L&T Technology Services

# Wind Platforms, Engineered to Scale

Nearly two decades. One engineering memory.




CASE STUDY

## THE PROBLEM

Wind's economics come down to cost per megawatt-hour, and for two decades the only reliable way to move it has been bigger machines. Every megawatt of rating makes the engineering harder, not easier: a substantially new machine every few years, certified, moved to site on public roads, kept serviceable long after the design team has gone — while the price keeps falling. The load spikes with each platform programme and collapses between them, so it cannot be staffed to. Spreading it across vendors fixes headcount and breaks something worse: every handoff loses design intent, and nobody owns the interfaces where the blade, the tower, the converter and the plant meet.

**The client, a global wind turbine OEM, needed a partner that could own scope outright and carry the design knowledge across turbine generations, not supply capacity.**

## WHY IT WAS HARD

**01** **Scale punishes the design.** Scale a rotor at constant tip speed and swept area and power grow with the square of diameter, while mass and moments grow with the cube. Aerodynamic stress stays flat; gravity-driven stress rises linearly with size. Each generation is not a scaled copy — weight has to be bought back through materials, load control or a different structural concept.

**02** **The certificate bounds the design.** Type certification evaluates the design basis, the load simulations run to IEC 61400-1, the components and the manufacturing as one set, assessed by an independent certifier such as DNV. Change a component and the case reopens.

**03** **Modularity multiplies interfaces.** One module changed on paper propagates into load cases, control software, tooling, service documentation and the bill of materials of every configuration that uses it. Without hard interface control and clean master data, variant count explodes and the platform's economics invert.

**04** **Nothing can be discovered in the field.** Power quality and fault ride-through are measured to IEC 61400-21-1 before a grid operator will accept a machine, so electrical behaviour must be provable on a bench. Transport and lifting rigs must be validated before the first lift.

**The hard part was holding all four at once, generation after generation, without losing what the last one taught us.**

## HOW THE SCOPE WAS EARNED

| 2007–10 | 2011–14 | 2015–18 | 2019–22 | 2023 onward |
|---|---|---|---|---|
| **Narrow-scope vendor** | **Research partner** | **Engineering services supplier** | **Single-source design partner** | **Value-adding partner** |
| Entry through safety risk assessment and validation of special transportation tooling. | Integrated content management and FEA programs begin. | A dedicated delivery team stood up for the account. Digitization of WTG data begins. | Single supplier for detailed design. CAPEX partner in a converter test facility. Five patents filed. | Digital programme implementation partner. R&D pool for embedded and control systems. Global testing as a managed service. |

# WHAT LTTS ENGINEERED

**A partnership of nearly two decades without a handoff. LTTS has held accountability on both sides of the connection point - the machine and the plant it stands in**

## OWNED INSIDE THE CLIENT'S PROGRAMS

- **The machine.** Single supplier for detailed design — the design work itself, not review support around it.
- **The plant.** Balance of Plant and EHV pooling substation design for a 200 MW plant: grid integration and load-flow studies, lightning protection and foundation earthing, plant automation, SCADA and cyber security, and plant monitoring software — full scope owned from design to rollout.
- **Simulation and data.** Integrated content management, FEA and digitization of WTG data, so simulation, design and configuration run in one controlled loop rather than separate silos.
- **Embedded, control and digital.** A dedicated R&D pool for embedded and control systems, and implementation of the client's digital programme.
- **Test.** Global testing delivered as a managed service, on a converter test facility LTTS partnered on as a CAPEX investor.

## THE PORTFOLIO CAPABILITY BEHIND IT

- **Design ownership** across blades, tower and nacelle; support structures, tower internals and foundations; power transmission and power conversion; plus transportation tooling, digital factory, engineer-to-order on PLM, and service, obsolescence and master data.
- **Depth:** 800+ man-years in wind; 10+ patents with six in wind equipment and tooling; V&V, HIL/SIL and EMI/EMC test capability; lifecycle services across machines from 1.5 MW to 15 MW.



## OUTCOMES

| Dimension | What was achieved | Why it's credible — the engineering driver |
|---|---|---|
| **Relationship depth** | **Vendor to single-source design partner** | Single-sourcing detailed design concentrates risk. Leading Global Wind OEMs do this only on a proven record. |
| **Scope** | **The machine and the plant** | Most partners do one or the other. Here one team answers for both sides of the connection point. |
| **Data discipline** | **Simulation, design and configuration in one loop** | Clean master data is what keeps a modular platform economic and an ageing fleet serviceable. |
| **IP created** | **Five patents filed** | Patents mean original design work, not supplied capacity. |
| **Test capability** | **CAPEX partner in a converter test facility** | A supplier that co-funds test infrastructure is committing past the contract term. |
| **Engaged scale** | **400+ dedicated engineers** | Grown inside the client's own programmes, not assembled for a bid. |




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ENGINEERING THE CHANGE


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