THREADED FASTENERS, TORQUE VALUES, CLAMPING FORCES, AND MORE

engine professional

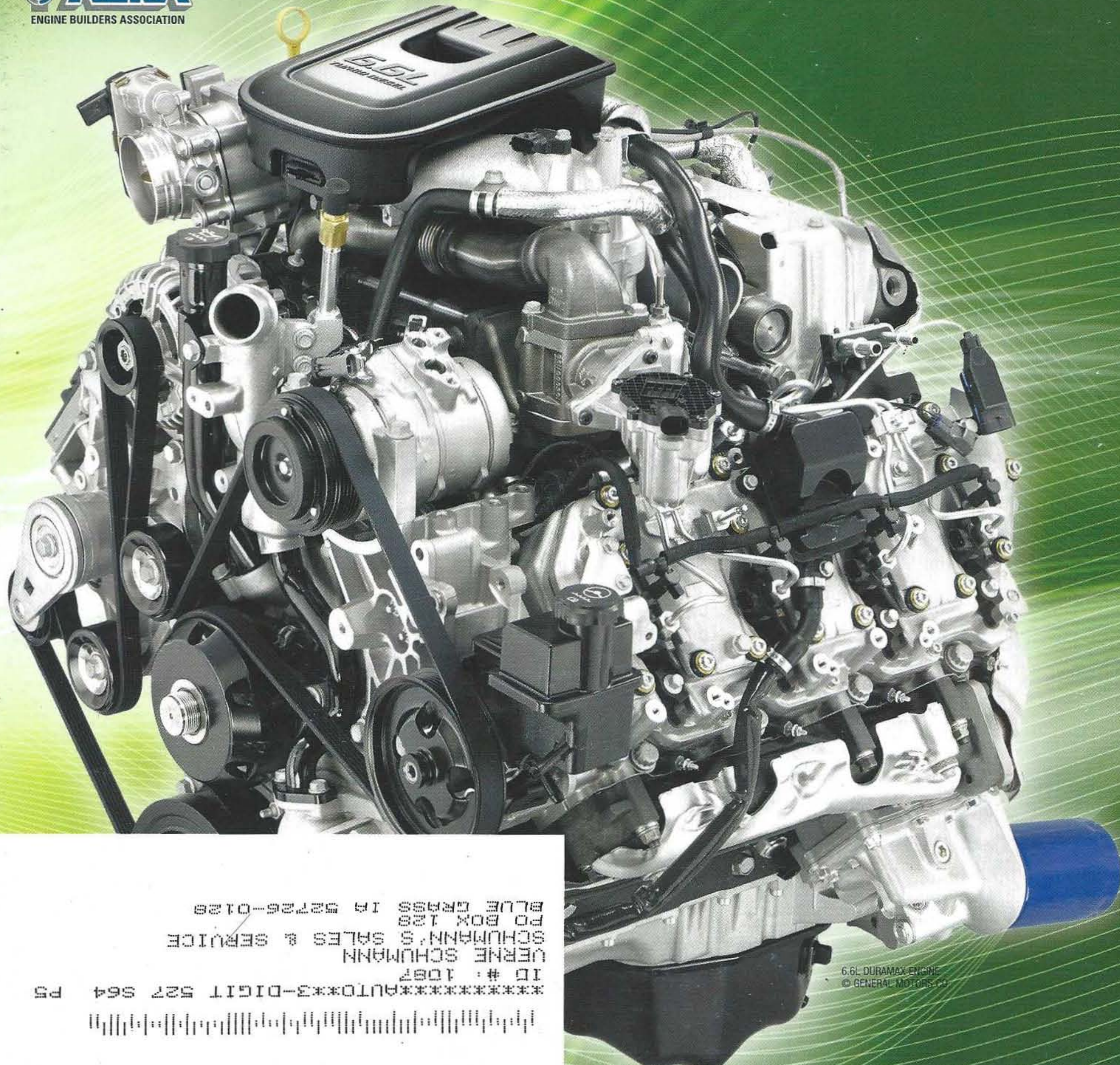
AN AERA INTERNATIONAL QUARTERLY PUBLICATION
JANUARY-MARCH 2013

AERA ENGINE BUILDERS ASSOCIATION

Piston Seizure in Diesel Engines
Understanding the true failure

409 Engine Build
Building a performance-oriented original

Saving Outboard Engines
"How to" before and after



6.6L DURAMAX ENGINE
© GENERAL MOTORS CO.

