Identification of the installation/facility:

Country: France
Location (city): Saclay
Name of the facility: M1
Date of construction: 1991 (upgraded in 1995 with a mobile soaking system)
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	☐
Propulsion bench	☒
Structures facility	☐
Material facility	☐
Simulator (ex. Flight simulator, tower …)	☐
Flight test bed (aircraft, embedded facilities …)	☐
Supercomputers	☐
Other	☐

2 - Main technical characteristics

Dimensions:
- Test cell inside diameter: 4.6 m
- Test cell overall length: 10.5 m

Two Power Absorption Systems can be used depending on the rotating speed of the output shaft of the tested engine, and its power:
- «Low speed» PAS: Maximum speed 8 000 rpm, Maximum power 1 000 kW
- «High speed» PAS: Maximum speed 24 000 rpm, Maximum power 2 200 kW

Supply of fuel of all types with the following characteristics:
- Pressure conditioning: 15 to 500 kPa abs
- Temperature conditioning: - 55 °C to + 80°C
- Maximum delivery rate: 2 000 l/h

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: 180 possible measurements by single sensors.
- Hydraulic pressures 48 measurements distributed within the chamber and grouped together on an external distributor.
- Temperatures: 480 measurements by thermocouples (24 Cu/Cn, 456 Cr/Al), 60 measurements by probes, 10 BST (Warm Junction Box).
- Period meters: 16 TF10 pulse measurements.
- Electrical measurements: 40 possible channels.
- Dynamic: 10 measurements installed and processed (possibility of increasing to 80). These measurements can be recorded on magnetic or analogic devices.
- Remote monitoring: 5 colour cameras inside the chamber, 2 of which are inside the isothermal enclosure of the SAP (Power Absorption System).

5 - Operational status
Fully operational in 2013

6 - Picture

Figure 1: The mobile soaking system at the entrance of the test cell

Financial elements:

Replacement cost (M€uros)*	
Less than 10	☐
10 to 30	☐
30 to 60	☐
60 to 100	☐
More than 100	☒

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

Practices concerning:

Access policy: contract

Comments:

Testing in free jet or connected mode at low speed on:

- turboshafts, whatever the position of the output shaft (front or rear), of the air intake (axial or lateral), or of the exhaust (axial or lateral),
- all types of starters and auxiliary power units,
- turboprops
- piston engines.

The test capabilities are:
- air bleed measurement, flow rate by diaphragm,
- power bleed,
- fuel conditioning (hot or cold),
- soaking (hot or cold),
- steady and transient tests,
- sea level and altitude testing.

Origin of information: Franky Le Mézo – Avril 2013