

Fatal Belly-Landing

Posted at: 01/01/2025

Fatal Belly-Landing: Lessons from Jeju Air 7C2216

Context:

A devastating aviation accident occurred recently when Jeju Air Flight 7C2216 attempted a **belly-landing** at **Muan International Airport**, South Korea. The aircraft **overran the runway**, smashed into the **perimeter fence**, and **burst into flames**, resulting in the loss of **179 lives**. This tragic event highlights the risks and complexities associated with **belly-landings** and aviation safety.

Understanding Belly-Landing

A **belly-landing**, also referred to as a **gear-up landing**, occurs when an aircraft lands without fully extending its landing gear, relying on its underside (or belly) to touch down.

Conditions Leading to Belly-Landings

1. Landing Gear Failure:

- Mechanical issues prevent the landing gear from deploying.

2. Emergency Landing in a Field:

- A stricken aircraft may land in a field if it cannot reach an airport.

3. Safety Considerations by the Pilot:

- Pilots may choose to skid the aircraft to a stop on its belly rather than land on wheels if they determine it to be safer.

4. Ditching (Water Landing):

- Emergency landings on water, such as in rivers or oceans, often involve belly-landing.

5. Pilot Error:

- In some cases, pilots forget to deploy the landing gear, leading to a belly-landing.

Safety Precautions During Belly-Landings

1. Emergency Services Preparedness:

- **Fire trucks and rescue teams** must be on standby to respond quickly in case of fire or evacuation needs.

2. Foaming the Runway:

- Historically, chemical foaming of the runway was practiced to suppress sparks and fires. However, this is no longer standard practice due to advances in aircraft fire suppression systems.
-

Damages to Aircraft in Belly-Landings

1. Structural Damage:

- Even successful belly-landings result in significant damage to the aircraft's **fuselage, engines, and wings**.

2. Wing Vulnerability:

- Wings are close to the ground during a belly-landing, making them susceptible to damage.
- A **slight left or right bank** during landing, caused by wind or pilot error, can cause a wing to hit the ground. This could lead to:
 - The aircraft flipping over.
 - Cartwheeling or breaking apart.

3. Fire Risk:

- Friction from the aircraft skidding along the runway may generate **sparks**, potentially causing a fire.
-

Key Terminologies in Aviation and Belly-Landings

1. Landing Long and Fast:

- When an aircraft touches down **beyond the designated touchdown zone** on the runway at speeds exceeding safe limits, leaving insufficient runway length for stopping.

2. Slats:

- High-lift devices located on the **leading edge of the wing** that increase lift during **low-speed operations** like takeoff and landing.

3. Flaps:

- Devices on the **trailing edge of the wing** that enhance lift by altering the wing's camber and surface area.

4. Stall:

- A condition where the aircraft **loses lift** and starts descending rapidly, often compared to "dropping like a stone."

Factors Contributing to the Jeju Air Incident

The **Jeju Air 7C2216 accident** underscores multiple critical elements of belly-landings and runway safety:

- **Landing Beyond the Zone:** Likely landing "long and fast," leaving insufficient runway for safe deceleration.
- **Skidding Risks:** Friction from skidding caused sparks that ignited the aircraft.
- **Wing Damage:** Possible wing contact with the ground, destabilizing the aircraft and worsening the impact.

Conclusion:

The Jeju Air tragedy is a stark reminder of the inherent risks in aviation, especially during emergency maneuvers like **belly-landings**. While such landings are sometimes necessary to save lives, they demand **meticulous preparation, pilot expertise, and immediate emergency response**. Learning from such incidents is essential to improving aviation safety protocols and preventing future accidents.

