

# safety bulletin

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head audit management*
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# Audit management



The Audit Management Team (DMA) Marianne Zingre and Peter Scheuber

Safety auditing is a core safety management activity, providing management with information on the safety of current operations and on areas where some form of corrective action may be required. Safety auditing is a proactive safety management activity, and offers a means of identifying potential problems before they have an impact on safety.

## General principles

The above summary, which has been derived from the ICAO Manual on Safety Management for Air Traffic Services, is one of the prime guidelines for our Audit Management unit and its activities.

Skyguide and its predecessor Swisscontrol have been performing evaluations or «audits» for over ten

years now. Audit management was originally part of Operations; and initially, the only units audited were those within this division. With the creation of the new Centre of Competence (CoC) in 2001, Audit Management was transformed into a companywide institution. The opportunity was also taken to ensure that the auditors involved report directly to the CEO or the Head of

Safety & Quality Management. Today's Audit Management unit consists of auditor Peter Scheuber (Head Audit Management) and auditor Marianne Zingre. One position currently remains vacant.

Our work is based on ICAO requirements, which state that «**safety reviews** of ATS units shall be conducted on a regular and systematic basis by personnel qualified through training, experience and expertise and having a full understanding of SARPs (Standards and Recommended Practices)», on Eurocontrol's ESARR 3, which specifies that «ATM service providers shall

ensure that **safety surveys** are carried out as a matter of routine, to recommend improvements where needed, to provide assurance to managers of the safety of activities within their areas and to confirm conformance with applicable parts of their SMS», and on the requirements deriving from ISO norms.

All these requirements have one thing in common: they all demand the regular and independent evaluation of all processes and services. It is a job that must be performed by trained and qualified auditors who have an adequate knowledge of air traffic services activities. Which is why our auditing team undergoes constant further training at both a national and an international level.

The mission statement of our Audit Management team is formulated accordingly: «To maintain and continuously improve **companywide audit management** in accordance with the requirements of ICAO, Eurocontrol and ISO 9001-2000, in order to provide assurance of the safety and quality of skyguide's services and ATM system».

Please have a look on the next article in this bulletin to discover more about our activities.

PETER SCHEUBER  
Head Audit Management

# More about audit Management



*The Tri National Evaluation Team from left to right: Heinz-Peter Gassen (DFS), Jürgen Lühmann (DFS), Daniel Knava (ACG), Marianne Zingre and Peter Scheuber (sg) and Karl Reischl (ACG). Two auditors from Austro Control are missing: Karin Jonas and Mario Lenitz.*

## TriNET

Austro Control (Austria's air traffic services organisation), Deutsche Flugsicherung (its equivalent in Germany) and the then swisscontrol concluded an agreement in 1998 to jointly form a «TriNational Evaluation Team». The aim of TriNET, as the project was named, was and remains to supply objective evidence of the safe, efficient and customer-focused provision of air traffic services by the organisations involved to their customers, their partners, the public and the supervisory authorities.

TriNET is a collaboration that has truly proved its worth over the past few years. But subsequent developments have had their effects on these activities, too. Which is why the TriNET partners are currently working on a revised and updated audit manual. A revised letter of understanding has also been signed at the top management level; and the general mandate issued to TriNET has been reviewed and revised. The following individuals are currently assigned to duties as TriNET auditors (see picture above).

## Future prospects

One of the annual objectives of our Audit Management team is to draw up an auditing concept that meets all skyguide's quality management, safety management and security management needs. To ensure full compliance with ISO 9001-2000 norms, future auditing activities will also be steadily extended to processes, too.

In a further development, the introduction of the Security Management System within skyguide should

permit security audits to be performed. This in turn should also ensure total fulfilment of the requirements of the SES.

## Safety Improvement Reports (SIRs)

The second major duty of the Audit Management team is to manage, monitor and process Safety Improvement Reports (SIRs) on behalf of the Head of Safety & Quality Management. This, too, is done to fulfil the requirements of ESARR 3, which states that «the ATM service provider shall ensure that all staff are actively encouraged to propose solutions to identified hazards, and shall ensure that changes are made to improve safety where they appear needed».

