# HONG KONG
# ATC - PILOT SYMPOSIUM 2018

## EMERGENCY HANDLING

JOINTLY PRESENTED BY HKALPA AND HKATCA

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# OUTLINE

- Pilot and ATC considerations in handling Emergency
- 5 Scenarios of emergency situations
  - Engine failure after take-off from runway 07R
  - Rejected take-off
  - Unreliable airspeed
  - Hydraulic problems
  - Missed approach

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# INTRODUCTION

- Promote ‘thought’ about emergencies and unusual situations, to outline some considerations and, perhaps, dispel some myths.
- There is rarely a single correct way to deal or assist with an aircraft emergency because each one is different, but the greater a pilot or controller's understanding of each others’ potential difficulties, the more appropriate his or her response is likely to be

# EMERGENCY PHRASEOLOGY

- Distress
  - A condition of being threatened by serious and/or imminent danger and of requiring immediate assistance
  - MAYDAY MAYDAY MAYDAY
- Urgency
  - A condition concerning the safety of an aircraft or other vehicle, or of some person on board or within sight, but which does not require immediate assistance
  - PANPAN PANPAN PANPAN

# PILOT PERSPECTIVE IN HANDLING EMERGENCY

- What are emergencies?
  - Abnormal situations
  - Non-Routine
- What's happening in the cockpit?
- Examples?

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# PILOT PERSPECTIVE IN HANDLING EMERGENCY

- Always a "surprise" element
- Workload in Cockpit increase significantly
- Priorities – Fly, Navigate, Communicate
- Communication – Cabin, ATC, Company
- Return to Land

# PILOT PERSPECTIVE IN HANDLING EMERGENCY

- What support we would like from ATC
- Time to respond your questions
- Vectoring assistance
- Observations

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# ATC PERSPECTIVE IN HANDLING EMERGENCY

- Observations
- Concept of 'ASSIST'
- Considerations

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# ATC OBSERVATIONS

- Flight crew may be reluctant to use the standard prefixes to inform air traffic control initially. It is likely that the declaration of an emergency will occur after a period of diagnosis
- Emergencies usually start with a statement of a problem and a request to standby
- A period of diagnosis by the flight crew will then follow
- Once the situation and its implications are understood, a **PAN** / **MAYDAY** may be declared

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# ATC OBSERVATIONS

- Crew not responding to your transmissions could indicate they are preoccupied
- A request to ***'standby'*** could be an indication of a problem, or that a checklist is being completed.
- Voice pitch/tone does not necessarily reflect the seriousness of the situation or the level of flight deck activity
- ***However***
  - The terms 'fuel emergency' and 'medical emergency' have no status and controllers are NOT required to give priority to aircraft with a reported shortage of fuel or medical problem unless an emergency is declared. (eg. Mayday Fuel, Minimum Fuel, Pan Pan)

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# CONCEPT OF 'ASSIST'

- A - Acknowledge & understand the call
- S - Separate the aircraft from other traffic. Give it room to manoeuvre
- S - Silence on the frequency. Provide separate frequency where possible
- I - Inform those who need to know and those who can help
- S - Support the pilots in any way possible
- T - Time - Give the pilots time to collect their thoughts, don't harass them for information

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# CONCEPT OF 'ASSIST'

- A more simpler version would be
  - COMMUNICATE
  - SEPERATE
  - COORDINATE

# ATC CONSIDERATIONS

- Initial actions
- Reduce workload
- Preparation if aircraft require to return
- Other factors

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# INITIAL ACTIONS BY ATC

- Acknowledge the aircraft call - observe any request to standby
- Ask flight to squawk 7700 if and when they are able
- Consider:
  - vectoring other aircraft away/around (to other sectors)
  - imposing RTF silence or using a discrete frequency or clearing the frequency of other traffic
  - the nearest 'suitable' runway and weather
  - the time that may be required in order to resolve, contain or improve the situation

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# REDUCE WORKLOAD

- delegate tasks to other competent persons in order to be able to concentrate on communication and direct assistance to the crew
- Identify resources available
  - Supervisors & colleagues around you
  - ATC support staff & adjacent ATC units
  - Airport fire services & emergency services
  - Other aircraft in the vicinity
  - Airline operations staff (e.g. operations or engineering personnel)
  - Airport security (AVSECO)
  - Flying instructors and aircraft engineers with experience of the aircraft in difficulties

# IF AIRCRAFT REQUIRE RETURN

- **Immediate landing**
  - In a ***critical*** situation or to contain a worsening situation. e.g. a fire which cannot be put out
- **Delayed landing** ***(This is more usual)***
  - Fuel jettison, drills, situation analysis and approach preparation

