

Workshop per le Società di Handling

L'Occurrence Reporting per gli Handler

Roma, 23/24 novembre 2016

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FUNZIONE SAFETY



Ground Handling Damage



Ground Damage

Fratelli Wright: il 1° volo lo fece Orville perché Wilbur riparò il ground damage alla tela dell'ala del Flyer ⇒ il 1° ground damage fu causato a terra prima del 1° volo a propulsione



- Il problema del danno in apron risale agli inizi dell'aviazione (*hangar rash*) ⇒ riparazione di danni minori
- con espansione TPP e con i a/m più grandi e più complessi, i costi del *hangar rash* diventarono sempre più significativi fino alle cifre di oggi (10miliardi \$/anno)

***Ground Services** executes a/c turn-around*

- **Baggage Services**
- **Push-back & Towing**
- **Cleaning**
- **Catering & o/b supply**
- **Aircraft Refuelling**
- **Water & Toilet Services**
- De-icing, cooling/heating
- Ground power supply
- External ramp equipment
-

- ❖ compiti molto diversi
- ❖ operazioni in **simultanea**
- ❖ tempo di transiti ridotti
- ❖ gestione operativa complessa
- ❖ incertezza *[in caso di guasto ad attrezzature, si deve operare una scelta (anche economica) a seconda dell'importanza dell'operazione interrotta]*

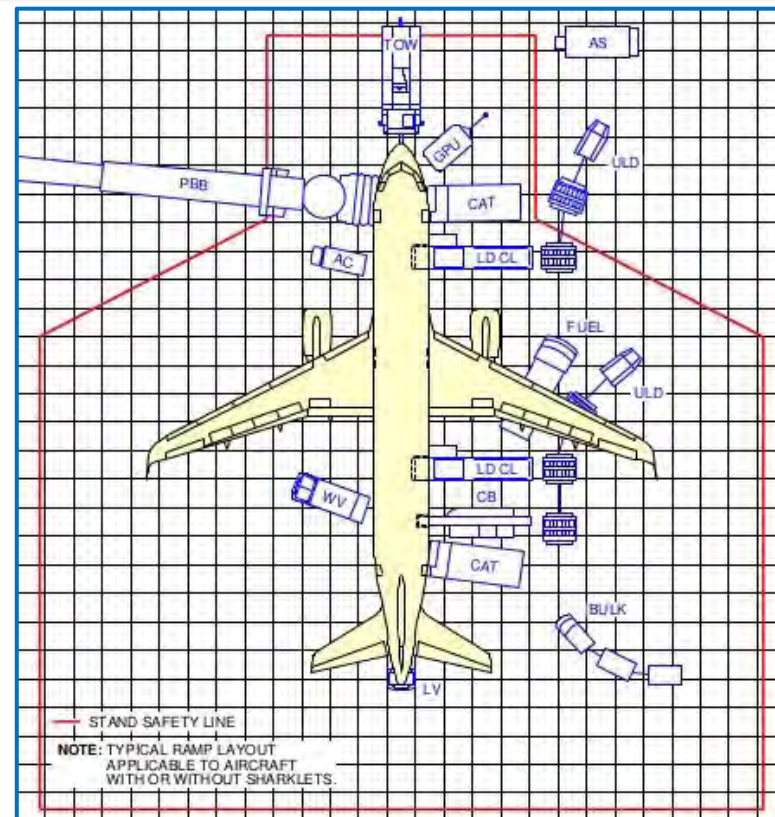
Ramp Operations Lay-out



altissima densità di attrezzature

task in simultanea

tempi ridotti





attrezzature

Tow-bars



Push-back tractors



Tractors



Dollies



Forklifts



GPU





Transporteurs



attrezzature

Steps



Loader



Uomo



Ground Operations

Ground Operations = tutti gli aspetti di *aircraft handling* in aeroporto + movimento aa/mm (escluso piste attive)

Ancora pochi dati sulle occorrenze di GH. Si stima che ~ 10% ha coinvolto l'handling

Ricorrenze più numerose:

Ground Damage = collisioni tra veicoli e ground servicing equipment e danni vari di natura causa sconosciuta scoperti all'arrivo in Italia

Loading Error = carichi nel cargo principalmente non fissati e distribuzione errata del carico a causa di un piano di carico errato o di a/m non caricato secondo un piano di carico corretto.

De-icing, Fuelling, Marshalling and Catering: una buona parte di questi eventi sono tipicamente “ground damage”.

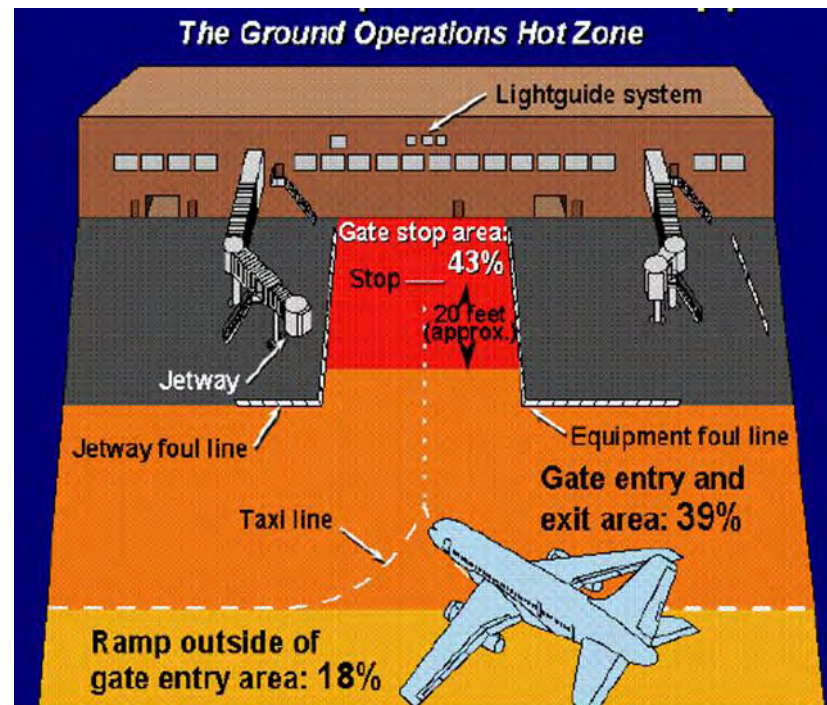
Ground Damage & Human Error

- **Errore Umano** è prevalente in maniera trasversale in tutti i campi dell' aviazione
 - collezione e interpretazione dei *ground damage data*
 - implementazione ed utilizzo sistema di reporting non punitivo
 - consapevolezza e riduzione della fatica
 - miglioramento della safety in apron
- Sbagliando s' impara. Si dice che commettere errori sia il rovescio della medaglia dell' avere un cervello.
- Errore Umano è "abbastanza" **normale**.
- Ma "normale" non significa scartarlo etichettandoli come «problema ingestibile» ma anzi identificarlo, determinarne le cause, progettare soluzioni e risolvere il problema identificato.



