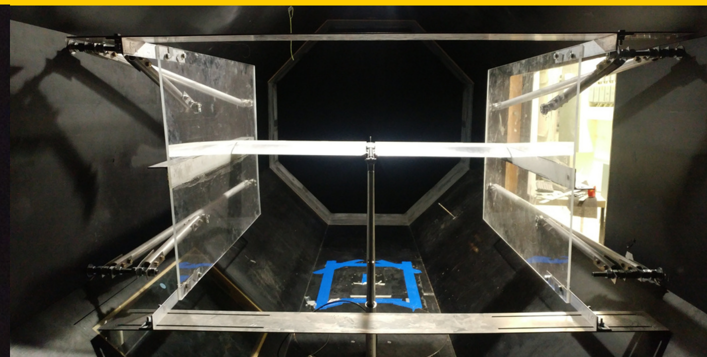
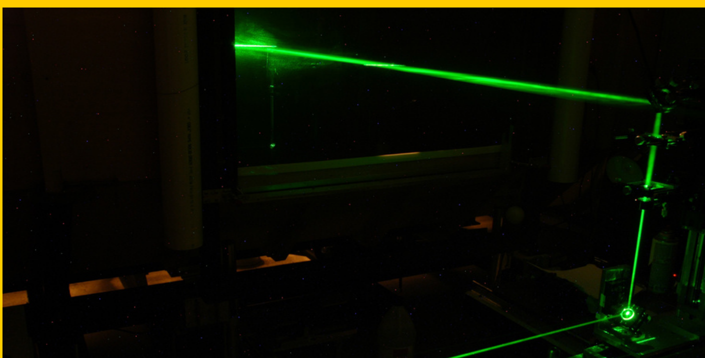
EXPERIMENTS

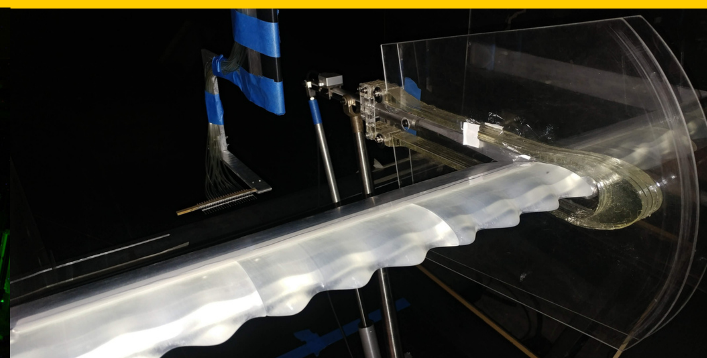
A bird-like model made of carbon fiber sits in the DWT test section, ready to be measured (Davis & Spedding, 2016).



Mounted wing and endplate system from inside tunnel (Croughan, 2019).



Guiding a green laser into the DWT test section through a mirror and then a cylindrical lens to make a flat sheet (Huyssen & Spedding, 2010).



Tubercled wing (Croughan, 2021).

Two model trucks on a platform that removes the boundary layer to mimic movement over a stationary road (Browand, 2008).

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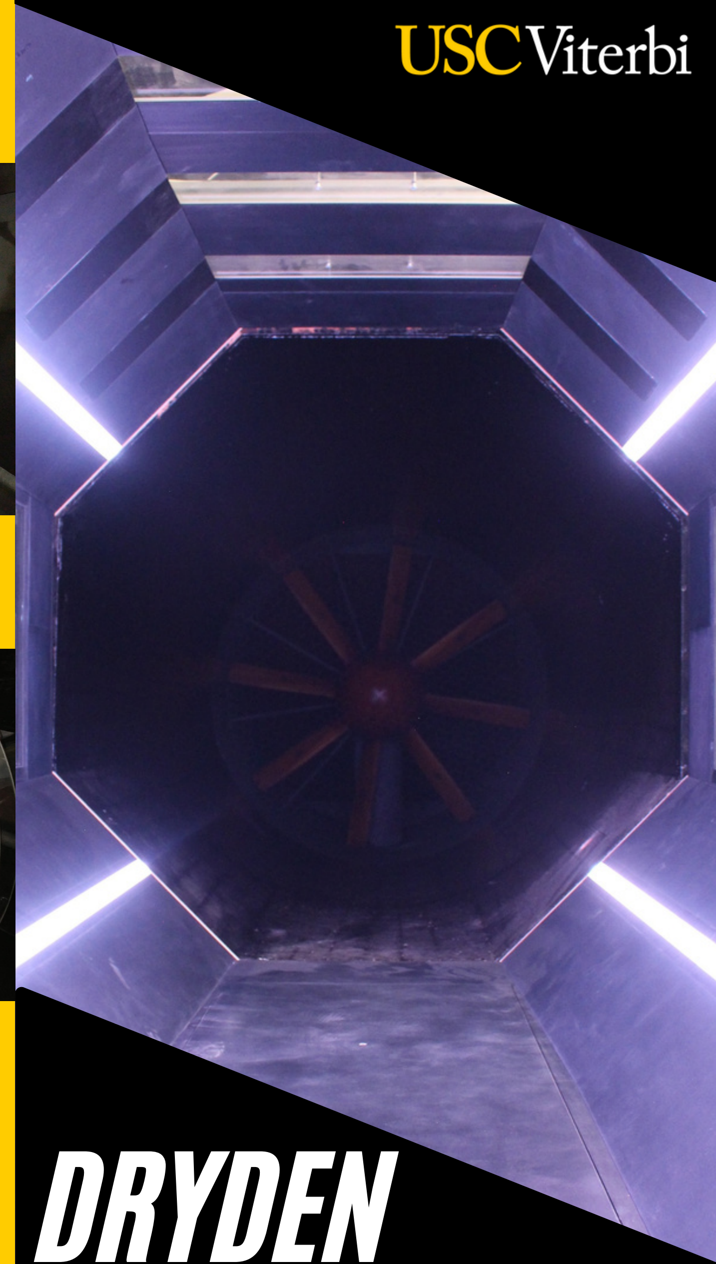


