



331 Ways To Waste an LS1

BY STEVE BAUR • PHOTOGRAPHY BY THE AUTHOR AND COURTESY OF THE MANUFACTURER • ILLUSTRATION BY GEORGE TROSBLEY

Corvettes for breakfast, Firebirds for lunch and anything else you care to snack on in between, thanks to our new DSS stroker.

Owners of LS1-powered GM cars have become boastful braggarts these days and rightfully so. Even in naturally aspirated form, these engines are terrors from the factory and adding a head and cam package can easily send them to the 500hp mark with the simple turn of a ratchet. You can't do that with any stock small-block Ford,

so most of us depend on forced induction to get the job done.

Turning up the boost is essential for making the appropriate amount of ass-whipping power, but in order for your motor to survive for more than just one race, you need to have a good foundation that will hold up to the abuse.

THE PACKAGE

MM&FF isn't known for doing things half-heartedly, so it should be no surprise when we tell you we're about to take our covert little '90 Mustang GT, drop in a state-of-the-art short-block and turn it into a mind-bending LS1 murderer with help from DSS Competition Engines.



Our ProCharger P1-SC intercooled unit has been impressive from the start, enabling the stock motor to hit 12.20s at over 118 mph on street tires. The same blower put us in the 11.40s at 124 mph after the Brodix heads and Edelbrock intake were installed. It's great to know that such an expensive part of the motor can grow with the car's performance.

This project car has popped up from time to time and has made mean strides toward eclipsing the quarter-mile in a minimal amount of time. Starting with ProCharger's P1-SC intercooled supercharger, we topped the stock short-block (cam and all) with a wicked set of Brodix M2 ST5.0R cylinder heads and an Edelbrock Performer intake manifold. Breathing through a race-ready set

DSS sells its stroker crank, rods and pistons as a kit for those who wish to build their own motor. With our lofty horsepower goal, we opted to have them stuff these parts in one of their Level 20 CNC-machined engine blocks.



These M2-ported Brodix ST5.0R cylinder heads offered a 90hp gain at the wheels and with their 2.02/1.60 valves, should work well with our increase in displacement, as well as our larger camshaft.



The cylinder is bored .025 over, leaving .005 to hone with torque plates.



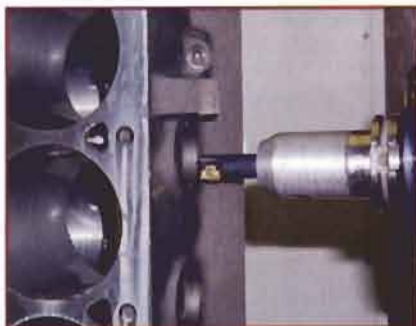
The Haas Horizontal Machining center was purchased and fixtured to blueprint engine blocks. Its size, accuracy and four-axis capability make machining on any part of the block possible. All fixturing is done off of the main saddles (not the oil pan rail like some other machines) with the end result being a very accurate, rigid, repeatable fixture that allows for proper machining and squaring of the block.

of Bassani stepped long-tube headers and catalytic converters (it did pass New Jersey's rigid emissions testing), the LaRocca's Performance-tuned pony has pumped out 473 hp and 476 lb-ft of torque to the wheels, enabling the Midnight Blue Metallic Mustang to run 11.40s at 124mph.

That's some serious street power for sure, but just barely enough to keep up with some of the faster LS1 cars. We could simply add more boost, but we have made this considerable amount of power using the



The CNC program machines an offset cylinder chamfer for a 4.100 bore. This 60-degree offset chamfer unshrouds intake and exhaust valves, similar to the Boss 302 and 351 Cleveland. Most aftermarket heads are 4.100 bore, as are the head gaskets. A 4.030 bore block without this chamfer leaves a wall for air and fuel to get around on the side of the valve. This subtle machine operation is one of the horsepower enhancements available with a fully CNC-blueprinted block.

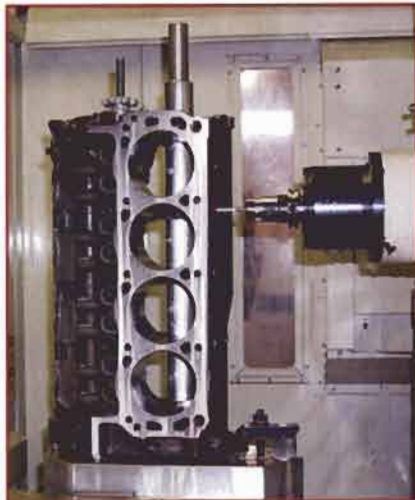


With production blocks that see such high-horsepower levels, using thread-in freeze plugs not only strengthens the block, but also prevents leaks brought on by movement of the block itself. Thread tapping is extremely difficult by hand and the CNC thread-milling program allows more efficient tapping in a shorter amount of time.

