KENNE BELL / AUTOROTOR vs. LYSHOLM FEATURE COMPARISON

We have been asked how the Kenne Bell/Autorotor compares to the Lysholm, the latest entry into the Mustang market. Considerable time was spent collecting data and analyzine the two superchargers. Most of the information was supplied by Autorotor engineering, the parent company. Lysholm is a subsidiary of Autorotor. The results are in the 3 pages of comparisons. We believe the data clearly proves the Autorotor superior in all areas. The only comparison not discussed was cost. Obviously, the Kenne Bell/Autorotor is considerable more expensive to produce - and it therefore costs more. We believe that the higher price is well justified by the Kenne Bell/Autorotor features such as 1. higher efficiency, 2. billet aluminum construction vs. cast aluminum, 3. high boost levels, 4. oversize bearings, shafts and bolts, 5. quiet gears, 6. lower torque of inertia, 7. low rpm male rotors, 8. steel pulleys, 9. model selections and 10. 13 years of race proven high boost reliability. These are hardly lower cost OEM production type low boost superchargers. Then there's Kenne Bell's well known reputation for tuning, the ongoing tech support and customer service.

KENNE BELL / AUTOROTOR 2.2 vs LYSHOLM 2.3 COMPARISON *(Autorotor 2.4 is same design with 1" longer rotors)*	**KENNE BELL/ AUTOROTOR**	**LYSHOLM**
Billet aluminum 0-porosity hi-strength case	**YES** *billet*	**NO** *cast aluminum*
Oversize front bearings (47% larger/47% higher load)	**YES** *.98"x2.05"x.588"*	**NO** *.67"x1.57"x.470"*
Oversize rotor shafts (47% larger)	**YES** *.98"*	**NO** *.67"*
Oversize rotor bolts	**YES** *.548"*	**NO** *.470"*
Easily serviceable oversize rear ball bearings (30% larger)	**YES** *1.378"*	**NO** *1.063" (pressed into case)*
Low torque of inertia 6x4 rotors (10% quicker "spool up")	**YES** *6x4 (1.5 ratio)*	**NO** *5x3 (1.67 ratio)*
Low rpm - lower friction hybrid male rotor	**YES**	**NO** *(11% higher rpm)*
Billet aluminum CNC machined inlet and outlet	**YES** *CNC ported*	**NO** *as cast surface*
Billet front rotor support plate	**YES** *billet*	**NO** *cast aluminum*
Billet rear rotor support plate	**YES** *billet*	**NO** *cast aluminum*
Precision silent gears (60-80% more gear teeth)	**YES**	**NO**
Steel pulley (greater strength - less wear)	**YES** *steel*	**NO** *aluminum*
Lowest power consumption (parasitic loss)	**YES** *(-8HP)*	**NO** *(+8HP)*
Highest efficiency per L displacement	**YES**	**NO**
Advertised boost range	**8-26/8-30**	**8-25**

HISTORY

Kenne Bell has used the Autorotor supercharger exclusively since 1991. It's proven to be an incredibly strong and reliable performer for any and all Kenne Bell kits. At one time, Kenne Bell was offered the Lysholm supercharger. The big machined cut on the inlet of the 2.3L is there to accept Kenne Bell inlet manifolds. After a thorough analysis of the construction and performance of the Lysholm on our dyno with high revving Mustangs, the Autorotor was selected. We never looked back. In January '04 Autorotor purchased all the assets of Lysholm. This was not a merger as some would leave you to believe. It was a simple buy out.

APPLICATION

Autorotor designed the 2.2L BLOWZILLA and the Lightning specifically for Kenne Bell. Both use the same hybrid rotor profiles. Many of our customers have asked how the two superchargers, Autorotor and Lysholm compare. First of all, both superchargers are based on the same Twin Screw concept and are far more efficient than an Eaton Roots type. However, the Autorotor is more expensive to manufacture as compared to the Lysholm. The billet case, billet rotor end plates, larger bearings and shafts, longer hybrid 6x4 rotors, CNC ported inlet and outlet and the silent precision gears are an obviously more costly package than the Lysholm. We've seen letters on the Lysholm warning the customers that they may "hear a medium-pitch rattle from the supercharger main housing." We don't have that annoying problem with the Autorotor.

