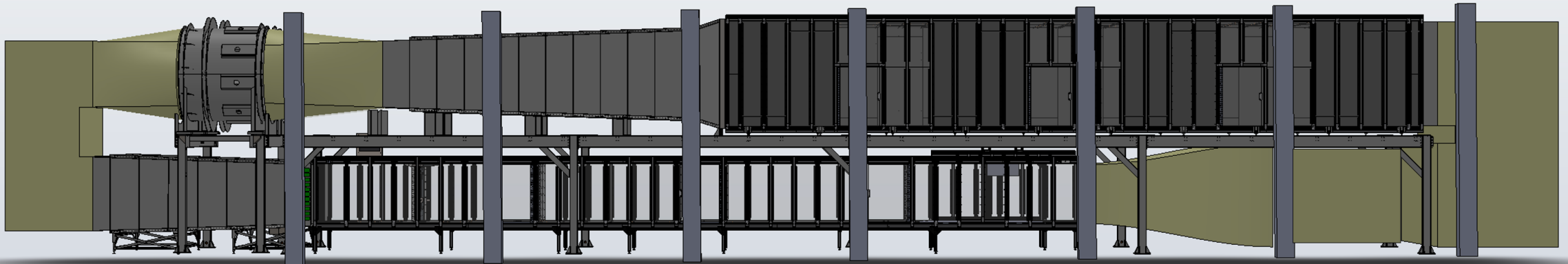
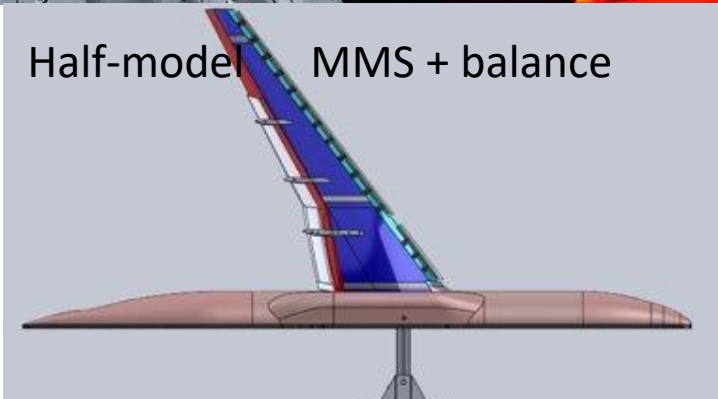
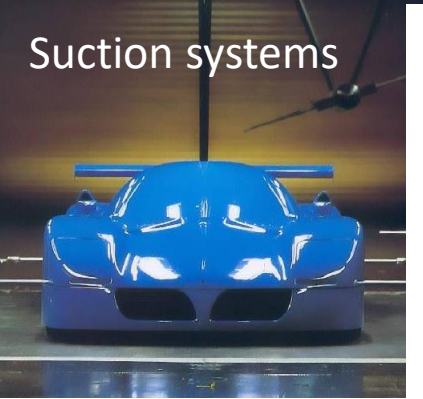
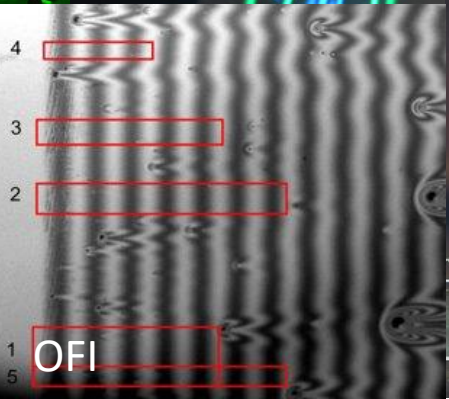
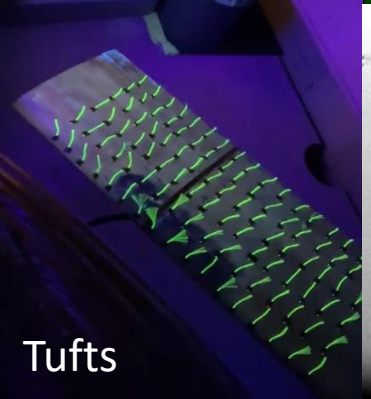
