

# D5.1 NTUA WT Website

LEAD BENEFICIARY: NTUA

TYPE: DEC —Websites, patent  
filings, videos, etc

DISSEMINATION LEVEL: PUBLIC

## WP5

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### Widening of Visibility and Profile

TWEET-IE / Twin Wind tunnels for Energy and the  
Environment - Innovations and Excellence

HORIZON-WIDERA-2021-ACCESS-03-01 / PR# 101079125

## History and Changes

Ver	Date	Description	Contributors
00	28/06/2023	Report	NTUA

## Abstract

Deliverable D5.1 involves the creation of a website for the NTUA Wind Tunnel (NTUA-WT).

## Project Website

According to WP5, Task 5.2, of the TWEET-IE project (Twin Wind tunnels for Energy and the Environment - Innovations and Excellence under the HORIZON-WIDERA-2021-ACCESS-03-01 call with Project number 101079125) a new up to date web page will be created with emphasis on exploiting NTUA numerical simulation capacity, experience, enhancement, and upgrade of provided services to industry.

The homepage ([Home](#)) of the new site is active at the address <http://wt.fluid.mech.ntua.gr>. The site has a responsive web design, which automatically adjusts for different screen sizes and looks good on both PC-desktop and mobile screens.

The website presents the basic info and the necessary contact data of NTUA-WT ([About](#)) and includes a set of tabs where one can find a detailed presentation of:

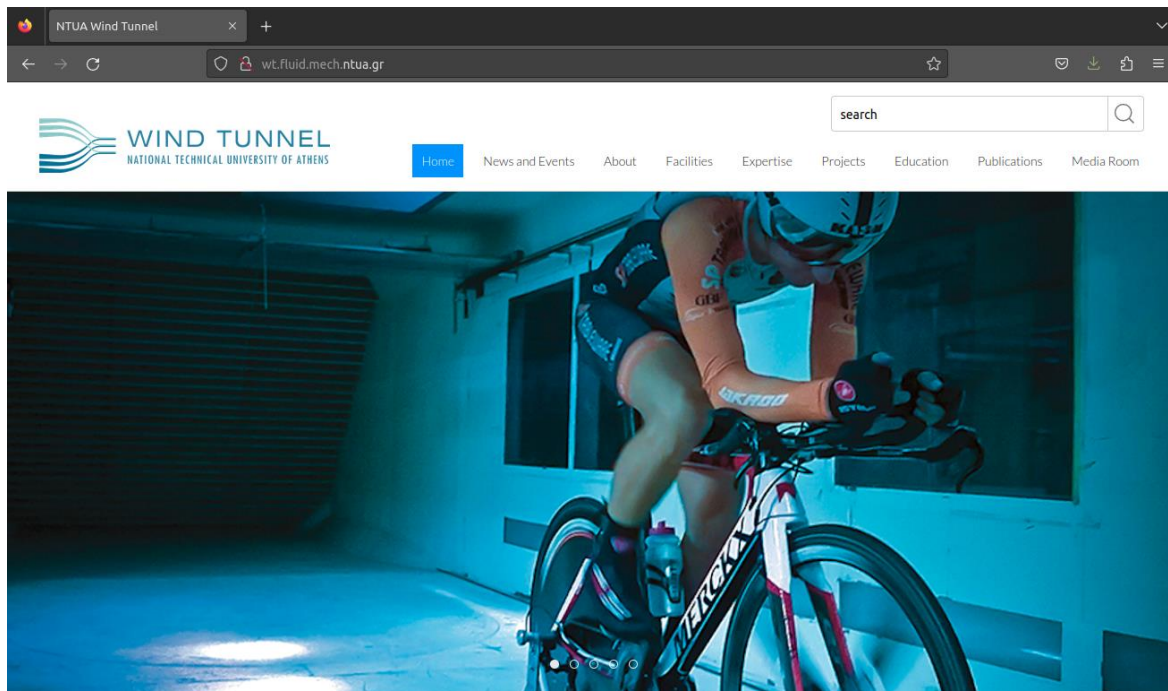
- The latest NTUA-WT [News and Events](#) with News and material related to Training Workshops, Forums and Open Days.
- The NTUA-WT [Facilities](#), where the different Wind Tunnel Test Sections, the measuring techniques and a selection of the available instrumentation are presented.
- The various NTUA-WT [Expertise](#) topics (e.g. Aerodynamics, Aeroelasticity, Green Buildings, Wind Energy, Anemometers Calibration, etc.) which present the expertise potential of NTUA-WT to provide relevant services to the private sector and the industry.
- NTUA-WT academic and research activities, through separate tabs referring to [Projects](#) participations (including Collaboration Opportunities, Case Studies and Experimental

## WP5. Deliverable 5.1

Databases), various activities related to [Education](#) (e.g. Experimental Fluid Mechanics Laboratories, International Competitions, Courses Material), [Publications](#), and a [Media Room](#) with available audio-visual informative material.

