

Hybrid vs. Trilobe PD Blower

by: Wiekert J. Miolee Jr. -President of United Blower Inc. (UBI)

United Blower, Inc. highly promotes its Quiet Pulse trilobe PD blower with pulse control channels. A pulse control channel allows a small amount of discharge pressurized air, to infiltrate the oncoming pocket of air from the intake. In so doing, the typical “pop” that occurs when this pocket hits pressure, is greatly diminished, because the oncoming air pocket has been partially pressurized.

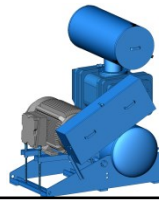
The net result is a much lower noise wave energy level hitting the discharge silencer, than would occur in a traditional 2 lobe blower. The noise level is also diminished by some 4-5 dbA, especially at elevated pressures of 10 PSIG and above.

The blower market has been introduced to the term “Hybrid Blower”. The definition is two fold. The simpler hybrid version utilizes a three lobe impeller that has been twisted. Here, one gets the benefits of the smaller pulsation from a three lobe impeller, but with the added smoothing of the pulse with the twist of the impeller.

The second definition is that of a much faster running machine, often running at 6,000-8,000 RPM! Atlas Copco, Aerzen, and Kaeser get their origins from compressors. These units have been converted to air blowers. In doing so, they incorporate a unique screw thread design set of impellers, one meshing smoothly into the other. Our firm refers to this precise design of blower impellers as a “true screw blower”. We eliminate the word Hybrid, as that is simply a marketing term.

The simpler hybrid blower has a similar net result to its straight lobe counterpart but achieves it differently. Its impellers are also three lobes, except they are twisted. This means that the popping of the air pocket is also lessened, because of the action of conveyance of air, is that of a twist, rather than a pop.

The simpler hybrid, however, has no pulse control channels to assist in the pre-pressurization of the oncoming air pocket. Therefore, the energy force



imparted to the discharge silencer is no smoother nor anymore quiet, than a comparably sized straight three lobe PD blower with pulse control channels. The BHP draw of the twisted or helical lobe, vs straight lobe is practically the same.

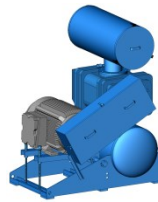
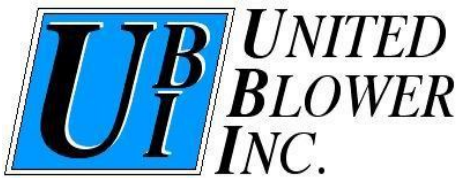
What is the claim then of the hybrid blower? As has been explained, the simpler hybrid blower has no claim of superiority, over the straight 3 lobe blower. That is simply a fact.

The more complex true screw runs at 6,000 to 8,000 RPM! As most consultants are aware, running at the high end of a blower curve, creates immense cooling in the blower, as well as momentum, which in turn improves efficiency. In addition, the true screw hybrid typically has as much as a 6 to 1 turndown, largely because it began at 95-100% of curve to start with. Most importantly however, greater efficiency is indeed achieved with the true screw impeller arrangement, because the volume of the air pocket gets progressively less as the pocket reaches the discharge. So essentially, the blower becomes something of a compressor as it conveys the pocket of air from the inlet to the outlet. The pulsation is quite smooth. The idea of expending less energy to pressurize the pocket of air, makes the BHP draw reduce, compared to conventional blowers.

If a true screw hybrid blower is spun very fast, then it can be one or two model sizes smaller than a conservatively chosen trilobe PD blower, producing the same output. This reduction in size helps keep the hybrid blower competitive, but it is at the expense of heavy wear and tear.

United Blower, Inc. (UBI) will always choose a conservatively sized PD blower for the application. Often this means restricting RPM to 75-80% of the curve maximum, and no more. This strategy provides excellent longevity of the machine, while still allowing for a reasonable turndown, and still maintaining close to peak efficiency.

Another prime advantage of the straight trilobe blower is having a model that is commonly stocked and readily available. In addition, the repair of such air movers can practically be done by any experienced blower repair center. The cost of a factory-only repair of either style of hybrid blowers can be as much as two to three times that of the straight trilobe PD offered by United Blower.



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As stated, prior, while the trilobe PD blower has a lot of advantages over the true screw hybrid, there is typically a reduction of efficiency when running our trilobes in the conservative area of the performance curve. The reduction can vary from 5-15%. To put that into perspective, a 100 HP blower that shares a 24-hour duty cycle with another unit, may cost an ADDITIONAL $12 \text{ hrs} \times 365 \times 0.10 \times .10 \text{ (avg)} \times 100 \text{ HP} \times .746 \text{ kw/HP} = \$3,267$ to operate, per year. In the case of a water treatment plant, the daily operation is typically $0.25 \text{ HR} \div 12 \text{ HR} = 2\%$ of that dollar figure, which is \$68. Part of the blower selection analysis needs to incorporate these savings into a ROI calculations. UBI's usual prediction is over 10 years to repay!

The trilobe PD blower is lower in capital cost, is a familiar product to most service and repair shops, will run at substantially lower RPM, will have 2 to 3 size larger bearings than its hybrid counterpart, can provide turndown commensurate with most applications, and has close to the same efficiency as the hybrid, with only negligible power cost differences. Most consultants and owners get excited by the lure of new technology, however those that prefer to take a conservative approach will not be disappointed by staying with the proven technology of the trilobe PD blower with pulse control.

Written by:

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A handwritten signature in black ink, appearing to read 'Wiekert J. Miolee Jr.'.

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