Understanding the Sights, Sounds, Feelings, Taste and Smells of Commercial Air Travel

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A Paper and Presentation
Presented to
the Faculty, Staff and Administration of
Kansas State University at Salina
College of Technology and Aviation

K-State at Salina Professional Day

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January 11, 2010

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The purpose of this paper and presentation is for fun, enjoyment and education. Also, this should prove helpful to people who deal with any level of aerophobia – the abnormal and persistent fear of flying. This activity will add greater detail to all who travel on airliners.

As the five senses of our body feed information to our mind about the activities and events that take place in commercial air travel, each person processes this information differently. For a knowledgeable or unconcerned air traveler such activities and events add little or no stress.

However, to someone who knows little about the activities and events of air travel each bump, noise, unusual smell, pressure change, light flicker, other aircraft movement seen out the window, mechanical noise, public address announcements, aircraft attitude changes, runway/taxi or gate delays, et cetera, all of this adds stress and concern.

Sometimes stress and concern becomes irrational and cause fear and panic to people in this people-filled environment not sympathetic to outbreaks of fear or panic attacks. Most people are able to control their composure, but continue to internally deal with moderate to high anxiety associated with this fear and panic of flying.

This paper and presentation will provide knowledge about general and technical aspects of flight and air travel including security, ground operations, flight operations, airline personnel training, responsibilities and more.

Sights – activities we see throughout the air transportation event:

- Watch the airline crew service and load the aircraft from the terminal windows.
- The transition from a comfortable terminal to a narrow jet way and into the aircraft, or the stairway to the ramp to the air stair and into the aircraft.
- Looking out the passenger window(s) during push back, taxi, takeoff, cruise, decent, landing, taxi, parking and exiting the aircraft.
- Seeing many other passengers and crew in close quarters during the travel experience.
- The features of the smallest bathroom (lavatory) known to people in the western world.

Sounds - activities we hear throughout the air transportation event:

- The bangs, bumps, hums, whines, jolts, rush of air, bells, tones, announcements, electrical and mechanical noises, turbine whine or propeller cycles and aerodynamic noises of moving fast through the air.

Feelings - activities we feel throughout the air transportation event:

- The bangs, bumps, vibrations, jolts, rush of air, pressure changes, humidity changes, seat back movements, elbow or leg bumps sensed while in the airline seat.

Taste - activities we taste throughout the air transportation event:

- The peanuts, cookies, snacks and drinks provided or available for purchase, or the choices a passenger may have to bring their own refreshments and drink.

Smells - activities we smell throughout the air transportation event:

- The changing of inside and outside air, the beverage and food cart, baked cookies (on a certain airline), jet fuel, turbine oil, lubrication oil, engine exhaust and fragranced bug spray between continents for control.

It is logical to walk through this process from the departure gate to the arriving gate including boarding, push back, engine start, taxi, takeoff, climb, cruise sometimes step ups, possible holding, decent, approach, landing, taxi, gate reconnect and exit.

With helpful information, an air traveler can think ahead and watch for the many activities and events to unfold during the normal air transportation process. The encouragement to all is to enjoy the wonderful benefits of time-saving travel and the comfort of air travel experiences. If a person is given this type of information of knowing and understanding how air travel works, anxiety should be minimized.

People all know that airplanes can fly, if we choose to, we see them most every day in the sky. We see them high up in the sky traveling very fast, and we can see them taking-off and landing quite slowly at or near airports.

To begin to understand how airplanes fly some basic aerodynamics to consider is the four forces of flight:

Lift – aerodynamic force caused by air flowing over a specially shaped surface called an airfoil.

Weight – a measure of the force of gravity acting upon a body.

Thrust – forward aerodynamic force produced by a propeller, fan, turbojet engine as it forces a mass of air to the rear, behind the aircraft.

Drag – aerodynamic force acting in the same plane as the relative wind striking an airfoil. There are two main types - induced and parasite drag.

A few fun aviation terms to discuss:

Air Traffic Controllers (ATC) – highly qualified people who use short, quick coded speech to coordinate the aircraft movement on ground and in the air.

Certificate – credentials with approval issued by FAA – not license.

Crew – Gate Attendant, Ramp Attendant, Mechanic, Line Attendant, Captain, First Officer, Flight Attendant.

Fix – a geographic location and assigned altitude for air navigation

Holding – waiting for further clearance while flying in an airplane

Landing Gear – the undercarriage supporting the aircraft on the ground.

Mean Sea Level (MSL) – average sea level across the world.

Nautical Miles – 6,000 feet per mile; unit used for speed aboard airliners and in shipping; nautical mile is one minute of arc of latitude; 100 knots equals 115 miles per hour.

