BLOWERS, COMPRESSORS AND MORE

*by Amy Stone**

While we have discussed friction loss in airlines, we haven't delved into the different kinds of air sources that are available in Aquaculture.

Compressor installation.

There are multiple variations of blowers, compressors and hybrids out there that each have a use in our industry. It's important to know how they work in order to select the proper equipment for the application.

Before we explore the types of aeration that are available, it is important to keep in mind a few things. First, there are very few applications where a back-up is not necessary. If the system can't function without aeration, then it is imperative to keep a second blower/compressor, either on the shelf or plumbed inline. As always, preventative maintenance programs are key to ensuring your livestock is as protected as possible from equipment failures.

In terms of installation, please refer to an earlier column where friction loss was reviewed and explained. This is one of the more common reasons that aeration equipment fails prematurely. Excessive heat caused by improperly sized piping systems causes bearing failures and in more extreme cases can cause the piping system to melt.

Blowers

Regenerative Blowers tend to be most common in aquaculture. This style of blower uses a large diameter impeller that has alternating channels which push air inward and outward within the impellor housing. As the fins of the impeller pass by the inlet, the blower takes in more air and discharges air at the outlet, with some of the air volume staying in the housing. This allows the blower to function in both vacuum and pressure applications. It produces high volumes of air at relatively low pressure.

This style of blower is perfect for tanks that have a standing water level of 1 meter or less and/or for diffuser placement in the same depth range. Since blowers use ambient air as their supply, it is important to avoid placing air diffusers at depths greater than one atmosphere of pressure, or

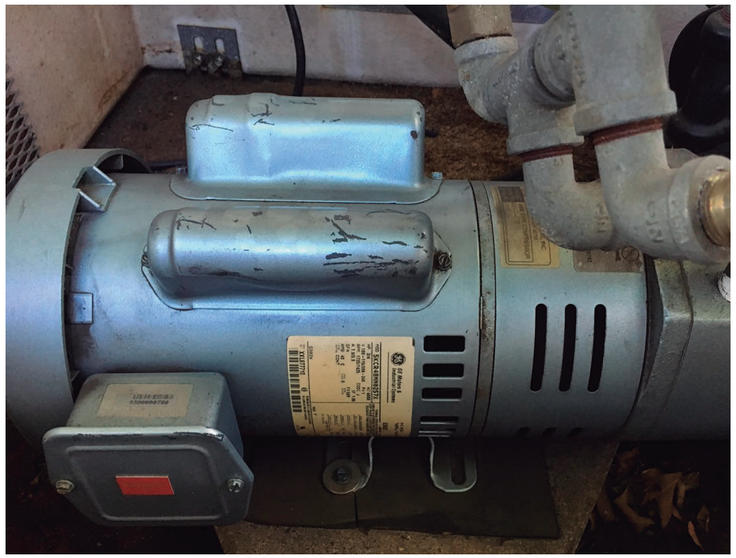
Regardless of what your application requires for air volume and pressure, there is a solution available. The key is making sure that the proper solution is chosen for the job.

Piston compressor.

14psi. This will reduce the possibility of nitrogen super saturation.

Regenerative blowers can be put in series to increase the amount of pressure they can produce. When they are put in series, one blower discharges into the intake of another equally sized blower. The pressure is basically doubled while the volume is relatively the same.

Squirrel or Centrifugal Blowers work in a manner similar to the regenerative blowers. However, they always have a tangential outlet. These blowers are used where higher volumes at very low pressures are required. They are often used on air exchange systems, ozone destruct systems or as cooling fans within compressor cabinets. They are not appropriate for providing air through diffusers or under any pressure.



Rotary vane compressor.

Compressors

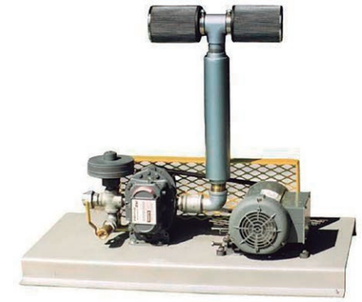
Vane Style Compressors use a sacrificial vane to compress the air within the housing of the unit. The style we most often see uses a compressed carbon material that wears away, and the vanes should be replaced once a year. These compressors provide low volumes of air at higher pressures than the blowers. These are most generally seen in pond aeration applications. In some cases, they are used to aerate deep algae vats. The compressor releases small carbon particles as the vanes wear. So, if a vane style compressor is being used to aerate clean cultures, an inline filter must be in place to avoid contamination.

Piston compressors are exactly what the name implies. They use pistons to compress the air. Like a car engine, they require regular gasket maintenance and can be difficult to rebuild. These are available in both oil-less and oiled versions. In most cases, we use the oil-less version since it is not a good idea to allow machine oil to be injected in culture water.

Rotary Lobe Compressors are usually referred to as Roots Blowers after the two brothers who invented the concept in 1860. The rotary-lobe compressor uses two intermeshing rotors mounted on parallel shafts. The two rotors rotate in opposite directions.

As each rotor passes the blower inlet, it traps a finite volume of gas and carries it around the case to the

Regenerative blower.



Rotary lobe compressor.

blower outlet. With constant speed operation, the displaced volume remains approximately the same at different inlet temperatures, inlet pressures and discharge pressures.

This style of compressor is often used with gas engines and is belt driven. They require a bit of engineering, as the pulley size and belt configuration both affect the volume and pressure of the air being delivered. These compressors work well in areas that do not have reliable electricity.

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