

Motorcycle Crankcase Flush

What are the effects of sludge build up in the crankcase?

As you can imagine, over time, engine crankcases tend to accumulate sludge build-up - that thick, gooey, sticky filth that oil and contaminants can turn into. Naturally, sludge is not helpful and in terms of our XJs, we can expect to see one or more of the following consequences:

- 1) After doing an oil and filter change, you expect to see only fresh oil through the oil level sight glass and on the day of the oil change that may be true. But an engine with sludge in it will help contaminate the fresh oil so you may see black oil again only a day or two after the oil was changed and looked new.
- 2) Another effect is sticking clutch plates. After leaving your XJ parked over night, climb aboard but leave the engine off. Then kick the transmission into 1st gear, pull in the clutch lever and try to roll the bike backwards. If it won't go without first having to rock the bike forward and back to break loose the clutch, then your clutch plates might be sticking due to sludge. In the case of my 454LTD, the sticking clutch was so bad that it broke my starter clutch assembly. I forgot to rock the bike forward & back first to free up the clutch plates, then when I pressed the starter button, the transmission resistance was too big against the starter clutch and broke the solid steel plate of the starter clutch assembly. That sucked.
- 3) Another sign of sludge build-up is a heavy clunk into gear when shifting. That may again be related to sticking clutch plates but that's only speculation. Whatever the reason, an XJ with a clean crankcase shifts more smoothly than one with sludge build-up.
- 4) And another sign is a sometimes missing starter like when you press the button and hear it spin wildly without actually engaging. Then after another try or two the starter actually engages.

Anyway, those things can be improved upon and sometimes even corrected 100% by way of a crankcase flush.

What is a crankcase flush?

A crankcase flush is akin to a cooling system flush. Just like for cooling systems, some kind of treatment is added to free up deposits which are then flushed out to leave the crankcase cleaner and hopefully free of oil sludge and its detrimental effects.

What oil treatments are used for a crankcase flush?

A lot of people swear by Seafoam for a crankcase flush. Others use diesel fuel or B100 Bio-diesel fuel. And still others have been known to use gasoline for a crankcase flush. However, given the dangers, the cost and the availability of those substances, most people agree that **kerosene** is a suitable and preferable alternative. Kerosene effectively breaks up sludge and has the benefit of being readily available and relatively inexpensive. Therefore, it's fairly unanimous that kerosene is the treatment of choice for a crankcase flush.

What are the cautions?

Naturally, using anything that will act as a solvent in your crankcase will counter the usefulness of the engine oil as a lubricant. Therefore, it is incredibly important not to use too much kerosene for the crankcase flush. The prescribed amount will facilitate sludge break-up without reducing oil viscosity so much that it does damage to your bearings or other engine components.

It's also critical that the bike is NOT operated under load when the kerosene treatment is being performed. That means, no riding the bike. Although it's helpful and even necessary to run the engine, it must be done with the bike on the centre stand, not while riding on the road.

You should also be careful to not spike RPMs while running the engine during treatment. Gradually increase/decrease RPMs where required rather than jerking the throttle or releasing it abruptly.

Some people say to limit RPMs to 1500rpm during treatment. Others are more liberal and say to run the engine to 5000rpm during treatment, but not much more than that. Personally, I believe 5000rpm is a bit excessive because you can really hear an engine work at that speed and we want to avoid working our engines during treatment. And 1500rpm is barely above idle so that speed may have little benefit. Therefore, I recommend that people avoid exceeding an upper limit of 2500rpm during treatment. I figure that's safe middle ground and will also cause fewer over-heating issues for those people with air-cooled XJs.

One final caution concerns the flammability of kerosene. Take care to stay away from open flames or sources of spark when using kerosene.

How much kerosene should be used?

There is quite a lot of discrepancy regarding the best & safest amount of kerosene to use as a crankcase flush treatment. Of course, the more you use the better the effectiveness as a sludge solvent but at some point more becomes detrimental.

