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Report on Recent Large Bird Ingestions  
into Transport Turbofan Engines

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## **Report on Recent Large Bird Ingestions into Transport Turbofan Engines.**

Today I am going to give you a report on recent bird ingestion events into transport category turbofan engine in commercial service. We are still having these events. We may not ever completely eliminate all such events, but our purpose for meeting is to put all our resources to work to try. The events that I am going to report on today represent some of the more significant events over the last couple of years. The events are significant because of the potential for jeopardizing the safety of the aircraft involved and the aircraft occupants.

The events I am going to discuss all involve encounters with large birds. Each situation reflects a bird control issue or event that resulted in a high workload for the flight crew because something out of the ordinary happened that they had to respond to. Some of the situations involve areas outside the US or Canada but serve as a lesson because that the same situation can happen here.

### **MONTREAL**

Montreal. November 19, 1998. It is 11:30 at night. A B747 arriving from London is making an approach into Montreal's Dorval International Airport. The aircraft has descended on its approach to an altitude of 900 ft. The pilot decides to make a go around. He applies power to all four engines and starts his climb for a go around. Everything is normal. Under control. Suddenly at 1200 ft in climb, Whap! Bang! Whap!. The flight crew hears the noise of something hitting the airplane. The parameters of the right outboard engine start to deteriorate. The cabin crew calls out that there is flame from the left inboard engine. The right engine is shut down. Whap noises are heard coming from the fuselage

Now we have a high workload situation. A flight crew, already flying for seven hours, now in the dark, have to deal with an unusual situation. True they have trained for similar situations before and know what to do. They declare an emergency, follow their checklists, and come around for another landing. On the ground fire trucks respond and are positioned in case they are needed. The aircraft lands safely. Fortunately the fire trucks are not needed.

This event like many others had a satisfactory ending. Passengers, crews, and aircraft are down safe. But for a few minutes there was a tense situation. What caused the situation to change?? BIRDS. Snow geese to be specific. This B747 encountered a flock of migrating Snow Geese during its go around climb out. Snow geese typically weigh 5 lbs. The aircraft was struck on the radome, on the main landing gear, on the wing slats, and in the right outboard engine. Pieces of the geese that impacted the aircraft were scattered and some were subsequently ingested into both the inboard engines. The left inboard engine either surged or luminated some bird remains that the cabin crew saw and kept running.

After all ground inspections, there was repair needed to the aircraft, two engines were removed, and most importantly we had a potential situation that jeopardized the aircraft. All due to Snow geese.

### **NAIROBI**

Another encounter with a large bird occurred in Nairobi, Kenya. This was not a goose but a larger vulture. A 17 lb African White Backed Vulture. An encounter with a bird this large is bound to create an unusual situation.

February 24, 1999. A cargo B747 is loaded and ready for takeoff from Nairobi's Jomo Kenyatta International Airport. The pilot advances the throttles. Rolls down the runway, past V1, past Vr, rotates and settles into normal climb.

Suddenly at 800 feet above the ground, with the aircraft at 210 knots, the first officer sees an apparition that looks like a big bird with a 6 foot wing span drop into the flight path. There is a loud bang followed by all the indications for the right outboard engine dropping to zero.

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The extent of the noise and reaction felt through the aircraft caused the pilot to believe he experienced a mid-air collision with another aircraft. The pilot had to apply full rudder trim and 1/3 turn of the control wheel to maintain level flight. The vibration was so severe that the aircraft instruments were difficult to read.

This again is a high workload situation. The pilot did not know what happened. He thought he collided with another aircraft. The crew maintained their composure, followed the checklists, dumped 90,000 lbs of fuel and returned safely to Nairobi. Once on the ground the crew could see what they faced. The engine had three fractured fan blades, the inlet cowl and exhaust tailplug were missing, and the fan thrust reverser was deployed.

In the end there was: a delayed flight, an engine severely damaged, 90,000 lbs of fuel lost, and a potentially dangerous situation because of an impact with one large bird.

As an epilogue, after several days of repair at Nairobi which included changing the engine, the aircraft encountered another ingestion into engine number 2 on its departure following the repairs.

### **SEOUL, KOREA**

The following example will illustrate the potential of a developing bird population that is not monitored temporarily.

October 30, 1997. A B747 takes off from Seoul's Kimpo airport's runway 32R. 9 seconds after liftoff at 250 feet AGL the aircraft ingests a bird in the left outboard engine causing damage to some fan blades.

November 6, 1997 at 20:16 local time, A B747 takes off from Seoul's Kimpo International airport runway 32R. At 300 feet AGL, suddenly a loud bang was heard from the right side of the aircraft and the right outboard engines' parameters went out of limits. The right outboard engine was shutdown and the aircraft returned to Seoul. I am sure that some fuel had to be dumped in order to reduce the aircraft for a return landing. The right engine had ingested a bird which resulted in the fracture of a fan blade.

November 8 1997 at 19:20 local time a B747 takes off from Seoul's Kimpo International Airport runway 32R . 12 seconds after liftoff the left outboard engine ingested a bird causing damage to some fan blades.

