

When the Royal Aeronautical Society published its Specialist Document “Smoke and Fire in Transport Aircraft” (SAFITA) in February 2007, the document said that in the United States an average of one airplane each day diverts due to a smoke event. However, new information from the FAA now puts that average at more than two diversions daily. Improved reporting of events accounts for much of the increase, but it is clear that the problem of smoke in aircraft is not improving across the industry.

Everyone in the industry remembers well the tragic loss of Swissair Flight 111, a McDonnell Douglas MD-11 that crashed near Halifax, Nova Scotia, on Sept. 2, 1998. The Transportation Safety Board of Canada (TSB) investigated the accident and wrote a comprehensive report that detailed the ways in which this accident was an example of the potential extreme consequences of a smoke/fire/fumes event in an aircraft. Following the recommendation of the TSB, improvements were made in the MD-11’s thermal acoustic blankets. While

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It’s time to implement recommendations for mitigating smoke/fire/fumes events.

NO SMOKING

BY JOHN COX

in the Cockpit

Smoke, Fire and Fumes Events in the United States and Canada, October–November 2008

Event Date	Flight Phase	Event Airport	Event Classification	Event Sub-classification	Aircraft Model	Operator Name
Oct. 8, 2008	Climb	La Guardia, New York (LGA)	Return to airport	Smoke alert	EMB-145LR	Chautauqua Airlines
After takeoff from LGA, flight crew received an EICAS lavatory smoke indication.						
Oct. 7, 2008	Climb	Portland, Oregon (PDX)	Return to airport, unscheduled landing	Smoke in cockpit	A320	Allegheny Airlines
5 minutes after takeoff, smoke started coming out of center glareshield panel.						
Oct. 7, 2008	En route	Denver, Colorado (DEN)	Diversion, unscheduled landing	Fumes in cabin	DC-9	American Airlines
Crew reported strong electrical smell in aft cabin. Flight attendant and passengers nauseous.						
Oct. 30, 2008	En route		Diversion, unscheduled landing	Fumes in cabin	A320	United Air Lines
Flight diverted after electrical smell in cabin.						
Oct. 3, 2008	Descent		Emergency landing	Smoke in cabin	EMB-145LR	American Eagle Airlines
On approach, cabin started filling with hazy smoke. Emergency descent to landing initiated.						
Oct. 29, 2008	En route	Memphis, Tennessee (MEM)	Emergency landing	Smoke in cockpit	727	Federal Express
At FL350, electrical odor was noted; donned O ₂ masks and ran "Smoke" checklist. Smoke visible near first officer's LIDO bag.						
Oct. 29, 2008	En route		Diversion	Smoke in cockpit, fire in cockpit	Beech 58	Corporate
Pilot smelled smoke and saw flames coming out of propeller heat circuit breaker switch.						
Oct. 28, 2008	Climb	Charlotte, North Carolina (CLT)	Return to airport, emergency landing	Smoke in cabin	ERJ190	Allegheny Airlines
Smoke/fumes in aft galley. Captain requested emergency equipment upon return to airport.						
Oct. 27, 2008	Climb	Dallas, Texas (DAL)	Return to airport, emergency landing	Smoke alert, smoke in cabin	737	Southwest Airlines
Both lavatory smoke alarms sounded; flight attendants reported haze in cabin.						
Oct. 24, 2008	Descent		None	Smoke in cockpit	Saab 340	Colgan Airways
Smoke in cockpit during descent.						
Oct. 24, 2008	Climb		Return to airport, unscheduled landing	Smoke in cockpit	EMB-120ER	Sky West Airlines
After takeoff, smell of smoke in flight deck, lavatory smoke detector activated.						
Oct. 23, 2008	En route	Columbus, Ohio (CMH)	Return to airport, unscheduled landing	Smoke in cockpit, smoke in cabin	EMB-145LR	American Eagle Airlines
On climbout, flight crew observed smoke in the cockpit and cabin.						
Oct. 23, 2008	Climb	Jamaica, New York (JFK)	Return to airport	Odor in cockpit, odor in cabin	ERJ190	JetBlue Airways
Burning odor detected in cockpit and cabin.						
Oct. 2, 2008	Climb		Unscheduled landing	Smoke in cockpit	Lear 60	Corporate
Upon leveling off at FL410, flight crew observed smoke in the area of the copilot's control yoke.						
Oct. 19, 2008	Climb		Return to airport, emergency landing	Fumes in cockpit	A320	Allegheny Airlines
Captain donned O ₂ mask and declared emergency after fumes in cockpit.						
Oct. 17, 2008	Climb	Kansas City, Missouri (MCI)	Return to airport, unscheduled landing	Smoke in cabin	EMB-145XR	Continental Express
Flight crew reported smoke in the cabin shortly after takeoff.						
Oct. 17, 2008	Climb	Atlanta, Georgia (ATL)	Return to airport, unscheduled landing	Smoke in cabin	DC-9	American Airlines
During climbout, flight attendant reported white smoke in cabin.						
Oct. 17, 2008	Climb	Jamaica, New York (JFK)	Return to airport, unscheduled landing	Smoke in cabin	767	American Airlines
Crew reported smoke in cabin.						
Oct. 16, 2008	Climb		Return to airport, unscheduled landing	Smoke in cockpit, smoke in cabin	CL600	Sky West Airlines
After takeoff, aircraft filled with smoke. Toilet smoke caution received.						

