What is the problem?

We’ve investigated aviation accidents in which people have died or suffered serious injuries because they were not wearing seat belts or shoulder harnesses, or children were not secured in their own seat by a child safety restraint system.

According to the Federal Aviation Administration (FAA), proper shoulder belt use in small aircraft would reduce major injuries and fatalities if an accident or incident were to occur. In commercial aviation, the FAA still exempts the most vulnerable passengers—children under age 2—from having to be secured in their own seat, allowing them to travel unrestrained on an adult’s lap. Our investigations have shown that children under age 2 are at risk of serious injury and death when they are not restrained by a child safety system and in their own seat.

We have also seen deaths and injuries due to inadequate evacuation procedures and crashworthiness. In March 2015, Delta Air Lines flight 1086 departed the runway while landing at LaGuardia Airport in New York and contacted the airport perimeter fence, coming to rest with the airplane’s nose on an embankment next to Flushing Bay. The airplane was substantially damaged, including the interphone and public address system. As a result, flight attendants left their assigned emergency exit locations to communicate with passengers and the flight crew and could not immediately open their assigned exit. This significantly delayed evacuation.

On July 3, 2015, an Airbus Helicopters AS350 B3e helicopter crashed into a parking lot after lifting off from the Summit Medical Center Heliport in Frisco, Colorado, fatally injuring the pilot and seriously injuring two flight nurses. Contributing to the severity of the injuries was the helicopter’s fuel system, which was not crash resistant and facilitated a fuel-fed, postcrash fire.

On July 6, 2013, a Boeing 777-200ER, operating as Asiana Airlines flight 214, was on approach to runway 28L when it struck a seawall at San Francisco International Airport, San Francisco, California. Three of the 291 passengers died; 40 passengers, 8 of the 12 flight attendants, and 1 of the 4 flight crewmembers received serious injuries. When the main landing gear and the aft fuselage struck the seawall, the tail of the airplane broke off. The airplane slid along the runway, lifted partially into the air, spun about 330 degrees, and impacted the ground a final time. The impact forces resulted in the inflation of two slide/rafts within the cabin, injuring and temporarily trapping two flight attendants. Six occupants, two of whom were not wearing seat belts, were ejected from the airplane during the impact sequence.

Related reports:

AAR-17/01: Loss of Control at Takeoff Air Methods Corporation Airbus Helicopters AS350 B3e, N390LG; Frisco, Colorado; July 3, 2015; Accident ID CEN15MA290

AAR-16/02: Runway Excursion During Landing Delta Air Lines Flight 1086 Boeing MD-88, N909DL; New York, New York; March 5, 2015; Accident ID DCA15FA085

AAR-14/01: Descent Below Visual Glidepath and Impact With Seawall, Asiana Airlines Flight 214; July 6, 2013; San Francisco, California; Accident ID DCA13MA120

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Continued on next page
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What can be done?

Seat belts and restraints reduce the risk of injury and death to pilots and passengers in the event of an accident. To minimize deaths and injuries, we must increase the use of existing restraint systems.

Additionally, even when occupants use appropriate restraints, deaths and injuries may still occur because of inadequate evacuation procedures or crashworthiness, such as fuel tanks that fail to meet current crashworthiness standards. In many cases, otherwise survivable crashes turn fatal because a postcrash fuel-tank explosion causes a catastrophic fire.

To improve occupant protection in aviation, the following actions should be taken:

**Aircraft Owners and Operators**

- Install shoulder harness systems in all general aviation aircraft.
- Properly train commercial flight and cabin crews in procedures to conduct timely and professional evacuations when conditions warrant. Consider joint evacuation exercises for flight and cabin crews to resolve these issues.
- The Association of Critical Care Transport, Association of Air Medical Services, and the Air Medical Operators Association should establish a working group and provide guidance regarding equipment and systems that would enhance helicopter crashworthiness, including, at a minimum, a crash-resistant fuel system and energy absorbing seats.

**Regulators**

- Require all general aviation airplanes that are not currently equipped with shoulder harnesses to be retrofitted in accordance with Advisory Circular 21-34, issued June 4, 1993.
- Remove the exemption that allows for children to be lap-held on commercial aviation flights. Children are safest when they are properly secured in a child safety seat, in their own seat, when flying.
- Prioritize approval of a retrofit kit to incorporate a crash-resistant fuel system into AS350 B3e and similarly designed variants to accelerate its availability to operators.

**Pilots**

- General aviation pilots should use shoulder restraints whenever possible (and ensure their passengers—including small children—do, too). Three-point shoulder harnesses can be very effective in minimizing injury.

**Flying Public**

- Wear a seat belt at all times during a flight.
- If you’re flying with children, use an FAA-approved child car seat or safety restraint system. All children, including those under age 2, should be properly restrained in their own seat. Holding an infant in a lap during flight is not a sufficient safety measure.