BAE Systems Regional Aircraft's Flight Safety magazine for its Jet and Turboprop fleets customers • March 2011

JETSETS

Why WAT, and does C of G really matter?
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Emotionally Enabled
By Shari Frisinger
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Unpaved Runway brochure

We have recently had several Operators who have needed to operate BAe 146 or Avro RJ aircraft from unpaved runways. This requires the use of low pressure tyres. This article outlines some of the requirements to operate with low pressure tyres on either paved or unpaved runways. Operation of these aircraft requires that Appendix 29 is in the AFM. The information contained within Appendix 29 is advisory, and operational approval must be obtained from the relevant National Aviation Authority.

Appendix 29 Current Certification Status

All data and standards in Appendix 29 originated from trials performed and certified by the UK CAA with a BAe146-100 demonstrator aircraft. From these trials certification was read across to the BAe146-200 series, and later the AVRO RJ70 and RJ85. Currently the RJ100 is in the process of gaining EASA approval.

Modification Requirements

If operating with low pressure tyres from a gravel surface or other surface with loose stones, the aircraft must be protected from stone damage by embodiment of a number of BAE Systems modifications. The actual modifications that would be required are specific to a particular aircraft and certification authority. The modifications which have been made to an aircraft throughout its life, and its current certifying authority, will determine what modifications, if any, are required to allow operation with low pressure tyres from an unpaved runway. It is difficult to list the modification requirements in a simple table thereby establishing the modifications needed for a particular aircraft. It is therefore necessary to enquire on a case by case basis through the BAE Systems modifications department.

ramodifications@baesystems.com

Runway Surface

A paved runway is a covered hard surface such as tarmac or concrete and capable of supporting the operational weight of the aircraft for the intended period of use. Operation from an unpaved runway requires the surface condition to be well compacted and the bearing strength to be adequate to support the weight of the aircraft under the climatic conditions, for the intended period of use.

When operating from an unpaved surface there should be no standing water, deep ruts, or deep loose gravel on the runway, and operation from this type of runway is permitted under wet or dry conditions. However, operation on unpaved runway surfaces of murrum or laterite is only permitted when dry as this type of surface could become unstable when wet and lack sufficient friction for braking.

Operations with Low Pressure Tyres

When operating on either paved or unpaved runways with low pressure tyres in addition to those conditions that will be discussed in the paragraphs that follow:

1. The anti-skid must be operative and selected ON.
2. The airfield elevations must be between -1000 ft and 8000 ft.
3. For landing on gravel runways only flap 33 degrees must be used.
4. Brake temperatures at the start of the take off roll must not be above 200 degrees C.

Take-off from Paved Runways with low pressure tyres

Take-off from paved runways with low pressure tyres carries a slight performance penalty in comparison to that achieved with standard tyres (a reduction in TODA of about 1%). This is due to the fact that the braking performance is slightly worse, and low pressure tyres heat up more quickly. Fast taxy speeds and high brake temperatures should therefore be avoided where possible.

Landing on Paved Runways with low pressure tyres

For landing on paved runways with low pressure tyres there is a correction made to the LDA taking into effect the performance penalty for the tyres. The penalty takes into consideration the fact that the braking performance is around 3% worse. Once the equivalent

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Welcome>

JEt and **T**urboprop **S**upport, **E**ngineering,**T**raining and **S**afety.

Welcome to the 2011 issue of JETSETS. Another year has passed, and here in Flight Operations Support we are preparing for another Operators Conference which takes place in the Conference Room, Ayr Racecourse, Prestwick at the end of March. I hope that I will meet some of you there.

On the Flight Safety front, 2010 has been much quieter than previous years. There have been many incidents of course, but no accidents resulting in hull write off. One of the major events of the year for us in the northern hemisphere was the eruption of the Icelandic volcano (I'll not try and spell its name!). This created a fair amount of havoc in the skies over Europe for a few days whilst everyone tried to sort out what to do. From the point of view of BAE Systems we offered advice both to Flight Departments and to Engineering Departments. This advice was initially sent to Operators via a FOSIL, and the information will also make its way into our Manuals.

Talking about manuals, we are working on Manuals for all types. The ATP Manuals have been ready for iSAPPHIRE for some time, but we have been delayed by a third party software compatibility issue. Because of this I asked our Publications Department to do a one-off distribution of the QRH as a pdf, and I hope that this enabled you to get ahead of the game. On the Jet front, we have been delayed by the need to approve and load Canadian Manuals before we could proceed. The subject of unpaved runways in Appendix 29 has also lost us some time. The Jetstream 41 is in work as I write, and the Jetstream 31/32 is the subject of a thorough review to bring all the Manuals up-to-date. The 748 manuals are also being reviewed, more details will be available later in the year.

In the middle of the year we issued a FOSIL to all Operators reiterating our advice not to reselect gear if it fails to lock up first time. We are including a drill in the QRH as we amend each type to stop crews reselecting up after successfully reachieving 3 greens. However, if the gear handle cannot be moved because of a weight on wheels micro switch fault, that drill can still be performed.

Our Scandinavian ATP Operators found that they were getting rotation problems following application of type 2 fluid. This was indicated by a heavy stick force which, if the PF was in the right seat, could lead to an elevator split. At present we have issued an NTA which places a performance restriction on take offs and we are investigating the fluid. The in use type 2 would appear to be of a different formulation to that used in previous years, but we are still looking into the problem.

I hope you find this issue of JETSETS of interest. The earlier issues are still available on our website: www.regional-services.com

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JETSETS is also available on our web site www.regional-services.com.
Here it is split up to make it easier for you to download an individual article.