All three, the Autorotor, Lysholm and Eaton are high quality reliable superchargers. According to Autorotor engineering, the Lysholm is more suited for the lower cost - lower boost OEM stock applications and aftermarket kits. We were told the Lysholm Twin Screw was designed to compete head on with the less efficient Eaton Roots in the price conscious OEM market such as the Ford GT.. Autorotor has stated that the Lysholm is not as well suited for higher boost - high rpm racing applications. One look at the two superchargers and their internal components and one can easily see why. Again, that does not imply the Lysholm is not a good reliable high quality supercharger. It is, for example, the Lysholm 2.3L performance graph shows no data beyond 13000 rpm. We rate the Kenne Bell/Autorotor 2.3L, 2.4L and Lightning at 18000.

Thirty six years of aftermarket experience in high performance has taught us that you never bring a knife to a gunfight. We use the Autorotors on our 5.0, 4.6GT, '99-'01 Cobra, '03-'04 Cobra, '96-'98 Cobra, and Lightning kits. These guys don't exactly sit and idle in their driveways. Hundreds of Cobra and Lightning owners have replaced their wimpy low 9 psi boost, lower efficiency Eatons with the rugged more powerful Kenne Bell/Autorotor Twin Screw, which can develop twice the boost with huge increases in HP - reliably.

EFFICIENCY OVERVIEW

Autorotor owns Lysholm. According to Autorotor tests, the Autorotor, with it's lower 2.2L "rating," matches the larger displacement 2.3L Lysholm in cfm and temperature efficiency, yet the Lysholm requires a whopping 8 more HP (10%) to drive. We have seen the addition of headers, exhaust and x-pipe barely make 8HP. The Autorotor 2.4L outperforms the Lysholm 2.2L by 80 cfm (8%) with 27° lower air charge temp and a lower power consumption (88HP). The real test of volumetric efficiency is when the 2.4L with only a 4.3% higher "rating" than the 2.3L produces an impressive 8% more air flow (cfm). Rotor design (shape and number of lobes) and the CNC ported inlet and outlet are responsible for the higher efficiency of the Autorotor. Also, the Autorotor 2.2L rotors are 1/8" longer and the 2.4L rotors are 3/4" longer. These tests were conducted at 15 psi and 13000 rpm with 77° inlet temp. Add to this the larger race proven bearings, bolts and shafts, billet construction, quieter gears, steel pulleys etc. and one can easily see why Kenne Bell prefers the Autorotor for both low boost and higher boost application.

PERFORMANCE TESTS

KENNE BELL / AUTOROTOR vs. LYSHOLM COMPARISON*

(AIR FLOW, DISCHARGE TEMP, POWER CONSUMPTION)

SUPERCHARGER	CFM	DISCHARGE TEMP	POWER (HP) CONSUMPTION
KENNE BELL/AUTOROTOR 2.4L	1005	266°	88HP
KENNE BELL/AUTOROTOR 2.2L	925	294°	81HP
LYSHOLM 2.3L	930	293°	89HP

**Data was furnished by Autorotor with all superchargers at 15 psi and 13000 rpm and 77° inlet temp. Higher boost and rpm levels will increase the superchargers cfm output. Naturally, discharge temp and power consumption will also increase as will the loads and stresses on the supercharger components.*

The Kenne Bell/Autorotors and the Lysholm 2.3L are the largest superchargers in this size category. The largest, the Kenne Bell/Autorotor 2.4L uses the same hybrid 6x4 rotor profiles, but they are .75" longer than the 2.2L. The 2.2L rotors are .125" longer than the Lysholm 2.3L. The 2.2L power range is 200-825+hp with no boost drop off. Our 2.4L which produces another 4 psi at the same rotor speed, is rated at 885HP and is used on the latest Kenne Bell BLOWZILLA 2.4L "Competition Only" kit (up to 30 psi).

