AVIATION SAFETY NEEDS YOU!

Aviation Safety is Everyone's Responsibility
Welcome to the 3rd issue of Blue Skies, GainJet Aviation’s bi-annual flight safety magazine.

In the aviation industry, safety is the driving force behind any successful operation and must be the most important factor in every part of an organisation. For this reason, we at GainJet have made it our mission to continuously strive for a corporate culture that embraces safety at its core. Among many other safety practices, Blue Skies magazine has become a solid and enjoyable tool for the advancement of safety within our company and within the industry. So I urge you to not only read every article, but to really consider all notions brought forward by them. Most importantly, remember that “safety is our top priority.”

Weather plays an important role in the safe operation of a flight, and therefore our Ops Team in OCC place great emphasis on analysis of the forecast conditions. Now as the days of thunderstorms, cold weather and snowstorms pass us, we are welcomed by the splendid days of spring followed by the hot days of summer. Hence, you will notice that this issue discusses and highlights the hazards caused by operating during hot weather conditions. Our operation takes us all over the world to many different airports with many different climates and altitudes. Our worldwide operation produces many challenging operating environments. These include, ‘hot and high’ conditions that could hinder aircraft performance, and extreme temperatures combined with high humidity that could affect aircraft equipment and instruments.

Beyond the effects of weather, there are many other factors that can affect safety. Company practices within the industry are continuously changing and advancing to ensure smoother and safer operations. It is important to be up to date with the concepts and techniques behind such advancements. Therefore we also discuss other factors and introduce new concepts (such as SMS) that are evolving in our company.

The two accident case studies in this edition focus on accidents that took place during ‘hot and high’ conditions. Both studies show how important it is to recognise the negative impact on performance by this environment and to calculate the corrections accordingly. The error chain plays a major role as a cause of the accidents. It is important to recognise that by following Standard Operating Procedures (SOPs) and carrying out checklists diligently we can keep the operation safe. Just removing one error can break the chain and may prevent the accident.

I urge you to look at all articles and all accident case studies with an objective point of view, and appreciate the valuable lessons that can be learned by the constructive articles and behind the tragic case studies.

Fly Safe!

Andrew Hallak
Editor, Blue Skies

A special thanks to all those who participated in this issue:
‘Hot and High’

Throughout my previous experience as a pilot, I had on many occasions seen the runway end getting closer and often asked myself, ‘if I ever have to abort takeoff now, will the aircraft stop in the remaining distance available?’

This was most evident in Sanaa, Yemen. Perched at 7,500 feet above sea level, with high temperatures throughout the year, it is an airport where all pilots are exploring the combination of those limits on a regular basis.

Fortunately for all of us, the manufacturers have already gone to the trouble of testing each product to the limit and none of us will have to put our ‘planes to the ultimate test of aborting at high speed and in hot weather conditions.’ With correct planning and preparation, we can achieve a safe and smooth operation.

The summer season is approaching, hence we have dedicated a portion of our articles in the new edition of *Blue Skies* to hazards and accidents related to the ‘hot and high’ where those limits are discussed in more detail.

Enjoy!

By Captain Ramsey Shaban
President
GainJet Aviation S.A

Safety Comes First

There is a saying in commercial aviation from long ago. “If you think safety is expensive, try having an accident.”

It is sometimes difficult to prove the link between Flight Safety issues and the commercial success of a company. Quite often there will be a certain amount of resistance from Senior Executives to approve spending the money on ‘Flight Safety’ projects as they cannot see the immediate financial benefit. We are all aware of how some senior managers in the industry are very commercially focused, perhaps losing sight of the fact that if safety margins are eroded too much, then the commercial viability is jeopardised.

Tragically, a perfect example of what we are talking about here, was presented to the commercial aviation industry very recently. When Spanair’s MD82 (flight JK 5022) crashed during takeoff on 20th January 2008, it resulted in the loss of 154 lives. They also lost the airline. The subsequent financial damage wrought upon the ailing carrier was too much to survive and ultimately lead to the bankruptcy of Spanair on 27th January 2012.

This lesson is important to you, to me and to all of us. Please take time to read and learn the lessons from the accident report which is republished in this issue of *Blue Skies* – look especially for the HUMAN FACTORS which lead up to that final disastrous take-off run…

When we think about our Flight Operations, we should think, ‘Is it Safe? Is it Legal? Is it Profitable?’ – in that order. Quite simply if you cannot answer yes to the first question, then you do not need to bother asking the other two – they become irrelevant!

Fly Safe!

By Captain James McBride
CEO and Accountable Manager
GainJet Aviation S.A
Bi-annual Safety Officer’s Review
Jun-Dec 2011

In 2009, GainJet developed a new flight safety program that promoted safety throughout the organisation, improved the flow of information and reporting, and made safety the responsibility of every member of staff. Since then, we have continuously improved the program, our safety measures, and our safety culture. As the new Flight Safety Officer, I look forward to enhancing our flight safety program even further.

Over the past six months the flight safety department has worked with the training department, the flight operations department, and the quality department, by examining ways to improve flight safety through:

- An enhancement of Flight Crew and Cabin Crew training.
- Enhancement of training in safety practices and measures for all departments.
- Crew notices and memos to include safety bulletins.
- Improvement in communication systems between all departments to allow an improved flow of information.
- Open and non-punitive safety culture to promote incident reporting.
- Introduction of Safety Management Systems (SMS). GainJet is currently releasing an SMS manual and establishing SMS throughout the whole company.
- Continuous review and evaluation of our entire operation in order to find and fix incidents, flaws, issues, and problems that could affect the safe and smooth operation of the organization.

We have made a proactive effort to enhance safety throughout the organisation, in order to avoid issues that may arise if we are complacent. We need to solve issues, before they actually become problems.

As you can see from the below table, with this proactive attitude as a driving force behind our safety program, we have been able to reduce occurrences, and advance safety thinking in our organisation.

Please always remember that safety is our top priority.

