Human Factors of the Cockpit Display of Traffic Information

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Abstract

With the advance in new airborne surveillance technologies, such as Automatic Dependent Surveillance-Broadcast, applications are being developed for the Cockpit Display of Traffic Information (CDTI). These applications, also known as distributed air-ground operations, are designed to allow the pilots to gain authority for certain separation tasks traditionally performed by Air Traffic Control (ATC). Advantages lie in the fields of capacity, flexibility, safety and controller workload.

In order to make CDTI applications suitable for easy pilot control and operation, a preliminary human factors analysis was made to integrate the CDTI into the flight deck (Winterberg, 2000).

The problem

In the current Communications, Navigation and Surveillance environment, pilots lack sufficient situation awareness regarding surrounding traffic. With the exception of visual conditions close to airports, ATC conducts traffic and is responsible for safe separation. Airspace capacity (especially in the terminal area) is limited by the amount of aircraft the controllers can deal with. Controllers cannot always utilise the minimum (radar and wake vortex) separation in high workload conditions and increase the separation margins to ensure safety. Radio Technical Committee for Aeronautics (RTCA) states that 25% of runway capacity is lost because of excessive spacing gaps between landing aircraft (RTCA, 1998).

Role of CDTI operations

The CDTI provides the pilot with two basic functions (Winterberg, 2000):

1. Enhanced traffic situation awareness.
2. Enhanced ability to perform routine separation manoeuvres otherwise taken care of by ATC.

Ad 1. An overview of surrounding traffic is presented to the pilot. This eliminates the need for pilots to form a mental picture by monitoring radio transmissions made by aircraft and ATC (the “party-line” effect). Currently, the Traffic-Alert/Collision