

A Wind of Change in Braking Systems for Power Generation

Airborne Wind Energy Systems (AWES) that produce energy as they soar through the sky are the latest innovation in wind power generation. These ground-breaking solutions require equally innovative brakes, as their needs greatly differ from conventional wind turbines. When a leading developer of AWES was looking for braking systems that would meet the unique, specific requirements of its applications, Svendborg Brakes was able to offer an ideal solution.

AWES are one of the latest and most promising technologies to produce electricity from renewable resources. They use tethered aircrafts, or other flying objects, to harvest high-altitude winds that blow at heights above 300m from the ground. By exploiting the fast, persistent, and less turbulent speeds of high-altitude winds, AWES can generate power at unprecedented levels.

More precisely, in 1980 the pioneering work of Loyd offered the mathematical demonstration that flying a tethered device across the wind could produce power outputs up to three times greater than comparably sized existing wind systems in similar conditions.

Further to their impressive outputs, these innovative wind energy converters also benefit from compact, lightweight and highly adaptive designs that considerably reduce the financial, environmental and noise impact of generating power. When deployed on floating offshore platforms in deeper waters, AWESs do not require solid foundation or much ballasting to restrict movement as they operate in tension. As a result, they can be used in locations where sea depths reach several hundreds of meters.

Additionally, maintenance activities on key components such as power generators, brakes and control systems are streamlined. In effect, these pieces of equipment are located at sea level and easily accessible by boats. Innovative solutions require equally cutting-edge components.

When a leading AWES developer needed suitable braking systems for its products, it contacted Svendborg Brakes, a division of Regal Rexnord Corp. The company has extensive experience in providing intelligent braking solutions and power transmission components to the wind energy sector.



HIGHLIGHTS

- Hydraulically-applied brakes
- Parking and low-speed dynamic brake functionality
- Braking force up to 190 kN
- Flexible, modular design
- Quick and easy pad replacement
- Protection C4-H standard ISO 12944-2



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The AWES manufacturer was looking for an innovative braking system with an extremely compact footprint which could operate without an external power supply. This would allow the energy converters to maximise the benefits offered in terms of cost, environmental impact and flexibility. In addition, it was crucial for the components to be able to withstand harsh offshore operating conditions.

In order to address these requirements and design an optimum braking system, Svendborg Brakes established a close collaboration with the AWES manufacturer. As a result of this strong relationship, Svendborg Brakes was able to develop a solution based on CB90-R ultra energy rotor brakes. These are active, hydraulically actuated systems for high-energy braking installations. Therefore, they suit the AWES' operating conditions. In addition, the CB90-R is designed to be extremely compact, allowing them to fit into applications with limited room.

The brakes are operated by similarly small hydraulic power units (HPUs) from Svendborg Brakes, allowing the entire system to fit into the AWES body. When braking, the callipers squeeze their pads against brake discs made of stainless steel. While uncommon for conventional braking applications, this material would allow the setup to operate effectively and for long periods of time in offshore environments.

SUCCESSFULLY TAPPING INTO PIONEERING POWER GENERATION APPLICATIONS

Thanks to this brake design, the AWES developer was able to produce a setup that uses 90% less material than conventional wind converters, such as wind turbines, while doubling the amount of energy produced. Extremely happy with the results, the company has since adopted the Regal Rexnord solution into its product range as standard.

Tilman Speer, International Sales Manager/Business Development Manager at Svendborg Brakes, comments: "Initially impressed by our existing portfolio, the customer has reported its satisfaction in our ability to design and deliver fully customised solutions, as well as offering continuous assistance throughout the R&D stages of the project. We look forward to further developing our relationship with the customer in future and collaborating on innovations in this exciting new renewables sector."

As a result of this successful collaboration and the resulting interest received for these innovative braking systems, Regal Rexnord has added them to its product portfolio to support the fast-growing AWES segment. Businesses in this field can therefore benefit from proven, bespoke, high-quality braking systems as well as comprehensive post-sales services. Tilman Speer concludes: "There is no question that there is a huge demand for special-purpose drivetrains to drive the renewable energy sector forward. Our brand has a longstanding leading position in the wind energy market as a specialist provider of robust and effective braking systems. These latest solutions further attest to our commitment to support businesses in this field with key products and services."

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