This is also an extremely demanding duty, and one which takes a great deal of time. All incoming reports must first be analysed and passed on to the unit heads responsible for studying them in more detail. The Safety Panel then meets every three months to discuss the feedback received and the solutions which management has decided to adopt in the light thereof. The Safety Panel is composed of currently-active air traffic controllers from our various operating units (ACC ZRH/GVA, TWR ZRH/GVA, Regional Airfields/Military) and representatives from our Technical Services division.



► More about Audit management...

We warmly invite all our skyguide colleagues to use these SIRs and thereby play an active role in further enhancing safety throughout our company and its activities.

**Activities 2004**

In 2004 ten audits have been carried out. Four in the operation department, four in the technic department and two in military units. During these audits a total of 288 problems have been identified. 104 of these problems were rated in category «B» and 184 in category «C». The main findings were:

- missing Letter of Agreements

between skyguide and airport operators;

- responsibilities concerning handling of Safety Case Documents are not described;
- missing guidelines for the implementation of ESARR's;
- the audits revealed that the requirements of the safety manual of skyguide, which should already be implemented, were not known by all of the audited Unit-Managers;
- missing documentation, particularly in the technical departments;
- procedures and responsibilities

which are not described in an unambiguous manner;

- missing cooperation between units within skyguide,
- information exchange is not standardized;
- responsibilities / competences are not (clearly) described

In 2004 unit management has closed a total of 201 problems, 59 B and 142 C.

Definition of Findings:

- **Category B findings**  
Category B findings are findings

which have an indirect influence on services and/or demand the initiation of corrective measures by the individual(s) responsible with priority over normal business activity.

• **Category C findings**

Category C findings are findings which have a possible influence on services and/or demand the initiation of corrective measures by the individual(s) responsible as part of their normal business activity.

PETER SCHEUBER  
Head Audit Management

# Safe Coordination, but...

**Facts and analysis**

Two traffic inbound Geneva from the South are arriving on the same STAR. The preceding one, a Dash 8, is 100 kts slower than the following one, an Embraer 145.

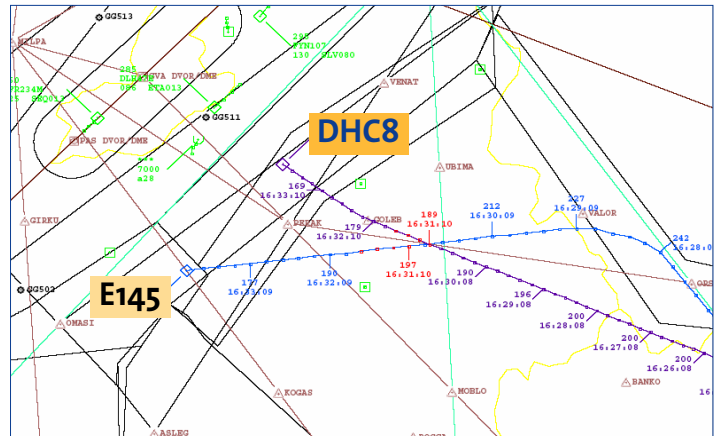
The DH8C which is maintaining FL200, is the first to establish radio contact with the INI sector: it is cleared on the planned Arrival route. One minute later, the E145 also establishes radio contact with the same sector, descending to FL270 on a converging track. The crew is instructed to descend to FL210. As the Embraer is catching up the Dash ( at least 1.5 NM/min), a coordination has to be made between INI and PRE sectors for the sequencing. It is agreed to keep speed for the Embraer and to clear it on a direct route, 1000 ft above the Dash.

According to the previous coordination, the E145 is instructed to «... maintain high speed» by the INI ATCO and when the DH8C is cleared to FL190, the E145 is descended to FL200. Few seconds

later, the Embraer is transferred to the Approach sector whereas the Dash, leveled at FL190, is kept on INI frequency.

On first contact with PRE sector, the E145 is cleared by the trainee controller to descend to FL150: at this very moment the aircraft is passing FL205, 2.5 NM East of the crossing point with the DH8C. One minute after, the latter is cleared to FL160 by the NI ATCO and also transferred to PRE frequency.

