VALUE ONLINE TECHNOLOGY COMPANY

KEY PROJECT LOCATIONS

15+
RENEWABLE ENERGY EXPERTS

12+ *years of*
EXPERIENCE IN RENEWABLE ENERGY

VOTC has assessed
100+
UTILITY-SCALE SOLAR & WIND PROJECTS SINCE 2016

VOTC has issued
125+
MEASUREMENT CAMPAIGNS SUCCESSFULLY COMPLETED

VOTC has performed
120+
METEOROLOGICAL MAST MAINTAINANCE CONTRACTS

LONG TERM CONTRACTS
15+ CLIENTS
OF THE WIND INDUSTRY'S TOP PROJECT DEVELOPERS & PLANT OWNERS

WRA & SRA SERVICES PROVIDED FOR
10+ GIGAWATTS
OF INSTALLED RENEWABLE ENERGY PROJECTS

POWER PERFORMANCE TESTING & INSTRUMENTATION
60+ PROJECTS
WIND PROJECTS SINCE 2016

Empowering Trust in a Sustainable Future:

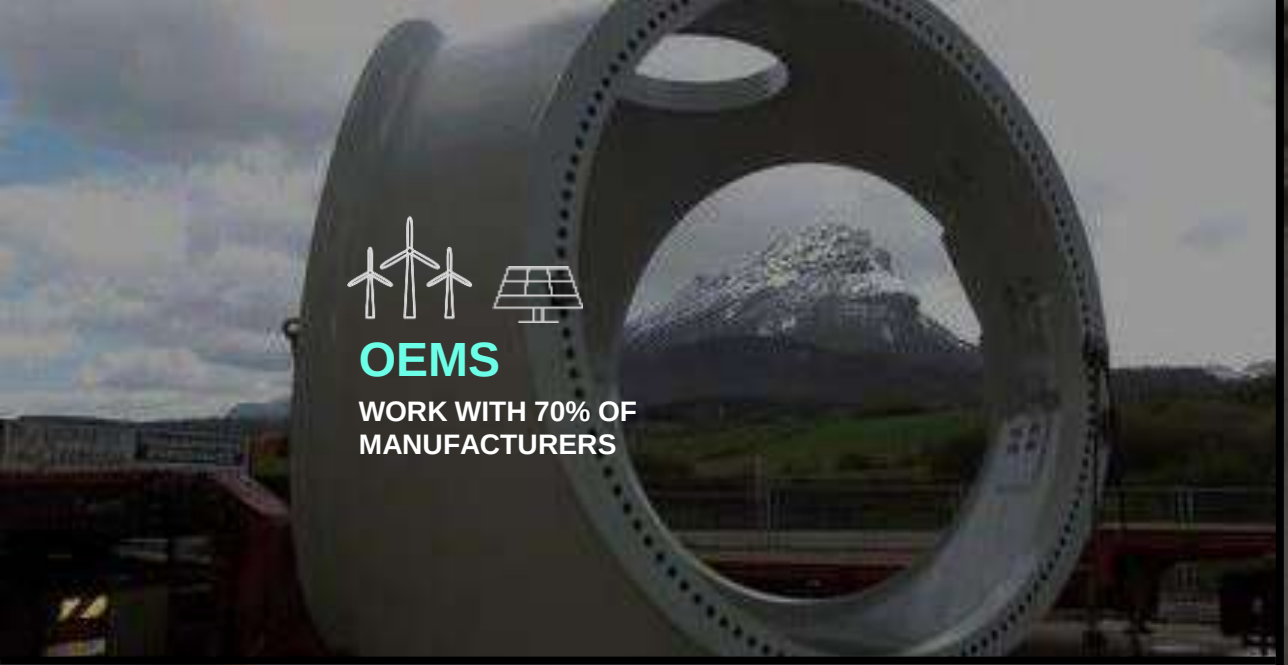
Wind Resource Assessment

Solar Resource Assessment

Robotic Cleaning Systems

Wind Solutions

- Wind Resource Assessment
- Power Performance Testing of Wind Turbines
- Wind Farm Perfomance Optimization



