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## Smoke, Maintaining Cockpit Visibility Emerge as Issues in Swissair 111 Crash

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The crash of Swissair Flight 111 has focused attention not only on the dangers of smoke in the cockpit, but also on available technology to maintain visibility for pilots in the event of a severe fire.

As investigators worked over the Labor Day weekend to decipher the Swissair MD-11's recovered flight data recorder, or "black box," new details emerged about the airliner's last few minutes and the extent of smoke its experienced two-man crew apparently faced before the widebody jet went down off the coast of Nova Scotia, killing all 229 people on board.

Based on tapes of Flight 111's transmissions to Canadian air-traffic controllers, and reports by the crew of a British Airways jet in the area that monitored those conversations, investigators believe the Swissair jet's pilots donned oxygen masks during the later stages of their ill-fated emergency-landing descent.

In addition to such masks, commercial jets carry goggles intended to ensure that pilots can see their instruments even if there is smoke in the cockpit. Some pilots and safety experts, however, consider this equipment unwieldy and potentially ineffective, especially in case of heavy and continuous smoke. "It works up to a point," said Mike Overly, of the Aviation Safety Institute in Worthington, Ohio. "But after you wipe off the goggles, you still may not be able to see the instruments."

By contrast, many corporate aircraft already carry more elaborate equipment to protect visibility for pilots. The devices shield part of the windshield and vital instruments by deploying an inflatable, see-through plastic covering through which the pilot can see the instruments unimpeded by smoke. Proponents of the devices contend that they provide an extra margin of safety, especially if a cockpit fills up with dense smoke.

Companies that already are using this so-called Emergency Vision Assurance System on executive aircraft include MCI Communications Corp., Prudential Insurance Co. of America, Bell Atlantic Corp.'s Nynex unit, and Planet Hollywood. It is also on board the Australian Air Force's VIP jets, according to a Raytheon Co. unit that recently began distributing the portable EVAS equipment world-wide.

Raytheon demonstrated the device recently at a conference for corporate aircraft operators in South Carolina. The Federal Aviation Administration has approved its use, but has stopped short of mandating it.

Jeff Synder, the Raytheon unit's president, said it received more than 100 queries about the system for protection against smoke after last week's Swissair crash. "We've been inundated with call," Mr. Snyder said. "These (corporate) operators are extremely safety conscious, and were mighty impressed by the demonstrations. They want the equipment."

### Protection Against Smoke

It isn't clear whether visibility in the cockpit played a part in Wednesday night's crash. At this early stage, investigators haven't ruled out whether fire or some mechanical difficulty may have caused a fatal engine problem, or made Flight 111's flight controls inoperable. The Canadian Transportation Safety Board's chief investigator for the crash, Vic Gerden, told

reporters over the weekend that the Swissair crew's radio transmissions remained "very professional" and didn't indicate they were incapacitated. The transmissions ended roughly six minutes before the three-engine jet crashed into the Atlantic.

Regardless of what the final causes of the Swissair crash turn out to be, Flight 111 has moved the issue of protection against cockpit smoke to center stage in the public debate over aviation safety. "Smoke is horrible" in flight, said Hans Weber, a San Diego aviation-safety consultant, adding that Flight 111 puts the spotlight on how well commercial jets are able to vent smoke once it appears.

Bert Werjefelt, president of Vision safe Corp., the closely held Hawaiian firm whose smoke-protection equipment is being sold by Raytheon, asserts that "pilots on the whole are still woefully misinformed." While the FAA and aircraft operating manuals indicate that oxygen masks and goggles are adequate, Mr. Werjefelt asserts, "they simply can't cope with a dense smoke source that doesn't stop."

### **FAA's Traditional Stance**

The FAA over the years has stayed away from requiring additional smoke-protection devices, maintaining that no major U.S. airline had suffered a crash primarily caused by impaired cockpit visibility. Before jetliners are certified to enter service, according to the FAA, they must be able to demonstrate that "smoke will not accumulate in the cockpit, but rather will be ventilated from that area" in a short period.

The 1996 crash of ValuJet DC-9 in the Florida Everglades, which also involved smoke in the cockpit, prompted the National Transportation Safety Board to prod the FAA to pay more attention to emergency cockpit-vision technology. Earlier this year, FAA administrator Jane Garvey wrote Sen. Daniel Inouye (D., Hawaii) that "additional rulemaking does not appear to be required in this area." But Ms. Garvey added that her agency did anticipate issuing updated guidance urging pilots "to don oxygen masks and smoke goggles at the first indication of possible in-flight smoke or fire emergency."

The role of smoke in the crash of Flight 111 may become clearer as investigators analyze information from the flight-data recorder. The state-of-the-art black box on the Swissair jet tracked more than 100 different aspects of the plane's performance, compared with 17 parameters recorded by the black box retrieved from the wreckage of Trans World Airlines Flight 800, a **Boeing** Co. spokesman said. In addition, the cockpit voice recorder was expected to be recovered soon, because investigators had detected a signal that should help pinpoint its location on the ocean floor.

Through cockpit smoke can come from the cargo hold, Mr. Gerden, the Canadian investigator, told reporters there was not evidence of hazardous flammable materials on the MD-11's freight manifest. Another potential source of fire is an electrical short in the equipment near the cockpit. But Swissair said over the weekend that the jetliner was in compliance with all orders and advisories issued by the FAA and the manufacture calling for various inspections of possible damaged wiring on MD-11's.