March 2023

100 KNOTS

India’s Aviation Ecosystem

Cargo Technology
Dronamics Middle Mile Cargo Drone

Flight Operations
Loss of Situational Awareness during Takeoff

Pilot Training
Unrealistic Simulator Scenario & Negative Training
Capt. PP Singh

Photos
Aero India 2023

Commercial
Economics of Airline Partnerships


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EDITORIAL DESK

Preet Palash
Editor

Dear Colleagues,

Welcome to the March 2023 issue of the 100 Knots Magazine.

In this issue, Accountable Manager and Vice President for Jet Airways (India) Ltd, Capt. PP Singh, talks about the hazards of Unrealistic Simulator Scenarios, Negative Training and negative learning transfers. Head Airline Partnerships at SpiceJet, Mr. Rohan Bhadgaonkar explains us the economics of airline partnerships. Capt. Vijay Devadas analyses recent incidents involving United, Emirates and Qatar Airways when the aircraft lost height shortly after take-off or failed to climb due to loss of situational awareness. He explains how the overall decision-making could be flawed with an impaired situation model, leading to unexpected control inputs in a so called knee jerk reaction and startle leading to disastrous consequences. Aviation Photojournalists walks us through the recently concluded Aero India through his beautiful photos.

As always, Contributions, comments, and feedback are always welcome. All papers are received with a high degree of enthusiasm and will find a home in future issues.

Our sincere thanks to all the contributors for their support and interest.

We hope to hear from you soon!

Happy Reading and Happy New Year

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Unrealistic Simulator Scenarios & Negative Training

PP Singh
Accountable Manager
Jet Airways

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What is Negative Training?

This question has perpetually intrigued flying instructors and ignited countless discussions in the briefing rooms. The need for training is self-evident in aviation, but how it is conducted is the subject of some debate. As is well known, the bulk of airline training is delivered through simulators. The modern flight simulators, known by the umbrella term 'Flight Simulation Training Device (FSTD),' have become so good at replicating airplane characteristics within the programmed feature set that it is almost impossible to identify the areas in which they become unrealistic. For instructors, it is challenging to discern where the machine is trying to mask its 'infidelity' by extrapolating the programmed behavior into regions where either the actual aircraft behavior is unknown, or the training device itself has not been tested at all.

The next question naturally comes to mind; why not train on an actual aircraft? On balance, the capabilities of a simulator in synthesizing scenarios, including weather and runway conditions, at the press of a few buttons far exceeds the training capability offered by an aircraft in the normal and non-normal envelope, even if we ignore the arguments for safety and economics. Once we agree that an actual airliner will not be used, the concept of training fidelity becomes paramount to ensure that the training provided is faithfully transferable back to the actual aircraft.

Coming back to our original question- what is negative training? It may be defined as a state where the crew actions result in a safety event even though they were applied precisely the way training was delivered. There are two distinct ways this can happen- The first is negative training, and the second is the negative transfer of learning.

Negative Training

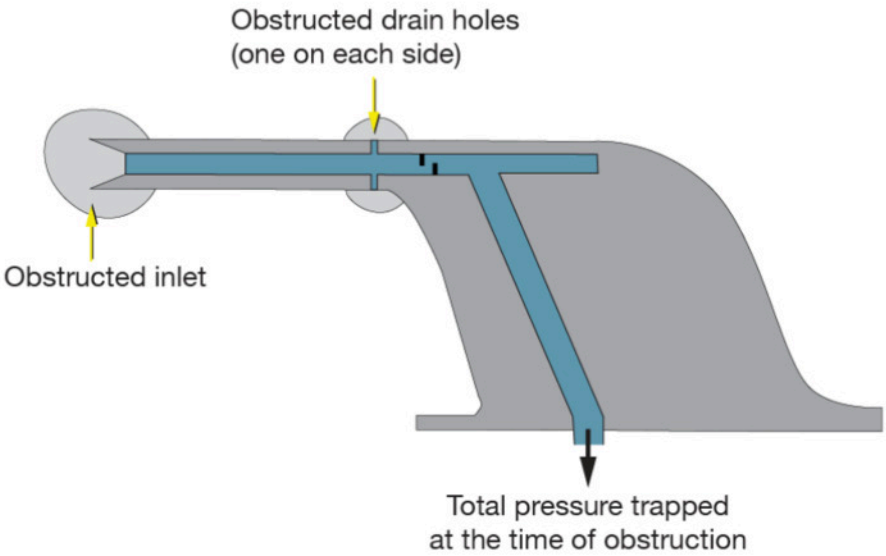
If instructors either intentionally or unknowingly operate outside the limitations or the certified capabilities of the training device, it is possible to systematically teach inappropriate skills. The training assimilation will then be based on the simulator's behavior in an area for which the device was never designed in the first place. Such behavior may turn out to be fundamentally different from the way an actual aircraft would behave in flight, but that would never be realized by the instructor and the trainee during training. This is called negative training, and its consequence is imparting skills that can be ineffective or even dangerous when applied in real aircraft.

Another common way in which negative training can occur is the instructors teaching improvised techniques in simulators as well as aircraft. Such techniques may offer a quick-fix solution to some specific situation but may be completely counterproductive when applied in a different context when the scenario shares similar cues.

Negative Transfer of Learning

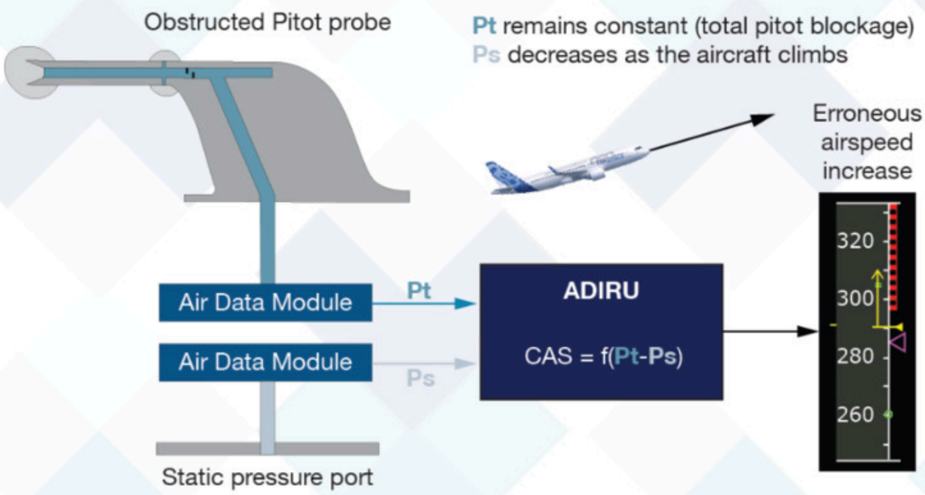
When previously learned techniques are inappropriate for the current aircraft, environment, or procedures, it is called negative learning transfer. When the crew faces a stressful time-critical situation, heuristics come into play, and it is all too common for them to instinctively fall back into the previously reinforced habits.

Instructors can contribute to this kind of negative transfer by passing on their previous learning from other types to the current aircraft.



An excellent example of negative training can be found in a 2019 article titled 'The Adverse Effects of Unrealistic Simulator Scenarios' published in the Safety First Magazine of Airbus- https://safetyfirst.airbus.com/the-adverse-effects-of-unrealistic-simulator-scenarios/ . The article describes how the « TOTAL PITOT BLOCKED » malfunction that is available in some simulators leads to negative training. This failure simulates a simultaneous obstruction of both the inlet and drain holes of both Pitot probes.

As a consequence, the measured total pressure remains at a constant value corresponding to the total pressure measured at the time of the complete obstruction, and the following sequence of events is triggered:
IAS increases as the aircraft climbs due to the decrease in static pressure. The captain's and first officer's speeds finally reach VMO/MMO with the triggering of the Overspeed warning. Autopilot disconnects and the High-Speed Protection activates
 The aircraft pitches up, and the flight crew tries to counteract with full forward sidestick input without success
 To recover, the flight crew is trained to switch off two ADRs
 Flight Control System reverts to alternate law and Overspeed protection is lost
 Crew is then able to manage the aircraft trajectory.



