

## **WorleyParsons provides design support for revolutionary wind power technology**

As an organisation that focuses on finding solutions to the world's changing resources and energy challenges, WorleyParsons continuously seeks to develop and encourage innovative ideas, refine those ideas and take them to market. With the drive towards renewable energy gaining pace, the project delivery company is harnessing its deep insights of energy markets and understanding of new energy technologies, and collaborating with innovators in this sector. One such innovator is Brayfoil Technologies which has developed a groundbreaking morphing wing that represents a first in aerodynamics.

The Brayfoil is an auto-setting morphing wing that has the potential to make a significant impact on the reduction of fossil fuel usage and the consequent reduction of atmospheric pollution and global warming. The revolutionary wing can reverse lift from one surface to the other, and can become any section required by the aeronautic designer by a simple actuation method. Whilst primarily a solution that expands the operating envelope on aircraft with vastly reduced cost and complexity from current technology, Brayfoil is focusing on the renewable energy field as its first area of development.

WorleyParsons is supplying design support in the form of engineering drawings and engineering analysis for the Brayfoil turbine prototype which uses a flexible wing in a vertical axis configuration to create optimal lift at low rotational speeds, enabling the use of large, dynamically adjustable wing surface areas. Its strength lies in its simplicity as the seamless wing works without hinges, joints, panel sections or flaps.

The world-wide patented Brayfoil is the invention of Robert Bray, an architect and entrepreneur incubated at the Climate Innovation Centre South Africa. Although still in the early stages of prototype development, the Brayfoil wind turbine has already been subjected to comprehensive scrutiny and has passed feasibility trials at the Faculty of Engineering at Stellenbosch, and wind tunnel testing at South Africa's Council for Scientific and Industrial Research (CSIR).

WorleyParsons has been working closely with Brayfoil on optimising the design of the moving wing mechanism, as well as the external skin of the wing that requires flexion and morphing abilities.

"WorleyParsons management has been incredibly supportive since the moment I showed them the groundbreaking technology, and has given significant engineering input on the application to wind power at end user. This move away from large utility wind farms to embedded solutions is now clearly going to become a reality in the near future," says Bray. Of particular interest he says is the use of the new turbine on city buildings in good wind resource areas, where it is a disruptive technology to solar PV, being cheaper power in far greater quantity than is available from the sun, on the limited roof areas of city buildings.

Robert's son Matthew Bray, Director of Strategy & Operations at Brayfoil Technologies, explains that conventional wind turbines have a horizontal axis with propeller blades that require a large amount of space and stable, smooth wind in order to generate power.

By contrast, Brayfoil wings have reflex sections which allow them to set their own angle of attack to the wind by using a flexing shell that can change shape and create variable lift. "The benefit of this is significantly higher energy yields compared to conventional turbines, as well as none of the noise or animal mortality associated with large, high-speed turbines and existing small wind turbines in urban areas," says Bray. "What is really interesting is that the turbine blades (or wings) are being made from transparent materials that renders them far less visible than current turbines."

Compared to solar PV, the Brayfoil turbine can generate two to 15 times more kWh per square metre of surface area. Being a vertical axis unit, the Brayfoil turbine is not necessarily mounted on a tall tower and is designed to collect energy by the better use of laminar wind flow acceleration and turbulent wind apparent on the edges of buildings or at the cusps of hills, ridges or forest belts, thereby further improving energy yields.

Consequently, the Brayfoil turbine has the potential to make renewable wind energy easily accessible to end-users, as it can operate in urban areas with wind speeds that are significantly lower than current benchmarks for conventional wind turbines. They are also suitable for use in the shipping industry as they can be placed on the decks of ships to supplement energy and reduce air pollution. With new legislation forcing ship owners to comply with emissions levels, the Brayfoil turbine is well placed to solve this problem on a global scale.

The Brayfoil turbine has been manufactured by Diesel Electric Services, who specialise in the design, manufacture, delivery, installation, commissioning and maintenance of generator sets, distribution boards, UPS and associated products. "This project would not have been possible without Diesel Electric Services who has provided considerable assistance to the development of the turbine," says Bray.

Besides wind turbines, the Brayfoil can be applied anywhere where wing sections are used, opening up greener energy solutions that were previously impossible. These include hydro power generation, maritime power, safer, faster automobiles, automatic sailing and fuel savings in aviation. Bray comments that engineering drawings and tooling have already been completed for an automatic wing sail production model, while aviation wing design is in the conceptual stage.

WorleyParsons is a world leader in the renewables energy field and has comprehensive expertise in the renewable energy sector. The organisation engages with power supply customers all over the world, including utilities, governments and energy companies to create sustainable energy solutions and forge creative partnerships. WorleyParsons has delivered projects in solar, wind, hydro, biomass and geothermal power, and supports customers in developing and realising their emissions reduction strategies.

WorleyParsons says that their focus is on staying relevant to customer needs in a rapidly changing energy sector, with a growing future portfolio of renewables working alongside traditional energy sources. This aligns with Brayfoil's belief that renewable energy is no longer a choice, nor does it constitute a compromise in affordability or the call for universal energy access, with decentralised embedded energy forming a large portion of an increasingly greener future energy mix.

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