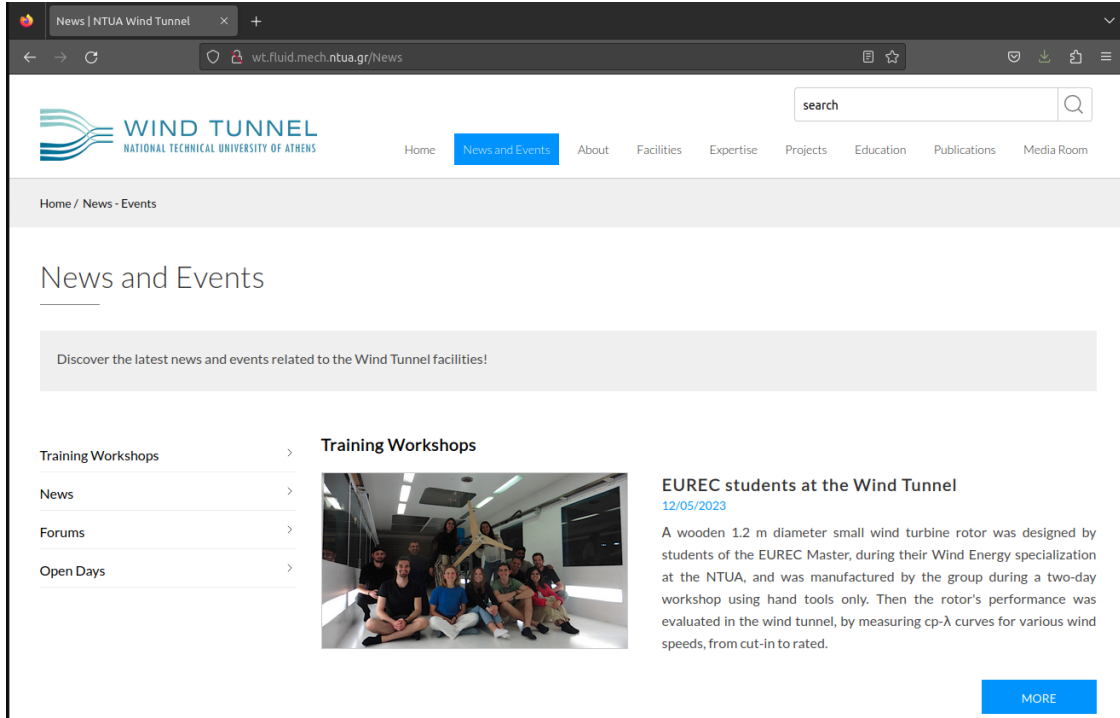
The NTUA-WT web site includes a **Search** function button to facilitate queries with specific keywords in the whole site. Finally there are available links to a dedicated NTUA-WT [YouTube](#) channel and an [Instagram](#) account.

Sample pages from the NTUA Wind Tunnel web site are presented following.



### Welcome

Welcome to the Wind Tunnel facilities at National Technical University of Athens, School of Mechanical Engineering, Fluids Section, Laboratory of Aerodynamics!



News | NTUA Wind Tunnel

wt.fluid.mech.ntua.gr/News

WIND TUNNEL  
NATIONAL TECHNICAL UNIVERSITY OF ATHENS

Home News and Events About Facilities Expertise Projects Education Publications Media Room

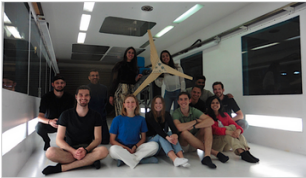
Home / News - Events

## News and Events

Discover the latest news and events related to the Wind Tunnel facilities!