Following below is a review of occurrences for the second half of 2011:

<table>
<thead>
<tr>
<th>MONTH</th>
<th>TYPE OF INCIDENT</th>
<th>LEVEL OF SERIOUSNESS</th>
<th>CASE STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>December</td>
<td>RTO at very low speed</td>
<td>LOW</td>
<td>UNDER INVESTIGATION</td>
</tr>
<tr>
<td>December</td>
<td>Go Around</td>
<td>LOW</td>
<td>UNDER INVESTIGATION</td>
</tr>
<tr>
<td>December</td>
<td>Light Smoke/Smell from #3 and #4 ovens</td>
<td>HIGH</td>
<td>CLOSED</td>
</tr>
</tbody>
</table>

By Captain Vangelis Lykoudis
Flight Safety Officer
The Evolution of Safety Thinking

During its early years, commercial aviation was a loosely regulated activity, characterised by underdeveloped technology, lack of a proper infrastructure, limited oversight, an insufficient understanding of the hazards underlying aviation operations and production demands incommensurate with the means and resources actually available to meet such demands.

It is a given, in systems safety theory, that production systems that set ambitious production objectives without deploying the necessary means and resources to deliver them, develop the potential for frequent breakdowns. Therefore, it is hardly surprising that the early days of commercial aviation were characterised by a high frequency of accidents, that the overriding priority of the early safety process was the prevention of accidents, and that accident investigation was the principal means of prevention. In those early days, accident investigation, prevented by the absence of other than basic technological support, was a discouraging task.

Technological improvements (due in large measure to accident investigation), together with the eventual development of an appropriate infrastructure, led to a gradual but steady decline in the frequency of accidents, as well as an ever-increasing regulatory drive. By the 1950s, aviation was becoming (in terms of accidents) one of the safest industries, but also one of the most heavily regulated.

This resulted in the still universal idea that safety can be improved, as long as rules are followed and that deviation from rules necessarily leads to safety breakdowns. Without denying the immense importance of regulatory compliance, its limitations as the importance pile of safety have increasingly been recognised, particularly as the complexity of aviation operations has increased. It is simply impossible to provide guidance on all conceivable operational scenarios in an operational system as open and dynamic as aviation.

Processes are driven by beliefs. Therefore, under the belief that regulatory compliance was the key to aviation safety, the early safety process was broadened to encompass regulatory compliance and oversight. This new safety process focused on outcomes (i.e. accidents and/or incidents of magnitude) and relied on accident investigation to determine the cause, including the possibility of technological failures. If technological failures were not evident, attention was turned to the possibility of rule-breaking by operational personnel.

The accident investigation would backtrack looking for a point or points in the chain of events where people directly involved in the safety breakdown did not do what they were expected to do, did something they were not expected to do, or a combination of both. In the absence of technological failures, investigations would look for unsafe acts by operational personal, i.e. actions and/or inactions that could be directly linked to the outcome under investigation. Once such actions/inactions were identified and linked, with the benefit of hindsight, to the safety breakdown, blame in different degrees and under different guises was the inevitable consequence, and punishment would be meted out for failing to “perform safely”.

Typical of this approach was to generate safety recommendations aimed at the specific, immediate safety concern identified as causing the safety breakdown, almost exclusively. Little emphasis was placed on the hazardous conditions that, although present, were not “causal” in the occurrence under
investigation, even though they held damaging potential for aviation operations under different circumstances. While perspective was quite effective in identifying “what” happened, “who” did it and “when” it happened, it was considerably less effective in disclosing “why” and “how” it happened. While at one time it was important to understand “what”, “who” and “when”, increasingly it became necessary to understand “why” and “how” in order to fully understand safety breakdowns. In recent years, significant steps have been made in achieving this understanding. And as we look back, it is clear that aviation safety thinking has experienced a significant evolution over the last fifty years.

The early days of aviation, those before and immediately following the Second World War until the 1970s, can be characterised as the “technical era” where safety concerns were mostly related to technical factors. Aviation was emerging as a mass transportation industry, yet the technology supporting its operations was not fully developed, and technological failures were the recurring factor in safety breakdowns. The focus of safety endeavours was rightly placed on the investigation and improvement of technical factors.

The early 1970s saw major technological advances with the introduction of jet engines, radar (both airborne and ground-based), autopilots, flight directors, improved navigation and communications capabilities and similar performance-enhancing technologies, both in the air and on the ground. This heralded the beginning of the “human era”, and the focus of safety endeavors shifted to human performance and Human Factors, with the emergence of crew resource management (CRM as a first stage, second stage was cockpit resource management and the third company resource management), line-oriented flight training (LOFT), human-centered automation and other human performance interventions. The mid-1970s to the mid-1990s has been proclaimed as the “golden era” of aviation Human Factors, where safety concerns were mostly related to technical factors. Aviation was emerging as a mass transportation industry, yet the technology supporting its operations was not fully developed, and technological failures were the recurring factor in safety breakdowns. The focus of safety endeavours was rightly placed on the investigation and improvement of technical factors.

The advancement of safety thinking and action – The Evolution of Safety

**Flight Safety Officer’s Briefing**

Safety is a chain and each member of staff working for an air operator is a ring of that chain. If any ring were to get loose, then the chain weakens – and disastrous results may follow. Rules, regulations, and procedures must be written down in a manual and all personnel involved in aviation must comply with the manual. This is the importance of the SMS, Safety Management System, manual.

GainJet Aviation has recently produced a Safety Management System manual. Let us define each one of these words, starting from the last one:

**SYSTEM:** An organisation which coordinates the activities of an enterprise in accordance with certain policies and in achievement of defined objectives.

It is a collection of laws, rules, regulations and procedures. It consists of processes, including a development process, an evaluation process and
defined expectation process that are well-ordered, repeatable and use data information so that improvement and learning are possible.

A system is established to reach goals, to achieve targets, and to serve an idea. In order for a system to be effective, strong management and leadership are indispensable.

**MANAGEMENT:** The senior administrators who have the power and responsibility to make decisions and to manage an enterprise. They are managers and leaders.

