focus

ON COMMERCIAL AVIATION SAFETY

WINTER 2005

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UNITED KINGDOM FLIGHT SAFETY COMMITTEE

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Front Cover Picture: Bristow Helicopters EC225

FOCUS *is a quarterly subscription journal devoted to the promotion of best practises in aviation safety. It includes articles, either original or reprinted from other sources, related to safety issues throughout all areas of air transport operations. Besides providing information on safety related matters,* ***FOCUS*** *aims to promote debate and improve networking within the industry. It must be emphasised that* ***FOCUS*** *is not intended as a substitute for regulatory information or company publications and procedures.*

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Editorial

During a recent trip to London by train I was unfortunate enough to sit next to a woman who turned out to be a compulsive user of her mobile telephone.

For 30 minutes she used her phone continuously. First to the office to tell her colleague that she was on the train and would be arriving at the office a little late. This was followed by a call to another colleague to give her apologies for her late arrival at a meeting. I thought that this would probably be the end of her calls but, no, she then set about calling all her clients. She had the same procedure for each. "How are you? I am fine thank you. I was wondering if you have had an opportunity to look at my proposal". And so it went on and on. For half an hour there was non stop chatter in a most annoying, whining voice.

By the time the train arrived at Paddington station my stress level was unusually high.

By contrast on the way home that evening I made a point of sitting in the "Quiet Carriage" of the train. What a difference. There were a couple of people whispering to each other and many others working noiselessly on their computers. Some elderly men took the opportunity to nap whilst most chose to read their newspaper or magazine. It was a real pleasure to be travelling by train.

So why mention a train journey in the editorial of an aviation safety magazine?

Currently aircraft manufacturers are planning to make it possible for air travellers to use their mobile telephones whilst flying around the world. To many of us this may at first seem to be a good idea as it would mean that if you were delayed you could inform those meeting you of your impending late arrival.

But spare a thought for those who happen to be passengers on a flight with those incessant mobile telephone users. If after 30 minutes on a train my stress level was high, I can just imagine what you would be like after several hours in an aircraft where you are not able to move to another seat.

Would this new facility provided to make the passengers flight more convenient not lead to a new form of air rage? In this case the disruptive passenger would be the usually quiet passenger who has travelled for years without incident, threatening or even assaulting his fellow passenger.

It makes you wonder if anyone has given this aspect of the implementation of the new system sufficient consideration. For the railways it is not too difficult to have a "Quiet Carriage" but for an airline it will be difficult to segregate the mobile phone users in the cabin.

We have seen airlines move to a "No Smoking" service due to passenger pressure. I wonder how long it will take and how many arrests for disruptive passenger behaviour it will take before airlines start to provide a "Quiet" service?

Mobile phone users seem happy to have the instrument to dominate their lives. They seem oblivious to the fact that they cause annoyance to those around them. I hope that we do not see an increase in Air Rage as a result of airlines providing mobile phone links on board aircraft.

UK FLIGHT SAFETY COMMITTEE OBJECTIVES

- **To pursue the highest standards of aviation safety.**
- **To constitute a body of experienced aviation flight safety personnel available for consultation.**
- **To facilitate the free exchange of aviation safety data.**
- **To maintain an appropriate liaison with other bodies concerned with aviation safety.**
- **To provide assistance to operators establishing and maintaining a flight safety organisation.**

Chairman's Column

The 2005 UKFSC Seminar attempted to look ahead 20 years in aviation safety, covering a range of issues from Air Traffic Control to Passenger Handling. It was evident by the end of the Seminar that technology has been gaining rapid ground over the last few years (maybe more than we realise), and will continue over the next 20 years. But is the technology always improving Flight Safety?

Undoubtedly, advances such as Traffic alert/Collision Avoidance System (TCAS) and Enhanced Ground Proximity Warning Systems (EGPWS) have added immensely to safe passage of aircraft, but are we in danger of losing sight of the basics of how to fly? Air Traffic, Engineering and Ground Handling have benefited hugely from technological advances, and in most cases, made the workload less painful (I didn't say easier!), and safety has improved. But what about the pilots?

When the digital watch was introduced in the 60s, manufacturers, in their attempt to grab the market, used all the technology they could to develop it, adding more and more features that had nothing to do with telling the time! The same can be said of the cell phone. The days of the 'brick' are long gone and the next generation of 'phones do everything short of preparing the evening meal!

The new generation of pilots have to learn how to operate complex systems at the flick of a finger and most, with their IT skills learnt almost from the cradle, are adept in the use of Flight Management Systems and their ancillary components. Is life in the cockpit of a modern aircraft becoming a serious video game?

In order to prepare these pilots for the modern age, training aircraft have to keep up with the times and many are now equipped with 'glass cockpit' instruments, and various other 'state of the art' systems. Of course, the basic flying skills must still be learnt and demonstrated, in order to begin the long road to a commercial licence.

But once a pilot begins commercial flying, how much of the basic skills are retained? It is sometimes difficult to see where it is in the system operators continue to maintain their pilots basic flying skills. One only has to look at most companies' Standard Operating Procedures to see how soon the autopilot should be engaged after take-off, to when it is disengaged to exit the destination runway. Technology will soon, no doubt, arrange for the aircraft to taxy onto the stand and shut itself down. Experienced pilots of today have many thousands of logged hours, but how many of those are actually flying the aircraft? Excellent as modern simulators are, even they cannot replace the 'feel' of genuine flight.

I am not against technology – far from it, but I think that the aviation industry must not, whilst welcoming all of these improvements, lose sight of what we expect our pilots to be able to do when all around is failing – AVIATE!

Have you noticed how modern digital watches now actually tell the time and do very little else?

by Stuart McKie-Smith
Chairman

Aviation Insurance

by Ed Gough, Willis

The market for Aviation Insurance risks from the outside can seem a rather strange place. The limited number of professionals involved both as Underwriters and Brokers can give the impression that it is something of a 'closed shop', beholden to its own rather unique and seemingly archaic practices. This, coupled with the problem faced by all insurance industries, namely that the customer only sees a benefit when something goes wrong, has led to a general misunderstanding both of the product and the factors that shape the market.

In this discussion we will try to understand a little more about the main players in the piece, the history of the market and the key steps in its evolution to the present day.

The Aviation insurance market's history is intrinsically entwined with Lloyd's of London and as with most classes of commercial insurance in the UK still finds a home there. Indeed it would be fair to say that London is still the worldwide centre for the whole industry, although there are significant markets in the USA and the role of the continental European market is strengthening year on year. It is still the case that any major international airline would rely on the London market for part of its placement and all of the major brokers have positioned themselves to reflect this.

The Aviation Insurance industry really became a distinct entity in 1933 when a trade body was established to represent the Insurers known as the IUAI (International Union of Aviation Insurers). There were certainly large numbers of policies both written and purchased before this date, but this tended to represent Marine Underwriters opportunistically dabbling in this new form of transport rather than an established distinct market.

The speed of development of aircraft and the pressure this has put on capacity cannot be stressed enough. For example in 1910 a typical aviation insurance policy was covering values of less than £1,000 both for physical damage to the equipment and third party liability. In 2005 a brand new aircraft can cost up to $250,000,000 and liability limits are as high as $2,000,000,000 per occurrence.

This has required nothing short of a revolution on behalf of the Insurance companies to keep pace with the ever changing face of the industry. The first major challenge arose in the late 1950s and 1960s with the introduction of the jet engine and the development of a mass market for transportation of people and goods by air.