- Training Workshops
- News
- Forums
- Open Days

### Training Workshops

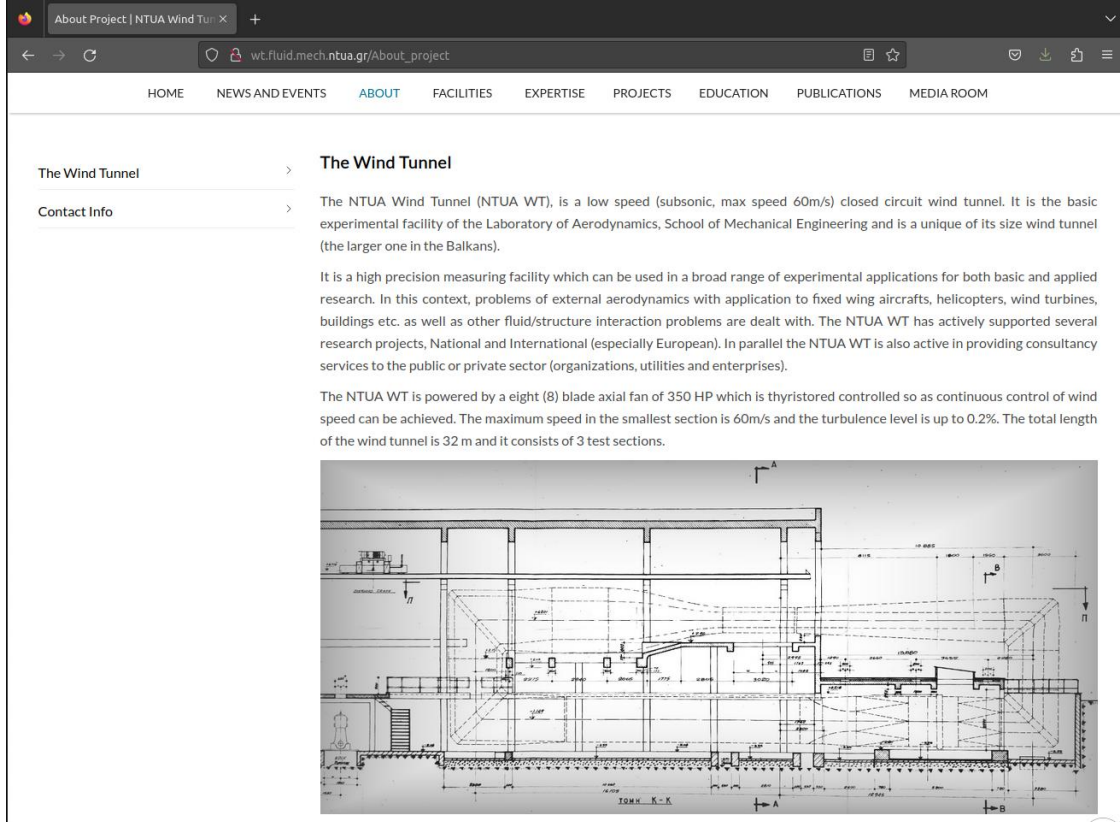


#### EUREC students at the Wind Tunnel

12/05/2023

A wooden 1.2 m diameter small wind turbine rotor was designed by students of the EUREC Master, during their Wind Energy specialization at the NTUA, and was manufactured by the group during a two-day workshop using hand tools only. Then the rotor's performance was evaluated in the wind tunnel, by measuring  $c_p$ - $\lambda$  curves for various wind speeds, from cut-in to rated.

MORE



About Project | NTUA Wind Tunnel

wt.fluid.mech.ntua.gr/About\_project

HOME NEWS AND EVENTS ABOUT FACILITIES EXPERTISE PROJECTS EDUCATION PUBLICATIONS MEDIA ROOM

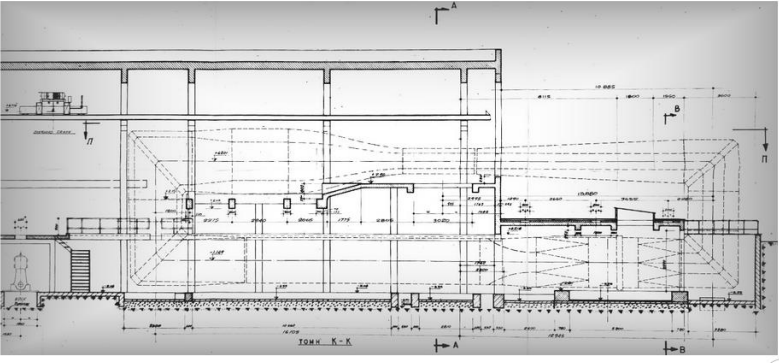
- The Wind Tunnel
- Contact Info

### The Wind Tunnel

The NTUA Wind Tunnel (NTUA WT), is a low speed (subsonic, max speed 60m/s) closed circuit wind tunnel. It is the basic experimental facility of the Laboratory of Aerodynamics, School of Mechanical Engineering and is a unique of its size wind tunnel (the larger one in the Balkans).

It is a high precision measuring facility which can be used in a broad range of experimental applications for both basic and applied research. In this context, problems of external aerodynamics with application to fixed wing aircrafts, helicopters, wind turbines, buildings etc. as well as other fluid/structure interaction problems are dealt with. The NTUA WT has actively supported several research projects, National and International (especially European). In parallel the NTUA WT is also active in providing consultancy services to the public or private sector (organizations, utilities and enterprises).

The NTUA WT is powered by a eight (8) blade axial fan of 350 HP which is thyristored controlled so as continuous control of wind speed can be achieved. The maximum speed in the smallest section is 60m/s and the turbulence level is up to 0.2%. The total length of the wind tunnel is 32 m and it consists of 3 test sections.



## WP5. Deliverable 5.1

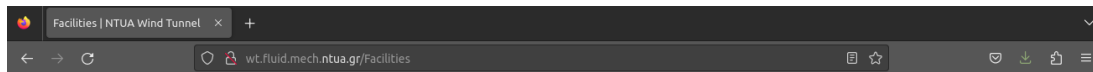
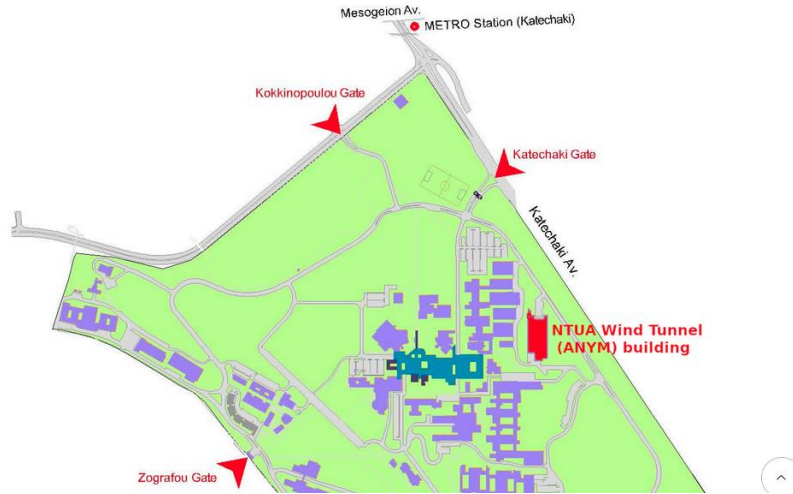


HOME NEWS AND EVENTS ABOUT FACILITIES EXPERTISE PROJECTS EDUCATION PUBLICATIONS MEDIA ROOM

- The Wind Tunnel >
- Contact Info >

### Contact Info

windtunnel@fluid.mech.ntua.gr  
 Wind Tunnel  
 Laboratory of Aerodynamics, Fluids Section  
 School of Mechanical Engineering,  
 National Technical University of Athens  
 9 Heroon Polytechniou, Zografou  
 15772 Athens



Home News and Events About **Facilities** Expertise Projects Education Publications Media Room

Home / Facilities

## Facilities

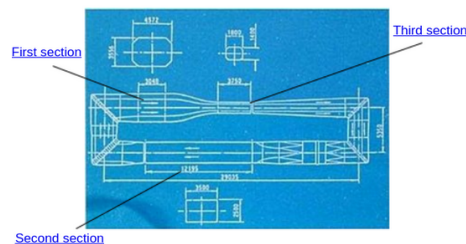
The Wind Tunnel sections and a selection of the available equipment is presented.

