

**Azadi ka Amrit Mahotsav**  
**to commemorate 75 years of progressive Independent India**

***Report of the***



**Fifth Event**

**“Webinar on Wind Turbine Testing and  
Measurement Techniques”**

NIWE with the support of MNRE has scheduled sixteen events to commemorate 75 years of progressive Independent India (Azadi Ka Amrit Mahotsav).

The fifth event, “**Webinar on Wind Turbine Testing and Measurement Techniques**” was successfully conducted on 07<sup>th</sup> December 2022.

The announcement about the event carrying the instructions was hosted in NIWE website and circulated through Social Media pages along with the Flyer given below.

to commemorate the 75 years of  
 progressive Independent India

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As part of the Azadi ka Amrit Mahotsav, NIWE has scheduled sixteen (16) Events  
 with the support of Ministry of New and Renewable Energy (MNRE)

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# 5<sup>th</sup>

EVENT


## Webinar on WIND TURBINE TESTING AND MEASUREMENT TECHNIQUES

**Speaker**

**Shri. J.C. DAVID SOLOMON**  
 Director & Head  
 M&T Division, NIWE


**07<sup>th</sup> December 2022**

**4.00 - 5.00 pm**



**Registration Link : <https://forms.gle/cZPjHJCyWPvZA4tr9>**

For more information, please contact **Dr. P. KANAGAVEL**  
 Director and Head, Skill Development and Training & Infrastructure Management Division  
 Mobile : +91 9445798007 Ph. : +91-44-22463982 / 83 / 84 E-mail : pkanagavel@niwe.res.in



**NATIONAL INSTITUTE OF WIND ENERGY**  
 An autonomous Research & Development Institution  
 Ministry of New and Renewable Energy, Government of India  
 CHENNAI

The event was conducted online, enabling large number of participants to take part in the Webinar.

### REGISTRATION

After the announcement, 57 candidates registered and 26 participants have attended the event.

### PROGRAMME SCHEDULE

Date	Time	Theme	Speaker
07.12.2022	16.00 - 17.00 pm	<b>Wind Turbine Testing and Measurement Techniques</b>	Shri. J.C. David Solomon Director & Head Measurements & Testing Division, NIWE

The speaker gave a detailed presentation on Wind Turbine Testing and Measurement Techniques and it was followed by a Q&A session, which was open for the participants to interact with the speaker. All the doubts and queries raised by the participants were clearly explained and clarified by the speaker. The participants were very much satisfied with the presentation and had reciprocated the same by appreciating the speaker. In addition, they expressed their thanks to NIWE for hosting this webinar.

## **Gallery of the 5<sup>th</sup> Event**

AKAM - 5th Event - Webinar on Wind Turbine Testing and Measurement Techniques on 7-12-2022

25:48

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Participants

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Presenters (3) Mute all

- events.nive@gmail.com (Guest)
- F & IT
- SDT Organizer

Attendees (6)

- Jayaraman Tamilvendhan CMB L... External
- Kavitha Sivaprak... (Guest) Meeting guest
- Priya Rani External
- Rekha Dangwal (Guest) Meeting guest
- Satish Kamthe [SEL-TG-T&M] External

SDT

G20 2023 INDIA

75 Azadi Ka Amrit Mahotsav

## Welcome to

5<sup>th</sup> Event

### Webinar on Wind Turbine Testing and Measurement Techniques

As part of the "Azadi ka Amrit Mahotsav" to commemorate the 75 years of progressive Independent India  
07<sup>th</sup> December 2022

Presented by

**Shri. J.C. David Solomon**  
Director & Head, Measurements & Testing Division  
National Institute of Wind Energy

Organized by

Skill Development and Training & Infrastructure Management (SDT & IM) Division  
**NATIONAL INSTITUTE OF WIND ENERGY**  
Chennai

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Attendees (9)

- Jaiwin (Guest) Meeting guest
- Jayaraman Tamilvendhan CMB L... External
- Kavitha Sivaprak... (Guest) Meeting guest
- Parul Merlia (Guest) Meeting guest
- Priya Rani External