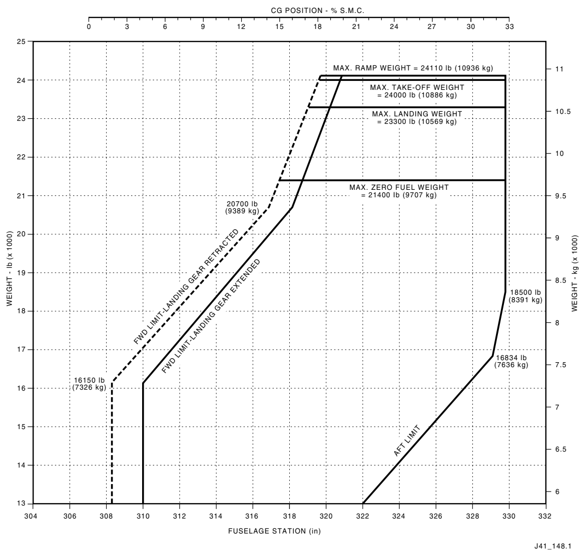
Why WAT, and does C of G really matter?

One request that I received for this JETSETS was to discuss Take-Off and Landing Performance and Weight and Balance. The safety of passenger aircraft was a cause for concern even before the First World War, but it wasn't until the 1920s that requirements started to be formulated. This work continued slowly up to the Second World War when activities were virtually suspended until the cease of hostilities. Following the Chicago Conference in 1944, ICAO was established. Although world wide agreement was still not possible, over the years the requirements and regulations governing civil public transport have emerged, and are broadly similar.

The performance requirements have been established to ensure that any public transport flight is dispatched safely. This means that it will be dispatched at a weight which will ensure that the aircraft can meet the required performance and safety levels in the known and forecast conditions. For a few of us this means delving into the complex graphs in the AFM to ensure that the required scheduled performance is achieved, and consulting the Weight and Balance Manual to ensure that the flight will be made with the aircraft remaining within its cleared centre of gravity envelope. Most of us however are lucky in that the data is already calculated for us and presented in Regulated Take Off and Landing Weight Tables, and the weight and balance is taken care of by the dispatcher (how many of you have to do manual load sheets now?).

The majority of us operate aircraft that must be able to suffer an engine failure at any time between commencement of the take off run and the end of the landing run without it being necessary to carry out a forced landing. To enable us to meet these requirements we need information from the airports we intend to operate to or from, plus the meteorological services and information on the performance of our aircraft.

The performance information is measured by the manufacturer, and all the data is gathered by test pilots flying the aircraft as accurately as possible. For instance, when gathering the information to produce the Jetstream 41 engine out climb graphs in the AFM we flew to an area with no turbulence, in this case San Diego Bay USA (some one has to be lucky!), and carried out climbs on one engine for 5 minutes with all the data being recorded both electronically and manually. Any climb where the speed varied by over ±2 knots was immediately rejected, and some where the variation over 5 minutes was more than ±1 knot were also rejected. Take off data for Vmca and Vmcg was gathered, and performance landings were flown as accurately as possible in calm conditions and, when braking was required, full anti skid braking was used. When sufficient data had been recorded, BAE Systems Aerodynamics Department factored it and produced the graphs you now see in the AFM. These graphs may then be used to provide the RTOW and RLW tables in your Operations Manual.



A typical C of G envelope for the Jetstream 41

The performance data in the AFM was usually produced when the aircraft were new. Although aging was taken into account when the final tables/graphs were produced in the form of gross and net performance to ensure that all aircraft of a type will meet the AFM this will only be true if the various weights are not exceeded. An aircraft may well take off if loaded to a weight greater than that allowed by the RTOW tables, but this will usually be because all engines are operating. The calculations in the take off tables assume that an engine fails and, as I said at the beginning of this article, we want the flight to continue without the necessity of a forced landing in the event of an engine failure. Therefore, if the TOW is above the WAT limit you may get away with a take off with all engines working, but if one were to fail the outcome might not be so certain. Remember that the required climb rate at the WAT limit will only be that required by the regulations. If heavier than the WAT limit you might not achieve this rate.

I'm sure that we all conduct a take off brief which covers what we are going to do in the event of an engine failure and it goes along the lines:

'Up to 80 knots we will stop for any warning, above 80 we will only stop for a fire, engine failure or other catastrophe. At V1 we will take into the air etc etc'. During testing I carried out many such take offs in which I knew an engine was going to fail, I was rotating exactly at Vr and achieving V2 gear up at 35 feet; my climb speed was within 1 knot of V2 and the air was calm. I would not expect to have been able to repeat that degree of accuracy later in my career when I was line flying every day. However, to achieve the necessary performance you must try and fly as accurately as you can (and do in the simulator every 6 months).

> 'THE PERFORMANCE DATA IN THE AFM WAS USUALLY PRODUCED WHEN THE AIRCRAFT WERE NEW'

An associated subject is the various weights limits applicable to your aircraft. Again exceeding these might not cause any immediate problem, but airframe fatigue is insidious and every time a limit is exceeded fatigue is added. Thus a problem may not occur on your flight, but might occur later to someone else who is operating within the weight limits. If you are forced to land over weight please tell your engineers who can then inspect the aircraft, and ensure that it is still safe to operate.

The C of G envelope is designed to provide the necessary degree of safety required by the regulations. Generally a forward C of G makes the pitch control heavy whilst an aft C of G makes the aircraft less stable. The aircraft may well still be controllable if flown outside the C of G envelope, but should some small incident occur, such as moderate turbulence, this may not still be so. Generally, loading towards the aft limit can help save fuel – see our 100 Ways to Save Fuel Brochure. So your Operations Departments might be able to produce a policy to load aft, but ultimately the responsibility will be yours, assisted by the dispatcher, to ensure that the load is distributed correctly.

I hope that, in this short article, I have given some support for keeping the aircraft within the performance and C of G weight limits, and shown some of the pitfalls of ignoring them.

Unpaved Runway brochure

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distance has been established, the maximum landing weight for landing distance available can be calculated with reference to the appropriate chart in the AFM Chapter 6.

