Virtual technical Visits AERO2020+1 - Wednesday April 14 2021

14h00 – 14h15 | S620 wind tunnel | Christophe SICOT

Web site : https://equipex-gap-prometee.ensma.fr/installations-banc/soufflerie-s620/

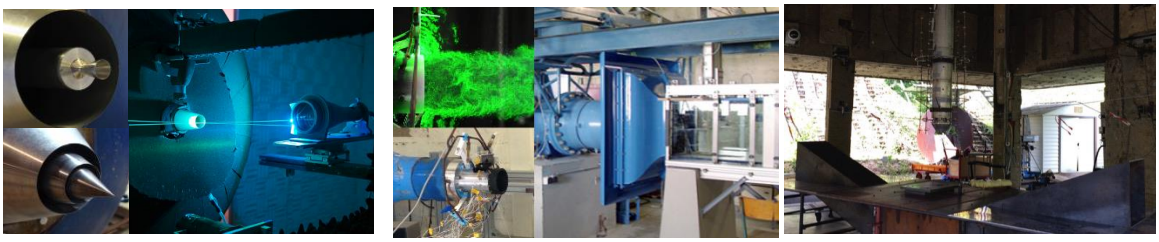
The S620 has a test section of 2.6 * 2.4 m² and a length of 6m. The wind speed range is from 5m/s to 60m/s with a turbulence intensity of less than 0.5%. Dedicated assemblies (current plane or raised floor) allow a wide range of tests ranging from ground transport (dedicated roller bank for rotating wheels) to aeronautics (aircraft or airfoil) through renewable energies (wind turbines). The wind tunnel is equipped with 6-component aerodynamic balances allowing the measurement of average or unsteady forces via the use of piezoelectric sensors. Regarding the pressure measurement, the wind tunnel has acquisition chains for average and unsteady pressure sensors. Velocity measurements are performed through the use of Particle Image Velocimetry (PIV) as well as the implementation of Laser Doppler Anemometry (LDA) or Constant Temperature Anemometry (Hot Wires or Films).

Left Wind tunnel S620; Centre: Control of partially separated flows on a NACA0015; Right: Drag reduction of automotive

14h15 – 14h30 | T200-S150 wind tunnels | Vincent JAUNET

Web site : https://equipex-gap-prometee.ensma.fr/installations-banc/soufflerie-t200-s150/

The compressible wind tunnels of P' Institute allow to study transonic and supersonic flows. Using a compressed air supply of 200 bars, these blowdown wind tunnels enable tests of a duration of approximately 10 minutes. The T200 wind tunnel features co-axial compressible jets (total pressure of primary jet < 150 bars, total pressure of the secondary jet < 3 bars). The S150 wind tunnel generates high velocities flows (Mach 0,8 to 2,8) with a test section of 150 x 150 mm2. Ongoing research projects are concerning compressible effects on turbulence and aerodynamic instabilities, separated nozzle flows, shock-turbulence interaction, boundary layer flows, …

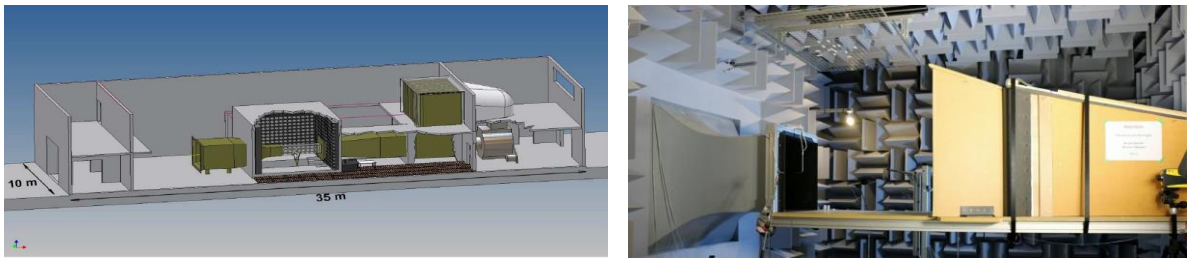


Left, T200 wind tunnel and LDA measurements, (pictures : FRESILLON, Cyril / CNRS Photothèque). Centre : S150 wind tunnel, Right : Martel test bench (collaboration CNES and Onera).

14h30 – 14h45 | Anechoic wind tunnel BETI | Vincent VALEAU

Web site : ***https://equipex-gap-prometee.ensma.fr/installations-banc/soufflerie-beti/***

The anechoic wind tunnel BETI (Bruit-Environnement-Transport-Ingénierie), commissioned in 2013, is located in the premises of the University of Poitiers on the ENSI-Poitiers site. It is an Eiffel-type wind tunnel, with an open test-section located in a 90 m^3 plenum acoustically treated to reproduce free field conditions from 200 Hz. It allows the study and optimization of the flow around obstacles and the associated acoustic radiation. Its main characteristics are: test-section with an area of 0.7 × 0.7 m2 and a length 1.5 m, contraction ratio of 9, maximum speed of 60 m/s (216 km/h), rate of turbulence of less than 0.5%.