As the Embraer is passing FL197 to FL150, the STCA triggers off and the PRE controller instructs the crew to maintain FL190. At the same time, the Dash is crossing FL189 descending: it resulted in a separation minima infringement although both aircraft are already on a diverging track. During the incident, the Dash 8 was not any longer in contact with INI sector and did not have call PRE sector yet. Consequently, no action could be taken for it.



**What can we learn from this event?**

Whereas a coordination was done to organise a safe and efficient arrival sequence, a loss of separation occurred. Different elements may have contributed to this:

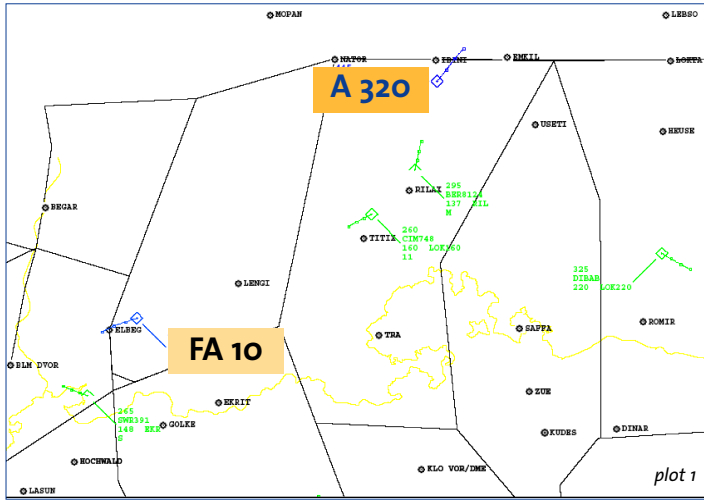
- the first a/c which contacted PRE sector was the highest one
- the two a/c were not simultaneously in contact with the same sector during the incident

- the probably lower experience of the trainee

This incident shows that a coordination is the first step to a safe solution, but it is not an absolute guarantee against future problems. This case also opens a discussion about separating aircrafts with radar headings on different frequencies.

DMO  
Occurrence Management

# FA10 / A320



A crossing between a Basle-departure (FA10) exit LOKTA and a Stuttgart-departure (A320) flying TGO VOR direct OLBEN then BENOT led to an air-proximity. The Lower Sectors North and East were coupled at the time of incident. According to RE N/E the traffic load was rated as being medium.

As the FA10 had turned over BLM VOR after departure from Basle, the RE of the sector N/E requested a higher radar-level from RE S/W. FL140 was granted for the FA10, restricting traffic being a BLM-arrival, cleared to FL150. On initial call when passing FL110, the FA10 received a climb clearance to FL140. Planned exit-level: FL230. As soon as the FA10 was clear of the BLM-arrival, RE N/E transmitted a new climb clearance to an intermediate FL200, in view of the A320 climbing out of FL170 with an average rate of 1000ft/min. 2 minutes later, the FA10 (passing FL175 with an average rate of 3000ft/min) was instructed to

turn right by ten degrees and subsequently cleared to FL230 (see plot 1).

By then, the A320 had checked in at the Sector U, passing abeam NATOR climbing through FL199. Shortly afterwards, RP U requested a climb release from Langen. The altitude read-out of the A320 showed FL222 when they were cleared to climb to FL280. At this moment, the FA10 (not visible to Sector U) was about to pass FL225.

The STCA was triggered when the FA10 had reached FL230 and the A320 was at FL226, at their relative 10 o'clock position and a distance of 8.1NM (see plot 2). RE N/E immediately instructed the FA10 to turn onto a heading of 090 degrees. On the other side, RE U who was suddenly faced with the STCA, instructed the flight crew of the A320 to turn right to BENOT and made this information visible in the radar label. There was no time to allow a telephone coordination with RE N/E.

The separation dropped below the prescribed minima when the two aircraft had already passed each other. The closest measured proximity was 4.1NM horizontally and 200ft vertically. No reports of TCAS resolution advisories were made by any of the two flight crews.