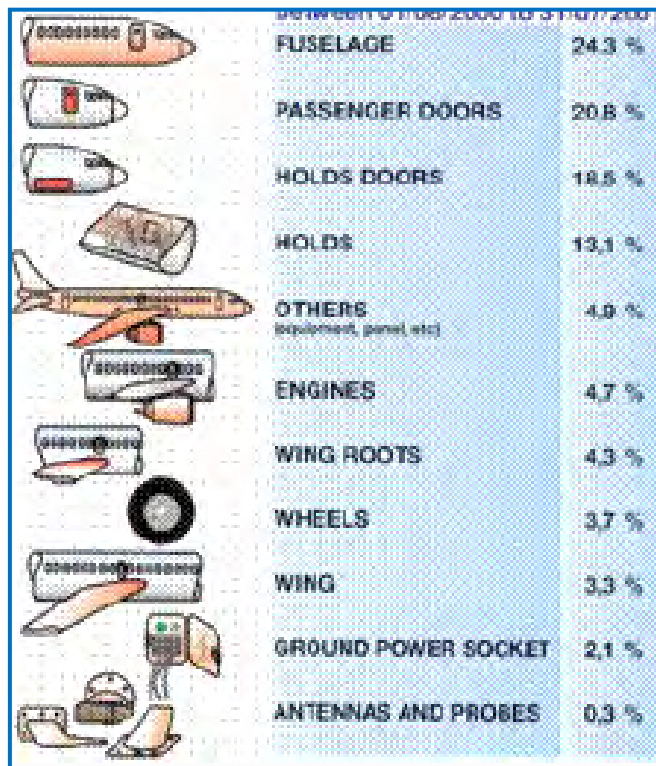
problemi di GH Safety

- maggiore vulnerabilità: cargo e pax doors
- GH safety è responsabilità condivisa tra handler e gestori
- la maggior parte dei processi non sono regolati dalla norma



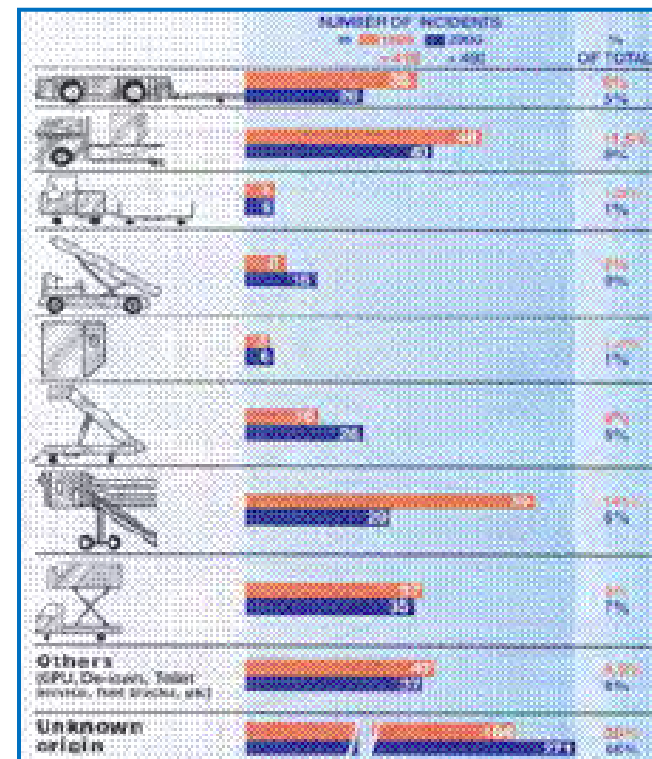


localizzazione



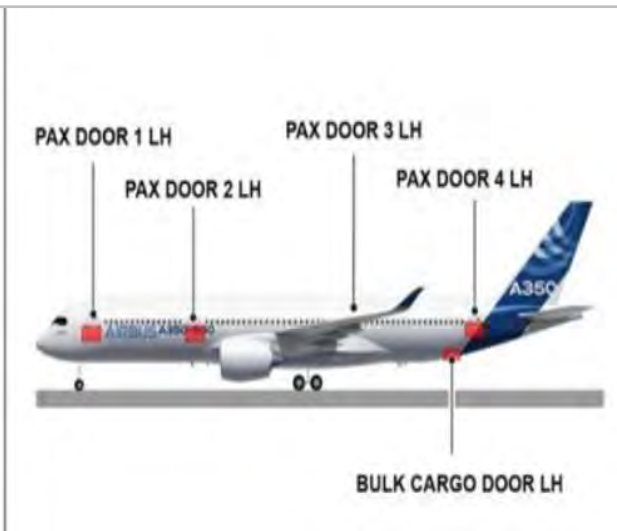
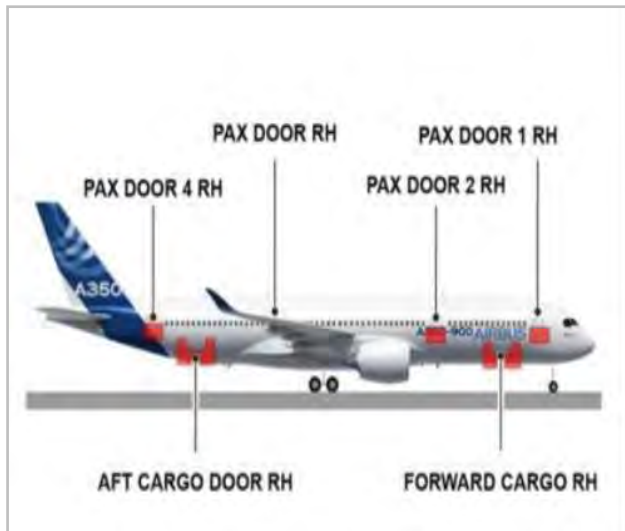
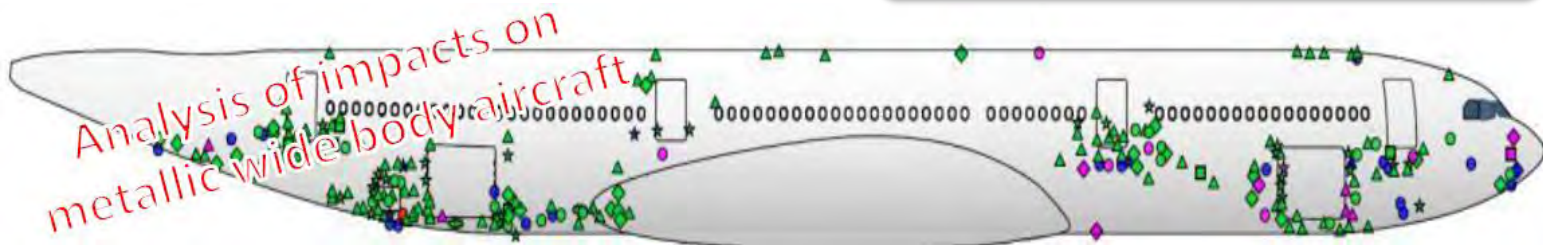
danni all'a/m