F & IT

### Testing Role in WTG's Certification

#### Type certificate certification process

```

graph LR
    A[Design basis evaluation] --> B[Design evaluation]
    B --> C[Manufacturing evaluation]
    C --> D[Type testing]
    D --> E[Final evaluation]
    E --> F[TYPE CERTIFICATE]
    
    G[Foundation design evaluation]
    H[Foundation manufacturing evaluation]
    
    subgraph Optional_steps [Optional steps]
        G --> H
    end
  
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AKAM - 5th Event - Webinar on Wind Turbine Testing and Measurement Techniques on 7-12-2022

34:40

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- events.nive@gmail.com (Guest)
- F & IT
- SDT Organizer

Attendees (16)

- Ankit Gupta1 External
- Aysurya Sagar External
- Jaswin (Guest) Meeting guest
- Jayaraman Tamilvendhan CMB I... External
- Kavin External

POWER PERFORMANCE MEASUREMENTS

The purpose is to document a measured power curve and predicted annual energy production for the wind turbine type

Figure 6 - Presentation of example measured power curve

Measured power curve corrected to sea level air density (1.225 kg/m<sup>3</sup>)

Table 5 - Example of presentation of estimated annual energy production

Estimated annual energy production  
Reference air density: 1.225 kg/m<sup>3</sup>  
Cut-in wind speed: 3.5 m/s  
(extrapolation by constant power from last bin)

Hub height (m)	MEP-measured average wind speed (Rayleigh)	MEP	Standard uncertainty in MEP	%	MEP	Standard uncertainty in MEP	MEP extrapolated (extrapolated power curve)
4	489	82	17	490			
5	1081	113	10	1081			
6	1824	138	8	1824			
7	2595	155	6	2603			
8	3305	162	5	3362			
9	3889	165	4	3965			
10	4318	162	4	4536			
11	4592	157	3	4954			Incomplete

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16:07 07-12-2022

AKAM - 5th Event - Webinar on Wind Turbine Testing and Measurement Techniques on 7-12-2022

42:26

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Attendees (21)

- Aakriti . External
- Ankit Gupta1 External
- Aysurya Sagar External
- Gaddam Sangeetha External
- Jaswin (Guest) Meeting guest

Figure 14: A photograph of a sensor mounted on a concrete surface. The sensor is a small, square, orange-colored device. The surface is marked with 'R3' and 'R2' in black marker. There is some yellowish residue or tape around the sensor.

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AKAM - 5th Event - Webinar on Wind Turbine Testing and Measurement Techniques on 7-12-2022

47:50

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- SDT Organizer

Attendees (22)

- Aakriti . External
- Ankit Gupta1 External
- Aysurya Sagar External
- Gaddam Sangeetha External
- Jaswin (Guest) Meeting guest

**LOAD MEASUREMENTS**

To validate design calculations and to determine the magnitude of loads under specific conditions.

IEC 61400-13 Edition 1.0, 2015-12

**INTERNATIONAL STANDARD**  
NORME INTERNATIONALE

Wind turbines - Part 13: Measurement of mechanical loads

Table 9 – Wind turbine fundamental load quantities

Load quantities	Level of importance
Blade root flapwise bending moment ( $M_{brf}$ )	1 blade mandatory additional blade recommended
Blade root edgewise bending moment ( $M_{bre}$ )	1 blade mandatory additional blade recommended
Rotor till moment ( $M_{rt}$ )	Mandatory
Rotor yaw moment ( $M_{ry}$ )	Mandatory
Rotor torque ( $M_c$ )	Mandatory
Tower base normal ( $M_{tn}$ )	Mandatory
Tower base lateral moment ( $M_{tl}$ )	Mandatory

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01:05:47

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Attendees (23)

- Aakriti . External
- Ankit Gupta1 External
- Aysurya Sagar External
- Gaddam Sangeetha External
- Jaswin (Guest) Meeting guest

**Cp of 1.5MW Wind Turbine**

Power coefficient [-]

Hub wind speed [m/s]

Wind direction

Blade rotation

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16:38 07-12-2022