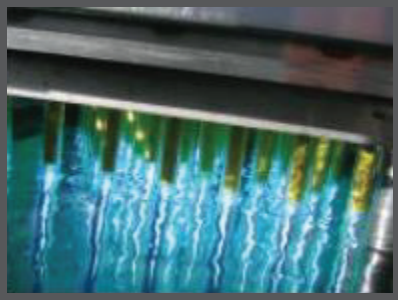
Vision Equipment
Environmental Process Technologies

TEXAS - NEW MEXICO - OKLAHOMA

APG NX BLOWER COMPARISON TO ABS HST BLOWER

Technologies for Municipal and Industrial Wastewater Treatment

- Headworks Fine Screening
- Grit Removal
- Clarifiers
- Trickling Filters
- Surface Aeration
- Diffused Aeration
- SBR
- Digester Mixers
- Sand Filters
- Extended Aeration
- Chemical Mixing
- Hypochlorite Generation
- Biosolids Thickening
- Biosolids Dewatering
- PD Blowers
- Single Stage Blowers
- UV Disinfection
- MBR
- Rotary Lobe Sludge Pumps
- In-Line Macerators
- Water Tank Mixing/Dosing



Summer 2016

To: All VE offices

Subject: APG Neuros Vs ABS Blower

The purpose of this internal tech memo is to identify the technical differences between APG NX and ABS HST Turbo blowers. Those differences result in significant costs of construction and ownership as shown herein. This information comes to Vision Equipment from a former manager of the ABS HST technology as well as from information exposed through the public bidding process.

Performance & Quality

Both blowers are quality technologies that will deliver reliable performance, however they are not equal in total cost of ownership or efficiency. APG submits to and conforms to all UL certifications and meets all "Made in USA" qualifications, while ABS does not. The APG NX is 7-11% more efficient than the ABS HST blower.

North American Service

APG offers full inventory, testing and assembly in their Plattsburg, NY manufacturing facility, as well as a variety of trained service technicians. Both manufacturers offer contract service centers throughout the USA. However, ABS has but a few dedicated HST specialists in the USA. The ABS HST blowers are made in Finland and shipped complete to the USA. No ABS HST core replacement facilities are currently available outside of Finland.

Layout & Piping Runs

The APG & ABS HST blowers typically have reversed inlet/outlet airflow patterns. Reversed airflow patterns can be overcome but ABS requires 2 to 3 more piping runs than APG, depending on HST model size. The HST 20 has two additional HVAC runs while the larger HST 40 requires 3 more HVAC runs than APG. Why? ABS pulls their motor, electrical controls and VFD cooling air from the blower room; therefore, it must be vented to the outside atmosphere. In some cases, contractors have installed a completehood over the blowers to capture the extra HVAC discharges but are often defeated by imbalanced air pressures. The extra HVAC lines are not highlighted by ABS bid day scopes and the unidentified costs can be very high to the unsuspecting contractor.

The APG NX and ABS HST require approximately the same floor space. However, they are not interchangeable. The added HVAC and vertical silencers for some HST models require a much taller ceiling height. Design engineers and contractors must not overlook the need for additional floor to ceiling height.

INSTALLATION EXAMPLES

The picture on the left is from the ABS HST reference in De Pere, WI. The additional ABS HST HVAC lines are evident. Notice the one (1) PLC for the complete system and the absence of emergency stop buttons. The picture on the right is from the equivalent model/HP APG NX blower.

The following picture is of the exact same reference. The original ABS HST blower is on the left. The NX replaced it. The cleaner workspace offered by the APG NX blower is a result of fewer HVAC lines. Based on the utilization of the base pad APG requires less space.

CLIMATIC OPERATING CONDITIONS

APG draws air into the unit through piped inlet or louvered inlets via dedicated airflow paths without any heat rejection to the outside environment. The APG cooling air discharge temperature is equal to or less than the inlet air temperature. The ABS HST motors/impellers run 7-11% less efficient than the APG design. That heat generated by the inefficiency is vented into the HVAC discharge lines. If the waste heat is vented into the blower room, the blower room will eventually exceed the 1040 F maximum room temperature specified by ABS thus mandating additional blower room HVAC, provided by the contractor.

BEARINGS

Bearings are a source of great consternation amongst distant competitors like Aerzen/K-Turbo and Atlas Copco/HSI. Their materials of construction generate waste heat through their inefficiency while operating at RPM levels necessary to produce Turbo blower efficiencies. The heat generated from extended high RPM service significantly reduces the service life of the specialized motors and VFDs required to operate the blower. In response owners typically have no choice but to de-rate the RPMs, thereby extending the service life of the bearing/motor assembly at the expense of power savings. Ultimately the owner paid for Turbo Blower efficiency but receives performance just slightly better than multistage centrifugal blower performance.

APG offers airfoil bearings proven to provide long-term reliability. The ABS HST blower operates on magnetically suspended bearings. Each approach has its merits and areas of concern. Airfoil bearings are susceptible to damage during shipping and startup; as shipping and handling instructions improve the number of incidents will continue to decrease. The good news is that the damaged cores fail during the warranty period and are field replaceable within a couple of hours.

Magnetically suspended bearings typically do not suffer damage from shipping or startup, which is a positive. However, their suspension requires a complicated array of 24 sensors to maintain suspension, plus a battery backup in case of power failure. The sensors have a service life of 5-7 years and are field replaceable by ONLY ABS engineers. APG does not have an equivalent need or sensor array. Furthermore, the ABS "back up" battery pack is a set of two car batteries with no provision for re-charging. So the owner is asked to maintain them. A failure in either the sensors or the backup battery will produce a high-speed catastrophic failure destroying the blower. Power failures with the APG approach simply brings the bearing to rest without damage.