The manager’s job is to plan, organise and coordinate. The leader’s job is to inspire and motivate. The manager administrates; the leader innovates. The manager relies on control; the leader inspires trust. They are there to guarantee the effectiveness of the system.

**SAFETY:** The state in which the possibility of harm to persons or of property damage is reduced to, and maintained at or below an acceptable level through a continuing process of hazard and safety risk management and mitigation.

Is safety 100% guaranteed? Certainly not. For many known reasons. Safety therefore is the day to day, endless and everlasting effort to minimize the risks assessed.

Observe, report, and act. These are some of the milestones of safety. Report everything that you believe does not comply with company procedures and anything suspicious, even if you think it is minor. It will be evaluated. It is the management’s duty to act upon hazard reports that are received. Do not hesitate. Inform and assist - be an active member of the evolution of safety.

Always remember that “We all are servants of the system that serves the ideal of safety. We are all rings of the safety chain. Let’s keep it solid.”

**BE ALERT!!!**

By Captain Vangelis Lykoudis
Flight Safety Officer
Weather & Operations

GainJet Aviation has established its position in the aviation market as a VIP carrier with the aspiration to provide its passengers with the utmost customer satisfaction during their journey. Our passengers feel comfortable and enjoy flying with GainJet because we have set a combination of top quality services, safety and security as our top priorities.

Weather plays a huge role in our ability to provide both top quality service and a safe flight. Since our operation is worldwide, we must be ready to face all kinds of weather conditions; including the most challenging ones. GainJet’s operations department consists of personnel with high safety culture, knowledge and experience who have all the necessary tools to check, plan and assist the flight crew to execute safe flights. Therefore it is highly recommended that the flight crew coordinates with the operations department regarding weather and other issues that could affect the safety of a flight.

Weather is one of the most important safety factors in aviation since it can affect an aircraft on the ground as much as in the air. Keeping an eye on the weather forecasts combined with familiarity of the procedures designated in the company manuals helps prevent the occurrence of incidents that can cause damage to the aircraft and/or ground equipment, or even harm people.

For example, consider a situation where extremely strong winds prevail at the airport during the time spent on ground between two flights. If those conditions have been brought to the attention of the flight crew and ground personnel well in advance, then all necessary safety precautions and actions could be taken to secure the aircraft, the crew, and the passengers. When such precautions have been taken, we can avoid unpleasant and dangerous situations such as an unexpected movement of the aircraft from its parking position during the phase of loading, refueling, embarkation or even when the aircraft is parked in a position waiting for its next future flight.

In the planning phase of a flight, the dispatchers must check weather conditions in order to find the most efficient way to design and prepare the execution of a smooth and safe operation. The dispatchers must choose routes and possible fuel stop airports using the best possible wind components that would help the aircraft to achieve better speeds, times and the maximum range with less fuel consumption. More importantly, in order to ensure the comfort and safety for passengers and crew, the dispatchers prepare routes that avoid (as much as possible) areas in which turbulence can be expected. I’m sure we can all recall past tragic accidents in the history of aviation with catastrophic results when aircraft were hit by severe turbulence. So if we can avoid turbulence, then we should. If not, then we should be prepared for it and take all necessary precautions to deal with it.

When flights are expected to operate in airports with dangerous conditions such as hot and high conditions, icing or heavy snow conditions, wet or contaminated runways, or possible low visibility, it is important for all appropriate departments to coordinate with each other and determine the necessary actions and precautions to be taken. The operations department retrieves all the necessary information and examines it in order to be prepared accordingly. The flight crew must be briefed thoroughly prior and during the flight in order to be able to make the correct decisions. Please always remember that an open and constant flow of communication and coordination between every department of the company is key to a smooth and safe operation.
Safety is our priority and should never be sacrificed for anything. The customer will appreciate it and the industry will commend it. For example, not so long ago, one of our flights that was supposed to operate was cancelled due to extremely unfavourable weather conditions at the destination airport as well as all other alternative airports that were chosen. At first, the customer felt disappointed and unhappy with this development since he was not able to complete his trip as originally planned. However, when all the related information was presented to his representative, he felt relieved and happy that we considered his safety as our priority. So always remember that safety comes first.

Our operations team is available 24/7 to guarantee a smooth and safe operation and to provide any vital information to the flight crew that will be useful to accomplish their mission. So we highly urge all departments to utilize our assistance at any time.

As we say in operations; “we keep them flying safely day and night”.

By Bill Zois
Flight Dispatcher/Operations Officer

Weather & Operations

Hot weather operation generally means operation in a hot, humid atmosphere. High ambient ground temperatures have a pronounced effect on aircraft and crew performance, and operating efficiency. High temperatures, alone or coupled with high humidity or blowing sand and dust, will complicate normal operations. Proper protection and inspection of the airplane while it is on the ground, and observance of the precautions covered in the aircraft’s hot weather section, will assure the safest operation. High humidity usually produces condensation throughout the aircraft, which will cause the following:

- Malfunctioning of electrical and electronic equipment.
- Fogging of instruments.
- Growth of fungi in vital areas of the airplane.
- In extreme cases, pollution of lubricants, hydraulic fluid, and fuel.

Here are selected recommendations for operation in hot climates:

- Closely monitor strut servicing and aircraft level.
- Inspect for leaks where seals may have swollen.
- Limit the use of brakes during taxi and after landing to prevent overheating.
- Idle reverse thrust can be used on clean taxiways to help reduce brake usage.
- Examine the effects of high temperatures on aircraft performance, especially at high altitudes.
- Give the engines extra time to cool after shutdown before installing plugs/covers.

Ground Operations

Hot temperatures can have an adverse effect on aircraft equipment and require special awareness by maintenance and the flight crew. The combination of ramp temperatures (usually well above ambient temperature) and the greenhouse effect on the flight deck can have a detrimental effect on aircraft electronic components.

When the operating flight crew is not at the aircraft, the maintenance department will assume responsibility for cockpit cooling and ventilation. However, coordination is necessary.

