In today's economy, there is a great deal of pressure on water and wastewater treatment operators to simplify processes, improve productivity and go "green." In response, some have looked to regenerative blower technology as a solution. Interest in these products also has been heightened due to the higher costs and increased maintenance associated with traditional air-displacement blowers and compressors.

By Jay Jarboe

Selecting Regenerative Technology

Regenerative blower technology for improved productivity and reduced energy and maintenance costs

There are some basic regenerative technology principles to consider for those with water and wastewater applications. Blowers provide critical aeration for proper biological oxygen demand in water treatment applications. Most blower applications can be satisfied by multi-stage or positive air-displacement blowers and compressors, but at a relatively high price when factoring in their levels of energy consumption and demanding maintenance requirements. In contrast, regenerative blower technology can serve as a practical, efficient and industry-friendly alternative to help keep costs down and output high.

Regenerative blowers draw air or other gases into the blower unit by impeller blades passing an inlet port. The impeller blades then accelerate the air in an outward and forward direction using centrifugal action. The air is turned back, or regenerated, by the blower's annular-shaped housing to the base of following blades, where it is again projected outward. Every regeneration imparts more pressure to the air.

When the air reaches a "stripper section" at the outlet, it is stripped from the impeller and diverted out the blower. (The stripper section is located between the inlet and the outlet where the annulus is reduced in size to fit closely to the sides and tips of the impeller blades.) The outcome is that pressures generated by the one or two spinning, noncontacting, oil-free impellers are equal to those obtained by many larger multistage or positive-displacement blowers.

Regenerative Blower Advantages

Energy efficiency. Developing pressures higher than required for applications wastes energy. Regenerative blowers have been engineered to deliver the ideal pressure and flow for properly sized pneumatics at point of use.

Low maintenance and high reliability. Fewer moving parts reduce wear, tear, maintenance and downtime to promote sustained blower reliability. Unlike competing technologies incorporating necessary sliding vanes, valves and pistons, the only contacting moving parts inside a regenerative blower are two perma-

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nently sealed ball-bearing assemblies.

Green performance. Regenerative blowers supply clean air and are free of oil, excess moisture and other compressor-induced contaminants. They further eliminate any need for expensive, high-maintenance outlet filters and dryers or special water and oil traps.

Making the Grade

With pressures up to 10 psig, water aeration applications can be aerated up to 18-ft depths and provide a quiet, maintenance-free, oil-free air option to positive-displacement and multistage centrifugal blowers. Today's state-of-the-art regenerative blowers operate within OSHA standards without requiring costly and bulky muffler arrangements.

Motors on regenerative blowers are mounted into the housing, eliminating the need for V-belt or coupling drives. Permanently sealed motor bearings with 20,000- to 25,000-hour life eliminate the need for oil reserve levels and keep running whether with 8-hour-per-day or 24-hour continuous operation.

Regenerative blowers offer simplicity in motion. A noncontacting impeller spins within a housing without need for replacement or service. The blowers contain no complex or close tolerance lobes, timing gears, elaborate oil reserves or multiple-stage bearing systems.

Oil-free air is another key advantage. Air exiting a regenerative blower is the same air entering the inlet. With permanently sealed bearings (no oil reserve to maintain), there is no possible oil contamination, allowing cleaned water to exit the system more quickly.

The versatility of regenerative blowers allows for a variety of motor options, including high-efficiency, variable-speed, explosion-proof and totally enclosed, fan-cooled models.

Additional Considerations

Depending on needs and preferences, additional options for regenerative blowers may be appropriate. For example, it may be critical to measure correct air flow to help finetune a system for optimized efficiency. An airflow meter will allow for direct readings in SCFM. (Basic models can yield accuracy within 2% at standard conditions.) Meters can help in troubleshooting, too. For systems in which channeling or plugging can occur, a noted diversion in measured CFM may signal an otherwise unseen system change likely requiring attention.

Airflow meters additionally can play a role in balancing multipiping systems. When evacuating CFM from more than one pipe, differently run lengths or end-system impedance may cause one pipe to handle more CFM than the others. With an accurate and timely CFM reading, piping can then be balanced by bleeding air in/out or by creating extra impedance.

Users may want to investigate inlet/outlet mufflers or filter silencers in areas where reduced sound levels may be required; an inlet filter—normally used in pressure systems—to protect the blower and the air distribution system from dust, other airborne particles and contaminants; or gauges dedicated for measuring pressure, vacuum and temperature in various ranges. All can contribute to ideal system performance and reliability. WWD

Footnote: When evaluating regenerative blower technology for a water treatment application, a recommended first step is to partner with an experienced manufacturer. Such an expert resource can deliver input and insights that can make all the difference in realizing the full potential and all the benefits.

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