

# focus

ON COMMERCIAL AVIATION SAFETY

SUMMER 2002



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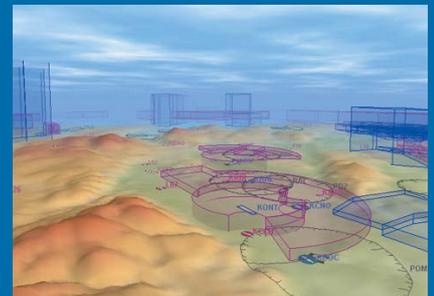
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### Ramp Damage - Time for Action

There are strong indications that the airline business is returning to the pre 11th September 2001 level. I am certain that many are breathing a sigh of relief. This should be good news for all those who were made redundant. Many have already found jobs and returned to work and I am sure they feel much happier, even if less secure, in their new positions. Others are still frantically looking for suitable employment.

For those, unlike the aircrew, who are not reliant for employment in the aviation industry, many have found positions in other industries, vowing never to return to aviation. Some feel there is a total lack of loyalty by management to their staff. The loss of experienced aircraft engineers to other industries is certainly not good for the aviation industry. They should however be a little cautious, as working in another industry does not make them immune to staff cutbacks.

One of the byproducts to redundancy action is the effect that it has on the work of the employees. Low moral has a direct impact on work practices and employee motivation and can ultimately lead to a lowering of safety standards within an organisation. It is therefore necessary for all managers to be aware of this and to manage accordingly.

On a brighter note the increasing number of air travellers means that the industry will soon be expanding again and there will be an even greater need for good reliable staff at all levels. The rate at which the air operators expand may well be

limited to the availability of suitable staff.

Damage to aircraft on the ramp remains a major concern and the uninsured losses to air operators continues to grow. Some airlines are starting to pay more attention to the monitoring of these losses as their prevention would lead directly to an increase in the profit. Some estimate these losses to be in excess of \$4 billion annually.

The Health and Safety Executive (HSE) is very concerned about the number of injuries on the ramp and the ever growing loss of working time. (Some believe the aviation industry injury record is now higher than that of the building industry.)

Safety on the ramp must be improved, but how?

It has become clear that making the air operator responsible for the safety of their contractors, as required by JAR-OPS, is not working. Perhaps it would make better sense for the airport to be responsible for safe operation of all contractors on their airport. The airport operator is in a far better position to monitor how the contractors are working, than an airline based in another city or country. In addition they have the ultimate sanction of withdrawing the right of the contractor to work on that airfield if they fail to perform in the correct manner.

Has the time come to introduce some form of certification for the many workers on the ramp? Pilots and engineers are required to be properly qualified in order

to work on aircraft. Whilst they do cause some damage to aircraft on the ramp it is far less than the damage caused to the aircraft by the thousands of unqualified ramp personnel.

The cost to the aviation industry due to injury and damage on the ramp has reached a point where we can no longer ignore it. The current system of employment of ramp personnel will have to change in order to bring the number of injuries and cost of damage under control. Should we therefore not "grasp the nettle" and introduce some form of ground handling certification before the problem gets even worse?



#### Amendment to 'Angle of Attack' article in Spring 2002 Issue:

*"Key Points to emphasise in training" bullet point 3, last sentence, 3rd to last word should read 'inappropriate'*

#### UK FLIGHT SAFETY COMMITTEE OBJECTIVES

- To pursue the highest standards of flight safety for public transport operations.
- To constitute a body of experienced aviation flight safety personnel available for advice and consultation.
- To facilitate the exchange of urgent or significant flight safety data.
- To maintain a liaison with all aviation authorities on matters affecting the safety of the flight-crew, ground-crew, the aircraft and passengers.
- To provide assistance to operators setting up a flight safety organisation.

### Challenges for the Industry

by John Dunne, Airclaims

2001 had all the makings of a good year for aviation safety until 11th September. Since then a greater emphasis has been placed on new or revised security initiatives. Many of these were, arguably, rushed into place.

Historically safety initiatives in our industry have always been carefully thought through to ensure that "improvements" don't contain any latent problems. Long queues of passengers at security screening posts within the terminals have become the norm at airports. Recent press reports have hailed the security initiative as a success, quoting the number of Swiss army knives and other "dangerous" items detected - we trust that they don't lose sight of the real objective.

John Heimlich, Director of Economics at the US Air Transport Association is quoted as saying "we'll never be able to stop the weapons, so we have to go after the people". The recent airside robberies at London Heathrow have illustrated that not all the "bad guys" are necessarily going to submit themselves to inspection at the passenger security checkpoints inside the terminal building.

I strongly concur with Tom Croke's message in the Spring 2002 issue of

FOCUS that security measures against the type of attacks of 11th September rest entirely with the state agencies.

Prior to the 11th September the aviation industry was already in a state of a steady but slow decline. Since then passenger numbers have fallen dramatically and Company Executives were faced with enormous survival challenges. Difficult times call for difficult measures, steady nerves and acute business skills.

We have all seen budgets slashed, aircraft parked up and colleagues and friends laid-off. Even the areas of Flight Safety and Quality which are considered to be essential to the safe operation have not been immune to the deep cuts. All areas of airlines are being forced to make painful cuts, and make rapid changes in policy and direction to keep pace with an uncertain market. Senior Managers need the eyes and ears of their Quality and Flight Safety departments to ensure that their organisations, now more than ever will emerge intact, safe and ready for the challenge of the upturn.

The UK Flight Safety Committee has been encouraged to continue its good work. It is the only Aviation Safety body in the world where Operators, Regulators, Pilots, Air Accident Investigators, Airport

Authorities, Trade Unions, Air Traffic Controllers, Ground Handlers, Engineers, Lawyers and Insurers meet on a regular basis in order to discuss Flight Safety matters. We do make and will continue to make a positive contribution to the improvement of Flight Safety.

To date 2002 has seen a number of accidents or incidents whose causal effects have included: CFIT; landing overrun; icing; engine flame-out in rain; autopilot mode confusion; failure of large diameter fan blades; hostile acts. These illustrate that we can never afford to be complacent.

We are all responsible for Flight Safety and we can all make a difference.



## It's not the one thing that gets you, it's when they gang up against you

*An account of a windshear event - December 2001, Milan, Jet aircraft*



**T**his is an account of what happens when several things conspire against you, to make an ordinary flight into something more dangerous. All the problems that are described here are manageable on their own but added together made quite an evening.

The flight was planned to go to Milan Linate, it was to be the first line training flight for a new first officer, and it is company policy to carry another first officer on the jump seat for safety reasons. The pilot flying was a line-

training captain with eight years experience on type.

At the pre-flight stage the weather for LIN and its alternates looked OK, just a chance of rain and snow on the forecast being the worst and further down Italy, two diversions had a quite good stable forecasts. Enough fuel to hold for 30 mins or divert a long way away was loaded.

The trip down was uneventful; the weathers all remained as forecast. Crossing the Alps that all changed.

As soon as we contacted Italian ATC we were sent to hold over Bergamo, also being informed that the two Milan airports were snow clearing and closed until further notice. We rechecked our other alternates, Turin and Genoa. Both of these were reporting good weather. A diversion to Genoa was requested, 'sorry' came the reply 'they are unable to accept diversions because of over capacity' 'OK, request diversion to Turin', same reply 'overcapacity'.

Now we had a problem, nowhere to go. Just as it was looking quite bad ATC asked if we had a fuel problem, well, two minutes ago we hadn't, now we did, They offered us the just cleared, Malpensa.

While all of this had been unfolding we were burning fuel, precious fuel. Now seemed a good time to change first officers to maximise the experience available.

We anticipated the northerly runway and briefed, it was not to be, the wind had swung round 180 degrees, that was our first clue as to what was in store for us. Then a third rebrief, as the ILS for the south runway was unserviceable.

Down wind the flaps decided to malfunction and stick at zero, I flew a VOR DME approach while the first officer did the relevant calculations and drills, these were all finished as we turned onto final approach, at last a runway ahead.

At 1000 feet on final approach all hell broke loose, with the wind roaring and howling, the aircraft went into an uncontrolled descent, WINDSHEAR GO-AROUND was shouted and the aircraft was put into the recovery attitude with full power. 'Gear up' was called, but twice the reply 'still descending' came back. How could this be? The aircraft was pitched up and full power was applied. The GPWS joined in, 'WHOOOP WHOOOP, PULL UP, TERRAIN'.

The aircraft data recorder noted that we



had gone down to 250 feet radio before recovery.

As we climbed away the TCAS went red in the whole of the climb segment; we levelled off, guessing that we may impinge on the holding traffic above and

declared a PAN, as we *had* to go to another airfield. Turin was nominated, and ATC, with renewed interest in us, turned us en-route.

Fuel and MSA's were now high on the agenda as the route would take us along the foot of the Alps, although, as we approached Turin snow once again raised its head. Turin had a long runway but the wind was straight across at 20 knots and the runway was covered in snow! Just ideal for a flapless!

The aircraft performed well on the runway, stopping two thirds down and taxiing off normally.

I always thought beer tasted best in Holland, but it tastes much better in Turin!

What did we learn?

Things happen in threes and fours not just on their own.

Weather forecasts are somebody's best guess, but not a certainty.

Airports close for a variety of reasons not just weather.

The quality of ATC varies with the workload they have.

The term windshear is often used to describe a loss of 10 knots or 100 feet, but don't forget it can be much worse.



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## How do you view Ramp Damage?



Who was held to be at fault? Yes you guessed it, THE CAPTAIN. Although he stopped in a position ordered by the marshaller, it was his responsibility to ensure the aircraft was suitably parked. Who paid for the damage? You can imagine the sloping shoulders on this one. The handling agent and airport authority claimed that they were blameless in spite of the obvious failings in their performance but ultimately a bargain was struck.

What are the lessons learnt following such an incident? The Captain is the Captain and is likely to be blamed for anything. Be aware of ramp markings even if you have followed external instructions correctly. Do not expect external agencies to put up their hands to accept blame, at least not without a fight.

**H**ow do you view Ramp Damage? Is it because poorly trained, poorly paid, workers are employed to carry out their work with heavy vehicles close to expensive aircraft? Is it because training standards are low and quality assurance poor? Is it the fault of the airlines who want everything for almost nothing? Is it due to unrealistic time pressures during turn-rounds?

This is a tale of a short turn-round at a Spanish airfield on a Charter Airline Boeing 757. The aircraft has been de-identified in the photographs to protect the innocent.