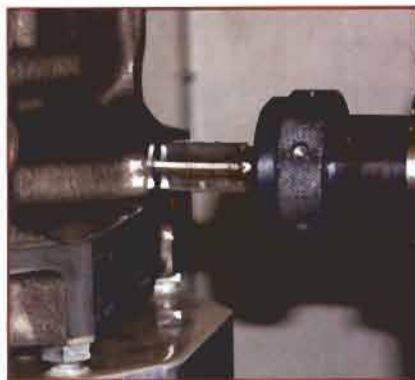
stock 140,000-mile short-block. Let's just say, we felt we were on borrowed time. We called up DSS Racing to find out what they could do for our project car.

THE POWER PLAN

We don't want to just beat LS1s, we want to erase them from memory, and watch them evaporate from our rearview mirror. Thus, we've decided to add a few more cubic



The Renshaw Probing system finds the center of the freeze plug hole so it can be accurately thread milled for the thread-in freeze plugs. The probe also enables accurate location of the head dowel holes. This is what Ford based all their machining coordinates from.



The top press in oil galley plug is a common source of trouble in high oil pressure applications (high-volume pump, 20W50, cold weather, etc.). The CNC machine gives DSS the ability to machine any place on the block making threading this hole for a plug a snap.

inches and get the air/fuel mixture moving faster with a high-performance camshaft. In part one of this buildup, we'll cover the core parts and the machine work that is required to assemble a 331ci stroker engine.

We've decided to stroke the 302 for the increase in displacement, which allows a greater volume of air and fuel to be pumped into the combustion chamber. A longer stroke also has a mechanical advantage by increasing the arm or lever of the crankshaft, which produces more torque. Our new bumpstick will offer far more valve lift than the stock .444-inch we are using now, not to mention more duration.

Part two of our 331 buildup will cover the installation and testing of the new

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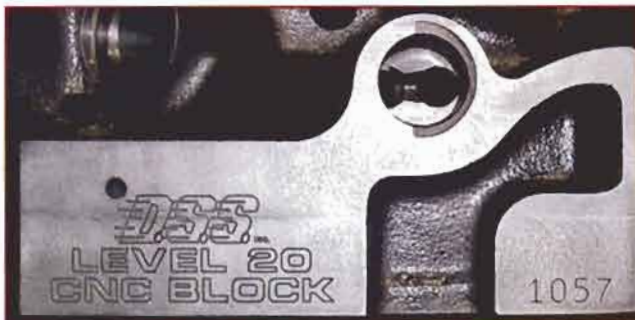
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• 311 WAYS...



The CNC machine makes engraving easy. Other simple mods like this that are gained by using the CNC mill are passed down to the consumer at little or no cost.



The Hines Hard Bearing balancer ensures racing tolerances to plus or minus 1 gram. The 331 stroker kit is externally balanced to 28 ounces.



Here you can compare the race-prepped, forged I-beam rod (right) to the stock connecting rod on the left. The DSS pieces come bushed and with ARP hardware.



Note the raised wrist pin height in the Pro Lite piston. This is to compensate for the increased stroke length of the crankshaft.

