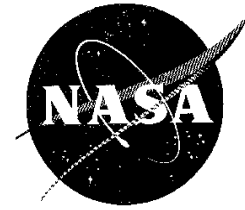


FactSheet



National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23681-2199

FS-1999-07-45-LaRC

Research Aims To Prevent Accidents On Hazardous Runways



NASA B757 makes a test run on a snowy runway in Michigan.

Runway water, ice or snow was a factor in more than 100 airplane accidents between 1958 and 1993. Most of those accidents involved fatalities. NASA supports a national goal to reduce the fatal aircraft accident rate by 80 percent in 10 years and by 90 percent in 25 years.

To help accomplish this ambitious agenda, NASA Langley Research Center has partnered with Transport Canada and the Federal Aviation Administration (FAA) in an on-going, 5-year winter runway friction measurement program.

The research effort uses instrumented aircraft, friction-measuring ground vehicles and test personnel from around the world.

Results will benefit aircraft, airports

The major objectives of the Joint Winter Runway Friction Program include:

- Coordinating different ground vehicle friction measurements to develop a consistent friction scale for similar potentially hazardous runway conditions.

- Establishing reliable correlation between ground vehicle friction measurements and aircraft braking performance.

Accomplishing these objectives would not only give airport operators a better way to evaluate runway friction and maintain acceptable operating conditions, but would also contribute to reducing traction-related aircraft accidents.

Testing began in 1996

Since testing started in January 1996, 5 instrumented aircraft and 13 ground test vehicles have been evaluated at sites in Canada, the United States, and Norway. The test aircraft have included the Canadian National Research Council's Falcon 20, the FAA's B727, a deHavilland Dash 8, and NASA's B737 and B757. The friction-measuring ground devices have come from a number of international partners. Transport Canada's surface friction tester and electronic recording decelerometer, the Scottish GripTester, the French IMAG, and Norway's RUNAR, ROAR and airport surface friction tester have all contributed data. So have the FAA's runway friction tester and BV-11 trailer, the American Society for Testing and Materials (ASTM) E-274 skid trailer, and NASA's instrumented tire-test vehicle and diagonal-braked vehicle.

Data collected from 1996—1999 includes nearly 400 instrumented aircraft test runs and more than 8000 ground vehicle runs. Tests were performed on a variety of runway conditions:

- Bare and dry
- Rain and artificially wet
- Artificially flooded
- Loose and compacted snow
- Smooth and rough ice
- Sanded and chemically treated ice
- Slush

Researchers also took manual measurements to monitor conditions before and after a test run series. They recorded ambient temperature; temperatures of pavement surface and snow, slush, or ice; depth of cover material (water, snow, slush, ice); and in the case of snow or slush, density of cover material.

From this substantial friction database, engineers have developed an international runway friction index (IRFI) to standardize



Researchers take measurements before aircraft and ground vehicles conduct their runway tests.

friction reporting from different devices and to minimize pilot difficulties in making critical takeoff and landing decisions. An IRFI methodology standard that defines procedure and accuracy requirements is under review for approval by an ASTM committee.

More tests planned

Future test plans include:

- Standard-equipped wide-body aircraft tests at a European airport facility.
- Falcon 20, Dash 8, and B757 aircraft tests at North Bay, Ontario, and Sawyer Airport, Gwinn, Michigan.
- Ground vehicle tests during annual NASA Wallops Flight Facility workshop in Virginia and at a special test track in Oslo, Norway.

The overall results from this program will increase aircraft safety and the capacity of airports where winter conditions are severe. Some of the results and test procedures may also apply to highway safety.

For more information, visit our Web site:

<http://sdb-www.larc.nasa.gov/SDB/Research/data/RunwayFriction.html>