Such simultaneous dual failures with permanent and consistent dual airspeed increase (decrease) when the aircraft climbs (descends) with resulting undue activation of the flight envelope protections have never occurred in service because, in terms of probability, multiple PITOT obstructions can never occur exactly at the same time and can never have the same obstruction characteristics along the timeline. Single or non-identical PITOT obstructions will undoubtedly lead to airspeed discrepancy being detected by the flight control system, which will then reject the erroneous airspeed information and revert to alternate law automatically.

Inserting this malfunction in the simulator results in keeping the normal control law and its associated protections active while the system continues to utilize corrupt data based on incorrect airspeeds.
Teaching recovery in this manner confuses the trainees and imperils their understanding of flight control system, control laws, flight envelope protections, and the operational consequences of air data failures. Training consisting of requesting flight crew to switch off two ADRs to revert to alternate law in such a scenario is, therefore, clearly NEGATIVE TRAINING because if this failure were to occur in real life, the aircraft behavior would be completely different from what was practiced in the simulator.

Lessons from the Past

British Midland Airways Flight 092

Moving our attention to the second aspect, the tragic crash of British Midland Airways flight 092 in 1989 comes to mind as an example of negative learning transfer. On the 8th of January that year, an almost brand-new Boeing 737-400 aircraft was on a flight from London Heathrow to Belfast. During its climb through 28,000 feet, the plane began to shake violently, accompanied by loud bangs and a burning smell in the cabin. Some passengers saw sparks and flames shooting out of the left (No1) engine. Unknown to the crew, inside the No.1 engine, part of a fan blade had detached, creating a mass imbalance in the fan rotor, causing heavy vibrations as it swayed from side to side and rubbed against the fan case. Simultaneously, the disrupted airflow led to an engine surge and compressor stall. These were textbook symptoms of engine severe damage/stall/surge, which is a serious malfunction, but nothing that should cause a plane to crash. In this particular case, most of the engine's internal components were not damaged, and it was still capable of operating at a reduced thrust level while producing sufficient hydraulic and electrical power for the associated systems of the aircraft.

However, as the investigation report would later show, the crew's actions resulted in a chain of events that eventually led to a hull loss, 47 fatalities, and numerous injuries to the occupants. Erroneously believing that the right (No.2) engine had sustained damage, the crew reduced the thrust on it to idle and subsequently shut it down. The wrong diagnosis emanated from the captain relating the source of the smoke and acrid odour to his training on the previous aircraft type flown by him. The captain's previous training and experience were on the Boeing 737-300 variant. After one year of flying the 737-300, he underwent a one-day differences course for the Boeing 737–400, which did not consist of any simulator training. After the accident, the captain stated that he had judged the No.2 engine to be at fault from his knowledge of the air conditioning system. He reasoned that the smoke and fumes were coming forward from the passenger cabin, which is supplied air from the No.2 engine, and hence the trouble lay in that engine. Whilst this reasoning was valid for the previous type he had flown, on the 737-400, some of the cabin air comes from the No.1 engine as well.

© CAE

Gaps in Training

This minor change had not been covered in the differences course, and with their low time on the new -400, the crew had not had enough time to learn through experience that this assumption was incorrect. In an insidious coincidence, as the No.2 engine was throttled back, the loud bangs and shuddering ceased, reinforcing their belief that they had identified the problem correctly. At the time of the failure, the autothrottle was engaged when it detected a sharp drop in the No.1 engine fan rotation speed. When the autothrottle system detected a mismatch between the commanded thrust and the actual thrust, it was programmed to treat it as an engine surge and reduce the commanded thrust to protect the engine from damage. On this occasion, this automatic reduction in thrust on engine No.1 coincided with the crew action of throttling back on engine No. 2 and the resulting low thrust setting on the engines mitigated the engine surge. As the original symptoms disappeared, combined with the absence of any visual or aural warning on the flight deck, the stage was set for the crew to revert to their previous training and experiences for decision-making. In reality, however, nothing was wrong with the right engine, and as a result of their actions, the aircraft was now being powered only by a damaged left engine, which would later fail when they tried to increase power on the final approach.

The incorrect crew response, in this case, was a textbook case of providing training that was not transferable to the actual aircraft. The Operations Manual at that time contained no guidance on the actions to be taken if vibrations and smoke/fumes occurred together. The pilots were suddenly presented with an unforeseen combination of symptoms that was outside the domain of their training or experience.

In its report, the Air Accident Investigation Branch remarked, "It is possible to identify three aspects of the circumstances of this accident where a different pattern of training could have favorably influenced the outcome." The report also states, "The speed with which the pilots acted was contrary to their training and the instructions in the Operations Manual. Therefore, their incorrect diagnosis of the problem must be attributed to their too rapid reaction." It is well known that both negative training and transfer are most likely to manifest themselves at times of high stress, fear, and surprise. Although it is vital to quickly identify and diagnose certain emergencies, it is also a proven fact that rapid crew reaction increases the likelihood of shutting down the wrong engine. It is worthwhile to note that the pilots had accumulated the greater part of their experience on propeller-driven aircraft like Viscount, Fokker-27, and Shorts 350, where the primary emphasis was placed on the need for rapid feathering of the propeller in the event of engine failure.

Final Words

In conclusion, it is hard to overstate the importance of recognizing the harmful effects of negative training and negative learning transfers. Regardless of the FSTD capabilities, the instructor remains the critical element in the success of the training. The instructor's awareness of the differences between the simulator and the aircraft is a crucial element in preventing negative training. For any training program, the positive transfer of knowledge and skills must dominate the training delivery, which is only possible when the instructor can meaningfully compensate for the shortcomings of the simulator and exploit the FSTD's strengths as a training tool while minimizing negative training transfer. All the investment in technology, systems, and procedures can come to naught if, to quote First officer David McClelland of BMA Flight 092, "What they're saying is that the people who designed it, manufactured it and carried out the specifications all got it right but the two chaps at the front got it wrong." Later, Captain Kevin Hunt would say in a BBC documentary: "We were the easy option - the cheap option if you wish. We made a mistake – we both made mistakes – but the question we would like answered is why we made those mistakes."

About the Author

As the Accountable Manager and Vice President for Jet Airways (India) Ltd, Capt PP Singh is the Key Management Person in this world-famous airline brand's resolution and revival process. He has been an aviation professional since 1984, possessing extensive training and checking experience accrued with major Indian and foreign international carriers as an instructor and examiner on large commercial jets. Over the past three decades, Capt Singh has held crucial appointments in the senior management teams of Jet Airways and Nepal Airlines in various regulatory and leadership roles. After graduating from the University of Delhi, he started his aviation career with the Indian Air Force and moved to civil aviation in 1994. He is currently responsible for the operations, training, safety, and engineering functions of Jet Airways.

