

# Mind the Gap and Optimise Your Blade Solution

a report by  
**SSP Technology**

## The Winds of Change

As wind turbines are getting larger to meet market requirements for offshore and off-highway installations, so are the blades. In general, an extensive development effort is taking place to scale up existing technologies from current suppliers of known concepts, rather than accepting that larger blades require new thinking and a stronger interface with wind turbine design.

At the same time, the wind turbine market is continuously becoming more competitive, with a high number of new entrants. This too is pushing the requirement for fast-developed new blade designs.

## The Modular Blade Concept

Most current blade designs are built up around a modular design concept, in which each module has its own life and limitation. Typical modules are the root concept (T-bolt design) and the spar cap concept, around which most blades are designed, based on a very limited number of aerodynamic profiles.

This way of designing, however, has two key restrictions, both of which will reduce the overall competitiveness of the final wind turbine design.

Firstly, the concepts were developed in the days when a large blade was no longer than 25 metres. Nowadays, a short blade is 40 metres and new blade designs have lengths between 45 and 60 metres. The concept of the T-bolt solution in particular, and of the spar cap, has thus been taken far beyond the imagination of their original developers. Hence, there is a gap between what is required to make blades competitive and what traditional concepts are providing.

Secondly, the modular view on design also often involves various partners in the design process, hence triggering a number of transitions with a likelihood of gaps in information, knowledge-sharing and processes, and making it difficult to run the required number of loops in the design process to ensure the most competitive solution based on the specific requirements of the blade design. Thus, the lowest common denominator will determine blade design.

## The Holistic Approach to Blade Design

SSP Technology looks at blade design in a less traditional way and takes a holistic approach, based on the application of new, patented concepts, particularly the root joint with integrated bushings, and the spar concept, both of which will ensure competitive, tailor-made blades to the benefit of both producer and user.

The general assumption is that the rotor blade has to be re-invented every time a new turbine design is developed from beginning to end, tested and manufactured in a single piece.

This way of thinking has already been replaced in more highly developed sectors, such as the automotive or electrical industry, by standardisation as well as access to best of breed components.

From its foundation, SSP Technology addressed the issue of best of breed components and as a result, the company is now able to supply two proven core components; the SSP load carrying spar and the SSP root solution. Using this as a platform combined with an application-specific aerodynamic profile, the customer is able to obtain a specific blade solution at a fraction of the cost and with increased flexibility.

The SSP patented root solution is a lightweight but strong construction offering high repeatability and minimal weight differences. All plies are cut in prepreg material by CAM (Computer-Aided Manufacturing) machines making the serial process extremely efficient and accurate.

The SSP patented spar is produced in a female mould making the surface of the spar very precise at each point, as well as driving down potential production errors. Another important feature of using the SSP spar in a blade is the fact that the blade can be upgraded to a higher wind class without having to change the spar mould.

Apart from general considerations, a holistic blade design must include considerations of optimum bolt-circle diameter, spar design, root joint design, place and method of manufacture, level of workers' skills, turbine customer, place of installation and maintenance. It requires a continuous dialogue with the customer and several loops to ensure maximum optimising of the complete blade design.

The difference in performance and loads between a standard blade and an SSP tailor-made blade can be significant. In fact, most surprisingly for many customers, the total investment in blade design and manufacturing facilities is often lower with an SSP tailor-made blade, particularly compared with a standard blade with a traditional root solution.

## From Drawing Board to Batch Production

Back in the days when SSP Technology was established, the founders developed their first rotor blade, the 34-metre rotor blade for installation on tested 1.5MW plants which gave the company globally unique expertise from drawing board to batch production. This know-how is currently available to customers and partners in the form of a turnkey production concept.

SSP Technology has taken the holistic approach to heart and is constantly acting upon it, with a view to always offering competitive and reliable products that are tailor-made to the individual customer.

Knowing that no two customers are alike, SSP Technology specialises in adapting to the customers' wishes and creating a solution that exactly meets the customers' needs, starting from blade design through mould and prototype production, to technology transfer with full commissioning and training of customers' personnel. By offering a complete blade solution, it is important to have constant focus on optimisation of products and services, and the company always uses the best and most reliable materials available on the market.

This kind of package solution has been carried out and implemented in many countries around the world resulting in thorough knowledge and years of experience in working with different cultures.

To keep constant focus on development of new solutions and improvement of existing ones, SSP Technology has a dedicated R&D department investing in aerodynamics, materials, structural design and production processes – always with a view to maximising

reliability and strength of the solutions and lowering prices per kilowatt hour.

SSP Technology takes pride in sharing the company's specific know-how with customers in order to scale up for future competition on the market, which is without a doubt going to demand the best from its players – whether well established or new to the industry.

By exchanging knowledge and experience with customers during the different project stages, SSP Technology is able to offer customers solutions that are adjusted and optimised to each specific product always making sure that expectations are met and the status of each project is evaluated and validated according to the agreed time frame.

SSP Technology understands the importance of working together as a team while catching the winds of tomorrow, today. ■