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Oct. 10, 2008	En route	Florence, South Carolina (FLO)	Diversion, emergency landing	Smoke in cockpit	Dash 8	Henson Aviation
Flight crew diverted to FLO with smoke in the cockpit and burning smell in cabin.						
Nov. 30, 2008	En route	Managua, Nicaragua (MGA)	Diversion, emergency landing	Smoke in cabin	737	Continental Airlines
Crew declared an emergency following engine problems. During diversion the cabin started to fill with smoke.						
Nov. 28, 2008	En route		Diversion, emergency landing	Smoke in cabin	737	Southwest Airlines
Declared an emergency with smoke in the cabin.						
Nov. 28, 2008	En route	Charleston, West Virginia (CRW)	Diversion	Smoke in cockpit	CRJ-200	Atlantic Southeast Airlines
Diverted after the crew smelled smoke in the cockpit. Landed approximately 15 minutes later.						
Nov. 26, 2008	Climb	Minneapolis, Minnesota (MSP)	Return to airport, unscheduled landing	Smoke alarm, fumes in cabin	CL600	Mesaba Aviation
Amber caution smoke in lavatory. Flight attendant reported fire odor. Aircraft landed overweight.						
Nov. 25, 2008	Climb		Return to airport, unscheduled landing	Smoke in cabin	EMB-135BJ	Corporate
Immediately after departure crew noted the cabin filling with smoke.						
Nov. 25, 2008	Takeoff		Aborted takeoff	Smoke in cockpit	EMB-135KL	American Eagle Airlines
At 80 kt on takeoff roll, cockpit became hazy with smoke accompanied by odor.						
Nov. 25, 2008	Climb	Jamaica, New York (JFK)	Return to airport, emergency landing	Smoke in cockpit, smoke in cabin	ERJ190	JetBlue Airways
Smoke in cabin and cockpit.						
Nov. 24, 2008	Descent		Emergency landing	Smoke in cabin	MD-88	Delta Air Lines
Smoke in cabin, both aft lavatory smoke detectors alarmed.						
Nov. 24, 2008	Climb	Houston, Texas (IAH)	Return to airport, unscheduled landing	Smoke in cabin	CL600	Chautauqua Airlines
Flight attendant reported smoke rising from the floor distribution ducts.						
Nov. 23, 2008	En route	Buffalo, New York (BUF)	Diversion, emergency landing	Smoke in cockpit	ERJ190	JetBlue Airways
Cockpit smoke smell at FL380, EICAS failure, multiple faults.						
Nov. 20, 2008	Climb	Fort Myers, Florida (RSW)	Return to airport, unscheduled landing	Smoke in cabin	EMB-145LR	Continental Express
Flight attendant reported smoke in the cabin.						
Nov. 17, 2008	Climb		Return to airport, emergency landing	Smoke in cockpit, smoke in cabin	Lear 35A	Corporate
On takeoff, crew noted smoke and fumes in aircraft, aircraft pressurization was in emergency.						
Nov. 17, 2008	Takeoff	Burbank, California (BUR)	Aborted takeoff	Smoke in cockpit	CL600	Mesa Air Group
Flight crew aborted takeoff and returned to gate due to smoke in the cockpit.						
Nov. 15, 2008	Climb		Return to airport, emergency landing	Smoke in cockpit, smoke in cabin	Emb135KL	American Eagle Airlines
Crew reported smoke detected in cabin and cockpit 30 seconds after takeoff.						
Nov. 12, 2008	Climb		Unscheduled landing	Smoke in cockpit, smoke in cabin	MD-88	Delta Air Lines
Smoke in cabin and cockpit.						
Nov. 11, 2008	En route	Jacksonville, Florida (JAX)	Diversion, emergency landing	Smoke in cabin	717	AirTran Airways
Crew declared an emergency due to smoke in the cabin.						
Nov. 11, 2008	Takeoff	Winnipeg, Canada (YWG)	Aborted takeoff	Smoke in cabin	CRJ-200	SkyWest Airlines
Rejected takeoff due to fire alert in rear lavatory, with smoke. Two hours later, the same aircraft attempted takeoff again with the same warning.						