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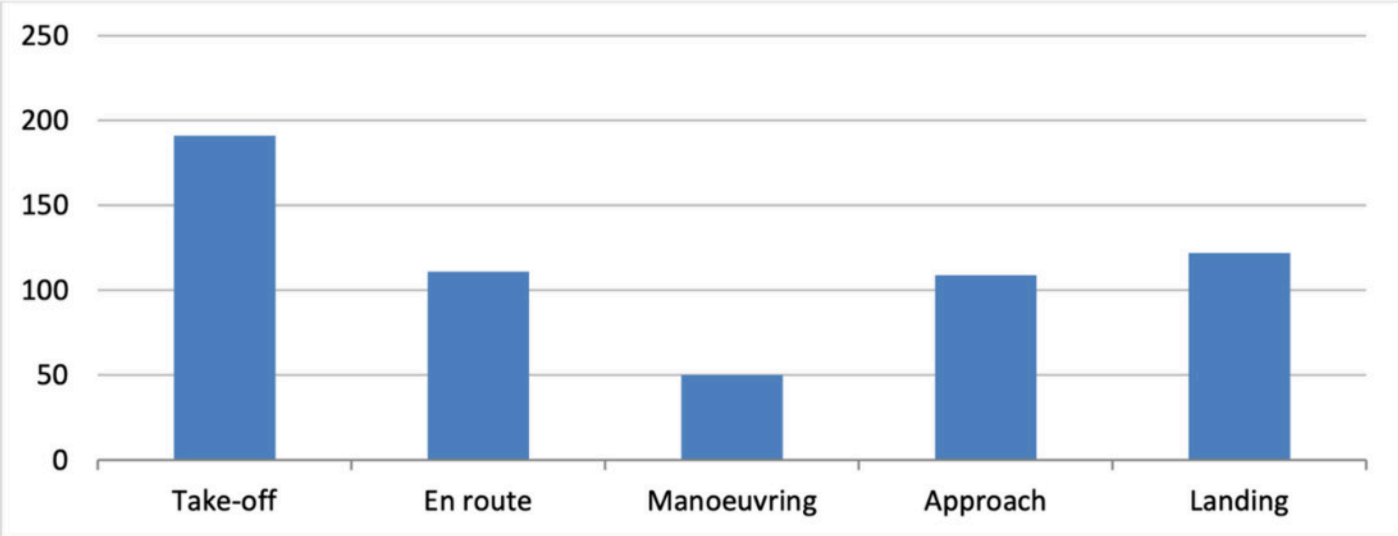
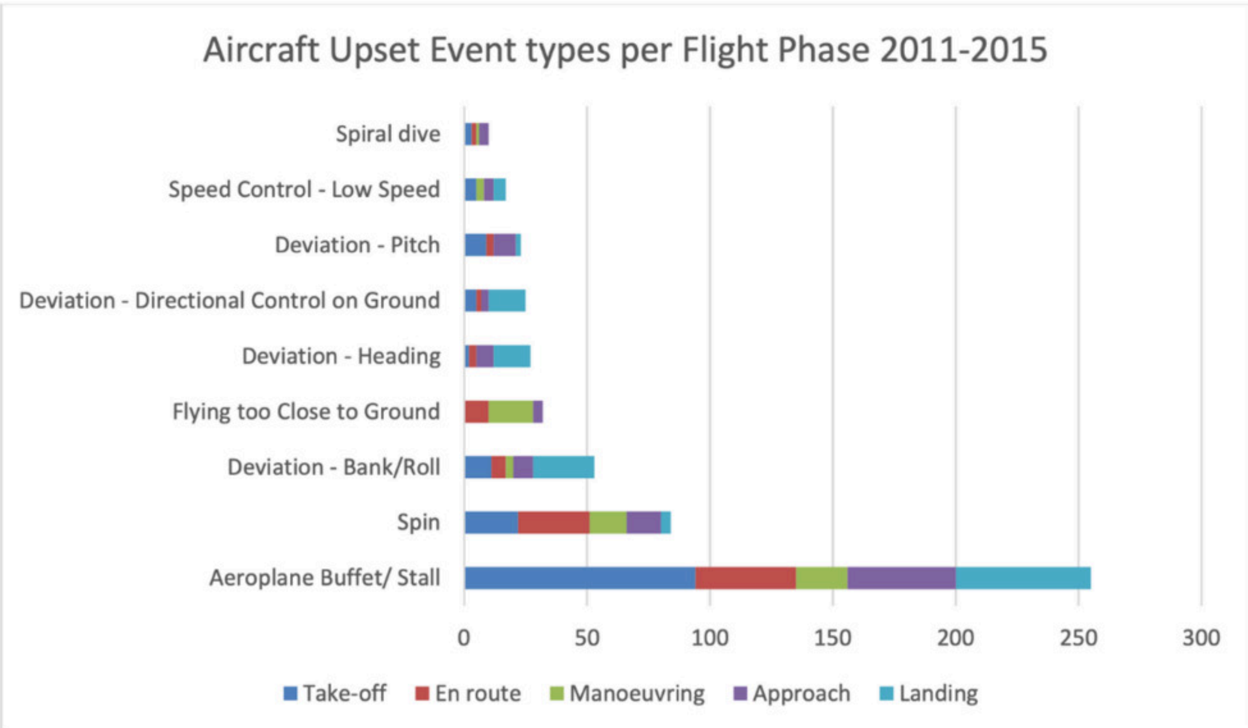
Loss of Situational Awareness During Takeoff

Capt. Vijay Devadas
A320 Captain

Takeoff is the riskiest phase of flight regarding the risk of Loss of Control in Flight (LOC-I) accidents. Data on fatal and non-fatal LOC-I accidents from EASA indicate that the highest number of accidents occur during Takeoff. Because accidents often involve a complicated chain of events, looking at LOC-I in isolation only shows part of the picture. Accidents are therefore often classified using more than one Occurrence, Category, therefore it is important to consider the relationship between LOC-I (Aircraft upset) and other risk areas. (EASA)



© EASA 2011-2015

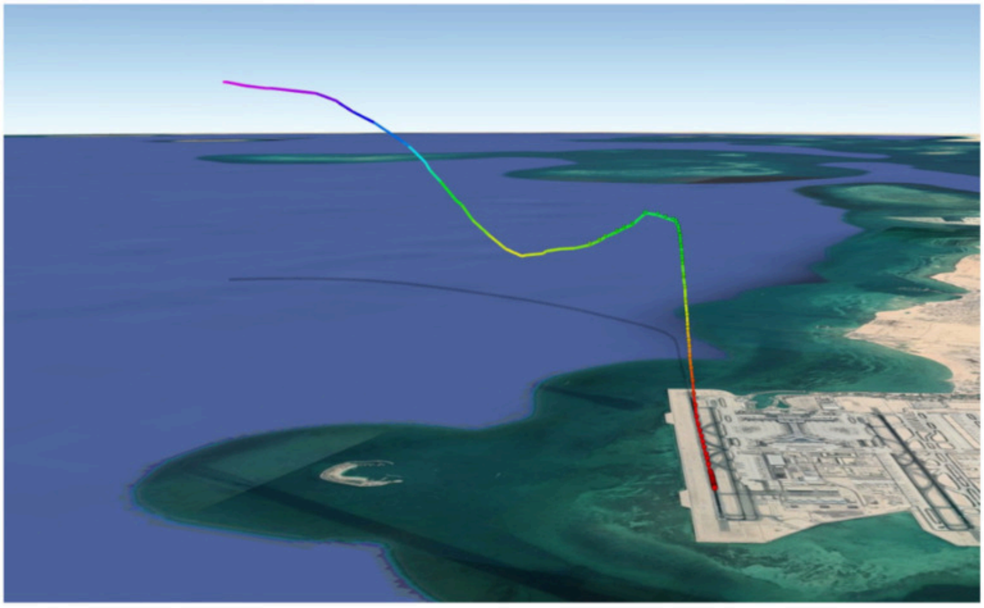


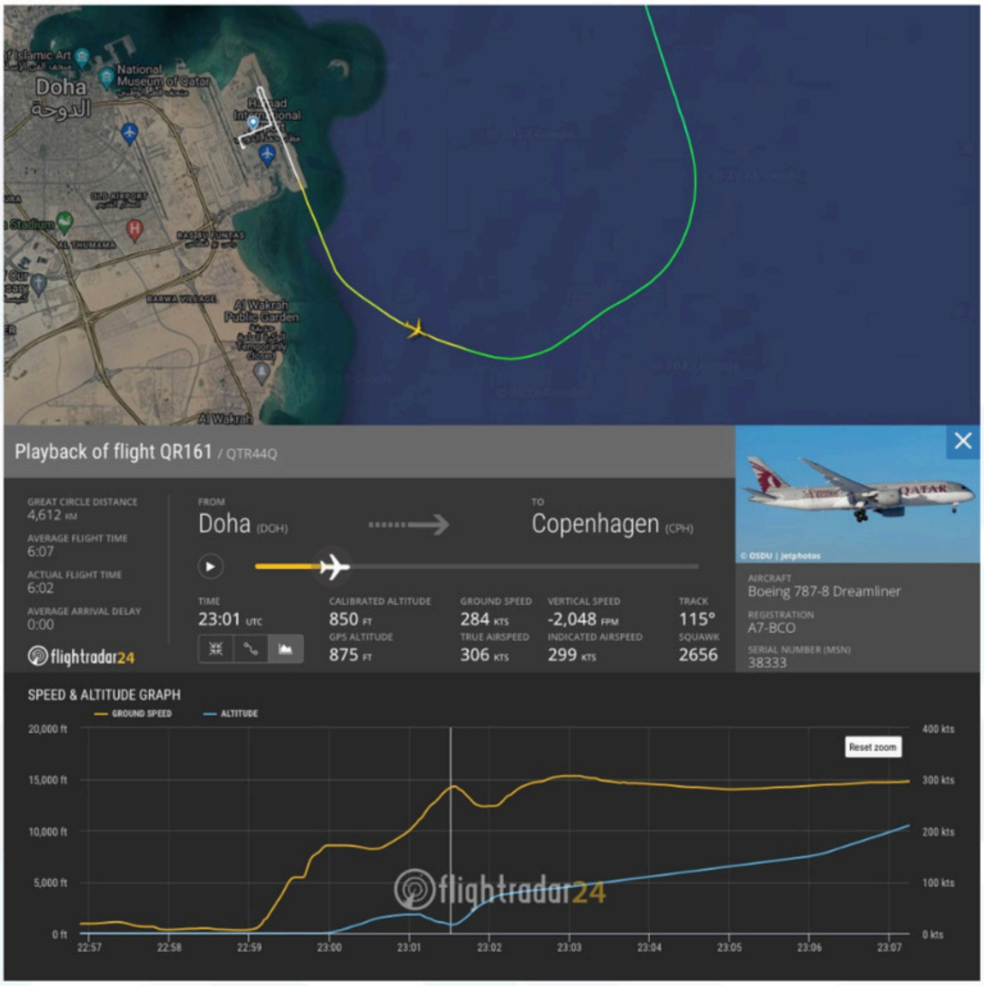
EASA Fixed Wing Airplane fatal accidents per aircraft upset event type (2011-2015)

