1/15/20

Steve Spurr, President
Katech, Inc.
via email

Dear Steve-

At the time my engine was first rebuilt, only a few Street Attack LS7s had been equipped with the Mahle 1mm/1mm/2mm ring package and Mahle's bore prep specification.

My comments
1) That combination not being properly validated by Mahle would make parts failure a more likely possibility than how it was considered by the report.

The report, has a picture of one of the combustion chambers. The caption says the chamber was sooty and wet because the engine was running rich. Elsewhere the report notes that the MAF table had a "lean dip". That would make the engine run lean and Katech's dyno data shows that.

My comments
1) The engine could not be rich and lean at the same time, ie: sooty chambers wouldn't be present if the engine was lean enough to be damaged.
2) If the engine was running dangerously lean for an extended period, there would have been significant wear to piston tops, exhaust valves and, again, there'd be little or no soot because it would have been burned away by high combustion temperature.
3) The combustion temperature might have been high enough over a long period to erode the cat substrates, but those cats dated to APR2012. The rebuild only dates to DEC2018.
4) If combustion temperature after rebuild1 was not high enough to burn away soot, damage piston tops or exhaust valves, in spite of the air:fuel ratio being lean, then the temperature couldn't have been high enough to damage ring faces or bore walls.

The report says particulate matter in the intake manifold was indicative of air filter failure allowing abrasive material (sand, dirt and whatever) into the engine to wear the cylinder walls.

My comments:
1) Those particles would have scratched the bores, not polish them to a mirror finish. Imagine this– you have a flat piece of iron of the same type used in the LS7 liners. The surface on the flat iron plate is the same as that of the surface of a liner finished to Mahle's bore spec. Your task is to scratch the surface of that plate the same way as would particles left in the intake manifold by a failed filtering system. Let's say those particles are like 100 grit sand paper. You get sanding block, wrap some 100 sandpaper around it and sand for a little while. The result is scratches the size of those particles, but the liner surface is far from polished mirror-smooth.
2) Now, wrap your sanding block with a sheet of 1000 grit sand paper, pick a different spot on the plate and rub for a while. Then, get some 2000 grit and rub some more. The result, after you wipe the sanding residue away, is a polished section of that iron plate that is almost mirror-finished. What makes that mirror finish? Particles so small as to be invisible, such as those coming from Mahle's ring face coating. What doesn't make a mirror finish? Particles the size of the dirt that ended up in the intake manifold. Mix residue you wiped away after sanding with 2000-grit with a little oil and you have something like the abrasive paste Fritz noticed during the teardown after the second rebuild.

The "engine disassembly imagery" image of the top ring and explanatory text.

My comments:
1) The report states "Outer bore sealing surface polished". The word "polished" (by very fine abrasive paste) is used, rather than "heavily scratched" (by more coarse particles from the failed air filter).

The "engine disassembly imagery" of the piston skirts

Comments:
1) the report states "normal wear." rather than, "skirts heavily scratched" as they would be if the engine had ingested a lot of those particles of dirt, etc which was in the intake manifold.
2) I think it's possible that, at the time of the teardown, the air filter failure was recent and had not occurred long enough before for significant wear due to particle ingestion to take place.
3) I think the vast majority of wear occurred starting from "day one" and was due to the top ring coating failure.

The "disassembly images" of the ring lands. The text states "possible wear on ring lands not easily measured" as well as "Polishing/possible wear" with arrows pointing at ring lands.

Comments:
1)The only way those lands could get polished is extremely fine abrasive material and not the larger particles which came in though the failed filter.
2) Because I've worked as a technical writer for Bill Miller Engineering for more than 20 years and BME makes pistons, to a certain extent, I understand piston manufacturing. In fact, in the interest of mitigating micro welding between rings and ring lands, one BME piston making process puts a much finer finish on ring lands than do some other piston makers. I can't tell you the specifics of how it works, but I can say that generally, it involves extremely fine abrasive.

As you can probably sense, I'm really hoping for that refund of the cost of the second rebuild. Hopefully this addendum will have additional influence on the decision.

Regards,
Hib Halverson