ENGINE FAILURE

SPEAK ON "FIRE ON BOARD". FOLLOW THE CHECKLIST

- the most common reasons for an engine failure
- related malfunctions in case of an engine failure
- dangers posed by an engine failure
- possible consequences of an engine failure
- pilots' requests and actions in case of an engine failure
- controller's actions in case of an engine failure
- the best principles of ATC assistance to the pilot in case of an engine failure
- arrangements needed on the ground for successful landing in case of an engine failure
- special vehicles required upon arrival in case of an engine failure
- situation connected with an engine problem you have had / heard about

KEY WORDS & PHRASES

- engine failure / malfunction / fault / cut-off / shutdown / fire / compressor stall / surge / flameout / vibration / breakdown / separation
- failure on a multi-engine / single-engine aircraft
- have / experience an engine failure
- fail in any stage of flight / during departure / during landing / during cruise / in flight
- happen due to technical reasons / human factor / bad weather conditions / outside factors
- affect flight safety / a flight / aircraft systems
- have problems with controllability / maneuverability
- lose altitude / thrust / power / speed / aircraft control
- identify / detect / determine / work on / solve a problem
- assess the situation
- restart / relight an engine
- require descent / diversion to the nearest suitable aerodrome
- result in precautionary / forced / emergency landing
- arrange towing equipment / technical support / assistance on the ground

ENGINE

The engine provides power for flight, makes direct and reverse thrust and provides speed for the aircraft. The engine generates power for the electrical system (needed for lights, avionics, anti-ice, electric pumps), hydraulic system (needed to drive controls), pneumatic (used for the landing gear extension or anti-ice) system. Besides, the engine supplies air to the pressurization and air-conditioning systems.

Engine failure may have serious consequences for an aircraft. Engine failure on an aircraft will reduce its power and ability to fly normally. The engine failure can lead to loss of electrical power, navigational system, communication system, loss of cabin pressure and manual gear extension.

ENGINE FAILURE IN DIFFERENT STAGES OF FLIGHT

Jet engines used on today's commercial airliners are quite reliable. However, engine malfunctions or failures sometimes occur. According to statistics most engine failures happen during take-off and cruising phases of flight. An engine malfunction during take-off roll can cause an aborted take-off. If an engine failure occurs during departure, the aircraft will continue on a straight course until reaching a certain safe altitude at which further decisions will be made.

An engine failure during cruise can result in a descent in order to maintain cabin pressure or to increase speed for an engine restart. Many aircraft need lower levels to restart their APU (auxiliary power unit).

ENGINE FAILURE ON MULTI-ENGINE & SINGLE-ENGINE AIRCRAFT

- Modern aircraft can fly with one engine inoperative, so one engine failure on a multi-engine aircraft usually does not affect flight safety. The crew will probably shut down the affected engine and make a precautionary landing at the nearest airfield, but sometimes pilots can carry on (continue) to the destination on the remaining engines. It depends on the aircraft position and fuel situation.
- Engine failure on a single-engine aircraft is certainly an emergency situation, because the aircraft can lose power, altitude and speed very quickly. In this case the pilot will choose a suitable landing area and glide the aircraft to the ground in order to perform(make) a forced landing. It is very important for the crew to assess the situation properly and make a correct decision about what to do next.
-

CONTAINED & UNCONTAINED ENGINE FAILURE

- Engine failures may be described either as "contained" or "uncontained". A contained failure is one in which components might separate inside the engine but either remain within the engine`s cases or exit the engine through the tail pipe.
- An uncontained engine event occurs when an engine failure results in fragments of rotating engine parts penetrating and exiting through the engine case. It can become a direct hazard to an aircraft and its passengers because fragments can penetrate the cabin or fuel tanks, damage flight control surfaces.

•

REASONS FOR ENGINE FAILURE

An aircraft engine may fail for many reasons: fuel problem, engine vibration, foreign object ingestion, electrical failure, loss of oil pressure or a serious mechanical failure. Many engine failures happen due human error. It may be: poor maintenance, inadequate pre-flight checking, fuel exhaustion, fuel contamination and so on. A turbine engine failure can also be caused by bird strikes or weather conditions like precipitation, volcanic ash, icing or severe turbulence.

ATC ACTIONS

Engine failures are unexpected, can cause stress and high workload in the cockpit. Pilots may need assistance from controllers: changes in flight path, level, destination, type of approach; technical support on the ground and emergency services.

The controller should be prepared (be ready) to

- clear the air space below the affected aircraft
- provide safe separation with other traffic in the sector
- inform the crew about next suitable aerodrome and provide alternate aerodrome details and weather information as soon as possible
- inform landing aerodrome of the inbound traffic with engine failure
- arrange towing equipment, technical and emergency services to be on stand-by
- in case of forced landing, request POB and if any dangerous goods on board

Engine failure can happen due to	***Engine failure may result in***	***ATC must***
• hydraulic /electrical problems • bird strike • fuel problems • low oil pressure • icing • ingestion of debris • poor maintenance	• aborted take-off • descent (due inability to maintain level or pressurization problem) • aircraft level-off during climb (to assess the situation) • control difficulties • fuel dumping • course deviation • diversion to the nearest available aerodrome or alternate • forced landing	• follow ASSIST principle • acknowledge the problem • find out pilot's intentions • limit maneuvering instructions • if needed, inform pilots about next suitable aerodrome, alternate aerodrome details and weather • inform the supervisor and all units concerned • in case of forced landing, record last known position and time