Fewer Fatalities in Hull Loss Accidents

A higher percentage of accidents were nonfatal in 1997–2006 than in the commercial jet era before then.

BY RICK DARBY

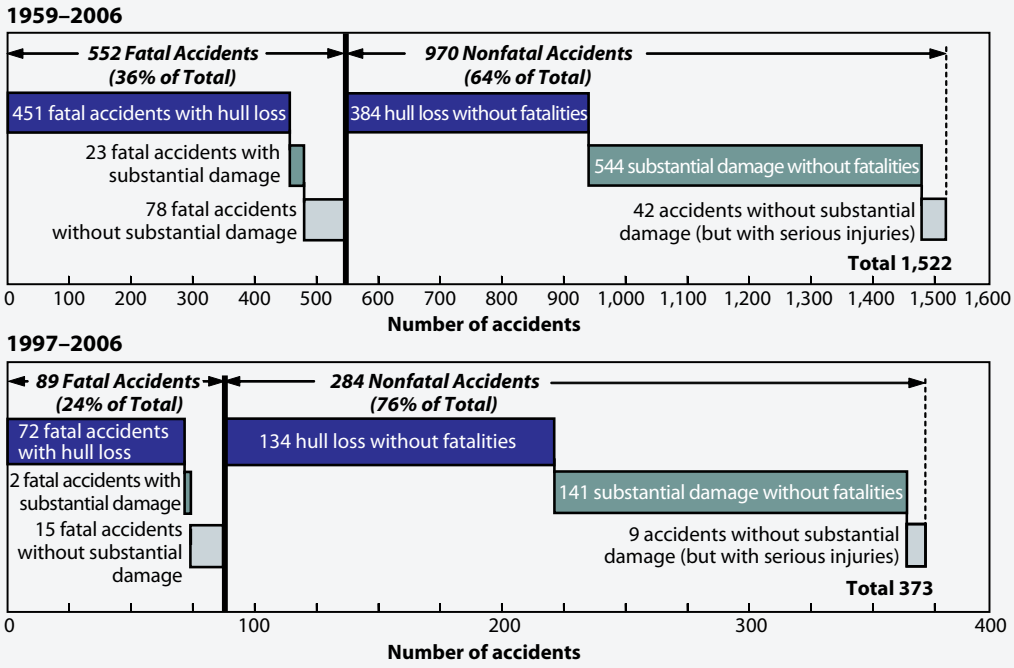
Worldwide commercial jet hull loss accidents less frequently resulted in fatalities in the past 10 years compared with earlier years, according to new data from Boeing.[1]

In the 10-year period through 2006, 134 of 206 hull loss accidents, or 65 percent, were nonfatal (Figure 1).[2] That compared with a nonfatal hull loss rate of 40 percent in 1959 through 1996.

From 1959 through 2006, or roughly the whole jet transport era, 384 of 835 hull losses, or 46 percent, were nonfatal.

