Ice landing: Still capable after 30 years

Apr. 12, 2013

by Captain Josée Bilodeau and Captain Steve Dieter

For the members of 436 Transport Squadron, located at 8 Wing Trenton, Ont., landing a CC-130J Hercules is part of the daily routine. However, no one had landed a Herc on an ice runway in 30 years.

A Hercules aircraft lands on the ice runway on Feb. 28, 2013, during Exercise Guerrier nordique. Credit: Cpl Alex Roy.

Worth the wait

Gathered on the shores of Squaw Lake, Que., a group of curious onlookers waits impatiently for the CC-130J Hercules aircraft from 436 Squadron to arrive. The crowd is buzzing.

“Is the plane going to land?” Innu children ask their parents.

“Will it be cancelled because of the temperature?” wonder some of the reporters who are on the scene.

It’s February 28, 2013, and the RCAF and the Canadian Army are doing something that hasn’t been done in Canada for 30 years: a Hercules will attempt to land on a runway that has been constructed entirely from ice.

Despite the big snowflakes drifting to the ground, sappers from 5 Combat Engineering Regiment (5 CER), located at Canadian Forces Base Valcartier, Que., and firefighters from 3 Wing Bagotville, Que., are confident that the Hercules will land … and take off again.

At 2:40 p.m., the four turboprops of the massive military transport plane reverberate in the distance. A sudden hush falls over the crowd, as if everyone were holding their breath. A few moments later, the group finally catches sight of the Hercules.

“It’s far too high,” noted one of the spectators.

“The aircraft passed over our heads,” said Lieutenant-Colonel Louis Lapointe, commander of the Immediate Response Unit (IRU) from 5 Canadian Mechanized Brigade Group (5 CMBG), Valcartier.

“It did a site reconnaissance and then vanished. [We] could feel the disappointment of those who had come here hoping to witness an event that, to say the least, doesn’t happen often on Côte-Nord.”

Then, as if by magic, the aircraft reappears. The faces of the children, who are trembling with excitement, suddenly light up.

Lights on, wings in landing position, the CC-130J Hercules slowly approaches the runway and, this time, the 60 tonne mammoth touches down on the ice runway built on Squaw Lake by Canadian combat engineers.

The crowd applauds!

Major logistical operation

The successful landing took place during the Canadian Army’s *Exercise Guerrier nordique*, held from February 19 to March 9, 2013, near Schefferville and Sept-Îles, Que.

“This type of training is essential,” said Captain Jean-Gabriel Fortin, a combat engineer who was in charge of onsite tasks. “It helps develop certain regimental skills that have been lost over time but are needed to carry out northern operations. Should we ever have to resupply our troops in northern Quebec or northern people in need, we have the capability.”

The last time a Hercules landed on an ice runway was in the High Arctic, north of Canadian Forces Station Alert, on March 24, 1983. The runway was built so the Air Force could support the Canadian Expedition to Study the Alpha Ridge (CESAR). [See the sidebar for more information.]

Captain Ian Wright and Flight Lieutenant James Tabern, a British officer working on exchange with the RCAF, were in the cockpit for the historic 2013 landing.

“The uniform, overcast sky — combined with a snow-covered lake and the recently graded ice strip — created a monochromatic picture,” explained Capt Wright. “This made the standard landing zone markings even more important, as they provided us with situational awareness of the landing touchdown zone and runway remaining.

“We could have landed far heavier with the 6,000-plus feet [1,829 metres] of runway that had been prepared, but the 112,000 pounds [50.8 tonnes] that we actually had made for a great compromise, given that this was the first ice landing in over 30 years.”

“Landing a tactical transport plane on an ice landing strip is a major logistical operation,” said Major Sébastien Picard, deputy director of the exercise. “It involves a number of steps that calls for rigorous planning and a lot of preparation. A range of factors is also taken into account, such as the size of the site, the wind direction and the water currents [in the lake].”

Initial site preparations

Like Operation CESAR, the successful build and landing was a team effort.

In December 2012, teams of specialists deployed approximately eight kilometres northwest of the airport in Schefferville, Que. Their first objective? To identify the ideal site for conducting air resupply operations and develop the operational concept of Exercise *Guerrier nordique* 2013.

Combat engineers and geomatics technicians from Valcartier carried out an environmental study onsite, along with members of 1 Engineering Support Unit, based in Moncton, N.B. The team then surveyed the site and marked the runway.

“Once all the specific conditions had been met, we were probably the only fools in Quebec who prayed for the mercury to drop below zero until our exercise ended in March,” said Major Jean François Huot, commander of 5 CER.

Climate determines the solidness and thickness of ice, making it a critical factor when building an ice runway. If Mother Nature fails to cooperate, landing such a huge aircraft can get dicey.

“The stable surface of an ice runway is similar to concrete,” said Capt Wright. “Up until you land, everything’s fine; there’s really no problem. But, any similarities to a ‘classical’ landing end there.