OEMS

WORK WITH 70% OF MANUFACTURERS

LENDERS & INVESTORS

INVESTOR/LENDER'S ENGINEER ON OVER 50 WIND & SOLAR PROJECTS SINCE 2016

DEVELOPERS

WE WORKED WITH 72% OF THE INDUSTRY'S TOP PROJECT DEVELOPERS AND PLANT OWNERS

OWNERS

OUR ANNUAL FORECASTING CLIENT REPETATION RATE IS 80%

POLICY MAKERS

WE HAVE SIMULATED 18,000 MW OF RENEWABLE ENERGY FOR GRID RELATED STUDIES THAT INFORM POLICY DECISIONS

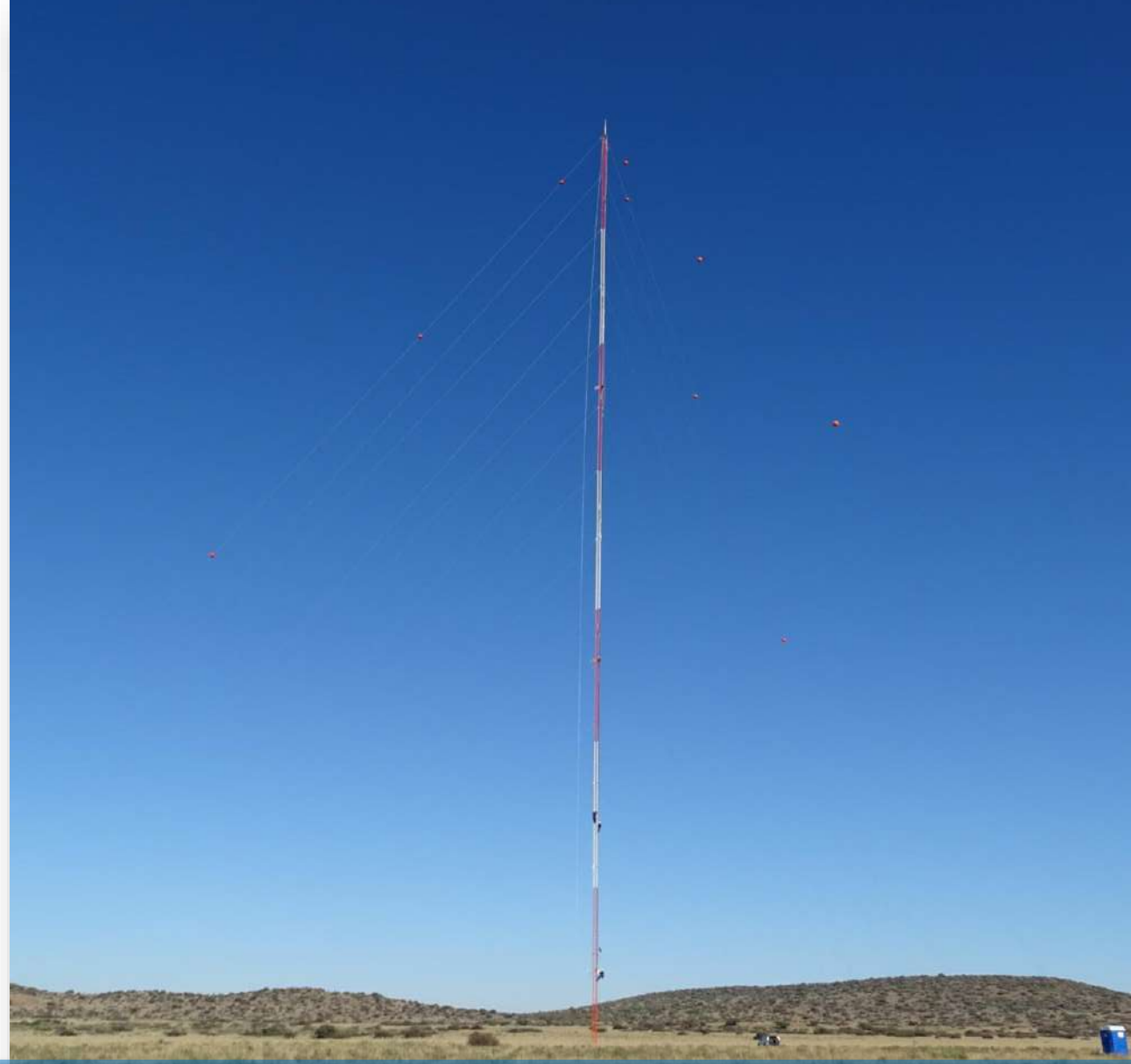
OUR MULTINATIONAL CLIENTS

Wind Resource Assessment

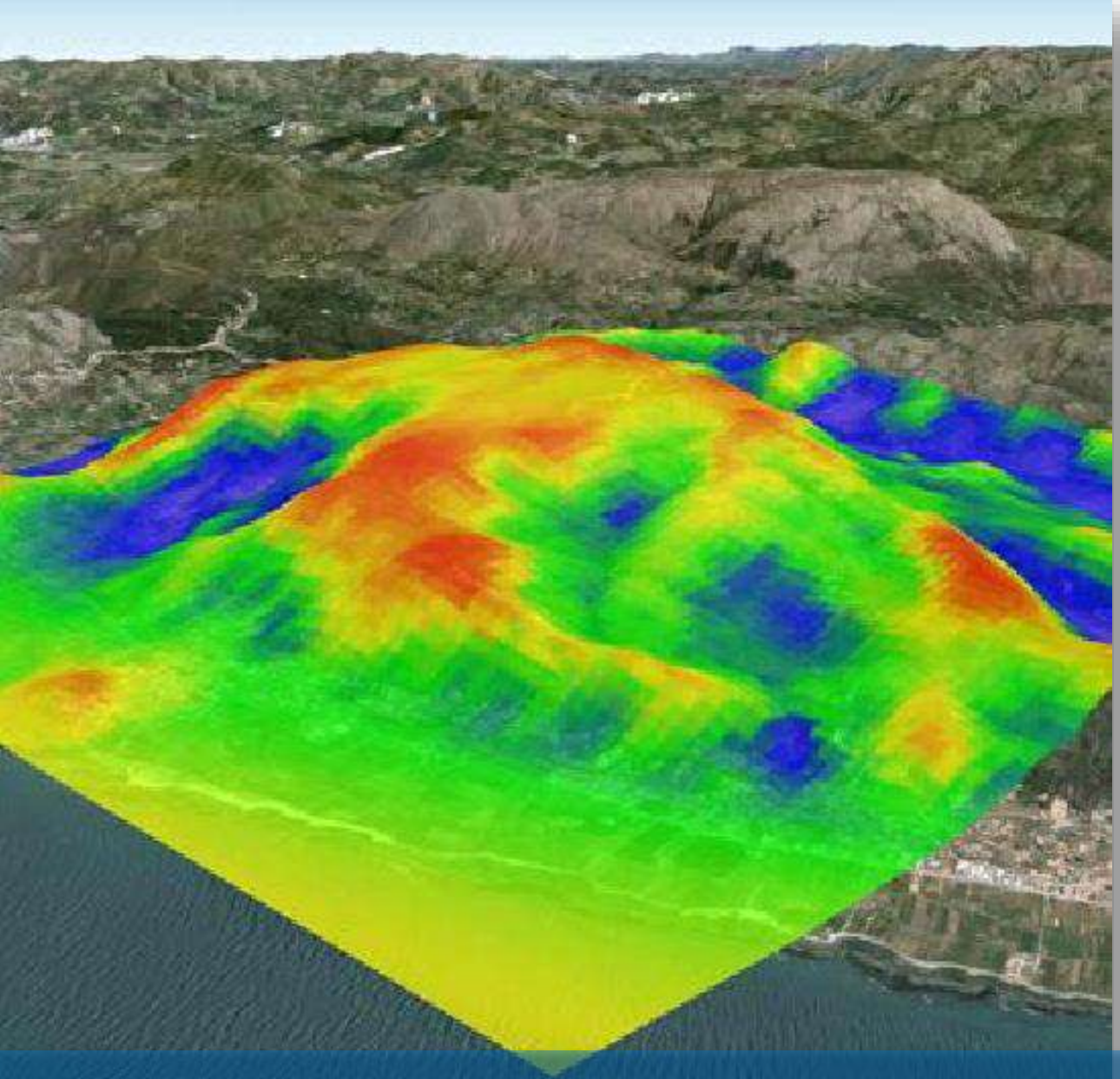
- VOTC specializes in providing comprehensive wind resource assessment services tailored to meet the unique needs of each project. Our expertise extends beyond traditional assessments to include advanced methodologies and technologies that ensure accurate and reliable results.

- Our services encompass the following key aspects:

    - Deployment
    - Data Collection
    - Analysis
    - Site Suitability Evaluation
    - Energy Potential Estimation
    - Reporting