Hull Loss Fatalities Down

Accidents by Injury and Damage, Worldwide Commercial Jet Fleet



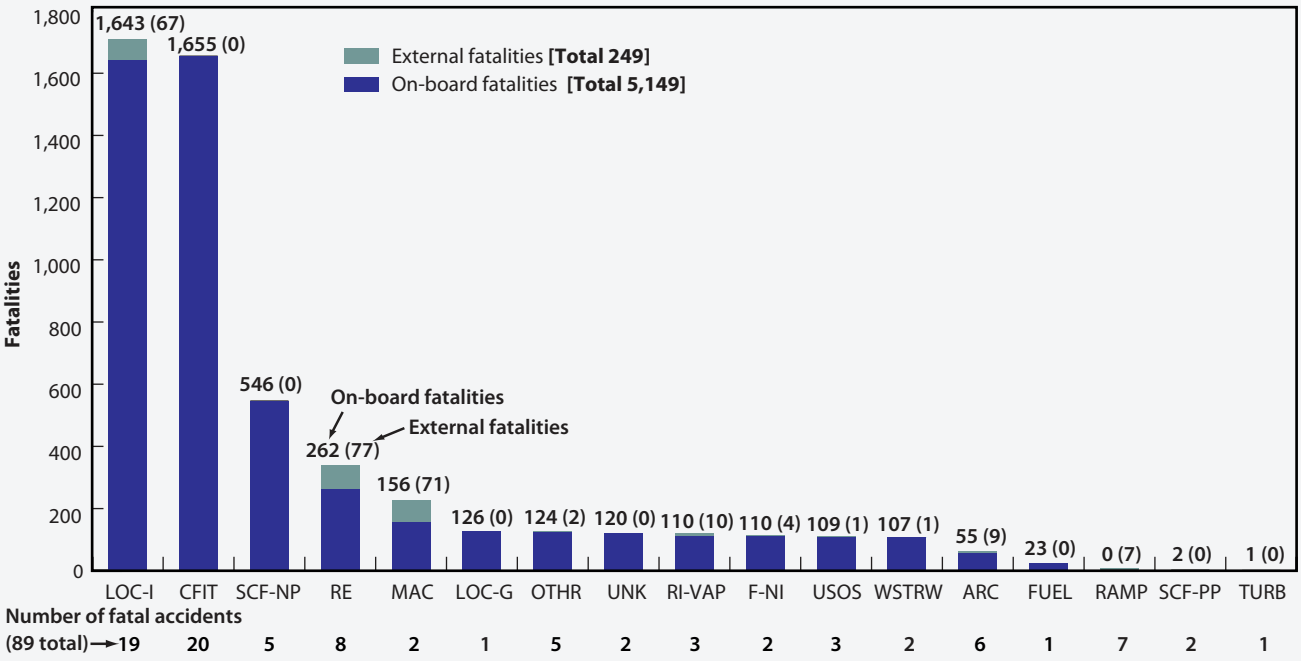
Note: Airplanes manufactured in the Commonwealth of Independent States or the Soviet Union are excluded because of lack of operational data. Commercial airplanes used in military service are also excluded.

Source: Boeing Commercial Airplanes

Figure 1

Loss of Control, CFIT Top Killers As Usual

Fatalities by CAST/ICAO Taxonomy Accident Category, Worldwide Commercial Jet Fleet, 1997–2006



CAST = Commercial Aviation Safety Team ICAO = International Civil Aviation Organization

ARC = abnormal runway contact; CFIT = controlled flight into or toward terrain; F-NI = fire/smoke (non-impact); FUEL = fuel related; LOC-G = loss of control (ground); LOC-I = loss of control (in flight); MAC = midair/near midair collision; OTHR = other; RAMP = ground handling; RE = runway excursion; RI-VAP = runway incursion (vehicle, aircraft or person); SCF-NP = system/component failure or malfunction (non-powerplant); SCF-PP = system/component failure or malfunction (powerplant); TURB = turbulence encounter; USOS = undershoot/overshoot; UNK = unknown or undetermined; WSTRW = wind shear or thunderstorm.
No accidents were noted in the following categories: AMAN = abrupt maneuver; ADRM = aerodrome; ATM = air traffic management/communications, navigation, surveillance; CABIN = cabin safety events; EVAC = evacuation; F-POST = fire/smoke (post-impact); GCOL = ground collision; ICE = icing; LALT = low altitude operations; RI-A = runway incursion (animal); SEC = security related.

Notes: Principal categories are as assigned by CAST. Airplanes manufactured in the Commonwealth of Independent States or the Soviet Union are excluded because of lack of operational data. Commercial airplanes used in military service are also excluded.

Source: Boeing Commercial Airplanes

Figure 2

The percentages of all accidents involving substantial damage to the airplane without fatalities was slightly higher in the recent period, 38 percent, compared with 35 percent in 1959 through 1996. For the 1959–2006 period, the equivalent figure was 36 percent.

Nonfatal accidents in the 1997–2006 period represented 76 percent of total accidents, compared with 64 percent in 1959 through 2006.

The trend lines for annual rates of fatal accidents and hull loss accidents continued in the low, narrow range they have maintained for some 20 years.

The U.S. Commercial Aviation Safety Team (CAST)/International Civil Aviation Organization (ICAO) Common Taxonomy Team has established standard categories and definitions for aviation accidents.[3] Among fatal accidents during the 1997–2006 period, the two most frequent categories cited were controlled flight into terrain, resulting in 1,655 on-board fatalities, and loss of control in flight, accounting for 1,643 on-board fatalities, each 32 percent of the total (Figure 2).

