HUMAN FACTORS NEWS

Issue 9 July 2014

THEME — WORKLOAD MANAGEMENT

The year is rushing by (again) and human factors training continues to be a popular topic of discussion.

People from all parts of the aviation industry will meet in Auckland on 29th to 31st July 2014 for the annual PACDEFF Conference.

(see: http://www.pacdeff.com)

The keynote speakers will be **Dr Alan Hobbs** - San Jose State University/Nasa-Ames Research Center and **Prof. Graham Braithwaite** - Cranfield University. Keith Calvert, Director of HFTS will also be speaking at the conference, discussing how to determine if you are getting value out of your training program.

HFTS is especially proud to welcome Skippers Aviation, KAS Helicopters and Toll Engineering who have joined our training program in recent months.

We have been busy putting the next round of refresher training together. The most valuable part of the refresher program is the training based on incidents that have occurred in your operations. When you see these, remind yourself how important it is to share your experiences. There is no point in all of us having to make all of the mistakes individually.

World Cup 2014

The World Cup has concluded with a victory for Germany, defeating Argentina 1-0 in the final, watched by an estimated 1 billion people.

Football is all about physical skills and cognitive skills. It is pure joy to watch players like Lionel Messi (Argentina), James Rodriguez (Colombia), Thomas Mueller (Germany) and Neymar (Brazil) cut the defence to ribbons. Unfortunately we can't see what is happening inside their heads, but we can see the result of their awareness, teamwork, communication, decision making, leadership, and workload management.

This last element, effective workload management, is crucial for success at this level. Players need to be able sustain their effort for the duration of the tournament and also maximise their performance for the duration of a game. You don't see players rushing all over the field, trying to be involved in every play. They need to pace themselves both mentally and physically so they are primed to excel when a chance comes their way. Spare a thought for the goalkeepers who endure prolonged periods of boredom (almost), interspersed with moments of terror.

The goal that won the Cup came after 113 minutes of play. It was set up by substitute, Andre Schurrle (31st minute), and scored by substitute Mario Goetze (88th minute). Both players were relatively fresh which gave them an advantage over the tiring defence. Their mental sharpness allowed them to see the opening, position themselves to perfection, and execute the play. Goetze's superbly struck volley was the reward for hours of practice. At the crucial moment he was not overloaded with calculating, judging, balancing, or aiming. It was all automatic.

Mario Goetz scores (*Photo: Reuters)*

Being able to reduce your workload at the most crucial of moments comes from sustained, perfect practice. Will you be ready when your crucial moment comes?

Climb to FL380

In March this year an Airbus A320 was on a repositioning flight from Melbourne to Darwin with two crew. The Captain temporarily left the cockpit. While he was absent the first officer received a clearance to climb to FL380. He entered this into the autopilot, maintaining managed speed mode. Here is a timeline of what happened next:

0.00	36,000 feet, mach 0.78	Selects 38,000 feet in managed climb mode, maintaining mach 0.78
0.45	37,000 feet, mach 0.80	Notices speed and rate of climb increasing. Selects mach 0.76 but speed continues to increase.
0.50	37,300 feet, mach 0.81	M_{MO} (Maximum Mach number) is Mach 0.82.
		Airbus rule: "Take action if things do not go as expected"
		Following this rule, F/O reduces thrust to idle which disconnected the auto-thrust, extends the speed brake, and disconnects the auto-pilot so he can manually control pitch.
1.00	37,800 feet, mach 0.78	Notices speed decreasing, increases thrust, increases pitch to 7^0 (angle of attack now 10^0)
1.10	38,100 feet, mach 0.75	Aircraft climbs through assigned altitude. Altitude warning.
		Increases thrust, applies forward stick to reduce pitch.
1.40	37,600 feet, mach 0.71	Reduces thrust to just above idle (pitch now 0^0 and angle of attack 10^0). Alpha floor protection activated.
1.45	37,100 feet, mach 0.70	Captain re-enters cockpit.
1.50	36,600 feet, mach 0.70	Captain takes over, increases thrust to climb, retracts speed brake, reduces pitch to minus 3^0 (angle of attack now 13^0)
2.10	36,600 feet, mach 0.71	Pitch restored to 3-5^0 range, angle of attack maintained in 5 - 7^0 range.
4.00	38,000 feet, mach 0.75	Breathe out.

See full report at:
http://www.atsb.gov.au/media/5246614/ao-2014-049_final.pdf.pdf

In this incident it took just on one minute for the aircraft to become unstable. The workload experienced by the First Officer increased dramatically once he elected to disconnect the auto-thrust and autopilot. You can see from some of the choices he made how quickly he fell behind what was happening.

Read through the event again and try to work out what occurred.

After examining the data from the flight it was established that the aircraft had entered a 35 knot wind shear in transiting the Southern Jetstream. This, combined with the light weight of the empty aircraft and the high altitude, caused a rapid increase in speed.