Take-off from Unpaved Runways with Low Pressure tyres

Take-off will be more limiting when operating from a gravel or unpaved runway with a penalty of around 10% in comparison to a paved runway of typical length. When calculating take off performance the unpaved runway distance available is used to establish an equivalent paved runway distance available, and this equivalent distance is used for further calculations.
Unpaved runway operation take-off calculations are based upon a CBR of 70 which relates to the strength of the runway

'THE ACTUAL MODIFICATIONS THAT WOULD BE REQUIRED ARE SPECIFIC TO A PARTICULAR AIRCRAFT AND CERTIFICATION AUTHORITY'

surface. A CBR of 70 was the benchmark for each of the certified types with a minimum recommended CBR of 30. With each incremental reduction of 10 from 70 there is a corresponding reduction in equivalent runway distance available. These equivalent distances should then be used to calculate the take-off performance with reference to Chapter 6 of the AFM
The information contained within the BAE Systems Airport Planning Manual or Aircraft Flight Manual gives reference to the PCN values. Such values relate to a covered hard surface such a tarmac or concrete.

Landing on Unpaved Runways with Low Pressure tyres

For landing on unpaved runways with low pressure tyres, there are charts within Appendix 29 that give maximum landing weight for the LDA. These charts are to be used instead of the charts in Chapter 6 of the AFM. The resulting weights will be less that that achieved when landing on a paved runway with standard tyres but the weight penalty will be variable dependant on runway length and elevation. The landing distances are based upon a flap setting of 33 degrees.
A landing weight obtained from the appropriate Chart in Appendix 29 could be subject to further limitation because of the Certification Standard for low pressure tyres. Therefore the maximum certified weight for aircraft fitted with low pressure tyres must also be checked.

Weight Limitations

Depending upon the certifying Authority and aircraft type, there could be limitations with either MAUW, MTOW or MLW when the aircraft is fitted with Low Pressure tyres.
These weight restrictions are driven by the MTOW for tyre rolling speed and value of

deflection. There are different tyre deflection values and maximum tyre rolling speeds with values of either, 32%, 35% or 36% deflection being used. The higher deflection values result in a flatter tyre which in turn causes a greater footprint and so greater friction thus requiring higher take-off speeds.

This short article is intended to offer advice to those who require to operate from unpaved surfaces. Details can be found in the AFM at Appendix 29, and information can be obtained via the Modifications Group on the BAE Systems Regional Aircraft Portal: www.regional-services.com.

Rejected Landings

I was recently involved in helping to investigate an accident where a late decision to abort the landing resulted in a fatal accident. This led me to think that we, as pilots, should research the possibility of rejecting a landing well before being faced with it, and formulate a plan of action – possibly even before we've taken off. Quite often airing and discussing problems can help to clarify our thought processes, and this article is intended to provide food for thought.
A go around may be carried out for many reasons. For instance, the threshold may not be visible at decision height, the runway may be blocked, ATC may order a go-around, or occasionally a landing is rejected by the flight crew because they recognise that the approach is flawed in some way.
The introduction of stabilised approaches has led to go-arounds when approaches are unstable, but here there are quantitative measures for the flight crew to assess their performance against.
Furthermore, go-arounds from stabilised approaches tend to be at a good height above the runway (usually initiated at 500 ft or 1000 ft).
Lack of visual cues at DH will also cause a go-around. However, this article discusses the viability of going around when much closer to the runway, and offers guidance on when a pilot is irrevocably committed to completing the landing, even if the outcome looks uncertain.
It is vital that you do not confuse the 'land' decision that is made at the instrument approach minima with an irrevocable commitment to land. This instrument approach 'land' decision is purely based on the ability to see the required visual references at approach minima, and has no relationship with the ability of the aircraft to perform a go-around.
More recently, with the introduction of monitored approaches, the PF is always ready to go-around until the landing pilot calls land. However, as indicated this, decision is often in relation to an instrument approach minima, and not related to the aircraft's performance.

Assumptions

For the purpose of this article it will be assumed that the approach is stable at 500 ft above the runway. A stabilised

approach is defined as when the aircraft passes 500 ft on the correct vertical and lateral profile, in the landing configuration with all landing checks completed, no more than 20 knots above Vref, and with the engine settings at the normal approach level (i.e. not at idle with the flaps just making the landing position and the speed just achieving Vref plus 20 decelerating).

For the purposes of discussion, a rejected landing will be defined as a go-around carried out after the wheels have touched the runway (until this point a normal go-around should be carried out).

Initial Pilot Training

During initial training you will have carried out many touch and go landings, and probably rejected more than a few either on your own initiative or when the instructor took control. At this early stage of their aviation careers, pilots are very familiar with the procedures and actions necessary to achieve a successful outcome for either completing or rejecting the landing.

Whilst initial airline type conversion may require some touch and go landings in the aircraft more usually, with the improvement of flight simulation, many pilots go straight into line flying having completed all their training in a simulator. Thus the skill to carry out touch and go landings and the memory of the required procedures gradually fades. But this is the manoeuvre that is required to reject a landing.

Touch and GO/GO Around

When carrying out a training touch and go the crew is already briefed on the procedures, the required reconfiguration is known, and the runway performance has been checked. Each crew member has pre-allocated tasks, the aircraft weight is usually low, and the weather benign. During the touch and go the airbrakes and/or spoilers will not be deployed, brakes will not be applied, and the engines will remain at flight idle. PF's main task will be to keep straight and apply power when instructed, whilst PNF (usually a Training Captain) will reconfigure the aircraft and, when the configuration is correct, will call for power, check that power has been achieved and call out speeds.

This reconfiguration will include the resetting of flaps, the pitch trim, and possibly the other trims as well.

If carrying out a rejected landing it is unlikely that many of these actions will be remembered or carried out. It is also possible that if the go-around decision has been taken by the first officer and the captain may not agree with it. This could lead to lack of co-ordination and confusion on the flight deck.