EICAS = engine indicating and crew alerting system

Source: FAA, SDR (Service Difficulty Reports) data compiled by Safety Operating Systems

this was a needed improvement, it was not all that needed to be done.

In February 2006, a McDonnell Douglas DC-8 freighter landed in Philadelphia with a cargo fire. The U.S. National Transportation Safety Board (NTSB) investigated the accident. In its report, the NTSB cited the need for improved “Smoke/Fire/Fumes” checklists and recommended widespread adoption of a new checklist developed by industry initiative, concurring with a recommendation made by the TSB.

Flight Safety Foundation led an industry group to develop an improved checklist used by flight crews facing an in-flight smoke/fire/fumes event. Boeing, Airbus, Embraer and Bombardier have agreed to begin using this improved checklist, an agreement that is a step forward in helping flight crews to successfully deal with in-flight fires.

The incorporation of the new checklist is one of 18 recommendations in SAFITA. SAFITA, like the TSB and NTSB reports, recommends specific improvements to reduce the likelihood and severity of a fire aboard an airplane. The U.S. Federal Aviation Administration (FAA) recently adopted another of the recommendations by requiring improved maintenance programs for aircraft wiring. This is a good step to reduce the source of ignition.

Have we done enough? Based on the recent experience of a flight crew that diverted to South Florida because of a smoke event, more needs to be done. This flight crew suddenly had dense smoke in the flight deck, followed by a windshield beginning to crack. The inner pane of the windshield shattered. Fortunately, the source of the smoke was located and electrical power removed. A successful unscheduled landing followed, just one of that day’s several smoke-caused diversions.

This Florida diversion reminds us of the needs pilots have for oxygen to breathe, to keep smoke out of their eyes and to see the flight instruments. Pilots must be able to fly the aircraft, accomplish the checklist, set up the approach procedure and successfully land the aircraft. Reinforcing the importance of protecting a pilot’s ability to perform, the International Federation of Air Line Pilots’ Associations (IFALPA) considers a pilot who cannot see his or her flight instruments to be incapacitated.

Improved flight crew training can make a significant difference in the outcome of a smoke/fire/fumes event. Many newer flight simulators use theater smoke to realistically simulate a smoke event. This more realistic simulation shows the challenges in communications between the crewmembers and with air traffic control, and the difficulty of programming flight management computers under such conditions. Improved training is one of the SAFITA recommendations.

While it is tempting to look back and believe that we have not had a serious fire event since 1998, investigation proves otherwise. In 2007, a widebody jet experienced a serious fire just after engine start. The crew only became aware of electrical anomalies following the second engine start. Maintenance technicians found evidence of a considerable fire in the electronics bay.

The FAA said in November 2005 in a notice of proposed rulemaking, “We have concluded we are unlikely ever to identify and eradicate all possible sources of ignition.”

Accepting that aircraft will continue to have smoke events, the industry must develop multiple layers of mitigation to reduce the hazard to an acceptable level. The NTSB, TSB and SAFITA

each recommend steps we can take to lower the risk. By reviewing and implementing these recommendations we can reduce the chance of a fire and the impact on the flight, and increase the probability of a successful outcome.

Aircraft are one of the worst places a fire can break out. In flight, a fire must be extinguished with the items on board; expert training and good equipment are essential. Operators should improve maintenance practices to inspect thermal acoustic blankets, which can provide fuel if a fire breaks out. Each of the multiple layers of mitigation is a step to risk reduction. It is time to implement the recommendations made by the NTSB, TSB and SAFITA.

Flight Safety Foundation is working with the Royal Aeronautical Society and others to enlighten the industry about this issue’s importance. By working together, successful cost-effective mitigations can and should be implemented. The Swissair Flight 111 tragedy happened more than 10 years ago — we must not let time dim the memory of the importance of that accident. We have analyzed accidents and incidents involving in-flight smoke/fire/fumes. It is now time to act and implement the recommendations. ➤

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(Editor’s note — This article and chart introduces a new feature in *AeroSafety World*, a quarterly chart that is intended to focus attention on a continuing risk factor: significant smoke, fire and fumes events in the U.S. This information is drawn from available U.S. sources. However, should information from other nations or regions become available we will endeavor to use it.)