SUPERCHARGER RATINGS & OUTPUT

As you'll see, a bigger "rating" is not always better. The supercharger cu" or liters rating is far from the complete picture. Let's use this analogy. We have two engines, one is rated at 350 cu inches (5.7 liters) and another is rated at 340 inches (5.6 liters) but the smaller displacement engine (engines are air pumps just like superchargers) has a better intake manifold, headers, a hotter cam profile and takes less friction to rotate than the larger 5.7 engines. The same is true for the supercharger. In addition to displacement, the rotor profiles, inlet flow, discharge flow and power consumption must all be considered when designing the supercharger. So don't be duped into believing that just because Lysholm rates their supercharger at 2.3L, that it is automatically superior to an Autorotor 2.2L. No way (see test data).

Then there's the component integrity. One should never compare a NASCAR 350" 9000 rpm engine to a stock 350" production OEM engine. The internal components are not the same. The Kenne Bell/Autorotor is designed for higher rpm/higher boost levels and loads whereas the Lysholm is designed for lower rpm/low boost high production with cost being a big factor.

As can be seen from the data, the Kenne Bell/Autorotor 2.2L is within one degree and a mere 5 cfm of the Lysholm 2.3L while requiring a full 8HP less to drive. That means your engine will produce 8 more HP. The 2.2L Kenne Bell/Autorotor has made over 700RWHP on a Cobra at 26 psi - reliably - and an incredible +700 ft lbs of rear wheel torque at a mere 2500 rpm and holding the 700 ft lbs all the way to 5000 rpm. That's enough to twist trans input shafts, fry clutches and snap IRS half shafts. However, if you need even more boost and power, our 2.4L kit can push the boost to 30 psi for another 60HP! That would put engine power at 900HP! As of January 2004, the Kenne Bell Lightning supercharger has registered 719HP and 870 ft lbs at the rear wheels of Johnny Lightning's stroker motor at 24 psi boost through a big power robbing E4OD trans that eats up 65HP by itself. Our point here is that Kenne Bell supercharger kits were engineered, tested and proven to produce all the power you'll ever need - reliably. If you desire more power than these superchargers offer, then we're not talking about a practical, cost effective street strip non-nitrous car or truck - but instead, some kind of all out race car.

Note: The Kenne Bell Lightning supercharger utilizes a special hi-strength reinforced cast aluminum case, but the hybrid rotor pack and the roller bearings and bolts are all the oversize race bred pieces used in the billet case 2.2L and 2.4L BLOWZILLA's

BEARINGS

According to our service records, there has never been a bearing failure in 13 years with any Kenne Bell/Autorotor supercharger used on our kits. Bearing size and rotor integrity are absolutely essential to long term - high rpm reliability. The huge Kenne Bell/Autorotor front bearings are load rated at 47% higher than the small Lysholms (2430 ft. lbs. vs 1660 ft. lbs.) bearings. The Kenne Bell/Autorotor stepped rear bearings are 30% larger than the Lysholm needle bearing. Big ball bearings are used in both the front and rear of the Kenne Bell/Autorotor. Lysholm uses ball bearings in the front, but the rear bearing is a press in difficult to remove needle bearing. Ball bearings are universally recognized as the better high rpm bearing.

ROTOR LOBES

We don't believe there is a better overall high performance rotor profile design available in any supercharger. A superchargers displacement is measured by the theoretical - not actual - liters or cubic inches of air discharged from one complete revolution of the male rotor. Look at it this way. A Kenne Bell/Autorotor female 6 lobe rotor makes 1.5 revolutions to rotate the 4 lobe male rotor one full revolution (1.5 ratio from 6÷4). The Lysholm female rotor's torque of inertia is 11% higher - and it must always be burdened with rotating the male rotor 11% faster than the Kenne Bell/Autorotor male rotor - at any engine rpm. The 11% higher rpm of the Lysholm can only mean more friction and heat on 47%-30% smaller bearings and shafts.

Example:

18000 Kenne Bell/Autorotor female drive rotor rpm is 27000 male rotor rpm.
18000 Lysolm female drive rotor rpm is 30000 male rotor rpm or 11% higher.