## Emerging considerations after analysis/ interview with ATCOs:

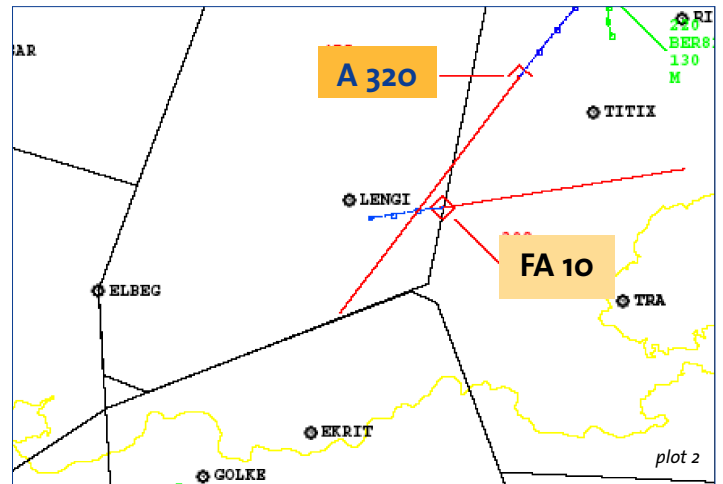
- It was discussed, whether the existing procedure for the transfer of communication [of Stuttgart-departures] could be improved; one suggestion was, that the transfer from Langen is made to Sector North, unless otherwise instructed by Sector N for each individual aircraft. Of course, this would increase the amount of coordination significantly.
- Another suggestion was to route traffic outbound Stuttgart via NATOR OLBEN BENOT instead

of a direct OLBEN BENOT. This would move the crossing point with Basle-departures towards the West, giving the advantage that Stuttgart-departures would be slightly higher and Basle-departures would be relatively low at the new crossing point.

The impact that one of those suggestions might have on other procedures/traffic routes (e.g. conflict with Zurich-arrivals on the BLM STAR) would have to be analysed closer.

**A full report is available under:**  
skyline/safety homepage/occurrence/investigation reports/internal

DMO  
Occurrence Management



# Human Factors, Management and Organisation

## RWY Accident in Los Angeles

On 1 February 1991, a Boeing 737 collided with a SA-227-AC while the 737 was landing on Runway 24 left at Los Angeles International Airport. The Metroliner was positioned on the runway, at an intersection, awaiting clearance for take-off. The glare from the apron lighting made the aircraft inconspicuous and difficult to see from the control tower. Both aircraft were destroyed and 34 persons fatally injured. The probable cause statement reads as follows:

«The National Transportation Safety Board determines that the probable cause of the accident was the failure of the Los Angeles Air Traffic Facility Management to implement procedures that provided redundancy comparable to the requirements contained in the National Operational Position Standards and the failure of the FAA Air Traffic Service to provide adequate policy direction and oversight to its air traffic control Facility managers. These failures created an environment in the Los Angeles Air Traffic Control tower that ultimately led to the failure of the local controller to maintain an awareness of the traffic situation, culminating in the inappropriate clearances and subsequent collision... Contributing to the accident was the failure of the FAA to provide effective quality assurance of the ATC system.

Safety management is a combination of...

- The development and implementation of a formal **Safety Management System**



- The development of a **Safety Culture** as a means to improve Safety

### Levels of action

In general terms, there are three levels of action decision-makers can choose in pursuing the safety recommendations from analyses such as those exemplified in the previous paragraphs.

**The first level** of action is to eliminate the hazard, thereby preventing a future accident. In the case of the runway collision accident, for example, a decision could be made that in airports having parallel runways, one runway should be used for take-offs and the other for landings.

**The second level** of action is to accept the hazard identified and adjust the system to tolerate human error and to

reduce the possibility of an occurrence. In this context, the decisions following the Los Angeles accident might include eliminating intersection take-offs or clearances involving taxiing into position on an active runway and holding for take-off clearance.

**The third level** of action involves both accepting that the hazard can be neither eliminated (level one) nor controlled (level two) and teaching operational personnel to live with it. Typical actions include changes in personnel selection, training, supervision, staffing and evaluation, increasing or adding warnings, and any other modifications which could prevent operational personnel from making a similar mistake.