causa



danni all'a/m

Analysis of impacts on metallic wide-body aircraft

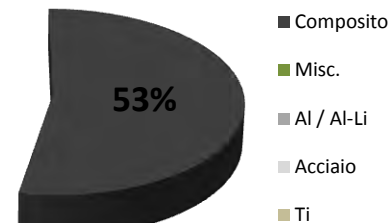
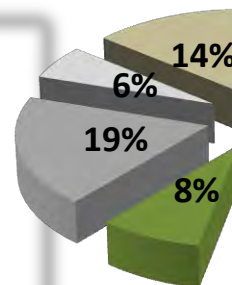


Composite Material

Con la fusoliera in CFRP l'area di lavoro dei Ground Handler è cambiata!

CFRP

- Wings
- Centre wing box and keel beam
- Tail cone (Section 19)
- Skin panels
- Frames, stringers and doublers
- Doors (Passenger & Cargo)



CFRP = Carbon Fiber Reinforced Plastic



Composite Material

Le strutture in composito sono robuste ma non indistruttibili o impermeabili ai danni



Che ispezioni tecniche si fanno?

787 AMM Chapter 5 Conditional Inspection

“Ground Handling Equipment Hits Airplane - Inspection”

(ossia punto per punto l’ispezione da fare a seguito di urto con ground handling equipment + elenco dei tipi di danni da cercare)



High Energy Impact Events

A high energy impact is when the type, force, or cause is significant with or without the result of damage you can visually see

Composite Material

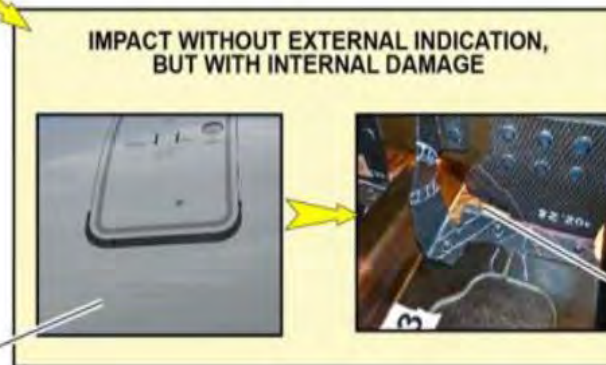
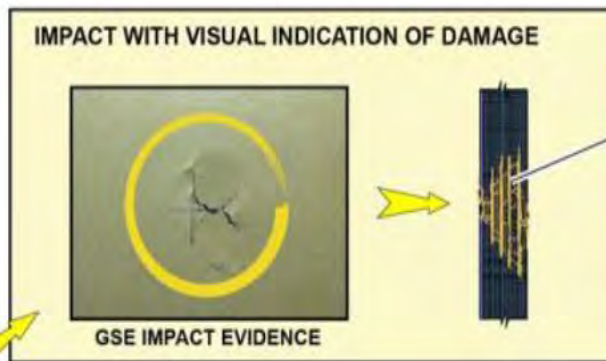
*Differenza dai contatti con a/m
“classici”?*

- ✓ **Finger** che colpisce la fusoliera ad una velocità/angolo > del normale
- ✓ **Ground Support Equipment** che colpisce la struttura a più di 3 Km/h o arriva a “scuotere” l’a/m
- ✓ Impatto da **oggetto contundente** a bassa velocità ma alta energia

Composite Material

GROUNDHANDLER: ACT AS TRIGGER

REPORT THE EVENT !





Composite Material

NORMAL OPERATIONS

- GSE impact a/c in «docking area»
and
- contact is done over full bumper length
and
- no a/c structure deformation observed

NOTHING TO REPORT

Devono **riportare immediatamente** le «abnormal operations» anche in caso di danno non visibile.

A350XWB

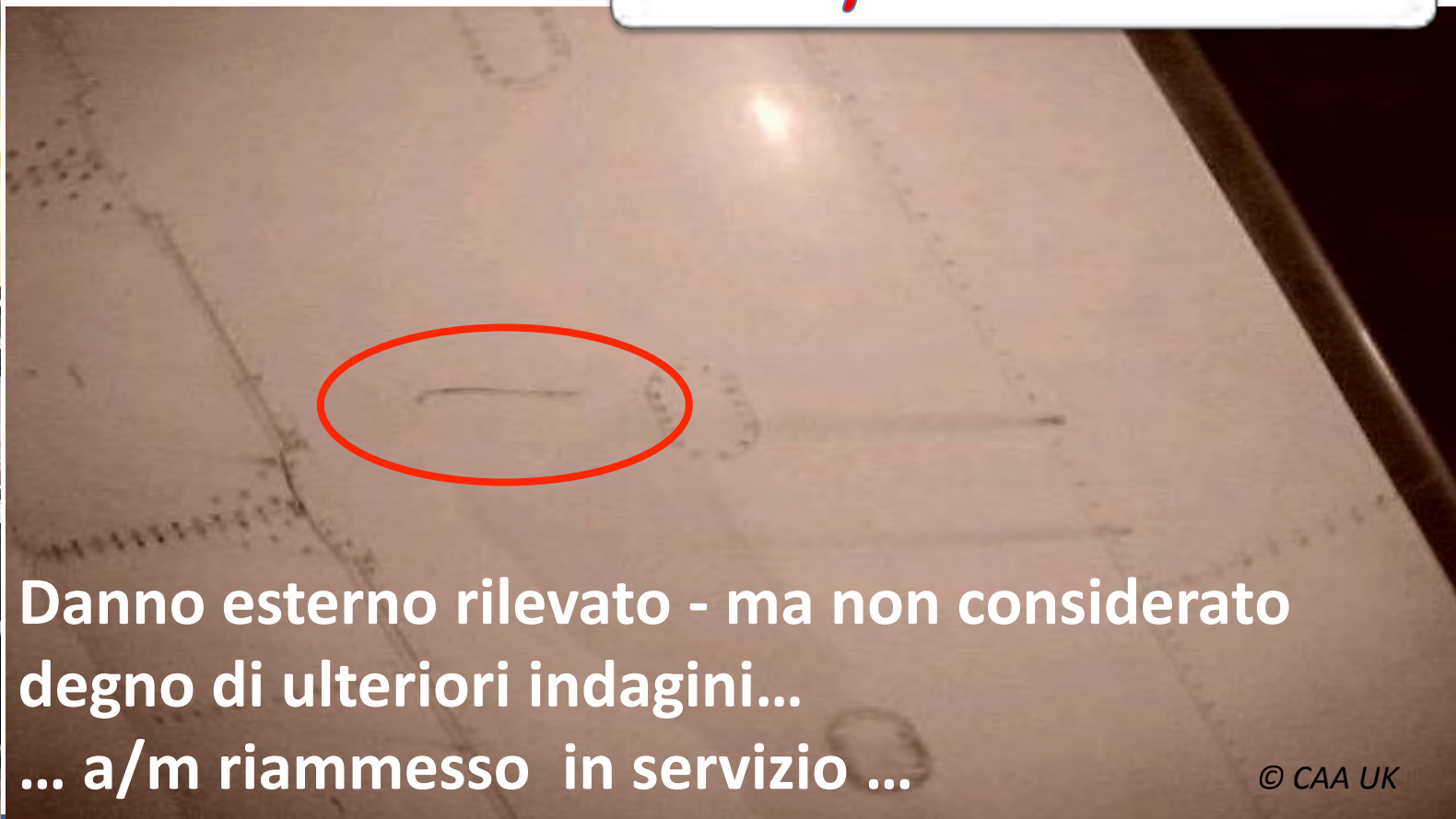
Tutti i ground handler devono essere **consapevoli** del rischio di danneggiamento della struttura dell'a/m.