The Captain had followed the signals from a marshaller and stopped the aircraft in accordance with his orders. The parking brake had been applied, shut down checks carried out and the passengers had deplaned. The APU was running in accordance with normal SOPs. A tremendous jolt was felt throughout the airframe and some of the crew left the aircraft to check for the cause. A set of passenger steps, that were being towed by a vehicle, had impacted the APU exhaust and caused part of the exhaust

structure to separate from the aircraft. The APU continued to run but was shut down immediately the Captain returned to the Flight Deck.

An investigation was initiated and several interesting points emerged. The steps were being towed in an unauthorised configuration i.e. sideways rather than lengthways and although the Captain had stopped the aircraft following instructions from the marshaller, the tail of the aircraft extended by a few inches beyond the 'yellow line'.

Ramp Damage remains one of the most significant areas of airline loss. Isn't it about time we got our act together?



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**Radar Information Service (RIS)**



# 3

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Other info on request

**Flight Information Service (FIS)**



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ACD A01329 11-01.

## Aircraft damaged by de-ice rig. Port stabiliser wing tip damaged beyond repair

by Dean Godfrey KLM uk

### Weather at the time of the incident:

Freezing, dry.

### Lighting:

Dark, stand lights.

### Surface conditions:

Dry, no contamination.

**A**ircraft damaged by de-ice rig. Port stabiliser wing tip damaged beyond repair. This occurred whilst repositioning the de-ice rig from the port to the starboard side of the aircraft; the rig boom came into contact with the rear port tail plane wing tip.



Due to congestion between the passenger air-bridge and the port wing, it was discussed and agreed between

driver and bucket operator, that the best approach would be to de-ice the wing and the rear tail plane, from the one position between wing and tail plane. The driver approached the aircraft at 90 degrees to the main fuselage and de-icing commenced, by spraying the root of the wing and working back towards the wing tip. This was completed by reversing the rig to allow the bucket operator the best angle of attack possible. On completing the wing, the rig was driven forward again at 90 degrees to the fuselage and the rear tail plane was de-iced using the same method.

While the de-icing operation of the port side was underway, a fuelling bowser had parked on the adjacent stand, to refuel another aircraft. The position that the fuel truck had taken blocked the normal reversing route

taken by the rig to pull away from the aircraft and to manoeuvre to the other side of the aircraft. It was discussed and agreed between the driver and bucket operator, what the best means to manoeuvre clear of the aircraft and reposition on the other side were. The manoeuvre would involve a reverse straight back as far as possible, before coming into contact with the bowser and the use of a hard right lock to turn away from the aircraft.

The bucket operator guided the rig straight back as far as possible and then the driver turned full right lock and moved forward. As the de-ice rig moved forward and right, the boom came into contact with the port rear tail plane wing tip, causing a crumple and tear to the wing tip approximately twelve inches in length. As a result of the investigation the procedures for moving from one side to the other for this aircraft were changed: Whilst manoeuvring, the boom should be positioned below the level of the tail plane to avoid any possible contact with the aircraft.

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## A Ramp Related Incident

by Nicole Stewart, Embraer Fleet Safety Officer, bmi regional



During turnaround at a UK International airport, the number 1 cabin attendant noticed that the viewfinder in the rear toilet, that allowed sight into the hold, was obscured.

She informed the Captain who asked the loaders to have the blockage removed. He then, during his walk-round, checked to make sure this had been done. It was obvious to him that something sticky had been put there due to adhesive still remaining on the lens.

The Captain then asked the loader who was walking away from the aircraft, what exactly had caused the blockage. The loader said that a sticker had come off one of the bags and had stuck to the lens.

Knowing the height to which the bags were stacked in the hold and likewise the height of the lens itself, the Captain surmised that the sticker would have needed to grow its own wings to get up there!

The incident was discussed amongst the whole crew and it was decided to contact the police and the duty ground manager.

The police agreed that there was a strong possibility that the bags had been tampered with. Whilst unlikely that anything had been placed in the bags, it could not be eliminated without further screening.

The Captain, conscious of not inviting bogus theft claims, told the now-boarded passengers that he had received information that their bags may not have been 100% screened during the check-in procedure. The passengers were then disembarked whilst their bags were removed and rescreened.

Whilst the aircraft was empty, the police boarded and inspected the cargo hold viewfinder from inside the toilet and inside the hold. They found a new, still sticky 'FRAGILE' label on the floor of the hold. It matched the marks still evident on the lens and adjacent bulkhead.

The police agreed with the crew that it was a deliberate attempt to prevent the loading staff being observed from within the aircraft.

The following day the same Captain had a similar incident at a European International airport. Again a label appeared to have been stuck over the lens to prevent the crew inside the aircraft seeing into the hold.

Certain recommendations were made:-

1. Advise all crews to inspect the viewer on walk-rounds.

2. Captains to brief cabin attendants to check prior to pushback that the viewer is clear.
3. Crews to file ASR's in all instances to assess the scale of the problem.
4. Cabin Services to issue crew directive to be aware of this problem.
5. That a label be produced in English, German and French to state that this area must be kept clear of luggage at all times. The lens itself to be at the centre of the label and attached to the bulkhead.



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## Confidential Reporting for Cabin Crew



The UK Confidential Human Factors Incident Reporting Programme (CHIRP), has been operating since 1982 and receives confidential incident reports from professionally licensed pilots, air traffic controllers, licensed engineers and approved maintenance organisations employed within the UK Air Transport industry along with individuals involved with General Aviation. CHIRP was established in its present form, as an independent charitable company limited by guarantee in 1996. The Programme receives a Grant of Funding from the Civil Aviation Authority.

Reports are validated as far as is possible through a callback process. If appropriate, report information is brought to the attention of the relevant operational management or CAA (SRG). Only disidentified information is used in any discussions with third party organisations. The confidentiality of the reporter is assured and the reporter's permission is always sought before any action is taken. No personal details are retained from reports received and on closing a report all personal details are returned to the reporter with a letter notifying them of the action that has been taken. Each report is allocated a unique reference identification. The reporter may, if they wish, contact the CHIRP office for additional information by using the report reference identification.

The Programme was extended in July

2001 to include Cabin Crew, for a trial period of one year. Recently, with the agreement of CAA (SRG) the trial has been extended to March 2003. It has been emphasised that CHIRP should not be seen as a replacement for Company Confidential Reporting Schemes and that it is important that safety-related matters be reported to the Company in the first instance, whenever possible. A separate newsletter, Cabin Crew FEEDBACK, containing disidentified reports is distributed to companies participating in the Trial; these are pigeon-holed or sent direct to bases/crew rooms.

In the period 1 July 2001 - 1 May 2002, 78 reports were received. Of these, 23 were represented to the relevant operator and 25 were made available to the Cabin Safety Office of CAA (SRG). Issues raised have been in the following categories; Standard Operating Procedures/Safety Emergency Procedures (21); Rosters/duty time/breaks (21); Faulty Equipment/Health & Safety (9); Security (9); Abusive Passengers (7); Potential Health Risks (4); Experience/Training (3); Dismissal/Discipline Due Sickness (3); Company Discipline (1).

Typical issues raised have been:

### **Standard Operating Procedures (SOPs)/Safety Emergency Procedures (SEPs) -**

Incidents reported in which SOPs/SEPs have not been followed, leading to potentially unsafe operations. Examples are; take-off/landing without receiving 'Cabin Secure' report and without notifying Cabin Crew; emergency exits blocked during ground operations by drinks trolleys, equipment not used in accordance with correct procedures (portable oxygen bottles/crash axe), cabin crew seating allocations not in accordance with SEPs.

**Rosters/Duty Time/Breaks -** Reports include misinterpretation of Company FTL schemes by either Company or Aircraft Commander leading to onerous duty periods and/or requirement to work into

'discretion time', lack of time/opportunity to take rest/meal breaks (short-haul multi-sector and charter operators). Some reports allege pressure/coercion by either flight crew or Company.

### **Faulty Equipment/Health & Safety -**

Reports of unserviceable/faulty cabin equipment interfering with normal duties and/or giving rise to safety concerns. Examples are; galley/catering equipment in a potentially dangerous condition, fumes in cabin, crew rest area unusable due to excessive temperature on an ultra long-haul sector, insect infestation in cabin crew rest area.

**Security Procedures -** Reports of breaches/lapses in airport/airline security procedures, such as a potentially dangerous passenger permitted to board at foreign stopover, segregation/screening of crew baggage, procedures for carry-on baggage during transit stops, screening of airport personnel.

For further information on the CHIRP Programme please contact:

The CHIRP Charitable Trust Building  
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## Book Review

### The Field Guide to Human Error Investigations

by Sidney Dekker, Linköping Institute of Technology, Sweden

**H**uman error may be the dominant contributor to incidents and accidents today, it is probably also the most misunderstood. How do you reconstruct the human contribution to system failure? Human error investigations must often follow a path of intuition or common sense, but can fall into the biases and traps inherent in understanding past, puzzling performance.

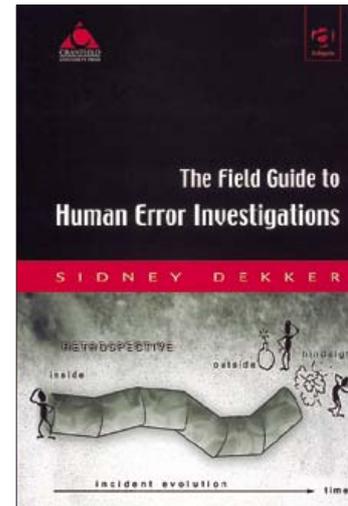
Many domains, including aviation, medicine, shipping, road and rail transportation, process control and military applications can benefit from The Field Guide to Human Error Investigation – using its methods, reminders, pointers, hints and tips to ultimately produce credible, well documented findings. It is intended for those who want to

understand human error in complex, dynamic domains and offers concrete guidance for reconstructing or investigating human error – not to find out where people went wrong, but why their performance made sense to them at the time.

#### Contents:

Human Errors as a Cause of Mishaps: The bad apple theory; Reacting to failure; What is the cause?; Human error - in the head or in the world?; Put data into context. Human Error as a Symptom of Trouble Deeper Inside the System: Human error - the new view; Human factors data; Reconstruct the unfolding mindset; Patterns of failure; Writing recommendations; Learning from failure; Rules for in the rubble; Index

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## Stand Discipline - Does Your Organisation Have It ?

**A**pparently it is lacking on the stand illustrated in the picture and has caused problems and danger for the catering operators.

The correct approach line for the catering vehicle should have been from the photographer's position following approximately the black line at the middle of the bottom edge. However, other operating staff have failed to park ground



equipment in the marked areas and left them overhanging, thus blocking the correct approach path.