- Wind Tunnel Test Sections >
- Measuring Techniques & Available Instrumentation >

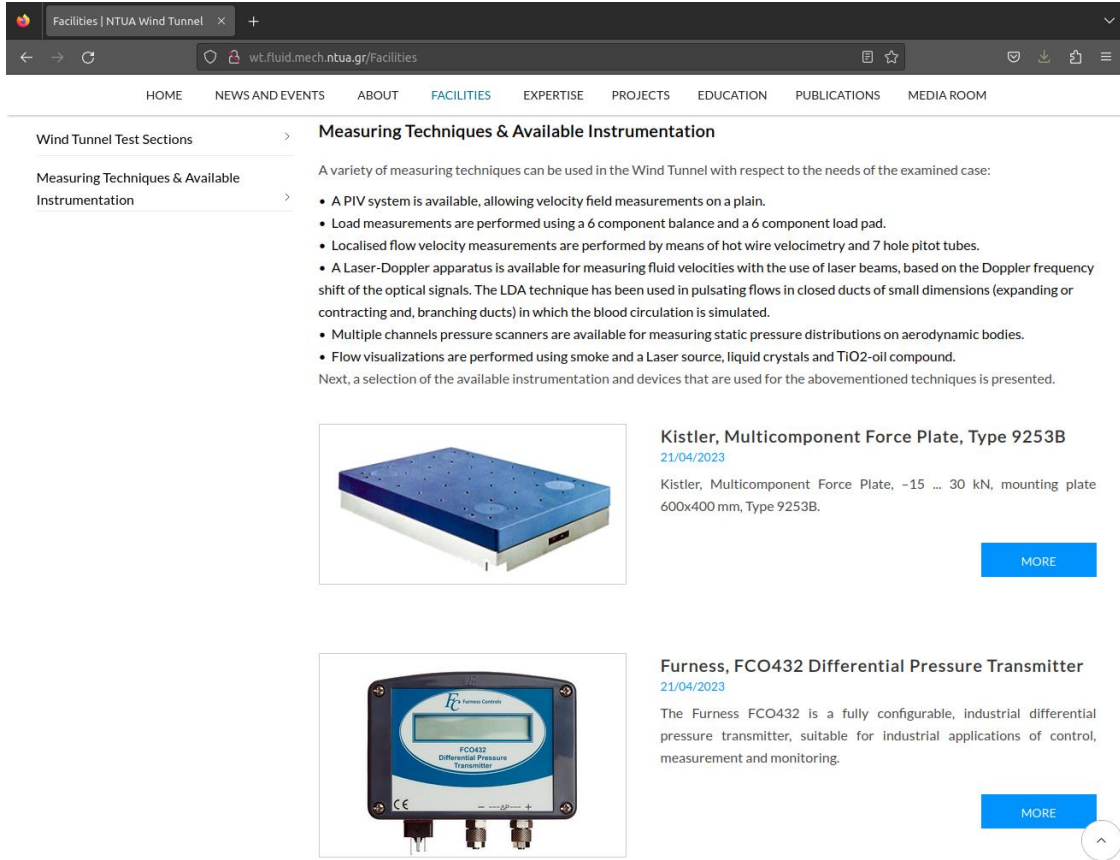
### Wind Tunnel Test Sections

The total length of the wind tunnel is 32 m and it consists of 3 test sections:

Section	Width (m)	Height (m)	Max. speed (m/s)
1	4.5	3.5	9.5
2	3.5	2.5	17.0
3	1.8	1.4	60.0







Facilities | NTUA Wind Tunnel

wt.fluid.mech.ntua.gr/Facilities

HOME NEWS AND EVENTS ABOUT FACILITIES EXPERTISE PROJECTS EDUCATION PUBLICATIONS MEDIA ROOM

Wind Tunnel Test Sections >


Measuring Techniques & Available Instrumentation >

### Measuring Techniques & Available Instrumentation

A variety of measuring techniques can be used in the Wind Tunnel with respect to the needs of the examined case:

- A PIV system is available, allowing velocity field measurements on a plain.
- Load measurements are performed using a 6 component balance and a 6 component load pad.
- Localised flow velocity measurements are performed by means of hot wire velocimetry and 7 hole pitot tubes.
- A Laser-Doppler apparatus is available for measuring fluid velocities with the use of laser beams, based on the Doppler frequency shift of the optical signals. The LDA technique has been used in pulsating flows in closed ducts of small dimensions (expanding or contracting and, branching ducts) in which the blood circulation is simulated.
- Multiple channels pressure scanners are available for measuring static pressure distributions on aerodynamic bodies.
- Flow visualizations are performed using smoke and a Laser source, liquid crystals and TiO<sub>2</sub>-oil compound.