Non-Towered Airport – use to be Uncontrolled Airport – sounds dangerous.

Terminal – departing or arriving airport area; facility with servicing gates.

Towered Airport – use to be Controlled Airport.

Statute Mile – 5,280 feet per mile

The most common method of airplane travel is aboard a jet-powered airplane. Jet engines provide more power than piston powered (reciprocating engines) and are much more reliable, as proven over many years. There are several forms of jet engines; the two most common types now are turbofan and turboprop. Both are jet engines producing thrust; one drives a fan and the other turns a propeller.

For ground operations an airplane needs wheels attached to landing gear on which to move the airplane around; this is called taxi. Generally the nose landing gear wheel is used for steering the airplane on the ground. When the airplane becomes airborne the crew will retract these wheels to reduce drag which allows the airplane to fly faster. Not every airplane can retract its wheels.

Airplanes come in various shapes and sizes; it does not matter if they have one wing or two wings, like older, early airplanes. Airplanes all use the same principles to fly. They all need airflow over their wings to generate lift.

Airliner airplanes have engines, hydraulic systems to power movable controls such as flaps, spoilers, speed brakes, ailerons, slats, stabilizers, elevators, rudders and to power the landing gear retraction and extension and wheel brakes. Pneumatic systems are used for air conditioning and electrical power systems are integrated to operate and control all systems including comfort and entertainment systems.

All of these mentioned systems create noise at some time and this noise is normal. Systems on aircraft make noises just like systems on cars, boats, in houses, and at offices and work shops. Some common examples most people are familiar with are furnace and air conditioner blower fans, garage door openers, refrigerator ice dispensers, boat motor trim, shop table saw, door bells, to name a few.

Boarding and waiting - before airplane engines are started there is normally a small jet engine running called an auxiliary power unit (APU). This APU produces an air rushing sound while generating electrical and pneumatic power as needed while the crew is preparing the airplane for departure. The air-conditioning system can make rushing air-type noises in the cabin near passenger seats. The flight crew will then check their various systems, change flow control valve settings and then divert pneumatic air pressure to start the engines.

During the engine starting process a person will hear the engines slowly wind up to an idle power setting (low, smooth rumble); they will then hear continuous, varied engine noise until they arrive at their destination gate and then the engines are shut down. The APU may be restarted prior to engine shutdown or not; this depends upon ground power hookup and/or cabin air conditioning needs during the unloading.

Taxi - as the airplane taxis out a person might hear motors running that extend the wing flaps out for take-off. It is also common for a person to hear the nose wheel steering system making a groaning sound as the hydraulics power the steering system. If the ground surface is wet it is not uncommon to hear the wheels skid on smoother areas like the paint markings on the runway; this sounds like a groaning noise too, much like the auto brake system (ABS) on a car, van or truck.

Position and Hold – occasionally ATC will issue and airplane crew this instruction. This means taxi out onto the start of the assigned runway ready for takeoff and wait till instructed to takeoff.

Take-Off - the engines will be set to a take-off thrust setting while sitting still or on the roll. This increase in power will be loud in the cabin and add to vibrations. As the airplane accelerates to takeoff speed so does the vibrations and movement. After the airplane rolls down the runway increasing airspeed and then lifts off to become airborne the crew will retract the landing gear. Hydraulic motor noises and sometimes a slight wheel out of balance adds variable changes as the gear retracts into the wheel wells. A minute or two after take-off the pilots will start to retract the flaps, again creating hydraulic and some air noise, and then climb power will be set. Engine temperature is the most limiting concern on an engine, so after take-off, power is reduced to engine temperature; full power is always available, if later needed.

Climb – the phase of flight transiting from the terminal area to the cruise altitude varied between 18,000 – 45,000 feet above mean sea level (MSL). The engines are adjusted to produce the best possible power for the given atmospheric conditions and the rate per minute of accent is 1,000 – 3,000.

Cruise - during short trips cruise attitudes seldom vary, but on long trips climbs during flight are important. At every weight there is an optimum height to fly for best efficiency; it is not practical to be constantly climbing so the optimum height is bracketed. Every two to three hours an airplane may climb to reach its optimum height. During cruise climbs a slight increase in engine noise is not uncommon and an increase in air conditioning noise and cabin air pressure is the result of these power increases.

The Airplane design is all about the best possible airspeed and efficiency in the cruise phase, and during flight this is where the airplane spends most of its flight time. To a

passenger cruise is also the best phase, knowing then travel is the fastest, food and beverage is served and little airplane movement allows for rest and sleep.

