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Supplier Spotlights
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Grassroots Road Racing

Will They Line Up For Your Engine Expertise?

Oil Pump Technology

Engine Blocks and Cylinder Sleeves

EXCLUSIVE:

2009 Machine Shop Market Profile Part 1

Fast Lane · Shop Solutions · NASCAR Performance

Moroso says their External Oil Pump also eliminates torsional stress on the camshaft, as well as spark scatter and resultant horsepower loss caused by an internal wet sump pump.

Brown, a Moroso sales engineer, says a properly designed inlet circuit is key to limiting cavitation. "You need to have the correct diameter inlet with minimal lifts and bends to mitigate piping losses and oil velocity limitations, as well as a properly designed inlet strainer (pick up) to minimize pressure loss at the inlet," says Brown. "Then, you must set the correct pick-up height off the floor of the oil pan to minimize vortexing at the pick up. A well-designed windage tray will help protect the oil from aeration, and of course you must be sure there is suitable oil volume in the oiling system to eliminate any drainback and oil turnover issues."

Vern Schumann of Schumann Sales & Service, Blue Grass IA, feels a solution for cavitation in the Chevy SB/BB oil pump is his dual feed design that flows 60 percent of the oil into the pump housing through the main inlet, and 40 percent into the housing through a second inlet. There are also cavitation relief channels cut into the pump cover (which are machined with a unique water jet process).

Pickup Restrictions

There is also a risk of starving the engine for oil at higher speeds with heavier viscosity oils. The screens or perforated metal covers on most oil pump pickup tubes are fairly restrictive. And the heavier the oil, the less easily it flows through the pores in the screen or perforations.

Wet sump oil pumps don't generate a lot of suction, so any restrictions on the inlet side of the pump can starve the pump and reduce oil pressure. Long pickup tubes with restrictive inlets, therefore, are bad news if you are trying to maintain good oil pressure in a performance engine – or even a stock engine.

Schumann says he has researched this issue extensively after discovering his new dual feed high volume small block Chevy oil pump was not realizing its maximum flow potential with commonly available aftermarket pickups. "Our pump is fully capable of delivering up to 12 gallons of oil flow per minute. But it can't achieve those flow numbers with any of the aftermarket pickup tubes I've tested. The pickups are too restrictive because of the size of the screens or

perforations they use."

Schumann said he has flow tested a variety of aftermarket pickups and found that all are overly restrictive and inhibit oil flow, especially with higher viscosity motor oils. For every 10 point increase in the viscosity of the oil, our tests show about a 5 percent drop in oil flow through the pickup screen.

An OEM style oil pickup with a screen style inlet cover has a theoretical open area of 60 to 70 percent between the wire mesh. Yet it only flows about 30 percent of what it should flow due to the restrictive drag created by the screen. Aftermarket pickups with perforated metal inlets are no better. In some cases, says Schumann, their flow characteristics are even worse!

The size, shape and spacing of the inlet holes in the aftermarket pickups vary from 29 percent to 49 percent (which is actually a lot less than the typical OEM screen style pickup) according to Schumann's analysis. The flow rates range from a low of 20 percent in the poorest design up to a maximum of 37 percent in the best design – which is far less than what you would expect from an aftermarket "performance" pickup.

Schumann says the industry needs to rethink the validity of current pickup designs because existing designs create a bottleneck that restricts oil flow to the engine regardless of what brand or style of oil pump is used. "The screen or perforated holes at the pickup inlet don't really protect the oil pump. They just keep big chunks of debris out of the pump. The tolerances inside an oil pump are typically .002″ to .005″, so any particles larger than that but smaller than the openings in the pickup inlet will be sucked into the pump anyway and damage the pump."

Schumann said he worked with a dozen different automotive, aircraft and industrial filter manufacturers to develop a cartridge filter or other filter that could be installed in the oil pump inlet or pickup inlet to protect the pump. But they all concluded it couldn't be done. Any such filter would be too restrictive due to the low suction qualities of wet sump oil pumps.

So Schumann came up with a different approach. Since the pickup screen or perforations don't really do much to protect the oil pump anyway, and only create a restriction, why not open up the pickup inlet to improve its flow characteristics? Schumann's solution is to replace the existing screen or perforated metal inlet cover with a 1/4″ hex honeycomb cover that has an open area of 92 percent and flows up to 78 percent of its theoretical maximum. There is still some protection to prevent large chunks of debris from entering the pickup, yet much less restriction to impede the flow of oil at higher engine rpms.

Schumann said he is working with several aftermarket pickup manufacturers to produce the new low restriction pickups, and hopes the entire industry rethinks their current designs and adopt his new approach.

"Another modification that can improve flow to the oil pump is to cut the inlet end of the pickup tube at an oblique angle rather than a straight cut. This increases the effective area of the opening and allows better flow into the pickup tube."

Schumann also cautioned that pickups with welded perforated metal covers may contain weld splatter inside that can flake loose and enter the oil pump. "If you pound the pickup against a pine board several times,

you'll often shake loose several weld BBs that are hidden inside the pickup. At least one pickup manufacturer I know has revised its welding procedure to reduce the risk of weld splatter ending up inside the pickup. But others have not, so you need to check the pickup tubes to make sure there's nothing lurking inside that could cause problems later on."

Oil Leaks

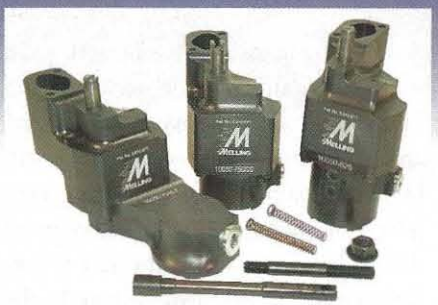
One often overlooked area where oil pressure and flow can sometimes be lost in a rebuilt engine (or even a new engine, for that matter) is the area where a bottom mounted oil pump mates to the block. The OEM mounting is simply a flush surface with no gasket or O-ring on most engines. Consequently, if both surfaces are not perfectly flat, gaps may allow high pressure oil to leak back into the crankcase. This can cause a drop in oil pressure at idle.

Schumann's fix for this is a thin copper gasket that fits between the pump housing and block. The gaskets are currently available for small block and big block Chevy, and Windsor Ford V8s.

Rebuilt Oil Pumps

Osterhaus said hot idle oil pressure is critical in any engine, whether it is stock or performance. An engine builder can resurface the cover on a worn pump to restore end clearances, but it won't restore the clearances between the gears or the gears and the sides of the oil pump housing. Because of this, a worn pump won't deliver the same pressure as a new pump.

"We've supplied oil pump rebuilding kits to the aftermarket, but the better approach is to go with a new pump because the housing is often worn," Osterhaus says.



Billet performance pumps are recommended for engines that rev over 5,000 rpm and are an affordable alternative to a dry sump system.

If you're worried about maintaining the oil pressure in your newly built engine, that's a good thing. Not being sure of the oil flow demands will be a real problem for your customers. EB