Next, a selection of the available instrumentation and devices that are used for the abovementioned techniques is presented.



**Kistler, Multicomponent Force Plate, Type 9253B**  
21/04/2023

Kistler, Multicomponent Force Plate, -15 ... 30 kN, mounting plate 600x400 mm, Type 9253B.

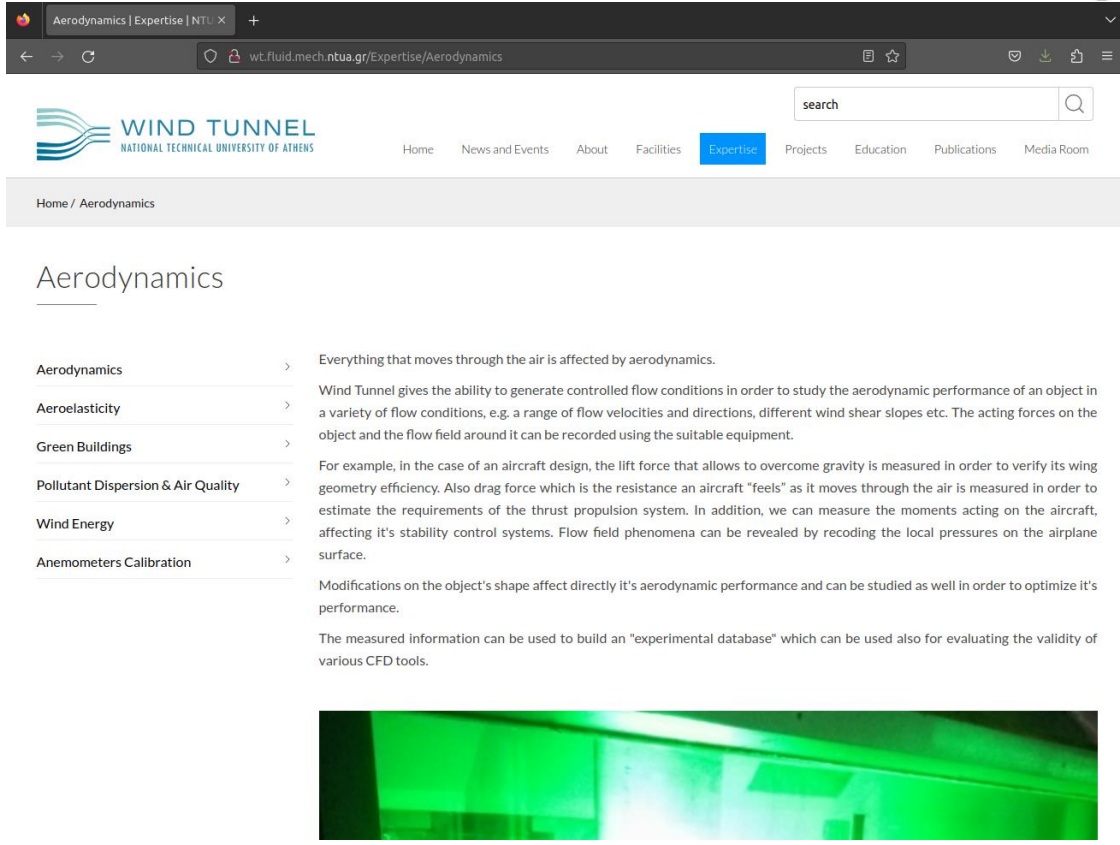
MORE



**Furness, FCO432 Differential Pressure Transmitter**  
21/04/2023

The Furness FCO432 is a fully configurable, industrial differential pressure transmitter, suitable for industrial applications of control, measurement and monitoring.

MORE



Aerodynamics | Expertise | NTUA

wt.fluid.mech.ntua.gr/Expertise/Aerodynamics

WIND TUNNEL NATIONAL TECHNICAL UNIVERSITY OF ATHENS

Home News and Events About Facilities Expertise Projects Education Publications Media Room