Wind Resource Assessment



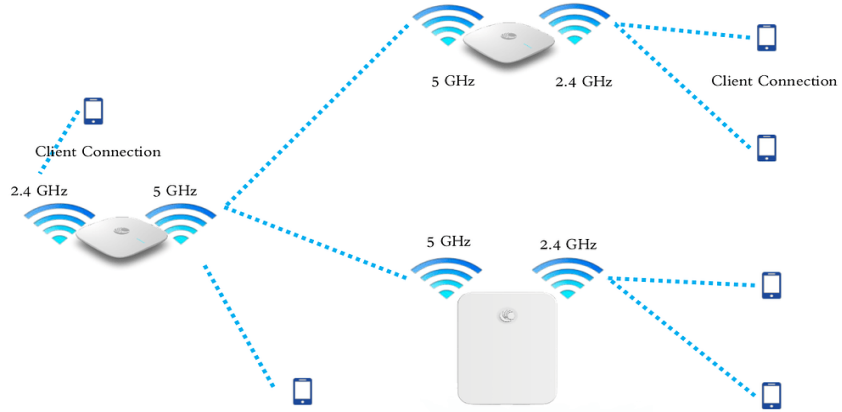
Wind Resource Assessment

- **Measurement Equipment:**

Ammonit · Thies CLIMA · EKO · LAPP KABEL

Galltec+mela · VAISALA · COMPTUS · CAMPBELL SCIENTIFIC

- **Communication System Design:** LAN, WAN, GSM, & Satellite Communication



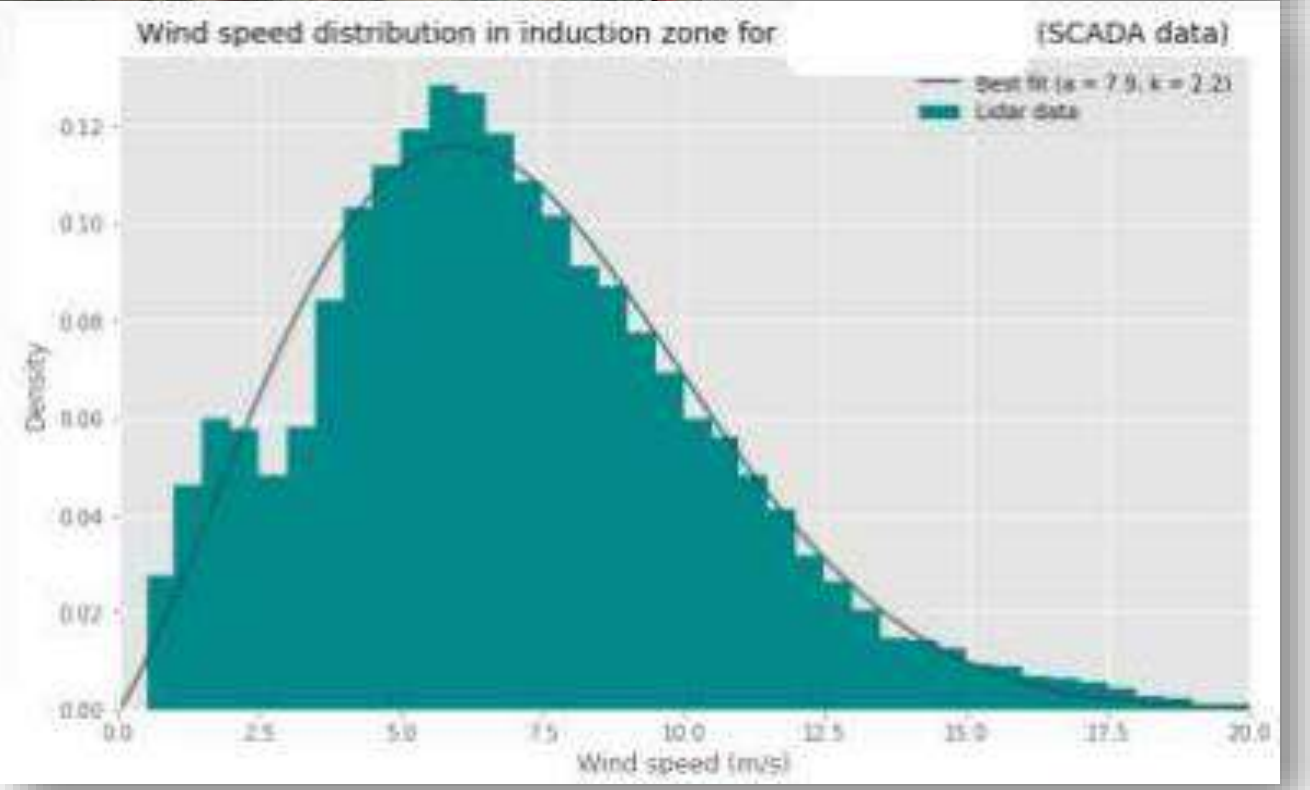
- **Data Acquisition & Analysis:** We provide calibrated DAQ & Customized Reports for clients.

Power Performance Testing of Wind Turbines

Power Performance Testing

- International Standards
  - Following IEC 61400-12-1 Ed. 1 & Ed.2
- Measurement Plan
  - Equipment (CT, VT, Power Transducer) Selection
  - Communication Protocol (Modbus TCP, Modbus RTU, CAN Bus, etc) Between Meteorological Mast & Wind turbines (Wireless, Wired).
- Measurement Parameters:
  - **Meteorological Mast:** Wind Speed, Wind Direction, Vertical Wind Speed, Inflow Angle, Temperature & Humidity, Pressure, etc
  - **Wind Turbine:** Active Power, Frequency, Blade Pitch Angle, Power Factor, Grid Frequency, Phase Current, Phase Voltage, Blade Pitch Angle, Generator Speed, Nacelle Wind Speed, Nacelle Wind Direction, Nacelle Yaw Angle, etc

Power Performance Testing of Wind Turbines



- Power Performance tests conducted on various OEM'S like: Simens Gamesa, Vestas, GE, Envision, Senvion, Suzlon, Inox, WEG, Etc.
- Medium Voltage:
  - Qualified Technicians for Instrmentation of Medium Voltage Systems
- Class of Instruments:
  - Best accuracy class available in the market 0.2S or 0.1.
  - Instruments are configured & calibrated by injecting the signals through process calibrator (Gossen Metrawatt).

CAMILLE BAUER · eltroma-technik gmbh · imc An Axiometrix Solutions Brand · CITEL · PHOENIX CONTACT · HELUKABEL® · ABB · RITZ · Schneider Electric · Gantner instruments · MOXA®

Wind Farm Performance Optimization

Wind Farm Perfomance Optimization

- Wind Farms with WindEagle: +300
- Different Countries: 16 Regions: Europe, America and Asia
- Average AEP Improvement: 2%

NTR

TOTAL eren

EDF renouvelables

EDF renewables

ENERJİSA ÜRETİM

CAPSTONE INFRASTRUCTURE

ReNew POWER

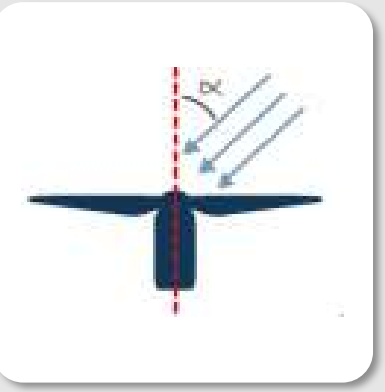
AQUILA CAPITAL

Eurus Energy

BORALEX

Yaw Error (lidar)

Misalignment of turbine with respect to wind **60% WT** misaligned



Turbulence (lidar) and wake effect **90% WT** are subject turbulences. Wake steering control strategy

Pitch error (accelerometers)

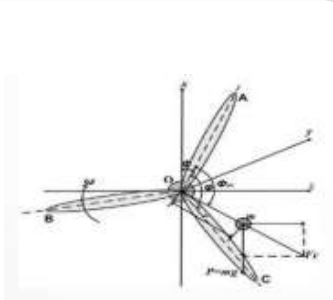
Blade angle differences **25% WT** misaligned

True North Detection (magnetometer)

Misalignment of turbine vis.a.vis true north, crucial in case of directional curtailment.

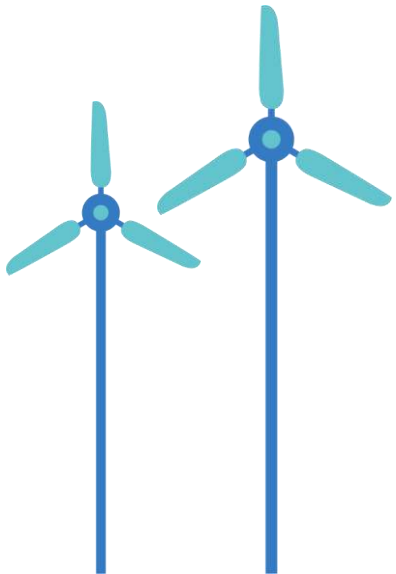
Mass Imbalance (Accelerometers)

Weight difference between blades



Tower Frequency Analysis

Tower & foundation condition diagnostics



Wake Steering Control Strategy

- Yaw misalignment table (one offset per wind direction per turbine) proposed based on SCADA Data analysis and measures of TI/yaw misalignment from WindEagles units
- Check/acceptance of the OEM
- Implementation of static wake steering control strategy

Control by windeagle units :

- Turbulence Intensity
- Yaw misalignment
- True North
- Wind Speed which hits actually the turbine
- AEP Gain

Real-life Yaw Misalignment campaign on Irish 6 3MW turbines WindFarm		
WT	**yaw misalignment detected**	**Percentage gain (cos3.5) after correction**
T1	-5,6	**1,66%**
T2	-6,8	**2,44%**
T3	-8,0	**3,36%**
T4	-7,5	**2,96%**
T5	-7,4	**2,88%**
T6	-6,2	**2,03%**
	Mean	**2,56%**

CF:40%, Electricity Price 90 €/MWh

Estimated gain after correction €	24 197 €	€/WT/year
TOTAL ANNUAL GAIN	145 180 €	€/YEAR
Payback time	1,6	month

Conclusions for Penmanshiel turbines	Method based on theoretical power curve	Method based on filtered power curves
Turbine 01	Medium YM	High YM
Turbine 02	Medium YM to high YM	Medium YM to high YM
Turbine 04	Well aligned	Medium YM
Turbine 05	Medium YM	High YM
Turbine 06	Well aligned to medium YM	Medium YM to high YM
Turbine 07	Well aligned to medium YM	Medium YM to high YM
Turbine 08	Very high YM	Very high YM
Turbine 09	Well aligned to medium YM	Medium YM to high YM
Turbine 10	Medium YM	Medium YM to high YM
Turbine 11	Medium YM to high YM	High YM
Turbine 12	Medium YM	Medium YM to high YM
Turbine 13	Well aligned	Well aligned to medium YM
Turbine 14	Medium YM	High YM
Turbine 15	Medium YM	Medium YM to high YM

Performance Improvement

We are a leading provider of performance improvement solutions tailored specifically for wind farms. With a commitment to optimizing renewable energy generation, we offer comprehensive services designed to enhance the efficiency, reliability, and profitability of wind energy projects worldwide.