To avoid negative effects on flight instruments and navigation equipment due to heat and/or condensation in the cockpit, please adhere to the following guidelines:

- Consider External Power to reduce APU load.
- Select high pack flow.
- When preparing the Boeing 757 or Boeing 737s for departure in hot and humid conditions, and cockpit cooling is needed, begin the aircraft
cooling procedure well in advance of the scheduled departure time. When possible, begin approximately two hours prior to departure.

- For the B757/B737: Operate both packs in automatic, leaving pack temperature control at midpoint position. Try to maintain the cockpit at a comfortable 78°F. Do not turn temperature control to full cold or set the temperature at an unreasonably cold temperature.
- Always keep all doors/windows closed as much as possible. This includes the cockpit entry door, cargo access area doors and cockpit windows.
- Excessive moisture in the cooling system may contribute to cockpit display blanking.
- If a ground source of conditioned air is available, the supply should be plugged in immediately after engine shutdown and should not be removed until either the APU or the engines are started.
- If a ground source of conditioned air is not available, use both air conditioning packs and recirculation fans.
- Electronic components which contribute to a high temperature level in the flight deck should be turned off while not in use.
- Open all passenger cabin gaper outlets and close all window shades on the sun-exposed side of the passenger cabin.
- Open all flight deck air outlets.

A ground source of conditioned air is being used to cool the aircraft

Note B757: If only a ground source of conditioned air is supplied (no bleed air from the APU or ground external air), then TAT probes are not aspirated. Because of high TAT probe temperatures, the FMCs or TMSP may not accept an assumed temperature derate. Delay selecting an assumed temperature derate until after bleed air is available.

If the life rafts are expected to be exposed to temperatures above 53.5°C (130°F), it is recommended that they be removed from the airplane. At temperatures above 53.5°C (130°F), the CO2 cartridge may discharge.

High brake temperature levels may be reached which can cause the wheel fuse plugs to melt and deflate the tires. Consider the following actions:

- Be aware of brake temperature buildup when operating a series of short flight sectors. The energy absorbed by the brakes from each landing is accumulative.
- Extending the landing gear early during the approach provides additional cooling for tires and brakes.
- In–flight cooling time can be determined from the “Brake Cooling Schedule” in the Performance–In-flight section of the QRH.

You must be aware of the risks of brake temperature build up, especially in hot weather conditions

During flight planning consider the following:

- High temperatures inflict performance penalties which must be taken into account on the ground before takeoff.
- Alternate takeoff procedures (No Engine Bleed Takeoff, Improved Climb Performance, etc.).

Following these guidelines will help keep the cooling temperature close to or above the dew point and should greatly reduce the chance of introducing moisture into the avionics equipment.

Flight Crews are strongly recommended to review applicable Hot Weather Operations procedures as follows:

- GLEX XRS FCOM 07-06
- G450 OM 07-01-30
- G550 OM 07-01-30
- B757 FCOM SP 16.12
- B737 FCOM SP.16.17

By Kostas Karalis
Chief of Engineering Department
Operating in Hot and High Conditions

Most aircraft flight manuals tend to depict numbers of performance capabilities of the aircraft at the standard atmosphere, which is 29.92 inches of mercury at 15° C at sea level. You, me, and anyone can sensibly assume that it is the rarest of cases where an aircraft will operate under the exact standard atmosphere. Therefore, you should always keep in mind that any increase in temperature or altitude will affect the aircraft’s optimum performance.

Temperature and air density have an inverse relationship. As temperatures increase, air density decreases. Hence, warmer air is less dense than colder air. Scientifically put, there are less air molecules in a given body of warm air than in the same amount of cooler air.

The same inverse relationship exists between altitude and air density. As altitude increases, air density decreases.

So, operation of an aircraft during times of hot temperatures, will require more power, more runway length for takeoff, may have a poorer rate of climb, faster approach, or may experience a longer landing roll. Simply put, aircraft performance suffers. Equally so, is the case of operating an aircraft in higher altitudes. Operating at high elevation airports also requires more power, longer runway lengths for takeoff, and its climb rate will be reduced, its approach faster, and its landing roll longer.

Imagine if individually each element has such a negative effect on aircraft performance, what the effect might be as a combination. Hot and high conditions are very dangerous, especially if the flight crew are not informed and prepared for it. Hot temperatures combined with high altitudes can severely reduce the performance of an aircraft.

The effects can include, but are not limited to:
• Since fuel/air mixture is reduced, a reduction of the thrust output of the engines is likely.
• Thin air exerts less force on the airfoils, which will reduce the lift of the wings.

If all the effects above are taken into account, it is easy to understand that the takeoff distance required will increase since climb performance is dramatically reduced.

Note: When operating to airports located in mountainous regions, you must consider the extra dangers, since there is a chance the aircraft may not be able to gain enough lift or maintain a rate of climb necessary to clear obstacles or surrounding terrain.

At 7,656 Ft Above Mean Sea Level and high temps, Bole Airport in Addis Ababa is likely to have hot and high conditions.

Keep in mind that hot weather may also increase chances of humidity. Humidity can have an effect on aircraft performance since the increased amount of water vapor in the air means there is less air density in a given body of air. As stated above, air is an important factor in aircraft performance, and therefore humidity also negatively impacts aircraft performance. Humidity can also affect aircraft equipment and avionics.

When operating in hot and high conditions, some helpful ways to increase aircraft performance are:
• Communication is key. Be informed and prepared.
• Reduce aircraft weight. Weight can be reduced by carrying only the necessary amount of fuel to reach your destination safely and/or to depart with less passengers/baggage.
• Increase engine power. More power can improve an airplane’s acceleration and reduce its takeoff run. Keep in mind, however, that added power means added fuel, which means added weight. So it may not be the best solution.
• Wait until the temperature decreases. Temperatures are highest during the day around the early afternoon. So aim to operate during the early morning or late evening. Keep in mind that the lowest temperature of the day is usually around 04:00 a.m local time.

By Captain Vangelis Lykoudis
Flight Safety Officer
Weight and Balance

It is important to consider the effects that center of gravity limitations and gross weight have on the performance of an aircraft. Flight crew must familiarise themselves with such effects and apply that knowledge for every flight to ensure a safe flight every time. Many flight accidents can be avoided by applying these factors, amongst others, while preparing for a flight.