BLOW OFF VALVE

The APG blow off valve is open in the "operating" condition. It is spring controlled when moved to the closed position. If it sticks, it will stick in the open condition; if it fails, it defaults to the open condition. The ABS HST design is the opposite design whereby in the normal condition it is closed. If it sticks, it will default to the closed position. The closed position with the ABS HST design will reverse the airflow through the impeller causing a catastrophic failure/total loss. APG does not have that potential fail point.

CONTROLS

The third major cost contributor to ABS HST owners is their lack of process flexibility. APG offers a fully programmable Allen Bradley PLC with an individual HMI touchscreen per blower. ABS offers very limited capacity CPU without a local HMI. See the attached tech sheet on CPU vs. PLC. It is substantial. The example uses information provided by Aerzen/K-Turbo but is interchangeable with any CPU based Turbo Blower. It should be noted that all Turbo Blower manufacturers have installed references copying the APG control scheme featuring Allen Bradley PLCs, DO control capability and local HMI touchscreens per blower. Often, the contractor is forced to supply these basic requirements because they did not carefully study the competitor's scope during bidding.

A pre-approval of a vendor DOES NOT automatically allow them to supply their standard scope.

The APG NX offers an emergency stop per blower, while the ABS HST does not. APG offers one (1) PLC and HMI per blower. ABS typically promotes one MCC for the complete blower system. Therefore, APG offers "built in" redundancy, as each unit is capable of independent programming and operation. The ABS HST standard control configuration cannot. If the ABS HST MCC PLC fails, the complete blower system is down.

IMPELLER

APG offers a wide range of impellers, five sizes per model, to fully optimize and fine-tune their efficiency curves resulting in energy savings and the significant reduction of waste heat. ABS limits the owner/process to two impeller sizes per model. The resulting limitation for ABS HST design engineers is a comparatively small airflow differences between horsepower sizes/models. The resulting limited "rise to surge" differential is also another detrimental process consequence of "standardization of impellers" at the expense of energy efficiency. This limitation prevents some HST models from operating above 9.5 psig while other models can't operate under 9.5 psig. This is clearly not the case for APG and it is a big benefit for the owner in terms of process flexibility.

ENCLOSURE

APG provides a stainless steel enclosure designed to reduce corrosion for both indoor and outdoor installations. The mild steel/painted ABS HST enclosure is restricted to climate-controlled environments.

REFERENCES

	US References & Age	TX Refs & Age
APG NX Neuros	> 1000 (10 years)	> 50 (8 years)
ABS Sulzer HST	< 100 (5 years)	< 10 (1 year)

DELIVERY

APG offers a proven track record of project specific shipments in 8-12 weeks from approved submittals. ABS ships "their standard" scope typically 26 weeks after approved submittals. Custom/site specific requirements like PLCs, E Stops and Ethernet connections are left in the hands of the contractor to get approved after the blower has shipped.

SUMMARY

This internal tech memo is not designed to disparage our competition or indicate they are unreliable. The ABS HST blower is a worthy competitor, just with a much higher cost of installation and ownership while leaving much more responsibility in the hands of the contractor to get their "standard features" approved in lieu of the specified materials. Lastly, it should be clear the APG NX is not interchangeable with the ABS HST in terms of performance or layout.

The following charts provided by APG Neuros help to abbreviate the points outlined in the narrative above.

FEATURES & BENEFITS CHART

	APG-NEUROS	HST
System Efficiency (with Turn Down)	70-75 %	57-68 %
Impeller	5 Axis Machining from Forged Disk Trimmed to optimize the performance	Fixed number of impellers Models. Apply standard performance to cover required performance without trimming
Bearing	Bump Type	Magnetic with Controller
Motor	PMSM (17,000-32,000 rpm) High Efficiency even at Part Load	Induction Motor Low Efficiency : Poor at Part Load
Motor Reliability	Service Factor 1.15 Motor Temperature Monitoring Water or Air Cooling	No In-line Filter : Loss & Life Issue Slip in Motor Speed without Feedback Control Air Cooling
Inverter	UL Certified L-C Filter : Low Loss < 5% THD : IEEE519 rated with Filter	No In-line Filter : Life Issue No Input Choke : THD > 50% Open Loop Speed Control : Motor Slip
Enclosure	Indoor / Outdoor	Indoor Only
Origin of Technology	Aerospace	Academy
Certificate	CSA/US, CE	Not Known

SUMMARY OF PEFORMANCE

- Percent of the Compression Efficiency to the Input Power (%)
- Standard of the Optimum Operation

Product	APG-Neuros	HST	Comments
Input Power	100	100	From Wall
Inverter & Filter Loss	2-3	3-4	LC Filter vs. No Filter
Motor Loss	5	9-11	PMSM vs. Induction Motor
Bearing & Mechanical Loss	1	2	HST Requires Active magnetic Bearing Controller
Fan/Cooling Loss	1	2	Induction Motor Generates more heat than PMSM: especially in the rotor
Compressor Loss	16-22	16-24	NX trims impellers to optimize the performance as user specification
Intake Filter Loss	NA	NA	Depends on Air Volume but 1% Max.
System Efficiency	68-75 (%)	57 -68 (%)	Difference is 7 - 11 %

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