- Performance Monitoring and Analysis: Our cutting-edge monitoring systems provide real-time data on wind turbine performance, enabling proactive identification of inefficiencies and potential issues.
- Turbine Optimization: Leveraging advanced control strategies and predictive maintenance techniques, we optimize turbine performance to maximize energy output while minimizing operational costs.

Solar Resource Assessment

- At VOTC, we offer integrated solutions that combine Solar Resource Assessment and Weather Monitoring System (WMS) services to provide comprehensive insights for solar energy projects and weather-dependent operations.
- Customized installation of meteorological stations tailored to project requirements for accurate data collection.
- Measurement of weather parameters such as temperature, humidity, wind speed, wind direction, solar radiation, and precipitation.
- Secure data logging and transmission systems for seamless access to real-time weather data.
- Advanced analytics and reporting to support operational planning, risk management, and resource optimization.

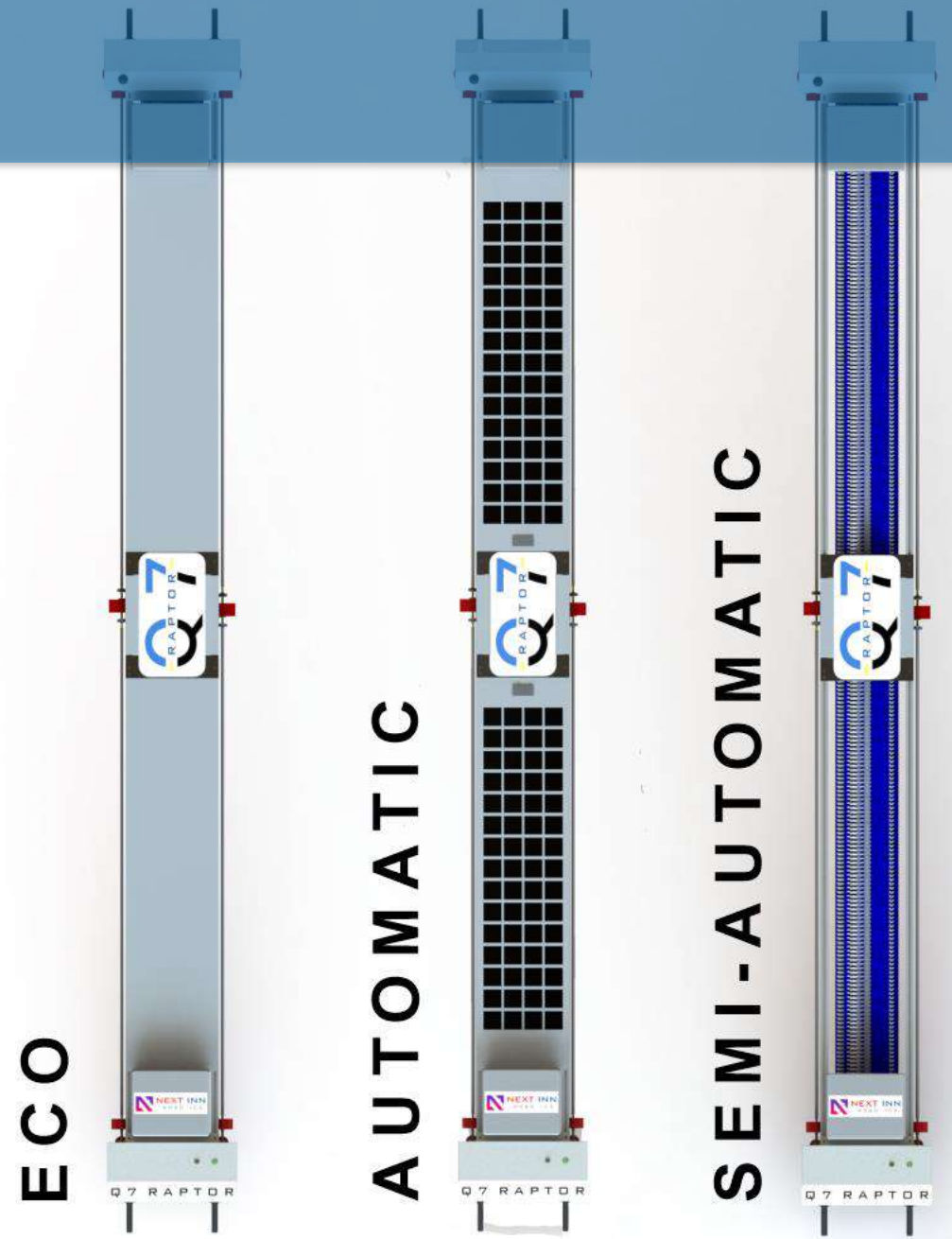
Solar Resource Assessment / Weather Monitoring System (WMS)

Fully Automatic & Semi-Automatic Robotic Cleaning Solution

Fully Automatic & Semi-Automatic Robotic Cleaning System

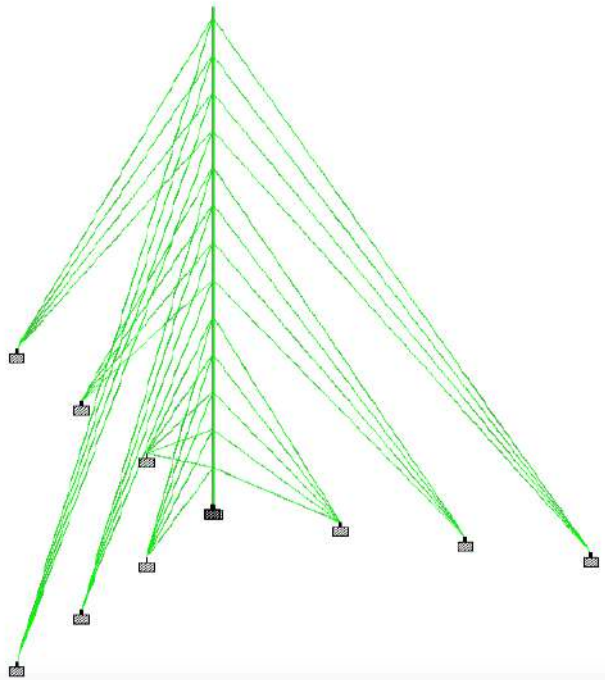
VOTC (NextInn Robotics Sister Company) specializes in the design, implementation, and maintenance of fully automatic and semi-automatic robotic cleaning systems for a variety of applications. Leveraging cutting-edge technologies and innovative solutions, we offer customized cleaning solutions that enhance efficiency, safety, and reliability across industries. Our comprehensive services encompass the following key areas:

- System Design: We collaborate closely with our clients to understand their specific cleaning requirements and operational challenges.
- Technology Selection: We carefully select the most suitable cleaning technologies and equipment based on the nature of the cleaning task, the type of contaminants involved, and the environmental conditions.



AUTOMATIC & SEMI AUTOMATIC ROBOT

Wind Resource Assessment Insights



Meteorological Mast – Design & Approval

- **Structural Design:** Designed by 25+ years experienced Team for designing SBC, high wind gust, international standards for structures.
- **IEC Compliance:** It is approved & accepted by various international consultants like UL, DNVGL, Wind Guard, Profec.