Home / Aerodynamics


## Aerodynamics

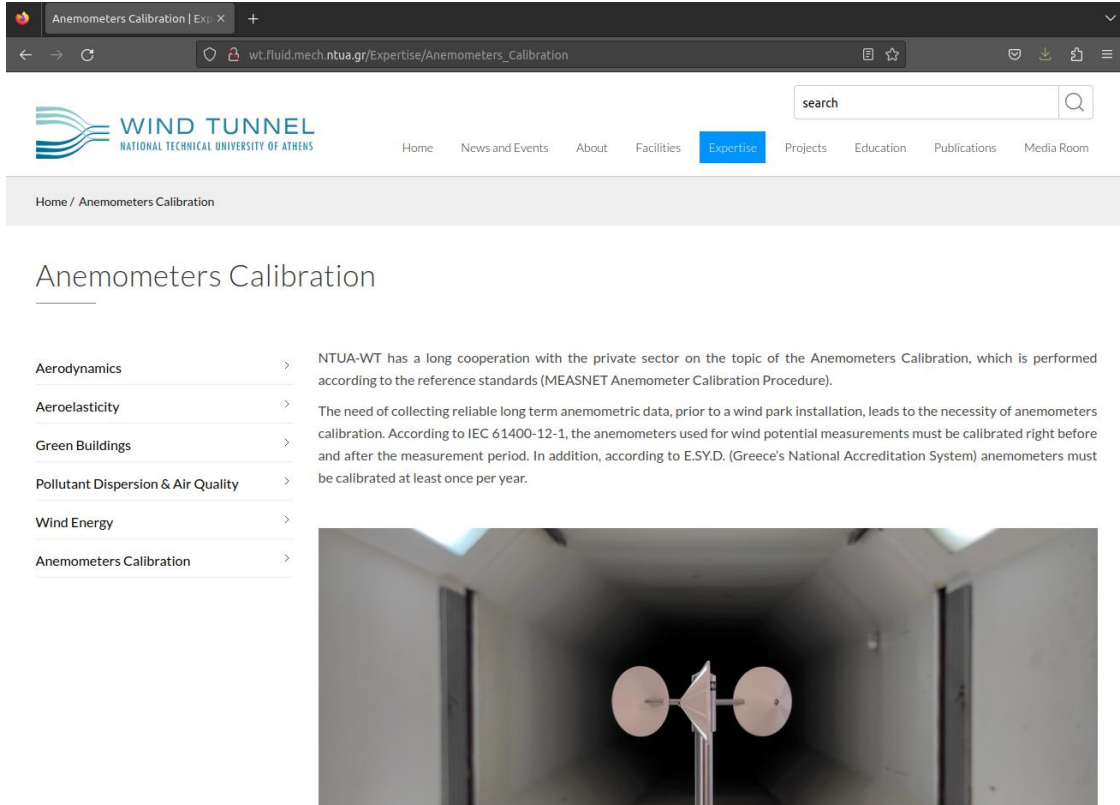
- Aerodynamics > Everything that moves through the air is affected by aerodynamics.
- Aeroelasticity > Wind Tunnel gives the ability to generate controlled flow conditions in order to study the aerodynamic performance of an object in a variety of flow conditions, e.g. a range of flow velocities and directions, different wind shear slopes etc. The acting forces on the object and the flow field around it can be recorded using the suitable equipment.
- Green Buildings >
- Pollutant Dispersion & Air Quality >
- Wind Energy >
- Anemometers Calibration >

For example, in the case of an aircraft design, the lift force that allows to overcome gravity is measured in order to verify its wing geometry efficiency. Also drag force which is the resistance an aircraft "feels" as it moves through the air is measured in order to estimate the requirements of the thrust propulsion system. In addition, we can measure the moments acting on the aircraft, affecting its stability control systems. Flow field phenomena can be revealed by recording the local pressures on the airplane surface.

Modifications on the object's shape affect directly its aerodynamic performance and can be studied as well in order to optimize its performance.

The measured information can be used to build an "experimental database" which can be used also for evaluating the validity of various CFD tools.





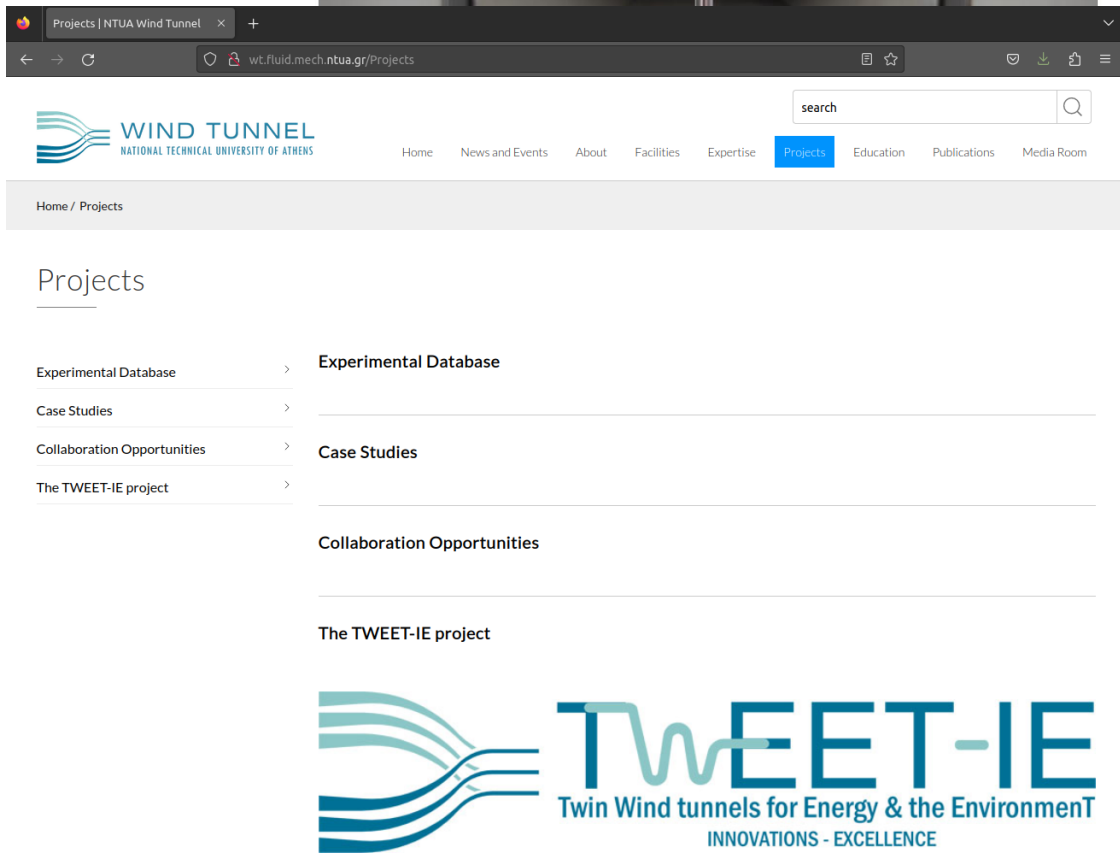
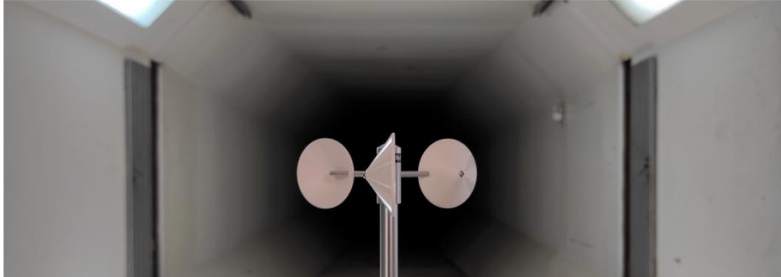
Home / Anemometers Calibration