Table 1 shows that, of the 28 accidents in 2006 listed by Boeing, 19, or 68 percent, occurred

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The Accident Record, 2006

All Airplane Accidents, Worldwide Commercial Jet Fleet

Date	Airline	Model	Accident Location	Phase of Flight	Description	Hull Loss	Fatalities
Jan. 16	Continental Airlines	737-500	El Paso, TX, U.S.	Parked	Mechanic killed during troubleshooting		1
Feb. 7	UPS	DC-8	Philadelphia, PA, U.S.	Initial Approach	In-flight fire	X	
March 4	Air Macau	A321	Macau, China	Tow	Tow bar broke during pushback		
March 4	Lion Air	MD-82	Surabaya, Indonesia	Landing	Nose landing gear damaged	X	
March 18	Air Algérie	737-600	Seville, Spain	Landing	Right main landing gear collapse		
April 19	United Airlines	777-200	Shanghai, China	Descent	TCAS avoidance maneuver		
May 3	Armavia	A320	Sochi, Russia	Final Approach	Struck sea in bad weather	X	113
May 30	Shuttle America	EMB 170	Chantilly, VA, U.S.	Landing	Gear-up landing		
June 4	Arrow Cargo	DC-10	Managua, Nicaragua	Landing	Runway overrun	X	
June 7	TradeWinds Airlines	747-200SF	Medellin, Colombia	Takeoff	Runway overrun	X	
June 9	Asiana Airlines	A321	Seoul, Korea	Cruise	Severe thunderstorm		
June 15	TNT Airways	737-300SF	East Midlands, U.K.	Landing	Right main landing gear damage	X	
June 16	VARIG	MD-11-P	Brasilia, Brazil	Landing	Center main landing gear fracture		
June 23	AMC Airlines	MD-83	Juba, Sudan	Landing	Runway overrun	X	
July 9	S7 Airlines	A310	Irkutsk, Russia	Landing	Runway overrun	X	126
July 28	FedEx	MD-10-10F	Memphis, TN, U.S.	Landing	Left main landing gear collapse	X	
Aug. 27	China Eastern Airlines	A320	Beijing, China	Tow	Pushback collision		
Sept. 7	DHL Aviation	727-200F	Lagos, Nigeria	Landing	Runway overrun	X	
Sept. 9	KLM Royal Dutch Airlines	MD-11-P	Amsterdam, Netherlands	Landing	Foreign object damage		
Sept. 14	FedEx	MD-11-F	Subic Bay, Philippines	Landing	Tail strike		
Sept. 29	GOL Linhas Aereas	737-800	Peixote Azavedo, Brazil	Cruise	Collision at Flight Level 360	X	154
Oct. 3	Mandala Airlines	737-200	Tarakan, Indonesia	Landing	Runway overrun	X	
Oct. 10	Atlantic Airways	BAe 146	Stord, Norway	Landing	Runway overrun	X	4
Oct. 29	ADC Airlines	737-200	Abuja, Nigeria	Initial Climb	Crash shortly after takeoff	X	97
Nov. 10	AirTran Airways	717-200	Memphis, TN, U.S.	Taxi	Runway excursion		
Nov. 17	Cielos Airlines	DC-10	Barranquilla, Colombia	Landing	Nose landing gear collapse	X	
Nov. 18	Aerosucre Colombia	727-100F	Leticia, Colombia	Final Approach	Hit a communication tower	X	5
Dec. 24	Lion Air	737-400	Ujung Pandang, Indonesia	Landing	Runway excursion	X	
28 Total Accidents						**498 on-board. Two external.**	