IEC UL DNV DEUTSCHE WINDGUARD

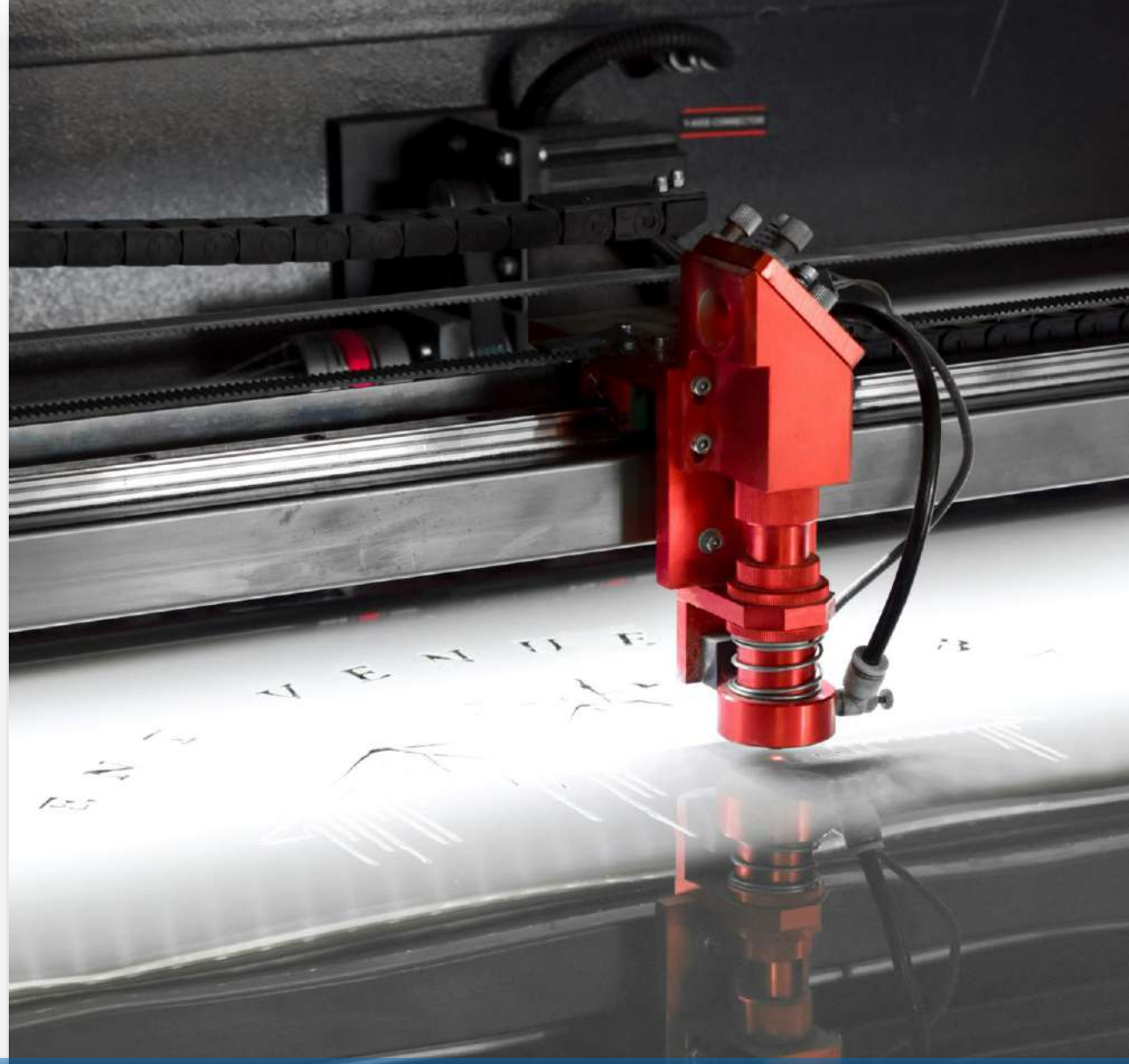
- **Independent Auditors:** BureauVeritas, NIWE, TATA Projects Limited.
- **Standards:** Standards like IEC 61400-12-1, Ed. 1 & Ed. 2

VALUE ONLINE TECHNOLOGY COMPANY

Fabrication of Meteorological Mast

- We have an in-house tower manufacturing facility with machines and equipment that seamlessly produce triangular & square lattice towers.
- We have an overall manufacturing capacity of more than 9 lattice towers (150+ height) per month with full-fledged facilities for development of square & triangular lattice towers, large storage capacity for raw materials and finished goods.
- All the lattice tower & accessories are hot dip galvanized to ensure they do not rust for a long time.
- The galvanizing process is done according to the international standards: BS EN ISO 1461. The galvanizing facility is equipped with zinc and acid fumes extraction systems, Effluent Treatment Plant for waste acid and rinsing water which helps in controlling pollution.

- Our laser cutting process is distinguished by its remarkable accuracy, with a tolerance of just 0.1 millimeters.
- We employ standardized templates and cutting profiles, meticulously crafted to guarantee consistency and uniformity across production batches.
- Our laser cutting machines are programmed to execute these standardized cutting operations with minimal manual intervention, maximizing efficiency and repeatability.
- Additionally, we prioritize material optimization by calibrating cutting parameters to minimize waste and maximize yield, enhancing cost-effectiveness for standard pipe sizes.
- Our standardized cutting processes are designed to accommodate high-volume production demands, allowing us to meet large-scale orders efficiently without compromising on quality.

