



Identification of the installation/facility:

Country: France
Location (city): Saclay
Name of the facility: S1
Date of construction: 1970
Owner: DGA Aero-engine Testing
Contact point: Franky Le Mézo
Internet site: <http://www.defense.gouv.fr/dga/la-dga2/expertise-et-essais/dga-essais-propulseurs>

Technical characteristics:

1 - Type of infrastructure

Wind tunnel	<input type="checkbox"/>
Propulsion bench	<input checked="" type="checkbox"/>
Structures facility	<input type="checkbox"/>
Material facility	<input type="checkbox"/>
Simulator (ex. Flight simulator, tower, ...)	<input type="checkbox"/>
Flight test bed (aircraft, embedded facilities, ...)	<input type="checkbox"/>
Supercomputers	<input type="checkbox"/>
Other	<input type="checkbox"/>

2 - Main technical characteristics

Dimensions:

- Overall length: 9,6 m
- Internal diameter: 3,5 m

Operating range:

- Standard air flow at the inlet: 100kg/s
- Minimum air speed: 10m/s
- Maximum flight air speed: Mach0.8 in icing conditions, Mach2 in supersonic mode
- Minimum static pressure in the test cell: 5kPa
- Temperature in the test cell: from -60°C to +110°C

Icing tests are carried out in free jet mode. To perform them, several nozzle diameters are available in order to comply with the specified air speed: from 0.7 to 0.3 m. This diameter is function of the specimen size (blade chord, engines sizes). Others nozzles diameters can be also manufactured.

3 - Research domains which can be addressed (refer to ACARE taxonomy)

Propulsion - Performance
Propulsion - Combustion
Propulsion - Air-breathing propulsion
Propulsion - Engine controls
Integrated Design & Validation (methods & tools) - Flight/Ground Tests



4 - Main (or specific) associated measurement techniques

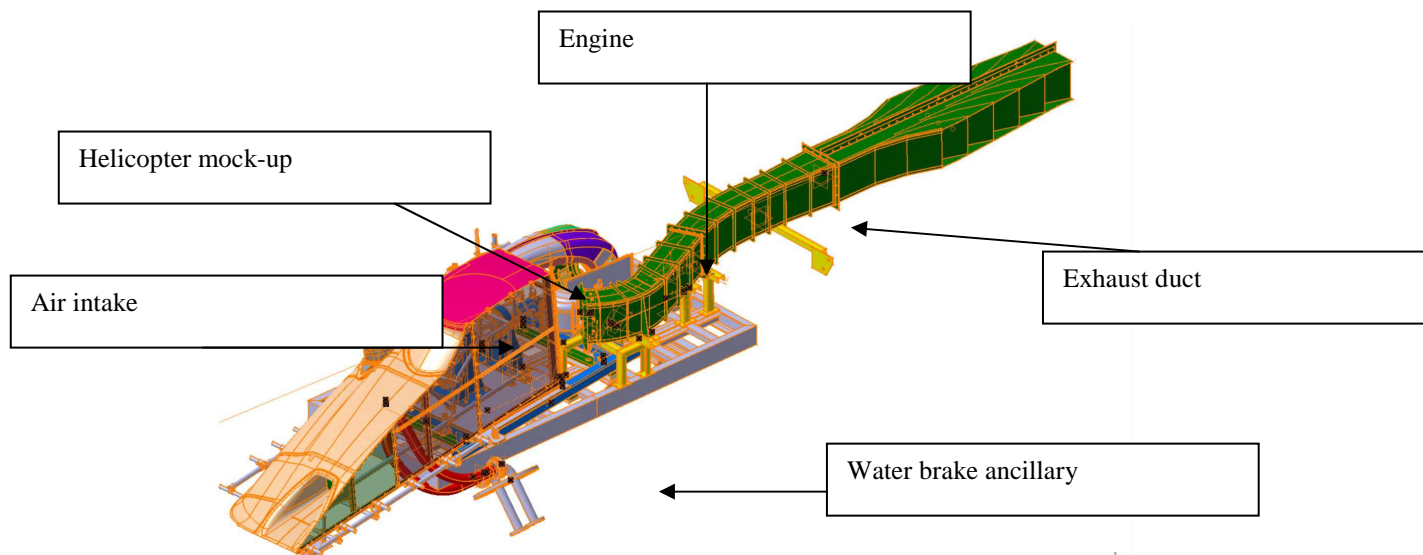
- Pneumatic pressures: 68 measurements by single channels (individual sensors), 148 measurements by multiplexed channels (ZOC electronic pressure sub-switches), extendible to 256 channels.
- Hydraulic pressures: 24 lines.
- Temperatures: 60 measurements by platinum probes, 1 warm junction box with 48 thermocouple channels, extendible to 3 warm junction boxes.
- Vibration 3 vibration racks.
- Humidity: 1 dew-point hygrometer, 1 mirror hygrometer.
- Electric: 48 electric lines available (application example: measurement of airfoil deicer power).
- Video: possibility of 6 videos (2 of them turret-mounted), recording on mini DV, saved on DVD.
- Photo: 4 cameras.
- Aerodynamic measurements by a stand designed with an automatic variation of the specimen angle of attack during the test.
- Droplets size distribution.
- IR thermography measurement on request.
- Icing shapes measurements: by camera (manual or automatic photography) or with a measurement grid, fitting the profile under testing (i.e. Rotor blade).

5 - Operational status

- Fully operational in 2013

6 - Picture

Figure 1: Scale 1 helicopter mock-up with turbo engine set up for icing certification testing





Financial elements:

Replacement cost (M€uros)*

- | | |
|---------------|-------------------------------------|
| Less than 10 | <input type="checkbox"/> |
| 10 to 30 | <input type="checkbox"/> |
| 30 to 60 | <input type="checkbox"/> |
| 60 to 100 | <input type="checkbox"/> |
| More than 100 | <input checked="" type="checkbox"/> |

*: air supply and exhaust facilities, shared with other test facilities, excluded
(replacement cost: 500 Meuros)

Practices concerning:

Access policy: contract

Comments:

Turbojet, turboshaft and turbo-propeller engines (with brake), in free jet or connected mode including icing flight conditions, with or without air intakes.

Origin of information: Franky Le Mézo – Avril 2013