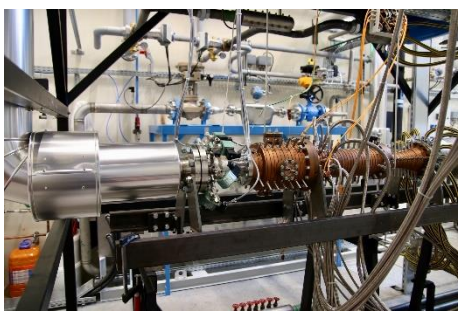
Anechoic wind-tunnel BETI: Left: general view; right: open test-section.

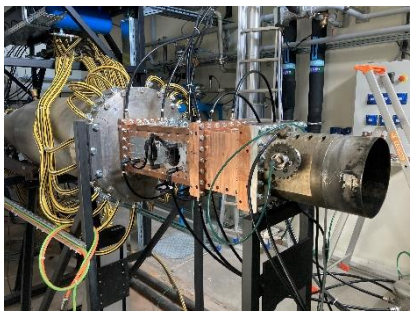
The BETI wind tunnel is equipped with several acoustic arrays (an array of 64 measurement microphones, an array of 1024 digital MEMS microphones), a wall-pressure fluctuation measurement system, and several flow-velocity field measurement systems (hot wire anemometry, LDV, PIV). These devices allow the location, identification, analysis and control of aeroacoustic sources. The BETI wind-tunnel is devoted to the aeroacoustic optimization of elements of land vehicles, to fundamental studies related to aeronautics or to metrological developments in aeroacoustics.

14h45 – 15h00 | BATH High Temperature Wind tunnel | Gildas LALIZEL

Web site : **https://equipex-gap-prometee.ensma.fr/installations-banc/soufflerie-ht-bath/**

BATH, (Banc AeroTHermique in French language) is dedicated to studies of turbulent flows and interactions with solid structures under extreme temperature and pressure conditions (up to 1300 °C, 10 Bars, 166 m/s). The BATH test bench was designed and sized to obtain, in the test section with optical accesses, academic-type inlet conditions which consist of homogeneous conditions of temperature and low turbulent quantities. The design of this test section allows to study different types of flows by using advanced thermal and aeraulic metrology (TOMO-PIV, PLIF-2 , ZnO phosphorescence ...).



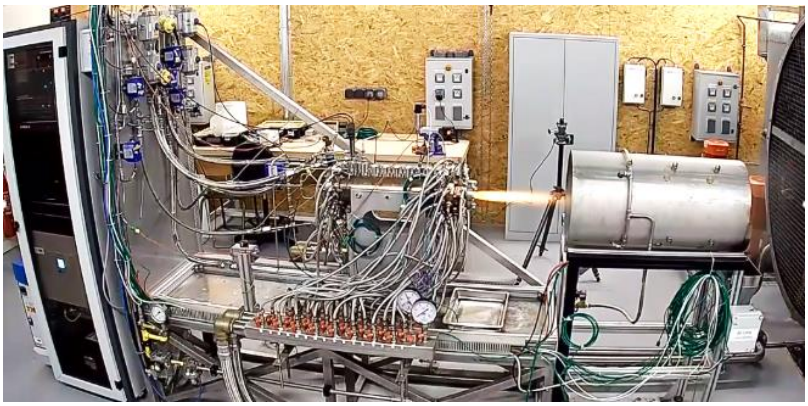


Left: kerosene combustion chamber et right: test section with optical accesses.

15h00 – 15h15 | PERGOLA Test Bench | Bastien BOUST & Marc BELLENOUE

Web site : https://equipex-gap-prometee.ensma.fr/installations-banc/pergola/

PERGOLA (for “Propulsion ERGOLs Avancés” in French) test bench has been developed by PPRIME and CNES to study green storable propellants for space propulsion in engine like condition. The specific objectives are to investigate and characterize the behaviour of the key physical phenomena involved in such combustors: atomization of propellant sprays, ignition ability, combustion stability, propulsion efficiency. PERGOLA is a mid-scale combustor (maximal total flow rate: 800 g/s, chamber maximal pressure: 50 bar, maximal thrust 1 kN, test duration : up to 1 mn) allowing physical measurements in its present configuration (opaque chamber). Using Hydrogen-Peroxyde as oxidizer, any kind of safe storable fuels like ethanol or kerosene can be studied. In the present configuration, ignition is performed using a H2-air torch ignitor and injection and atomization are based on impinging liquid jets (doublet like or unlike triplet).



Hydrogen peroxide – ethanol combustion test in PERGOLA facility

15h15 – 15h30 | Conclusion and common discussion