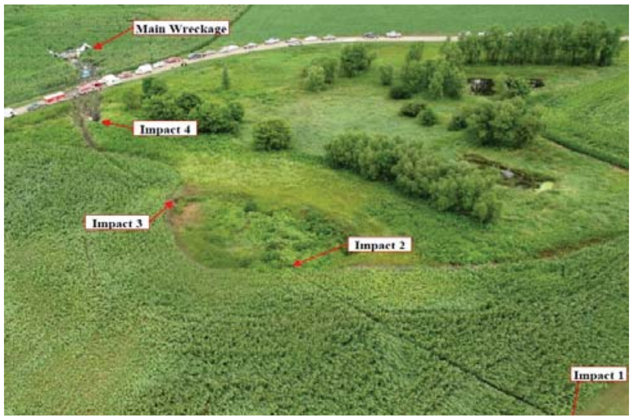
By Michael R. Grüninger
and Capt. Carl C. Norgren
of Great Circle Services AG (GCS)

COMMITTED TO LAND – WHATEVER THE COST?



ACCIDENT N818MV crashed when the right wing touched a localizer antenna pole during an attempted go-around.

The morning of July 31st, 2008 had started with thunderstorms over Minnesota. A Hawker Beechcraft Corporation, N818MV, operated by East Coast Jets as flight 81 had departed from Atlantic City International Airport earlier that morning with six passengers who needed to reach Owatonna Degner Regional Airport (KOWA). It was the second leg of a planned series of 5 legs for the day. East Coast Jets operated under the provisions of Code 14 of Federal Regulations Part 135, approving non-scheduled, domestic passenger flights.

Stormy weather with rain and turbulence were present along the route. Approaching the destination, the crew flew the ILS30 KOWA, pretty much into the prevailing winds with a visibility of more than 10 miles, thunderstorms, clouds scattered at 3,700 feet and overcast at 5,000 feet, and lightning in the distance in all quadrants. Once the crew identified the runway, they cancelled the IFR flight plan. The landing was uneventful, and within the touch-down zone. However, the breaking action was not sufficient and the captain decided to abort the landing and go-around. He applied full thrust and accelerated, but could not get airborne before the end of the runway. The right wing touched the localizer antenna pole and the Hawker cart wheeled, then bounced a few times and slid along the ground for several hundred meters, breaking up completely and killing all crew and passengers.

How could a successful approach end in such a disaster?

The NTSB concluded that the probable cause of the accident was "the captain's decision to attempt a go-around late in the landing roll with insufficient runway remaining."

The accident crew did not deploy the lift-dump system fully after touchdown. Only after the co-pilot prompted the commander did he select the air brake from 'OPEN' to 'DUMP'. 17 seconds after touch-down the Captain initiated a go-around, but too late into the landing roll and without following the standard procedure for go-arounds, which would have required a retraction of flaps to position 1 instead of the selected full-up position.

In addition, the wind direction had changed in the vicinity of the storm while the crew was on short final. In fact, the crew probably landed the aircraft with a tailwind component without being aware of it.

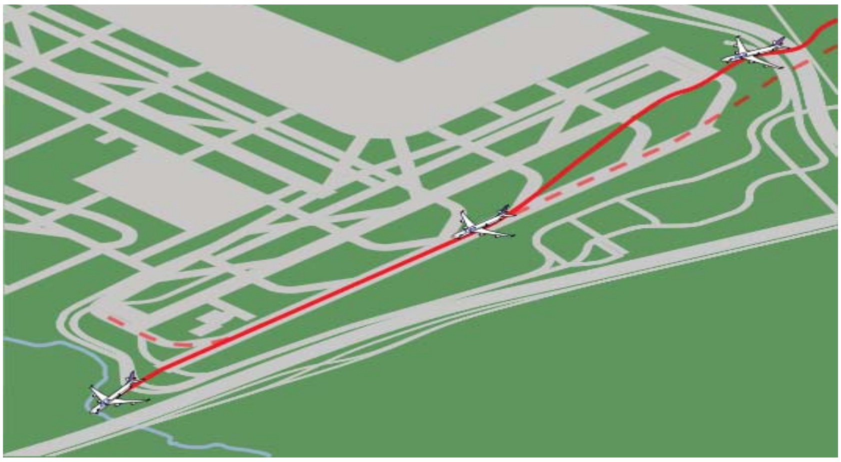
AF 358, Toronto

An Air France Airbus 340 landed on August 2, 2005 at Toronto Pearson International Airport in severe convective weather. The crew had not calculated the landing distance required. Had the crew done so, it would have seen that the margin was negative due to the convective weather. Furthermore only the shortest runway 24L was available at that moment for landing.