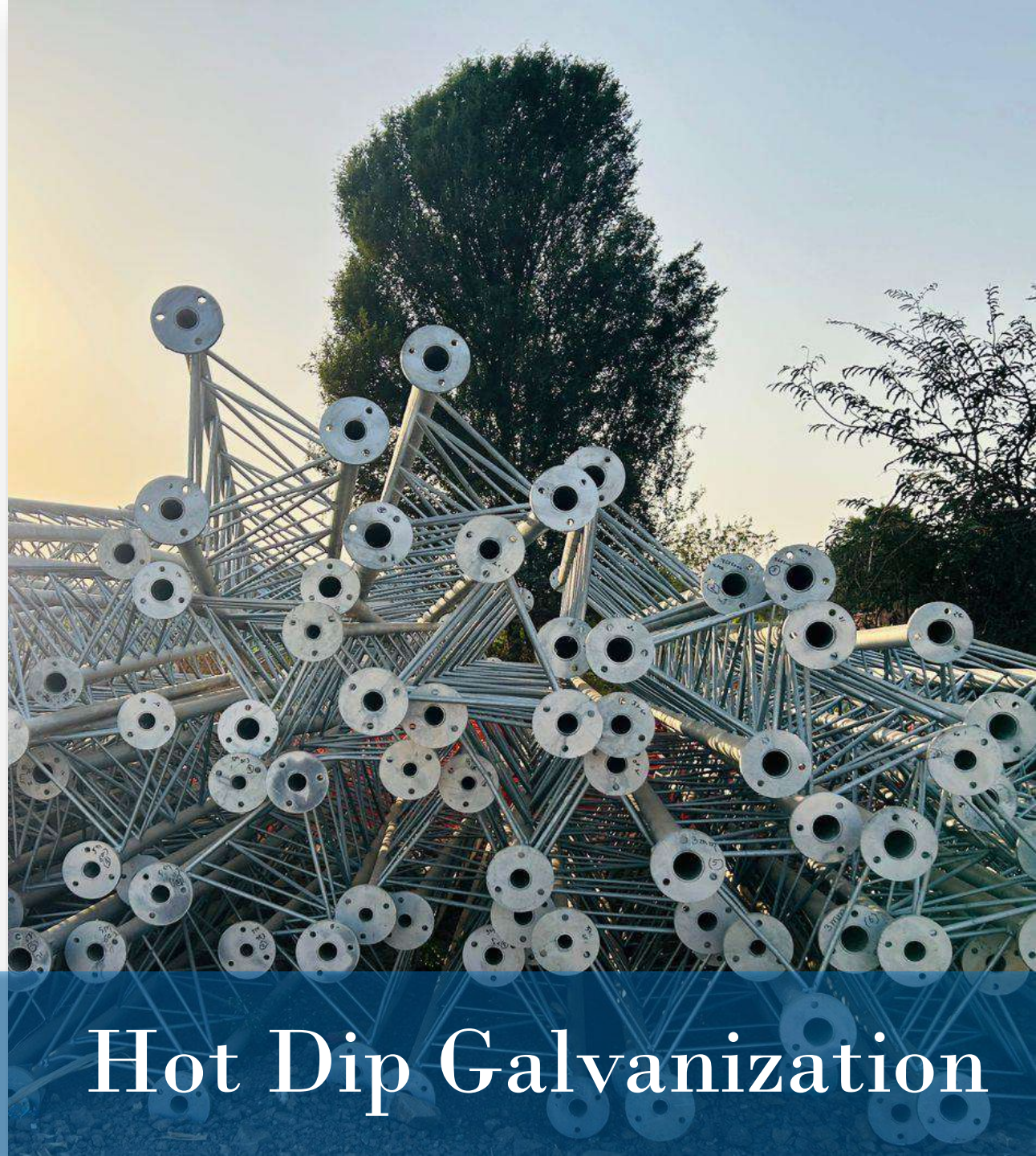


Precision Laser Cutting

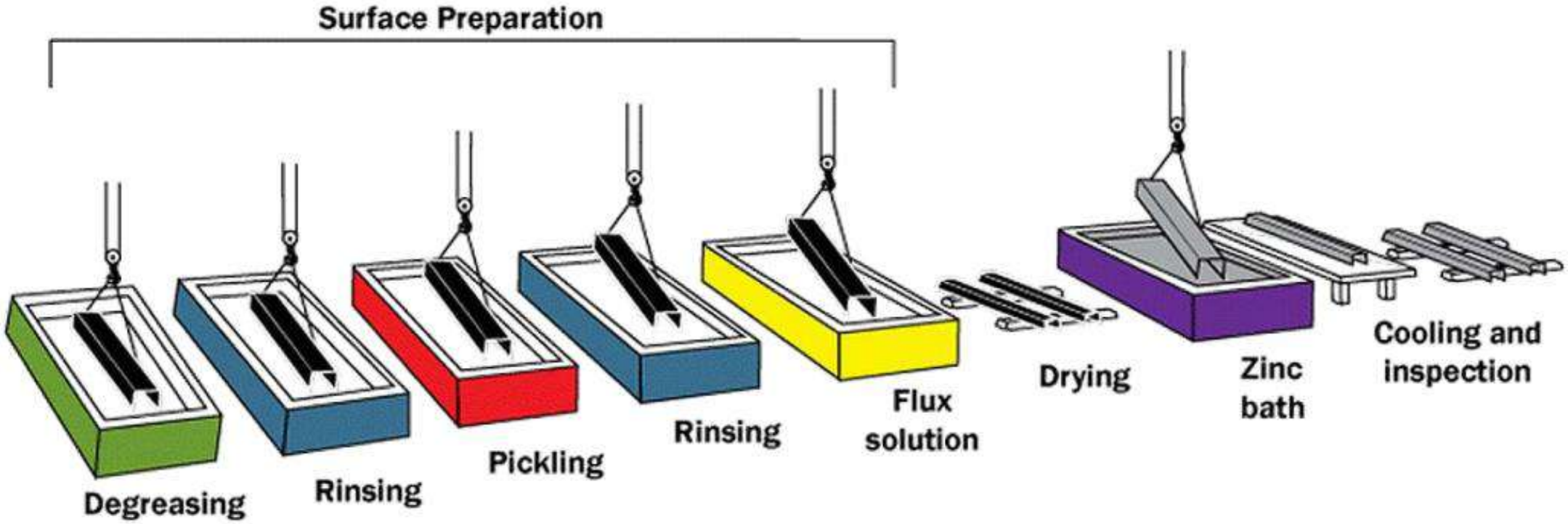
Fabrication Processes & Quality Assurance

- Design and Fabrication:
  - Develop detailed engineering designs for the meteorological mast, ensuring compliance with industry standards and regulations.
  - Fabricate the mast structure using high-quality materials capable of withstanding harsh environmental conditions.
  - Integrate mounting hardware and instrumentation ports to accommodate various meteorological sensors and equipment.
- Quality Assurance:
  - Implement rigorous quality control measures throughout the fabrication process to ensure the structural integrity and reliability of the mast.
  - Conduct comprehensive testing and inspection procedures to verify the performance and functionality of the fabricated mast.

- Our galvanization process is meticulously engineered to counter erosion by applying a zinc coating with exceptional effectiveness.
- Employing carefully calibrated parameters and established procedures ensures consistency across all treated surfaces, while automated technologies streamline the process for efficiency without compromising precision.
- Throughout, stringent quality control measures validate the coating's effectiveness, ensuring uniform thickness, coverage, and adhesion.
- By optimizing materials and employing scalable processes, we deliver reliable protection against erosion, reinforcing the longevity and resilience of metal assets across diverse industries.
- Additionally, we prioritize material optimization to minimize waste and maximize the utilization of zinc resources, promoting sustainability and cost-effectiveness in our operations.



Hot Dip Galvanization



Galvanization Process

Galvanization Flow

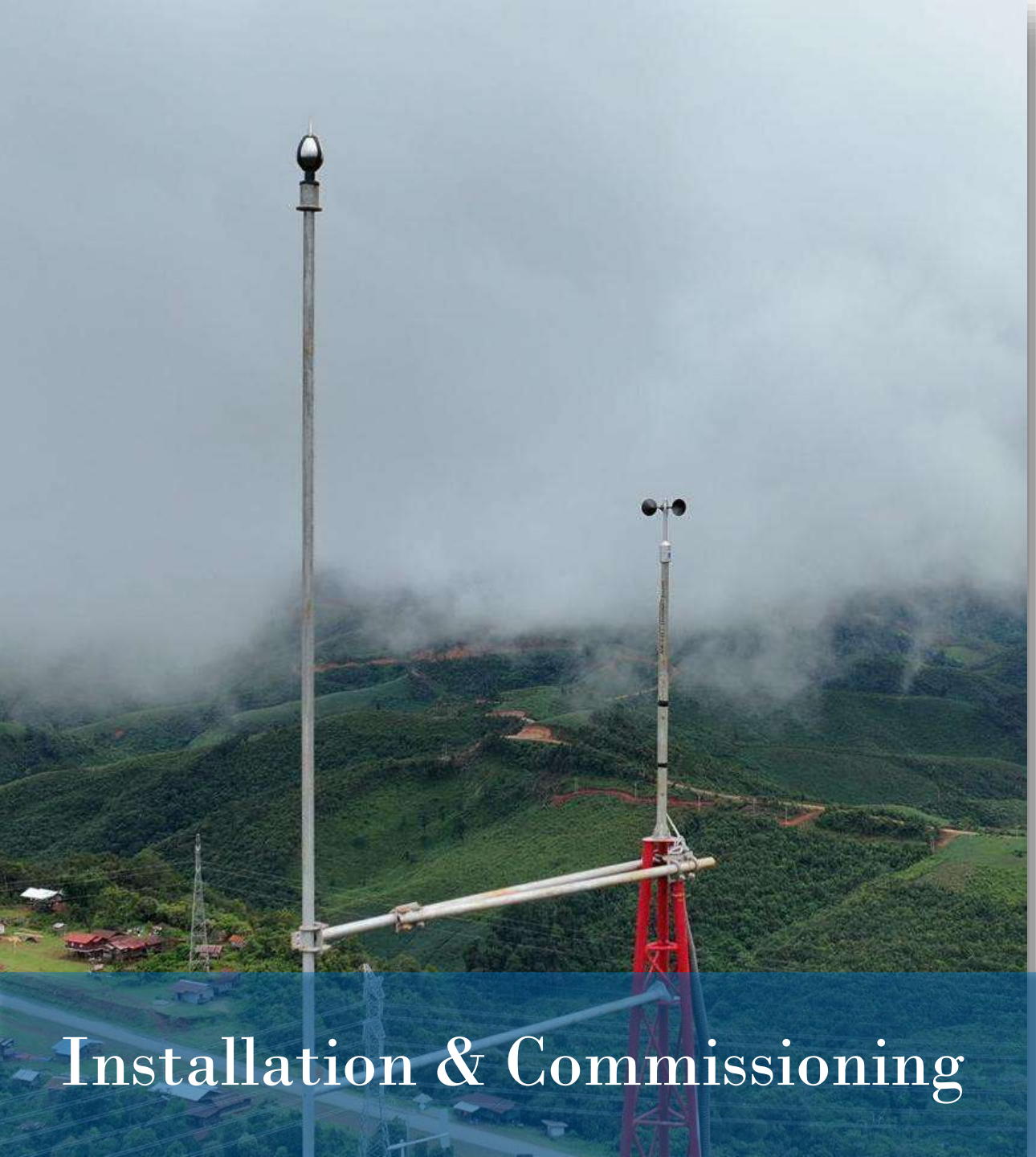
- Degrasing
- Pickling
- Rinsing
- Visual Inspection
- Pre Flux
- Galvanizing
- Quenching
- Treatment
- Testing Finishing

