

Minimising time to market for innovative composite wind turbine blade design by securing certification within near record time

STRUCTeam and DNV GL (formerly Germanischer Lloyd) completed the design certification of a new composite wind turbine blade within less than three months. This certification in near record time was the result of the two organisations' close working relationship and composites expertise, alongside STRUCTeam's rapid understanding of the high quality engineering deliverables required for a certification of this type.

“This was the first wind turbine blade design verification we had received from STRUCTeam and you would usually expect a new client to take time getting used to how the reports should be prepared,” explains Dr Simon Pansart, DNV GL's Principal Engineer Rotor Blades. “From the beginning, STRUCTeam delivered high quality engineering and documentation that made it quite easy for us to go through the certification process. As a new customer coming to us for certification for the first time, they were very well prepared.”

STRUCTeam's Managing Director Julien Sellier believes that developing a strong relationship with DNV GL's rotor blade team and understanding the processes resulted in the certification going so smoothly: “It was simple things like understanding when key members of DNV GL's rotor blade team would be available for the next stage of certification that smoothed the way. Because we maintained regular communication throughout, we streamlined the process.”

Achieving the optimum blade design

According to Julien, the challenge facing STRUCTeam was to obtain design certification from an internationally recognised and top three global certification body so that the blade design became internationally accepted.

This had to be completed within tight deadlines to meet the overall project schedule, to minimise the turbine's time to market, make it available ahead of competing products and to deliver best performance with optimal material use.

He explains: “The wind turbine OEM's specifications were demanding. The challenge, as with most blade designs, was to achieve the best combination of aerodynamic and structural performance whilst reducing overall turbine system cost.

“Minimising blade mass and rotor solidity reduces the overall system loads and as a result the total lifetime costs. This was also a design that would be manufactured in volume, so the



development of robust manufacturing processes that complemented the structural architecture was key. Design for manufacture was essential to ensure quality.”

A further aspect of certification is the time schedule, as Simon highlights: “There are always two factors that determine the speed of a certification. The first is the resources we have available and the speed with which we can get to work. The second part is the quality of the design the customer delivers to us”

“If we have lots of questions on the initial designs that we have to go through and that involves lots of discussions and changes it can take a while, but this did not happen. STRUCTeam and I communicated regularly during the month before the project started so we were prepared from a resource scheduling point of view. Many companies do this, but it is rare for a first time customer such as STRUCTeam. In this case, they were well prepared.”

Project management and preparing the correct design and engineering deliverables

Simon notes that the quality of the engineering was quite striking; this meant that STRUCTeam submitted all of the structural drawings of the blades and the calculations that were 90-95% of what was needed first time.

“STRUCTeam was very good in delivering the required documents to check compliance with certification requirements. They delivered the right analyses at the start, and provided drawings we could work with immediately. With STRUCTeam, it was not necessary to go through a long process of explaining what is required to get to the point where we can certify”

Simon adds that it was also STRUCTeam’s professional attitude to project management and communication that made it easy to deal with the certification: “STRUCTeam was the single point of contact and we were not obliged to talk to the blade manufacturer, the turbine OEM or the end-customer. This was very efficient.”

Completing the design certification in less than three months

STRUCTeam submitted the design for certification in late June, and by early September DNV GL had completed its work and issued the certification. This represented a turnaround time of less than three months, which is near record time for a design certification.

Simon explains: “Our role was to go through the design and do our own validation and calculations. Where we identified some details where the design might not be fully compliant with the certification requirement, we sorted this out with STRUCTeam directly over the phone.”

Julien highlights that getting new designs accepted is always a challenge, but this was overcome through thorough preparation and close collaboration with DNV GL’s rotor blade team: “This was a very smooth project for STRUCTeam, and it was easy for us to work together through the technical challenges that we encountered that are specific to any project.”



Once certified, the rotor blade design was rapidly incorporated into the OEM's wind turbine offering. The fast availability of the certified blade design enabled the OEM to take the product to market faster, and ahead of competing designs. It is now widely adopted in several major Asian wind farms.

Continuing to deliver state of the art blade designs

STRUCTeam are continuing to work closely with other wind turbine OEM clients and DNV GL's rotor blade team to deliver state of the art blade designs. Most recently, a carbon fibre blade for a large offshore turbine has also been developed and will shortly go through the same certification process.

"The benefits and challenges associated with the use of carbon fibre in wind blades are balanced in our latest large blade design," highlights Julien. "We have shown that it can deliver improved performance characteristics on the turbines, providing a source of competitive advantage.

"Our manufacturing process engineering team have also liaised closely with the proposed blade builders to make sure that the right form of carbon is used in the design. It is important that the material products are tailored for wind to give the robustness and quality necessary."

He concludes: "We are sure that our previous experience of working with DNV GL on blade certification will enable this design to be certified quickly and efficiently for our clients."