Recently, FlightRadar24 noted two instances involving United and Qatar Airways when the aircraft lost height shortly after takeoff. In a separate incident, Emirates B777 failed to climb after takeoff. This sudden increase in serious incidents after takeoff is alarming. Let's look at these events and understand what went wrong in each of them.

Qatar Airways Flight QR161

Qatar Airways Boeing B787 flight QR161 from Doha (DOH) to Copenhagen (CPH) on January 10, 2023, entered a steep descent after reaching an altitude of 1,850 feet. The aircraft lost 1,000 feet in just 24 seconds before the pilots recovered the aircraft and carried it on to Copenhagen with no further events.

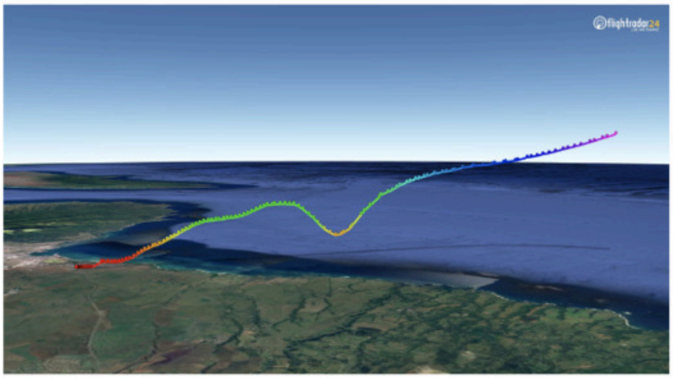




Why, in such a crucial part of the flight, would the plane drop 1,000 feet of height when the weather was perfect? According to The Aviation Herald, the first officer was the pilot flying. After reaching 1,600 feet in altitude, the pilots were asked to proceed directly to one of the waypoints on the SID. The PM (Captain) delayed executing the Direct to, and the PF turned anyway without FD guidance towards the possible track. The first officer lost situational awareness while operating the aircraft manually and without the flight director's indications, causing it to descend at a rate of 3000 feet/minute. The plane was already traveling at a TAS of more than 300 knots when the fall became so steep, and the sink rate led to the aircraft exceeding the flap speed limitations.

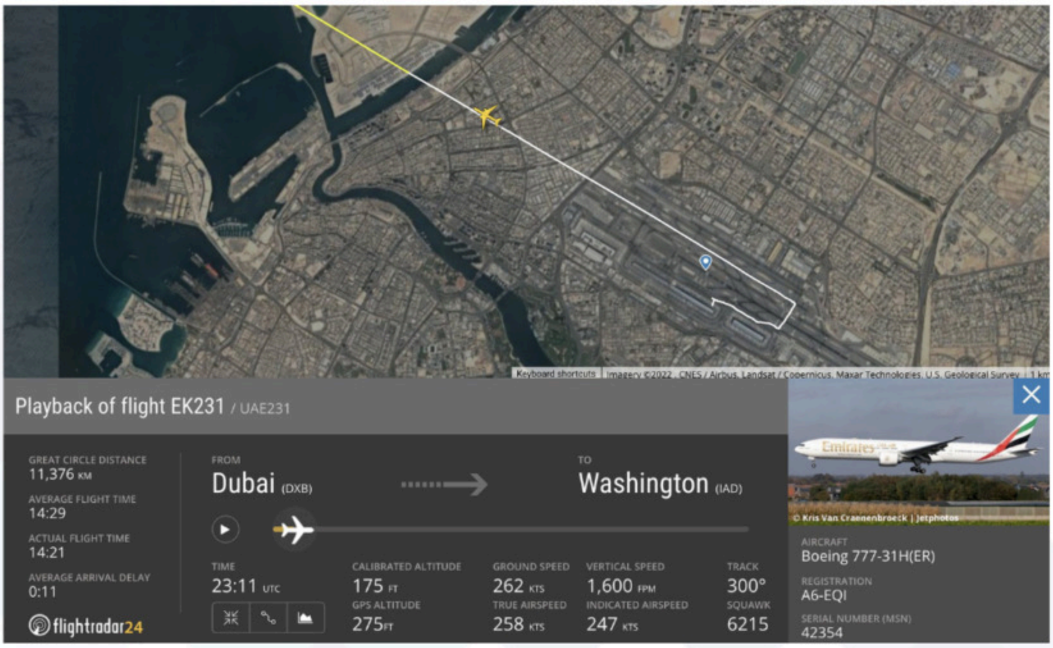
The sudden movement of FD after execution of Direct to may have caused a loss of situational awareness and/or spatial disorientation. Generally, this happens when the aircraft is maneuvered without reference to instruments. This can induce bizarre inputs from pilots, as has happened in many incidents/accidents in the past.

United Airlines flight UA1722



On December 18, 2022, United Airlines flight UA1722 took off from Kahului typically until 71 seconds into the flight, when the aircraft descended sharply. Before recovering and continuing its journey to San Francisco, the aircraft dropped from 2,200 feet to just 775 feet. There was rain and some weather, so whether they got in some downdraft or microburst is unknown.

Emirates EK231



The aircraft, registration A6-EQI, was carrying 372 people, including four flight crew and 14 cabin crew, when it departed DXB on December 19, 2021, for Washington Dulles (IAD) as flight EK231. The preliminary report notes that the aircraft reached a maximum rate of climb of only 800 feet per minute, which was below the climb gradient for the departure procedure. However, data from flight tracking services showed that instead of climbing promptly after takeoff, the aircraft entered a shallow climb and was just 175 feet above the ground when passing a residential area beyond the end of the runway. Immediately following the incident, Emirates issued a memo about altitude settings on the mode control panel of the aircraft, indicating that the flight director system may engage in a different mode if the altitude window is set to airport elevation upon landing.

The incident has prompted much discussion online on over-reliance on automation and human factors, given that there were two sets of crews in the flight deck at the time.

Minimum Acceptable Aircraft Performance

The Net Takeoff Flight Path (NTOFP) is the vertical profile of an aircraft beyond the takeoff point, showing the minimum height that an aircraft will obtain. To certify the procedure for the worst-case scenario, the failure of the most critical engine is assumed.

The aircraft net gradient capability, correctable for temperature, altitude, and pressure, is published in the AFM performance data and, in actual operations, must ensure that the limiting obstacle in the departure path can be cleared by a minimum of 35 feet.

