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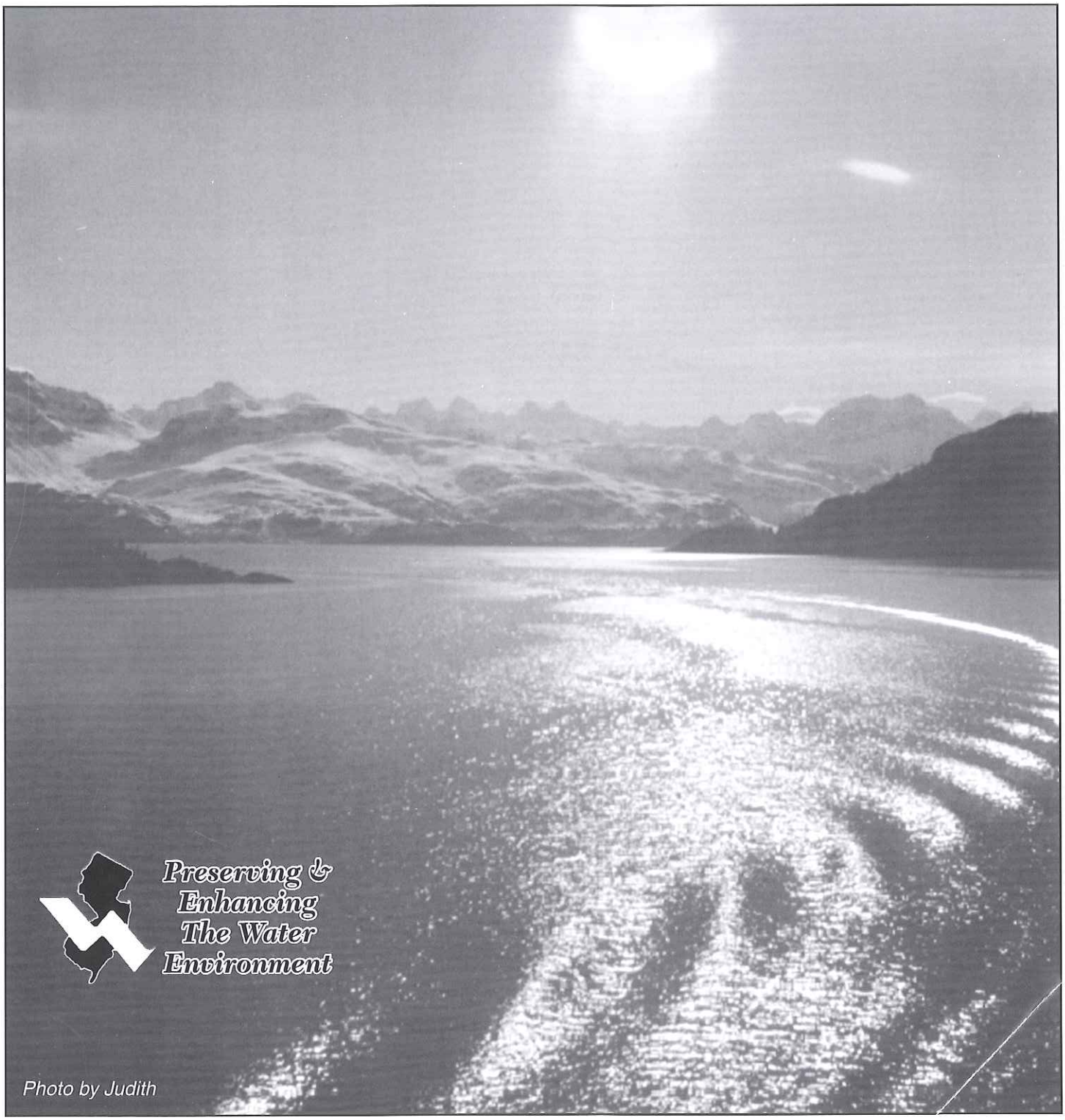
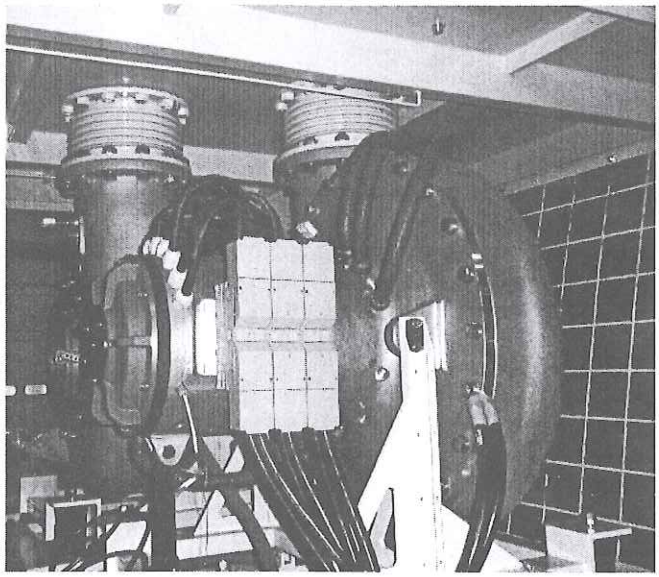


THE EVOLUTION OF BLOWERS

HOW AERONAUTIC TECHNOLOGY CHANGED THE WAY WE AERATE AND WHO IS BEHIND IT ALL

by Elana Podvalniuk, APG-Neuros, Inc.

