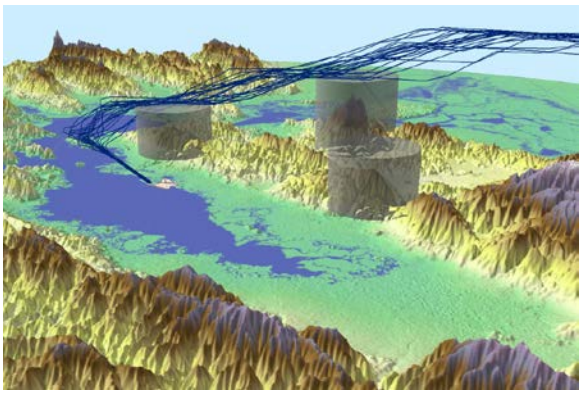
# Terrain Awareness and Warning Systems (TAWS)

In 2009, industry and Government, through the Commercial Aviation Safety Team (CAST), initiated a directed study of Terrain Awareness and Warning System (TAWS) alerts and warnings because flightcrews reported receiving nuisance, or overly conservative, alerts and warnings. This study leveraged textual reports, digital data from aircraft, surveillance radar data, and high-resolution terrain data to identify contributing factors. The study focused on specific hot spot areas to better understand the following:

- Flightcrew member desensitization to TAWS alerts caused by the occurrence of unwanted alerts when the aircraft was not in imminent danger.
- TAWS alerts triggered by the interaction between airspace design (for example, minimum vectoring altitudes (MVA)) and aircraft flight path trajectories.
- The role of Traffic Collision Avoidance System (TCAS) alerts issued following crew reaction to a TAWS alert.
- The interaction between air traffic control (ATC) procedures and aircraft warning systems logic.

The study identified several key contributing factors, such as vectoring traffic over high terrain, crew situational awareness, difficulty seeing terrain during night visual approach, "dive and drive" approaches, and operating with TAWS systems that did not have a Global Positioning System (GPS) signal and lacked the latest software updates (logic version, terrain and obstructions databases). The study team proposed several safety enhancements (SE) to address technological, procedural, and infrastructure changes that would reduce TAWS alerts and the potential for crew desensitization. The study team concluded that by upgrading the TAWS system to the latest logic software and providing a GPS signal to the system, almost 98 percent of the nuisance Mode 2A alerts could be eliminated. In addition, the team concluded that reevaluation and validation of MVAs and establishment of Area Navigation (RNAV) Visual or other procedures could offer further benefits.



As evidence of the effectiveness of these mitigation strategies, a reexamination of the TAWS hotspots identified in the Controlled Flight Into Terrain (CFIT)/TAWS directed study showed there have been no valid TAWS events recorded over the hotspots since 2013. The only TAWS alerts received are attributed to aircraft not operating on established procedures. The CAST Metrics Working Group continues to monitor TAWS data for any recurring or emerging issues.

The TAWS SEs (1, 120, 184, and 185) are available for review at http://www.skybrary.aero/index.php/Portal:CAST_SE_Plan.