthy runway at a major airport in a wide body jetliner on a clear day. Assume also that the crew is accustomed to executing autopilot-coupled approaches with the assistance of auto-throttles that automatically maintain the desired approach speed.

On this day, the instrument landing system is out of service, and the approach must be flown manually (although vertical guidance is provided by PAPI). The crew fails to realize during the approach that the auto-throttles are not engaged and that indicated airspeed is eroding dangerously while on short final approach. Before long the stick shaker provides loud and tactile notice that a stall is imminent. But it is too late to recover—the aircraft is too low and too slow.

Is it possible for pilots to be so dependent on automation that they fail to observe airspeed during an approach, and instead trust completely that the auto-throttles are doing the job and maintaining the selected airspeed? Many experts believe so. Could this explain why Asiana Flight 214 came in too low and too slow to San Francisco in July 2013?

Thoughts from an Airbus Captain

From the first few seconds after take-off to the last few minutes before landing, nearly every pilot leaves the flying to Fifi (our affectionate name for the French-built Airbus). Why? Because, when it comes to airliners, flying an airplane is nothing. Safely managing a flight is everything.

The moment I punch the FCU and leave the driving to Fifi, my mind's tendency to tunnel vision suddenly expands to see the "Big Picture." Rather than be distracted with the minutiae of keeping this speed, that heading and climbing to that altitude, my attention is freed up considerably by letting her do the dirty work. This situational awareness is critical to the safe handling of an airliner.

Moreover, when things go pear shaped, I am a strong proponent of letting Fifi do the driving while my First Officer and I troubleshoot. To be sure, somebody is always flying the plane. In fact, our emergency procedures call for the Captain to run the checklists while delegating the relatively straightforward task of flying to the First Officer.

Do you want your pilot hand flying an approach to minimums after being awake for 14 hours on the back side of the clock in a state of exhaustion? Thought not.

Automation or not, we make mistakes - on every flight. The vast majority of errors are minor and trapped by pilots before they become big errors. When the magic is turned on, pilots can better see the Big Picture and more easily trap those errors.

However, pilots can become over-reliant on automation, get bored and forget to monitor. This is a constant human factor challenge for any pilot. Recently, in the "box," we simulated the Air France 447 situation, and believe me, things got mighty confusing, mighty fast. Those pilots were fighting erroneous and conflicting instrument indications that quickly compounded. That training, I assure you, was worth its weight in gold.

Contact us:

Phone: 0412 542 859

E-mail:
info@hfts.com.au