The flight was uneventful until the landing. However, weather forecasts had indicated the presence of severe thunderstorms over Toronto. Air France did not require pilots to calculate the landing distance, nor did Air France provide the pilot with such figures. Shortly before and shortly after AF 358 other aircraft had attempted or were attempting to land at Pearson International. The accident crew missread the threatening situation and also attempted to land.

After landing, the pilot flying (PF) struggled with settling the aircraft down and landed high and fast. Under the storm, the headwind had become a tailwind, changing both flight path and ground speed. Reverse power was set only 12 seconds down the runway. The pilot monitoring (PM) probably failed to use standard call-outs. The PF was holding his hand tightly on the throttles to counteract lateral forces exercised by the storm. The accident crew did not call for a go-around.

The aircraft overrun the runway and slid down a ravine at the end of the runway. Passengers and crew succeeded in escaping from the burning aircraft.



OVERRUN
AF 358 crashed when it overran the runway and slid down a ravine.

Approach and Landing Accidents

Approach and landing accidents are not rare. Failure to act or inappropriate action caused three quarters of the 76 approach-and-landing accidents and serious incidents worldwide between 1984 and 1997. The two cases described above, well beyond the period of collection of these statistics, provide additional examples of approach and landing occurrences associated with omission of action or inappropriate action.

While being two very different cases, East Coast Jets Flight 81 and AF358 have a few things in common:

❍ An approach under or in the vicinity of severe convective weather.

❍ The decision to land without a clear knowledge of the actual landing distance required and available.

❍ The failure to properly apply standard operating procedures after landing to decelerate the aircraft or to perform a go-around.

❍ The misperception by crew of the existing threat combined with a determination to land against.

❍ A lack of awareness that the wind had turned during final approach resulting in a tailwind at the time of landing.

Gambling the Landing

What can we learn from these accidents? It simply means that the decision to land is often not taken out of a position of consolidated knowledge of the physics and realistic awareness of the threat situation. Pilots tend to base their decision to land on idealized mental models, and not by quantifying the distances based on actual real-time data. Landing thus becomes a gambling exercise, maybe with the go-around option held as an escape from an unsuccessful landing attempt.

The aircraft flight manual (AFM) provides pilots with empirical data collected during the type certification process in the form of performance tables. Pilots can use these tables provided and integrate the data contained with real-time environmental and infrastructural factors affecting landing distance. Such factors include airport elevation, runway slope, runway conditions, wind conditions, type of braking, airspeed over runway threshold and height over threshold, use of braking devices (including thrust reversers, autobrakes etc.), and finally Minimum Equipment List (MEL) conditions.

Successful landings depend on successful energy management. Low and slow or high and fast approaches determine the potential disastrous outcome of a landing.

Landing Scientifically

One of the lessons learnt from the East Coast Jets Flight 81 tragedy is that a scientific approach to landings would have identified a committed-to-stop point on the runway, after which no go-around should be attempted. Had the crew known that a go around was no longer feasible, deceleration would have continued to a complete stop. While an exact calculation of such a committed-to-stop point is mathematically complex, such a point can also be defined by making reference to operational actions. An easy to determine committed-to-stop point is the moment when the lift dump has been deployed or reverse thrust has been engaged.

As flying is always and intrinsically a high speed experiment in the atmosphere, a positive outcome requires a scientific approach to it. Flying by the numbers includes thorough flight planning by using all available data and careful in-flight re-planning again using all available real-time data. And since errors in such calculations are inevitable due to the often weak data basis and computation errors, a safety margin should be added to the calculated actual landing distance resulting in a “factored” required landing distance.

Michael R. Grüninger is Managing Director and Carl C. Norgren is Head of Business Development of Great Circle Services (GCS) Safety Solutions. GCS assists in the whole range of planning and management issues, offering customized solutions to strengthen the position of a business in the aviation market. Its services include training and auditing (IS-BAO, IOSA), consultancy, manual development