When To Go Around?

A decision to go around can be made at any time up to wheel touchdown in all but some engine/system failure cases, and the normal go-around procedures carried out. If a very late decision is made care must be taken not to over rotate (to avoid tail strike), and runway contact can be expected. I am sure that you will have practiced this type of go around during your low vis training.

A decision to reject a landing requires much more careful consideration and, as time will be at a premium, scenarios should be examined and rehearsed during initial and recurrent training. For example:

- Once retarding devices have been deployed it will almost certainly be too late to reject the landing.
- If the aircraft has a flight ground idle power position then selection of ground power may be the commit to land criteria if the engines are slow to spool up.
- Selection of reverse thrust or brake operation also usually means a commitment to land has been made.

Commitment To Land

On landing, once the wheels have touched down, the ability to go-around safely becomes a decreasing option as runway is consumed and the aircraft decelerates. In other words just at touchdown a go around is an option whereas when stationary it is not. Between these 2 extremes the option changes at some point on the runway, and this position will vary for every approach and landing.

The greatest threat to safety is the unknown performance of the aircraft, especially as to whether there will be sufficient runway remaining on which to become airborne, if the decision to reject the landing is made. It will be safer to overrun at low speed rather than at high speed having failed to take off.

The ability to reject safely will be enhanced if the crew have considered the options and have briefed the configuration:

- Trim setting(s) and speeds.
- Can the aircraft climb with land flap, or should the flap be retracted to the go-around setting?
- Is it necessary to retract airbrakes?
- Does the pitch trim need resetting, or can PF safely hold the out of trim forces (aircraft with under slung engines often exhibit a strong nose up pitch on power increase)?
- What is the relationship to the speeds bugged (often Vref and Vapp) to V1 and V2 - i.e. are the bugs useable on the go-around?
- How long do the engines take to spool up, and is this time significantly increased if the ground idle setting has been selected? Once the decision to reject is made the crew must remain committed to this decision, and not change their minds. This is also true in the case of a go-around where a late acquisition of the runway followed by an attempt to land has caused accidents.

System Malfunction

Rejecting for system malfunction needs equally careful consideration. Malfunctions will eat into the safety margin allowed for in the landing distance calculation, but the increased distance required is usually provided within the calculated regulatory landing distance. Safety Analyses are performed to satisfy probabilities compared to hazard effects. These analyses assume that all other landing parameters are met i.e. correct speed and landing position. In other words, a single systems malfunction during a landing should not require a rejected landing to be carried out if all other parameters have been met.

Procedures When Rejecting A Landing

A decision to stop must be followed by the application of sufficient braking – up to maximum - until assured of stopping. The actions needed to achieve maximum braking must be known and practised (in many aircraft it is difficult, due to the geometry of the toe brakes, to achieve maximum brake without moving in the seat), and the feel of the aircraft during anti skid operation should be demonstrated. Full anti skid braking feels very uncomfortable but: Brake for effect – not for comfort!!

Overruns are usually the result of a combination of factors – i.e. slightly too fast on the approach, a bit too far down the runway, too little braking, slightly more tailwind than calculated and, it must be emphasised, many overruns occur on non limiting runways. We have discussed the subject of overruns in previous issues of JETSETS. So the first prerequisite for a successful landing is to achieve the performance parameters on which the landing distance has been predicted. In the main these are to arrive 50 ft (sometimes 35 ft) over the threshold at Vref (sometimes Vat), to touchdown within 300 m, select the thrust levers to idle, and deploy the retarding devices (including full wheel braking if necessary on a limiting runway) as soon as possible. Some aircraft select flight idle at 50 ft, and in all cases the touchdown speed will be below Vref which is defined as the landing threshold speed (landing reference speed). If the landing parameters do not look as if they will be achieved then consider going around.

Bounced Landing

Cause

A bounce on landing can be caused by several factors. Amongst the factors are: an

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Rejected Landings

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excessive sink rate, a late or too vigorous flare, excessive speed, or too much power left on. For whatever reason, the aircraft becomes airborne again. If at this stage the pilot sees the error and pushes the control column forward the likely result will be a landing on the nose wheel followed by a further bounce as the pilot pulls the control column back to try and prevent nose wheel contact. This can set up a pilot induced oscillation with each bounce increasing in severity as the pilot gets out of phase with the aircraft, and such bounces often result in nose wheel collapse or tail strike. Furthermore, following a bounce the aircraft is airborne with a low power setting and decelerating. Therefore the pilot's ability to reduce the rate of descent for the next ground contact is reduced. The result of this can be either a heavy landing or a tail strike (or both!) as the round out is attempted.

Recovery

Bounce recovery technique will vary for each aircraft type, and with the severity of the bounce. For a small bounce the best recovery actions are to maintain or regain the landing attitude (do not increase the pitch attitude as this could lead to tail strike), and continue with the landing using power to cushion the subsequent touchdown. However, consideration must be made to the increased landing distance that will probably result, and a go-around flown if there is any doubt as to the ability to stop the aircraft within the runway distance remaining.

For a larger bounce a go-around must be flown. Simultaneously, maintain or regain the landing attitude and select the thrust to go-around. Maintain the aircraft configuration until a positive climb is achieved. Be prepared to touch the runway again. Be alert for out of trim forces (pitch up) caused both by the position of the pitch trim and, if fitted, under wing engines. Once well clear of the ground carry out the normal go-around procedures.

The definition of the size of bounce that can be recovered will vary with type, and needs to be understood for the actual aircraft being operated.

Conclusion

The old adage that a good landing comes from a good approach remains true. Having calculated the aircraft's landing performance it makes sense to achieve all the parameters that this performance assumes. This can partially be achieved by applying stabilised approach criteria, but stabilised landing criteria should also be applied.