ABNORMAL OPERATIONS

- GSE impact a/c outside the «docking area»
or
- Violent and sudden impact on a/c
or
- a/c structure deformation observed

GROUND HANDLER TO REPORT

Composite Material



**Danno esterno rilevato - ma non considerato degno di ulteriori indagini...
... a/m riammesso in servizio ...**

© CAA UK

Composite Material



Danno interno riscontrato durante il successivo controllo manutentivo di base

© CAA UK

Composite Material

Understand the aircraft you're handling

▶ Awareness

Follow the best standard procedures

▶ Best practices

Use correct Ground Support Equipment

▶ Enhanced standards

Report when something went wrong

▶ Report & Just culture

1986

B727 – Compressed Air instead of Nitrogen

The center landing gear tire had been filled with compressed air, instead of nitrogen. In addition, the tire had some marks of overheating caused by a malfunctioning brake on the landing gear.

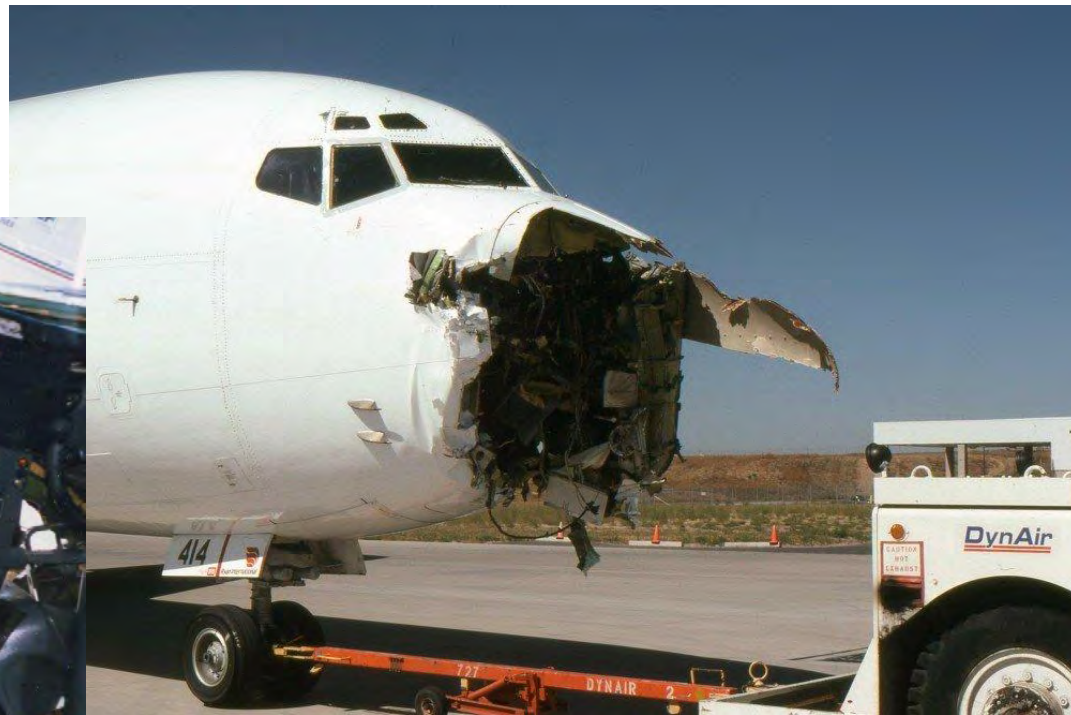
The cause of the in-flight fire is believed to be the rupture of fuel lines by the overheated exploding tire filled with compressed air. All persons on board dead. Maintenance personnel were blamed for negligence in maintaining the 727 and for filling the tire with regular compressed air, instead of nitrogen.



01 OCT 1997

B727 – collision with a bus

A Boeing 727 is damaged beyond repair after colliding with a bus.




12 NOV 2016

A380 collided with tow truck



 @航空事
weibo.com/606787403



 @航空事
weibo.com/606787403

Collision with tow truck



28 AUG 2016

A330 – towing accident

An Airbus A330-323 sustained substantial damage to the horizontal stabilizers in a towing accident.

The LH horizontal stabilizer apparently hit a hangar door causing a distortion of the tail section and damage to the left-hand horizontal stabilizer's leading edge.



12 MAR 2016

B747 – collision with tow truck

Two ground workers have been hospitalised after Boeing B747-400 crashed into a tow truck.

In addition to the injuries suffered by the tug operators, two engines on the B747 were extensively damaged.

The accident happened when a pin connecting the plane to the truck dislodged and the two vehicles crashed into each other on the tarmac.



8 SEPT 2016

A330 – collision with service vehicle

The Airbus A330 was heading slowly for the runway when the van drove under the plane and straight into one of its engines. The crash caused the van to list and resulted in damage to the plane's left engine.

The driver was trapped in the van and was freed by firefighters. He was taken to hospital with not serious injuries. Pax disembarked.



17 FEB 2014

A321 - FA fell out of a/c upon impact by catering vehicle

An Airbus A321-200 was preparing for departure at the gate when a catering ground vehicle impacted the aircraft causing a flight attendant to fall out of the a/c through the open door. The F/A received injuries upon hitting the apron and was taken to a hospital.

