AIRCRAFT ACCIDENT INVESTIGATION

2015. 6.

AVIATION AND RAILWAY ACCIDENT INVESTIGATION BOARD

CONTENTS

1. Synopsis

- Operator: Asiana Airlines
- Type: A321-200
- Registration Mark: HL7730
- Manufacturer: Airbus
- Date & Time: 16 April 2013, 17:37 (Local)
- Location: Incheon International Airport

2. Factual Information (History of Flight)

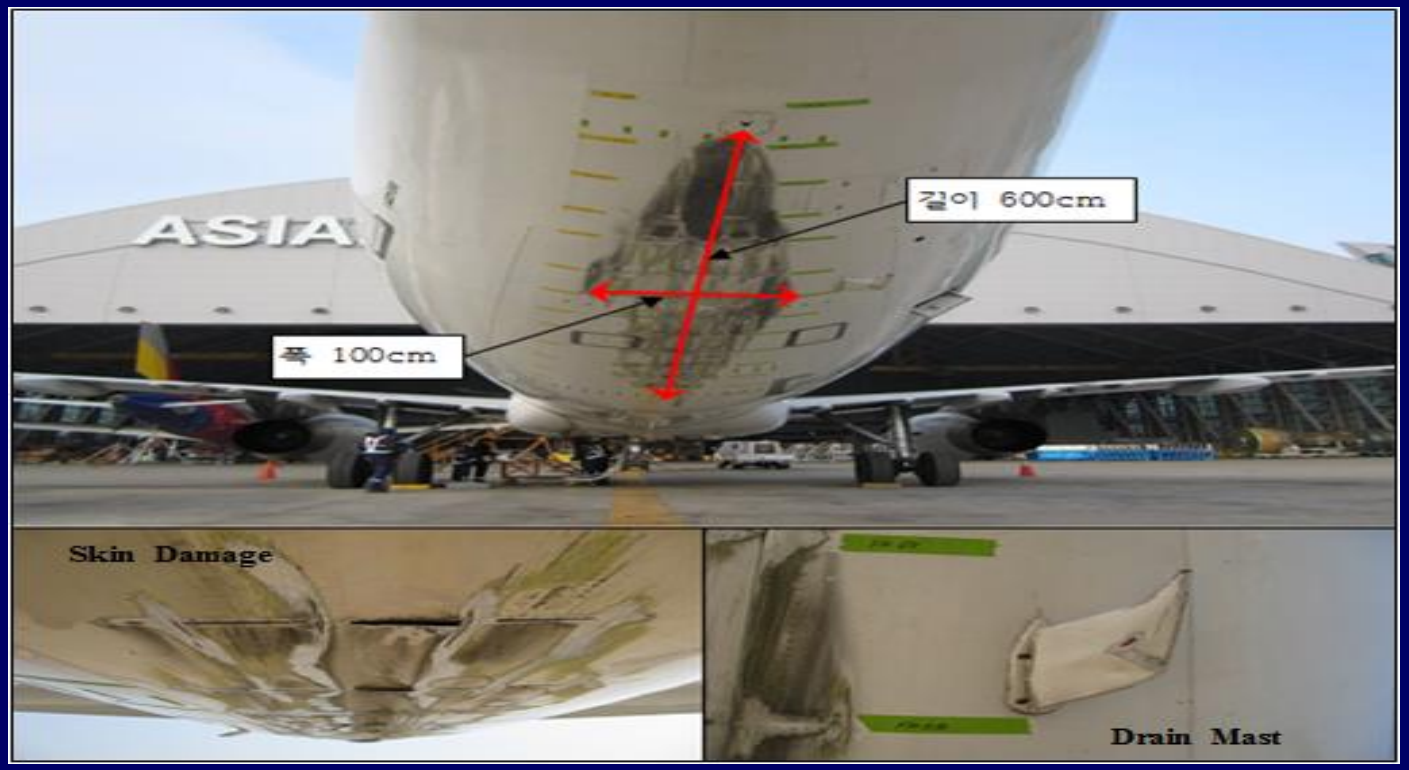
- Asiana Airlines flight 340 took off from Harbin International Airport, China for Incheon International Airport (ICN), ROK
- ❖ Before decent for ICN
- ❖ Duty change: CAP PM, FO PF
- After 15,000 ft, CAP said to FO, “manually fly the airplane"
- ❖ After intercept localizer ILS RWY 16, CAP was informed by the tower that base ceiling was 200 ft
- ❖ Duty change: CAP PF, FO PM
- ❖ CAP disconnected A/T at 1,209 ft AGL