These developments required a massive expansion in the scope of insurance to cope with the values of the new aircraft and the number of people carried on board. This process peaked with the introduction of the B747 in 1970. To give some idea of the leap that this represented at the time, a typical aircraft was valued at $7,500,000 and carried around 150 passengers, while the first B747s had Hull values of between $20,000,000 and $25,000,000 and carried 400 passengers. This multiplied by a factor the maximum potential insurance

market loss and required a significant influx of capacity to cover the new values. At the time there was genuine concern that it would not be possible to insure such a big machine. In reality these concerns translated to an increase in prices and the higher premiums attracted the new capacity required to complete the picture. In a classic case of history repeating itself the same worries and fears are currently being aired in anticipation of the roll out of the A380. Doubtless engineers will continue to test the envelope in terms of the size and performance of the aircraft that they produce and it is to be hoped that the aviation insurance market will continue to meet the challenge.

It was also around the mid to late 1970s that most airlines began moving away from ownership of their main assets toward an operating lease model. This significantly affected the industry in two ways. Firstly the Insurers were now offering the benefit of the policy to a third party which was a legal obstacle that took some time to overcome. Secondly and on the upside for the insurance market, these third parties insisted the airline buy comprehensive cover to protect their asset. This has developed to a point currently where insurance is mandatory for almost everyone involved in the aviation industry and this is now enshrined in law particularly within the EU.

The advent of bigger, more valuable machines not only stretched capacity but also led to much larger and more complicated claims which have had a significant impact over the years on the market's development.

Aviation insurance is often seen as somewhat maverick within the insurance world simply because the law of large numbers is difficult to apply. Actuarial science has taken the guesswork out of the most commonly held insurance policies such as motor, life and travel. It is very difficult to have a catastrophic year when insuring motor cars, as there is such a large pool of insureds and the potential downside limited enough that it is almost impossible to skew the statistics. Aviation insurance on the other hand is almost forced to lurch from one catastrophic year to the next.

Currently most Underwriters perform statistical modelling of risks to give them some idea of risk vs. reward on any specific account. Unfortunately the models can never take into account the unpredictable nature of the beast. In a bad year such as the annus horriblis for the aviation market of 2001 the claims figure for the year totalled almost $6 billion whereas for 2003 and 2004 the figure only reached slightly under $1 billion. Such huge variations undoubtedly create an extremely reactive market as it is virtually impossible to plan for such a huge swing.

This combined with the fact that there is actually a very small number of aircraft to insure and thus a small pool from which to draw premiums creates a considerable problem for Underwriters. It is a frequently quoted fact that the total worldwide premium for aviation is less than the amount paid for plate glass insurance in the State of New York. This is not to paint Aviation Insurance as a complete folly; it just means that timing and judgement, two ephemeral qualities, are key rather than the more measurable mathematical models that investors prefer. It is still the case that Aviation Insurance is a potentially rich prize. An Insurer opening their doors on September 12th 2001 would now be sitting on a goldmine with the kind of margin that other businesses could only dream of.

The two key factors of claims and capacity conspire to create within Aviation Insurance a much shorter and more severe cycle. This cycle is present in most classes of insurance but it is rarely so pronounced. In order to examine this further it would be worth offering a quick

overview of the roles of the interested parties within the market.

The position of the broker is something of an interesting one. The broker is the classic middleman and as such is frequently cast as the pantomime villain of the piece. For many clients the broker is the sole contact for all their insurance buying and this sometimes leads to the assumption that it is the broker offering the coverage. In reality the broker is a pure agent and is simply empowered to buy on behalf of the airline their insurance coverage. The three big players in the broking world and a host of other significant outfits all operate extensive aviation departments and it is really the brokers that engender genuine competition in the market and restrict the pricing vagaries of individual Insurance companies.

There are only maybe half a dozen individual insureds in the whole market who are of a big enough size to stand alone and achieve the most competitive price as individuals. For the vast majority the broker's ability to bulk buy and manage relationships across the insurance spectrum are the only means of leveraging a competitive price.

Each of the three big brokers control roughly 30% of the clients buying aviation insurance and this gives them a significant strength when negotiating with Insurers. Indeed many Underwriters feel that the brokers have a lot to answer for in the unhealthy cycle by using their size to squeeze premiums down to unrealistic levels at which point any loss creates a knee jerk pricing reaction. In reality the brokers are bound by their duty of care to their clients and the very real threat of competition amongst the broking fraternity to push the pricing issue at every opportunity.

It is fair to say that in the past brokers have had something of a bad press. When you offer no tangible product you are constantly required to justify your existence and the reason why you take money out of the deal. Over the past 15 – 20 years this has created a real sea change amongst the broking houses. It is fair to say that professional standards are now higher and more rigid than they have ever been within the industry. The brokers have looked to the model of the professional services industry and have driven to bring 'added value' to their role. They now offer much more than a simple transactional service; legal advice, risk management and consultancy are all strings that have been added to the bow. It is also reasonable to point out that a good broker will cost significantly less than a good accountant or lawyer and can bring a significant financial upside.

This brings us on to the cornerstone of the market, the actual Insurance companies themselves. For many years insurance was something of a home banker for anyone with the funds to invest. The market as a whole continually produced profits and this led to something of a blasé attitude where some small investors literally bet their house on the market seemingly ensured of a return. This worm turned dramatically during the 1980s and 90s when consecutive years of massive claims left many of the traditional Lloyds names facing bankruptcy.

This led to a significant change in the industry and the influx of serious, institutional investors who demanded a return on their capital or would look elsewhere to turn a profit. This brought about many positive changes in the professionalism of the market and the abandonment of the 'old boys' club mentality which could no longer be justified. This was particularly true of aviation where the potential high returns attracted a lot of bold investors.

The aviation market is best considered as exactly that, a true market. No single Insurer has sufficient capacity to retain even a small airline on a 100% basis. The mandatory rules governing the limits purchased mean that someone operating one B737 will buy the same amount of

cover as an airline operating a fleet of ten. What this means is that to place one insurance policy the broker will be required to contract with as many as twenty individual companies. This is clearly a significant task but it is also another factor which drives prices. The overall capacity of the market fluctuates and when it is high simple market forces bring down prices as insurance companies compete to form part of that magic 100% on any given placement.

The market as a result of these pressures is something of a mixed bag. At the top end are the long term players who frequently have the most experience and resources and take the position of 'leader' on the policy. This is a crucial role as the rest of the markets defer a great deal of their authority to this company. It would be unworkable in the fast moving 24/7 world of the airline industry if every time a small change to a policy was required a broker had to seek the agreement of 20 different people. This had led to the streamlining of the process whereby a 'leader' will bind the rest of the market.

It is also fair to say that the leader takes much of the responsibility for pricing the product as the rest of the market would be offered this price or a proportion of this price for their share of the risk.

The second group contains the more recent entrants to the market. They are sometimes unfairly labelled by their more durable brethren as opportunists. They enter the market at the right time to take advantage of the high premiums created by claims that have been paid by other companies. In reality this picture merely reflects the modern business environment where flexible investment follows returns and as such is an unavoidable part of the business.

Following September 11th 2001 these flexible, demanding investors have put a great deal of pressure on the aviation market to deliver a flatter cycle and more consistent performances; the ultimate stick being the withdrawal of the capacity the Insurers rely on to trade. There was a genuinely concerted effort among some companies to achieve this but, as has happened in the past, market forces and the power of the broker has conspired against them. There is now a school of thought that the market premiums have dropped to such a level that it is once again in a perilous position.

This can be argued both ways as many feel that the events of 9/11 were such an aberration that it is never likely to be repeated. It is indeed hard to see a circumstance in which four of the largest ever losses will occur on the same day again but surprises continue to happen and on this only time will tell.