Note the errors:

The mobile conveyor belt wheels just inside the line but the boom is sticking well out.

The container/pallet loader with most of its main platform over the white line.

Behind that, an AKH container lying on the ground on the wrong side of the line.

In this situation, the catering operator, trying to help the airline to achieve an on time departure has elected to break the operating procedure rules and come in at an angle

instead of waiting for the other equipment to be moved.

Positioning the vehicle like this increases the risk of injury to staff and damage to the aircraft.

Only the day before this picture was taken a similar angled approach had resulted in the catering vehicle striking the opened forward hold door.

What instructions are given to ground staff on your station when they find their route blocked?

- A. "Do not approach until the obstructions are cleared"
- B. "Get in there somehow and don't delay the service"

Which is the correct answer in keeping with one of your goals to be a safe and secure airline?



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## The JAA's operations standardisation team visit programme

by Captain Tim Sindall

Romania, Switzerland, Finland, the United Kingdom, the Republic of Ireland, and Austria – these are the first six European States whose national aviation safety authorities have been listed to receive audits from the Joint Aviation Authorities' (JAA) Operations Standardisation Team (OPST).

JAA audits are not new: maintenance and licensing already have well-established visit programmes, but operations – the 'sharp end', some might say – has hitherto been spared. One reason for the delay has been the relative immaturity of JAR-OPS 1 and 3, which contain requirements and guidance material addressing commercial air transport operations by aeroplanes and helicopters, respectively. However, recent amendments to both documents, correcting omissions, creating alleviations where the early rules were unnecessarily onerous, and accommodating recent ICAO Standards and Recommended Practices, have done much to improve the acceptability and reasonableness of both sets of JARs. In turn, this has removed many objections to implementation from States that had undertaken to do so for all requirements adopted by the JAA Committee. The few years that have passed since adoption of JAR-OPS 1 and 3 has also given many States the time they needed to develop or to elaborate their national legislation to accommodate their provisions, and to complete text translation into national languages.

Implementation in national legislation or equivalent arrangements that result in all commercial air transport operators complying fully with JAR-OPS is the aim of Central JAA's Operations Division, which is masterminding the OPST visit programme. Unless either solution is achieved, the much-desired 'level playing

field' will not be realised. Whilst a common compliance level is, perhaps, the most sought-after 'prize' expected by those who have had to invest heavily to meet the standards required for the issue of a JAR-OPS Air Operator Certificate (AOC), the true beneficiaries will be the customers, those who pay for the services on offer. It is they who should hereafter be assured of a common, high level of safety whenever they travel or send cargo in an aircraft operated by any AOC holder regulated by a JAA Member State, wherever in the world their flight may take place. However, the levels of safety established in JAR-OPS 1 and 3 will be effective only when the operators concerned have implemented fully the requirements they prescribe.

It is thus appropriate that Central JAA should now begin the process of satisfying itself that States that have issued AOCs based upon JAR-OPS 1 and 3 have ensured full compliance, that there are no National Variants from the requirements, and that no long-term Exemptions or Exceptions have been granted. The means by which the JAA does this is by the formation of OPSTs, each of which comprises three inspectors seconded temporarily from three different States – the team composition being different for each audit – working to a common set of procedures. This is to ensure that all audits are conducted in like fashion and that a fundamental set of questions of critical importance is put to all States. One State will be visited every month until all full members of the JAA have been audited.

The OPST audit process begins in the month before the visit is due to take place, with the 'host' State being invited to complete a questionnaire, the contents of which will assist team members to understand the organisation within its flight operations authority/inspectorate.

Questionnaires are sent also to three operators who have been issued with an AOC based upon JAR-OPS, typically one large aeroplane operator and one small, and one helicopter operator.

In the week prior to the visit, the three team members travel to Hoofddorp, where Central JAA is based, to meet the national co-ordinator of the 'host' State and to be briefed by the Operations Division visit programme manager on the objectives and procedures concerning the audit. The audit programme is discussed and agreed, and any queries arising from information provided in answers to the questionnaires are answered or noted for later investigation. Team members collect copies of the checklists they will use and the associated forms on which they can note their observations. One checklist contains questions targeted directly at the requirements to be observed by States as have been published in Joint Implementation Procedures - Operations (JIPs). Others have been designed to indicate the level of compliance with JAR-OPS, and do this through queries targeted at selected requirements that have been prescribed in all the relevant Subparts.

In the week following the briefing, on the morning after their arrival, team members are usually first given a welcome by the authority of the State they have come to audit. The OPST leader, or spokesperson, then explains the process that the team will follow before they begin to work their way through the 'National Aviation Authority' checklist. By the end of the day, the team will probably have made a few observations that might later be confirmed as non-compliances, and many others that will have indicated full compliance. On the second and third days, the OPST visits each of the three operators in turn, not to carry out any

audits (that activity is the function of the State), but to ascertain whether any applicable requirements of JAR-OPS have not been implemented. So-called 'Operator' checklists are used for this purpose.

It then remains for the team to discuss their observations with the national coordinator, who has accompanied them throughout their visit, to obtain clarification, to correct any misunderstandings, and to obtain acceptance or agreement by the authority of any apparent non-compliances that have been observed. All relevant observations are transposed onto an electronic report form, and any that appear to require remedial action may then become 'findings'. Before members of the team depart on the third or fourth day, they debrief the 'host' State on the contents of the report. Finally, the report is first printed and then signed by each member of the OPST.

Once completed, the report is handed over to the JAA Operations Division, who will first review it and then formally send it to the State that has been audited. The latter is then required to construct an Action Plan that will include proposals for addressing all items listed in the report and show time scales within which corrective action will be completed. When the Plan has been accepted by Central JAA, staff there will monitor progress until they are satisfied that all remedial action has been fulfilled. Now, what has been found so far from the first States to have been made subject to OPST visits? Well, this is for the Operations Division to declare at their discretion and to share with all the other JAA Member States in a manner of their choosing. As may be expected, the OPST has concentrated on 'high profile' issues such as implementation of JAR-

OPS in national legislation, the absence of National Variants or long-term Exemptions/Exceptions, and full implementation by operators of commercially sensitive items such as performance degradations associated with operations on contaminated runways, and the existence of a flight time limitations scheme that satisfies the requirements of Subpart P. Many readers will know that the JAA Committee never adopted Subpart Q, which had been designed to accommodate requirements for a JAA FTL scheme. However, Subpart P requires operators to have a scheme based upon that prescribed by their State authority and to specify how crews should manage exceedences of flight duty and reductions of rest. The OPST checks these points.

Although still in its infancy, the OPST visit programme has got off to a very good start thanks largely to the enthusiasm shown by all who have been involved. All parties seem to share in the belief that time and resources allotted to this exercise are well spent if they ensure that operational safety standards have been raised to the levels contained in JAR-OPS 1 and 3, and that compliance levels applied by JAA Member States to their operators are not below the required level.

*The author, Tim Sindall, was formerly Head of the Flight Operations Inspectorate (Aeroplanes) in the UK CAA's Flight Operations Department, and the UK member of the JAA's Operations*

*Committee/Sectorial Team responsible for developing JAR-OPS 1 and 3. He helped the Operations Division to establish procedures for use by the OPST, and participated as a member of the first three audit teams.*



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## CRM training needs measures and remeasures if it is to succeed

by Keith Bedingham

**C**RM can help prevent accidents caused by human error, but it must be measured or it could continue to fail, writes Keith Bedingham, Chairman, Verax.

Crew Resource Management (CRM) is sometimes touted as a quick fix for situations where people are not working well together, or where an improvement in communication is required. Training is the deliverer of CRM, but is the training effective? If CRM training achieved its objectives, we wouldn't continue to hear stories of communication lapses between members of the flight crew and/or air traffic control. Nor would we continue to hear apocryphal stories of grumpy, taciturn or arrogant pilots creating potentially dangerous situations.

It's common knowledge that all commercial flight crew are obliged to attend CRM training, although it is largely left to individual airlines as to the form it takes. Yet there is very little evidence to show that increases in the frequency of CRM training - where it is practised - results in a reduction of accidents.

However, there is evidence from the military that with the current level of technical reliability and sophistication, over 90 per cent of current aircraft accidents are due to human error. Fifty years ago the percentage of accidents attributable to mechanical failure was very

much higher. So, things have moved substantially in the right direction, but there is a problem - and it is encapsulated in human nature, which hasn't changed as rapidly in the same time frame.

### What is the solution?

If we believe that flight deck crew, air traffic controllers and all others involved in the communications process intend to do a good job -and intend to impart the right kind of information in the right way and at the right time - we can only assume that the reason things don't happen properly is because individuals are unaware of their communication failings, or don't know how to communicate.

No training, however good, is of any use unless the trainees see a personal benefit to them. CRM or communications training has little impact because most people think they are already good at it - just like everyone is a good driver (except the others on the road). Only by demonstrating real and personally specific need, will individuals take CRM or communications training seriously. This can only be done through feedback, not from the classroom - because we can all fake it for a short while - but from the flight deck or workplace.

One of the findings of a feedback and

measurement tool (Personal Effectiveness Profile, or PEP) - which is used for diagnosing and analysing individuals' preferred communication and influencing style -is that around half the population systematically has difficulty understanding their own style, compared to how it is experienced by others.

This research has covered about 7,500 individuals and there is no reason to believe that flight crew are any different from the rest of the population. Indeed, work that Verax carried out five years ago with the RAF indicated exactly the same trend.

How do we break through this impasse of poor self-knowledge in key areas such as communication? The solution lies in each individual who attends CRM training agreeing to submit to analysis of his/her communication and behaviour styles. The analysis is of their own view of themselves and the views of the colleagues who fly with them i.e. of self and peer views of an individual's communication and behaviour styles. Such a holistic, or 'helicopter', view is also known as a 360 degree view.

A tool such as PEP provides information from - and analysis of - the various 'views'. It allows individuals (users) to identify their own communication strengths and identify their own weaknesses and work to improve them. It also allows users to understand the kinds of people they are likely to 'turn off' by their communication style and to learn techniques for communicating more effectively with this latter group.

Re-measures (i.e. post training measures) provide a means of monitoring the extent to which air crew are actually applying these new acquired capabilities in the cockpit. Training alone may be counter-productive, whereas continuous assessment improves communication performance.