NTOFP is divided into four segments:

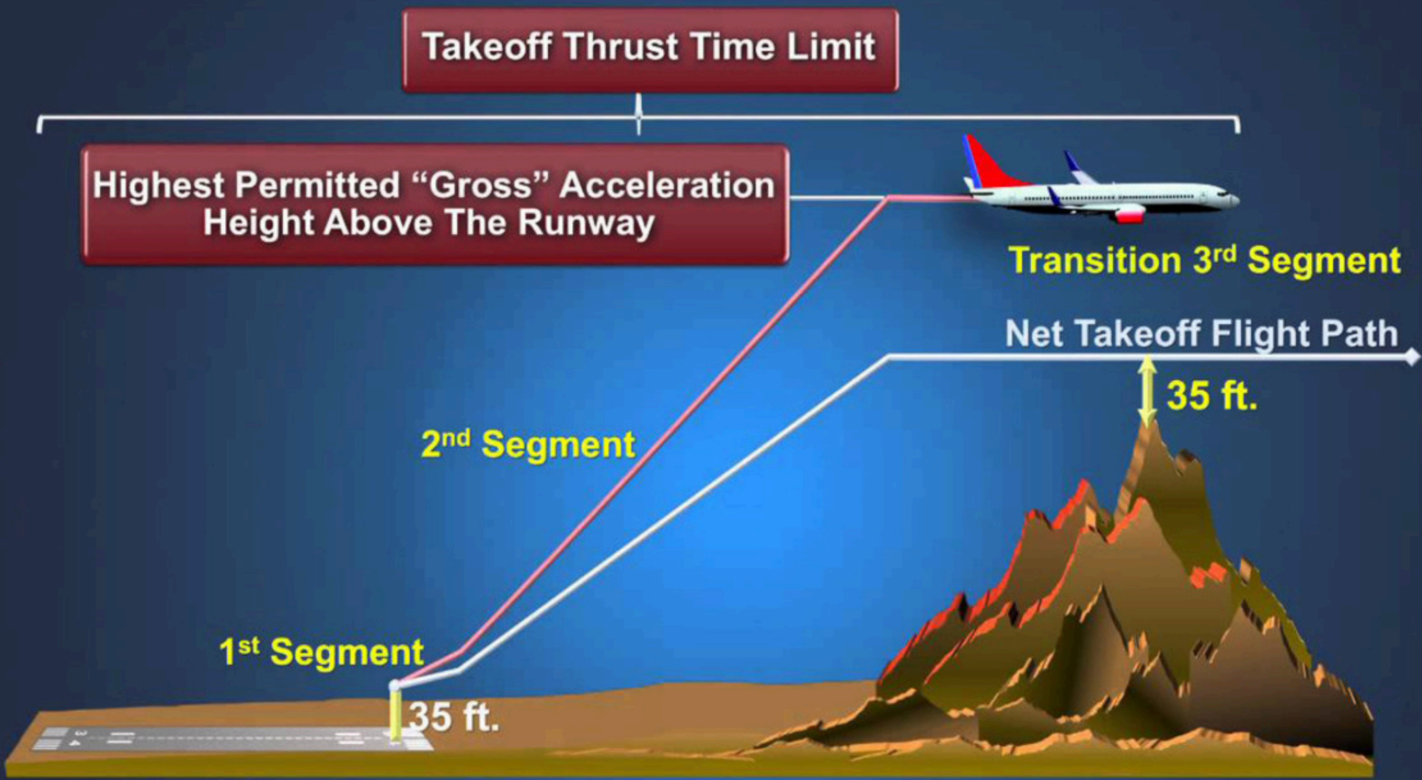
First Segment The aircraft accelerates to the proper speed in the first Segment after retracting its landing gear.

Second Segment The aircraft ascends during the second Segment to the flap retraction height, which cannot be lower than 400 ft.

Third Segment The flap is retracted in the third Segment, and the aircraft speeds up to the climb speed in the fourth part.

Fourth Segment The aircraft climbs to 1500 feet or until it is clear of major obstruct during the fourth Segment.

Each Segment of the one-engine inoperative takeoff flight path has a mandated climb gradient requirement. For example, a gross second segment climb gradient capability of 2.4%, 2.7%, or 3.0% is required for two, three, and four-engine aircraft, respectively. Similarly, the required gross gradients for the fourth Segment are 1.2%, 1.5%, and 1.7%, respectively.

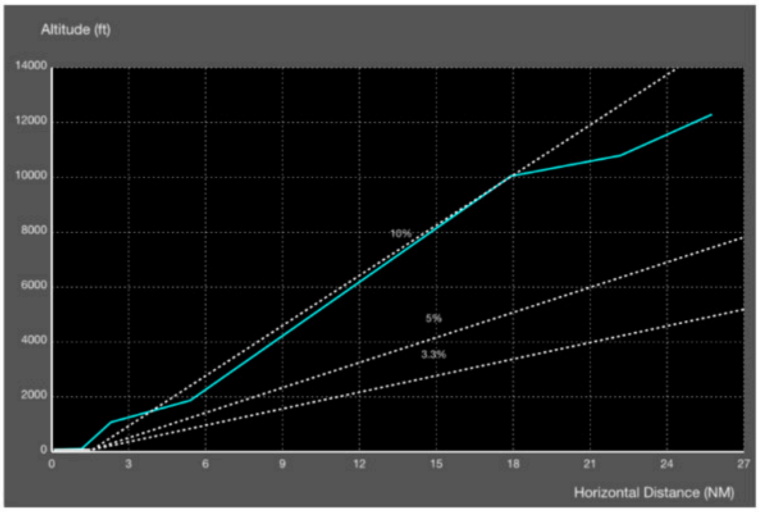


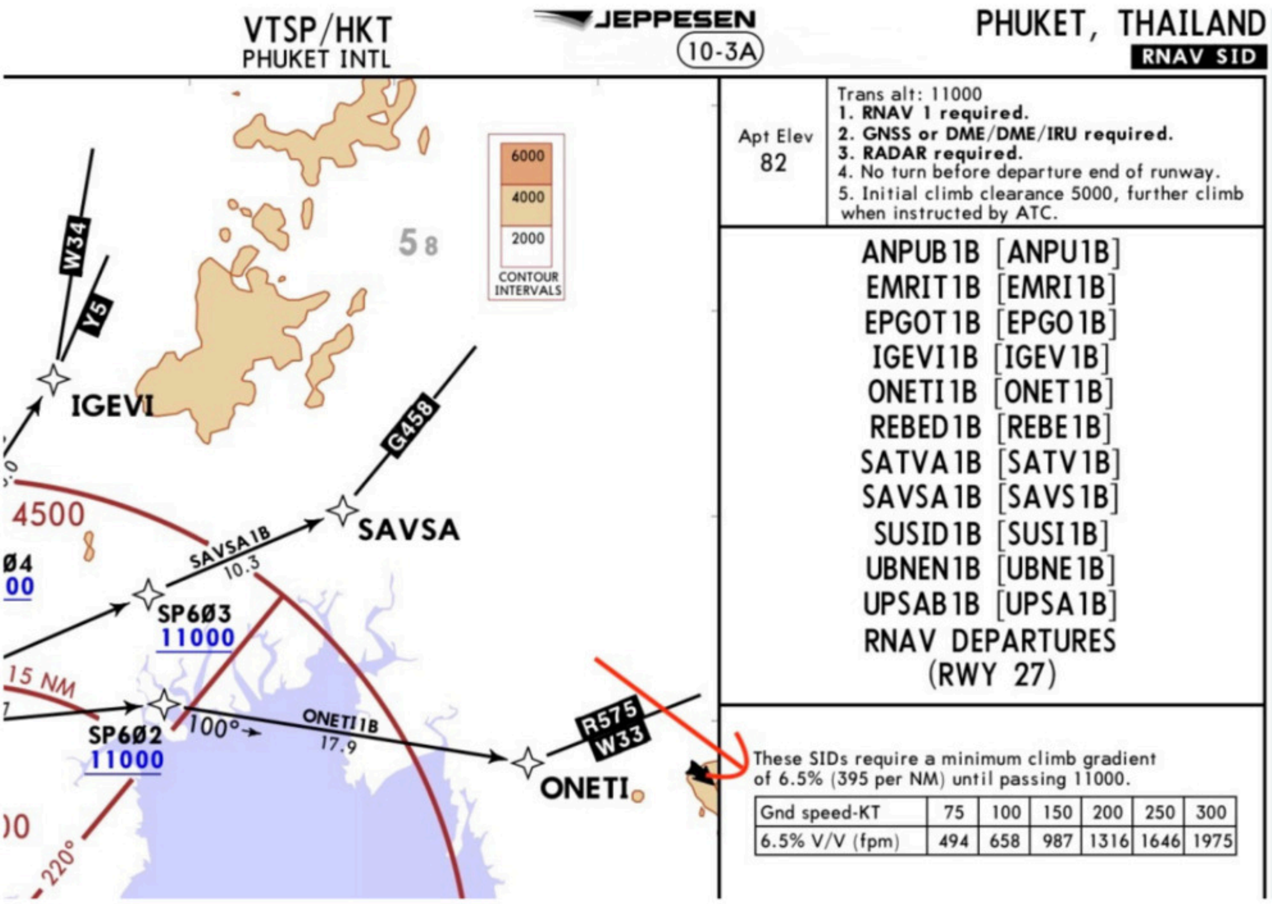
Departure Procedure Design

The design of an instrument departure procedure is generally dictated by the terrain surrounding the aerodrome. This takes us to the Minimum obstacle clearance (MOC) and climb gradient.