From the brief overview above we can see that the Aviation Insurance market is a very dynamic environment. Just as the aviation industry has expanded and evolved during the 20th Century, so the Insurance market has been challenged to keep pace with this change. To date it has survived all the considerable challenges and continues to thrive offering an essential product to an ever expanding industry. Indeed it may be this expansion which offers a genuine hope of breaking or at least lessening the cycle as a larger base of aircraft and the ever improving safety record of the airlines may significantly alter the face of the market.

UK Flight Safety Committee Annual Seminar 2005
Aviation Safety: Looking Ahead 20 Years

Report by Ian Sheppard

Stewart McKie-Smith (Chairman) with Dr Kathy Abbott (Chief Scientific & Technical Advisor for Flight Deck Human Factors - FAA).

The Seminar was opened by Stuart McKie-Smith, UK Flight Safety Committee Chairman, who introduced the Keynote Speaker, Dr Kathy Abbott, Chief Scientific and Technical Adviser for Flight Deck Human Factors. Dr Abbott told the audience that there was a "long list of forthcoming technologies", such as the electronic flight bag, which would significantly improve aviation operational efficiency. She singled out the EFB as it represented a "generational change for the pilot".

Dr Abbott warned however that technical advances do not assure operational capability and that the industry is moving towards lower experience levels of flight crews, with a more procedural (standard operating procedure) focus. "I'm not saying that's wrong but there needs to be a trade-off to ensure pilots can handle unexpected situations. There are various examples where flight crew have saved the day, such as the Transair A330, Iraqi A300 and Malaysian 777 incidents.

If technological advance is on balance "good", criminalisation of safety data is an example of a "bad" development, believes Abbott, while the "ugly" is the belief that "technology is the answer". Dr Abbott proceeded to show a very interesting video illustrating how crews can make mistakes by not fully understanding aircraft systems, for example where pilots entered a hold on the 240 radial rather than 06 as intended.

"We still have difficulties out there" she warned, and remain "critically dependent on pilots". The certification of autoland systems, for example, depends on the assumption that pilots can take over. Do we embed risk mitigation in design? If we don't, she suggested, then we must give the pilots the skills and knowledge that they need - with an explicit decision to this end. Looking to the future, there is a significant need to recognise how we rely on humans (including ATC and others).

"Tinker carefully", she said by way of concluding advice.

John Levesley, President of GATCO, said that the ATC system should be improved whether there is a need to cope for increased capacity or not, especially in terms of flow management and greater capability in routing. Safety grounds are reason enough, with the planned deployment of new airspace needing particularly careful management.

Meanwhile "sustainability and the environment are things that will not go away", he added. "When is the future," he asked, given all the talk of the future - "a huge amount is happening as we speak" so that while there is a "tendency to put dates on everything", this is "not as useful as concepts - with milestones. He reflected that when he started in the industry there were major milestones every 15 years or so, whereas now it is "every three to five years".

When will ATM switch from evolution to revolution though? Probably in 20 years time, suggests Levesley. The three major challenges at present are aerospace utilisation, interoperability and human factors. There are areas of the UK where you simply can't get any more capacity, not least because of the cost of the consultation exercise - in both time and money; such that sometimes it is "better to wait for technology". With interoperability (between controllers), "some countries in Europe squash everything into 'sausages', while the UK has less rigid constraints. We need flexibility, he suggested. Finally, in terms of human performance, "do we recruit now for skills needed two years hence, or look further ahead?" How do you estimate the skills and aptitude required of controllers in 30 years time? Controllers' jobs will probably be far more tasks-driven, he suggests, which will be "very different".

Aptitude to handle this is not necessarily an age thing, it is more down to ability and aptitude. Sometimes a 30-year old can find things difficult which a 50-year old finds easy, suggests Levesley. However even looking ahead there will be problems which just "pop up" and have to be dealt with, such as level busts. This is something which had been improving but which "is now getting worse again" - so "we didn't crack the problem".

Also runway incursions, with small airports being simple to plan with good procedures and lighting layouts (and there is technology to help) but "it is too expensive to mandate". Also airprox statistics are a worry outside of controlled airspace (and is also an issue for the military). BALPA is concerned about this and the RAF, CHIRP and others have "started to admit there is a problem." Using area proximity warning for

intrusions is good in theory but "you shouldn't rely on automation." Errors in GNSS systems can be up to half a mile and have become a cause of incursions and are thus "becoming a real problem" he concludes.

Key influencers on how technology may develop include ICAO, ATMCP, Eurocontrol, PHARE, ACARE. He also pointed to various informative reports on the issues, such as that by Volpe ("very in-depth"), from Eurocontrol's Collaborative-ATM programme, the EU's SESAME project and Netcentre Technology (whose ideas for future ATM have been funded in part by the US Congress). There was also Airbus's 'Deploy' project about three years ago, which "disappeared when the EU said it would fund SESAME", with Airbus now being involved in that.

"We are starting to see a converging of ideas", observed Levesley, who believes that "Airbus and Boeing cold probably fix this by agreeing a standard avionics fit - then the only question would be the way that you use it." He suggested in addition that there is a "conspiracy theory" that the manufacturers and airlines have in reality "done far more on this than we realise."

In conclusion he talked of the "possible extinction event" which is perhaps a figment of fertile imaginations, "when the meteorite called capacity demand is too big…". Lots of people, he suggested, want to spend billions on future systems, but the danger is "lots could be spent on something you don't need".

Boeing's Thor Johansen, former Director of Engineering at Norwegian airline Braathens, looked at how the accident rate can be improved around the world. He highlighted that the African Safety Enhancement Team was "about to get going" and that there were "good initiatives" in a number of other parts of the world, such as the CIS with ICAO. He said that there was a need to focus on reducing fatalities, which can be for analysis purposes split into two groups - forensic (where the cause is a repeat cause) and diagnostic (a first time cause). A consistent trend is that outside North America and Europe, there are "lots of recurring accidents" (Uberlingen and the Alaskan Airlines accidents were examples of diagnostic occurrences in US/Europe).

Focussing on the forensic type means looking closely at accident investigation (that is, learning from accidents) and airline accident prevention programmes, while the starting point is to map all events accurately so that their types are properly identified. The 'safety bar' can be driven up, said Johansen, by public expectations and political factors.

Johansen said that with Boeing aircraft, starting in 2005 there is "capability to do something with fatality rates over the next 50 years" with lots of redundancy in current initiatives - while people are talking more about a collective approach (e.g. IOSA). There is a clear need for a high-level plan, and Johansen professed himself to be impressed by the future aviation safety team (FAST), a JAA initiative the momentum of which he "hopes" EASA will maintain.

There is still a sense that there is a difficulty for people to handle a negative data positively, although regulators are "buying in well to initiatives and playing a key role in, for example, the sharing of data." A greater effort should be made however to identify new hazards when dealing with well-known risks.

Human Factors are the principal focus, especially the increasing incidence of runway incursions - while there are lots of promising technical advances in the

Peter Hampson (Director Airport Solutions)

pipeline. Boeing gets 100,000 inputs from airlines, only 100 or so of which ultimately become airworthiness directives (ADs). Maintenance is climbing as a contributory factor in incidents/accidents, and MSG-3 is helping to focus on that with probability analysis and optimisation of maintenance. In human factors generally, says Johansen, there are efforts to get an EU-wide standard approach to accident investigation, using ICAO Annex 13 as a framework. Having common basic training in accident investigation worldwide is a laudable long-term aim, believes Johansen.

In conclusion Johansen stressed the need to maintain the focus on known risks (such as CFIT) with the biggest focus on the regions where improvements are badly needed.

Graham Forbes, former GAMTA Chief Executive and Head of Personnel Licensing at the CAA since 2003, explained ICAO's new multi-crew pilot's licence (MPL), which is aimed at "the right-hand seater" and comes out of ICAO's recent review of Annex 1 and 6 of the Chicago Convention, and the result of an airline sector which wants "a programme more in tune with modern simulation". ICAO's flight crew licensing and training panel developed it with

IAOPA, IFALPA, IATA and others being involved. It is geared to the ab initio pilot and is competency-based, with it being possible to complete most of the course in simulators.

