

카본파이버 적용 블레이드 개발

Development of Carbon Composites Blade

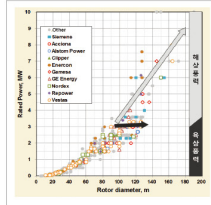
TRL7

기술내용

- 저풍속 지역용 대형 카본 블레이드 개발
- 카본 블레이드 실증 및 성능평가
- 블레이드 설계 기술 고도화
- 국산 블레이드용 카본 소재 개발
- TBC (Twist-Bend Couple) 기술을 적용한 블레이드 경량화
- 카본 블레이드 적용 풍력 터빈 사양
 - Rated Power : 3MW
 - Rotor Diameter : 120m 이상
 - Blade Length : 60m 이상
 - Capacity Factor : 37% 이상 (평균풍속 7m/s 기준)

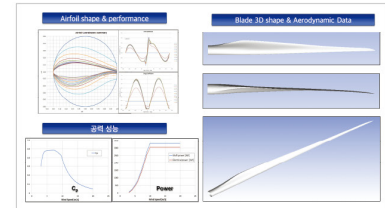


카본 블레이드 개발 배경

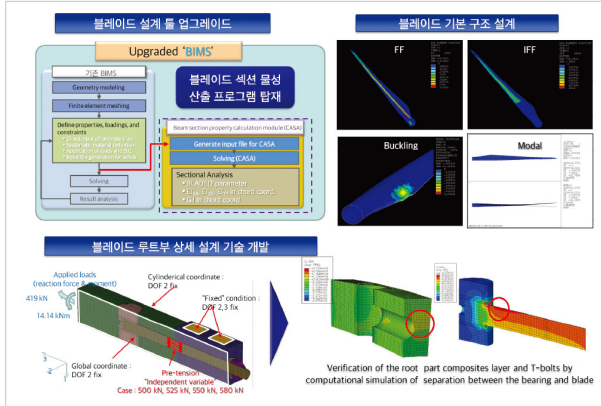


- '25년까지 육상시장이 80% 이상 높은 비중 유지 전망
- 전력 수요가 높고 전력망 연계가 용이한 저풍속 육상 시장 확대
 - ↳ 로터 직경 증가로 고성능
- 현재 : 1.5~2.5MW 주력모델
- 향후 : 3MW급 보급 확대 전망 (25년 44% 전망)

공력 설계 및 형상 설계



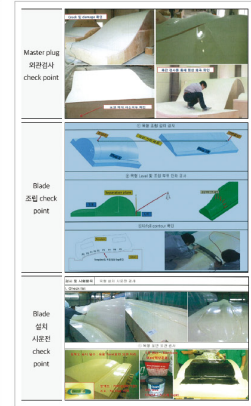
구조 설계



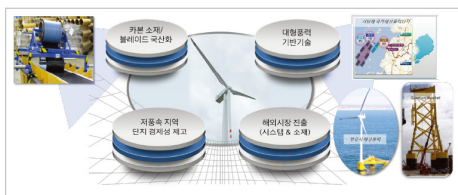
카본 소재 개발



성형 장비 개발



사업성



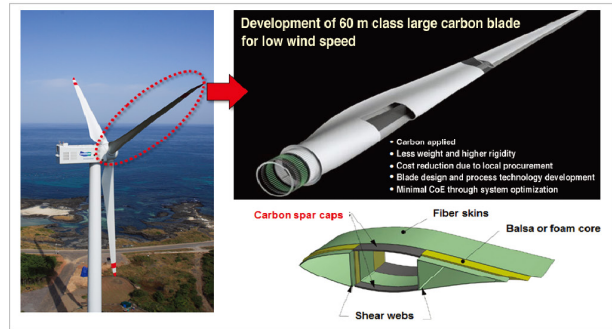
- 국내 내수 시장 국산화 풍력 터빈 공급 및 국산 카본 블레이드 적용 터빈의 Track record 확보를 통한 국가 경쟁력 확보
- 호주, 브라질, 동남아 등 고성장 시장진출, 국내발전사와 동반 해외진출 도모
- 국산 터빈의 경쟁력 확보로 해외 시장 진출
- 블레이드 설계 기술의 고도화를 통한 국내 풍력 터빈 기술 경쟁력 강화
- 국산 소재의 활용을 통한 복합재료 내수 시장 활성화