Some people drain half their oil and use 50/50 oil and kerosene - that's quite a lot! Some use 1L (33.8oz); others use 473mL (16oz) and still others use as little as 200mL (6.8oz). All of them are bound to say that they didn't have any problems doing it their way. But how can you know how well your crankcase was cleaned without splitting the case and looking inside? How can you know how much damage was done to the bearings without tearing apart the engine and checking bearing clearances? The answer is - you can't know. The only judgement here that makes any sense is to find a balance between erring on the side of caution and finding some middle ground. So, on that basis, I'll propose that an amount of **400mL (13.5oz)** would be safe while still accomplishing the goal. And if that amount ends up being less effective than expected in breaking up engine sludge, then remember that you can always do it again and again until you're satisfied. Better multiple gentle flushes rather than one aggressive, and potentially damaging one.

How to perform a crankcase flush?

Assuming you've read everything to this point and fully understand the benefits, the cautions and the concerns about a crankcase flush, now you can begin.

- 1) Schedule your crankcase flush at a suitable time, like before you choose to fill the crankcase with the most expensive oil you can buy. You'll be discarding at least one crankcase full of oil so it's best to do that with cheap oil rather than the expensive stuff.
- 2) Have everything ready including kerosene, a container to measure out the right amount, fresh oil, a funnel, a new filter, rags, an empty drain pan so you don't end up with unexpected overflow issues, tools and most of all a torque wrench to properly torque the oil drain plug rather than stripping the threads like many have done before.
- 3) Begin by first warming up the engine & transmission to full operating temperature, preferably by going on a nice long ride.
- 4) Turn off the engine and set the bike on the centre stand on a level surface.
- 5) If you have an air-cooled XJ, connect an extension cord and a sufficiently large fan to blow air across the engine so it doesn't overheat while you're doing the crankcase flush procedure. This isn't something you need to worry about if your XJ is liquid-cooled and has a functional fan and thermal switch. However, if you've installed a manual fan switch on your liquid cooled XJ, then make sure the fan is spinning during the crankcase flush procedure so that the cooling system works properly and keeps the engine from overheating.
- 6) If your crankcase is full to the upper limit, it's recommended that you first drain 400mL (13.5oz) of oil before you fill in the suggested 400mL (13.5oz) of kerosene. Some people simply add the kerosene but if you do that you run the risk of raising the crankcase oil level so high that the crankshaft counterweights slap the surface of the oil and whip air bubbles into it. That's not good with normal oil, let alone when you've compromised the effectiveness of the oil by adding a solvent like kerosene to the mix. So, it's advised to make room for the kerosene first, unless of course your oil level is low to begin with. Don't forget to close the oil filler cap again and anything you might have opened to drain away some oil ahead of time.
- 7) Start the engine and let it idle for a minute or two, until the kerosene has fully circulated and blended with the oil in the engine.
- 8) Continue to allow the engine to run for 5 to 10 minutes. Work through the gears several times as you would when riding, and gradually increase/decrease RPMs between gears as well as. Those with air-cooled XJs need to be especially careful about engine temperature at this stage.
- 9) Stop the engine and let it cool for several minutes, preferably until the downpipes are cool enough to touch. This will allow plenty of time for oil to settle in the crankcase and will make it less likely that you burn yourself as you continue.
- 10) Drain the oil & kerosene into the empty drain pan you prepared. Leave the drain plug open for several minutes to allow as much as possible to drain away.
- 11) Remove & discard the used and now kerosene-contaminated oil filter and allow any remaining oil & kerosene to drip away. Some people even compress the forks to help drain the final few drops but that's a bit of a wasted effort. After all, it's not 100% kerosene draining away and in terms of the full volume of oil in the crankcase, a few drops of 10-15% kerosene concentration is hardly important - it's negligible.
- 12) Install a new oil filter. If it's a spin-on filter tighten it properly by hand. If your XJ still has the stock filter housing, torque it properly. Also replace the oil drain washer & plug and torque it properly.
- 13) Fill in fresh oil, close the filler cap and your crankcase flush procedure is finished.

Who gets the credit?

A lot of people have a lot of opinions about how to do a crankcase flush. So, over the years I've accumulated the best suggestions and compiled them into this single set of instructions. But, to be fair, I myself initially had no idea what a crankcase flush was or how it was done so the credit for this information goes to the following people (and possibly some others I've overlooked & apologize to):

Dwayne Verhey - Melissa, Ontario, Canada
Mike Labencki - Milton, Ontario, Canada
William Hanna - Harrisburg, Pennsylvania, U.S.A.

Gary Schulte - Austin, Texas, U.S.A.
Peter K. - San Ramon, California, U.S.A.