It consists of 240 hours with four main phases - core flying skills, basic, intermediate and advanced. "You could do it in two hours if you were superman", Forbes joked, as no strict breakdown is required.

Forbes said that one representative at a meeting to discuss MPL asked why if you want to fly a 747 should you start in a Cherokee - "as if you start in an oil tanker you don't start [learning] in a rowing boat." However, there is the fact that instructors will be very different and therefore the question of where they are going to come from.

The pilot unions wanted a proof-of-concept programme to ensure that it was working in practice, and there were various issues from the industry. For example, when a pilot comes out at the end with a type rating, how can that be separated from the airline SOPs when moving to another airline on the same type? Also there was a question over whether the self-sponsored route would still be possible - as additional training will be required if a pilot transfers to a new aircraft type. Forbes admitted that the MPL was not necessarily a cheaper option.

Forbes estimated that the new licence would be available to allow the first MPLs to be issued in around September 2007. As for the JAA, it is intended that it will complete its work on adopting the licence before EASA takes over flight crew licensing in Europe.

Peter Hampson of Airport Solutions (a consultancy), former General Manager of Manchester Airport, said that with at least half the UK population flying at least once a year and with air freight having doubled since 1990, it is good to see the UK Government "adopting a proactive, measured and balanced approach" with its White Paper, The Future of Air Transport. This had been acknowledged by industry, he said, which made full use of the long consultation process during 2002/3.

Peter Richards (RAes) receives a certificate for 30 years service to the UKFSC from Stewart McKie-Smith (Chairman)

Stansted, which had grown "from nowhere" in ten years, saw its proposals for a second runway by 2011/12 supported, although third and fourth runways were not supported; Heathrow needs to meet strict environmental conditions if it is to have a third, smaller runway to the north (with a recommendation for mixed mode before that being made); and Gatwick can safeguard land for a wide-space parallel runway for beyond 2019, when a 40 year planning constraint expires.

Meanwhile Luton is putting its case forward for a second runway, and a second runway at Birmingham is supported but again with strict environmental constraints. A second runway at Nottingham East Midlands Airport was not supported but is to be kept under review. An all-new airport at Cliffe on the Thames Estuary was rejected - that would have been the first new UK airport since Sheffield ("will we ever see another large UK airport?", asked Hampson).

Continuing the list, Manchester "was ahead of the game" with its second runway, and is looking for more apron and terminal capacity; Leeds Bradford is looking at extending its runway; Liverpool's expansion was supported as long as there is no intrusion on protected sites (of which there are examples all around it!); and Newcastle will have a 360m extension. Again strict environmental constraints will have to be observed.

Hampson reminded the audience that aircraft were 75% quieter than in the 1960s, while emissions - CO^2, NO^2 and contrails (which cause 'global dimming') are hot topics - even though aircraft tugs, ground power units and local traffic often cause more emissions than the aircraft.

Hampson said that the industry got together "very proactively" to respond - BATA, NATS, SBAC, AOA and reached conclusions on what reductions could be achieved, such as an 80% reduction in NOx gas emissions. The industry has also undertaken to report back every two years on its progress - the first review coming in 2006. Meanwhile each airport has to produce a Master Plan to take into account the White Paper, to present the Government with details of their development plans. Some (such as Heathrow's) have been published in draft form already, said Hampson, who warned airports of protester action as their plans progress - the protester known as 'swampy' dug tunnels 30ft below the

ground at Manchester, while others were in trees - ultimately though the £200 million development included £21 million in environmental mitigation steps, such as the moving of 34,000 great crested newts, an endangered species, and special barns being built for relocated bats.

Many airports which were 'sleepy hollows' now need new infrastructure, said Hampson, who added: "Let's hope operations there are sustainable".

Another current issue facing airports is "ramp rash", which has seen a proliferation of handling agents since the market was opened up by an EU Directive in 1996 - so now an airport can have 10 or 20 handling agents operating rather than one or two. Thus there is now a need to reduce the amount of duplicated equipment at airports, not least because it presents a hazard to safety. In the future, airports will need to invest in underground servicing units (such as pop-up hydrants).

John Chappelow OBE of QinetiQ gave a very polished performance presenting current work of the Safety Performance Group of the Centre for Human Sciences. He is a Psychologist who has been involved in around 200 civil and military accident investigations, and is currently looking at risk analysis tools.

Chappelow said that he's "not absolutely certain that there's been any fundamental change" despite an eight percent year-on-year improvement in civil aviation safety in the UK (and five percent for military flying). He asked whether there was perhaps an "irreducible minimum".

Historically pilots had to put up with what engineers gave them but now we "still draw instruments we used to make out of brass and steel" and put more information on the screens to increase the confusion.

Meanwhile with software "we can now build very deep traps which you don't come across very often".
He reflected on an anecdote of a crew attempting to land at Hong Kong where the aircraft was found to be uncontrollable with the undercarriage down, the warner requiring a mandatory go-around each time. "They know they were going to die, but got it down in the end" - the computer thought the flaps were one notch less than full flap when in fact the flaps were fully deployed on all three approaches. An engineering short-cut had led to a bad display for flap position. The moral was "not to give pilots something to argue about" - as there is potential for real disaster with new technology and old procedures and practices.

"Sometimes you only get organisational change by waiting for the dinosaurs to die out", said Chappelow, reflecting in particular on the RAF's acceptance of confidential reporting and a no-blame culture at a rather late stage (although it then became "the best I've seen").

To illustrate the value of research Chappelow said that the US Navy had invested lots in equations to tell them simple things, but sometimes it proved very worthwhile. One example was aircraft visibility - where the theory was that in daytime visibility (to avoid collisions) required black aircraft and very bright lights. The RAF liked the idea so much it went straight to flight trials. Red, white and blue aircraft and grey/blue aircraft were no different in their rates of detection, but the black one made a real difference. The lamps accounted for two-thirds of the reduction in risk while the black aircraft accounted for the other third. The black one had a ten second advantage. This was Psychology 1, Common Sense 0, said Chappelow, who reflected that "real HF work produces numbers, and with numbers we can beat the accountants."

"We don't take enough care designing new systems", asserted Chappelow, "and then dump the problems on the aircrew". There have been improvements but they took a long time coming - but real HF can make changes, he claimed. With fewer opportunities to practice skills, deep traps and the fact that society is increasingly compensation oriented, the risk is still significant for aircrew. In addition, as the accident rate falls there is less data from which to glean trends, or to spot traps, so that "we must get more and better incident data". This is exactly what Chappelow's department is currently doing for the UK MoD, creating a flight safety information management system.

In conclusion, Chappelow said that much could be learned by comparing aviation with other modes of transport, which led on nicely into the next speaker, Philip Cartwright from TRANSEC, part of the Department of Transport which deals with airport security. "The threat is very real and enduring", said Cartwright, "and we need to adapt to the new threats while also covering 'old' threats." He pointed out that there was much to balance when putting security in place: cost, burden on passengers and companies, and so on. TRANSEC works with QinetiQ, DSTL and academia, as well as international organisations. Human Factors, he said, is very important, with people remaining in the loop in security, for example new scanning equipment being deployed, but less so than before. And as for what the future holds, he said it lay in open systems, embedding security in design, increasing EU attention and resilience as an investment factor.

Simon Phippard explored the legal minefield surrounding aviation safety - he has been a partner with Barlow, Lyde and Gilbert in London for several years and was about to join Rolls-Royce's in-house legal team, and step down as UKFSC's Honorary Legal Adviser.