Why may training be on the negative scale of things? Someone may sail through training on 'how to be a good listener', or 'how to be a good team member', because he is 'listening' well in order to show a good result. However, if his attitude to the world is 'everybody's an idiot', he will revert to type when he gets back to the flight deck. He can thus fool everybody with short term behaviour while on CRM training, but his underlying attitude to people is unchanged. Measures and re-measures should give a truer picture, certainly where his peers' views of his behaviour are concerned. Direct objective feedback is likely to be the start point for real behaviour change.

## Table of communication skills seen as important to CRM, and measured by PEP.

- 1: *Communication style (open and honest or otherwise)*
- 2: *Advocacy (willing to state a position or point of view)*
- 3: *Enquiry (happy to question in order to understand)*
- 4: *Critique (i.e., analyse one's own - and the team's - performance)*
- 5: *Assertiveness (willing to speak up, so that your point of view is heard)*
- 6: *Synergy (able to ensure that the crew's performance is better than that of any individual in it)*
- 7: *Acknowledgement (able to confirm commands, questions and observations)*
- 8: *Crew co-ordination/observation (i.e. ability to clarify tasks, roles and responsibilities)*

When the RAF adopted a 360 degree measure approach (with re-measures) in the 1990s, the number of aircraft accidents attributed to human error reduced to zero for more than two years. When the programme ended, having succeeded in its aim of reducing the number of accidents, human error-led accidents re-occurred. It does seem that archetypal human behaviour will re-assert itself unless we are regularly reminded of how things should be!

A tool like PEP could be included in the training and performance review of flight crew members. But let's not point the finger of bad behaviour solely at flight crews. Similar CRM-led issues are found on board warships and in civvy street - for example, in the control units of nuclear power stations, where the dangers of 'I know what I'm doing because I'm always right' could translate into disaster.

360 degree measures are simple objectively phrased questionnaires about behaviour and communications that guarantee anonymity and can therefore not lead to 'comebacks'. The exception might be where an individual learns that a majority of the people he/she works with are critical of him/her. But in that case the individual should then realise pretty quickly that positive change is paramount. Analysis of questionnaire feedback can be carried out by an airline's own HR people who have been trained to do this job, or by an authorised third party, or a combination of the two.

### Summary

What everybody on CRM training really needs is 360 degree measurement and re-measurement. This gives anonymous feedback from everybody the crew works with, from among themselves on the flight deck to ground support/ATC. Because the measurement includes

individuals' view of how they see themselves, those views can be compared to how others see them.

Many airlines don't use any measurement or re-measures after training, while those that do tend to use rather antiquated and less effective measurement tools. I do not argue that all aircraft accidents are caused by human error, but I do know that human error is often blamed when fatal incidents occur: e.g. a number of Airbus incidents and the crash in South Korea in April.

I cannot be sure that human error-led incidents would cease totally if all airlines carried out measures and re-measures after CRM training, but I do know about the RAF's experience, as I was involved in the measurement programme.

Old methods of measurement do need to be phased out and replaced by modern 360 degree measures. These show why people hold particular attitudes...and can help in changing those attitudes. Until this happens and until re-measures are more widely taken up, CRM training will continue to disappoint.



## New Human Factors Requirements for JAR145 Approved Maintenance Organisations

by Fiona Merritt, CAA Human Factors Specialist, Operating Standards Division

Many of you will be aware of accidents and incidents where 'human factors', from a maintenance standpoint, have been identified as having contributed to the event. Some issues, such as poor procedures or maintenance data, engineers signing off tasks without having seen or checked the work, information misinterpreted at handover, etc. can be described as 'human factors' since it is people who write the procedures, engineers who sign off work not seen, human beings who become complacent, or make assumptions, etc.

The UK CAA has invested time and resources encouraging industry to adopt methods of minimising the risks associated with human factors during the last few years. Whilst this has been successful in some areas the CAA consider that a change to requirements, underpinned by organisations adopting human factors best practice and principles, will raise standards resulting in a reduction of maintenance errors. In any case recent amendments to ICAO Annex 6 standard states that "the design and application of the operator's maintenance programme shall observe human factors principles" and "the training programme established by the maintenance organisation shall include training in knowledge and skills related to human performance". Therefore in order to comply with ICAO Annex 6, there was a need to have an appropriate national or JAA requirement.

Consequently there has been an initiative, driven by the JAA, to mandate good safety practice, with the emphasis upon human factors.

Some of you will already be aware that there are new human factors requirements round the corner, for JAR145 organisations, in the form of NPA12 to JAR145. These proposed changes were drafted by the JAA Maintenance Human Factors Working Group (MHFWG), with representation

from both industry and regulators, specifically formed for the express purpose of looking at human factors in maintenance. The group has published, on the JAA website ([www.jaa.nl](http://www.jaa.nl)), a report explaining the background to NPA12 and providing additional guidance material.



The scope of issues addressed by NPA12 include:

- publication of a safety and quality policy, signed by the Accountable Manager
- an internal occurrence reporting, investigation and analysis system
- reporting of inaccurate and ambiguous maintenance data
- reporting of poorly designed procedures and work instructions
- shift and task handovers
- implications of fatigue on human performance
- planning of work to take account of human factors
- error capturing mechanisms and duplicate inspections
- signing off tasks not seen
- human factors initial and continuation training

The UK CAA has published a document, entitled "CAP 716: Aviation Maintenance Human Factors (JAR145)" containing more comprehensive guidance material in support of human factors requirements, both existing and proposed, in JAR145. It is available from the CAA website ([www.caa.co.uk](http://www.caa.co.uk)), in the publications page. Also recently published is CAP715 "An introduction to aircraft maintenance engineering human factors for JAR66" which is study material in support of JAR66 module 9.

In order to inform industry about NPA12, and the rationale behind it, the UK CAA have recently run a 'roadshow' across the UK, at 7 different venues and with over 400 attendees from UK JAR145 companies, JAR147 training schools and other organisations which expressed an interest.

The aim of NPA12 is to create a level playing field by requiring all JAR145 organisations to adopt the good safety practices already implemented by more conscientious companies. The requirement proposals allow enough flexibility to enable organisations to apply the changes as appropriate to the size and nature of the company, and not to impose an excessive financial burden upon industry.

The CAA remains committed to the success of this requirement change and considers the implementation of NPA12, can minimise the likelihood of maintenance error being cited as a factor in aircraft incidents and accidents.



## Frontline Defences? Safety on the Ramp

by Colin Brown, CHC Scotia



**F**ormula-One motor racing pit stops are planned, rehearsed and monitored to extract the best from a team performance for safety, accuracy and speed. The race can be won or lost purely on what transposes in a very brief period as multiple operations take place in a severely limited time frame. Is this analogy comparable to that of frontline flight receipt and dispatch – Ramp operations?

In a way yes, but the systems being linked are more diverse and multiple. Similar determined objectives can be observed by aircraft/airport operators as well as handling agents as they are forced to meet commercial/contractual and ATC deadlines. With a touch of driver error thrown in for good measure on occasion.

An industry axiom echoes that the Airport Ramp is the last area still to be addressed by many operatives with the same enthusiastic safety protocols utilised for core business Safety Management System (SMS) activities.

In the UK civil aviation industry we have enviable safety and quality initiatives

through our obvious responsibilities, utilising our individual internal SMS and hardware. However, the airport Ramp is a jigsaw of systems trying to function under extreme pressures for a common goal. Mike Seller's article "How safe is your destination airport" (FOCUS, Spring 2002), touched on a few of the issues that can affect ramp operations worldwide and pointed out the valuable direction of auditing. The problem with Ramp incidents is the diversity of possible error situations/events resulting from overlap activities. Thus it is harder to ensure realistic and practical controlling barriers are in place.

This is not a new awareness problem. The UKFSC voiced concern about Airport Ramp operations early in 1994 and will do so again this year, basing its 2002 Annual Safety Seminar in September on Ramp Safety issues.

Two relevant CAPs are available;

- CAP 642 - Airside Safety Management
- CAP 700 - Aerodrome Safety Management Operational Safety Competencies

However, as Ramp personnel related accidents have increased over the last 5 years the UK's Health and Safety Executive (HSE) have advised their grave concerns to the industry. They have identified that Airport Ramp workers are more exposed to serious injuries than agricultural workers and equal to the mining industry for minor incidents.

Such concern has prompted their guidance document titled;

- Aircraft Turnaround (Publication ID# - HSG209)

This guide is suitable for airport and aerodrome operators, airlines and service providers. It offers advice on control, co-operation and co-ordination of turnaround activities performed by companies and contractors to reduce staff risks.

As with many failings that can culminate into an accident, communication errors are a key failing. Lack of, mistaken or failure to communicate in partnership with other cross boundary services is a cause of concern if safety could be compromised.

Through CRM & MRM teachings the benefits of education on the Human Factors affecting communication and other important tenets are recognised. This level of knowledge though is not widely available to other labour skills found with access to the ramp area. Safe working practices require specific staff training, procedures and terms of reference. However, considerable conflict and dissonance could result if an individual in charge of ramp function procedures also had overriding constraints to perform goals on-time.

Since the horrific events of September 11th 2001 higher pressures have been placed on all aspects of flight operations to ensure their operations maintain quality while being efficient, secure and

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economically effective. The ramp now has greater challenges to deal with because of possible shortfalls in staffing numbers, heightened security awareness, etc.

Everyone including the general public is aware of the hazards of overcrowding the skies but are we not in danger of overcrowding the aprons?

Do we or our contractors take it for granted that someone else has responsibility for overseeing basic safety concerns that are not actually even flight related?

Embarrassingly other industries externally remote to aviation have tackled overlapping error management, though sometimes through experiencing a severe cost first. One US airline did overcome some ramp exposures perhaps

unintentionally by educating company staff in each others roles with active participation where possible. This included aircrew experiencing ground staff duties willingly and allowed awareness and appreciation to all.

The aim was to produce faster turn-arounds but did produce beneficial side results and a teamwork respect.

Personnel, Vehicular/Equipment, FOD, Manoeuvring and Jet Blast hazards are prolific and amongst the most common incidents globally. They may be in danger of being just accepted exposures if

awareness is not constantly enforced and failure to adopt safe practices controlled. Incident diversity is restricted only to the imagination as the Ramp has a personality culture of its own. Careful planning of appropriate ground hazard analysis and risk assessment methods is required and these must be periodically re-evaluated.

■ In November last year a large piece of aircraft staging (used for tail work on SAAB 340s) "took-off" with an assisting 35knot wind gust along the main taxi-way of a northern airport in Scotland. The taxi-way was closed until the staging was cut up and had been removed from the area by the Airport Fire Service. The staging had been stored outside in the lea of a large Hangar, following cessation of maintenance. It is still unclear

whether or not the braking mechanism had failed, or if the wind just proved too strong even with proven adequate, serviceable brakes. As a result of that incident, approximately £6000 worth of aircraft staging is now in several pieces and consequently scrapped. By chance only the staging came to rest before damaging anything else; it had the potential to hit at least two fixed wing aircraft, which were parked nearby at the time.