GMAW & FCAW

SAW

SMAW

GTAW

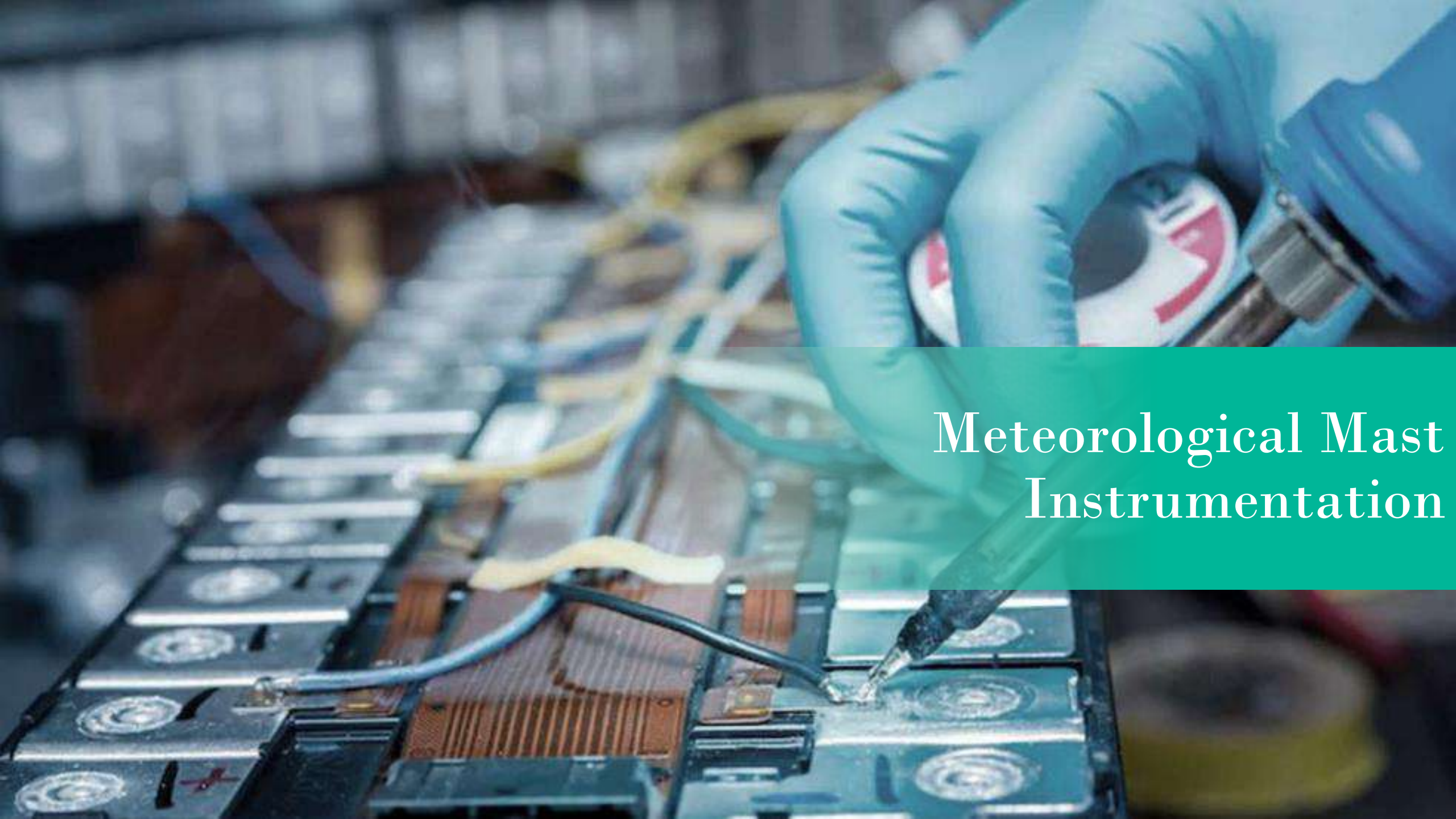


Installation & Commissioning

- We have in house team of engineers & technicians to success- fully execute installation & commissioning of measurement systems, be it a 3 meter triangular tower for a weather station or over 150 meter guyed lattice tower.
- The installlation of senosrs is done by experienced team of climbers who are fully trained for work at height.
- Our team also ensures to follow all EHS norms during the installation & always use approved PPES to ensure personal safety.
- Our team is equipped to handle emergency situations swiftly and effectively, with established protocols in place to address any unforeseen challenges or safety concerns during installation.

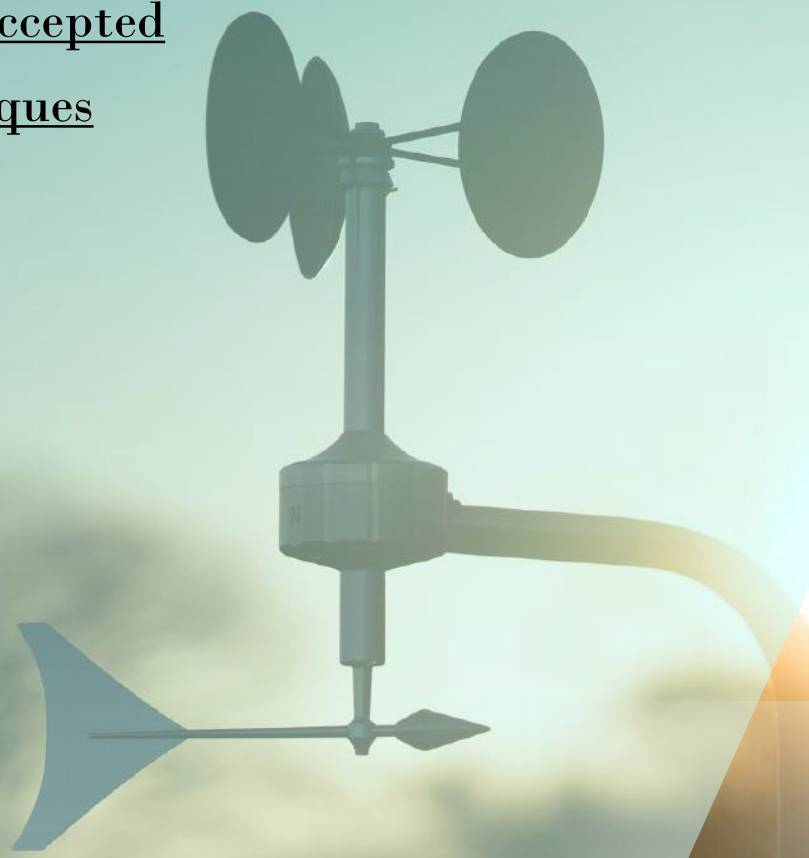
- We are certified by Occupational Health & Safety Management System (OHSAS) 45001:2018.
- GWO Certification: WAH, MH, FA, FF certified team.
- Medical Fitness & Insurance: For all employees.
- OPITO/ Offshore – HUET with EBS, BOSIET Certified team.
- Method Statements: We provide method statements to issue work permit.
- 5S: We follow 5S procedure in our company
- Ensure compliance with all applicable EHS laws in all countries in which the Company operates. Manage EHS risk and performance effectively; actively seeking and acting upon meaningful opportunities to reduce risk and improve our EHS performance.