DRYDEN WIND TUNNEL

Rapp Engineering Building (RRB)
854 Downey Way
Los Angeles, CA 90089
DrydenWT.usc.edu

ABOUT

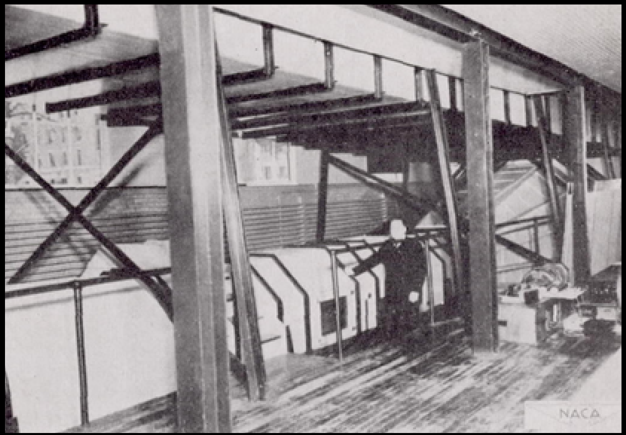
The Dryden Wind Tunnel is a unique and history-laden facility providing excellent air flow qualities from air speeds of 2 – 35 m/s.

CAPABILITIES

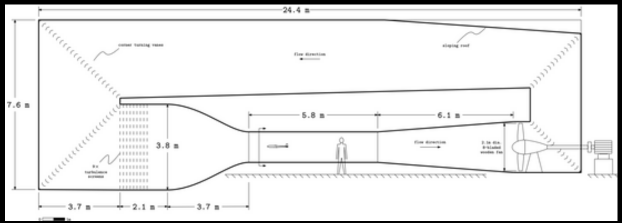
The large size and gentle contraction section, combined with 9 turbulence screens yield turbulence levels of 0.03% or below. It is therefore still perfectly matched for measuring and manipulating flow instabilities that are sensitive to small background disturbances. Current instrumentation includes two sensitive force balances and a Particle Imaging Velocimetry system to estimate flow fields.

HISTORY

The DWT was originally commissioned in 1918 at the National Bureau of Standards in Washington DC. Modifications completed in 1939 were responsible for it being the first very low turbulence tunnel in the world, capable of detecting flow instabilities that had hitherto eluded measurement. In 1975 it was shipped by train to its new home at USC, where it has been in continuous operation since. The new refurbishments include a new motor and controller, and 3 modular test sections that can be swapped in and out for different experiments.

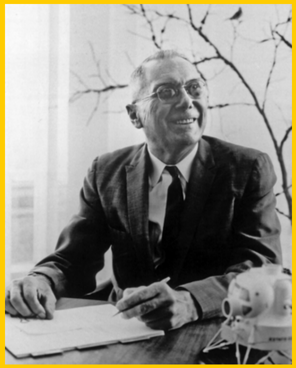


Hugh Dryden next to the tunnel that now bears his name, from a 1948 publication NACA-TN-1755.



Schematic of the closed-return tunnel as it is still used today (Kruger, 2023).

HUGH L. DRYDEN



Credit: NASA

Hugh Dryden (1898-1965) was a child prodigy, entering Johns Hopkins at age 14. He began working at the NBS wind tunnel in 1918 for his PhD thesis, *Air Forces on Circular Cylinders*. Dr. Dryden became the first NASA deputy administrator in 1958.

To read the rest of his bio, scan the QR code!

SIGNIFICANCE

The DWT was the first to demonstrate the existence of two-dimensional instability waves in a growing boundary layer, using novel hot-wire measurement techniques. It was used extensively in further investigations of boundary-layer stability and transition to turbulence, generating much of the classic data now found in textbooks. It has also played a crucial role in verifying the performance of new, inverse-design, high lift:drag ratio airfoils, and in finding minimum drag solutions for practical bodies, including models of platooning trucks designed to alleviate congestion on LA freeways. Current work includes testing novel aircraft configurations and control of wings at small scale for autonomous surveillance aircraft.