Carbon Fiber Reinforced Composite Blades

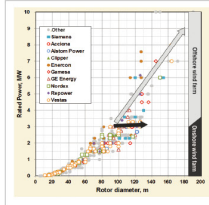
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Technology Overview

- Development of large carbon blades for low wind speed application
- In-situ testing of carbon blades and evaluation of their performance
- Enhancement of blade design technology
- Development of carbon prepreg for wind turbine blades
- Reducing blade weight using twist-bend couple technology
- Specifications of wind turbine incorporating carbon blades
 - Rated Power: 3MW
 - Rotor Diameter: No less than 120 m
 - Blade Length: No less than 60 m
 - Capacity Factor: No less than 37% (assuming avg. wind speed is 7m/s)

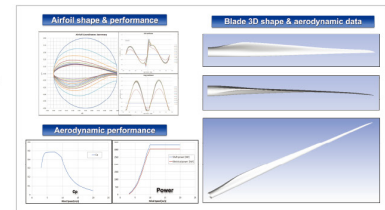


Background

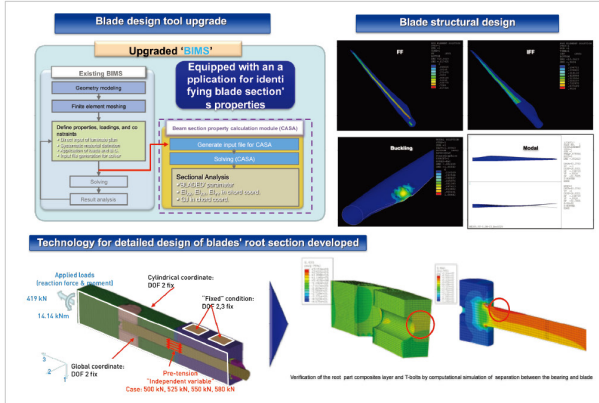


- The onshore wind farm market will continue to be dominant until 2025 (with over 80%)
- Low wind speed onshore market which is easy to connect to the grid is increasingly expanding due to high electricity demand
 - ⇒ Higher performance due to greater rotor diameter
- Today: 1.5-2.5 MW models are dominant
- Future: Occupancy of 3 MW models will increase (44% by 2025)

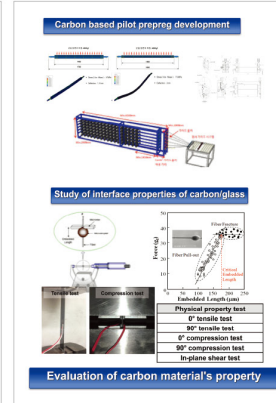
Aerodynamic design and shape design



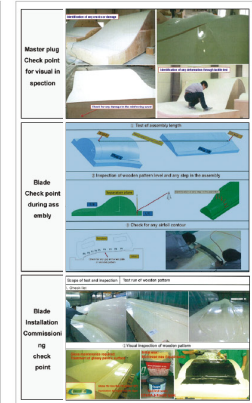
Structural design



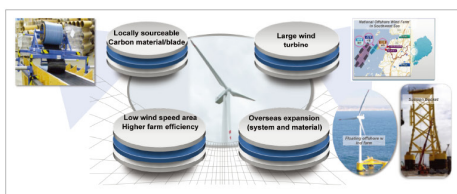
Carbon prepreg development



Manufacturing equipment



Business Cases



- Supplying domestic wind turbines to the domestic wind market and enhancing competitiveness of domestic wind industry by accumulated track record
- Providing opportunities to expansion into emerging markets like Australia, Brazil, Southeast Asia
- Expanding international market share with enhanced competitiveness
- Helping to upgrade the blade design capability
- Stimulating domestic composite material market according to localization of materials