It is also important to recognise and appreciate the effects of weight and balance on an aircraft’s performance, especially when there are other factors involved that could also hinder performance like contaminated wings and hot and high conditions. Therefore, I would like to remind you of the basic concepts of weight and balance:

- An aircraft can be considered within weight and balance if the weight of the aircraft is equal to or below the limit for its configuration while the center of gravity is within the designated range set by the aircraft manufacturer.

- Total weight is calculated by adding up all weight on the aircraft.

- In order to calculate the center of gravity you must:
  - Calculate the weights and arms of all mass within the aircraft.
  - Multiply weights by arms for all mass to calculate moments.
  - Add the moments of all mass together.
  - Divide the total moment by the total weight of the aircraft to give an overall arm.
  - The resulting arm needs to be within the arm limits for the center of gravity that are designated by the manufacturer. The figures are likely found in the aircraft manual.

- If this is not the case, then weight in the aircraft must be removed or redistributed until the center of gravity is within the designated limits.

- An aircraft whose weight exceeds the maximum weight set by the manufacturer:
  - May be unable to sustain or even achieve controlled flight.
  - May be unable to take-off within available runway length.
  - May be unable to take-off at all.
  - May not be able to climb beyond a certain altitude
  - May not be able to maintain a certain altitude

- When an aircraft’s center of gravity is out of the designated range set by the manufacturer the aircraft may pitch uncontrollably, which may result in the loss of control and handling of the aircraft.

For your safety, for the safety of your passengers, and for the continuous safety of our operation check the weight and balance of the aircraft before each flight and ensure that the aircraft gross weight and center of gravity are within designated limits.

And always remember that “we will strengthen our business by making safety excellence an integral part of our company activities.”

By Captain Dimitris Kehayas
Flight Ops Manager
The purpose of this article is to address three aspects of managing an in-flight smoke or fire event that are appropriate to all aircraft types.

**Physiological Protection**
At the first indication of smoke, fumes, or fire within the aircraft, the flight crew should put on smoke goggles and oxygen masks. Goggles and masks need to fit tightly and 100 percent oxygen with emergency overpressure should be utilised to minimize any entrance of smoke and fumes in the mask. If using a combination of mask and goggles, ensure the smoke valve vent selector is open, so forced air can clear the goggles of contaminants.

**Establish Communication**
Utilise the radio communication panel on your aircraft to properly make the mask’s microphone active for both internal and external communications. Ensure the overhead speaker is on and the volume adjusted to establish clear communication with others on the flight deck. Remember, if you inhale while communicating, the overhead speaker will transmit the sound of oxygen being inhaled which may interfere with your ability to effectively communicate.

**Plan for Descent and Landing**
Warnings or reports of smoke or fumes need to be taken seriously until it is positively confirmed that the reports are false. Establish a plan and determine who is flying and who is working the emergency. Consider splitting cockpit duties. For example, the pilot flying can also talk on the radio.

If it is a real fire, then the flight crew does not have very long to deal with the situation - time is critical. The crew should begin descent immediately and should plan for an emergency landing. An emergency should be declared and Air Traffic Control should be advised that the aircraft is in a descent. Don’t make the emergency worse with improper planning requiring a go-around. If there is quantifiable evidence of an uncontrolled fire, then there is a real possibility of loss of control in the short term and, therefore, an off-field landing or ditching may be the only way of surviving the experience.

While the requirement is to land the aircraft as soon as possible, the crew needs to do all they can to isolate and extinguish the fire. Consider utilising other crewmembers and occupants to locate the source of the fire and aggressively attack it using all available resources. Crews should follow all GainJet established procedures for fighting an in-flight fire.

**Simulator Flight Training Strategies For In-Flight Fire/Smoke In The Cockpit**
Areas to be incorporated into the 2012 Simulator Training are:
- Decision Making
- Energy Management
- Use of Emergency Equipment
- Communications

GainJet tailors a scenario for each specific type of aircraft to train and evaluate crew performance in each of the emphasis areas. During training, crews are...
challenged to respond to a cargo fire in-flight and to make decisions on diversions, checklist management, internal and external communications, and descent and arrival strategies. A major emphasis in the training scenarios is for crews to understand the importance of quickly developing a plan and landing at the nearest suitable airport. The scenarios require the full use of the oxygen masks and smoke goggles throughout the event.

**General Subjects Recurrent Emergency Procedures Training**

All GainJet recurrent training allows us to collect detailed training data during the smoke and fire training scenarios. The data is then analysed to determine if any changes to our training or flight crew procedures are warranted. Fleet comparative data can be used to identify any unique challenges on a specific fleet type.

The response to the training enhancements has been extremely positive so far. Crewmembers receiving this training have responded with a high level of professionalism, and indicate they have a determination to sharpen their skills and expand their Cockpit Resource Management abilities. Feedback shows they understand the training’s criticality and how the emphasis areas can affect the outcome of an actual flight event. Each crewmember stated they understood the safety and survival implications of responding to these training scenarios with the highest possible performance standard.

By Captain Konstantinos Molyndris
Training Manager

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**Safety Management System & Safety Culture – A Guide to Hazard Identification**

Risk assessment is one of the functions in a Safety Management System. An important element of risk assessment is the identification of hazards.

A hazard can be considered a dormant potential for harm. This potential for harm may be in the form of a natural hazard such as terrain, or a technical hazard such as incorrect runway markings.

**Introduction to Hazard Identification**

Amendment 30 of ICAO Annex 6 requires organisations to establish Safety Management Systems (SMS) that, as a minimum: identifies safety hazards; assesses risks; ensures remedial action to maintain an acceptable level of safety is implemented; provides for continuous monitoring and regular assessment of the safety level achieved; and aims to make continuous improvement to the overall level of safety.

SMS is a systematic and organised approach to managing safety, including the necessary organisational structures, accountabilities, policies and procedures. The component of SMS within which hazard identification takes place is risk assessment and this forms part of an overall risk management process.