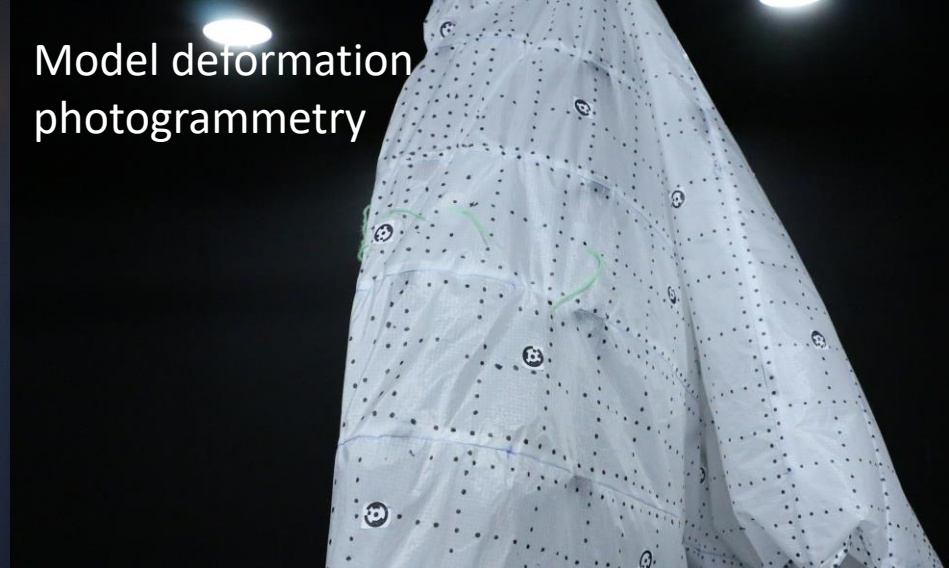
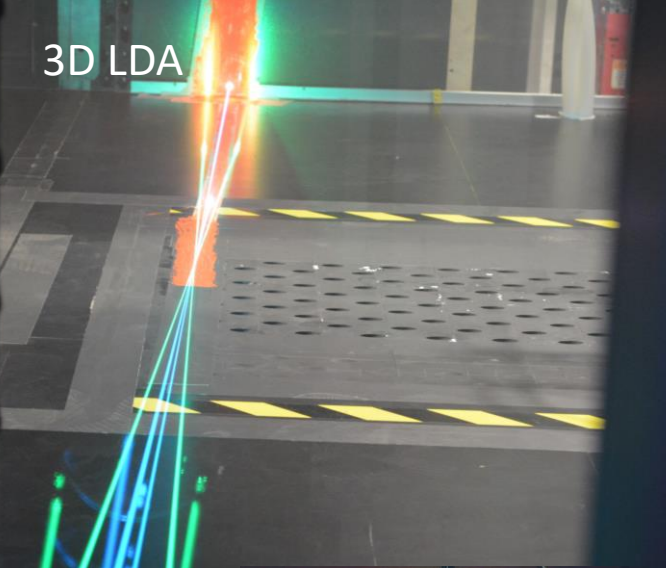
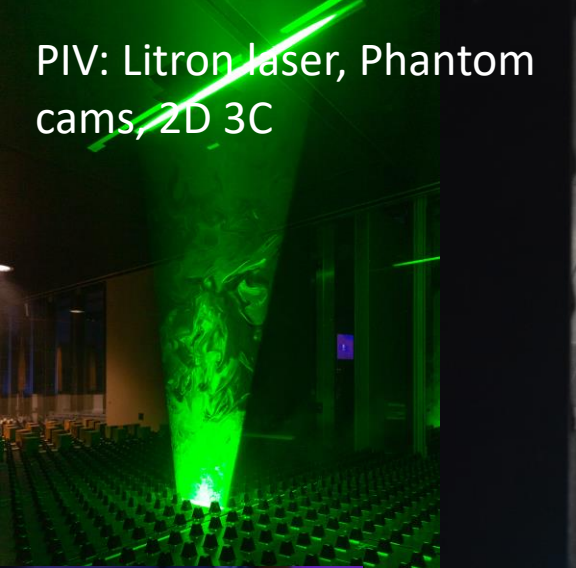
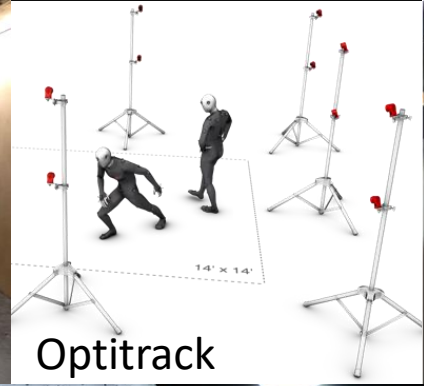
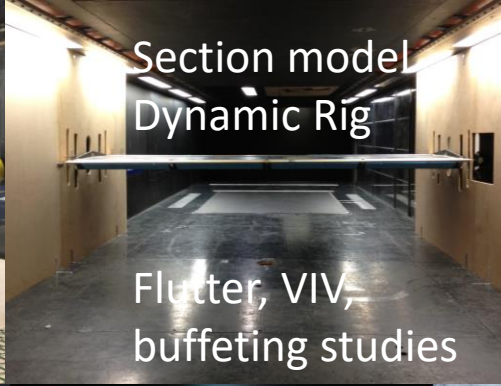