■ Recently a ramp worker got lost in fog on an airfield. Finally suppressing embarrassment to use the vehicle radio and requesting assistance he returned safely. Fortunately, nothing else was moving around at the time and his manoeuvrings were extremely cautious.

■ A helicopter crew mistakenly became misled by the attending ground staff hand signals and lifted into the air. (Physical miscommunication is a common error). Unfortunately the cargo boot was still in the process of being loaded and a handler experienced a very brief 2m lift into the air.

■ Rodents have stowed away in fresh unsecured freight and chewed their way through navigation computer wiring, crippling two independent systems. In sunnier climes large lizards have strayed aboard and, exploring new found territories, discovered the cockpit, "and so the tails go on."

Ramp incidents will continue to take place without concerted efforts by all in the industry. An adage circulates amongst us that states, "If it is on the ground it costs money". This is now truer than ever but, it is not necessarily the safest anymore either!



## The Dangers of Tyre Failure

In our manuals, staff are warned against approaching hot aircraft wheels from the sides, in case they explode. Although they are fitted with fusible plugs which melt if they become too hot and allow the tyres to deflate, there is a risk that they could fail.

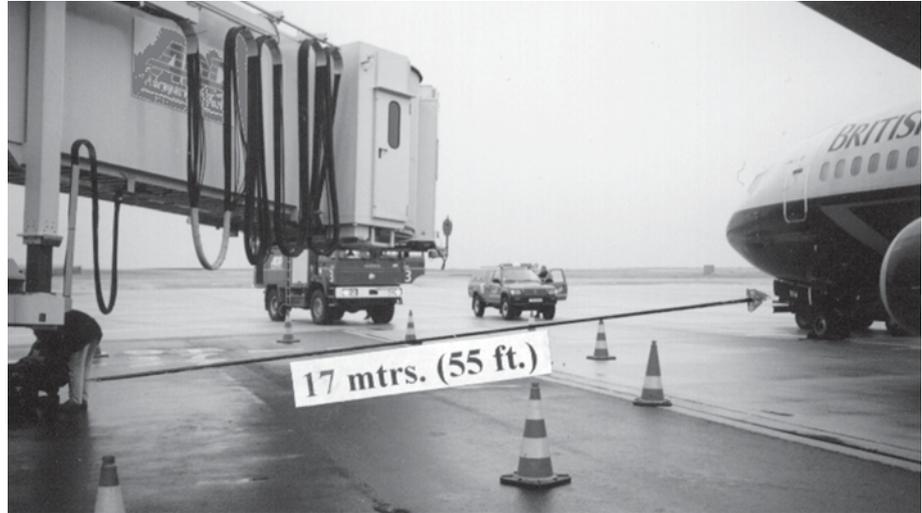
### If a wheel did fail what could be the result?

I, for one, did not appreciate the potential danger until a recent incident occurred to one of our aircraft. Strangely enough, it was not an aircraft wheel which failed but one fitted to an apron drive jetty.

The design of the jetty wheel was similar to that of many aircraft wheels with the tyre held between two halves of the wheel hub. The two halves of the split hub were bolted together with 12 bolts and the wheel hub was attached to the axle with a further 12 bolts.

The pressure of the air in the tyre was nominally 16 bar (235 psi) which is slightly higher than the pressure of most aircraft tyres.

The jetty had been retracted from the aircraft following completion of boarding and the wheels were turned to allow the



*Position of air jetty to aircraft when jetty wheel failed*

jetty to be driven to its parking position. At this point a loud bang was heard. The outer half of the split hub flew across the ramp and struck the B737 aircraft just behind the nose undercarriage causing a large hole in the fuselage.

Why the wheel failed is still under investigation. The jetty had been in service less than three months. The potential risk, particularly to staff, of such a failure is more fully appreciated when one realises that the split half of the hub, which weighed 52kg (115lb), travelled 17m (55ft) through the air without touching the ramp and struck the

fuselage some 1.3m (4ft) above the ground.

Only the ground engineer was near the aircraft at the time. He was checking the removal of the nose wheel steering pin. Fortunately he was located on the opposite side of the aircraft. Had he been on the left hand side of the aircraft it is probable that the hub would have hit him causing serious injury or even death.

Aircraft and air jetty wheels are not the only ones utilising high pressure tyres. Be aware of the risks of any equipment fitted with them.



*Split hub lying below the hole in the fuselage*



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## Helicopter Ramp Incident

**A** helicopter was taxied from the maintenance area to a position outside the terminal building where it was due to embark its passengers.

The crew were aware that whilst the passengers were being loaded, a baggage vehicle approached the aircraft and later departed from the aircraft. The First Officer was given the manifest and whilst he was checking it the passengers were given the normal briefing.

With all the preparations completed the Commander called for pre-taxi checks. At the time no ground personnel were in sight. The checks were completed without either pilot noticing an illuminated baggage bay warning light.

At this stage the aircraft was taxied forward and commenced a gentle right turn towards the taxiway.

When the tower controller saw the helicopter for the first time he noticed that the baggage door seemed to be open and advised the Commander of the aircraft. The aircraft came to a halt and the First Officer was dispatched to secure the door. On his return the aircraft continued to taxi. The Tower controller received a telephone call from the operator regarding the baggage that he did not understand and so advised the aircraft to return to the stand for clarification.

Once on stand, another helicopter advised the Commander that there seemed to be some damage to the frangible fairing below the tail.

The aircraft was shut down, the passengers disembarked and engineering support requested.

On arrival in the hangar the crew were advised that the aircraft had collided with the baggage truck and the baggage loader.

It transpired that the baggage loader was still busy loading the aircraft and the baggage compartment door was open. The crew had missed the illuminated door light during their checks. When the Captain taxied forward and started his turn he crushed the baggage loader against the baggage truck, causing injury to the baggage loader and damage to the frangible fairing on the aircraft.



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## Ground Damage at Zurich



**T**he aircraft was parked on one of the remote stands and was being prepared for a night departure to Turin. The crew had operated an earlier flight and remained on board during the turnaround.

The passengers were bussed out to the stand and were boarded from the front and rear steps. When boarding was completed the rear steps were removed

and the front steps remained in place until the 'head count' was completed and the paperwork handed off.

The front steps were then removed, first by reversing from the aircraft and then by driving away from the aircraft to drive around the port wing. The parking area is

quite tight. There is a manoeuvring area for vehicles which forms the boundary of the parking area for aircraft and designates the parking area for vehicles. The stairs had not been fully retracted when they were pulled from the aircraft and the driver turned too early when turning onto the parking area and drove the steps into the port wing, about two feet in from the wing tip. The vehicle was not being driven quickly but the left rail of

the steps became imbedded in the wing and was stopped by the leading edge spar.

The aircraft was grounded for two weeks while the repairs were carried out with the handling agents accepting full responsibility for the 'downtime' and for the cost of a replacement aircraft during this time.

In the final report there were no real extenuating circumstances given either by the driver or by the airport authorities as to what caused the incident other than perhaps inattention by the driver. There was a lot of rebuilding going on at the time. The stands had aircraft positioning past them on both sides, but were fairly well lit and had been in use for some considerable time. A local curfew was in place but was not a factor in this incident.



## Implementation of HSE's Aircraft Turnround Guidance Note HSG209 at Heathrow

The Health and Safety Executive's Aircraft Turnround Guidance Note HSG209 first published in 2000 came straight to the point in its introduction by stating 'currently, accident rates in the industry are well above the national average for all industries, and for ground handling and airport workers, accident rates exceed even those of the construction industry and the agricultural sector'.

These are strong words for an industry that can rightly pride itself on an aviation safety culture which has delivered unparalleled safety performance in the skies but why has this not been translated onto the ramp? To outsiders it may seem a strange anomaly but those within the industry will be able to recognise that in the past a task culture was nurtured that focused on getting the job done rather than how it was done.

The HSE document raises many important issues. It focuses on the responsibilities of the airport operator, the airline or aircraft operator and the service providers as individuals and also acting collectively. Under existing Health and Safety Legislation, all companies have responsibility to protect the health and safety of their employees and to protect them from risks created by the activities of other airport users. If others are likely to be affected by a company's activities, the HSE define three guidelines that companies should follow:-

1. Co-operate and co-ordinate with other employers
2. Control your contractors
3. Assess and control the risks to other people from your activities and inform them of any risks still left

Under the first point the HSE recognises that the airport or aerodrome operator is best placed to develop co-operation and co-ordination on an airport wide basis, but can only do so with the active

involvement of the whole airport or aerodrome community. A simple but very important message inherent to the new document is that success can only be delivered by all parties working together.

Control of contractors has become more of an issue over the years. Services at one time provided in house by airlines have been divested and are now carried out by separate companies. The HSE document states that legal safety responsibilities cannot be delegated and that it is not possible to merely rely on standard clauses requiring contractors to comply with relevant health and safety legislation. While companies are responsible for checking their prospective contractors' arrangements for health and safety, they should also co-ordinate and control the work they carry out on the company's behalf and monitor their performance. One of the key recommendations is that companies should appoint a supervisor to control the turnround, who could be a member of the airline or handling agent staff. This supervisor should have sufficient authority to control the activities around the aircraft and should work to an agreed turnround plan.

Interestingly it can be argued that the introduction of the EU Directive for Ground Handling at Heathrow created the need for a changed environment where airport users took on responsibility through collaborative decision making for shaping how the market would be structured and managed. Initially HAL saw the introduction of an open market as contrary to maintaining a safe and efficient airside working environment. For an airport that already had 8 ground handlers it was difficult to see that there would be any benefits from having more, as more handlers almost inevitably meant more equipment and congestion.

Further to HAL's request for a restriction, a ruling by the CAA in December 1998 in favour of an open market thrust all the parties involved into forming the Airport Users Committee (the body described in the legislation) and putting in place all the measures necessary to support the implementation of the new legislation from April 1999. The work was undertaken by the AUC Licensing Sub Group which has since become a model for developing proposals that have wider community benefits. It was this sub group that was



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reconvened in October 2001 at the request of the AUC to examine the HSE document and identify if a Heathrow framework could be developed. Membership of the AUC Licensing Sub Group was comprised of 5 nominated airlines, 5 airlines who were also handlers and 5 independent handlers. A series of weekly meetings was established to move the task forward rapidly with HSE invited to attend. Their presence proved very beneficial and maintained a focus on avoiding the risk of injury to people which is now a consistent theme in the Heathrow document. It is probably significant that before this work, safety data on aircraft damage incidents and vehicle incidents was widely monitored and while significant improvements have been achieved over the last year (a reduction of 16% and 20% respectively), there was not the same focus on personal injuries. That is not to say that companies were not monitoring and reporting personal injuries as required by legislation, but as a community we found it difficult to share the data and use it to target improvement.