2. Factual Information (History of Flight)

- CAP and FO saw RWY at 200 ft
- A/C speed was 137.6kt at 100 ft, 131.4kt at 59 ft AGL, and 129kt at 29 ft AGL (flare point)
- After touchdown, A/C bounced, then touched down again about 491.3 m from RWY 16 threshold
- At this time, A/C was at 136.9kt at a pitch angle of 10.9°with vertical gravity of 1.7 g
- A/C completed landing roll and taxied to ramp for itself

2. Factual Information (Damage to Aircraft)

- Exterior Fuselage
  - ❖ Rear fuselage damage 100 cm wide and 600 cm long

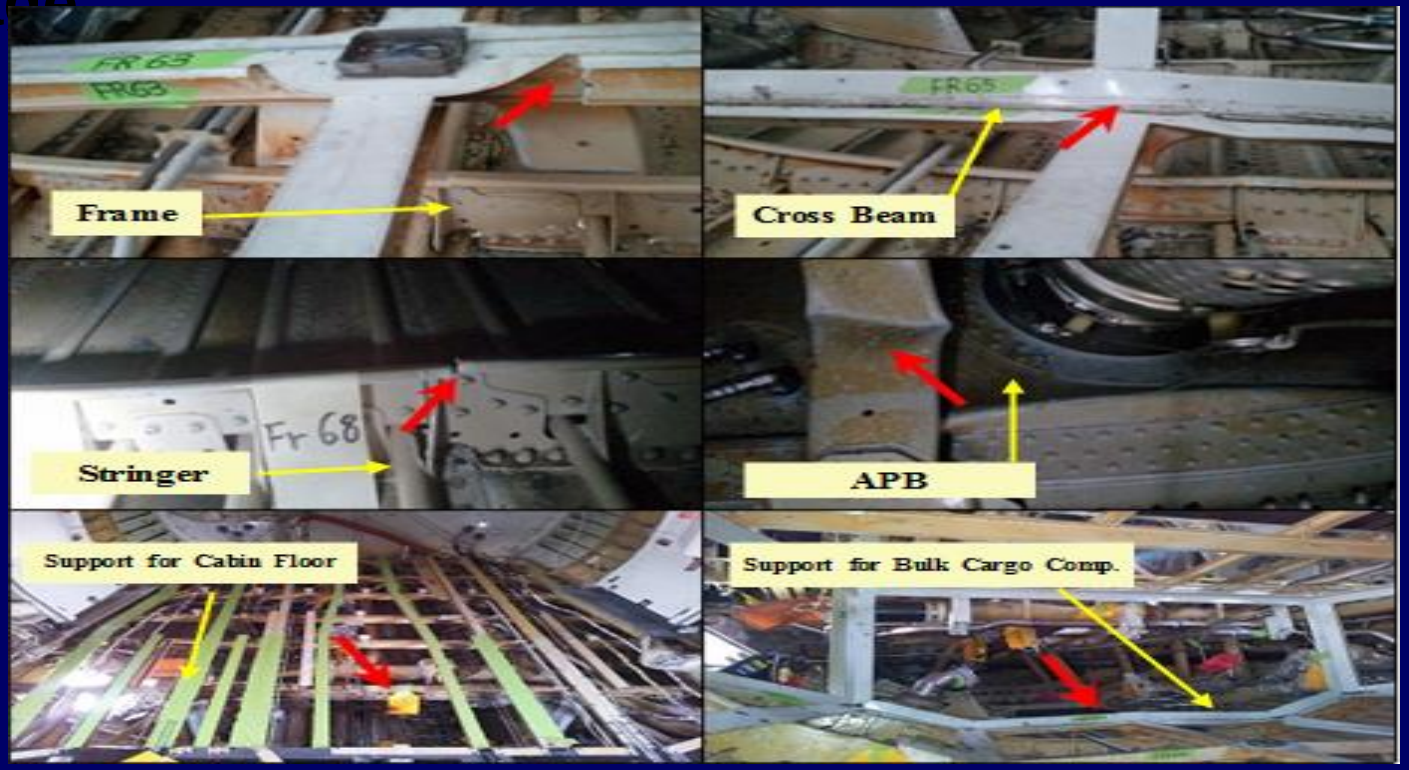


2. Factual Information (Damage to Aircraft)

- Interior Fuselage

❖ Frames damage (major structure of the fuselage)