# IF AIRCRAFT REQUIRE RETURN

- Type of approach required?
  - Preference of pilots
  - How to help reducing workload in flick deck? E.g. vertor to ILS/ Visual approach
- Go-around may be difficult or impossible
- 'Fly by' may be required before landing to establish the full extent or nature of any damage
- All of the above intentions/options will depend upon the time available versus the risk

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# ATC CONSIDERATIONS

- Aircraft may be fast on approach (overweight landing)
- Aircraft may require the full length of the runway
- The brakes may be hot. Brake fires and tyre deflation are possible
- Aircraft may be unable to vacate the runway – blocked runway
- Steering may be compromised
- Emergency evacuation may take place
- The aircraft may not be able to comply with normal ATC procedures when executing a go-around

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# ATC ACTIONS

- Provide extra spacing between proceeding and succeeding traffic
- Arrange traffic to land on different Runway
- Arrange Fire-Rescue Vehicle to Standby
- Arrange Runway Inspection after Landing
- Tow/Engineer to Standby

# 5 SCENARIOS OF EMERGENCIES

- Engine failure after take-off from runway 07R
- Rejected take-off
- Unreliable airspeed
- Hydraulic problems
- Missed approach
- Pilot Perspective / ATC Perspective

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# ENGINE FAILURE AFTER TAKE-OFF FROM RUNWAY 07R

# ENGINE FAILURE AFTER TAKE-OFF FROM RUNWAY 07R – PILOT PERSPECTIVE

- Workload in Cockpit increase
- FLY !
- System Actions – shut down the correct engine!
- Checklist
- Approach Preparation
- Holding and come back to land
- Reduced handling capabilities
- May not be able to vacate runway

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# ENGINE FAILURE AFTER TAKE-OFF FROM RUNWAY 07R – PILOT PERSPECTIVE

- 07 Departure – Terrain
- Operator Engine Out procedure (EOSID) may not be the same for 07R
- Heavy Weight (Above Max Landing Weight)?
  - Terrain
  - Additional checklist for landing
  - Fuel Jettison?
  - Hot Brakes


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# ENGINE FAILURE AFTER TAKE-OFF FROM RUNWAY 07R – ATC PERSPECTIVE

- ATC does not know EOSID
- Aircraft likely to be below MVA
- Runway Inspection may be necessary (V1)
- ATC may query deviating off SID
- EOSID may conflict with other traffic (including VFR)
- Once Emergency declared ATC will allow time to respond
- Subsequent return after diagnosis / fuel dump / fuel burn

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# TERRAIN AROUND THE AIRPORT


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# REJECTED TAKE-OFF

# REJECTED TAKE-OFF – PILOT PERSPECTIVE

- Why? System malfunctions
- High-Speed – usually refer to 100+kts
- Heavy Weight?
- Both may end up with hot brakes, possible smoke and fire

- May need observation feedback from Tower
- In most cases will try to taxy off runway
- We will advice ATC stopping, and reason when able, please give us time

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# REJECTED TAKE-OFF – ATC PERSPECTIVE

- Tire and brake fires can result - tire burst can damage the aircraft further
- Tires may deflate due to hot brakes resulting in runway/ taxiway blockage.
- The aircraft may overrun the runway.
- Smoke/Fire spotting from ATC.

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# REJECTED TAKE-OFF – ATC PERSPECTIVE

- Rescue-Fire Unit to response
- Runway Inspection to clear FOD.
- Aircraft on final behind to go around.
- Departure missing slot.

# REJECTED TAKE-OFF – ATC PERSPECTIVE

- ***High speed rejected take-off***
- Experience shows that unless the controller is absolutely sure of the source of a problem, all advice should be general. For example,
- "Smoke appears to be coming from the rear of the aircraft" rather than "Your APU is on fire".

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# REJECTED TAKE-OFF – ATC PERSPECTIVE

- ***Low speed rejected take-off***
- The aircraft will normally vacate runway.
- The aircraft may return to stand or even reattempt take-off. (state your intention)
- Missed slot may takes time to rearrange

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# UNRELIABLE AIRSPEED

# UNRELIABLE AIRSPEED – PILOT PERSPECTIVE

- Pitot-Static system malfunction
- Resulted in Unreliable airspeed or altitude information
- Fly with checklist, trouble shooting, more challenging in IMC
- May not be able to maintain QHN altitude if using GPS data
- Expect Similar support from ATC as Hydraulic Malfunction

