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TECHNOLOGY

Computers in cockpits breed pilot complacency

Helen Gavaghan, Washington DC

HIGHLY automated cockpits in aircraft can make pilots complacent and compromise safety, according to a report* by NASA. Some pilots say that coping with automated controls may increase their workload, not decrease it.

Earl Wiener from the management department at the University of Miami conducted the report from NASA, which was published last month. Its aim was to evaluate "human factors" in the new generation of aircraft with highly automated cockpits.

Wiener questioned pilots working for two different airlines on two occasions a year apart. He chose pilots of Boeing 757s, because pilots have more experience of takeoff, approach and landing in these aircraft than in others.

Automated cockpits have made pilots' lives more difficult

The results of the study, according to Wiener, apply equally to other highly automated aircraft, such as McDonnell Douglas's MD-80 and Airbus Industrie's A-310. On these aircraft, electronic systems have taken over most of the work that the flight engineer does on other aircraft, and there is a crew of only two on the flight deck.

All large modern aircraft have some degree of automation, such as autopilot, but electronics plays a wider role in new aircraft. For his study, Wiener defines automation to include control of vertical and lateral navigation and electronic alert and warning systems. Lateral navigation has been around for some time, but vertical navigation is relatively new.

Many of the pilots that Wiener questioned said that they thought cockpit automation had gone too far, that it diminishes flying skills and leads to complacency. The pilots were divided as to whether automation increases or decreases the workload. Because flying aircraft with automated cockpits involves much programming of the computers on the flight deck, the experience is different from that of flying older aircraft. Wiener believes that some of the pilots' dissatisfaction could be linked with the qualitative difference in flying the two types of aircraft.

Pilots who were critical of automation said that the increase in workload comes when they are at their busiest anyway—in other words, during the approach to an airfield. The problem arises because air-traffic control often changes the approach of an aircraft several times, and the pilot has to feed the new information into the computers on the flight deck each time. Instead of doing this, many pilots switch to manual control of the flight.

In some cases, the pilots said that they wanted more from their computers. For example, when pilots want to begin their descent earlier than the point preprogrammed into the computer, they have to trick the electronics by putting in false information about tail winds. The report praises the pilot's ingenuity, but says: "It does not speak well for automation that pilots of a modern airliner must deliberately enter incorrect data into a sophisticated computer to achieve a desired objective."

Wiener also looked at the mistakes people make in highly automated cockpits. He says that crews can easily enter incorrect information into computers on the flight deck, or select the wrong mode of operation. As yet, machines are not very good at spotting such human errors, says Wiener.

The report concludes that crews operate the modern aircraft safely, but that engineers could improve the design of automated cockpits to take account of human factors. □

*Human Factors of Advanced Technology (Glass Cockpits) Transport Aircraft, NASA, AMES Research Center, Moffett Field, California 94035.