# 10'x5' Wind Tunnel, Dept of Aeronautics Imperial College

## Facility overview

- Originally built in 1985 – recently (2015) reconfigured and re-built, doubling the length of the test section, introducing a second test section, and including a heat exchanger
- Working sections size:
  - 3 m x 1.5 m x 20 m (10 ft x 5 ft x 66 ft)
  - 5.8 m x 2.7 m x 18 m (19 ft x 9 ft x 60 ft)
- Maximum flow speed: 40 m/s in smaller section, 11 m/s in larger section
- Operating temperature: 12 - 30°C





+ multi-hole probes, 1/ X hot wires, accelerometers, load cells. Full model MMS under dev; sting balance available.

# 10'x5' Wind Tunnel, Dept of Aeronautics Imperial College

## Tunnel operations

- Test team core of 4 people – then each project gets its own post-docs/PhD students/MSc & MEng students, external consultants, external model makers

## Pluses / minuses

- Long fetch provides ability to develop a naturally-growing boundary layer, or atmospheric boundary layer (ABL)
  - Has enabled research in Transpiration Cooling (porous floor with cold secondary stream injection), Turbulent Boundary Layer Friction Drag reduction through Surface Waves, Wind Farm in ABL control optimisation.
- Multitude of specialised rigs around the two test sections, and local experts in various kinds of measurement / instrumentation techniques help diversify the portfolio: Winds in Civil Engineering, Automotive, Aeronautical, Wind Energy.
- The 10x5 tunnel is the largest facility on campus in South Kensington. Large pressure on space and its usage; space charge.
- Quick change over between different experiments, and up to speed of measurements quickly is encouraged, to minimise downtime, maximise run time, and fit in more users. Often this “experiment readiness” is a culture shock / requires culture change for experiments coming from smaller facilities, where longer sessions are often allowed.



# 10'x5' Wind Tunnel, Dept of Aeronautics Imperial College

## Rigs & Instrumentation

- 360-degree turntable with integrated model elevator and stiff platform for high frequency force balance
- Atmospheric boundary layer simulation – from ultra urban to sea fetch
- Half-model aircraft model motion system with 6-axes underfloor balance and BL suction upstream
- Full-span model aircraft model motion system under development – sting balance on long loan
- 6-axes strut-mounted internal balance
- Rolling road for automotive, with yaw capability, and pitch and ride height model motion system; also used for aircraft testing in ground proximity configurations
- Model wind turbine rig with torque and speed control
- 512-channel TE Initium pressure acquisition
- High-speed PIV with Litron lasers and Phantom cameras – planar, 2-component or 3-component velocity
- Dantec 3D Laser Doppler Anemometry, on traverse
- Multi-hole probes and Omni-Probe
- Dantec Streamline Constant Temperature Anemometry – single and X wires
- Dynamic (vibration) section model rig – for flutter, VIV, buffeting identification of section models of bridges and wings
- Surface oil flow shear techniques – oil flow interferometry and surface shear stress visualisation
- Accelerometer array
- Range of ATI 6-axes load cells
- OptiTrack motion tracking system with 9 cameras
- Model Deformation Measurement system: EOS Motion Photomodeller
- Flow visualisation : minitufts and oil flows