

GAS TURBINE RESEARCH

Environmental and Icing Simulation

The Gas Turbine Laboratory (GTL) of the NRC Institute for Aerospace Research (NRC Aerospace) is a pioneer in the development of icing simulation technology aimed at engines and wings, as well as ice detection equipment and atmospheric measurement of icing conditions. Its propulsion team has performed icing simulation testing on gas turbine engines since 1947 and worked closely with most of the major gas turbine manufacturers to certify small engines, namely turboprop, turbo-shaft and turbofan engines.

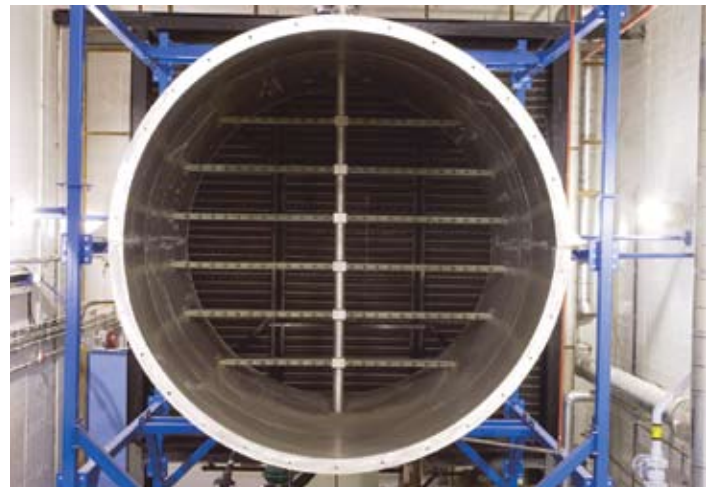
Icing simulation testing is currently performed in two test cells that can deliver a liquid water content (LWC) of up to 4.0 grams/cubic metre over a 15 to 45 micron range of median volumetric diameters (MVD). The smaller test cell can handle engines with up to 45 kN of thrust (140 kg/s of engine airflow), while the larger test cell can handle engines with up to 120 kN of thrust (360 kg/s of engine airflow). As the facility relies on ambient air temperatures to produce the desired conditions, the operational window for the icing testing is December through March.

Current research and development efforts are directed toward increasing the diameter range of water droplets to meet the regulatory needs for supercooled large droplets (SLD) and developing the requirements for ice crystal and mixed phase icing.

Our expertise in analysis and test extends to the operation of propulsion systems in adverse environments, such as bird ingestion and hail storm simulation.



The GTL management system has been registered to ISO 9001:2000



Test cell #4 spray mast with 128 nozzles

Project areas

NRC Aerospace clients benefit from:

- the availability of specialized icing test facilities for extended periods
- contributions of specialists in research, instrumentation and operations during planning, execution and analysis phases of a project
- availability of laser measurement technologies for MVD measurements
- techniques for snow and ice crystal ingestion, and
- calibrations traceable to national standards.

Proven capabilities

NRC Aerospace expertise has attracted clients from most of the engine manufacturers. Some of the more recent projects have included:

...cont'd

- icing certification of
 - a helicopter/engine installation
 - a turbofan engine for a business jet application, and
 - a nacelle for a very light jet application
- a hail storm test for a turbofan engine for a business jet application
- a bird ingestion certification test of a turboshaft engine for a helicopter.

Facilities

- A calibrated gas turbine test cell referenced to internationally accepted standards (up to 360 kg/s air flow and 260 kN thrust)
- Turboshaft test cells (up to 7 MW)
- Two seasonally-operated engine/inlet facilities capable of performing icing and snow ingestion tests (up to 360 kg/s air flow and 260 kN thrust)
- A hail storm simulation rig
- Two air cannons for bird and hail stone ingestion testing
- A large aviation fuel handling facility (400,000 litres available at a flow rate up to 8 kg/s).

CONTACT:

Mr. James MacLeod (Jim), Gas Turbine Laboratory
Tel: (613) 993-2214 Fax: (613) 957-3281
E mail: jim.macleod@nrc.gc.ca

Mr. Martin Trerice, Gas Turbine Laboratory
Tel: (613) 993-0142 Fax: (613) 990-7444
E mail: martin.trerice@nrc.gc.ca

Mr. Jeff Mackwood, Marketing and Contracts Office
NRC Institute for Aerospace Research
Ottawa, Ontario, Canada K1A 0R6
Tel: (613) 990-0765 Fax: (613) 952-7214
E-mail: jeff.mackwood@nrc.ca

Or visit our Web site at: www.nrcaerospace.com

January 2006
Aussi offert en français
IAR-GT04e