HSE Policy Statement



Meteorological Mast Instrumentation

- IEC Compliance
- Most Accurate & Globally Accepted
- Smart Programming Techniques
- Robust & Reliable
- Surge Protection



Instrumentation

Instrumentation

Wind Vane

Data Logger

Cup Anemometer

Temperature & Humidity Sensor

Pressure Sensor

Ultrasonic Anemometer

Data Logger (Campbell Scientific)

Pyranometer

Procurement & Delivery

- **Procurement:** Timely prourement & onsite delivery is very critial to adhare to the project timeline & we ensure to have sufficient inventory of items in our stock so as to avoid delays in the installation.
- **Inventory / Stock:** Most of the sensors need to be calibrated in a laboratory which could be time consuming We ensure to keep a stock of commonly used calibrated sensors to minimize delivery time.
- **Packaging:** We provide measurement cabinets, sensors properly packed in wooden boxes & entire solution in shipping containers of 20’ & 40’ (as per the export import regulation)
- **Overseas Supply Chain Management:** Our foreign export and overseas export services are designed to provide you with a seamless and efficient experience, regardless of the distance. With our global reach and local expertise, we ensure that your products reach their international destinations safely and on time.

Insights to Robotic Cleaning System

Q Rapter 7– Automatic & Semi-Automatic Robot for Module Cleaning

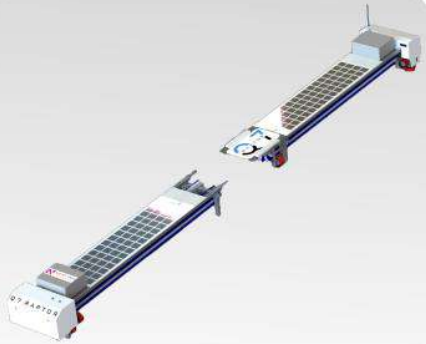
Robot for PV Module Cleaning

Value Online
Technology Company

Self Locking

Modular

Easy Handling



Flexible

Wheel Adjustment

Modular Design

Robust

HUMAN SAFETY

- Electric Hazards - Autonomous Cleaning
- Improper Lifting - Insulated Handles
- Mechanical Hazards - Contact Free

ENVIRONMENT

- Water Consumption - Dry Cleaning
- Non-toxic - No Fossil Fuels
- Waste Generation - Zero

ROBOT SAFETY

- Trip & Fall - Self-locking Design
- Theft Protection - Live Tracking
- Faults - Automatic Fault Detection

GREEN ASSET

- Trip & Fall - Self-locking
- Live Stress - UDL By Wheels
- Stress - Contact - Less Motion

Projects in Last 5 Years

- 125+ Wind Mast with (150+ meters) supply & installation, 120+ Met Mast Maintenance for various clients.
- 40+ Automatic Weather Station & Solar Resource Assessment projects done.
- 35+ Wind Turbine Power Curve Projects successfully commissioned in India.
- Several instrumentation supply for Australia, South Korea, South Africa, Kenya, Vietnam, Laos, Phillipines, Egypt, Spain.
- Fabrication & Supply of HVRT System to UL – India for wind turbine testing projects.
- Wind Farm Performance Optimization for Diverse Client

- Techno Commercial Marketing Team with 8+ years experienced professionals.
- Mechanical & Electronic Engineers for design & development of products.
- In house PCB Design Engineers & Tools.
- Our own manufacturing facility for lattice towers – over 8000 sq feet area.
- Tower Design Certified by Structural Engineers.
- Land Liasoning Team for procurement of Land for various projects.
- Experienced & skilled Team for Civil Foundation, Tower Erection & Onsite Installation.
- Climbers trained for Work at Height & Rescue Training (GWO).

Advantages of VOTC

Engineering Team

Mr. Govind Shukla

Technical / Marketing Head | Director

Mr. Mohit Bhajipale

Project Execution Lead

Mr. Shivaji Pawar

Team Lead for Site Activities

Mr. Mayur Sahare

Co-Project Lead

Mr. Akash Chavan

Embedded Software & System Engineer

Mr. SaiKumar Bet

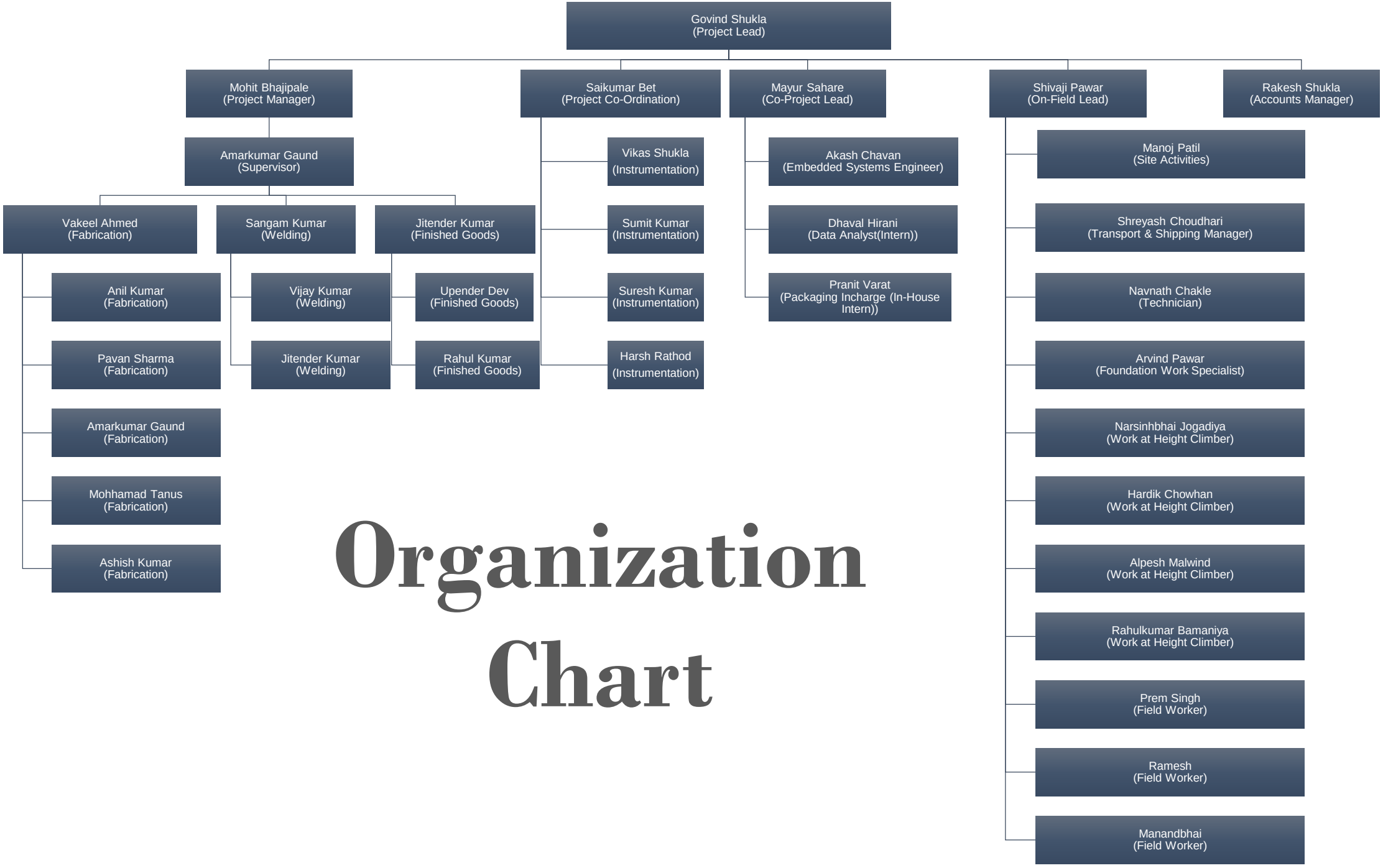
Data Analyst

Mr. Shreyash Choudhari

Co-team Lead to Site Installation & Transport /Shipping Manager

Mr. Dhaval Hirani

Intern – Profiling & Report Analyst



Organization Chart

THANK YOU

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Delhi – 110009 (INDIA)

G/N 769, Koregaon Bhima, Shirur Taluka,
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- www.votc.in