The commitment to land decision must not be made too early in the approach, and crews should have pre briefed the decision process and drills for a rejected landing. System failure on its own should not trigger a reject if all other parameters are satisfied. For anything but a small bounce a go-around must be flown. The decision must be final, and the crew must commit to this.

The Flight Safety Foundation have a very useful toolkit entitled Approach and Landing Accident Reduction (ALAR) which I am sure your Flight Safety Departments would find useful if they are not already aware of it.

What would be your criteria for committing/rejecting a landing?

ENGINE FAILURE AT A CRITICAL ALTITUDE

I am sure that all of you will remember the Hudson River Airbus accident, and the excellent outcome achieved by all the crew. On 15 January 2009 an Airbus A320 operated by American Airlines hit a flock of geese. The birds disabled both engines and the aircraft was successfully landed in the Hudson River with no loss of life. Amongst the recommendations that followed the investigation, the NTSB recommended that manufacturers provide crews with a drill to be used following engine failure at a critical altitude. The full NTSB report can be found on their website under the docket number NTSB/AAR-10/03.

One of the areas examined by the NTSB was the Airbus A320 Emergency Checklist. The crew started to use the Dual Engine Failure Checklist, and this

checklist consisted of 3 parts and was 3 pages long. Although the crew managed to complete most of part 1 they were not able to complete parts 2 and 3 because of the low altitude and limited time available. The Dual Engine Checklist was designed assuming both engines failed at altitude and there was no checklist to be followed if a total engine failure occurred at low altitude. The crew never reached the portion of the checklist that dealt with ditching. The NTSB concluded that if a checklist that addressed a dual-engine failure occurring at low altitude had been available to the flight crew members, they would have been more likely to have completed all the checks.

The Airbus was at 2818 feet when the birds hit the aircraft, and was in the Hudson River about 3 minutes 32 seconds later. Therefore there was little time to carry out any drills. The Captain started the APU out of sequence. This improved the outcome of the ditching by ensuring that normal power was available, and the controls remained in normal law mode.

If you dig deep into your memory I am sure that you will recall your basic training and the engine failure on take off practices that your instructor gave you. The procedure would have been practised many times, and consisted of choosing a landing area within a small arc of straight ahead (say ± 45°) and getting into the gliding attitude. You then made sure that you would land in the chosen area, made the aircraft (fuel and ignition OFF) and passengers safe, and landed. This all took about 30 seconds.

Discussion with the NTSB Investigator in Charge indicates that the NTSB is looking for a very simple drill along the lines:

Relight	Attempt
Speed	Glide (146/RJ 210kts (or Vfto+30) ATP 135kts. J41 150kts. J31/32 130kts).
PA	Brace, Brace, Brace Crash
Landing/Ditching	
Gear	Down (up if landing on water)
Flaps.....................	Land
Pressurisation	Ditch (if landing on water)
Thrust Levers..........	Off after touchdown

BAE Systems are investigating the production of such a drill as a memory action together with guidance on the distance that you are likely to be able to glide. As a rule of thumb expect to be able to cover about 2 miles per 1000 feet. Thus from 3000 feet AGL you can glide 6 miles. The procedure would be customised to type.

All our Abnormal and Emergency Checklists have forced landing and ditching drills, but these assume sufficient height to carry out all the drill. Additionally, the 146/RJ FCOM Volume 3 Part 1 includes a Topic which discusses all engines out, but again this assumes a reasonable altitude at the start of the procedure.

Post the Hudson River crash I am sure that all of you will have thought about what actions you would take if faced with a similar emergency. We would welcome your comment on our proposed drills.

Emotionally Enabled

By Shari Frisinger

This story is taken from an issue of Flight Safety Foundation's journal, AeroSafety World. A free subscription to the digital version of that publication is available though the signup form on the Foundation's Web site home page, www.flightsafety.org.

We watched in astonishment when Chesley Sullenberger in early 2009 skillfully piloted US Airways Flight 1549 to a safe landing in the Hudson River, and listened in horror a month later when we heard of Colgan Air Flight 3407 crashing into a Buffalo, New York, U.S., suburb.

Among the factors that caused one perfectly good aircraft to fall out of the sky, killing 50 people, while another very crippled aircraft made a safe water landing that resulted in only a few minor injuries, technical flying skills obviously play a major role. However, success or failure to a large degree can be linked to the captain's ability to control his own emotions in order to think clearly, while being aware of the crew's emotional and mental states.

When the role pilots play in aircraft incidents and accidents is considered, the initial focus of the U.S. National Transportation Safety Board (NTSB) and many analysts is on the technical abilities of the pilots: When was their last recurrent training? How many flight hours did they have in the aircraft type? How many total hours of flight experience?[1]

But some time ago it was realized that technical skills are not the only desirable traits a captain should have.

Many years ago, airlines implemented cockpit resource management (CRM) techniques to enhance crew coordination. This new concept was partially based on a U.S. National Aeronautics and Space Administration investigation that discovered a common theme in many accidents — failure of leadership and ineffective crew interaction.

CRM focused on how the crew interacted in the cockpit, not necessarily on acceptable or appropriate cockpit behaviors. During the first decade of CRM use, it morphed into crew resource management, to include helping all crewmembers work more effectively as a team, improving situational awareness and providing techniques to break the error chain.

CRM has become a training mainstay. To date, CRM has included only the technical skills and thinking abilities — analytical, conceptual and problem solving. However, research beginning in the 1980s demonstrated that emotions greatly influence a person's Cognitive abilities.

To be effective, the next level of CRM needs to include more of the "people" side — self-confidence, teamwork, cooperation, empathy and flexibility in thoughts and actions. A major factor in maintaining the safety of the crew and passengers is the combination of the leader's objective thought process and his or her emotional awareness.