When APG-Neuros, Inc. came out with their revolutionary air-bearing technology just a few years ago in 2005, it was received with hesitation and skepticism on the wastewater market. Today, APG-Neuros' air-bearing turbo blowers are installed in 220 locations in North America and 170 units are currently on order. The product has optimized and made aeration more energy efficient in wastewater treatment plants where the majority of APG-Neuros' blowers are installed, bringing a much needed change to the aging technology on the blower market.



The first Positive Displacement Blower was invented and installed by Roots Brothers in Connersville, Indiana, in 1859; made out of wood, it was initially used as a "more efficient water wheel, generating power for milling until someone noticed that such an arrangement would move a quantity of air and the use as an air blower was begun"[1]. This was followed by the invention of Multi Stage Centrifugal Blowers in 1945, Single Stage Centrifugal (gear driven) in 1980 and finally Single Stage Centrifugal (Magnetic Driven) in 1985. Since then, for almost 20 years there was little technological advancement in the blower industry – until the Single Stage Neuros Turbo Blower was introduced in 2003.

APG-Neuros' Turbo Blower technology was founded in the aerospace and defense industry where Aero Engines were used in Unmanned Aerial Vehicles (UAV) and in the F-16 military aviation program, making the technology tested and reliable. The core of the technology is the patented 3rd generation bump foil air bearing which is oil-free and non-contact, needing no lubricating or associated maintenance resulting in lower vibration from the rotor during operation. It proved to have durability and endurance which was demonstrated through 25,000 starts; equivalent to more than twenty years lifetime in a typical operation.

Another key technology within the blower is the high efficiency impeller, which is designed using in-house software based on aero gas turbine engine technology. It's a solid forging impeller machine with 5-axis machining for higher integrity and higher fatigue life, as well as a larger diameter and precise impeller shape combined with optimal speed resulting in higher efficiency. The Permanent Magnet Synchronous Motor (PMSM) transfers EMF to load rather than windings and slip rings with no physical contact between stator and shaft, offering high precision motor speed control. Driven by sinusoidal PWM algorithm lowers motor heat rejection and minimizes cooling requirements resulting in energy savings.

Other design features include the cooling of the blower core, the VFD and the control systems with the blower inlet air. With no heat rejection to the blower room, no auxiliary exhaust systems are required and no additional power consumption for cooling. The 200 to 300 Horse Power models have an Integrated Glycol cooling system for higher performance and durability with no external water supply required. Finally, every standard Turbo Blower model comes with an Allen-Bradley Programmable Logic Controller which makes it possible to run the blower in constant pressure, flow or DO control mode. It can also work with other different PLC options to suit customer's control systems, making controlling, monitoring and diagnostics easy. APG-Neuros' blowers can now attain flow rates of up to 20,000 SCFM and a discharge pressure up to 15. The Dual Core models NX400 (400 HP) to NX700 (700 HP) combine two cores within the same enclosure unit to provide flow rates range between 3000 and 20,000 SCFM

The Turbo Blower's innovating design results in many benefits; primarily the energy and operating cost savings of up to 35%[2] when compared to the conventional Positive Displacement Blower. Energy consumption being one of the biggest parts of operating costs of a WWTP; this could represent significant operational cost savings. Additional savings could be achieved with operational flexibility thanks to a turndown rate of up to 50% in single core and 76% in dual core, allowing the customer to turn up or down the air flow as needed. This is made possible by the combination of the dual core design and the automated system, DO and flow control.

Unlike the conventional blowers, the Turbo blower is also low noise and vibration thanks to APG-Neuros' patented Noise Trapping System enclosure design which effectively controls sound propagation and reduces noise levels to 80dB(A) – the low vibrating of the no-contact air bearing eliminates the need for heavy foundations.

The product is environmentally sustainable not only due to its energy savings, but also the reduced foot print and installation costs; the blower's space footprint is at least 25% smaller compare to technologies with similar flow rates. Finally, operating costs are further reduced thanks to the low maintenance of the blower which is limited to the periodical need to clean or change the air filter.

APG-Neuros' product is welcomed and accepted as the future of blowers in the wastewater market. The blowers allow WWTPs to be more environmentally sustainable, energy efficient and cost effective which are all growing concerns for WWTPs. "APG-Neuros' Turbo Blowers are the greatest thing that have come along in a long time. It's a great and easy to use blower that runs flawlessly and requires minimal maintenance" noted Jonathan Lane a Wastewater Operator from Benicia, CA.

1 Mark W. Royston. "The World of Positive Displacement Blowers; a Few Facts, Memories, and a Lot of Nostalgia." Royston Group. 1999. http://roystongroup.com/history.htm

2 Based on a third party case study published in WE&T. Katherine Bell, Jason Sciandra, and Kevin Wagner, "Aerate for Less; Turbo blowers can cut energy costs by more than 35%", WE&T (2010)

ABOUT THE AUTHOR

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