Descent - expect the engine noise to change and mostly decrease. The cabin nose will normally lower slightly; flight path changes may also happen as ATC instructions to the pilots vary to keep positive separation from other air traffic.

Holding - is the term used when a plane must wait for a turn to land or wait until the weather or other delay clears. Aircraft cannot park in the sky. They must keep flying, so they orbit at some position or fix in what is known as the holding pattern. Most commonly these patterns are based over a navigational radio beacon or on a course with a precise distance from a navaid.

Approach - engine noise continues to decrease as the power is reduced further and as the pilots prepare to land. Sometimes the engines do increase in power and noise and pitch and roll changes are required as circumstances vary in a dynamic environment of coordination airplanes in and away from airports. During approach flaps and landing gear are extended, and similar noises will be experienced like after take-off. Pilots also use speed brakes to conform with ATC instructions. Speed brakes and spoilers are strong panels located on the wings and allow the pilot to create drag or reduce lift. Speed brakes cause a slight turbulent feeling and add wind noise; this is normal.

Landing - the pilot operating the controls at the time, backed up by the other pilot, will flare the aircraft and reduce the power to idle and the cabin noise will decrease. When the wheels touch down it is normal for the pilot to select reverse thrust to aid in slowing the airplane on the runway. The engines do not reverse on direction of operation, but part of the thrust is mechanically blocked and deflected forward slowing the airplane. Sometimes the pilots increase in power and noise just before touch down; this technique is common for steep approaches and using power to increase speed and slow the sink rate before touch down.

Taxi – taxing in is the opposite of taxing out.

Gate Arrival - engines will be shutdown and the engine noise will go away; the APU may already be running again or started after engine shut down. Electrical power fluctuation causing the flickering of lights and variances of electrical noises will happen when the pilots shift the aircraft power to ground power plugged in by a line attendant at the gate.

Other many considerations - weather is a topic that nearly everyone talks about each day. Pilots would love to fly in continuous warm sunny weather. Airline Meteorologists, Dispatchers and Pilots need to know how to handle different weather situations.

Flying at night should be mentioned as well because flying at night involves flying with a reduced visibility. This really involves instrument flight.

Wind - an airplane flies on airspeed, the only difference that wind makes is to affect groundspeed.

Rain or Snow - causes visibility problems and can make runways slippery; contaminated runways cause problems for both takeoff and landing by reducing acceleration on takeoff and making stopping difficult on landing. There are limits to operate airplanes in these conditions, and there are performance penalties that must be taken into account in advance to operate safely.

On takeoff and landing it is preferable to fly into the wind because the groundspeed is less than the airspeed, and hence, the distance required on the runway is less. The only real problem that wind creates in this phase of flight is if the wind blows across the runway, that is called crosswind, and each airplane has a definite crosswind limit.

Turbulence- probably the most common question from passengers. No one likes turbulence; it is really a term given to rough air. The problem with turbulence is that we are unable to see it. Compare an ocean liner sailing on calm seas to an ocean liner sailing through stormy weather. The ship will toss and heave caused by the rough water.

The majority of turbulence below 5,000 feet above an airport is caused by surface winds blowing over obstacles like mountains, trees or buildings. Turbulent air is downstream of the object.

Storms or large clouds around an airport can also be the cause of turbulence and the greatest sources of turbulence come from large thunderstorms which can create turbulence and windshear (vertical shifts of air currents). Pilots will make judgement calls to wait for takeoff or perhaps divert and land somewhere else during bad weather conditions, in the name of safety.

Another source of turbulence can be caused by airplanes. This is called wake turbulence and is caused by a mixture of disturbed airflow from the wings and/or engines of other airplanes.

The sun heating the surface of the earth is a cause of turbulence because it creates updrafts. This mixes with upper atmosphere winds and creates turbulent air.

Delays - everyone hates delays; here are reasons of delays.

Mechanical - airplanes have built-in redundancies, but now and then something just has to be fixed. Safety comes first!

Weather - thunderstorms or snow storms make it unsafe to take-off or land.

Passengers – the fellow passengers from a delayed connecting flight.

Air Traffic Control – the people and system responsible to maintain aircraft separation; sometimes flights will have to wait to be able to fit in with the traffic flow.

Catering - incorrect number of meals has been loaded; passenger numbers change late or because an outside source for the catering had wrong data or messed up an order.

Crewing - usually caused by illness or unavailability.

Baggage/Cargo Loading - late loading can be weather related, last minute passenger joining the flight etc.

Delays happen, and know pilots and airlines want the airplane to leave on time too, but will only do so when it is correct and safe to go. A passenger should not let something small like a delay ruin an air-travel experience.

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