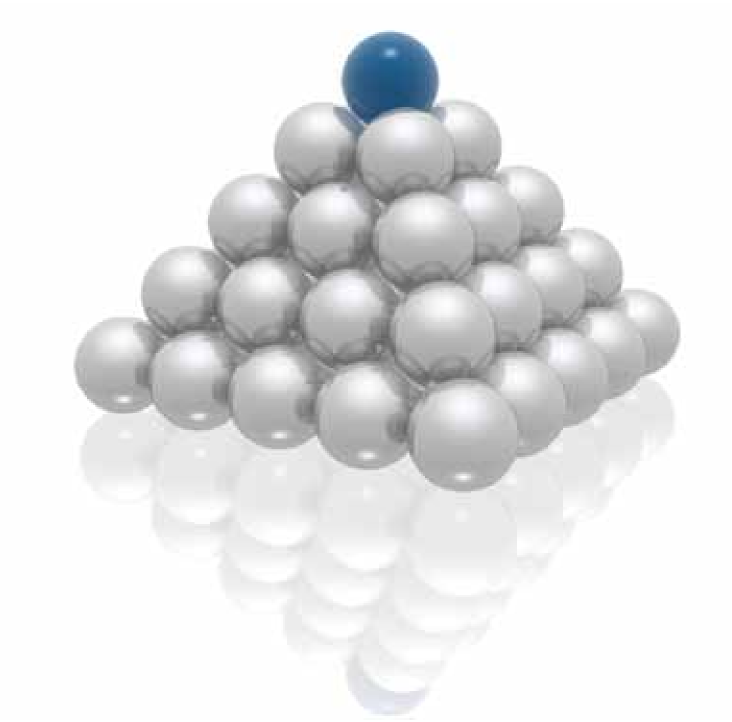
The word "emotion" may conjure up negative elements that tend to degrade safety: anger, fear, crying, shouting and other unhelpful behaviors, but everyone every day experiences more subtle varieties of emotion.[2] In the cockpit this

might include satisfaction for having achieved a smooth landing, pride in maneuvering around turbulence, excitement in getting desirable days off, irritation when plans don't work out, and sometimes annoyance with others.

Regardless of the situation, there always exists some degree of emotional response, and emotions are simply another type of information that must be considered in making effective decisions, especially in a team environment.

'Emotional Intelligence' means being aware of an entire crew's mental state, not just your own.

Emotionally Enabled



A major factor in maintaining the safety of the crew and passengers is the combination of the leader's objective thought process and his or her emotional awareness.

A high degree of situational awareness relies on a person being attentive to the environment. Internal situational awareness consists of understanding one's own emotions and emotional triggers. External situational awareness involves insights into team members' moods and unspoken communication, and appropriately addressing them.

The cornerstones of emotional intelligence (EI) are consciousness of one's thoughts and moods, of how the behaviors resulting from those impact and influence others, and of the moods and behaviors of others.3 People with a high level of EI recognize and control their own emotional outbursts, step back from the heat of any situation, analyze it objectively and take the appropriate action that produces the most desirable results.

A person's perception of reality shapes emotions and feelings, and these drive thoughts and behaviors. Status quo is maintained until new strong feelings are experienced. Simply being unhappy in a job is usually not enough to warrant a change. Getting passed over for a promotion, accompanied by the belief that the decision was wrong, usually sparks anger and an active job pursuit.

The *amygdala* is the part of the brain that controls a person's level of emotional reactivity. It never matures, and, if left unchecked, it can bring chaos to a life. To compound the problem, the human brain instinctively cannot distinguish between a real threat and an imagined one.

Sitting in a theater, watching a panoramic or 3-D movie, the sudden loud sound of an airplane approaching will make most people reflexively duck. Intellectually, they know the airplane is not real, but the emotional brain hears the loud sound and tells the body it needs to avoid getting hit. When a situation changes, the emotional brain determines if the stimulus causing the change is a threat. If a threat is sensed, awareness becomes heightened and physiological changes take place to cope with this new danger. Adrenaline is released to pump the heart faster and prime the muscles for action. If the situation is later deemed to not be a threat, logic and objectivity take over again, but it takes four hours for the adrenaline to dissipate from the body.

Today's fears, threats and dangers are not unlike those of prehistoric man. A flight department manager who needs to justify the expenses of his department can experience the same "fight or flight" reaction that the caveman did when faced with a saber-toothed tiger. A similar reaction occurs when people feel their reputation or credibility is threatened. Fear and stress envelop thinking and people over-focus on a narrow selection of solutions, disregarding alternative approaches.

When people allow their stressed brains to overtake thoughts, the perspective narrows and the main focus becomes escaping from the situation. Unable to think of alternatives, they don't see the "big picture" or question assumptions. At this level of thought, perception of the complexity of the situation becomes paralyzing, and the focus is on current limitations. Remember the last time you became angry during an argument? It probably wasn't until later, after you could see the situation without emotion, that you thought of several obvious points that could have helped your case. These become apparent because your rational mind was back in control. Your primary focus, in the midst of that argument, was to defend yourself. Success is more assured when this emotionally downwardspiraling thinking is halted and the problem is addressed more creatively.

Emotionally Enabled

The captain in the Colgan Air 3407 accident chose the "flight" reaction; he chose to avoid a developing situation.4 When the first officer brought up the icing conditions — "I've never seen icing conditions. I've never deiced. I've never seen any, … I've never experienced any of that" — the captain's response was, "Yeah, uh, I spent the first three months in, uh, Charleston, West Virginia and, uh, flew but I — first couple of times I saw the amount of ice that that Saab would pick up and keep on truckin' … I'm a Florida man … ." Then he added, "There wasn't — we never had to make decisions that I wouldn't have been able to make but ... now I'm more comfortable." The captain was still unaware of what was rapidly developing around him, chatting while the aircraft's airspeed rapidly decayed. His failure to quiet his instinctive emotions narrowed his perception to the point that airspeed, one of the most basic elements of flying an airplane, no longer had his attention.