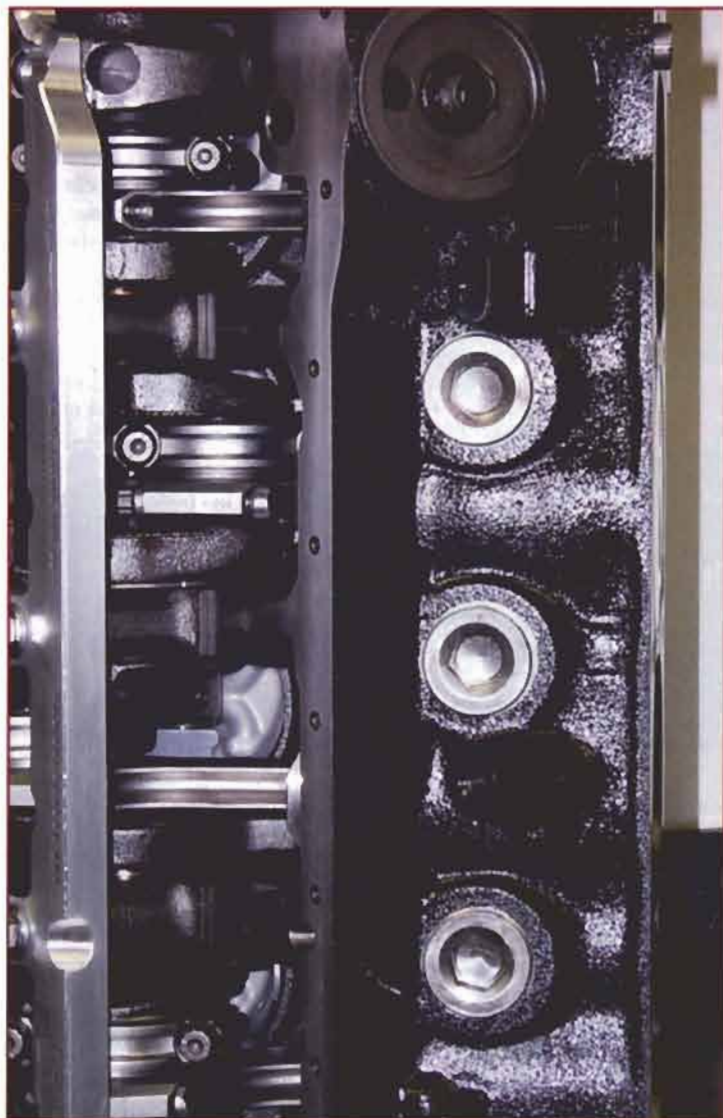


The Pro Lite pistons use forced pin oiling rather than splash oiling. Another key feature is the sealed power ring package. The low-drag ductile iron rings use thinner top and middle pieces, yet prevent oil consumption.



The DSS max quench reverse dome low-compression piston is an efficient design that weighs about 160 grams less than a stock piston. The lighter the rotating assembly is, the quicker the motor can rev.

Here you can see the thread-in freeze plugs have been installed. These will add strength to the side of the block.



powerplant in our innocent little Fox. More boost, more cubes and more cam. It should be fun.

THE FOUNDATION

DSS Competition Engines was one of the first companies to market Ford crate motors and is probably best known for its Bullet short-blocks, but its latest acquisition, a Haas Horizontal Machining center (more commonly known as a CNC machine) has enabled the company to take engine block modifications to the next level.

This machine does it all, from boring to decking to thread milling and stroker clearance. It also does it perfectly every time. "DSS engines have a reputation for making more power than people expect," says Tom Naegele, Vice President of DSS Competition Engines. "This is a result of extensive block preparations and ring seal. Ring seal is the most important part of making power."

DSS still offers its Bullet short-blocks, but



The trick to clearancing blocks is to take just the right amount of material without taking too much or too little. The CNC machine does just the right amount every time. This gives you the strongest possible block with no chance of interference.

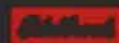
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for higher horsepower applications, the CNC mill works overtime to pump out the Level 10 and Level 20 CNC production blocks.

All of the engine cores that DSS uses are provided by guaranteed core suppliers, but DSS thermal cleans and shot-peens them to stress relieve them. Then they are Magnafluxed to double check viability.

The 10 series is rated at 600 hp while the 20 series piece is good for 675 hp. In addition to the numerous CNC-milling procedures that are completed on the Level 10 piece, the Level 20 receives thread-in freeze plugs that strengthen the sides of the block.



This is the finished short-block with main support installed.



Each DSS engine is assembled in a climate-controlled clean room to prevent contamination of the motor's internals. This isn't exactly your cousin's backyard shed we're talking about here. DSS not only sells to enthusiasts, but it services hardcore racers who demand even more from their engines.

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For the enthusiast who needs even more, DSS offers its Street Renegade Bullet short-block, which uses a Ford Racing R302 or optional Dart block, which is good to over 1,000 hp.

COMPONENTS & ASSEMBLY

For the 331ci motor, each cylinder receives a 4.030 overbore to be combined later with the 3.25-inch stroke of the nodular iron crankshaft. "We provide a well engineered high-performance assembly which offers great value for the money," says Naegele. "We like to fit people into combinations that make sense to them. We offer an optional 4340 forged crank that's good up to 1,000 hp, but it's 15 percent heavier and more expensive, which is why the nodular iron makes better sense for the individual who is using a stock-block."

The connecting rods used in the 331 assembly are 5.315-inch forged I-beam pieces that feature bushed ends, full-floating wrist pins and ARP 3/8-inch Wavelock bolts. The piston of choice is DSS' own Pro Lite forged aluminum unit. Made in house, these pistons utilize a max quench reverse dome (low compression) for better efficiency and flame travel. Rather than having just a big dish in the top of the piston, the DSS reverse dome is like a mirror image of the combustion chamber itself.

Once the CNC machine is done with the block, assembly is no different than any other 302, but all DSS engines are built by professionals and not your cousin's friend's uncle. "In order to ship motors all over the world like we do, they have to be right the first time," says Naegele. "We have a redundant triple quality control system in place that checks clearances and torque specifications using precision dial bore gauges and micrometers."

The DSS 331ci SuperPro stroker with the Level 20 upgraded block sells for \$3,539.95 and is capable of making over 700 hp, although DSS recommends limiting it to about 650 with the stock-block. At this price, the 331 is a good value for the money, and is exactly what we need to support our induction system.

Now that we have a solid bottom end, we plan to crank up the boost on our LS1 killer and go hunting. Stay tuned for part two where we'll bolt this baby in and hit the dyno and dragstrip. **///**

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