The catering truck collided with the a/c just underneath the aft RH pax door causing damage to the aft fuselage, as result of the impact the a/c rotated causing the nose of the a/c to move about 5mt to the RH. This created a gap between the jetway connected to the LH forward pax door, a F/A just boarding the a/c for the next sector fell from the LH forward door and received serious injuries. The door and jetway also collided as result of the impact by the truck resulting in damage to the LH door.



A Dash 8-400, with 75 people o/b, completed a seemingly uneventful preflight preparation, departed at about 18:30L and landed about 3 hrs after departure.

The airline in the meantime had ordered a fleet wide inspection of all their aircraft for possible damage caused by a catering vehicle at departure airport. The inspection revealed damage to an outboard flap track canoe fairing.

At about 18:00L a catering truck reported back at the catering hangar, the upper beacon however was found dislodged and damaged. The airline was notified, who identified the last two aircraft serviced by the truck. The operator then called for a fleetwide inspection of all aircraft, which resulted in the identification of the one having been hit by the catering truck.





collision with airport bus



collision with fuel tanker

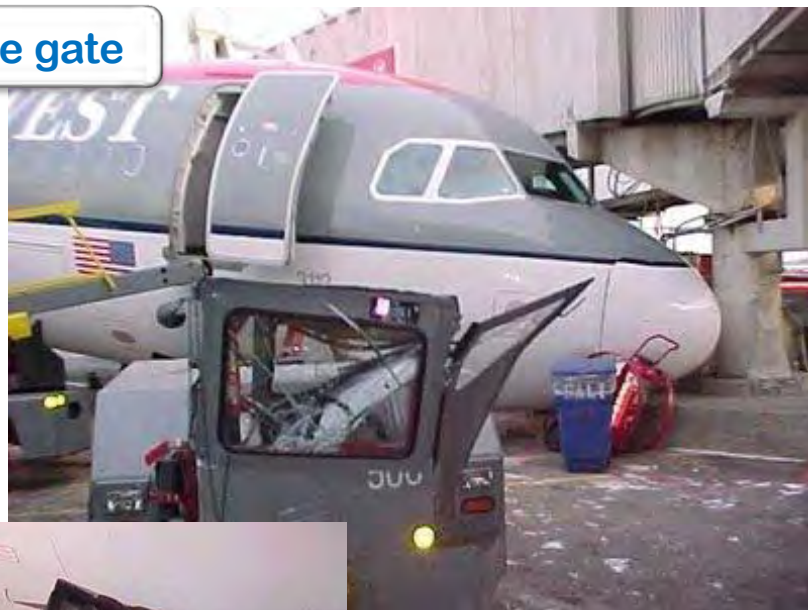


collision between aa/cc

19 JAN 2013

A319 – collision with vehicle at the gate

Mechanics failed to maintain control (to stop at gate) and impacted jetbridge. NLG collapse. Damaged beyond repair.



16 OCT 2016

A380 – water tank truck hits aircraft

A water servicing vehicle struck an Airbus A380 causing some damage in the underbelly of its fuselage. The incident happened in daylight. No pax or staff o/b. No injuries, including the driver of the vehicle.



16 OCT 2016

Dash 8 – RH ENG Prop collision with GPU



09 AUG 2012

B777 – A340 ground collision

Boeing 777-200 involved in a "ground collision" with an Airbus A340-600

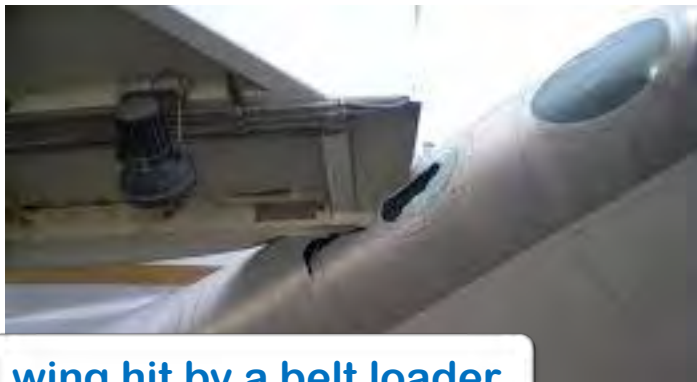


collision with truck



ground collision during taxiing





wing hit by a belt loader



collision with tow truck



Towing



27 SEP 2016

A310 & A340 – collision during push-back

A Boeing 727 is damaged beyond repair after colliding with a bus.



02 FEB 2008

F27 – strike with GPU

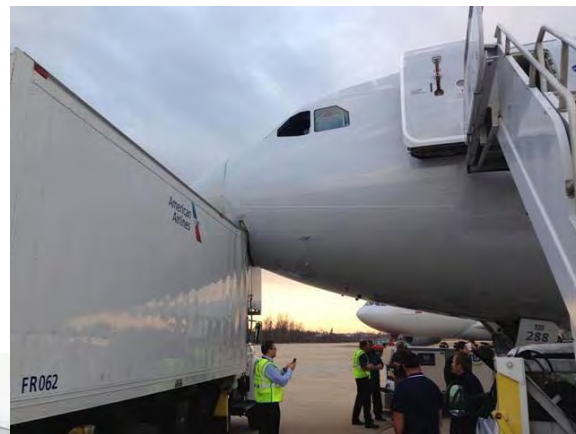
Wx-conditions wintry with snowfall, which required the a/c to be de-iced. Shortly after both engines had been started, the Cpt signalled to the marshaller to remove the GPU. As the marshaller went to assist his colleague to remove the GPU to a safe distance prior to the aircraft taxiing off the stand, the aircraft started to move forward slowly, forcing them to run to safety. The flight crew, who were looking into the cockpit, were unaware that the aircraft was moving. It continued to move forward until its RH PROP struck the GPU, causing substantial damage to the GPU, the propeller and the engine. The ground crew were uninjured. Possible explanations include that the parking brake was not set, the chocks had slipped from the nosewheel, or the chocks were removed prematurely. There was insufficient evidence to determine which of these scenarios was the most likely. Contributory factors were: the aircraft was facing down a slight downslope, the ramp was slippery due to the wx conditions and the flight crew increased engine speed to top up the pneumatic system pressure.



07 JAN 2015

A330 – hit by cleaning truck

An Airbus A330-200 was hit by a cleaning crew truck. Loss for > 30 million \$

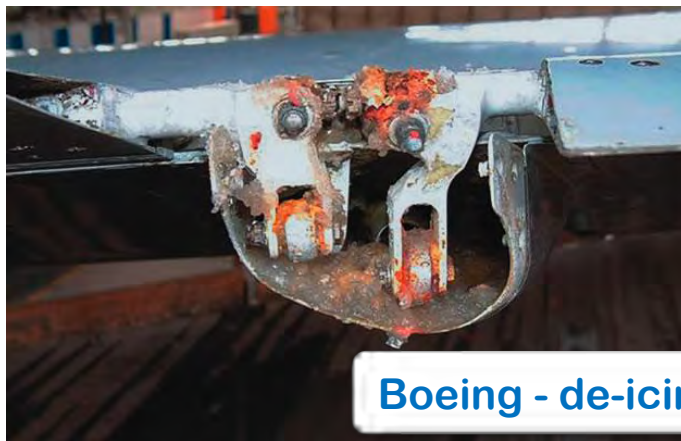


20 JAN 2016

A320 – collision with de-icing trucks



The Airbus A320 was involved in a ground incident when it contacted two de-icing trucks on the ramp. De-icing trucks were positioned on both sides of the airplane near both wing tips. Apparently the aircraft began to move, hitting both trucks. The trucks tilted to the side. 109 pax have to go back into the airport. No injuries.