There were few instances when the captain referred to the first officer's health. He did not ask how she felt about her ability to perform her flight duties, even though she sneezed twice and six minutes later, she mentioned her ears. Basic understanding of CRM and crew performance should have tipped off the captain that the first officer was not feeling well that day and her performance could be negatively impacted. A person with higher EI could have recognized that, and probably would have been empathic to her condition and her inability to actively participate as a viable crewmember.

The captain told stories for most of the flight. At one point, he rambled for over three minutes while the first officer only said 34 words, most of which were "yeah" and "uh-huh." Research on how the mind processes information has revealed that people can only consciously execute one task at a time, and unconsciously perform one additional task. When driving in heavy traffic or merging onto a freeway, are you able to continue your conversation? Your mind moves from the conversation you were having to looking at traffic, calculating vehicle speeds and analyzing the best opportunity to speed up and merge. Your automatic mind does not have the ability to safely handle non-routine driving tasks.

A classic example is United Airlines Flight 173, a McDonnell Douglas DC-8, which in 1978 was destroyed when it crashed during an approach to Portland (Oregon, U.S.) International Airport.5 The captain's intense preoccupation with arranging for a safe emergency landing prohibited him from considering other anomalies. His concentration was so focused on the emergency landing checklist that he did not modify his plans when the first officer and flight engineer twice warned him about their airplane's dwindling fuel supply. Ten people were killed when the aircraft crashed into a wooded area due to fuel exhaustion.

The NTSB said, "The probable cause of the accident was the failure of the captain to monitor properly the aircraft's fuel state and to properly respond to the low fuel state and the crewmembers' advisories regarding fuel state.… His inattention resulted from preoccupation with a landing gear malfunction and preparations for a possible landing emergency."

This accident was one of the key events driving the adoption of CRM in airline training.

Contrast the reactions and situational awareness of the Colgan and United crews to those of the captain of the US Airways A320 that landed in the Hudson River. Sullenberger kept his emotions under control and remained focused on doing his job — to safely land the plane.

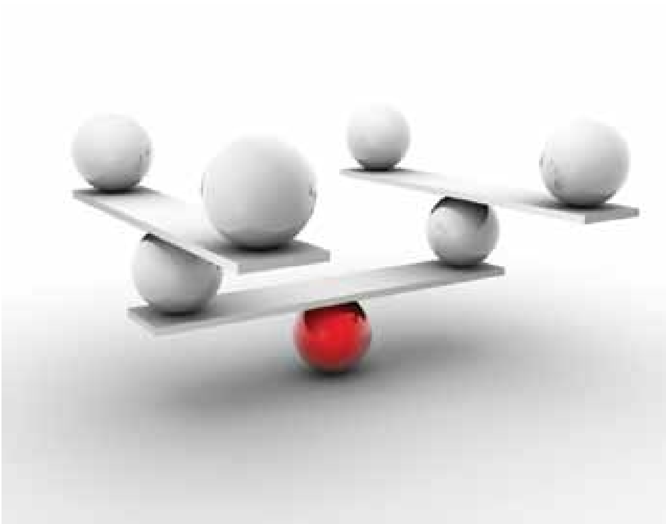
The captain's words "my airplane" when he took over the controls after the bird strike could have been trigger words, words to focus on, snapping his rational brain into action and putting him into a safety frame of mind. He repeated the commands from the first officer, indicating that during those critical seconds there was no room for any misunderstanding. This flight crew's emotional intelligence was as good as it gets, which enabled their processing information quickly and using every resource available to them at the time.

The captain of United Airlines Flight 232,

The next level of CRM needs to include more of the 'people' side — self-confidence, teamwork, cooperation, empathy and flexibility.

Emotionally Enabled

a McDonnell Douglas DC-10 that in 1989 attempted to land in Sioux City, Iowa, U.S., with catastrophic hydraulic and flight control systems failures, could have reacted to his challenges by becoming indecisive, shutting out the crew or dictating orders to them.6 If he had responded in any of these ways, the captain would have reflected the emotional pressures he was experiencing, and, as a result, his crew would have had his pressures added to their own. Instead, he worked as part of the crew, alternating between giving direction and explaining his actions and taking input from anyone in the cockpit, including a training pilot. Emotions are contagious, and the strongest expressed emotion will be felt unconsciously by others and mimicked. In this case, the captain's calm demeanor was mirrored by the crew and they were able to contain their emotional reactivity.



Aviation history is overflowing with accidents due to pilot error. Many of them could have been avoided if the crews were more aware of their own emotional reactivity and those of the others. Captains infected with "captainitis" are so absorbed in their own world that they lose their situational awareness. The captain in Colgan Air 3407 was self-absorbed, talking about himself for nearly 20 minutes of the last 40 minutes of the flight, missing a number of clues that eventually led to the crash; on the other hand, the captain of US Airways 1549 maintained his composure throughout his short flight and focused on every element of the emergency.

Captains infected with 'captainitis' are so absorbed in their own world that they lose their situational awareness.

Why is EI relevant? The Center for Creative Leadership found that the leading causes of failure among business executives are inadequate abilities to work well with others, either in their direct reports or in a team environment. Another study of several hundred executives revealed a direct correlation between superior performance and executives' ability to accurately assess themselves.

What actions demonstrate an increased level of EI?

- When crewmembers voice their concerns in a calm, firm manner, giving evidence to back up those concerns;
- When leaders acknowledge the atmosphere and question crewmembers in a non-defensive manner to determine the causes of the uneasiness; and,
- In a crisis or stress situation, when leaders maintain their composure and communicate more frequently and more calmly with the crew.