The document developed was titled 'The Aircraft Turnround Plan (Heathrow Airport)' and describes the activities involved in the generic aircraft turnround process which

should be considered at each stage together with checklists. The plan can be represented as four key sub processes as shown at Figure 1.

- a) **Resource Planning Process**  
This sub process requires companies to have all necessary risk assessments, trained staff, equipment and resources in place together with a co-ordinated turnround plan for any particular aircraft movement. It also identifies the need for a Turnround Co-ordinator (TCO), and the need to analyse performance against the turnround plan and review if necessary, communicating any changes to all parties.
- b) **Preparation and Arrival Process**  
The preparation sub process contains all the checks that are necessary prior to the arrival of the aircraft, while the arrival sub process describes the ground procedures for the safe arrival of the aircraft onto stand.
- c) **Turnround Servicing Process**  
The turnround servicing sub process involves all the core activities undertaken while the aircraft is on stand and is further divided into four

sub processes: off load, core servicing, on load and departure.

d) **Make Ready for Next Turnround Process**

This final sub process importantly describes the activities which should be undertaken after the aircraft has left the stand to ensure everything is in place for the next turnround.

The second part of the Aircraft Turnround Plan (Heathrow Airport) contains appendices which have been collated as examples of current good practice, to assist airlines and service providers in the development of their own more comprehensive Turnround Plans.

The AUC has now approved the final draft of the document and the licensing sub group has been stood down. The document will now be issued under a General Notice and will effectively embody relevant safety requirements into the licence documentation.

The success of the new document has yet to be proved although it should result in decreasing personal injuries and aircraft and vehicle incidents. The document is an important starting point but will be reviewed and improved as felt necessary. What is clear is that through the airside community involvement a wide range of expertise from various companies has been brought together to create a simple document that will provide a common framework for companies working airside at Heathrow.

**Changing Safety Culture**

While the Aircraft Turnround Plan (Heathrow Airport) has been produced to provide a generic template for specific aircraft turnround plans, another important initiative has been running alongside, based initially on work undertaken by Dupont Safety Specialists. Previous experience has shown that it has proved difficult to sustain safety

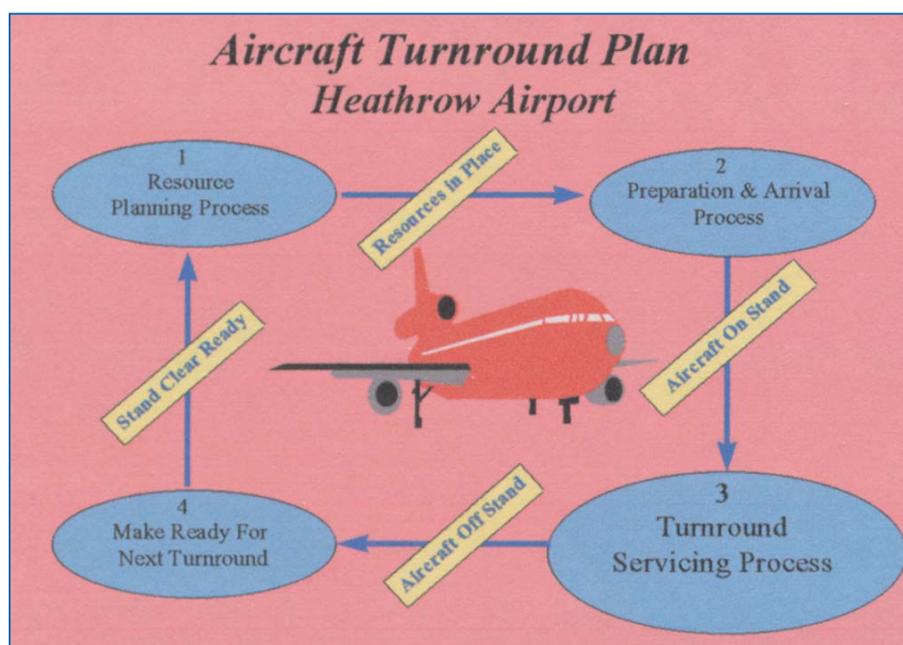


Figure 1

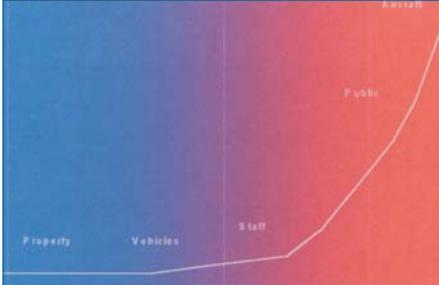


Figure 2

improvement and while various campaigns have had some impact, the benefits tended to dissipate fairly quickly. It was recognised that to make a significant change in safety performance it would require a step change in the safety culture which affected everyone's behaviour. As a result Dupont Safety Specialists were commissioned to carry out a 'peg in the ground' safety study with eight significant ramp operators.

Separate individual company reports were produced but also a communal report

which sought to identify how we as an airport community could lead a change programme. Dupont found that 95% of injuries and incidents were caused by 'unsafe acts' as opposed to 'unsafe conditions' which focused attention strongly onto behaviour and developing a safety culture where people identify and eliminate 'unsafe acts'. Their studies also found that there was a strong commitment towards aircraft and passenger safety, while staff, vehicle and infrastructure came significantly lower as shown in the Safety Curve at Figure 2.

Behavioural auditing training has commenced so that line managers can interact with the front line teams to support good safety performance but also to address areas where further improvement must be made.

A Safety Leadership Group has been formed and membership expanded, sharing a vision of zero incidents and

injuries. While everyone accepts there is much to do, there is a community approach being developed with common strategies for sharing data and improvement. It clearly will take time to change a task culture particularly one that has been built over many years but there is a growing commitment to wanting to act as part of an airport community to make a sustainable safety culture change that will be for everyone's benefit.

Copies of the Aircraft Turnround Plan (Heathrow Airport) are available from George Cook, General Manager Airside, Heathrow Airport Ltd

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## Ramping-up Safety

by Dr Simon Bennett FICDDS

**R**amp safety is of importance to all those involved in commercial air operations — if only because the economic and public relations fallout of a mishap involving passengers transiting the ramp could easily cripple the airline involved, its ramp service provider and the airport authority. This article will look at safety issues pertaining to passenger embarkation and disembarkation using stairs (either carried or provided by ground handlers).

The rise of the 'low cost' carrier has meant a greater focus on turnaround time. The low cost business model requires that aircraft spend as little time as possible on terra firma. An airframe's profitability is partly a function of its utilisation level (although numerous other factors act on the bottom line). The embarkation of passengers across the ramp to, say, a 737 has a number of advantages. First, it obviates the use of a (potentially) more costly air bridge. Secondly, passengers can be embarked via L1 and L2 simultaneously. Thirdly, carriers practised in this method are free to choose secondary or tertiary airports where air bridges are not provided. Fourthly, because of their technical complexity air bridges are prone to failure. In this context a carrier that becomes reliant on air bridging may encounter operational problems. (Of course a 737's integral air stairs can also jam, although redeploying the ground stairs from L2 to L1 is always an option). As a consequence of such factors ramp loading is attractive to low cost operators.

### Resident pathogens

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The ramp is an example of what technologists call an 'open system'. In an open system people, technologies and the natural environment may interact in unpredictable and potentially unsafe ways. These potentially dangerous interactions constitute 'resident pathogens' or 'problems waiting to happen' (see Reason's book *Human Error* for a fuller explanation. Details below). The most

obvious problem is a passenger, possibly a poorly or non-supervised infant, running across the ramp and sticking her arm into a revolving compressor blade (the 737's CFM-56 is a low-slung engine that almost invites the curious and naive to crawl inside). As we all know children are unpredictable, supervising adults are not always attentive (especially when tired, wet, cold, disorientated and/or intoxicated) and compressor fans freewheel in the wind.

Having worked as a safety consultant to an airline for two years I can attest to both the unpredictability of children and their (nominal) guardians. I have witnessed numerous near misses. On occasion, when managing the ramp on turnaround, I have found myself monitoring then apprehending wayward children. Finding the supervising adult is not always easy.

Of course, airport designers use such devices as barriers and markings to impose a measure of discipline on the ramp. At Stansted, for example, all ramps are marked to mandated standards, with the usual green and white lines indicating passenger ways, the red and white lines indicating the ramp equipment park (REP) and the double whites indicating the aircraft manoeuvring area (prohibited to all except those workers directly involved in push-back, start-up and release). Of course the obvious problem is that while such markings mean – or should mean – something to ramp workers, they carry no meaning for passengers. Hence the need for the supervision of passengers on the ramp.

This creates potential problems:

The low cost business model requires that overheads be minimised. To pare down costs aircraft are usually operated with the legal minimum number of cabin crew. In the case of a 148-seat 737 this means three. Ideally, one cabin crewmember should, in concert with the dispatcher, supervise the ramp. In practice, due to on-board duties at turnaround, this is not always done. (Some carriers aim for and achieve 25-minute turnarounds). For their part dispatchers, of necessity, have to work

between the ramp, cabin, flight deck and gate. This generates a resident pathogen - the non-supervision of passengers between the gate and the aircraft. This scenario creates numerous affordances for mishap (as in the wayward child-and-engine fan accident). It also gifts a 'window of opportunity' to any passenger with malicious intent, enabling her/him to either ruin an airline's reputation (and make some tabloid money along the way) or sabotage an aircraft. (It is certain that Al-Qaeda is considering other modes of attack. This year's low-intensity civil war in Israel and the West Bank has magnified tension and loathing and the US/UK campaign in the Afghan mountains has not been as successful as we have been led to believe).