Third level actions should not be taken in preference to first or second level actions, since it is impossible to anticipate all future kinds of human error. Attempting to eliminate all human error is an unattainable goal, since error is a normal part of human behaviour. The total system (including aircraft, crew, airports and ATC) should identify, tolerate and correct human error. Tolerate is the key word; as long as humans are involved, the system must be designed to tolerate the entire range of «normal» human behaviour, including human weaknesses. It must be error-tolerant.

*(Text in italics is an extract from ICAO Circular, Human Factors Digest No. 10, 1993)*

## Conclusion for skyguide's Safety Management System

The goal of our SMS is

- to protect our organisation against choosing level three solutions when introducing changes to our ATM/CNS-System by means of Safety Assessments and
- to detect level three solutions through our Occurrence Management, Audit Management and Safety Improvement Reporting

in order to give our organisation the possibility to look for solutions on level one or two.

If level one or two solutions are not feasible our organisation has to ensure through training, information, team resource management, etc. that technical and operational personnel can cope with unsatisfactory situations; knowing that third level solutions are the most ineffective and those which need the most resources.

To improve the safety of our system we need teamwork between all collaborators of skyguide; management and staff. The Safety Management organisation has to put in place the procedures, guidance material, etc. Management and staff have to use these tools effectively in a «Safety Culture» spirit. With this mutual understanding we will improve our Safety continuously. Take part in this evolution and help our organisation to become safer each day.

MARTIN PROBST  
Head Safety and Quality

## Active and latent failures

*Depending upon the immediacy of their consequences, failures can be viewed as **active failures**, which are errors and violations having an immediate adverse effect, generally associated with the operational personnel (pilot, controller, mechanic, etc.); or **latent failures**, which are decisions or actions, the consequences of which may remain dormant for a long time. Latent failures become evident when triggered by active failures, technical problems or adverse system conditions, breaking through system defences. Latent failures are present in the system well before an accident and are most likely bred by decision-makers, regulators and other people far removed in time and space from the event. Those at the human-machine interface, the operational personnel, are the inheritors of defects in the system, such as those created by poor design, conflicting goals, defective organizations and bad management decisions. They simply create the conditions under which the latent failures can reveal themselves. Safety efforts should be directed at discovering and solving these latent failures rather than by localized efforts to minimize active failures. Active failures are only the proverbial tip of the iceberg.*

## Corporate safety culture includes the following

- *senior management places strong emphasis on safety as part of the strategy of controlling risks*
- *decision-makers and operational personnel hold a realistic view of the short- and long-term hazards involved in the organization's activities*
- *those in top positions do not use their influence to force their views or to avoid criticism*
- *those in top positions foster a climate in which there is a positive attitude towards criticisms, comments and feedback from lower levels of the organization*
- *there is an awareness of the importance of communicating relevant safety information at all levels of the organization (both within it and with outside entities)*
- *there is promotion of appropriate, realistic and workable rules relating to hazards, to safety and to potential sources of damage, with such rules being supported and endorsed throughout the organization; and*
- *personnel are well trained and well educated and fully understand the consequences of unsafe acts*

*(Text in italics is an extract from ICAO Circular, Human Factors Digest No. 10, 1993)*

# Low vigilance (inattention) report

In Autumn 2004 Eurocontrol asked me to disseminate a questionnaire about low vigilance within the company. The questionnaire was distributed within the ACC and TWR/APP of Zürich. Thanks to the 25 Air Traffic Controllers who completed the form. The completed questionnaires were forwarded to Eurocontrol in November 2004.

The purpose of the work is to understand low vigilance in the ATM domain and to identify whether low vigilance is a safety issue and to what extent it is a problem.

A main report will be completed July, 2005. Three other ANSPs have been surveyed, and these results will

be summarised together with the results from skyguide in the main report. The skyguide document has only been circulated within the company.

The questionnaire contained 11 questions, which are all presented in the full report. Below a choice of results are displayed.

Question 1 asked respondents how often they had encountered a low traffic density period in the last month. All of the respondents had experienced a «low traffic density» period, where the majority experienced one from «time to time» (70%).

	Freq.	%
<b>Never/ Hardly ever</b>	0	0
<b>Occasionally</b>	2	8
<b>From time to time</b>	16	64
<b>Often</b>	4	16
<b>Very Often</b>	3	12
<b>TOTAL</b>	25	-

Table 1 - Frequency of low vigilance

Respondents were asked (Q6) if they thought the factors could lead to inattention (low vigilance). The majority of respondents felt that

monotony, boredom, fatigue, and napping (just before falling asleep) can lead to inattention.