Phippard pointed to various factors which are relevant to the future, such as pressures on 'the Chicago System', EASA, ever-looming corporate manslaughter legislation and industry consolidation which could see the industry one day "dominated by 15 large brands." He asked what pressures on safety that would bring, what requirements for national monitoring by the state of registry of aircraft.

On EASA he said that "any changes brings its own risks - that's all I'll say", which was rather telling. He highlighted other political issues, such as the EU's proposed 'blacklist' of airlines, and the threatened criminalisation of the flight safety process.

The blacklists subject has been around for ten years and legislation, said Phippard, is due by the end of 2005. There are various unanswered questions, however, including whether such lists will work, the impact on operators, compliance with treaty obligations, the impact on regulators (such as if an airline is not added to the list but later has an accident). He pointed out that Flight International magazine had characterised it as a 'lazy response' although it could be an effective tool.

As for criminalisation, in the US the NTSB process has lawyers "intimately involved" but Phippard professed that he was "not convinced that it's the best way to get to the bottom of things". That the lawyer involved is subsequently professionally precluded from acting for that carrier he describes as a "bizarre outcome". In addition Phippard said there should be a clear line between any police investigation and Annex 13 investigations "but sadly it does not look like things are about to improve".

Various questions were asked at the Seminar ranging from the impact of rising fuel prices on traffic growth (it was agreed that technology such as RNAV could help reduce costs and thus offset these costs); the risks of UAVs sharing the same airspace (they still have a habit of falling out of the sky but the CAA is looking at the issue); and incorrect responses to TCAS resolution advisories (the FAA usually responds "careful what you ask for or you may get it!")

Closing the Seminar, Stuart McKie-Smith said that it was worth keeping in mind the old adage that if it ain't broke, don't fix it, as with any change comes risks which need to be carefully weighed up in advance. Another issue highlighted had been that losing corporate knowledge as the older generation retired was a significant problem. He also reiterated that automation is only as good at the operator, and said that he liked the saying "tinker carefully".

Ian Sheppard is an experienced Aerospace Journalist and part-time Law Student at the College of Law in Guildford. Tel +44 (0)7759 455770.

Cold Weather Operations

by Capt. David Prior, CAA

The UK CAA has launched a new free DVD on the subject of cold weather operations and has also been collaborating with an international team of experts to produce a free web based training package entitled A Pilots Guide to Ground Icing.

Cold weather operations can present flight crew and ground staff with a potentially dangerous but avoidable challenge to aircraft safety; Frozen contamination.

Ice on the wing or control surface is dangerous because there is no known reliable piloting technique for recovering an aircraft from wing stall during or shortly after take-off as a result of ice contamination.

Aircraft systems can also be affected by the accumulation of frozen contamination. In some cases accumulated contamination within engine intakes could cause an engine to flameout. A review of recent incidents revealed two such examples. In the first, the aircraft suffered a double engine flameout as it was lining up for take-off. In the second case the crew were not so fortunate, the flameout occurred shortly after take-off resulting in the aircraft ditching with the tragic loss of both crewmembers.

Clearly, it is essential that aircraft critical surfaces are cleared of and remain free from frozen contaminants whilst the aircraft is still on the ground. This is achieved by a variety of methods ranging from keeping the aircraft in the hangar through to de-icing and anti-icing using high tech fluids. But fundamental to achieving contamination free critical surfaces is good communication between aircraft operators, ground-handling agencies, airfield operations and, of course, air traffic control. In fact everyone involved in aircraft ground icing operations should have a clear understanding of their responsibilities and how they can positively contribute to the team effort.

CAA Ground Icing Initiative

The CAA has consistently sought to improve standards in ground icing issues. Yet despite this, ground icing related incidents continued to occur. It was the idea of Captain David Chapman, now Head of Operating Standards Division, to create a focal point within the CAA in order to examine why these incidents continued to occur and to formulate an appropriate response in order to further promote flight safety. This focal point or ground icing 'gateway', as it is known in the CAA, consists of representatives from flight operations, maintenance standards and research management.

In 2004 it was decided that the first output from the gateway should be a film and publicity campaign designed to highlight the dangers of ground ice and to promote a better understanding of what each member of the industry de-icing team is required to do. Captain Chapman gave the go ahead and the Ice Aware film was produced in conjunction with representatives of the industry. Judging from the feedback we have received, the film has been a great success.

2005/6 Season

Following on from the success of the Ice Aware film the CAA has now updated it

for the 2005/6-winter season and incorporated new footage showing various aspects of de-icing fluids. The film, previously released on CD-ROM, is now available in DVD format and is available free from the address below.

In addition to the Ice Aware film the gateway has been actively involved in the production of a web based training (WBT) aid. This free online course, entitled A Pilots Guide to Ground Icing, is intended primarily for professional pilots who make their own operational de-icing/anti-icing decisions. This includes pilots who fly business, corporate, air taxi, or freight operations in fixed wing aircraft ranging from business jets to single engine turboprops.

The course discusses the risks of contamination, cues to alert the pilot to ground icing hazards and actions to help ensure safe operations. Imagery, case studies, pilot testimonials and interactive elements are used to inform the pilot and help him or her make better operational decisions. The course has region specific differences incorporated where required and will be an invaluable tool for pilots to enhance their knowledge base.

An international team of experts in icing, de-icing/anti-icing fluids and end user pilot trainers developed the course. This multi-national team comprised representatives from CAA, NASA, FAA, Transport Canada, West Jet, Flight Options and the University of Oregon. Whilst this first WBT is aimed at the target audience mentioned above it is likely that further variants will be produced in the future aimed at other sectors within the industry.

Clearly it is imperative that pilots are equipped to take good operational decisions and these new training aids will enhance the basis on which those decisions may be made.
Ultimately, though, ground icing operations are a team effort and as Captain Chapman said in the Ice Aware film 'as you operate rigorous schedules in challenging weather conditions it's your professional judgement and good safe procedures that can make a significant contribution to flight safety'.

Copies of the DVD are available through Flight Operations Inspectors or alternatively by email request to Alison.Jarvis@srg.caa.co.uk

The free Ground Ice Web Based Trainer is available at http://aircrafticing.grc.nasa.gov/index.html

Working Together to Cut Airspace Infringements

by Steve McKie, NATS Safety and Performance Improvement.

Where do most infringements happen?
Given the nature of the airspace they manage and the volume of traffic involved, it's hardly surprising that the infringement problem is at its biggest for the controllers who work at the London Terminal Control Centre, West Drayton. They handle the approach control task for Heathrow, Gatwick, Stansted, Luton and London City airports as well as managing traffic using the lower airspace over South East England.

The Boeing 737 was just a few minutes away from journey's end. Descending to 2,000 feet, it was making a right-hand turn to intercept the Instrument Landing System for Stansted airport's Runway 23.

It was at that moment that the 737's pilot spotted another aircraft. He hadn't expected it to be there. The intruder was about three miles ahead. As it cleared the 737 by an estimated 300 feet, the airliner's pilot identified it as a PA 28. It wasn't squawking so there was no TCAS alert nor STCA warning to the controller. No avoiding action was taken but the 737's pilot reported the incident to the Stansted director and an airprox report was subsequently filed.

The PA 28's pilot later told the UK Airprox Board that he'd been trying to establish his position when he saw the 737 below him. He'd also forgotten to switch his transponder on. This meant that as the controlled airspace at that point had a 1,500-foot base, the controller was initially unaware that the PA28 had entered it. Its pilot later apologised for his error.

Contrite he may have been, alone he certainly was not. While the Airprox Board found there'd been no risk of collision in this case, figures show (see graph) that Stansted's airspace is the UK's most frequently infringed.