The minimum obstacle clearance equals zero at the departure end of the runway (DER). From that point, it increases by 0.8 percent of the horizontal distance in the direction of flight, assuming a maximum turn of 15°.

Departure procedures assume a 3.3 percent (helicopters, 5 percent) climb gradient and straight climb on the extended runway center line until reaching 120 m (394 ft) (helicopters, 90 m (295 ft)) above the aerodrome elevation. When obstacles affect the departure route, procedure design gradients greater than 3.3 percent may be specified. When such a gradient is established, the altitude/height to which it extends is promulgated.





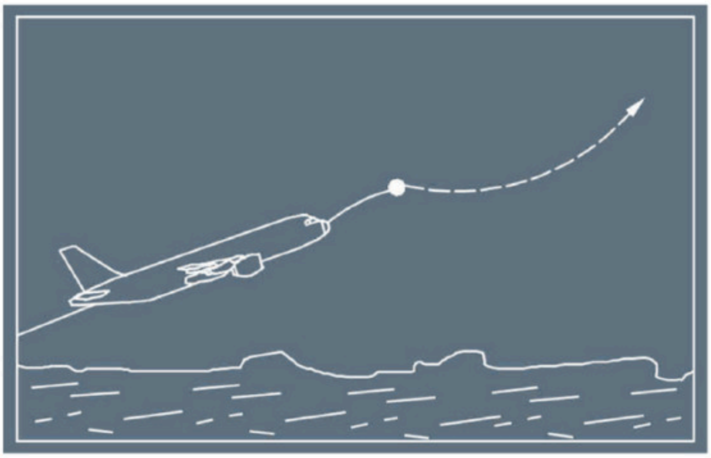
Takeoff Protections The GPWS warnings

An automated warning system called a Ground Proximity Warning System (GPWS) alerts pilots when their aircraft is in potentially dangerous proximity to terrain. In case of altitude loss after takeoff, Mode 3 warnings of GPWS will pop up, giving an aural alert of "DON'T SINK."

The table below illustrates a typical Class A GPWS system.

Mode	Condition	Aural Alert	Aural Warning
1	Excessive descent rate	"SINKRATE"	"WHOOP WHOOP PULL UP"
2	Excessive terrain closure rate	"TERRAIN TERRAIN"	"WHOOP WHOOP PULL UP"
3	Excessive attitude loss after takeoff or go-around	"DON'T SINK"	(No warning)
4a	Unsafe terrain clearance while gear not locked down	"TOO LOW - GEAR"	(No warning)
4b	Unsafe terrain clearance while landing flap not selected	"TOO LOW - FLAP"	(No warning)
4c	Terrain rising faster than aircraft after take off	"TOO LOW - TERRAIN"	(No warning)
5	Excessive descent below ILS glideslope	"GLIDESLOPE"	(No warning)

MODE 3 : ALTITUDE LOSS AFTER TAKEOFF



Mode 3 triggers aural and visual alerts when the altitude significantly decreases after takeoff, and go-arounds with landing gear or flaps not in landing configuration.

	CAUTION
AURAL ALERT	"DON'T SINK, DON'T SINK" (repeated as long as MODE 3 is triggered)
VISUAL ALERT	 The GPWS amber lights come on

Best Practice

Since air is not a natural human habitat, we don't have any relevant or safety instincts once in the air. So, we first develop some muscle memories to handle the aircraft, and then we must strictly fly by designed practices or SOPs. It's like a blind person being guided three steps in front and then two to the right; we are lost if we don't follow them. Instrument flying can be called detached consciousness. You observe everything and take suitable actions but are not involved emotionally or instinctively. That keeps illusions out.

Verify your actions

Map the facts with the mental model, if there are any conflict try and address it with the resource around. "Perceive, analyse, interpret, action, and feedback"

Prioritize your tasks

Do it right away else it will kill you, delay if it can wait for a coffee, delegate if there is someone else to do it, discard if it is not worth anyone's time. " humans generally see what they seek, try and see what is hidden'.

Confirm the Guidance

Don't let the aircraft lead you, let it be the tool which supports your needs. Verify the flight directors action with what you expect, if else step down and take over manually.

Follow the Guidance Strictly

Sustained attention is the key, failing which is an expensive trade-off, especially transiting through the various phases of the climb involving speed, configuration changes and subsequently flight path.

Avoid half IMC and half VMC

Visual and instrument flight skills are quite opposite. Visual flight obtains the distance, height, earth, and sky reference through the eyes. Whereas in instrument flight the eyes are limited to perceiving external cues and hence would require to commitment on the flight instruments.

Situational Awareness

Understand the automation modes, the FMA is the language of the automation. It conveys the pilot of what its going to do and is doing. However, the primary flight instrument must be in synchronous to what the FMA reveals. If else intervene or take over completely. Situational awareness is how much one is able to draw a mental picture of what is happening around in various context and combinations.

Adhere to Manufacturer Provided SOPs and Limitations

The manufacturer-recommended procedures and limitations are synonymous with the works best and safe. In retrospect, these procedures have been tested, proved, analysed and tweaked in the best interest of safety, repeatability, and useability.

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Conclusion

Loss of control during take-off is quite nerve-wracking in various directions such as loss of speed, altitude, navigating the incorrect path and in various combinations. The outcome is an undesired flight path, at worst leading to an incident or accident. Take is a high workload phase and if inappropriately managed, could lead to HEAVY cognitive demand and fewer reserves for monitoring the information in front through the flight instruments and subsequently a mismatch in the mental model between the pilots and the aircraft. In addition, being a victim to distraction could break the sustained attention, which breaks one's continuity in a process and hence separation from intended behaviour. With an impaired situation model, there could be unexpected control inputs in a so called knee jerk reaction and startle leading to disastrous consequences. the overall decision-making could be much flawed and one could surrender to the automation until serious surprises prompt the pilot back through a bottom-up approach and thus the incident.

About the Author

Vijay Macmilton Devadas is a line training captain and an Airbus procedural trainer with an airline in India. He also works with the CRM team as a pilot and cabin crew facilitator. He has formerly worked with various airlines, including Indian Airlines, Air India, and Emirates flying A320, A380 and B787. In his educational background, he has a bachelors in Mechanical engineering and Post Graduate Diploma in Business Administration, and currently a student with Embry Riddle Aeronautical University in the Master of Science - Human Factors.

His motivation is to understand "why we think the way we think" and apply them to the commercial aviation environment of human psychology and bring awareness to the industry and public. In his personal life, he mostly enjoys reading various disciplines of science, philosophy, and psychology. His hobbies include motorcycle riding and bodybuilding. He also enjoys having different coffees as a beverage, which helps him think with insight and penning down his thoughts.

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AERO INDIA 2023

The runway to a billion opportunities

Sriram Hariharan
Photo Journalist

At a Glance

First started **1996**

This Year 14th Edition

Location
Yelahanka Air Force Station
13-17 Feb 2023

Organizer
Indian Department of Defense Production

Visitors 640,000
Exhibitors 811
Countries 98
Foreign Defence Ministers 32
Foreign Air Chiefs 29
Industry CEOs 73
Defence companies 809

Achievements

266 partnerships worth ₹80,000 crore
201 MoUs
53 Major Announcements
9 Product Launches
3 Transfer of Technology

Major Participants

AIRBUS
LOCKHEED MARTIN
UNITED STATES ARMY AVIATION
BOEING
IAI
SAAB
DASSAULT AVIATION
SAFRAN
HC ROBOTICS
Rolls-Royce
भारत डायनामिक्स लिमिटेड
BHARAT DYNAMICS LIMITED
हिएलि HAL
भारत इलेक्ट्रॉनिक्स BHARAT ELECTRONICS
KALYANI
BHARAT FORGE

Major Agreements

Gopalan Aerospace India and Omnipol of Czech Republic sign agreement for manufacturing and assembling 1st passenger aircraft (L 410 UVP-E20 version) by a private company in India.

HAL and Elta Systems Limited of Israel sign for cooperation on future business in maritime patrol radar for Indian platforms.