The First Officer commented that the rate of things happening seemed much quicker than usual.

With his high workload, he believed that he may not have had time to action the over-speed checklist.

As a result of the investigation the operator revised their standard operating procedures to require both flight crew members to be present on the flight deck during altitude changes.

This incident highlights how quickly an increase in workload can impact on performance.

Nursing Workload and Patient Safety

When you read this article, substitute LAME for nurse, and aircraft maintenance for patient care and notice the similar working environment and Human Factors issues.

The heavy workload of nurses is a major problem. There are several important consequences of high nursing workload. Research shows that under a heavy workload, nurses may not have sufficient time to perform tasks that have a direct impact on patient care. A heavy workload can influence a nurse's decision to perform various critical procedures.

Further, a heavy workload negatively affects job satisfaction. Job dissatisfaction can lead to low morale, absenteeism, high staff turnover, poor levels of performance, and potentially threaten patient care quality.

Various characteristics of a workspace, such as a poor physical work environment, supplies not well stocked, and ineffective communication among team members, significantly affect workload. The distance between the workspaces assigned to a nurse affects their physical workload and the condition of the work environment (noisy versus quiet, hectic versus calm) affects the overall effort spent by the nurse. A heavy workload may also reduce the time spent by nurses communicating with key people. Nurses have identified that the following factors lead to high workload: difficulty finding a place to sit down and do paperwork, poor condition of the equipment, spending a lot of time searching for manuals, and a crowded and disorganized work environment.

High workload can lead to distress (e.g., cynicism, anger, and emotional exhaustion) and burnout. Nurses experiencing stress and burnout may not be able to perform efficiently and effectively because their physical and cognitive resources may be reduced; this may affect patient care and safety.

Workload can be a factor contributing to errors. High workload in the form of time pressure may reduce the attention devoted by a nurse to safety-critical tasks, thus creating conditions for errors and unsafe patient care.

The Eagle Has Landed (Heart rate 156)

REAL WORKLOAD: Neil Armstrong hand flew the Lunar Module for the last 600 feet of the descent onto the moon.

300 feet (altitude) down at three and a half (feet per minute)... 47 (feet per minute) forward, slow it up...

Altitude velocity light, three and a half down, 220 feet.. Coming down nicely, 200 feet, four and a half down... 100 feet three and a half down, nine forward.. 5 per cent [fuel remaining]... quantity light.. Okay 75 feet, things looking good...

60 seconds worth of fuel remaining.

Lights on... sixty feet... down two and half... forward... forward... that's good... forty feet, down two and a half... picking up some dust...

30 feet, two and a half down.. faint shadow.. four forward, four forward...drifting to the right a little...

30 seconds of fuel left.

A five foot long probe extending under the landing gear pads touched the lunar surface. Armstrong punched the engine stop button and Eagle settled onto the moon's surface.

Houston, Tranquillity base here. The Eagle has landed.

See: http://www.firstmenonthemoon.com/

Coming To Your Backyard

Civil aviation authorities around the world are scrambling to regulate the use of drones or unmanned aircraft that are taking to the skies and putting commercial airlines and the safety and privacy of the public at risk.

The unmanned aircraft, which were once used exclusively in military operations, are now readily available on the internet and in shops. The drones can be used for law enforcement, agriculture, wildlife management, search and rescue operations, the sale of property and marketing, surf life saving, news reporting, sports coverage, as well as for fun. They are particularly attractive to photographers. Apparently having drone coverage of your wedding is the in thing at the moment.

There are several problems:

The operator can direct the drone remotely so they only see what the on-board camera sees. The operator cannot see or hear other aircraft.

Air traffic controllers are unable to detect the drones on radar.

Purchasers of drones may be totally ignorant of air space rules.

Reliability is an issue. Several kilograms of whirring carbon fibre and alloy randomly falling to earth is about as dangerous as a flying lawnmower.

Australia was the first country in the world to regulate remotely piloted aircraft, with the first operational regulation for unmanned aircraft in 2002.

CASA is reviewing CASR Part 101, and will modernise it into CASR Part 102.

Phase 1 will involve amendments and the development of a notice of proposed rule-making - *1309OS - Remotely Piloted Aircraft Systems Terminology and Weight Categorisation of Remotely Piloted Aircraft*.

Phase 2 will consist of a complete re-write of the regulation resulting in a new CASR Part 102 for RPAS.

CASA expects to have this done by 2016.

See: http://www.casa.gov.au/scripts/nc.dll?WCMS:STANDARD::pc=PC_100374

Keep Practising

Constant practice is an effective way to prevent work overload. By correctly practising a task, you will be more familiar with it, succeed more often, be less frustrated, and be able to accomplish it more quickly. Each of these elements will reduce your workload significantly.

Human Factors Training Solutions

Contact us:

Phone: 0412 542 859

E-mail: info@hfts.com.au

Web: www.hfts.com.au