

# Higher Horsepower With Less Heat

It seems that there is more than one way to build a Twin Cam motor, in fact there are hundreds of ways. Most of the performance upgrades we see involve 95-inch big-bore cylinders and oversized pistons. The cylinders get their larger capacity by either boring out a set of stock cylinder barrels to 3 7/8 inches or by buying Harley's Screamin' Eagle big-bore cylinders.

There is another way. Revolution Performance offers a unique type of cylinder that has a 3 15/16 inch bore. Its cylinders have a 1/16-inch larger internal diameter than most "big-bore" Twin Cam cylinders, which equals 98 inches of displacement on an 88-inch base Twin Cam motor. It accomplished this 3-inch larger motor as a by-product of the manufacturing process. Instead of using a steel liner that then has an aluminum heat sink, the finned part of the cylinder barrel cast around it, Revolution Performance's cylinders are cast as one piece from aerospace grade aluminum with

nickel-silicone-carbide electroplated bores. This design does two things: it allows for the larger bore; and more importantly, it keeps the motor cooler by providing better heat transfer between the combustion chamber and the outside air.

As much as people talk about the "larger displacement" of the Revolution cylinders, their ability to dissipate heat is a larger benefit. Keeping a high-performance motor cool can be a problem. This is because for every extra horsepower generated over the stock motor, the cooling fins on cylinders and heads must remove an additional 2540 BTUs (British Thermal Units) of heat from the combustion process. This is no mean feat, as a well-tuned 95- to 107-inch motor can easily crank out an additional 125,000 BTUs over a stock motor. Because the stock steel liner-aluminum finned cylinders have a thermal joint at the connection of two metals that have drastically differing rates of thermal expansion, their ability to

dissipate heat is about 18% less than that of the all aluminum cylinders. The cooler-running Revolution cylinder-equipped motor will not only run longer, it will also put out slightly more power than a steel/aluminum barreled motor.

The Revolution Performance kit includes forged aluminum pistons, wrist pins, rings and gaskets. To complement the big-bore kit, we selected a set of S&S No. 510 gear driven camshafts, a 50mm Screamin' Eagle throttle body, an AB Racing 2-into-1 exhaust system and a set of Bill Chambers Racing's reworked cylinder heads. A 2006 FXDI Super Glide provided the foundation for the installation. Larry Kennedy over at County Line Cycles in SoCal's Simi Valley, did the wrenching. The bike's EFI control computer was re-mapped using a Harley Screamin' Eagle Race Tuner kit.

The only hiccup in the whole project was relieving the rocker boxes for added clearance around the reworked heads' new



The Revolution Performance cylinder (right) is cast from aerospace-grade aluminum. It does not use a steel liner like the stock cylinder on the left. The internal cylinder wall is given a nickel-silicone-carbide coating. This makes the cylinder bore harder than steel, with excellent wear properties.



Our big-bore kit included a set of forged pistons made by CP Pistons. The pistons have a raised crown that gives the motor 10.2:1 compression when used with a stock size Twin Cam combustion chamber. They also offer a big-bore kit for Harley's 96-inch 2007-up motors that gives them 107-inches of displacement.



The S & S camshafts feature their unique gear drive system. The kit includes block-off plates that replace the two hydraulic drive chain tensioners.



We matched Harley's 50mm Screamin' Eagle throttle body with a set of Twin Cam cylinder heads that had been reworked by Bill Chambers Racing. The throttle body comes with high-flow injectors and all the electronic sensors installed. The heads have 1.900-inch intake and 1.610 exhaust valves.



When Larry fitted the rocker boxes, he found that the valve spring retainers contacted their inner walls.



The Bill Chambers Racing cylinder heads use high-performance valve springs and full size retainers.



The 2006 Dyna models and all 2007 Twin Cam motors have larger inner cam bearings and a higher capacity oil pump. Camshafts made for the earlier motors will not work in the new motors.



The S&S gear drive camshafts do away with the stock intermediate drive chain and hydraulic tensioner. Because the gear drive rotates the cams in opposite directions, the system also allows for higher lift without the lobes running into each other.



Larry had to grind the area just inside the rocker box where each valve spring retainer sits. This was the only custom fitting required in the whole installation. The throttle body and exhaust systems were straight bolt-on propositions.



The cylinders and heads bolted on just as with the stock parts. They required no custom fitting or machining. Revolution Performance supplied custom head gaskets made by Cometic.



To give the motor a sharp contrast, County Line used black cylinders and heads instead of the natural aluminum finish that came on the Super Glide. This went well with the other blacked-out parts on the bike.

high-performance valve springs. This was due to the re-worked heads having high-performance springs and retainers.

The finished bike runs better than any 95-inch Twin Cam powered bike we have ever ridden. The low to midrange power is fantastic. Because of the new cylinders, pistons and rings, we haven't had it on a Dyno yet. —John Sullivan

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The interference is caused because the stock cylinder heads use "beehive" shaped valve springs with small diameter retainers.

Photos: John Sullivan