Last year, airspace infringement reports were filed against approximately 340 aircraft. And the figure is growing. Since January 2005, the number of infringements resulting in a loss of standard separation between aircraft in controlled airspace has continued to increase.

Such incidents don't always result in a loss of separation or lead to an airprox report. But when an aircraft enters controlled airspace without ATC clearance controllers must attempt to establish standard separation - five nautical miles horizontally or 5000 feet vertically - between the intruder and other aircraft in the vicinity. Large amounts of airspace are therefore effectively sterilised. The resulting inconvenience is, of course, nothing compared to the risk.

A report prepared for the Civil Aviation Authority puts it this way: 'This operational hazard, commonly called an infringement, may result in serious harm either from an actual mid-air collision or from a rapid avoidance manoeuvre. Infringements also result in increased costs through delayed departures, go-arounds and extended routings.'

On Track, an independent study commissioned by the CAA, contained data on airspace infringements collected between June 2001 and January 2003. It followed this up with a list of recommendations, which can be viewed at www.flyontrack.co.uk. As the On Track investigators found that about 70 per cent of infringements are caused by general aviation pilots, it's no surprise that most incidents happen in the summer. One way of reducing them might be to pray for rain every summer week-end, but NATS has adopted a rather more practical approach.

As part of its safety Destinations work, under which challenging targets have been set for attainment by April 2007, NATS is giving the reduction of airspace infringements a high priority. One manifestation of this is the internal infringement group that's been established to develop initiatives and solutions.

The NATS Infringement Group (NIG) comprises a dozen members, many of them operational air traffic controllers. It's identified three key areas for reducing the risk of infringements to commercial traffic inside controlled airspace. These are: boosting controller awareness, introducing technological solutions and raising the issue's profile within the general aviation community.

A controller awareness campaign has been initiated on two fronts. As On Track suggested that only half of all infringements are reported, the NIG has asked controllers to report every incident so that the true scale of the problem can be understood. Controller awareness is being also raised to ensure that timely and positive action is taken on a consistent basis to avoid unknown aircraft. This has so far taken the form of a poster campaign (as shown), a safety notice and a map of local infringement 'hot-spots'. It's been aimed initially at the London Terminal Control Centre but will shortly be extended to other NATS units.

Technology can also help. NATS is proposing to develop a radar display device that can warn controllers about unknown aircraft entering controlled airspace. It'll alert them to all aircraft using transponders, with or without Mode C, and shows how NATS is encouraging and supporting the CAA's proposal to mandate the carriage of Mode S transponders in all aircraft. NATS is also exploring the possibility of an airborne airspace proximity warning system, based on a new lightweight transponder coupled with GPS, which would provide an alert to pilots.

On Track found that 60 per cent of the GA pilots who are known to have infringed controlled airspace had less than 500 flying hours to their credit. This indicates that an education programme would be beneficial and NATS units are being encouraged to expand the links they have with their local flying clubs, airfields and groups. That will enable them to raise the profile of the infringement issue and develop local solutions as well as increasing understanding between GA pilots and controllers. A poster and DVD-based presentation will soon be available for all units to use with the local GA community to highlight the dangers of straying inside controlled airspace.

So how can commercial pilots help? The first thing is to stop assuming there's

complete protection in Class D or even Class A airspace. Keep a good lookout, especially at lower levels. If you become aware of a conflict, either visually or via TCAS, tell the controller. The fact is that gliders, microlights and some home-built aircraft are extremely difficult to see on ground-based radar so the controller might not be aware of their presence.

Many commercial pilots fly for pleasure. If you do, spread the word about the dangers of infringing controlled airspace and make your club-mates and leisure flying friends aware of the CAA's Top Ten Tips (see box).

The safety and commercial implications of airspace infringements are obvious. So too is the frustration of controllers and pilots at the resulting extended routeings, avoiding action, cancelled approaches and postponed departures. Inevitably, this leads to an increased workload and more paperwork. Reporting and analysing every incident will only add to it. But that could be a small price to pay for the enhanced safety that will come from cutting the number of times controlled airspace is infringed.

For more information on airspace infringements, contact steve.mckie@nats.co.uk

Data from the CAA On Track project shows that about half of all infringements happen in Class D airspace with a quarter in Class A. This suggests that what has come to be regarded as a totally controlled and protected environment can in reality be rather less so.

Ten ways to avoid an infringement

The Civil Aviation Authority's Airspace Infringements Working Group has issued a list of ten tips for avoiding an infringement. Based largely on good airmanship and common sense, they are:

1. Navigation is a skill, and needs to be practised regularly, **both planning a flight and conducting it**. Safety Sense Leaflet 5 (available on the CAA website and in the LASORS publication) contains good advice on VFR navigation, but it only works if you read and apply it.

2. If you plan a route through controlled airspace, remember that a crossing clearance may not always be possible and consider that route as your 'secondary' plan. Your primary plan should avoid controlled airspace - **and don't forget to make your overall time and fuel calculations using the longer, primary route.**

3. Where possible, **avoid planning to fly close to controlled airspace boundaries.** If you do need to do so, be very careful. A small navigational error or distraction of any sort can lead to an infringement – and it doesn't take much to ruin your day.

4. Pilot workload rises rapidly in less than ideal weather - and so do infringements. **If the weather starts to deteriorate, consider your options early** and if necessary divert or turn back in good time.

5. If you wish to transit controlled airspace, think about what you need to ask for in advance and **call the appropriate ATC unit at 10 nautical miles or five minutes flying time from the airspace boundary.** This gives the controller time to plan ahead.

6. Thinking before you press the transmit switch and **using the correct Radio phraseology** helps air traffic control to help you - and sounds more professional.

7. Be aware that ATC may be busy when you call them – **just because the frequency doesn't sound busy doesn't mean that the controller isn't busy** on another frequency or on landlines.

8. Remember - the instruction **'Standby' means just that; it is not an ATC clearance and not even a precursor to a clearance.** The controller is probably busy so continue to plan to fly around the airspace. Only fly across the airspace if the controller issues a crossing clearance.

9. Your planned route through controlled airspace may appear simple on your chart but the traffic patterns within that airspace may make it unrealistic in practice. **Be prepared for a crossing clearance that does not exactly match your planned route** but will allow you to transit safely.

10. Don't be afraid to call ATC and use the transponder when lost or uncertain of your position - **overcoming your embarrassment may prevent an infringement** which may in turn prevent an Airprox or worse.

Safety Regulation Versus Consumer Rights?

by Richard Gimblett - Barlow Lyde and Gilbert

Traditionally, the primary focus of aviation authorities has been safety regulation. Whilst that primary focus remains, recent years have seen increased concentration on passenger rights legislation, particularly, though not exclusively, in Europe. The regulatory climate in which airlines face severe financial consequences in the event of flight cancellations and delays has led some commentators to question whether the legislative balance has shifted too far towards consumer rights, potentially at the expense of safety.

The period to date from August has seen seven major airline losses, with a combined death toll of over 550. After a prolonged period with losses at a record low, recent events have inevitably excited discussion as to whether they represent no more than a tragic blip on the airline industry's otherwise steadily improving safety performance or something more significant.

At the same time, however, they have also drawn attention to the activities of aviation regulators (particularly at a European level) and have led some commentators to question whether there is not an increasing tension developing out of recent legislative initiatives.

Historically, the focus of aviation regulators has been operational safety. That remains the core activity of the world's national aviation authorities charged with implementing their countries' obligations under the 1944 Chicago Convention. Recently, however, there has been a much greater focus on the issue of passenger rights. This is an international phenomenon (for instance, the US is currently extending the scope of its disability rights legislation within the civil aviation field), but within the EU the process has perhaps been most marked. Indeed, in many ways the issue of passenger rights can be said to have dominated recent civil aviation policy making with the European Commission. Certainly that is an impression confirmed by the Commission's website.