TCAS = Traffic-alert and collision avoidance system

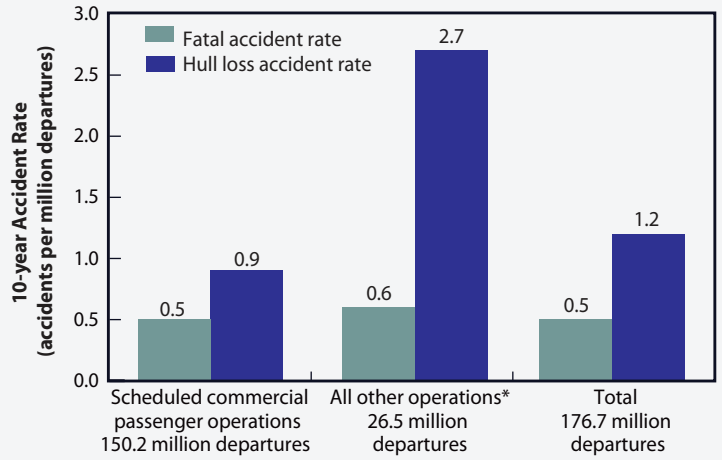
Note: Airplanes manufactured in the Commonwealth of Independent States or the Soviet Union and commercial airplanes used in military service are excluded.

Source: Boeing Commercial Airplanes

Table 1

Fatal Accident Rate Similar Across Operational Types

10-Year Accident Rates by Type of Operation, Fatal and Hull Loss Accidents, Worldwide Commercial Jet Fleet, 1997–2006



*Charter passenger, charter cargo, scheduled cargo, maintenance test, ferry, positioning, training and demonstration flights.

Note: Airplanes manufactured in the Commonwealth of Independent States or the Soviet Union are excluded because of lack of operational data. Commercial airplanes used in military service are also excluded.

Source: Boeing Commercial Airplanes

Figure 3

during the approach or landing phases. The year's seven fatal accidents included four approach-and-landing accidents.

The rate of fatal accidents involving scheduled commercial passenger operations was slightly lower than the rate for all other operations in the 1997–2006 period (Figure 3).[4] The hull loss accident rate was three times higher in all other operations than scheduled commercial passenger operations.

The methodology of Boeing's annual statistical summary, which is widely used by aviation safety professionals, has been updated for the 2006 summary. Differences in definitions between those of ICAO and the U.S. National Transportation Safety Board are pointed out. There is more emphasis on fatal accidents and less on hull loss accidents; the summary says that CAST uses fatal accidents as its metric, and that hull loss has become less useful as an indicator of accident severity.[5] An aging fleet and the high cost of repairs mean that more accidents are write-offs, the summary says.

"The Accidents by Primary Cause chart has been eliminated," the summary says. "Many investigating authorities do not assign a primary cause. Assigning a 'primary cause' can oversimplify the complexities of the aviation system and can therefore be misleading."

The comparison of accident rates by "generations" of airplane types has been dropped, on the grounds that many factors other than time elapsed since introduction of a type were significant.●

Notes

1. Boeing Commercial Airplanes. *Statistical Summary of Commercial Jet Airplane Accidents: Worldwide Operations, 1959–2006.* Available via the Internet at <www.boeing.com/news/techissues>.

2. An *accident* is defined as "an occurrence associated with the operation of an airplane that takes place between the time any person boards the airplane with the intention of flight and such time as all such persons have disembarked, in which: death or serious injury results from being in the airplane, or direct contact with the airplane or anything attached thereto, or direct exposure to jet blast; or the airplane sustains substantial damage; or the airplane is missing or completely inaccessible." Accidents involving test flights or hostile actions such as sabotage or terrorism are excluded.

   A *hull loss* is defined as an airplane totally destroyed, beyond economic repair, missing or completely inaccessible.

3. A complete description of the taxonomy can be found at <www.intlaviationstandards.org>.

4. A *fatality* is defined as any injury that results in death within 30 days of the accident.

5. Flight Safety Foundation has departed from the use of *hull loss* and *total loss* in defining the most severe type of aircraft accident, on the basis that these terms derived from manufacturer and insurer data are not the best criteria for aviation risk analysis. The Foundation now uses *major accident*, in which any of the following three conditions is met: The aircraft is destroyed; there are multiple fatalities; or there is at least one fatality, and the aircraft is substantially damaged.

   Jim Burin, FSF director of technical programs, said, "The use of the major accident classification criteria ensures that an accident is not determined by an aircraft's age or by its insurance coverage, and it gives a more accurate reflection of the high risk areas that need to be addressed" (*ASW*, 2/07, p. 21).