TWIN SCREW 1.5L vs. ROOTS 1.5L

DYNO TEST COMPARISON - *THE FINAL PROOF*

EFFICIENCY - Although the Twin Screw and Roots are both "positive displacement" superchargers and use the same capacity rating system (liters and cu"/revolution), that is where the similarities end. Size for size, the Twin Screw is simply more efficient.

Superchargers are a lot like engines. The old flathead Ford V8 was a "good old engine" - as was the Model A 4. They were reliable, widely accepted and made good horsepower but as compared, size for size, with the new overhead valve engines, they simply are not as efficient.

If you set aside the rhetoric and advertising claims, what really matters most is how much actual power an engine makes with a particular supercharger. The amount of power will depend on how EFFICIENT the supercharger is. We all know that a cooler denser air charge can make more power - and if the supercharger requires less engine HP to drive it, the engine will subsequently develop more horsepower. Finally, if a supercharger develops more boost at a given rpm, the engine makes more power as boost=HP.

CHOICE - Picking the size is easy. There are plenty of choices (150-750HP) ranging from .32L (19 cu") to 2.6L (156 cu") and larger. Selecting the most EFFICIENT supercharger is equally as easy if one takes the time to research the facts. If you do, all roads lead to the Twin Screw.

COMPARISON - The best method of comparing high performance products has always been to test both products on the same vehicle under identical conditions in a controlled environment. Such a test was recently arranged by Muscle Mustangs and Fast Fords Magazine. A 1.5L (90 cu") Twin Screw and 1.5L (90 cu") Roots with identical capacity ratings were tested and compared. Four (4) pulley sizes were selected to cover the full boost range (7 psi to max). Pulley diameters were the same for both.

TEST VEHICLE - Stock '99 Mustang 4.6 automatic trans with production Roots aftermarket kit, stock 80mm, mass air meter, throttle body and filter, heads, cam etc. A Kenne Bell BOOST-A-PUMP was used with the stock in tank pump to feed and regulate the flow of the 42lb Ford injectors. A Kenne Bell SWITCH CHIP® precisely calibrated the engine spark, fuel etc. A data logger recorded all events (boost and temp in and out of the intercooler, inlet temp, fuel pressure, air fuel ratio, spark timing, HP, torque etc.). Anyone doubting the superiority of a Twin Screw should check out these tests.

THE TESTS - For the ultimate test, we compared both with a maximum output 2" pulley. The Twin Screw develops a whopping +72HP over the Roots type under equal conditions. Also note the Twin Screw developed a full 4 psi (+33%) more boost, yet the actual air discharge temperature was 35% cooler! "Boost" is merely the benefit of a supercharger overpowering or pumping more air (cfm) than the engine can flow in naturally aspirated form! The more efficient the supercharger, the higher the boost. Although "rated" the same (90 cu"/1.5L), the Roots just couldn't keep up. It was unable to match the cfm output - and therefore the boost - of the Twin Screw which obviously pumps MORE AIR at the same rpm. If the Twin Screw produces 33% more boost (cfm) with 35% cooler air and makes 72 more HP under equal conditions, it would be safe to say that the Twin Screw is more EFFICIENT! The data clearly proves the Twin Screw is a far superior product. For those wondering how they also compare with a 2-3/4" pulley and lower boost levels, check out the data. The Twin Screw again produced +42HP, 30% more boost with 26% cooler charge temperature. *Note: Approximately 10-16HP of the Twin Screw power advantage emanates from it's lower parasitic loss. It simply requires less engine HP to drive than the Roots.* And yes, the speed of the Twin Screw could be reduced approx. 30% to match or "dumb down" to the Roots boost level. Then the charge temp would be even cooler by approx. 46° (4 psi x 11.6 = 46.4°)! And since the Twin Screw rpm (cfm) would be lower, the parasitic or pumping losses go down incrementally. That's what EFFICIENCY is all about.