### Designer error

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At one UK airport passengers are funnelled from a gate into a roadway. They have to negotiate the roadway, often without supervision, to get to the aircraft. While the roadway is marked with the usual solid and zig-zag white lines, it is debatable whether all passengers understand their meaning. It is also questionable whether road safety is uppermost in passengers' minds (after all, this is an airport, not a High Street). At night and in bad weather being seen and being safe on the apron would, in most passengers' 'hierarchy of needs', come a poor second to reaching the light and warmth of the aircraft cabin. Here we have a resident pathogen par excellence — an opportunity for accident rooted in bad design. It is certain that children will have no understanding of the dangers inherent in such situations. If it is feasible for a child to run out into a roadway and into the path of a service vehicle then, one day, this will happen. It is only a matter of time. Besides the immediate tragedy of a child being killed or injured the subsequent economic and public relations fallout would be devastating.

There are other, perhaps more obvious resident pathogens, like service vehicles parked on the left hand side (or PAX side)

of the aircraft. Sometimes these vehicles, whether belonging to engineering or cleaning companies, are left unattended with engines running. There is an obvious risk in asking passengers to negotiate these vehicles to embark or disembark the aircraft (from either L1 or L2). During my ramp work I have witnessed stairs abandoned across bay markings (presenting another obstacle to passengers), bags of waste left on the ramp just waiting to be kicked open by passengers and chocks not returned to the REP. The obvious solution to poor performance is for the airline to choose another agent. This is not always straightforward, however.

First, the airport may only have one ramp service provider. If there are two there is always the possibility that personnel will migrate from the less favoured to the more favoured company. While this migration is vital if the more favoured company is to meet the increased demand for its services the down side is that the staff who migrate may bring with them the bad habits (evidenced in and reproduced through a poor safety culture) they picked up with their previous employer. The preferred ramp service provider could recruit staff from other airports and/or industries. But this may be prohibitively expensive. It might also be a logistical impossibility, given that many of the regions served by airports are booming, house prices in those regions are rocketing and other, more attractive and better-paid jobs are beckoning (ramp work is physically hard, especially in winter). In conclusion while the co-existence of two companies offers a choice in theory, in practice an over-preference for one company will, in time, nullify that choice. The less preferred company will go under.

## A manifesto for change

While the ramp safety record of most airports is good the situation could be improved. The need for improvement is driven by the growth in airline traffic. It

stands to reason that the more passengers the airlines transport the greater is the potential for mishap — especially when many of these passengers will travel by low cost carrier from secondary or tertiary airports where ramp loading is the norm. Kueter (2002) observes: 'The international air transport market is characterised by a tendency toward continuous growth. Estimates predict growth of 100 to 150 percent in passenger volume within the next 15 years'. Possible measures to improve safety range from spontaneous organisational change to regulation:

1. Given that 'seamlessness' is one of the keys to safe operation the ideal would be for the airline to ground handle its own aircraft. While this would increase

costs (third party operators keep costs down by servicing more than one carrier) it would obviate the problems inherent in divided responsibilities. Safety is indivisible. Through creating a disjuncture in supervision any formal division of responsibilities by definition threatens safety. A unified, multi-function structure would ensure that both air and ground operations were driven by the same safety culture. The same standards would be applied in both spheres. As everything would be done in-house error-reporting and problem-solving would (in theory) be expedited. (Although there is no guarantee that the resulting inclusive, multi-tasking 'umbrella' structure would be more effective than the fragmented structure it replaced.)



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2. If option 1 is rejected there is a fallback: a member of the airline's staff must be on the ramp exercising the airline's authority during embarkation and disembarkation. This ensures that the airline's safety culture permeates both air and ground operations. Continuity of oversight is the key to safe ground handling.
3. If option 2 is considered too ambitious there is a final fallback: airlines should provide feedback to and be prepared to deploy sanctions against wayward ground handling companies. The handling company should be made aware of what is not acceptable (like parking vehicles on the left hand side or leaving stairs on the ramp). Airlines might consider punitive financial sanctions against transgressors. (This management technique will only work if employed sparingly. If over-used the ramp service provider may go under, creating a short-term operational problem and longer-term diminution of competition and choice.)

At the end of the day no solution is perfect. The problem with using cabin staff to supervise the ramp is that it leaves just two cabin crewmembers to complete turnaround duties. Given this logistical hurdle it is likely that some — perhaps a majority — of airlines would carry on as before. This raises the question of whether regulators should require airlines to manage the ramp. A statutory duty on airlines would (theoretically) raise standards and ensure a level playing field between carriers. My inclination would be to choose persuasion over compulsion. Operators should be appraised of the likely consequences — in terms of death, injury, financial loss and bad press — of a mishap on the ramp.

Having said this I am under no illusion as to the magnitude of the problem. Ramp indiscipline is a major topic of conversation amongst cabin and flight crew. One pilot remarked that amongst some ground handlers 'competence' seemed to be

measured not in terms of how safely (i.e. slowly and carefully) workers drove service vehicles, but how fast they could drive them without skidding and/or colliding with parked aircraft or ramp furniture. This pilot had observed a truck driven so fast that when the brakes were applied ten yards from a parked aircraft the vehicle skidded for three yards! I have observed a handling agent reverse a car at speed across several ramps. There is no way that the driver could have seen exactly where he was going. The car was packed with his colleagues. The fact that they saw me (dressed in regulation clothing with airline logos on display) making a note of their number plate made no difference whatsoever to their conduct. But it did change their demeanour. They smiled.

Having said this I am aware that ramp service providers perform their duties within a context fashioned in part by the airlines. The airlines, in turn, respond to market demands. As Chong (2001) has put it: '[T]he ever-increasing number of passengers boarding our airplanes are expecting ... better performance, value and service ...'. If low cost carriers demand quick turnarounds ramp service providers respond. No company would risk losing its contract to the opposition by ignoring its client's requirements. So the drive to improve ramp safety has two elements. First, carriers must re-emphasise the primacy of safe operation. This should be an ongoing activity, secured through periodic safety audits and debriefings with ramp service providers. Without feedback to subjects audits are useless. As Jones (2002) puts it: '[L]ike all reports, carrying out an inspection can be the easy part of the process; the question remains as to what to do with the information gleaned'. All carriers should commit one cabin crewmember to the ramp. All crewmembers should be trained in ramp management (it is much more common sense than rocket science) and should be given the requisite assertiveness training (the ramp can be a pretty macho working environment!). They should also be provided with appropriate warm and

waterproof clothing. Secondly, ramp service providers must respond to carriers' feedback (as well as feedback from the airport authority). If this 'softly softly' approach fails to produce results the responsible authorities should consider tighter regulation of the interface between the airlines and their handling agents. I am sure we can all agree that public safety is our number one priority.

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- About the Author**  
*Dr Bennett directs the MSc in Risk, Crisis and Disaster Management at the Scarman Centre, University of Leicester, England. His latest book Human Error — by Design? is available from Perpetuity Press at orders@perpetuitypress.com*



## Just Another Ramp Incident



Some of the most costly types of incidents that still affect airlines today are those on the Ramp. Although, usually, of a relatively low order in terms of individual cost, they occur frequently enough that the annual bill can still be very significant. What do I mean? Lets look at a recent incident that affected one major UK scheduled carrier in the last couple of years.

Imagine a major UK airport on a pleasant day with a 737 crew manoeuvring onto a recently vacated stand. The stand concerned is wide enough for one 747 or two 737s, but the jetty is only usable for the left-hand stand when two 737s are parked. The correctly parked ground power supply, painted yellow, is fixed and mounted on an extending cradle on wheels to the front right of the approaching 737. The crew are trained to ensure that the stand is clear of obstructions before entering the stand. The crew have been allocated the right hand of the two parking slots and the standard STOP line is in use and marked on the concrete to the left of the stand centreline. Unfortunately, the stand geometry dictates that the AGNIS display

is mounted very high, and to the right of the crew, on the terminal structure which creates a significant split of the Captain's attention, especially as the aircraft nears the final parking position.

The crew concerned both ensured, to the best of their ability, that the stand was clear and that the guidance system was switched on. Accordingly, they proceeded slowly onto stand. Just before the aircraft reached the correct STOP position, the crew were signalled to stop by an agitated member of the loading crew who were awaiting the aircraft's arrival. The Captain stopped the aircraft and shutdown the engines on the instructions of the ground personnel.

Upon initial investigation, it transpired that the right-hand engine intake had contacted a small pair of engineering access steps. Needless to say, a full investigation was launched and, inevitably, there was more to the incident than met the eye. I don't wish to bore you, the reader, with the full details so I will confine myself to the important bits.

The error chain began before the crew even approached the stand. The aircraft

that had previously been on stand had undergone minor corrective maintenance using the steps for access. The removed part had been bagged up and placed on the top of the steps – no doubt intending to return the offending article to stores once the aircraft had been dispatched (Error 1). The steps had been moved forward away from the aircraft, but were left on the active stand area (Error 2) in front of the extending arms of the ground power with the brakes off (Error 3). The aircraft was then instructed to carry out a long push to allow our aircraft onto the stand. Our dispatcher arrived at the stand in a hurry having had a long way to travel, saw the offending steps parked in front of the extending arms of the ground power unit but infringing the protected zone. The dispatcher decided that the steps were parked too far away to be a hazard and left the stand guidance illuminated (Error 4). The crew did not notice the steps parked on stand (Error 5) as they were roughly the same height as the ground power system and painted almost exactly the same colour!

As the aircraft approached the correct parking position, the airflow through the right engine was sufficient to suck the unbraked steps towards the intake. Unfortunately, suction was also strong enough to cause the engine to ingest the small packaged aircraft part that had been left on top of the steps with the inevitable damage to the engine.

### The moral of the story?

Adherence to correct procedures and meticulous attention to removing stand obstructions - even if you are in a rush.



## Thoughts on Ramp Safety

by Wing Commander Dave McCormick  
SO1 Engineering Policy  
Defence Aviation Safety Centre

**A**ircraft operating ramps are home to many aviation safety hazards. The mixture of aircraft, refuellers, hot engine exhausts, ground equipment, vans, people and a variety of noises is potentially lethal. But, are ramps safe? I can hear the ramp managers now explaining that, considering the number of aircraft movements on our ramps, there are few reported accidents. Unfortunately, that is not convincing for 2 reasons.

Saying “we have few accidents” is not the same as saying “we are safe”. For example, flying hour for flying hour, would an organisation that had 3 different aircraft accidents be less safe than one that had 2 identical and preventable accidents? I think not! Current safety experts agree that being safe implies looking at all the hazards, carrying out risk assessments and mitigating all the risks until they are as low as reasonably practical and tolerable. Also, reported accidents are a function of 2 variables: how many accidents occurred and the proportion of accidents reported. If there is a poor reporting culture, the number of reported accidents may be irrelevant to the safety level.