Risk assessment can be performed on steady-state operations to provide assurance that the risks associated with day-to-day operations remain tolerably safe. It can also be performed on proposed changes to a system or operation to ensure that the risks from any additional hazards or any impacts on existing hazards introduced by the change, remain acceptably safe.

Managers must define, document & communicate the safety roles, responsibilities, and authorities throughout its organisation.

**Risk assessment features 8 steps:**

1. System / operation description
2. Hazard identification processes
3. Consequence analysis
4. Causal analysis
5. Evaluation of risk
6. Mitigation of risk
7. Approval of residual risk
8. Safety assessment documentation
Definitions
• Hazard Identification
To identify the Safety Event which could lead to an Undesirable Event and defining the characteristics of this undesirable event in terms of the potential Safety Outcome and magnitude of Consequences.
• Hazard
A condition, object, activity, circumstance or event with the potential to cause injury, damage to equipment or structures, loss of material, or reduction of ability to perform a prescribed function.
• Safety Event
A failure condition, causal factor, threat or precursor event which, in isolation or in combination with other safety events, could result in an undesirable event.
• Undesirable Event
A stage in the escalation of an accident scenario where the accident will occur, unless an active recovery measure is available and successfully used.
• Consequence
The degree of injury, damage, loss of material, or reduction of ability to perform a prescribed function arising from an outcome. Consequences have a magnitude.
• Risk Controls (Barriers and Mitigation)
A system, action, activity or procedure that is put in place to reduce the risks associated with a hazard. Mitigation may include elimination of the hazard (preferred); reduction in the frequency of the hazard (barriers); reduction in the likelihood of the outcomes of the hazard (outcome mitigation); reduction of the severity of the outcomes of the hazard (consequence mitigation).
• Risk
The combination of the predicted frequency and severity of the consequences of hazard(s) taking into account all of the potential outcomes.
• Risk Management
The identification of hazards associated with the day-to-day operations of an organisation or with changes to the operations of an organisation; the assessment of risks associated with those hazards; and the implementation and management of measures to reduce those risks to an acceptable level (hazard removal; or the application of barriers and/or mitigations – i.e. risk control).

2. Hazard identification in Practice
Hazards may be identified through a data-driven (quantitative) methodology or qualitative process.

2.1 Quantitative Methodologies (Data Driven)
Hazards are identified and recorded through a systematic process allowing for traceability and further analysis.

There are various types of recorded observations which may be used to identify hazards. Sources for hazards identification can be Flight Data Monitoring (FDM), company audits, staff surveys, hazard reports etc. Investigation and reports of past occurrences may provide insight to existing hazards, as well as uncovering other hazards that may arise.

2.2 Qualitative Process
Hazards may be identified through a qualitative process that is either formal (part of safety assessment) or informal (based on discussions, interviews and brainstorming).

Informal qualitative methods are heuristic processes based on expert judgement. They often identify hazards that other approaches cannot detect. Using both approaches in combination will provide better results.

Existing material should be reviewed with the aim of identifying gaps or hazards. The UK CAA (Ref. UK CAA CAP730) suggests a brainstorming exercise, which will allow participants to identify hazards within the organisation. The FAA/EUROCONTROL suggest that identification of hazards may be done by individual or group-based assessors. It may be difficult to identify certain hazards. So some approaches have been developed to cover what might be termed ‘unimaginable hazards’.

Individual Approach
One or two assessors identify hazards across all aspects of a system. These assessors are responsible for identifying the majority of hazards within the organisation. Examples of questions which may assist in identifying hazards are:
• What would possibly go wrong?
• What could lead to something going wrong?

Unimaginable Hazards
A common way to identify hazards other than from occurrence reports is to conduct functional Hazard Assessments: The identification of failures of prescribed or intended system functions or operational procedures, the operational consequences of these failures, and the potential effects on the safety of the operation.
2.3 Hazard Identification Documenting & Review
It is very difficult to declare a hazard identification process as complete. Hazard identification should be periodically reviewed; especially if there is a significant change in the operations or the organisation; if mitigation measures have been identified; or in the light of the outcomes of internal investigations. The outcome of the hazards identification process should be documented in the form of a list of hazards or hazard logs. Hazards logging is useful for subsequent analysis.

3. Specific Tools and Techniques for Hazard Identification
Any system or operation comprises of people; procedures; equipment; and an environment of operation. All these elements must be considered during hazard identification. Hazard identification requires a definition of the System/Operation.

The definition may be Functional, Operational, Process, or Scenario based.

3.1 Checklist
Lists of known hazards or hazard causes that have been derived from past experience. The past experience could be previous risk assessments of similar systems or operations, or from actual incidents that have occurred in the past.

Example Hazards by Hazard Type:
Natural
- Severe weather or climatic events.
- Adverse weather conditions.
- Geophysical events.
- Geographical conditions.
- Environmental events.
- Public health events.

Technical deficiencies regarding:
- Aircraft and aircraft components, systems, sub-systems and equipments. This includes failures, inadvertent or erroneous functioning of systems.
- An organisation’s facilities, tools & equipment.
- Facilities, systems, sub-systems and equipment external to the organisation.

Economic
- Major trends related to Growth, Recession, Cost of material or equipment, Fuel cost, Environmental issues, etc.
- Diverging interests: Operation vs. Shareholder.

Ergonomic
- Deficiencies in the environment within which front line employees have to operate.
- 24-hour operation with impact on individual’s performance (circadian cycle).

Organisational
- Complex organisational structures resulting in unclear responsibilities.
- Re-organisation/Restructuring.

Example Hazards by Organisation
Airport Operator
- Worn runway markings.
- Unclear ramp marking for vehicle holding point.
- Fuel spillage.
- Poorly lit parking position.
- Partial failure of weather monitoring devices.

Ground Handler
- Jet blast.
- Noise.
- Understaffing.
- Misinterpretation of Load-sheet.
- Wet surfaces/ equipment.
- Improper application of anti-icing fluid.

