In 2010 a new fabric reinforcement solution for wind blades based on R-glass has been presented as Ultrablade™ Fabric [1]. This solution delivers a modulus increase of 17% in fiber direction and reaches 49-50 GPa at 56% fiber volume fraction when compared to traditional E-glass reinforcements [2,3]. Measured static tension strength of 1066 MPa and a compression strength of 907 MPa show an improvement of more than 20% versus traditional reinforcements [2,3]. The measured fatigue strength of 292 MPa at R=–1 (tension-compression) at 10e+6 cycles show an improvement of more than 60 years versus traditional reinforcements [2,4,5]. Evaluation of the economic impact of this new solution has been achieved using new computational models as presented in DEWEC 2010 [6]. A blade load simulation carried out on 40m and 60m blades showed cost saving in the same magnitude as the modulus increase of 17% to 20% if the material is used in the spar caps [7]. When comparing different blade sizes the saving is higher for larger blades. A more favorable load spectrum on components such as pitch and main bearings was also observed.

Improve blade spar cap cost by 17% - 20%
More favorable load spectrum on bearings
Reduced blade weight
Better aerodynamical performance, higher energy yield

Abstract

Impact of High modulus Fabric Solution on Production Cost and Performance of Wind Turbines

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