



BD2

Identification of the installation/facility :

Country: France

City: Modane

Name of the facility: BD2

Date of construction or of acquisition or of main refurbishment ~1970

Owner Onera/French MOD

Contact point : jean-pierre.foucault@onera.fr / stephen.wolf@onera.fr

Internet site <http://windtunnel.onera.fr>

Technical characteristics:

1 - Type of infrastructure : Nozzle thrust test bench

2 - Main technical characteristics Direct-jet and reverse-jet engine nozzle and after-body performance characteristics Thrust measurement, mass flow rate, pressure and distributions on single-flow and bypass-flow models of various scales

➤ Forces range:

- dynamometer thrust capacity: 9,000 N,
- lateral component of the thrust capacity: 1,200 N.

➤ Flows range:

- primary flow range, 16 kg/s maximum mass flow rate in cold condition, maximal temperature 1,150 K allowed by the stand structure (see the mass flow vs pressure diagram);
- secondary flow range, 16 kg/s maximum mass flow rate in cold condition, and 1.5 kg/s maximum at 450 K.

3 - Research domains which can be addressed (refer to ACARE taxonomy <http://www.acare4europe.com/docs/ASD-Annex-final-211004-out-asd.pdf>): aircraft design, aircraft optimization, aerodynamic research

4 - Main (or specific) associated measurement techniques :

- Steady measurements
- Unsteady measurements
- Steady pressures
- Primary flow measurement: hot or cold mass flow rate by sonic throat mass flow meters, when hot flow, kerosene mass flow is measured by piston mass flow meter.
- Secondary flow measurement: hot or cold mass flow rate by sonic throat mass flow meters upstream of the heater.
- Laser velocimetry, IR signature and visualizations.

Accuracy: thrust: $\leq \pm 0.15$ % of the calibration range,
lateral thrust component: $< \pm 4$ %,
mass flow: $\leq \pm 0.1$ %;

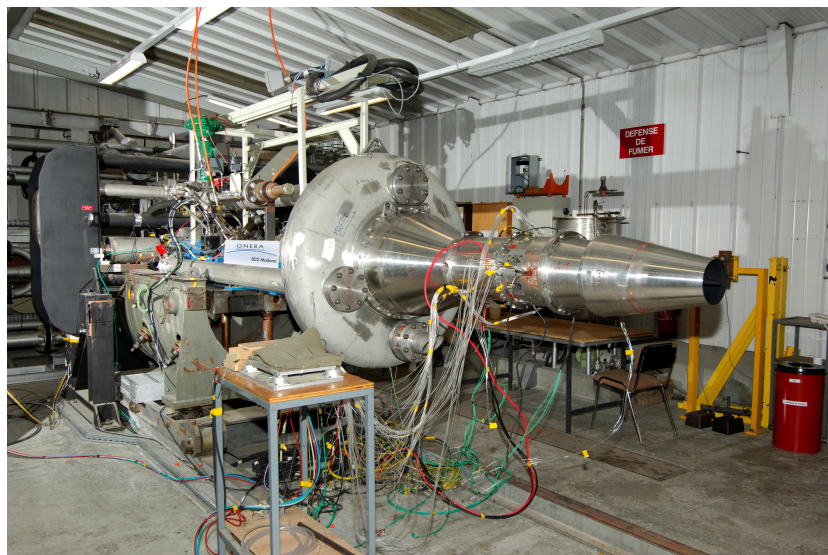
5 - Operational status - Fully operational.



Financial elements:

Replacement cost (MEuros): 20-30

Picture:



Practices concerning:

Access policy (contract, voucher, free access for research, etc...) : contractual relationships with customers based on a quotation of a test matrix

Support (regional, national, European, private, ...) : self-sustaining facility for operation purposes. Investments and upgrades partially funded by national and local supports.

Origin of information : Patrick Wagner, Director Wind Tunnel Division at ONERA – March 2011