The most recent expression of this process was the coming into force on 17 February 2005 of the new EU Regulation on denied boarding, flight cancellations and delays. Notably, in addition to increasing existing compensation levels for instances where passengers with confirmed reservations are denied boarding, the Regulation creates completely new rights in cases of flight cancellations and delays.

The distinction is important because, whereas denied boarding is generally a matter within the control of the airline (the most frequent cause being the operation of traditional overbooking policies), flight delays and cancellations frequently are not.

Yet in all cases of cancellation and delays exceeding five hours, there is now an automatic right to rerouting or a refund (the latter extending to other sectors rendered redundant by the passenger's decision to terminate his or her journey). In addition, cancellation triggers a right to large compensation payments unless the carrier can prove it was caused by extraordinary circumstances not avoidable by taking all reasonable measures. On any view, this is a difficult burden to overcome and there is considerable industry uncertainty as to whether, for instance, technical problems with an aircraft capable of affecting its safety would fall into this category. If not, the compensation bill for cancelling the affected flight could easily run into six figures.

Increasingly, commentators are questioning whether, from a safety perspective, this is a healthy environment in which to expect the aviation industry to operate. Subject to the final outcome of the legal challenge to its provisions currently before the EC, the Regulation in question comes up for review in January 2007 (after two years' operation) and it may well be then that safety arguments will come much more to the fore than they did when the legislation was originally enacted (at which time the industry's principal grounds of objection were economic).

Icing on Helicopters

by Capt.Derek Whatling & Capt Mark Prior, Bristow Helicopters

Approx 2 inches of ice on a leading edge. Not much in fixed wing terms but remember the size of the helicopter's 'wing' (rotor blade).

In the Northern European climate it is highly desirable for helicopters operating under IFR, in the Commercial Air Transport role, to have as part of their certification, a clearance to fly in icing conditions in order to maintain schedule regularity throughout the year.

In the broadest of terms, helicopters face the same challenges in icing conditions as aeroplanes i.e. performance degradation of both lifting surfaces (the rotor blades) and engines. The engine related issues are virtually the same in both fixed and rotary wing aircraft; this short item will thus concentrate on the systems available for the anti icing of rotor blades and how the helicopter fraternity has operated for so many years with no rotor anti icing at all.

Anti-iced rotor blade systems using electrically heated pads embedded in the blade have been available for many years; however the additional weight does reduce the available payload as they not only require blade de-icing equipment to be carried, but [usually] additional or uprated electrical generating capacity. In a typical system, electrical power is transmitted to the rotor blades from the airframe through slip rings; the blades are then de-iced by the heated mats on the forward section of the rotor blades. The system is operated in a similar way to a pneumatic boot de-icing system; ice is allowed to build to a pre-determined depth before the de-icing system is energised, warming the mats, and de-icing occurs. It is important that the de-icing is sequenced correctly in order that the ice is shed symmetrically and out of balance forces are not induced. The symmetrical shedding of ice should also occur in degraded or reversionary modes of the system; an interesting problem on a helicopter with an odd number of rotor blades. In addition to the reduction of payloads, such anti-icing systems have historically suffered from corrosion in the slip rings and a generally increased servicing burden. Recently, two new helicopters, the S92 and EC 225, have been certified with a new generation of rotor ice protection systems.

Currently very few civil helicopters have the necessary rotor ice protection systems to enable a full icing clearance to be granted. Nevertheless, an unprotected rotor (with non-heated blades) can operate safely provided that suitable airworthiness and operational constraints are in place and applied. This capability, referred to as a Limited Icing Clearance, can be utilised in specific operational situations that allow the aircraft freedom to change flight profile swiftly in order to vacate or avoid atmospheric conditions beyond the demonstrated icing capability.

How then do today's helicopters operate, safely, IFR, to and from destinations in the North Sea, with a limited icing clearance?

In all but the most extreme conditions offshore in UK waters, a layer of positive temperature air exists for several hundred feet above sea level, so helicopters can, if necessary, descend offshore into this layer of warm air to naturally de-ice the rotors. Initially this descent is to MSA [generally considered to be 1500ft over the N Sea] but, in extremis, using the onboard radar and a radar altimeter for surface and obstacle separation this descent can be continued to 500ft. Needless to say, the regulations require the availability of a layer of air at a positive air temperature to ensure the shedding of ice in a timely manner. The full operational rules under which such flights may be conducted are comprehensive, they stipulate the weather requirements for the planning stage, the actions following an encounter with icing conditions in excess of the certified limits and the minimum equipment levels.

The UK CAA has certified helicopters with a Limited Icing under the aegis of BCAR Paper G610 and the Advisory Material contained in CAA Paper 96009. for the last 30 years: the UK MOD has also used similar principles. EASA invited the UK CAA to develop a Special Condition, based on BCAR G610 and the Advisory Material, to allow Limited Icing Certification of helicopters under JAR 29. Indeed this Special Condition has recently been used to certify the EC 225 for flight in Limited Icing Conditions as an alternative to installing a fully de-iced rotor.

Limited Icing clearances have been used successfully and without significant incident, for the past three decades for IFR operations in support of the UK oil and gas industry to and from airfields located near the coast.

For non-helicopter operators it may be useful to define the basic principles that apply to the certification of a helicopter for flight in Limited Icing conditions:

- The rotor system is not protected by a de-icing system, but relies on natural tolerance to limited ice accretion.
- Systems essential to safety of flight, such as the engines, pitot static systems and windscreens, must be fully protected against the effects of ice. These critical components must comply with JAR 29.1419 (CS 29.1419).
- The aircraft must be certified Category A and IFR.
- The engine intakes must be certified for flight in snow.
- The aircraft must continue to comply with the relevant sections of JAR 29 (CS 29) in the iced state, including:
  - o Handling – including the capability to enter and recover from autorotation.
  - o Stability
  - o Performance
  - o Vibration
  - o Flight loads
  - o Fatigue
  - o Flutter
- The aircraft must have means of indicating to the crew the likely ice accretion on areas of the airframe not visible to them.
- The certification provides a practical set of atmospheric conditions and airworthiness limitations within which the rotorcraft may be safely operated in icing conditions.
- The limitations must be clearly defined in the aircraft's flight manual using parameters readily available to, and observable by, the operating crew.

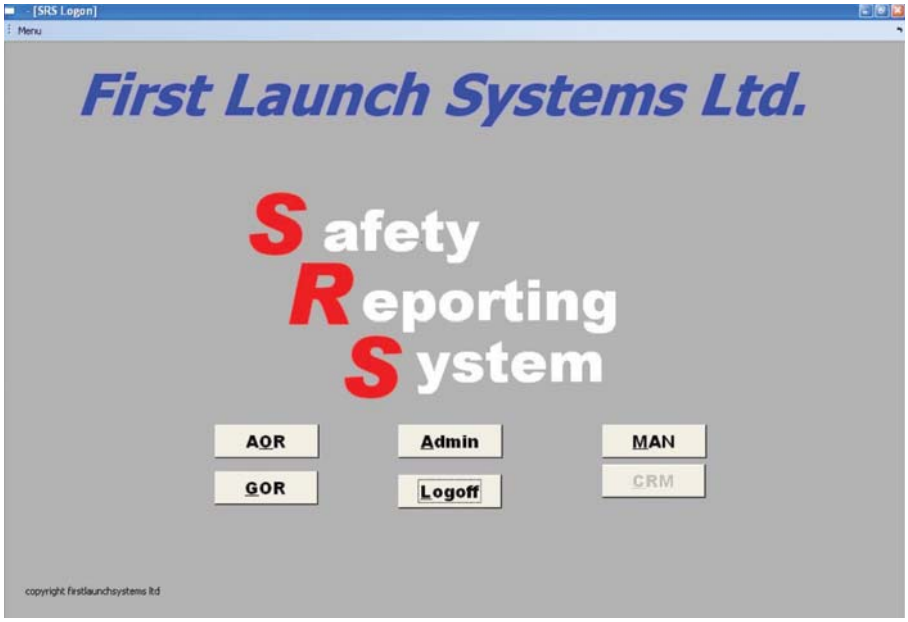
It can be clearly seen, that flight under a Limited Icing Approval is equally as valid as flight with a "full" icing approval as a similar and rigorous certification process is followed. The fundamental difference between the two regimes is that the Limited Icing Approval uses a known band of positive temperature air to de-ice the blades if icing conditions beyond the limits of certification are encountered, rather than de-icing the rotors and stabiliser by means of heated elements. However, this requires that a safe descent into positive temperature air can be assured. In practice this means that limited icing clearances only offer significant benefits to helicopters which operate, primarily, over water.

