JEEE-U (Journal of Electrical and Electronic Engineering-UMSIDA)
Vol 7 No 1 (2023): April, 11-26
Electrical Engineering

Design of Savonius Double-Stage Wind Turbine, Capacity 300W

Perancangan Turbin Angin tipe Savonius Double-Stage, Kapasitas 300W

Ridwan Alfiansyah Singaperbangsa University Karawang
Jojo Sumarjo Singaperbangsa University Karawang
Aripin Aripin Singaperbangsa University Karawang

The use of fossil energy sources is increasing along with the increasing need to make reserves of fossil energy sources dwindling. Without the discovery of new reserves, oil in Indonesia will run out in the next nine years, natural gas will run out in 22 years, and coal will run out in 65 years. According to ESDM data, with current technology, the electricity potential from renewable energy reaches 432 GW, or 7-8 times the current total installed generating capacity. Wind energy (wind) is one of the renewable energy potentials, and the most widely available among all energy sources. Therefore, to anticipate the depletion of energy reserves that we have and to take advantage of the existing energy potential, research is being carried out on designing wind turbines so that we can take advantage of the existing energy potential, and not only depend on fossil energy which is depleting, and the main goal is know how to design and get the appropriate size and design of the turbine. From the design results obtained the value of the rotor diameter is 442 mm, the height of the rotor is 884 mm, the blade height is 439 mm, the diameter of the end plates is 486.2 mm, and the diameter of the shaft is 18 mm. As well as from the simulation, the maximum shaft stress value is 30,794 N/m2, the maximum displacement is 0.313 x10-4 mm, the minimum safety factor is 3.028, and the strain value is 0.114 x10-6, where these results can be used as a reference for the manufacture of this wind turbine later.

References

1. A. Pribadi, “Menteri Arifin: Transisi Energi Mutlak Diperlukan,” Esdm.Go.Id, Oct. 22, 2020. Https://Www.Esdm.Go.Id/Id/Berita-Unit/Direktorat-Jenderal-Ebtke/Menteri-Arifin-Transisi-Energi-Mutlak-Diperlukan-1 (Accessed Jul. 14, 2021).
2. Iesr, “Laporan Status Energi Bersih Indonesia: Potensi, Kapasitas Terpasang, Dan Rencana Pembangunan Pembangkit Listrik Energi Terbarukan 2019,” Mar. 2019.
3. I. P. Prakoso, P. Hartono, And U. Lesmanah, “Perencanaan Turbin Angin Sumbu Vertikal Tipe Darrieus-H Dengan Penambahan 2 Blade Tipe Savonius Untuk Pembangkit Listrik,” Jurnal Teknik Mesin, Vol. 13, Jul. 2019.
4. M. F. W. Permadi And I. H. Siregar, “Uji Eksperimental Turbin Angin Sumbu Vertikal Jenis Cross Flow Dengan Variasi Jumlah Blade,” Jurnal Teknik Mesin, Vol. 6, Pp. 15–31, 2018.
5. T. Zulfadli And A. Mulkan, “Studi Kelayakan Energi Matahari-Angin (Hybrid) Sebagai Sumber Daya Pompa Air Untuk Sistem Pengairan Di Kawasan Aceh Besar (Visibility Study Of Hybrid Solar-Wind Energy To Power Up The Pump For The Irrigation System In The District Of Aceh Besar),” 2019.
6. J. Sumarjo, D. B. Santoso, And I. A. Bangsa, “Desain Optimal Wind-Turbines Tipe Savonius Sebagai Suplai Energi Listrik Di Desa Pusakajaya, Kabupaten Karawang,” Jurnal Teknologika, Vol. 10, May 2020.
7. I. Priyadi, A. Surapati, And V. T. Putra, “Rancang Bangun Turbin Angin Horizontal Sebagai Salah Satu Pembangkit Daya Pada Mobil Hybrid,” Seminar Nasional Inovasi, Teknologi Dan Aplikasi (Senitia), 2018.
8. M. Amiri, M. Kahrom, And A. R. Teymourtash, “Aerodynamic Analysis Of A Three-Bladed

Pivoted Savonius Wind Turbine: Wind Tunnel Testing And Numerical Simulation," Journal Of Applied Fluid Mechanics, Vol. 12, No. 3, Pp. 819–829, 2019, Doi: 10.29252/Jafm.12.03.29324.