Safran Helicopter Engines and HAL signed a workshare agreement for the joint development of the engine intended for the future 13-ton Indian Multi-Role Helicopter (IMRH) and its naval version Deck Based Multi-Role Helicopter (DBMRH).

Bharat Electronics Ltd (BEL) signs MoU with the Aeronautical Development Agency (ADA), DRDO, for the Advanced Medium Combat Aircraft (AMCA) program.

Aerial Display

Light Combat Aircraft (LCA) Tejas
HTT-40
Dornier Light Utility Helicopter (LUH)
Light Combat Helicopter (LCH)
Advanced Light Helicopter (ALH)
Rafale
Sukhoi-30 Mki
B-1
DC-3
F-16
F-35
Dakota DC-3
Harvard Trainer
Surya Kiran aerobatics team
Sarang helicopter display team

United States Air Force's (USAF) fifth-generation fighters F-35A Lightning II and F-35A Joint Strike Fighter make their debut.


SB 325

Static Display

ALH
HTT-40
Jaguar Darin-II
Apace AH-64
Mirage 2000
C-130J
Embraer C-30 Millennium
EMB-135 NETRA
Falcon 8X
F/A-18
Dornier DO-228
Hawk-i
Hawker 800
L39 Albatross

About the Author

Sriram is a plane spotter and aviation enthusiast who has been pursuing this hobby since 2009. The passion for aviation comes from his childhood. Though he had the urge to become a pilot, life had different things in store. He currently works in the software field and has 16+ years of experience in the industry. Sriram loves flying and has done some interesting and exotic flight travels in recent years. His favourite aircraft type is the ATR Turboprop aircraft. Plane Spotting is his favourite hobby and he wouldn't mind travelling long distances on a bike or even take an overnight bus journey to spot planes from airports in nearby cities. Apart from plane spotting, Sriram loves long drives with his family and is a true filter coffee lover.

Understanding

Airline Partnerships

Rohan Bhadgaonkar
Head Airline Partnerships
SpiceJet

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With the advent of the new world order post-pandemic in the travel industry, the boom in travel looks like the travelers were held up hostage and now have come back with a vengeance to go places. This comes off as an absolute positive, nonetheless, also with impediments in terms of reviving grounded fleets which have been erratic post-pandemic, which comes with a price and also supply chain issues to serve the demand for MRO requirements.

With the demand brimming to the top, none of the airlines want to miss the bus to serve the passengers and preserve their loyalty by not turning them down with the lack of capacity due to internal challenges. This is when you explore options of entering into Partnership/s, Alliance, or Strategic Alliance with 2 or more carriers associating with each other on various fronts; be it interlining, codeshares, joint business, joint ventures, etc. For a layman, let us dwell on what we talk about when it comes to the mumbo jumbo of various collaborations that the airlines dive into.

Purpose of an Airline Partnership... Why?

Seldom are there airlines that have the propensity to reach every corner of the world; it may be due to a lack of aircraft or Air service Agreements or just commercial demand enough to operate that route. However, there is a demand for a few passengers who can be sent to the farthest point of Carrier A and further connecting to Carrier B (and C many times) through a mutually agreed partnership where all the airlines in the equation earn their portion of deserved revenues.

What happens in an Airline Partnership?

This area of business is based on quid pro quo arrangements, which work on unilateral or bilateral functions where the airlines can share resources, design new routes with each other through the schedule and commercial alignments, or boost the current partner networks through the addition of frequencies beyond the organic network of each carrier. Another key area where partnerships leapfrog is Loyalty Program, where 2 carriers can reach an arrangement to earn and redeem each other's mileage or reward points.

Such arrangements not only serve the benefit of taking a passenger to the destination through a common point of connection but also provides leverage to the carrier to be present in the part of the world where they have never flown directly yet be visible to the travelers through various marketing techniques and platforms.

How is it Done?

These partnerships are developed starting in the more simplistic equation to the most complex algorithms, which are based on the requirements and objectives of the organization to where they want to see themselves in the future. Let us see the type of partnerships an airline could enter, starting from the easiest way forward.

Interline Partnership

These are preliminary partnerships that collaborate on points that are beyond their own network. These are primarily based on managing a simple contractual obligation of a Special Prorate Agreement (SPA) signed between 2 carriers encapsulating the below elements.

- Interline rates: How much the issuing airline pays to the transporting airline
- E-ticketing agreements
- Through check-in capability: to reach your baggage to the final destination
- Baggage arrangements: Acceptance of baggage allowance based on your dominant airline allowance
- Loyalty: Subject to the requirement of the cooperation (Optional)

E.g. – DEL-Carrier A-DXB-Carrier B-TBS or LON-Carrier A-DXB-Carrier B-DEL-Carrier C-DIB

Codeshares

These airline partnerships are forged to enter the 2nd ring of strategic cooperation, where we see a marketing carrier and an operating carrier. The marketing carrier is the one that is not operating on the said route but applies its code (e.g., EK for Emirates, QR for Qatar Airways, LH for Lufthansa, etc.) on another carrier that is operating the said route, which will be known as the operating carrier.

Let us take an example of Indigo's (6E) cooperation with Turkish Airlines (TK), where 6E applies its code on Turkish Airlines flights, let's say on the IST-ATY route. Hence if the routing is DEL-IST (6E 000) / IST-ATY (6E 0000*) (the * identifies as a codeshare number), 6E will be the marketing carrier on the IST-ATY route, and TK will be the operating carrier.

There are Block space arrangements in a codeshare environment where the seats are provided to the partnering carrier on:

Hard Blocks: Fixed number of seats that needs to be sold by the marketing carrier and will be billed by the operating carrier for the number of seats that are allocated.
Soft Blocks: Fixed number of seats that will need to be sold by the marketing carrier, which will be released at a specific time, billing only for the seats that are sold.
Freesale/Freeflow: The marketing carrier can sell as many seats they would want on the operating carrier at a price agreed by between the partners.

Airline Alliances

This method is entering a cluster of carriers that have formed an arrangement to share all possible resources from flight routes, system integration, operation resources, airline lounges, operation manpower (air and ground), Marketing & Branding prowess, Loyalty programs, etc.

Such alliances can offer a wide range of products to travelers, such as fast-track access on all alliance member airlines, faster mileage rewards by earning miles for a single account on several different carriers, round-the-world tickets, enabling travelers to fly over the world for a relatively low price due to better/multiple connectivities, accessible fare products with lower operational costs.

There are 3 most popular alliances which are currently operating, with the biggest being the Star Alliance (in terms of members and the number of seats available) with a 23% share, SkyTeam with a 20.4% share, and OneWorld with 17.8%; while rest of the 38.8% is share with the other smaller alliances such as Vanilla, U-Fly, and Value.

Strategic Alliances

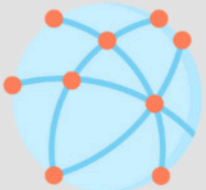
These are airline partnerships that are more comprehensive in nature and involve creating a product on common routes to avoid duplicity and revenue dilution, generally known as Joint Business, else approach business interests and investments of funds to purchase equity in an airline of interest to forge a consolidation through mergers and acquisitions. For such partnerships, key areas of interest involve:

- Sharing of resources
- Optimise route duplicity
- Operational costs
- Sales incentivizing
- Revenue sharing
- Merging of multiple airlines under a single brand
- Merger of Loyalty Programs
- Airport lounges
- Ground crews

E.g., Codeshares, Joint Business, Joint Ventures, Mergers & Acquisitions

Behind the Scenes

Beyond the realm of the commercials, other synergies are involved in making an Airline Partnership successful.



Network Planning

This is one of the most engaging areas that could make or break the success of a partnership. Aligning the schedules, mapping the flights, and feeding the systems with a frenzy of data to create SSIM (Standard Schedule Information) files which standardize the exchange of information between airlines for optimizing the connections, Schedule Confirmation Requests, organising the slots at different airports and Airline schedules.

Ground and Cabin Services

To understand the partnerships that come with deliverables and product alignment, such as baggage, meals and lounges, which need to be honored by the partner carriers.

Aeropolitical Division

Receiving permissions and compliances are one of the key components when it comes to entering a strategic partnerships or codeshares. Aeropolitical unit is the liaison between the government (mainly Civil Aviation, Foreign Ministry and other administration departments) who are responsible for sanctioning the airline partnerships in 2 or more countries

Digitalization/E-commerce/IT

This area of business handles much of how the selling is managed on partner carriers to ensure visibility on the digital real estate for the flights to drive passengers to a destination where the airline does not directly fly.