It will be interesting to see how the new generation of rotor ice protection systems perform and if they eventually supersede the current Limited Icing regime to give the helicopter a truly unrestricted IFR capability usable over all terrain.

Ice looks the same from the helicopter flight deck as it does from the fixed wing one!

Enterprise Safety Reporting and Administration Software for Commercial Aviation Operators

E-SRS V1.2



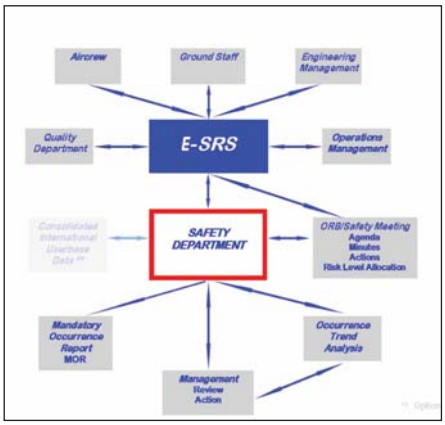
Introduction

With ever greater emphasis on safety and with an increasing focus on operational incident prevention, the importance of capturing and processing all incidents quickly and accurately is paramount if Operational Safety levels within the Commercial Aviation Industry are to continue to be improved.

All successful safety cultures are built on the solid foundation of a formal Safety Manual and detailed Safety Procedures. Enshrined within these systems are procedures to capture, process and then report system non conformances, incidents and potential incidents.

First Launch Systems Ltd has been addressing this area for the last five years and has developed **E-SRS** V1.2, a Structured, Modular, Enterprise Safety Reporting, Analysis and Communications Software Suite specifically designed for the International Commercial Aviation Industry.

System Schematic Overview



Overview

The **E-SRS** V1.2 system is designed to allow the easy input of Incident reports by operational personnel, providing an integrated Safety Management tool, assisting the company's Safety Department and Safety Officer in processing each Report.

The system provides a structure within which Reports can be efficiently and rapidly administered, trends identified and overall operational safety improved.

By significantly reducing the Safety Department's workload in comparison with manual systems the **E-SRS** V1.2 system has the capability to achieve considerable safety administration savings.

Trend Analysis can also identify recurrent high cost operational incidents, providing significant operational cost savings.

Key Features

System key features:-

- Standardised Multi User Data Entry
- Structured Data Workflow Routings
- Automatic New Report Notification via e-mail
- Formal Risk Level Assignment for each Report
- Automatic Mandatory Report (MOR) Despatch
- Sophisticated Trend Analysis and Incident Cost Reports
- Assisted generation of ORB/Safety Meeting Agenda, Actions and Minutes
- Full & Detailed Audit Trail on all Reports
- Flexible Administrator Controlled Setup
- Core input Data Locking and Security
- Optional - Regular updates of User Group Historical Reference Data

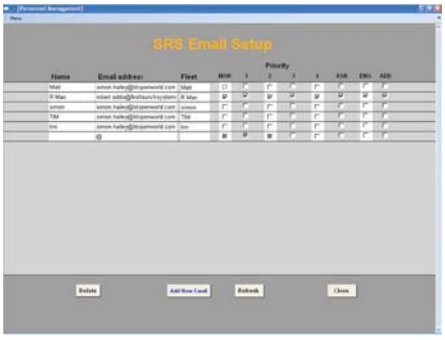
Operating Features

The E-SRS V1.2 suite has been designed as a self-contained, automated, safety reporting system. It provides a user-friendly structured application to allow the primary operational user groups, or any interested parties, to efficiently enter operational safety reports and then, by utilising Administrator pre-set workflow/ information routings, control the subsequent data distribution, review, analysis and safety administration processes.

Section 1 - Report Capture

Air, Voyage, Operations and Ground Handling Safety Reports, are entered using any standard company network PC via three easy to use standard input screens, titled "Details", "Flight Conditions" and "Description". Where appropriate, fields provide validation and auto lookup. Mandatory Occurrence Report status can be attributed on report entry to any report, if required. Additional Report types are available if requested.

Section 2 - Report Distribution, Access & Security



On each report entry a printed copy is provided for the originator.
Electronic notification of the new reports is then distributed via the company's existing e-mail system to the relevant operational, safety, quality and management staff in accordance with the system setup tables.

All users are allocated security passwords and access levels within the system on setup controlling both their viewing and access rights to the system.

Section 3 - Report Initial Review & Comment

Following notification of each new report filing, the preset recipients can review the report in full by entering the unique Report number in the yellow screen field. The Report as entered comprised three screens and during the review these correspond to the first three tabs on the ASR Review screen. At this reviewing stage the Safety Officer can assign or reassign to the Report an initial Priority Level and Risk Level.

All notified parties can comment on the Report using the comments form provided. All comments, with authors, are time and date logged and all entries are available for subsequent review by the Safety Officer and the ORB / Safety Meeting. There is no effective limit to the number of comments made against the Report by notified parties.

Section 4 - ORB Meeting Agenda Review & Minutes

The system allows the Safety Officer to create New Safety Meetings at future specified dates, create Agendas, select Meeting attendees and to distribute the Agenda. The Agenda is created by selecting on screen the Reports to be considered and transferring them to the Meeting. The Agenda is then automatically distributed.

A range of report filters is provided in order to aid selection of Reports for consideration at the Meeting.

At the Safety Meeting the Agenda is on screen. As reports are considered by the meeting all information and comment entered in relation to each Report can be accessed for review. Priority and Risk levels can be assigned, Actions identified and allocated and MOR status agreed. As the meeting progresses the Minutes and Actions can be entered directly to the system.

On final review Reports can be formally Closed.

To assist subsequent analysis the Meeting, or Safety Officer, is required to assign to each Report:-

1) A series of relevant Descriptors describing the scope of the incident

2) The Direct Cost, Lost Revenue and a measure of Lost Reputation that each Incident incurred.

Section 5 - Trend Analysis

With all reports having been assigned Descriptors and costs, if available, Trend Analysis within the data can be conducted between User Defined Dates and All, or Defined, Aircraft Types.
Up to three Descriptors can be selected for the Analysis. In order to speed each Trend Analysis, as the primary is selected the system offers a list of Descriptors that are already assigned to existing database Reports for that Primary Descriptor.

On initiating the Trend Analysis the System outputs the results as both a listing of all Reports matching the Descriptor query and a graphical representation of the Occurrence frequency together with the Cumulative Costs associated with the query.
Full details of each identified Report can be accessed directly from the screen listing and a hard copy of each Trend Analysis screen can be printed as required.

Availability

The **E-SRS** V1.2 system is now available for demonstration, purchase and installation.

First Launch Systems is actively seeking worldwide resale agents. Interested parties are invited to contact the company.

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