November 11, 1997 at 21:52 local time a B747 takes off from Seoul's Kimpo International Airport runway 32R. After liftoff at 700 ft AGL the right outboard engine surged and developed high vibration. The engine was shutdown, 128,000 lbs of fuel was dumped and the aircraft returned to Seoul.

Although none of these events appeared to involve a flock encounter or ingestion of birds into more than one engine on each aircraft, note that these four events all occurred on departure from the same runway, at night, within a span of 12 days. The bird species involved in each event was the same. Brant geese. The consistent reports over a few day span raised a concern about the local species population and the bird control practices at that airport. Although in this example a foreign airport was involved, do not let this happen to you. At the airport in this example there was adequate feeding for the birds near the airport and a temporary lull in bird control practices on the evening shift.

This local, seasonal increase in birdstrikes caused multiple engine manufacturers to draft a letter for the FAA to advise the Korean government and offer assistance with airport bird control techniques

### **KANSAS CITY**

March 15, 1999. A freight DC9 with cargo has just completed its flight from Los Angeles to Kansas City (MCI) and is making its approach for landing. It has been a normal flight and everything is typically under control. All of a sudden the view out the windshield is a complete "white out" of birds at 800 feet. The right

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engine surged and reduced power to 30% and the left engine reduced power to 40% with repetitive surges and violent vibration.

We now have a high workload situation for the pilots.

The pilot advanced both throttles. The left engine advanced but continued with repetitive surging and vibration. The right engine did not advance. The left engine throttle was pulled back some to clear the surges and left at that power. The aircraft continued on its descent path and landed with out incident.

The birds were snow geese. In this event there were bird strikes to the aircraft and the engines. The left engine received a strike on the inlet cowl lip and bird material entered the engine in sufficient mass to fracture two fan blades at the tip. The right engine ingested a whole bird. Upon landing the whole bird, though eviscerated, was still hanging from the engine inlet guide vanes. The physical damage to this engine was relatively minor.

It is interesting to note that the left engine with the fractured fan blade tips is the engine that provided the most power to continue the descent and landing. The right engine, with the bird hanging on the inlet guide vanes, had little physical damage to the fan blades yet this is the engine that could not produce power. In this event bird material plugged some of the sense lines that provide signal to the fuel control. That plus the blockage of the bird carcass is what caused the loss of power not physical damage.

### **BIRD EVENT REPORTING**

You have heard from other speakers about the need for accurate bird strike reporting. Part of that discussion has involved frustration at differences and lack of consistencies regarding reporting standard. How trends made from the data can lead to surprising results until it become known of the influences that bias the data. Examples have included lack of bird encounters between midnight and 3:00am actually being due to no aircraft flying then not due to lack of birds. Or regions showing decreasing birdstrikes which turn out to be that the region actively decided not to tell us any more.

I would like to add an additional comment in that regard. Birdstrikes into engines are actually a rather rare event statistically. By rare I mean that in order to make any meaningful assessment from the data it takes years of collection. AT this meeting there has been attention given to the ingestion of geese and their rising rate. It is quite critical, for those of you involved in reporting birdstrikes to PLEASE take the time to collect some bird remains so that the birds can be properly identified. To call a strike a goose strike because "geese have been seen in the area" or because a dead goose is found on the side of the runway does not provide accurate data. I have had many strikes where it was initially reported that the strike was a goose or some other large bird and when I received feathers and had them analysed the bird turned out not to be what it was originally thought to be. Usually smaller.

So consider it a plea. Please take the few minutes to gather some remains. Remains mean feathers or scrapings of dried goo from anywhere. Please avoid the temptation to send wet meat. If the remains are from a Pratt & Whitney engine send them to our nearest Pratt & Whitney rep or to me directly at: Pratt & Whitney, 400 Main Street, East Hartford, Ct. 06108, Attn Dick Parker M/S 162-24. If they are from a GE engine send them to Tom Alge at GE Aircraft Engines, Attn: Tom Alge MD J60,1 Neumann Way, Cincinnati, Oh, 45215.

To illustrate my point let me just share with you a few anecdotes regarding some reports involving bird identification.

Feb 8, 1999. A B737 on approach to Lubbock Texas. "both engines .... Ingested birds (geese) during approach to Lubbock Texas. Birds turned out to be Herring Gulls.

Jan 2, 1995. " Multi birdstrike on approach. Hit at least two birds. Right engine with high vibration. Engine shutdown on landing roll. Pilot reported birds were probably snow geese since they have been seen in the area and white feathers were found in the engine. Bird turned out to be a Mallard Duck.

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Jan 8, 1998 " a B727 departed Houston and struck a flock of geese at 3000 ft on climbout. The left engine was destroyed, the right engine was severely damaged, the radome was torn off and the right wing was damaged. Operator reported birds were believed to be Canada geese.

This was a strike to the radome. Pieces of radome and bird went into the left engine. The right engine received minor damage and was not a powerloss. The bird was identified as a Snow Goose.

It is my hope that working together we can reduce wildlife encounters with birds. As a final thought. The group might want to consider a measure of our effectiveness. Have we reduced bird encounters??? Has the information shared within this group improved any airports bird control?? How do we know???

Thank you for your attention

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