PRSRT STD
WINONA MN
US POSTAGE PAID
PERMIT #184

*************AUTO**3-DIGIT 527 S64 P5
ID #: 1087
VERNE SCHUMANN
SCHUMANN'S SALES & SERVICE
PO BOX 128
BLUE GRASS IA 52726-0128

option, if I was to stay with traditional solid lifters, was to use a tool steel lifter. Cost of a high quality roller lifter and a similar quality tool steel lifter set was deep into $1,000. Just not in the budget, I am afraid, so back to a conventional solid lifter/cam arrangement.

Once it was decided to take an old school approach, we had Vern Schumann qualify each lifter individually for dimension and features. The elliptical face of each lifter was measured and would you know it, one of them was way out of spec. You would never have caught this visually as all lifter faces looked the same but that single defective lifter could have easily caused a cam failure without anyone knowing why. I strongly recommend a shop take a little extra time to qualify all hydraulic and solid lifter faces before installing them in an engine. It is easy to do and takes just seconds to qualify. Simply chuck a lifter in a machine that can hold them and run a dial indicator across the face. You should see the same movement of the dial from low (edge of lifter) to high (center of lifter) and back to the other edge. You can also place the dial indicator at any point on the lifter face and rotate the lifter. There should be no movement of the dial. If there is, then the elliptical face has been ground off center and lifters exhibiting such a machining defect should not be installed. One other little trick Vern did for us was to grind a small flute along the side of the lifter body. This takes pressurized oil directly to the lifter/cam lobe interface to assist simple splash method for lubrication. Today, it is possible to buy lifters with a hole already drilled directly into the face that accomplishes the same thing and well worth the extra cost, in my opinion.

We spent a lot of time talking about lifters so what about the cam? When it comes to custom ground cams, I don't look any farther than Dema Elgin of Super Lobes. Dema has ground cams for just about every racing venue and so many high level engine builders that I think even Dema has forgotten how many. Dema rightly asks for a ton of engine specs and flow numbers along with a few questions about how the engine is to be used. There is no guess work with Dema. He gets you as close to correct as one can get on the first try. So, Dema ground a cam that is optimized for the engine. There is absolutely nothing more to say here other than Dema felt we should have no reliability problems using a conventional cam/ lifter arrangement. Neither do we.

One last thing on cams; We are going to strictly follow recommendations by Lake Speed Jr. (Joe Gibbs Racing oil) and use correct break in oil followed by the correct blend for the type of duty this engine will see. Aftermarket oils have come a long way and play a critical role in the performance and reliability of engines both racing and street. This is cheap insurance as far as I can tell.

Oil Pump

Why take time explaining the oil pump? Because it isn't quite the same pump we often choose. Our choices for a wet sump pump were either a big or small block Chevy. Vern Schumann, a

longtime friend and clever engineer, developed a wet sump pump that improves the external oil by pass circuit. Unlike normal cup or spool plug by pass devices that are slow to react, Schumann features an oversized seated ball valve for instant reaction time. Anyone who has ever suffered a stuck by pass valve can appreciate going to a seated ball arrangement. But what interested me most about this pump is the near instant positive oil flow right off start up. No more lag time for the pump to prime and "catch up" with required oil. In some ways, this pump acts like a dry sump pump by delivering fresh oil quickly. There are other stated benefits but I will let Vern tell you about those.

Carburetors (induction)

We had a genuine GM 409/425 HP 2X4 intake manifold mostly trying to retain as much of the stock look of an original 409 as possible but those big aluminum heads kind of blew that idea out the window. Surprisingly, there are not many intake manifold alternatives that work with these Edelbrock heads (besides Edelbrock) and most of those take the AFB or Edlebrock carburetors only. The idea of going to a fabricated manifold was out of the question. Cost was one big factor but a fabricated manifold gave the engine too much of a race car look. So, the search was on to find a reasonable solution.

Troy Patterson of TMP Carbs wrote an article for the January-March 2011 issue of Engine Professional on Holley carbs using TMP's Weber Power Plates. Troy had some very interesting ideas on how to fuel engines so he was our first choice to build and tune the two Holley 4150 carbs for the 409. I would encourage you to go back and read that article but for our purposes, Troy wanted to make sure we were sufficiently fueled at wide open throttle (WOT). He finds that all too often, carburetors are chosen for low to mid RPM range efficiency and WOT tends to lean out. Going to slightly bigger carbs helps ensure enough fuel for the entire RPM range without drivability issues.