There are several techniques that can raise your level of EI:

- Be aware of the thoughts going through your mind. Are they stuck in the past and wallowing in problems, or are they focused on the future and actively looking for solutions? Once we choose negative thoughts, they can very easily spiral downward, the cycle descending into hopelessness.
- Acknowledge your emotions. Remember they are neither good nor bad, they are what they are. Next, identify these emotions: Angry? Irritated? Defensive? Disappointed? Guilty? Frantic? Miserable? Naming your emotions makes them less abstract and helps release their influence on you. It becomes easier to detach yourself and think objectively.
- Look back over your previous reaction. How could you have made a better choice? What information and alternatives are clear now that weren't at that time? As we frantically search for quick solutions to rectify the situation, we automatically use the techniques that we have used before, whether they are the best choice or not. Our mind is not free to explore new alternatives.
- Put yourself in the other person's position. How would you react if you were on the receiving end of your emotions? The other person's brain will

send him through the same fight/flight freeze reaction that yours is experiencing. Imagine both people fighting for their pride or their reputation — chances are slim that the discussion will end well.

Leaders need a considerable amount of cognition.7 The ability of the leader to broaden his or her focus from technical and task-related activities to include an awareness of the moods of the crew is critical to success. It would benefit all parties to know which skills in specific circumstances are most appropriate.

A leader's behaviors directly affect the team's disposition, and the team's disposition drives performance. When the leader can analyze and manage his or her own emotional reactivity, the team members can more easily manage their own emotions. How well the leader performs this can have a direct effect on the safety and morale of the crew.

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Notes:

1. Helmreich, R.L.; Merritt, A.C.; Wilhelm, J.A. "The Evolution of Crew Resource Management Training in Commercial Aviation." The International Journal of Aviation Psychology. Jan. 1, 1999.
2. Goleman, D. "What Makes a Leader?" Harvard Business Review. Jan. 1, 2005.
3. Mayer, J.D.; Salovey, P.; Caruso, D.R. "Emotional Intelligence: Theory, Findings, and Implications." Psychological Inquiry. Jan. 1, 2004.
4. NTSB, Colgan Air 3407 cockpit voice recording. <www.ntsb.gov/Dockets/ Aviation DCA09MA027/418693.pdf>.
5. Aviation Safety Network. <aviation-safety. net database/record.php?id=19781228-1>.
6. Aviation Safety Network. <aviation-safety. net investigation/cvr/transcripts/cvr_ ua232.pdf>.
7. Helmreich et al.

Guide to Abbreviations used in this issue of JETSETS

AGL	Above Ground Level
ALAR	Approach and Landing Accident Reduction (a toolkit provided by the Flight Safety foundation)
AFM	Aircraft Flight Manual
APU	Auxiliary Power Unit
ATC	Air Traffic Control
CBR	California Bearing Ratio (a measure of firmness of surface)
C of G	Centre of Gravity
DH	Decision Height
FCOM	Flight Crew Operating Manual
ICAO	International Civil Aviation Organisation
LDA	Landing Distance Available
MAUW	Maximum All Up Weight
MLW	Maximum Landing Weight
MTOW	Maximum Take Off Weight
NTSB	National Transportation Safety Board
PA	Passenger Address
PCN	Pavement Classification Number
Pdf	Portable Document Format
PF	Pilot Flying
PNF	Pilot Not Flying
QRH	Quick Reference Handbook (Abnormal and Emergency Checklist)
RTOW	Regulated Take Off Weight tables
RLW	Regulated Landing Weight tables
Vapp	Approach Speed
Vmca	Minimum Control Speed in the Air
Vmgc	Minimum Control Speed on the Ground
Vref	Reference Speed at Threshold
WAT	Weight Altitude and Temperature

JETSNIPS

A light hearted look at the aviation industry

Good judgement comes from experience, unfortunately experience usually comes from bad judgement.

Keep looking around.
There's always something you've missed.

Some great lies in aviation:

I'm from the authority, and I'm here to help you.

We will be on time, perhaps a little early.

We shipped the part yesterday.

All that turbulence spoiled my landing.

Your aircraft will be ready at 2 o'clock.

No need to look that up – I've got it memorised.

The strength of the turbulence is directly proportional to the temperature of your coffee.

Heard on the PA!

"In the event of a sudden loss of cabin pressure, oxygen masks will descend from the ceiling. Stop screaming, grab the mask, and pull it over your face. If you have a small child travelling with you, secure your mask before assisting with theirs. If you are travelling with two small children decide now which one you love more."

After a particularly bouncy landing:

we ask you to please remain seated as Captain Kangaroo bounces us to the terminal.

Your seat cushions can be used for flotation, and in the event of an emergency water landing please take them with our compliments.

One of the Trusted

You are at cruising altitude. The westering sun is pink on the disc. Your eyes flick the gauges.

The engines are contented. Another day, another dollar.

You look down at your hands on the wheel. They are veined and hard and brown.

Tonight you notice they look a little old. And, by George, they are old.

But how can this be?

Only yesterday you were in flying school. Time is a thief! You have been robbed, and what have you got tot show for it?

A pilot. Forty years a pilot. A senior pilot.

But what of it?

Just a pilot.

The voice of the flight attendant breaks in on your reverie. The flight is running full.

Can they begin serving dinner to the passengers?

The passengers, oh yes, the passengers. You noticed the line of them coming aboard;

The businessmen, the young mothers with their children in tow, the old couples, the two priests, the four dogfaces.

A thousand times you have watched them file aboard, and a thousand times disembark.

They always seem a little happier after the landing than before the take-off.

Beyond doubt, they are always somewhat apprehensive aloft.

But why do they keep coming up here in the dark sky despite their fears?

You have often wondered about that.

You look down at your hands again and suddenly it comes to you.

They come because they trust you, the pilot.

They turn over their lives and their loved ones and their hopes and their dreams to you for safekeeping.

To be a pilot means to be one of the trusted.

They pray in the storm that you are skilful and strong and wise.

To be a pilot is to hold life in your hands, to be worthy of faith.

No, you have not been robbed, you aren't just a pilot.

There is no such thing as just a pilot.

Your job is a trust. The years have been atrust.

You have been one of the trusted.

Who could be more?

Gill Robb Wilson