## Anemometers Calibration

- Aerodynamics >
- Aeroelasticity >
- Green Buildings >
- Pollutant Dispersion & Air Quality >
- Wind Energy >
- Anemometers Calibration >

NTUA-WT has a long cooperation with the private sector on the topic of the Anemometers Calibration, which is performed according to the reference standards (MEASNET Anemometer Calibration Procedure).

The need of collecting reliable long term anemometric data, prior to a wind park installation, leads to the necessity of anemometers calibration. According to IEC 61400-12-1, the anemometers used for wind potential measurements must be calibrated right before and after the measurement period. In addition, according to E.SY.D. (Greece's National Accreditation System) anemometers must be calibrated at least once per year.



Home / Projects


## Projects

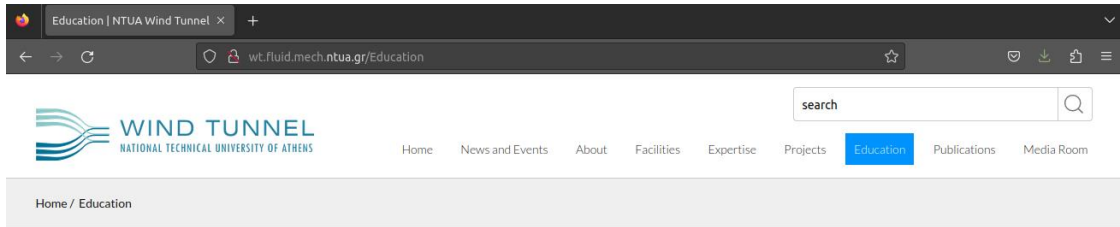
- Experimental Database > **Experimental Database**
- Case Studies > \_\_\_\_\_
- Collaboration Opportunities > **Case Studies**
- The TWEET-IE project > \_\_\_\_\_

**Collaboration Opportunities**

\_\_\_\_\_

**The TWEET-IE project**

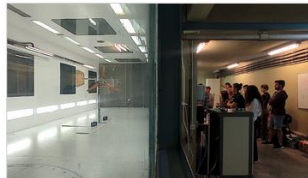




## Education

- Experimental Fluid Mechanics Laboratories >
- International Competitions >
- Courses Material >

### Experimental Fluid Mechanics Laboratories



#### Wind Energy Laboratory

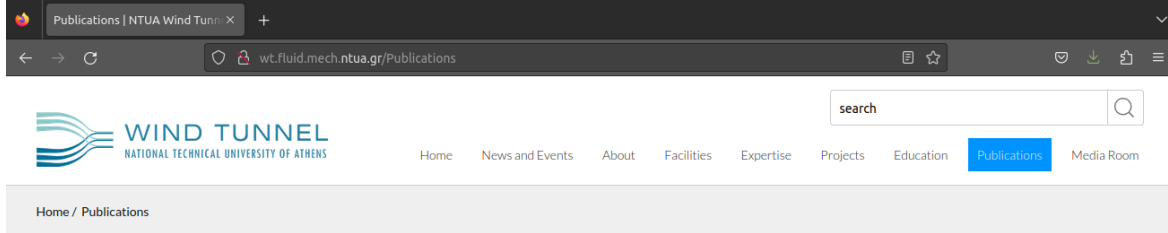
Efficiency study of a low cost small horizontal axis wind turbine (D=1.2m) entirely built by students at NTUA.

[MORE](#)



#### Lab Test : Measurement of a Turbulent Jet Impinging on a Flat Plate

The exit of a fluid jet from an opening or nozzle into an environment filled with the same or another fluid is one of the most interesting fluid flows in terms of flow physics and technological applications.