Boeing - de-icing fluids not compatible



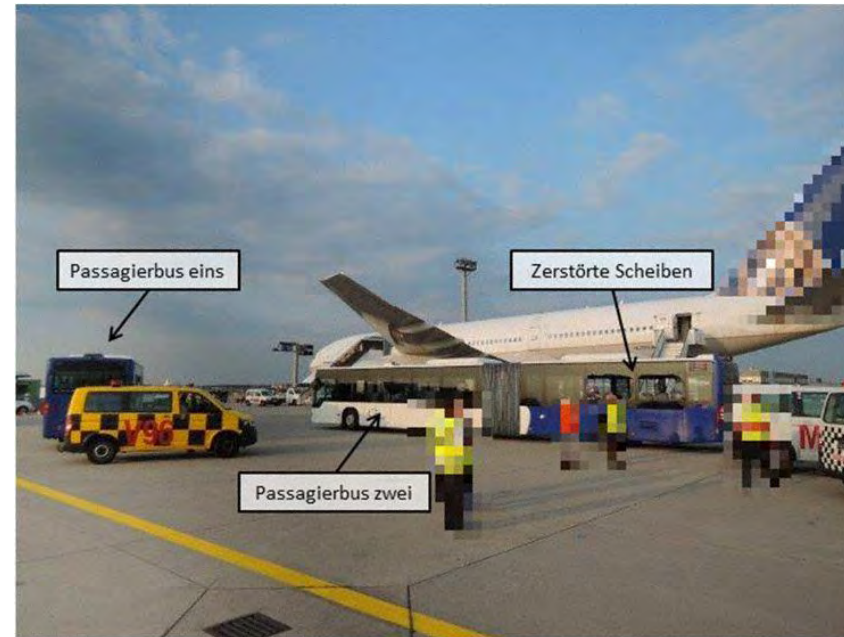
11 AUG 2015

B747 – airport bus damaged and injured pax

A Boeing 747-800 had safely landed and was taxiing to its gate via taxiway N. While turning left off taxiway N onto gate the engine exhaust gasses hit two airport busses serving another aircraft at parking position and caused a number of bus windows to shatter. Flying splinters of glass injured one of the 70 pax on one of the busses.

According to the FDR the aircraft's speed reduced from 5 to 1 Kts while turning left into the gate, the #4 engine accelerated to 50% N1 with engine #1 remaining at 40%, engine #2 at 0% and engine #3 at 43% N1. The aircraft's speed increased to 7 kts afterwards.

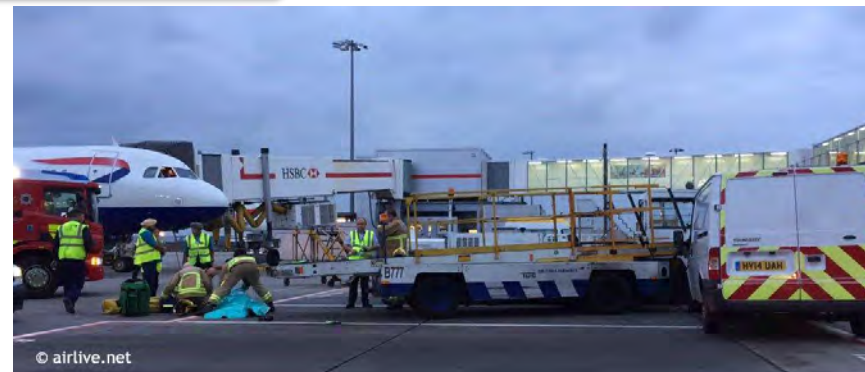
[...] Idle thrust is adequate for taxiing under most conditions. A slightly higher thrust setting is required to begin taxiing. [...] Breakaway power should be limited to 40% N1! [...] One or two engine(s) should be shutdown for environmental reasons and fuel saving, taking into account condition of taxiways and ramps (i.e. upslope, icing etc.). [...] Two engines out taxi-in permitted if all conditions are favorable (e.g. weight, taxi route, weather). [...]



18 SEP 2016

A van crashed into a baggage loader truck

At 19:00L, a van crashed into a baggage loader truck at gate 542 at London Heathrow airport. A baggage handler was injured during the incident as he fell from the truck.



11 OCT 2016

A330 – faulty equipment caught fire

An Airbus A330-200 has been damaged after faulty equipment caught fire

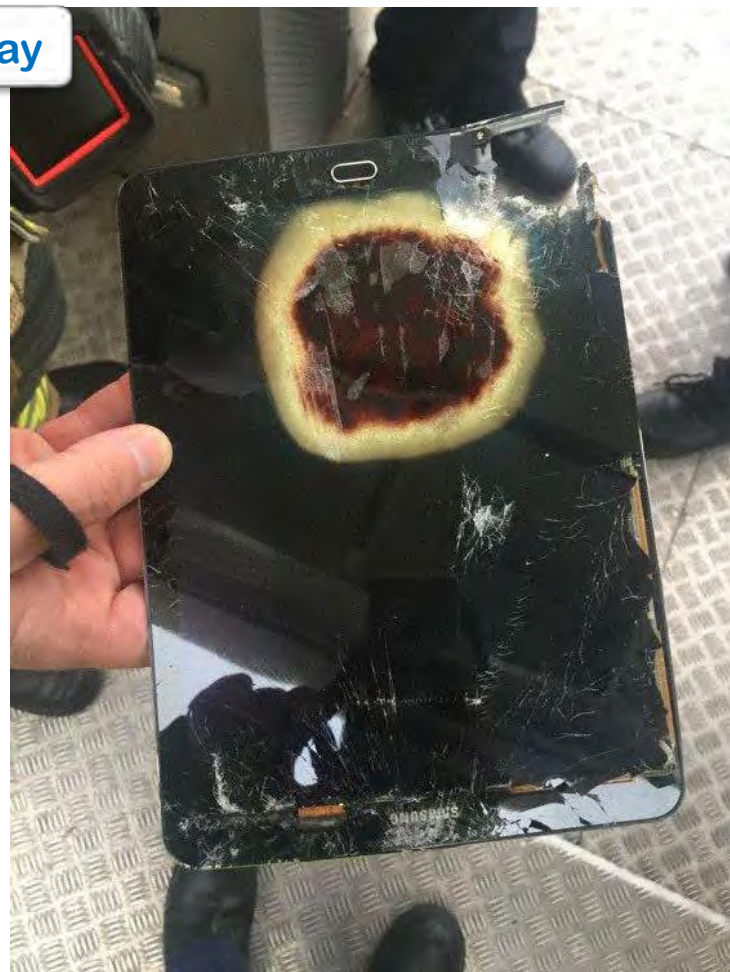
25 SEP 2016

B767 – tablet battery thermal runaway

A Boeing 767-400 was enroute at FL330 when the crew decided to turn around and divert reporting smoke in the cabin. The aircraft landed safely about 20' later and taxied to the apron. Smoke was emanating from a premium class seat prompting the crew to divert.