TOM LAURSEN

	Can lead to low vigilance		Does not usually lead to low vigilance		Not sure		Total no. of responses
<b>Fatigue</b>	16	73%	5	23%	1	4%	22
<b>Nightshift</b>	14	67%	3	14%	4	19%	21
<b>Monotony</b>	18	82%	2	9%	2	9%	22
<b>High to low traffic</b>	14	61%	8	35%	1	4%	23
<b>Low to High traffic</b>	1	4%	20	87%	2	9%	23
<b>Napping</b>	15	75%	2	10%	3	15%	20
<b>Boredom</b>	17	74%	2	9%	4	17%	23
<b>Personal activities</b>	14	61%	4	17%	5	22%	23

Table 2 - Causes of low vigilance (multiple-choice questions)

The full Eurocontrol report can be consulted on skyline: Skyline/ safety homepage/publications/documents/others  
 For more information you are welcome to contact me: [tom.laurсен@skyguide.ch](mailto:tom.laurсен@skyguide.ch)

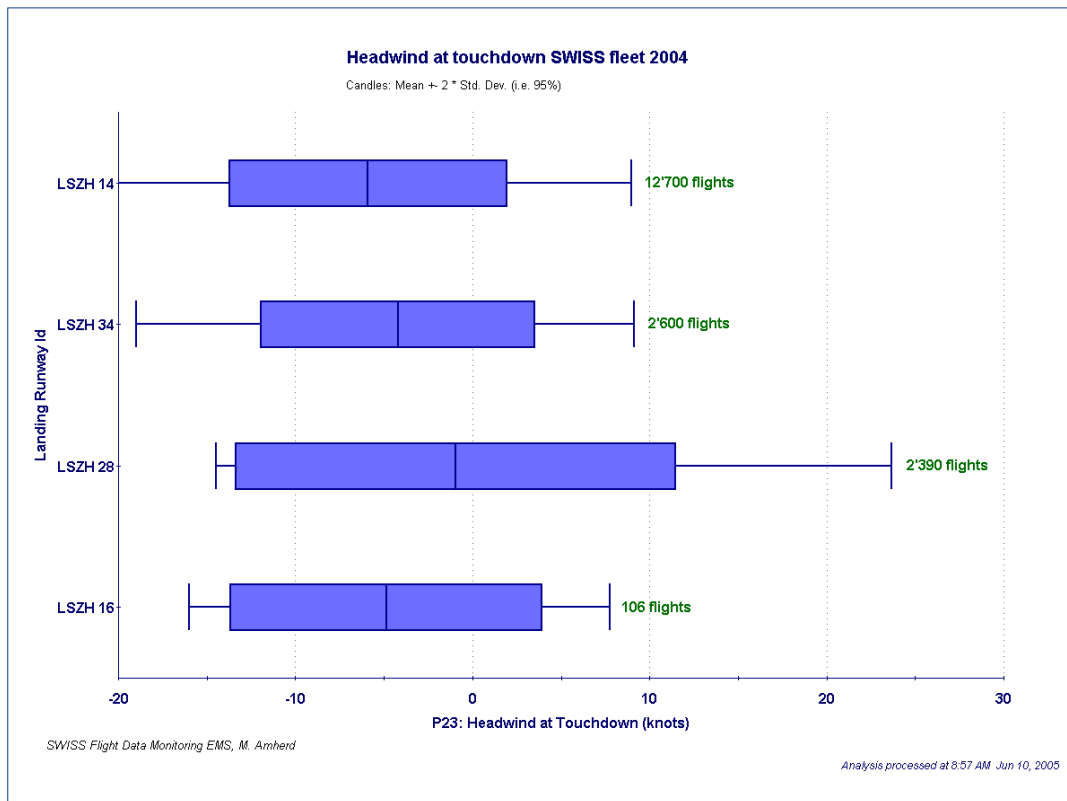
# Birds land into the wind

And so do aeroplanes, at least usually they do. That the international airport of Zurich is an exception can't really be blamed on its operating company. Nevertheless the situation is a little bit «unique». Through the use of our flight data monitoring system, the Event Measurement System EMS, we were able to, based on the large number of landings, generate a meaningful graph, which shows the average wind component for each runway in the touchdown zone. Additionally the actual wind values and the extremes are shown graphically.