HORSEPOWER NOTES - For you Mustang lovers, here are some additional dyno numbers that will surely interest you. Horsepower increased to 418 from 388 after upgrading to a 90mm meter, 12" filter and big oval throttle body. Replacing the Kenne Bell 1.5L Twin Screw with our more efficient BLOWZILLA 2.2L raised the HP from 418 to 438 with no other changes. The same set up with a manual trans makes yet another 30 rear wheel HP, 448 and 468 respectively. This converts to 527 and 550 engine HP. Yes, with either Twin Screw, this car runs 1/4 mile times well over 120 mph in the 10's and is a daily driver. For more information, see April and June 2002 Muscle Mustangs and Fast Fords Twin Screw vs. Eaton Comparisons.

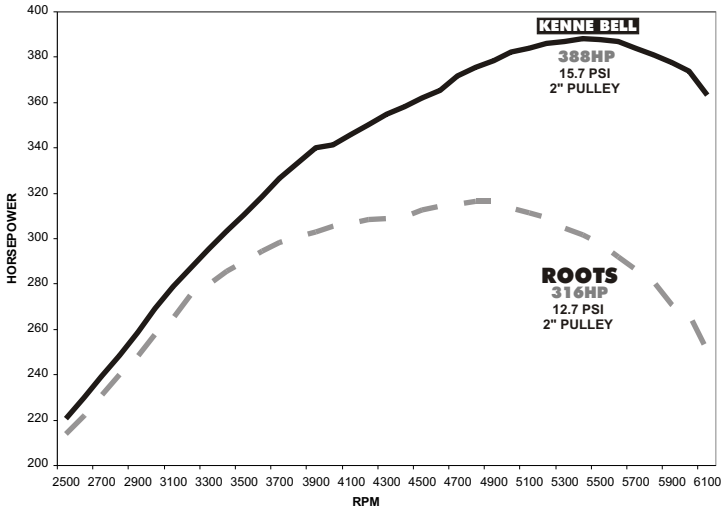
2" PULLEY

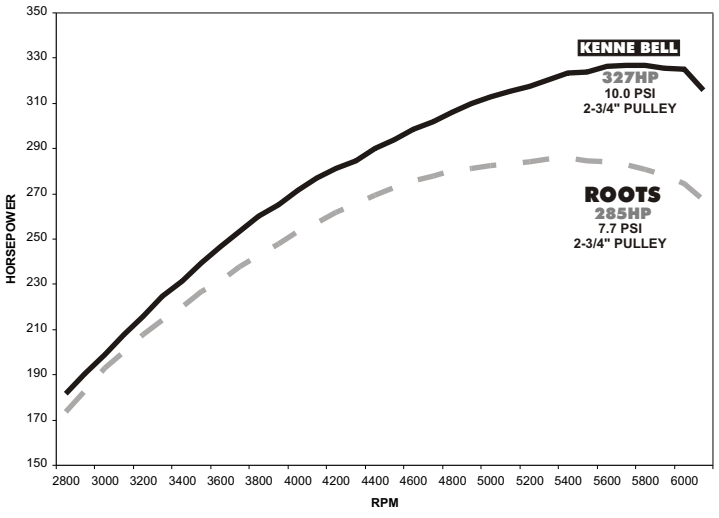
SUPERCHARGER	PEAK HP	BOOST*	TEMP RISE PER PSI BOOST*
TWIN SCREW	388 (+72)	15.8 (+33%)	11.6° (-35%)
ROOTS	316 (-)	11.8 (-)	18.0° (-)

2-3/4" PULLEY

SUPERCHARGER	PEAK HP	BOOST*	TEMP RISE PER PSI BOOST*
TWIN SCREW	327 (+42)	10.0 (+30%)	11.0° (-26%)
ROOTS	285 (-)	7.7 (-)	15.0° (-)

**77° inlet temp. All measurements at 6000 rpm. HP is "peak" rear wheel Dynojet. Divide by .8 for engine HP.*





Only the supercharger was changed on the engine to illustrate the superiority of a 1.5L (90 cu") Twin Screw over a 1.5L (90 cu") Roots.