Maintenance personnel found a tablet computer entangled with the seat, invisible to pax and cabin crew. The tablet had suffered a thermal runaway.

It is presumed the tablet was lost by a pax on the previous sectors flown by the aircraft.



cell phone battery catches fire aboard flight

A cell phone battery caused an inflight disruption after catching fire on a McDonnell Douglas MD-88 flight. The fire started about 15' after departure.

A passenger (a retired military personnel) aided the F/As in extinguishing the fire by using a bottle of water until a fire extinguisher was located. Others helped pax get out of the cabin area filled with smoke.

Though there was some damage to the seats, no one was hurt during the incident and the smoke cleared out of the cabin within a few moments. F/As said the owner has not been identified.



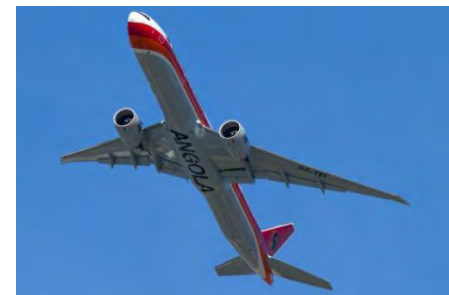
01 OCT 2016

B777 – ground worker trapped in cargo hold

A Boeing 777-300 was enroute at FL350 when the crew was informed that a ground worker has gone missing in the departure aerodrome; the ground worker had last taken care of cargo loading and was presumed locked into the cargo hold. The crew turned around and diverted making a rapid descent and landing 18' later. The ground worker was found in the cargo hold suffering from Hypothermia and was taken to a hospital.

The worker passed out in the cargo bay while he was securing the box of a pax's pet. The a/c departed with the unconscious worker. 40' after the a/c had departed the absence of the worker was noticed.

It wasn't his job to deal with live animals. The worker had started working that day about 90' earlier and had attended to 4 aa/cc.



20 MAY 2016

Dash 8 - vehicle collides with aircraft and kills ground worker

The a/c parked at the gate to be filled up with fresh water. The according vehicle, driven by XW, was reversing towards the a/c, and the ground worker YZ was directing his colleague. The vehicle collided with the a/c, and YZ was caught between vehicle and a/c received fatal injuries. The a/c received substantial damage as result of the accident, too.



11 SEP 2016

A320 – ground worker electrified

An Airbus A320-200 had completed an uneventful flight and stopped at its parking position. A ground worker attempted to connect the GPU but received an electrical shock and sustained serious injuries.



06 AUG 2016

E120 – incorrect loadsheet causes unexpected aircraft responses

An Embraer EMB-120 was departing from runway 11 when the crew noticed unexpected responses by the aircraft. After departure the flight crew reviewed the load sheet and observed that some luggage and cargo had not been included with the load sheet. The crew recalculated the aircraft performance and continued the flight to destination for a safe landing about 90' later.

The ATSB reported that the center of gravity remained within limits and no structural limits were exceeded. The occurrence was rated an incident and is being investigated.



26 OCT 2016

Dash 8 – CG out of limits due to cargo hold not emptied

400 Kg of bags were not unloaded from cargo hold #3 in ABC airport despite standard operations procedures requiring to inspect all cargo holds, the bags were not accounted for, too. As result the a/c departed ABC with the bags on board and the CG 5.39% forward of forward limit.



22 JUN 2016

B747 – Mass & Balance problem

A Boeing 747-400 was enroute at FL350 when the crew decided to turn around and divert due to a cargo loading error. The aircraft landed safely.

A cargo container was erroneously loaded into an invalid cargo bay resulting in a mass and balance issue. The cargo was unloaded and correctly reloaded.

09 JAN 2002

MD11 – incorrect unloading – a/c pitch-up

A MD-11 cargo plane tipped on its tail forcing 10 crew members to be rescued by a cherrypicker. The plane had arrived and a car was being unloaded when the incident happened.



Nice to know:

ATSB – Report on aircraft loading occurrences from July 2003 to June 2010

<http://www.atsb.gov.au/publications/2010/ar-2010-044.aspx>

21 SEP 2004

B747 – misloaded - CG out of limits during take-off

A Boeing 747-400F was taking off. During take-off run, the a/c started to autorotate at approximately 120 Kts CAS due to the actual CG being aft of the aft CG limit. The stabilizer remained steady as the a/c continued to accelerate and became airborne at 165 KCAS and 11.5° pitch attitude. After lift-off the nose attitude was increased to 12° and then to 19°. The Cpt realized that the a/c balance was wrong due to the far forward trim setting. The crew suspected a wrong CG location and contacted the company office through SATCOM. The crew was informed that the CG was out of limits for landing. A new CG location was received and the flight crew relocated some load pallets during flight. However, the CG was still aft of the aft limit. During the approach briefing, the landing configuration and performance parameters were discussed to reduce the possibility of a tail strike during touchdown and landing rollout. Emergency equipment was requested to stand by. During the landing rollout at RKSI, the aircraft nose lifted at 60 kts and nose wheel steering was lost. The Cpt stopped the a/c on the runway and shut down all engines. The aircraft was subsequently towed to the parking stand.

The wrong CG location was caused by a mistake during loading. During load planning the Load Master mistook the Standard Operating Mass (SOM) Centre of Gravity (CG) Mean Aerodynamic Chord (MAC) percent number for the Index Unit (IU) number. Hence the aircraft was misloaded to a CG of 37.8% MAC, which was 4.8 % aft of the aft limit of 33 % MAC. The mistake was not discovered by anyone (Load Master, Supervisor, etc). Nor was the mistake discovered by the Cpt who accepted and signed the cargo loading manifest before take-off.

The a/c took off with the CG 4.8 % aft of the aft limit and landed with the CG 7.2% aft of the certified aft limit.