To summarize, the Lysholm must spin 11% faster to match the output of the Kenne Bell/Autorotor - and at an additional penalty of 9% higher power consumption (see tests). These are real facts. As one can see, supercharger "ratings" can be very deceptive.

For more information on supercharging, see Kenne Bell FAQ's, "What is supercharger volumetric, adiabatic and temperature efficiency" and "I'm confused about cfm and Hp. Can you clarify?"

KENNE BELL

KENNE BELL / AUTOROTOR 2.2 vs LYSHOLM 2.3 COMPARISON

1.66 RATIO
5 X 3 ROTORS
2.3L LYSHOLM

1.5 RATIO
6 X 4 ROTORS
***2.2L, 2.4L KENNE BELL/AUTOROTOR**

6x4 Autorotor "spools up" 10% faster because of 1.5 rotor lobe ratio (6÷4=1.5) vs. slower 5x3 Lysholm (5÷3=1.66). The Autorotors lower torque of inertia ratio means 10% potentially quicker boost response and higher cfm. Also, the Kenne Bell/Autorotor male rotor turns 10% slower given the same female rotor speed as the Lysholm. This means reduced friction, heat and parasitic loss for the Kenne Bell/Autorotor. For example: with both female drive rotors at 13000 rpm, the Autorotor male will spin at 19500 whereas the Lysholm speed is 21580 rpm. Big difference, isn't it? Kenne Bell big shaft rotors and oversize bearings and bolts mounted in a billet aluminum case provide maximum stability.

HYBRID ROTORS

Cooler air charge temp, lower power consumption. Rotors flex less (torsional twist) at high rpm preventing rotors from contacting the supercharger case and allow higher rpm potential.

OVERSIZE ROTOR SHAFTS, BEARINGS & ROTOR SHAFT BOLTS

Added strength and reliability at any RPM.

CAST ALUMINUM END PLATE

BILLET ALUMINUM END PLATE

Billet aluminum provides more stable support for the rotors.

KENNE BELL/AUTOROTOR
LOAD RATING
2500 ft. lbs.

LYSHOLM
LOAD RATING
1700 ft. lbs.

Front bearing comparison. Kenne Bell uses 100% ball bearings which are better for rpm applications.

There's an old saying "If little bearings were the answer, why do they still make the bigger, more expensive ones?"

AS CAST UNPORTED INLET & OUTLET

PRECISION CNC PORTED INLET & OUTLET

LYSHOLM 2.3L

AUTOROTOR 2.2L

Smoother contoured entrance and discharge billet openings result in increased air flow, lower air charge temp and less power consumption. And a bullet proof billet aluminum case with virtually "0" distortion at any rpm.

**Note: The Kenne Bell/Autorotor 2.4L is essentially the same supercharger as the 2.2L, only with 1" longer rotors. The 2.2L with it's .125" longer rotors matches the Lysholm 2.3L air flow and temp efficiency, but the 2.2L requires 9% less HP to drive. The 2.4L produces 8% more air flow, the air charge temp is a whopping 9% cooler, yet the power consumption (HP to drive) is the same. Tests performed by Autorotor at 15 psi, 13000 rpm and 77°F ambient temp.*

LYSHOLM 2.3L
1.66 RATIO (30 & 50 TEETH)

Fewer teeth makes for higher noise level. Male gear must spin 10% faster than Autorotor for 1 female rotor revolution.

KENNE BELL 2.2L, 2.4L
1.50 RATIO (54 & 81 TEETH)

Precision, low lash fine mesh helical gears are quieter and more reliable at high rpm. 80% more teeth on male gear and 60% more on female gear.

LYSHOLM
(ALUMINUM)

KENNE BELL
(STEEL)

KENNE BELL 2.2L, 2.4L

Unbreakable steel is able to withstand virtually unlimited belt speed, which can be 750 ft/sec, without failure or wear. All OEM's use steel for longer pulley and belt life.

LYSHOLM 2.3L

Weaker, shorter life low cost softer aluminum.