If the number of reported accidents does not tell you how safe your ramp is, what does? To measure safety you need to look at the following 4 things:

### How safe is your equipment?

Has a competent individual decided that your equipment is designed to meet the task for which it is used? Do you have an adequate and responsive equipment maintenance regime? Do you have enough equipment for the tasks you intend to complete? Is there a management system in place to maintain adequate availability of the equipment? Is all the equipment on the ramp really necessary?

### How safe are your people?

Do you have a system in place to ensure that your people are competent for the processes you expect them to complete? Do your people have a positive attitude to safety? Do you have enough people for the tasks you intend to complete? Are all the people on the ramp really necessary?

### How safe are your processes?

Are all your processes validated and documented? For complex processes, do you have quick reference checklists that are suitable for use on the ramp? Do your safety critical processes rely on perfect performance by individual staff members? Do your safety critical processes define required levels of supervision and independent checks? Do you have a quick and simple system for validating process change proposals and altering your documents and training where appropriate?

### Does your organisation use risk management principles in your work on the ramp?

Are you continually looking for hazards, particularly during unusual events? When you identify a hazard, do you assess the likelihood and consequences of realising those hazards? Do you mitigate the risks to achieve a tolerable level that is as low as reasonably practicable? Every



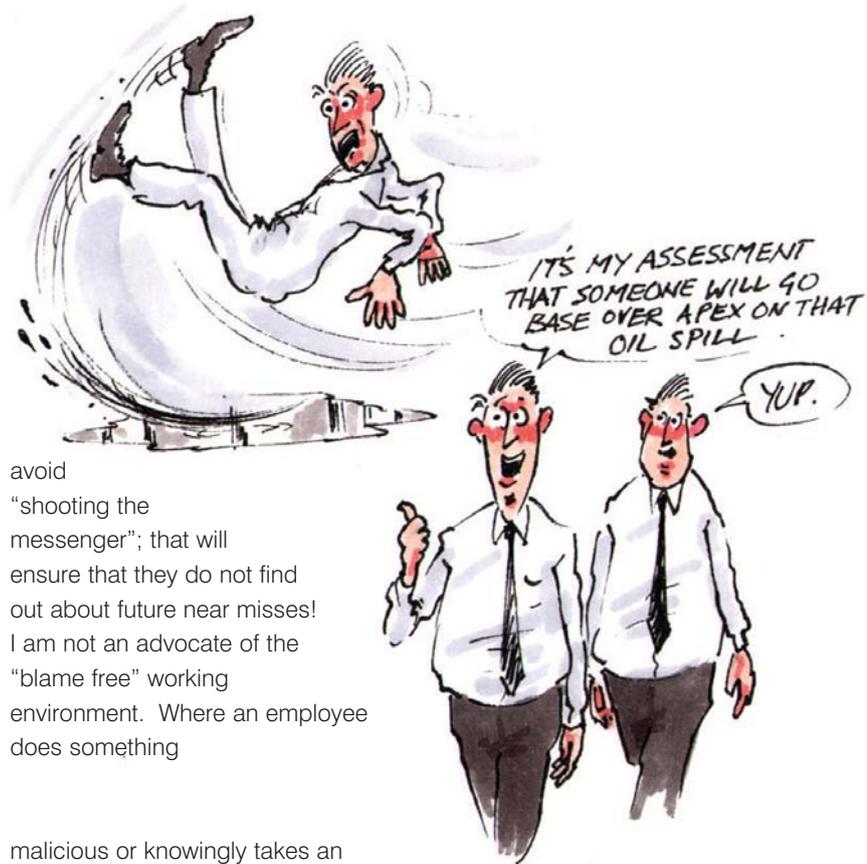
time something goes wrong, do you investigate why it went wrong and implement a solution intended to prevent recurrence?

These are basic elements of a safety management system. How often do you carry out an independent audit of your systems to ensure that they are working as intended?

How does all this theory apply on the ramp? Well, consider aircraft refuelling. Are the only personnel aware of the hazards the recent arrivals? The routine nature of aircraft refuelling inevitably increases the likelihood of complacency. Might there be an element of complacency amongst some of your more experienced refuelling staff? When was the last time they were reminded of the hazards? How often do supervisors or safety staffs watch aircraft refuelling to ensure that procedures are being followed? What about aircraft loading? What about cabin cleaning? What about aircraft de-icing? What about aircraft despatch teams? All these areas deserve regular scrutiny. After scrutiny do you have a team debrief where your findings and observations are openly discussed?

People will always make errors; it is an inevitable consequence of being human! If you can understand why people make those simple mistakes, you can design your systems to be more tolerant of error. Safety is all about how error tolerant your systems are!

The problem for any organisation is preventing the next accident, rather than the simpler task of dealing with the last one! Until everyone reports all the near misses and these are dealt with actively, they will continue to occur. Eventually they may cause an accident rather than another near miss. Thus, if managers want to make the ramp safer, they must



avoid "shooting the messenger"; that will ensure that they do not find out about future near misses! I am not an advocate of the "blame free" working environment. Where an employee does something

malicious or knowingly takes an unjustifiable risk, discipline is appropriate and most employees would agree. However, I commend management encouraging an open reporting culture and being seen to produce practical and effective recurrence prevention strategies.

A particularly difficult issue to deal with is the "can do" attitude amongst ramp staff. Despite any problems, ramp staff will always attempt to get the aircraft away on time.

Unfortunately, in these circumstances, they will often focus only on meeting the time slot. This focus can lead to unintentional risk taking. When things are not going well or are rushed, that is the time for a supervisor to be standing back and taking the overview. He must try not to get involved in the detail but only to step in when safety is compromised. You might say he is your goalkeeper and he is trying to prevent an own goal!

I will finish with some questions for you to contemplate!

- Is your ramp a safe one?
- How do you know?
- Is safety the fortunate result of professional effort?
- Or is it the planned result of active management?
- Can you justify everything that happens on your ramp?
- Is an ounce of effort worth a ton of theory?



# UK FLIGHT SAFETY COMMITTEE



Annual Seminar 2002

## Ramp Safety Revisited Chaos or Concerto?

3rd/4th September 2002

The Radisson Edwardian Hotel Heathrow

### Seminar Objective

The UKFSC visited this topic in 1994 - what has changed? Statistics show an increasing incident/accident trend; areas still require major improvement - why? If you are involved in any way with Ramp activities, you should attend.

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### Programme

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#### 3rd September 2002

1600-1700	Registration This will take place in the Hotel Foyer	2000hrs Seminar Dinner After Dinner Speaker - Air Cdre. Chris Moran OBE MVO MA BSc
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#### 4th September 2002

0800-0900	Registration Session Chairman - <b>Capt. Steve Solomon, MyTravel</b>	1155-1215	Health & Safety on the Ramp <b>Christine Barringer - HSE</b>
		1215-1245	Discussion
0900-0910	Opening Remarks <b>John Dunne - Chairman UKFSC</b>	1245-1400	<i>Lunch</i>
0910-0940	Keynote Speech <b>Ken Smart - AAIB</b>	1400-1430	Where is Best Practice - UK or Abroad? <b>Richard Heard - Birmingham Intl. Airport Ltd</b>
0940-1010	Regulators View <b>Mike Overall - Aviation Consultant</b> <b>Stan Brown - CAA</b>	1430-1500	Damage Assessment & Claim Recovery from an Airline's Perspective <b>Ivar Busk - SAS</b>
1010-1040	How We Do It <b>Charlie Clifton - Ryanair</b>	1500-1530	Airport Design Influence on the Problem <b>Mark Oliver - Jacob Gibb Ltd</b>
1040-1100	<i>Refreshment Break</i>	1530-1550	Discussion
1100-1130	Case Studies in Damage <b>Paul Clark/Peter Cooper - Airclaims</b>	1550-1600	Closing Remarks <b>John Dunne - Chairman UKFSC</b>
1130-1155	Ground Handlers' Dilemma <b>Bob Newman - Menzies Aviation Group</b>		

# Seminar Information

- **Hotel Accommodation**

Hotel Accommodation is not included in the Seminar Registration Fee. A rate of £137 (including breakfast & VAT) has been negotiated with the Radisson Edwardian Hotel (valid only until 16th August). If you require accommodation please contact the hotel directly on Tel: +44 (0) 20 8759 6311 and quote Block Booking Code 0309 UKF when making your reservation.

- **Seminar Dinner**

Dress for Dinner - Black Tie

- **Cancellations/Refunds**

Cancellations received prior to 2nd August 2002 will be refunded 50% of registration fee. Refunds after this date will not be given.

*If you are unable to attend why not nominate a colleague to take your place. If so, please advise the UKFSC Fairoaks office of any changes prior to the Seminar.*



## Seminar Registration Form

Please complete in full one registration form per person. (Photocopies accepted)

### REGISTRATION INFORMATION

*(Please print clearly)*

First Name: \_\_\_\_\_ Surname: \_\_\_\_\_

Company: \_\_\_\_\_ Job Title: \_\_\_\_\_

Address: \_\_\_\_\_

Tel No: \_\_\_\_\_ Fax No: \_\_\_\_\_ e-mail: \_\_\_\_\_

### PAYMENT INFORMATION

Seminar Fee: £125 UKFSC Member  £175 Non-UKFSC Member

This includes the Seminar Dinner on the evening 3rd September, lunch, refreshments and car parking. This does not include hotel accommodation - **please see 'Seminar Information' above.**

**Payment** is by Sterling cheque only. No credit cards are accepted. Bank transfer is available, details on request (please note an additional cost of £6 will be added to cover handling charges). The UKFSC is not VAT Registered.

**Sterling cheques should be made payable to UK Flight Safety Committee.**

- Do you plan to attend the Seminar Dinner on Tuesday 3rd September?  Yes  No
- Do you require a Vegetarian alternative?  Yes  No

**PLEASE SEND YOUR COMPLETED REGISTRATION FORM WITH YOUR CHEQUE TO:**

**UK Flight Safety Committee, Graham Suite, Fairoaks Airport, Chobham, Woking, Surrey, GU24 8HX.  
Tel No: +44 (0)1276 855193 Fax No: +44 (0)1276 855195 email: ukfsc@freezone.co.uk**

Confirmation will be faxed to you on receipt of your Registration Form and payment.



# WHATS YOUR DAMAGE THIS MONTH?

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Eliminates the spearing effect of forks reducing damage by up to 70%\* without imposing on their effectiveness.

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Sumo glove fits most forklift trucks, covering a fork thickness of up to 12mm and a width of between 80mm and 150mm, and are attached with a specially formulated two part epoxy resin.

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\*figures as results of trials by Ford Motor Company.



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