Revenue Management

Being the critical cortex of the airline, the unit ensures the sanctity of the partnership is embroiled in the most appropriate manner through chart mappings, providing the deserved rates, structuring a selling mechanism with profitability as the main objective and Policy, Procedures & Processes for the collaboration to avoid any revenue leakage and avoid any imbalance in the partnership/s.

Finance, Legal and Compliances

- Visibility on unbiased performance reporting in terms of absolute and aligning with business on setting agreed KPIs
- Enabling channel distribution strategy by reviewing the cost of sales with Distribution team
- Evaluating Airline Partner revenue contribution as a % of overall Airline Revenue and leveraging the same in setting targets
- Influencing incentive framework of Channel Distribution team to minimize the Cost of Sales
- Ensuring due diligence completed on the multiple contracts that govern the foundation and expansion of partnerships

Marketing & PR

Announcing partnerships is one of the most prestigious moments for airlines, and they have to ensure they meet each other standards of customer engagement. Ensuring due diligence completed on the multiple contracts that govern the foundation and expansion of partnerships

Distribution Channels

To ensure a steady flow of revenue is maintained on the partnerships, diverse distribution channels need to be tapped, viz. Airline Websites (direct selling), Travel Partners (agents and travel management companies), Online Travel Agents, and Global Distribution Systems (GDS).

Sales Management

With the evolution of business and accountability to ensure numbers are flowing on the partnerships and the Return of Investment is met for the partnerships, sales are bestowed with tools of engagement such as a Productivity Linked Bonus to the trade is included for flights under the collaboration.

Over the years there has been exponential increase in Airline partnerships with every carrier big or small entering a cooperation with another carrier with a mutual interest which can either be to enhance their brand reputation or reach the obscure lands which would otherwise be challenging due to bilateral constrains or plain demand.

Hence we foresee the holy covenants of shaping a successful partnership to be:

1. MRO/Resources: Manpower, Technical or Commercial
2. Symbiosis/Mutualism: serving to each other's interest to address demand or limitation
3. Existence: creating a brand presence in otherwise unknown area
4. New Customers: in the markets/countries/areas where you have never been but need to exist predicting an online operation in the future
5. Market Diversification: create a demand for a market which creates new opportunities for future operations

While this article just scratches the surface of the Airline Partnerships and Strategic Alliances, there are a lot more new innovative ideas such as AI, Digitalization etc. that can be incorporated in the area of partnerships for a successful collaboration.

About the Author

Rohan comes across as an aviation specialist with more than 19 years of rich aviation experience across various domestic and international carriers. He started his career with Air Sahara and then moved to Virgin Atlantic international sales before his next challenge with Jet Airways Alliances and Revenue Management. His last airline tenure was with Qatar Airways, which lasted for 11 years. He worked in multiple profiles as a Business Process Analyst, Country head in Nepal, Head of Specialty Sales in Global Sales, and then Alliance & Partnerships. Rohan is now the head of Airline Partnerships and Strategic Alliances with SpiceJet Ltd.

DRONAMICS

Revolutionizing the Middle Mile Cargo Drone Market

Prashant Prabhakar
Subject Expert
100 Knots

Dronamics was founded in 2014 by Svilen Rangelov, an entrepreneur and economist, and his brother Konstantin, an aerospace engineer, with the intention to solve a simple problem: how to get a package across Europe at a competitive price, quickly and reliably.

The company now employs more than 150 people in 12 countries. As the world's first cargo drone airline with a license to operate in Europe, Dronamics has the mission to enable same-day delivery for everyone, everywhere. Dronamics' all-in-one solution streamlines existing supply chains through integration of its Black Swan long-range cargo drone (capable of being flown autonomously or semi-autonomously), its Drone ports network and its Network Operation Centers.

Design

The Black Swan is the first long-range, remotely-piloted aircraft built specifically for cargo operations. The core technology is based on:

- Fixed-wing airframe design
- Proprietary aerodynamic profile
- Consolidated avionics
- Robust design to land on paved or unpaved airstrips

To achieve the vision to democratize air cargo for everyone, everywhere, it was required to build an aircraft that is cargo-first, efficient, and scalable.

Wingspan	**16m / 52ft**
Fuselage	**8m / 26ft**
Height	**4m / 13ft**
Diameter	**1.3m / 4.3ft**
Payload	**350kg / 770 lbs**
Capacity	**3.5 cmb / 925 gal**
Range	**2,500 km / 1,550 mi**
Altitude	**20,000 ft**
Speed	**200 km/h / 125 mph**
Endurance	**12.5 hrs**
Fuel Consumption	**5.8 l per 100km / 1 gal per 50mi**

Full specs chart of the Black Swan

Emissions, Emissions and Emissions

The aircraft is designed with fuel efficiency in mind. The reasons include the Black Swan's aerodynamic fixed wing design and the superior load factor as it is built for cargo only, unlike traditional aircraft that are built for passengers and adapted to carry cargo.

An external study conducted by Oliver Wyman has examined CO_2 emissions of the Black Swan vs traditional modes of transportation[1]. The results show up to 60% less emissions compared to current journeys (including road, air freight and ferry) even when the Black Swan runs on petrol. The integration of Dronamics in the logistics chain is especially CO_2 beneficial on smaller payloads (e.g. LCV, small trucks) as well as when compared to air cargo substitution (both dedicated freighter and belly).

Additionally we cut down emissions by shortening the supply chain. Our direct fulfillment model enables a quicker, leaner fulfillment process by cutting down steps and decentralizing distribution.

According to research, transporting cargo using kerosene-fuelled belly freight produces 820g CO_2 emissions per tonne-km tank to wheels, with a dedicated freight airliner still emitting 470g CO_2/tkm. Even ground transportation emits 374g CO_2/tkm using a 7.5t diesel truck or 101g CO_2/tkm with a 24t-40t diesel truck.

This means that customers are better placed to meet decarbonization targets in their supply chain.

Furthermore, we have a partnership with Zero Petroleum, a British technology company that makes whole-blend synthetic, non-biological fuels in a completely fossil-free process, using just carbon dioxide taken from the air and renewable hydrogen made from water. The use of ZERO® Syn95® fuel will result in the world's first carbon neutral flights by long-range cargo drone.

We are also working on developing two hydrogen technologies in parallel - conversion of a gasoline engine to use hydrogen, as well as fuel-cell adaptation in collaboration with Cranfield Aerospace Solutions.

Competition

Traditional aircrafts are built for passengers not cargo, which makes them very inefficient for the transportation of goods. The Black Swan, being the first remotely-piloted aircraft built specifically for cargo, optimizes the space used and therefore has a superior load capacity. This, coupled with the aerodynamic design which ensures low consumption, gives it a fuel efficiency advantage compared to conventional aircraft (at 5.8 l per 100 km / 1 gal per 50 mi - the equivalent of a small car).

Also, Dronamics is the first cargo drone airline with license to operate in Europe and we will start commercial flights in the continent in 2023.

Middle Mile Market

The middle-mile cargo drone market where Dronamics operates comes up as the clear front-runner vis a vis urban air mobily or drones that deliver packages to your doorstep, mainly because national aviation authorities are starting to adopt regulations that give a clear path to certification for a solution like ours.

We also see that by 2030, over 70% of merchandise trade is expected to be intra-regional, requiring route and mode optimization to address supply and demand concentration

By offering an air cargo solution that is designed to make affordable, efficient and sustainable freight possible, especially for remote and underserved communities and by establishing new direct routes, Dronamics serves a multitude of industries that are already engaging our services and signed agreements with us, especially those requiring time-critical delivery times, such as:

- eCommerce
- Healthcare (medicines, vaccines)
- Perishables (food, flowers)
- Engineering and automotive (spare parts)
- Humanitarian aid
- Mining

Ready to fly

First cargo drone licensed to fly in the EU

Scalable

Built by a world leading in-house avionics team
Long-term manufacturing partners to produce at scale
Can land anywhere – on strips as short as 400m (¼ mile)

Reliable

Proprietary design
Engine can be serviced anywhere in the world
Temperature controlled environment for perishables

Sustainable

CarbonNeutral certified
60% less emissions than current transport options
Built for biofuel, moving to hydrogen-based and synthetic fuel solutions
Named “2022 Sustainable Drone Technology Company of the Year” by Freightweek


DRONAMICS

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