# UNRELIABLE AIRSPEED – ATC PERSPECTIVE

- May associate with Unreliable Airspeed/Altitude/Pressure Sensors
- ATC radar only sees GS
- May request to proceed in VMC
- Lateral Separation with other traffic
- Allowance in time to comply with ATC instructions
- Mode C check +/-200ft level flight, +/-300ft climb and descent

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# HYDRAULIC PROBLEMS


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# HYDRAULIC PROBLEMS – PILOT PERSPECTIVE

- Challenges depends on the number of systems lost/aircraft type
- Gear may not be able to retract
- Flaps may not be able extended or retracted, likely return to land
- Cockpit preparations and workload

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# HYDRAULIC PROBLEMS – PILOT PERSPECTIVE

- Higher approach speed due to configuration
- Reduced handling capability
- Vector for Longer Final and greater separation
- A chance of unable to taxy off runway

# HYDRAULIC PROBLEMS – ATC PERSPECTIVE

- ATC have limited knowledge about what systems are affected
- Speed constraints
- Turn direction constraints
- Landing Configuration constraints
- Preferred Approach Type
- Vapp and stabilization
- Runway Inspection after landing

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# MISSED APPROACH


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# MISSED APPROACH – PILOT PERSPECTIVE

- Cockpit workload + surprise factor
- High power and dynamic situation
- Need to reconfigure the aircraft and confirm tracking
- Workload reduced after cleaned up
- ATC distractions, we will advice ATC reason when able

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# MISSED APPROACH – ATC PERSPECTIVE

- Standard Missed Approach for separation
- Runway Heading for Wx
- Vertical Separation for a piggy-back situation
- Re-sequencing
- Diversion

# ANY QUESTIONS?


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# HUMAN FACTOR –
## *IMPACT OF IN-FLIGHT EMERGENCIES*

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# HUMAN FACTOR – *FIGHT OR FLIGHT?*

- Aircraft emergencies are stressful for everyone involved. Our initial reaction to stress is the so-called 'fight or flight' response where our bodies physically prepare to stay and fight or to take flight and run away from danger with a rush of adrenaline. This reaction does not necessarily help us think or perform better.

- The following summarizes some human responses to emergency situations both on the flight-deck and in the ATC environment and makes some suggestions for managing them.

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# HUMAN FACTOR – *TIME DISTORTION*

- There may be an extremely high workload, especially early on, whilst completing initial checklists and diagnosing the problem.
- The flight crew may experience very high stress levels.
- Personal danger is real and many crews are likely to be finding themselves in their first real emergency of that kind.
- Time distortion - crew perception of time is compressed as they feel they have an inordinate number of things to do in a very short period of time; whereas for the controller it will seem to 'expand'

# HUMAN FACTOR – *TIME DISTORTION*

- Time distortion - the controller's perception of time is expanded so that it appears more time has elapsed between communications than is actually the case. Write down the time of communications to keep this in check.

- Resist the urge to 'throw information' at the flight crew. A common response of the need to 'do something' is to pass on as much information as possible. This can have the effect of overloading the flight crew at a time when they have other priorities. Anticipate this urge and take a few seconds to consider the amount, relevance and timing of the information.

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# HUMAN FACTOR – *COMMUNICATION*

- Communication problems may be encountered:
- The crew may be wearing oxygen masks if the emergency is due to smoke in the cockpit.
- Under stress language problems increase.
- Do not ask for too much information at one time.
- **Remember:** Use of *standard phraseology* may help to overcome many communication problems.

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# HUMAN FACTOR – *COMMUNICATION*

- When under stress, any existing language difficulties will be exacerbated.
- Voices do not necessarily reveal seriousness. The flight crew can sound very cool, calm and collected when it is anything but that on the flight-deck.
- Communication with ATC is a low priority. The crew's last priority will be to communicate with ATC (aviate, navigate, then communicate).
- There may be a reluctance to acknowledge the extent of the problem. Sometimes there may be a reluctance to declare an emergency when it is appropriate to do so.

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# HUMAN FACTOR – *TUNNEL VISION*

- Keep additional information on hand and ready in case of flight crew request or a change of circumstances.
- 'Tunnel vision' is a common response to stress and high workload. Anticipate it and force yourself to monitor all relevant sources of information.
- Minimise requests for information, especially early on, when the crew are likely still to be running through checklists and diagnosing the problem.

# HUMAN FACTOR – *MEMORY*

- Memory is degraded by stress. Write down more notes than you would do normally as a reminder and keep scanning the notes and other sources of information to help back up your memory.
- There may be a high workload. Let colleagues know that you have an emergency as soon as possible so that support is at the ready.
- Post-event stress may occur. Involvement in emergencies can lead to post-event stress for controllers as well as flight crew. Seek help promptly if affected.

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# THANK YOU


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