Aircraft Operator
- Load-sheet errors.
- Lack of sleep during off duty.
- Partial failure or loss of navigation systems.
- Error in FMS database.
- Loss of radio communication.
- Wrong read-back of ATC clearance.
- Expired aeronautical information.
- Loss of transponder transmission.

ANSP (Air Navigation Service Provider)
- Loss of communication.
- Loss of aircraft separation.
- Improper flight handover.
- Improper clearance.
- Use of wrong call sign.
- Adverse weather conditions.
- Diversion of multiple aircraft.
- Loss of transponder transmission.

Maintenance Organisation
- Use of outdated procedure.
- Delayed implementation of AD.
- Use of non-OEM certified parts.
- Improper handover of remaining work to next shift.
- Improper application of paint or other chemicals.
- Chemical spillage.
- Repair of wrong system/component.

Examples of Sources for Identifying Hazards
1. Flight Operations Data Analysis (FODA) / Flight Data Monitoring (FDM).
2. FODA-Campaigns (subject specific in-depth analysis).
3. Flight Reports.
4. Cabin Reports.
5. Maintenance reports.
6. Confidential safety reports.
7. Operations control reports.
8. Maintenance reports.
9. Reports of the NAA.
10. Crew surveys.
13. Partner airline assessments.
15. Training records (e.g. crew periodic checks, simulator checks and training, line checks etc.).
16. Manufacturers reports and SIE (safety information exchange) programs.
17. Safety reporting.
18. Observation of maintenance operations (if APL).
20. Safety Culture monitoring through surveys.
21. Internal safety investigations.
22. Ad-hoc questionnaires on chosen safety issues.
23. Internal safety workshops.
25. Training records.
26. Company voluntary reporting system.
27. Audits and surveys.
28. Ground handling report.
29. Disruptive passenger report.
30. Captain’s special report.
31. Flight and duty time discretion report.
32. Flight operations monitoring.
33. Accident reports.
34. State mandatory occurrence system.
35. Organisation’s partners.
36. Assessment of partners.
37. IOSA reports.

The Hazard Log
A key element of this process step is the documenting of hazards identified. Organisations should maintain a centralised log of all identified hazards. The nature and format of such a log may vary from a simple list of hazards to a more sophisticated relational database linking hazards to mitigations, responsibilities and actions (as part of an integrated safety risk management process). As a minimum, it is recommended that the hazard log includes the following information:

- Unique hazard reference number against each hazard.
- Hazard description.
- Indication of the potential causes of the hazard (safety events).
- Qualitative assessment of the possible outcomes and severities of consequences arising from the hazard.
- Qualitative assessment of the risk associated with the possible consequences of the hazard.
- Description of the risk controls for the hazard.
- Indication of responsibilities in relation to the management of the risk controls.

In addition, organisations may wish to consider the following information for inclusion in the log:
- A quantitative assessment of the risk associated with the possible consequences of the hazard.
- Record of actual incidents or events related to the hazard or its causes.
- Risk tolerability statement.
- Statement of formal system monitoring requirements.
- Indication of how the hazard was identified.
- Hazard owner.
- Assumptions.
- Third party stakeholders.

A sample hazard log template is located on the inside back cover of this magazine.

An example of Risk Management for identification of a wrong take-off configuration hazard

By Simon Roussos
Quality Manager
On 20th November 1974, the first ever crash of a commercial Boeing 747 took place. Lufthansa Flight 540, flown by Boeing 747-130 (D-ABYB) was scheduled to operate the final segment of its Frankfurt – Nairobi – Johannesburg route. The aircraft had landed in Nairobi without incident. However, as the aircraft was taking off from Jomo Kenyatta Airport in Nairobi, with the First Officer as handling pilot, the crew felt a buffeting airframe vibration. The FO continued the takeoff and just after airborne the Commander (suspecting wheel imbalance) raised the landing gear. As this was being done, the aircraft started to descend and the stall warning system light came on. The aircraft continued descending and approximately 3,700 feet (1,100 m) from the end of the runway, the 747 grazed bushes and grass. It then struck an elevated access road and broke up. The left wing exploded and fire spread to the fuselage. Of the 157 people aboard, 59 perished (55 passengers and 4 crew members).

The accident report stated that the cause of the crash was a stall caused by the fact that the leading edge flaps had been left in a retracted position. Without leading edge flaps deployed, the aircraft’s stalling angle of attack was reduced. Additionally because of the elevation of Nairobi airport (5327 feet above sea level) and the high ambient temperature, the thinner air was responsible for reduced aerodynamic performance. The elevation and temperature at the airport were within the capability of the 747, but only with leading and trailing edge flaps extended. The thinner air at higher altitudes generates less lift and further degrades the aircraft’s ability to handle high angles of attack, as well as reducing the thrust provided by the 747’s four turbofan engines. With the leading edge devices retracted, the aircraft lacked sufficient lift and thrust to continue climbing once out of the ground effect near the surface.

There had been numerous previous clean L/E takeoffs with B747s at both Heathrow and Schiphol. In all cases the aircraft had been committed to takeoff without the leading edge Kruger flaps and Varcams deployed for precisely the same reasons – the crews had neglected to switch the bleed air back on after engine start. It was standard procedure for the Flight Engineer to switch the bleed air off to increase N2 rotation speed on the P&W/GE engines for the B747 during engine start. It was essential that this switching was returned to normal during after start procedures as the leading edge devices were pneumatically driven.

Findings from the accident report found that the flight crew of LH540 did not perform thorough checklists.
and did not properly follow the SOPs. These failings played a major role in the sequence of events that lead to the accident. It was also found through the investigation that the flight engineer failed to turn on the engine bleed air valves as required during the pre-flight checklists.

The identified errors in the chain of events which lead to this accident were as follows:

1. Nairobi – a high elevation airport – reduced aerodynamic efficiency.
2. High ambient temperature – thinner air.
3. Crew failed to carry out correct pre-takeoff checklist/procedures.
5. Manufacturer’s T/O Config Warning not effective to alert re Kruger flaps.
6. Flight Engineer – forgot to switch bleed air system to normal.
7. Leading Edge Kruger flaps did not deploy.