It was much to our surprise that for all runways the mean wind direction was from the rear. Top of the line is runway 14 with a tailwind average of 7 knots. As I mentioned previously this has less to do with the operating company but more with the topography and the politically motivated constraints.

It would be easy to say that a 5 knot tailwind instead of a headwind does not have a significant impact with an approach speed of 140 knots. But since the energy rises with the speed squared this 10 knot difference already requires a considerably higher deceleration through the use of increased reverse thrust or wheel braking.

With the available runway lengths this is normally not a big problem, the exception being runway 28 especially when it is wet or even contaminated. The approach to runway 28 entails an additional problem.



During «Bise» the flight crews are quite often confronted with the following situation:

At the initial approach altitude they experience a tailwind component of 30-40 knots which decreases to 20 knots at about 500 ft AGL. Under these conditions the Airbus A330 is only able to follow the nominal glide angle by accepting a speed increase in spite of idle thrust settings. Since the wind measured on the ground is often within the tailwind limits or even shows a headwind the flight

crews have to cope with a negative wind shear of 20 knots. Thus they run the danger of landing long with too much kinetic energy and this on the shortest of the available runways! For this aircraft type, the A320 and A340 have better speed reduction capabilities, these situations can become very demanding and the execution of a missed approach may sometimes be indicated. A manoeuvre, which although perfectly safe leads to an increase of the workload in the cockpit and in

the tower and not to mention more noise and a higher fuel consumption, which in turn also leads to higher costs.

This is not about apportioning blame I do however feel it is very important to understand the needs and worries of the respective partner in order to keep this aircraft carrier Airport Zurich successful and safe.

JÜRGEN SCHMID  
Vice President SWISS Safety

# The Ambulance in the valley

*'It was a dangerous cliff, as they freely confessed,  
 Though to walk near its crest was so pleasant;  
 But over its terrible edge there had slipped  
 A duke, and full many a peasant.  
 The people said something would have to be done,  
 But their projects did not at all tally.  
 Some said "Put a fence 'round the edge of the cliff,"  
 Some, "An ambulance down in the valley."*

*The lament of the crowd was profound and was loud,  
 As their tears overflowed with their pity;  
 But the cry for the ambulance carried the day  
 As it spread through the neighbouring city.  
 A collection was made, to accumulate aid,  
 And the dwellers in highway and alley  
 gave dollars or cents – not to furnish a fence –  
 but an ambulance down in the valley.*

*"For the cliff is all right if you're careful," they said;  
 "And, if folks ever slip and are dropping,  
 It isn't the slipping that hurts them so much  
 As the shock down below – when they're stopping."  
 So for years (we have heard), as these mishaps occurred  
 Quick forth would the rescuers sally,  
 To pick up the victims who fell from the cliff,  
 With the ambulance down the valley.*

*Said one, to his pleas, "It's a marvel to me  
 That you'd give so much greater attention  
 To repairing results than to curing the cause;  
 You had much better aim at prevention.  
 For the mischief, of course, should be stopped at its source;  
 Come, neighbours and friends, let us rally.  
 It is far better sense to rely on a fence  
 Than an ambulance down in the valley."*

*"He is wrong in his head," the majority said;  
 "He would end all our earnest endeavour.  
 He's a man who would shirk this responsible work,  
 But we will support it forever.  
 Aren't we picking up all, just as fast as they fall,  
 And giving them care liberally?  
 As superfluous fence is of no consequence,  
 If the ambulance works in the valley."*

*The story looks queer as we've written it here,  
 But things oft occur that are stranger.  
 More humane, we assert, than to succour the hurt  
 It the plan of removing the danger.  
 The best possible course is to safeguard the source  
 By attending to things rationally.  
 Yes, build up the fence and let us dispense  
 With the ambulance down in the valley.*



*We are «picking up all, just as fast as they fall...»*