

عنوان مقاله:

MAPNA ۲.۵ MW Wind Turbine Nacelle Redesign; Second Part: Free Vibration and Strength Analysis

محل انتشار:

سی و یکمین همایش سالانه بین المللی مهندسی مکانیک ایران و نهمین همایش صنعت نیروگاهی ایران (سال: 1402)

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نویسندگان:

Mohsen Maleki - *Stationary Equipment Design Specialist, R&D Department, MAPNA Generator Engineering and Manufacturing Co.(PARS), Karaj*

Eqlima Mahdavi - *Special Tools Design Specialist, R&D Department, MAPNA Generator Engineering and Manufacturing Co.(PARS), Karaj*

Mohsen Nikfar - *Head of Stationary Equipment Design, R&D Department, MAPNA Generator Engineering and Manufacturing Co.(PARS), Karaj*

خلاصه مقاله:

The present study explains the static and free vibration analysis of the redesigned nacelle cover of the ۲.۵ MW wind turbine. Besides covering the nacelle, nacelle cover experiences various loads like wind loads, the weight of the technician who stands on the nacelle, snow weight, and fall protection system. Because of this reason, the new design of the nacelle cover should be evaluated by strength and free vibration analysis. In order to decrease the weight of the nacelle cover, this structure is composed of composite materials. The nacelle cover has been formed from six parts. Fastener bolts have been used to connect the nacelle cover's sections. Bolts preload has been defined in the simulation to indicate the effects of bolts' torque on contact surfaces. A parametric study has been performed to evaluate and achieve the proper value of the preload bolts. Finite element analysis has been utilized in the present study. The geometry model has been created in CATIA and then imported into the ANSYS workbench. ACP pre and post-moduli have been used to model the composite laminations and post-process the strength analysis results, respectively. The model has been meshed by almost ۲.۵ million elements, and contacts among the model parts have been simulated by bonded, frictionless, and frictional contacts. The present analysis results for composite sections should be evaluated by the criteria defined for composite materials like Tsai-Wu. The present analysis shows that the natural frequencies and margin of safety for composite parts are in the acceptable ranges.

کلمات کلیدی:

,Wind turbine, Nacelle cover, Strength analysis, Free vibration analysis, Finite element analysis

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