Two other elements might be considered with regard to this specific accident:

- Firstly there was a ‘crew change’ at Nairobi and this may have been a distraction/disruption to the normal flow of events for departure.
- Secondly, the Captain (non-handling pilot) elected to raise the landing gear, just after airborne in order to reduce the aerodynamic drag of the aircraft. In reality there is a transient increase in drag when the landing gear is raised as the main gear doors lower into the airstream, prior to the entire undercarriage retracting. This increase in drag may have been critical in preventing acceleration on this occasion.

In the words of one very experienced B747 Captain, “Because of these learned events, a lot of takeoff briefings now include, F/O flying “After positive rate, without stall warning, I’ll call gear up, LNAV, THR REF, VNAV SPD, right A/P to CMD…”

The accident report also determined that there was an inadequate warning system fitted by the manufacturer, which would have alerted the flight crew to the problem. This accident was pivotal in ensuring that Boeing fitted proper Takeoff Config. Warning systems to alert pilots if there are disagreements between flight control surfaces and required takeoff configuration.
After the MD82 stalled during takeoff due to an incorrect configuration, it rolled to the right, crashed, broke up into several pieces, and caught fire. The aircraft was completely destroyed.

On 20th August 2008, Spanair Flight JK5022 was scheduled to depart Madrid Barajas Airport in Spain to Gran Canaria. The aircraft being used for the flight was an MD82, registration EC-HFP.

Shortly after being cleared for takeoff, the crew contacted ATC stating that they had “a slight problem. We have to clear the runway again.” The problem, as reported by the crew, was that they detected abnormally high Ram Air Temperature probe reading.

After returning to the terminal and work by the engineers, the temperature sensor was deactivated, in accordance with the Minimum Equipment List (MEL). This was a normal engineering procedure as the flight was unlikely to encounter icing conditions. After a delay of over an hour, the aircraft was cleared once again for takeoff. During its second takeoff attempt, the aircraft stalled shortly after becoming airborne and lost altitude.

From the Flight Data Recorder (FDR) and Cockpit Voice Recorder (CVR), the crew did not identify the stall warnings and did not correct the stall situation after takeoff. They momentarily retarded the engine throttles, increased the pitch angle and did not correct the bank angle, which lead to a deterioration of the stall condition. The aircraft rolled to the right and crashed into a ravine just off the runway, breaking up into several parts, and catching fire. 146 people on board were killed immediately, 6 more on the way to the hospital, and 2 more at the hospital. There were 18 survivors.

In its final report, the Spanish Civil Aviation Accident and Investigation Commission (CIAIAC) determined that the crew lost control of the airplane as a consequence of entering a stall immediately after takeoff due to an improper airplane configuration involving non-deployment of the slats/flaps following a series of mistakes and omissions, along with the lack of Take-Off Warning System (TOWS).

At 2,000 Ft above mean sea level, Madrid Barajas Airport is a high altitude airport with hot weather in the summer. Hot and high conditions were present on the day of the crash, which would have meant a reduction in aerodynamic performance.
The CIAIAC published its final report into the accident on 26 July 2011.

It determined that the cause of the accident was:

1) The crew lost control of the aircraft as a result of a stall immediately after takeoff, because they did not have the correct plane configuration for takeoff (by not deploying the flaps and slats, following a series of errors and omissions), coupled with the absence of any warning of the incorrect configuration.

2) The crew did not recognize the indications of stall, and did not correct the situation after takeoff, and – by momentarily retarding the engine power and increasing the pitch angle – brought about a deterioration in the flight condition.

3) The crew did not detect the configuration error because they did not properly use the checklists to select and check the position of the flaps and slats during flight preparation.

4) They failed to select the flaps/slats lever during the corresponding step in the “After Start checklist”.

5) They did not cross-check the position of the lever and the state of the flaps/slats indicator lights during the “After Start” checklist.

6) They omitted the flaps/slats check under ‘Take Off Briefing’ (taxi) checklist.

7) The visual inspection carried out in execution of the “Final Items” step of the “Take Off Imminent” checklist – no confirmation was made of the position of the flaps and slats, as shown by the cockpit instruments.

8) The absence of any warning of the incorrect take-off configuration because the TOWS did not work. It was not possible to determine conclusively why the TOWS system did not work.

9) Inadequate Crew Resource Management (CRM), which did not prevent the deviation from procedures and omissions in flight preparation.

10) The initial technical problem and return to the ramp, added to crew workload and was a distraction, with the delay causing time pressure on the crew to depart. (Ed.)

This case study uses excerpts from the translated CIAIAC accident report A-032/2008.

For more information please visit: http://www.fomento.gob.es/NR/rdonlyres/EC47A855-B098-409E-B4C8-9A6DD0D0969F/107087/2008_032_A_ENG.pdf
The graphs above show that even though more SAFA inspections were performed in 2011 than in 2009 or 2010, there were less findings. The ratio between the number of inspections to findings has dramatically decreased. Therefore, the trend shows that GainJet’s operation has been influenced by safety awareness and the safety measures being implemented. This does not, however, mean that any member of staff has the right to be complacent. The company is moving in the right direction, but everyone must work together to continue to minimize findings.

Sample Hazards Log Template

<table>
<thead>
<tr>
<th>Operation / System</th>
<th>Hazard No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazard Description</td>
<td></td>
</tr>
<tr>
<td>Safety Events</td>
<td>(Causes or Threats)</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Potential Outcomes (and Associated Consequence Magnitudes)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Risk Controls (Barriers and Mitigations)</th>
<th>Description</th>
<th>Responsible</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
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<tr>
<td>3</td>
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<td></td>
<td></td>
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<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Risk Assessment (Worst Foreseeable Scenario – i.e. Highest Risk)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazard Frequency</td>
<td>Outcome Likelihood</td>
</tr>
</tbody>
</table>

| Relevant Previously Reported Incident Data | |
|-------------------------------------------||
| Safety Performance Monitoring Requirements | |
| No. | Description | Responsible |
| 1   |             |             |
| 2   |             |             |
| 3   |             |             |