## Publications

### Expertise

- All
- Aerodynamics
- Aeroelasticity
- Aeroacoustics
- Aircrafts
- Green Buildings
- Sports

### Document Type

- All
- Journal Paper
- Conference Paper
- Master Thesis
- PhD Thesis
- Project Report

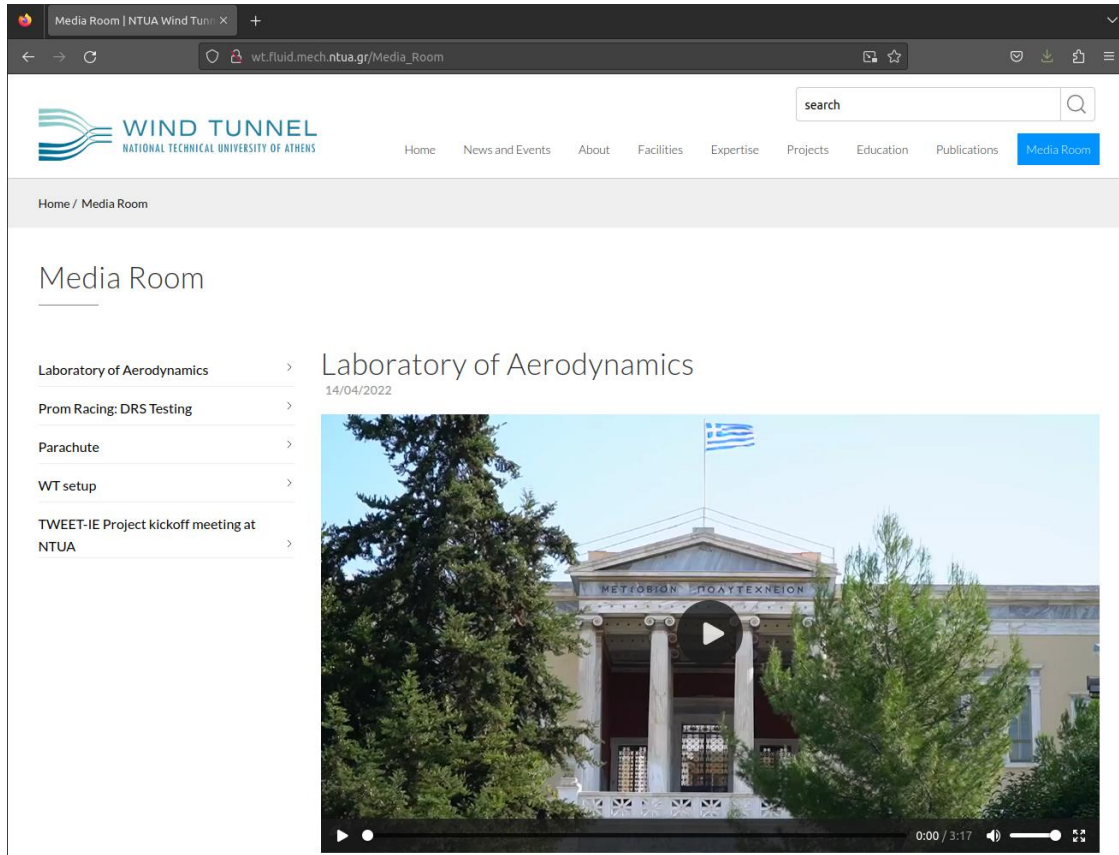
Gkiolas Dimitris. (2021). EXPERIMENTAL FLOW STUDY OF AN OSCILLATING AIRFOIL, Ph.D. Thesis <https://dspace.lib.ntua.gr/xmlui/handle/123456789/54698?show=full>

Pappa, Vasiliki & Langidis, Apostolos & Manolesos, Marinos & Bouris, Demetri. (2019). STEREO PIV MEASUREMENTS OF VERTICAL VARIATION OF LOCAL VENTILATION RATES FOR A GENERIC BUILDING EXPOSED TO AN ATMOSPHERIC BOUNDARY LAYER. Conference: 11th International Symposium on Turbulence and Shear Flow Phenomena (TSFP11) At: Southampton, UK, July 30 to August 2, 2019 [https://www.researchgate.net/publication/335464651\\_STEREO\\_PIV\\_MEASUREMENTS\\_OF\\_VERTICAL\\_VARIATION\\_OF\\_LOCAL\\_VENTILATION\\_RATES\\_FOR\\_A\\_GENERIC\\_BUILDING\\_EXPOSED\\_TO\\_AN\\_ATMOSPHERIC\\_BOUNDARY\\_LAYER](https://www.researchgate.net/publication/335464651_STEREO_PIV_MEASUREMENTS_OF_VERTICAL_VARIATION_OF_LOCAL_VENTILATION_RATES_FOR_A_GENERIC_BUILDING_EXPOSED_TO_AN_ATMOSPHERIC_BOUNDARY_LAYER)

Marinos Manolesos, Zhiqiu Gao, Demetri Bouris. (2018). EXPERIMENTAL INVESTIGATION OF THE ATMOSPHERIC BOUNDARY LAYER FLOW PAST A BUILDING MODEL WITH OPENINGS. Building and Environment Volume 141, 15 August 2018, Pages 166-181 <https://doi.org/10.1016/j.buildenv.2018.05.049>







The screenshot shows a web browser window with the URL `wt.fluid.mech.ntua.gr/Media_Room`. The website header includes the "WIND TUNNEL NATIONAL TECHNICAL UNIVERSITY OF ATHENS" logo and a navigation menu with items: Home, News and Events, About, Facilities, Expertise, Projects, Education, Publications, and Media Room. A search bar is located in the top right. Below the header, the page title is "Media Room". A sidebar on the left lists several categories with right-pointing chevrons: Laboratory of Aerodynamics, Prom Racing: DRS Testing, Parachute, WT setup, and TWEET-IE Project kickoff meeting at NTUA. The main content area features a video player titled "Laboratory of Aerodynamics" with a date of "14/04/2022". The video thumbnail shows the classical facade of the National Technical University of Athens building, with a play button in the center and a progress bar at the bottom indicating 0:00 / 3:17.