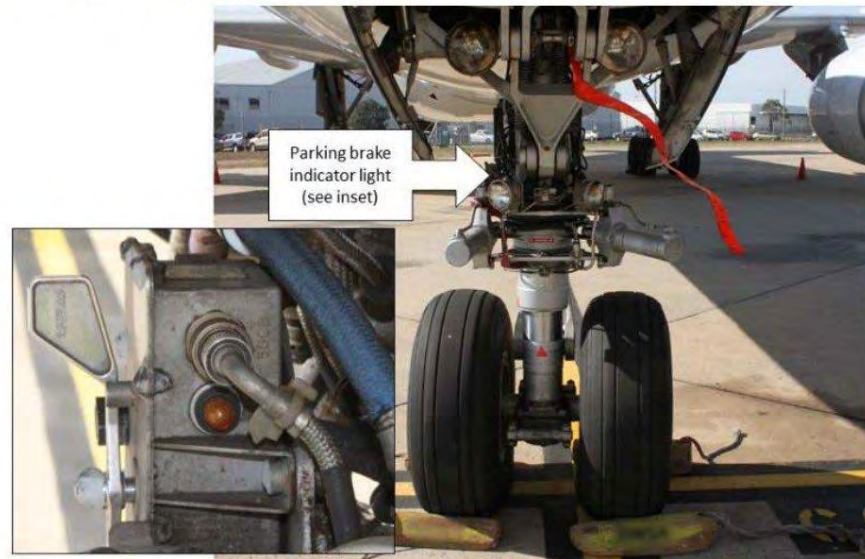
14 SEP 2016

A330 – collision with aerobridge (poor procedures)

The ground and flight crew procedures were not well harmonized, leading to reduced cohesion between the crews, and that the tractor operator's procedures did not match the way tasks were carried out locally. In addition, the flight crew and engineers did not explicitly convey their actions and intentions to the others, resulting in a number of missed opportunities to discover the resulting procedural errors. This caused the parking brakes on an Airbus A330 to be released when the chocks were already removed. The aircraft rolled and impacted an aerobridge.

An Airbus A330 was being prepared and boarded for a flight. The Cpt engaged the aircraft's park brake before carrying out an external inspection of the aircraft. The resulting lit park brake indicator light on the NLG led the technician to assume that the park brake would remain on. Thinking that the a/c would remain secure, the technician removed the MLG chocks out of sequence with the relevant procedure and without informing the others in the ground crew. The ground crews did not check the main gear chocks before removing the nose gear chocks to attach the tow tractor to the nose gear. Unaware that no chocks were in place, and out of sequence with the relevant procedure, the Cpt released the park brake on return to the flight deck. The aircraft rolled back about 3 m and struck the aerobridge. The aircraft's forward-left door and hinges, and the aerobridge were damaged. No injuries.

Nose landing gear showing the aircraft's park brake indicator light (note the wheel chocks in place)



15 JUL 2016

A330 – unreliable fuel indication



An Airbus A330-200 was enroute at FL320 when the crew declared emergency and diverted for a safe landing on runway 32R about 15'.

The crew announced they had an unreliable fuel quantity indication caused by water particles in the fuel tank.



Spillage



filter after contaminated fuel



FOD – Foreign Object Damage

La rimozione del FOD è un requisito ICAO (Annex 14)

Un **Foreign Object** è qualsiasi cosa che sta dove non dovrebbe, quindi non lo troviamo necessariamente nelle vicinanze di un a/m.

Un **Foreign Object** ha in sé il potenziale di causare danni a persone o a cose.

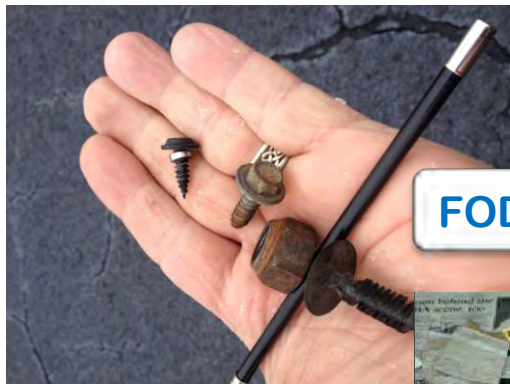
E' ovunque e sempre presente attorno l'a/m, in apron, taxiway, runway, etc.

Il **Foreign Object** può causare danni per contatto diretto (es: taglio pneumatici) o indiretto (es: ingestione nei motori). Il jet blast inoltre può farsi che il **Foreign Object** venga soffiato in qualche attrezzatura o colpisca (anche mortalmente) le persone.

Tutte le operazioni di *turnaround* dell'a/m, inclusi (ma non limitati a) manutenzione, rifornimento, catering, pulizia, movimentazione bagagli e merci possono produrre detriti (*debris*).

Anche i pezzi di bagaglio (etichette, ruote, ...) che cadono in apron o nel vano cargo devono essere rimossi per non creare un **Foreign Object Damage**.





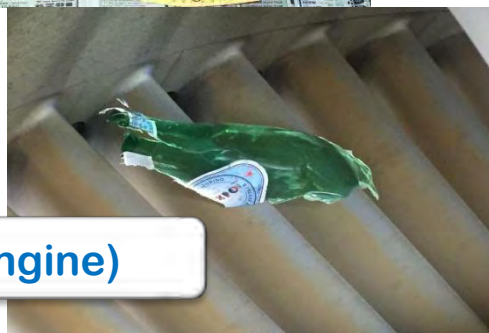
FOD (material)



FOD (on tyre)



FOD (engine)



FOD (aircraft structure)





FOD (on human – jet blast)



FOD (of human)



10 JUL 2016

B737-800 – FOD on both engine

A Boeing 737-800 departed from XYZ's runway 07R and completed, what appeared to be an uneventful flight, with a safe landing on ZWQ's runway 30L.

A post flight inspection revealed damaged to the fan blades of both engines caused by foreign object ingestion.

The occurrence aircraft remained on the ground for about 41 hours before resuming service.



FOD on engine



loading bridge incident



ULD abandoned, damaged, ingested, ...



... \$!!

Il Ground Handling Damage può essere molto costoso.

Costi indiretti: dirottamento a/m, canx voli, danni di immagine, investigazioni di incidenti, impatto negativo sulle operazioni, reazioni delle CAA, ...



....concludendo

- ✓ il servizio che offri è proprio il **Tuo staff**
- ✓ è necessario creare un ambiente in cui il personale riesca a fornire ai “clienti” un servizio **sicuro ed efficiente**
- ✓ per far ciò è necessario che sia il Tuo staff a **riportare** ciò che accade
- ✓ avere una **Just Culture** lo permetterà
- ✓ avere un efficace **Sistema di Gestione della Safety** aiuterà a creare il giusto ambiente
- ✓ ...e potrai offrire un servizio **più sicuro** ai Tuo clienti e proteggere il **Tuo staff front-line!**



Grazie per l'attenzione!



Safety is
everybody's
business