Fuselage



2. Factual Information (Damage to Aircraft)

- Repair of the Aircraft Damage
  - ❖ Length: 3 months
  - ❖ Cost of repairs: 3.7 billion won ($ 3.37 million)

Fuselage

2. Factual Information (Personnel Information)

- CAP
  - 7,530 total flight hr, and 722 hr as PIC
  - Promoted to CAP on A321 in Mar. 2012

- FO
  - 383 total flight hr, and 33 hr and 31 min as A321 FO
  - Completed A321 FO training 2 weeks ago

2. Factual Information (Tail Skid Mark)

2. Factual Information (Training)

- Bounce Recovery Procedures in FCTM

BOUNCING AT TOUCHDOWN

In case of a light bounce, maintain the pitch attitude and complete the landing, while keeping thrust at idle.

Do not allow the pitch attitude to increase, particularly following a firm touchdown with a high pitch rate.

In case of a high bounce, maintain the pitch attitude and initiate a go-around.
Do not try to avoid a second touchdown during the go-around. Should it happen, it would be soft enough to prevent damage to the aircraft, if pitch attitude is maintained.

2. Factual Information (Stabilized App. Criteria

- **Asiana Airlines Flight Operations Manual (FOM)**

❖ Stabilized approach criteria is pilots should maintain max target speed of + 10kt and min target speed of - 5kt until A/C passes above the RWY landing threshold

❖ All approaches should be stabilized by 1,000 ft above field elevation (AFE) regardless of meteorological conditions (IMC/VMC)

❖ If a stabilized approach is not established above or below 1,000 ft AFE, immediate go-around should be done

2. Factual Information (Tail Strike)

- According to A321 FCOM, if pitch attitude during landing is more than 9.7°, with main gear position fully compressed (by the weight of the fuselage), a tail strike will occur

3. Analysis

- Un stabilized Approach
  - ❖ During approach and landing after RWY in sight, CAP failed to control A/C speed (target speed 138kt)
  - ❖ Crossing at about 60ft, A/C speed slowed down
  - ❖ At 29ft, A/C speed was 129kt (138kt – 9kt)
  - ❖ CAP increased thrust and started landing flare
  - ❖ After A/C bounced at initial touchdown, CAP increased pitch and decreased thrust, then A/C made a second touchdown

3. Analysis

- Inadequate Actions of CAP
  - ❖ Failed to control A/C speed due to A/T disconnection during approach
  - ❖ Failed to make an immediate go-around at 29 ft
  - ❖ Failed to maintain pitch and keep thrust at idle after bouncing
  - ❖ Increased pitch to 10.9°(more than 9,7°→ tail strike)
- Inadequate Actions of FO
  - ❖ Failed to call out speed during landing
  - ❖ Failed to call out pitch after bouncing

4. Conclusions

- Findings

❖ During landing, right cross wind at 10kt with no wind shear, and base ceiling 200ft

❖ When A/C made an initial touchdown and bounced, thrust was not kept at idle, then when it made a second touchdown with pitch attitude exceeding A321 airplanes' limitation, it sustained a tail strike.

4. Conclusions

- Causes

❖ A/C bounced due to PF's failure to maintain proper approach speed until flare just before touchdown, and due to increased thrust and speed just before touchdown

❖ A/C made a second touchdown at the pitch attitude exceeding an A321 airplane's limitation and sustained a tail strike due to PF's failure to keep thrust at idle and proper pitch attitude during the bounce

4. Conclusions

Contributing Factors

- Inadequate training program on recovery from bounce
- PM's inadequate advice on PF's A/C speed control
- PF's disconnection of A/T and failure to manually control thrust and speed
- PF's failure to execute a go-around when stabilized approach criteria are not met

5. Safety Recommendations

- To Asiana Airlines

❖ Reemphasize, through your pilot training program, that if a stabilized approach is not established, executing go-around is the safest choice for safe operation so that flight crew can be fully aware of it

❖ Train your pilots in a simulator to ensure that they can operate A/C in a stable manner after bouncing on touchdown, and add this training to your ground training program

❖ Reinforce, through your training program, flight crew adherence to POM's approach briefing and standard callout procedures on every flight`

5. Safety Recommendations

- To the Ministry of Land, Infrastructure and Transport

❖ Review measures to ensure that all pilots of Korean airlines can be given simulator training as part of ground training programs to attain proficiency that enables them to operate A/C in a stable manner after bouncing during landing

Thank you!