“After the [transition from the descent to the landing, when the tires hit the runway surface], which must be precise and is tricky, you have to use the available length of the runway to gradually transfer the weight of the aircraft, supported in flight by the wings, onto the landing gear. A miscalculation at [this point] can lead to major problems.”

All in a day’s work

As of mid-January, the personnel endured two major snowfalls. Temperatures plunged as low as 40ºCelsius, and winds of 60 kilometres per hour pummelled approximately 40 engineers from 5 CER as they cleared, built and maintained an ice landing strip, with extremely cold water, in six-hour shifts.

“It took us two weeks to clear the site with heavy equipment and over three weeks to water the runway with pumps,” said Corporal Brian Buteau, a reservist from 35 CER in Québec, Que. In the end, the ice airstrip measured approximately 1,524 metres long, 49 metres wide and 106 centimetres thick.

The final step involved obtaining certification from the experts. Lance Gélinas from A4 CE (the construction engineering organization at 1 Canadian Air Division in Winnipeg, Man.) ensured that the project met all the safety and feasibility criteria. Using special equipment, including ground-penetrating radar (GPR), he conducted adhesion tests on the ice landing strip, ensured it had the required thickness and checked for anomalies such as air or water pockets. Once it was certified, the only remaining task was to mark the runway for “D-Day”.

“On behalf of the crew ... who were lucky enough to be chosen for this historic landing, I’d like to thank those who made it happen,” said Capt Wright, “specifically A4 CE, 5 CER, the heavy equipment operators from Schefferville, the firefighters and [landing zone] controllers and all the engineers who worked for months on this project.”

Sidebar

What was CESAR?

Operation CESAR was the Canadian Forces project to construct an ice runway on the frozen surface of the Arctic Ocean, about 475 kilometres from the North Pole in 1983.

It was built to support the Canadian Expedition to Study the Alpha Ridge (CESAR), which was a Department of Energy, Mines and Resources expedition.

During CESAR, 40 scientists carried out a geological survey of the Alpha Ridge, a 1,300-kilometre underwater mountain range running from Ellesmere Island to the Siberian Continental Shelf that was discovered in 1963. According to the Canadian Encyclopedia, it is “among the most important scientific expeditions ever mounted in Canada”.

Before CESAR could begin, the expedition needed a runway to allow the scientists, along with their equipment, to fly in and out of their remote research station by Hercules.

The first personnel, including the drop zone controller, medical personnel, vehicle technicians and a para-rigger, arrived by CC-138 Twin Otter aircraft on March 13 to begin the process. A few days later, several Hercules airdropped 60,000 kilograms of materiel (including heavy equipment such as a grader and bulldozer, other equipment, supplies and rations) and 17 paratroopers onto the ice.

Over the course of several days, engineers levelled the ice with explosives and flooded the site with sea water in a process similar to constructing an outdoor skating rink. They then roughed up the surface to provide a braking surface for the aircraft.

Airfield CESAR officially opened at 9:26 a.m. on March 24, 1983, when a Hercules from 435 Squadron touched down. It was the culmination of a mammoth effort to plan and carry out the northern-most airfield construction in Canadian Forces history.

The engineering crew spent 17 days at the ice station, building the airstrip and an extension. By the time they left at the end of March, 31 Hercules from both 435 Transport Squadron (located at Edmonton, Alta.) and 436 Transport Squadron (located at Trenton, Ont.) had landed on the 1.6-kilometre ice-paved runway.

The Air Force flew in all the required materiel — including kitchen structures, dormitory tents, prefabricated plywood buildings, equipment, food and more — to build and maintain the scientists' camp, as well as government scientists, and university geologists and oceanographers from Canada, the United States and Norway.

The scientific expedition lasted until May 1983. The ice runway was still in good shape when the scientists broke camp.

This article is drawn from material by Captain Marsha Dorge, originally published in Airforce Magazine in1984 and by Major Dave Noble, originally published in Sentinel Magazine in 1983.

The RCAF provided airlift for Exercise Guerrier nordique. Troops from 1 Battalion, Royal 22e Régiment, board a CC-130 Hercules to travel to Schefferville, Que., on Feb. 22.

MWO Chris Robin, sergeant major of C Company, 1 Battalion, Royal 22e Régiment, guides the crew of a CH-146 Griffon helicopter in for a landing. The RCAF helicopter flew regular supply runs for troops deployed on Exercise Guerrier nordique.

Members of 5 CER spray water to create a layer of ice on the ice runway.

Members of 5 CER smooth out the layers of water on the ice runway.

CH-146 Griffon helicopters from 430 Tactical Helicopter Squadron located at CFB Valcartier, Que., also participated in Exercise Guerrier nordique.

The ice runway, seen from the air.

Members of 5 CER pump water onto the surface of the lake to create a runway strong enough to support a CC-130 Hercules.