Table of Contents

Go To Technical Menu

REF: Engine Mechanicals - Sub-04M

Why Oil Pukes Out the Breather or Air Cleaner

Wet sumping is a term usually used when oil spits out the breather vent / air cleaner. [1)]
However, engine breathing and wet sumping are two different ideas. But they are tied together as much as air and water.
Oil puking and oil seepage out the air cleaner are different conditions.
You'll know it if it pukes as there will be a good puddle of oil on the shop floor or gobs of oil running rearward of the A/C all over the bike.
Oil seepage (or the oil filter getting saturated with oil over time) may be perfectly normal.

The real reason these things like to spit oil out the breather is because they're a common crankpin 45° design. [2)]
Since the pistons are only 45° crankshaft degrees apart, they arrive at BDC 45° apart and again at TDC 45° apart.
So the volume of the crankcase is constantly changing.
If the check valve isn't functioning properly, it'll cause this issue.
There are usually two main concerns when this happens.

1. The breather valve(s) have to function properly. [3)]
   Often the original breathers / umbrella valves will no longer work or will become less effective. [4)]
   - This piston design causes a variable volume crankcase:
     - Pistons come down and the volume is smaller, pistons go up and the volume gets larger.
       Most engines don't work this way, they have a piston going up for every piston going down.
     - The variable volume design causes it to want to inhale and exhale air into and out of it's crankcase constantly.
       For a graphic illustration of this, take your timing plug out and start your motor.
     - If it's allowed to suck air in, it'll have an inhalation & exhalation effect going.
       Whenever air goes out, it'll carry some oil with it and deposit it.
       So by allowing it to inhale & exhale, you've basically created an oil pump.
2. Likewise if the motor has excessive blowby (poor ring seal) it'll cause it.
   - Bad ring seal helps evacuate the sump from oil. [5)]
     But on the other hand it increases the flow rate through the crank vent system to such levels that a lot of oil droplets join in.

Helpers for oil puking out the engine breather:

1. Wet Sumping: Click Here to read more on wetsumping.
    - During engine down time.
    - During high revs.
2. Over filling the oil tank: [6)]
   Click Here to read more on overfilling the oil tank.
   Click Here to read more on Oil Tank Pressure.
    - If the puking starts after you top you're oil tank, this is probably the problem.
      If you fill the oil tank to the full mark while some oil has wet-sumped down into the engine, you have too much oil in the system.
      The oil from the sump will be pumped back up to the tank, dribble down the vent tube to the timing cover, from where it is fired out the engine breather.
      This puking will continue after initial start up until all the excess oil has been fired out, which can take a while.
    - The cure is to drain a quart or so out of the oil tank, run the engine for five minutes until the puking stops, then top up the oil tank to the full mark.
    - On 1957-1976 engines, do not be tempted to drain oil out of the sump by taking out the threaded drain plug under the front of the engine.
      These are notorious for stripping the threads and are very difficult to repair properly.
      See Sportster Drain Plugs Explained for more information on that.
3. Worn engine / rings: [7)]
    - If your engine continues to puke oil / blow smoke after the above two things have been eliminated, your problem may be wear in the cylinders and/or heads.
      Worn rings and even valve guides, can allow blowby of combustion gasses into the crankcase area, which then comes out the breather.
      Usually this will be accompanied by smoke or oil coming out the exhaust pipes too.
      A compression test will give some indication of top-end condition.
      Anything below 120psi is suspect, according to the factory manual.
    - These bikes will still run OK at even 100psi, but they will be down on power and consume oil, and blow fog out the breather pipe.

The OEM system is spec'd with a certain pressure on downstroke in mind.
If atmospheric pressure is also present then, the total positive pressure will be higher at the breather vent when it opens next.
The extra air is combined with what the downstroke exerts (including normal blowby).
Likewise, increased blowby adds more air in the crankcase which increases positive pressure.
The higher the positive pressure is when vented, the greater the oil that is carried out with it. It's a balance.
There are very small amounts of oil mist that will normally go back into the carb. You may not see it, but it is there.
When the balance is off, you see it though.
When we modify the system, these balances have to be maintained. That may be in the form of a new or better breather valve.
Or that may require a better breather valve in addition to something else.

Worn rings / leaking oil out the umbrellas is only one cause of oil loss, however; [8)]

- The one way breather valve is designed to only allow air out.
    - This helps restore the OEM aim of a crankcase vacuum.

    - It also cuts down on oil leaks.
- Once the umbrella valve(s) fail, it changes to an open breathing system that allows air to suck in and blow out.
    - Violent air pressure changes and power losses follow.
    - The fluctuations in air pressure suck oil up into the air in the engine.
    - The fluctuations are driven by the pistons.

So to keep oil out of the A/C, means keeping engine breathing And wet sumping in balance. [9)]

Things you can try to reduce oil carryover

1. Check to make sure you haven't overfilled the oil tank. Topping off the oil tank on a cold engine is a common mistake.
   Also in regard to lowering the oil level in the oil tank:
    - 1957-2003 oil tanks are metal.
        - They have plenty of unrestricted air inside and do not require one to lower the oil level to the low mark on the dipstick.
    - 2004-Up oil tanks are plastic.
    - They are poorly designed in general to handle what they are asked to do.
      There is an excepted practice of lowering the oil to the bottom dipstick mark on 2004-up Sportsters.
      This is sort of a band-aid to the real issue being oil tank construction, but reportedly does work to keep down excess oil out the breathers.
2. Check for oil seepage around gaskets.
   The crankcase should only allow oil / mist to escape in one place, the breather valve(s).
   Ultimately it breaks down to whether your breather valve(s) can handle pressure changes fast enough.
    - Pushrod tube gaskets / O-rings seem to be the weakest joints on Ironhead Sportsters.
      If you keep replacing them due to leaks, you might want to check the breather valve (1977-1985) or breather timing (1957-1976).
    - Fiber rocker box washers seem to be the weakest joints on rigid Evos.
      They will implode if there is too much vacuum in the bottom end.
      That also lets extra air in the bottom end to wreck crankcase pressure balance.
      So check the rocker box bolts for tightness and seal after you change the umbrella valves.
    - Rocker box gaskets are also susceptible to moving / leaking / imploding from excess vacuum pressure.
      They seem to be the weakest joints on rubbermount Sportsters.
      Check for oil / air leaks around the gaskets. Also check the seam between the cases.
      Really, any to every joint that has a gasket, O-ring or sealer has potential to leak air/oil out and air back in.
3. Check for ring and head seal issues.
    - Click Here for information on Performing a Cylinder Leak-Down Test.
    - Click Here for information on Performing a Compression Test.

Go To Technical Menu

[1] [9]
,
Hippysmack of the XLFORUM
https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-era-specific-and-model-specific/frame-mount-evo-sportster-talk-1986-2003-models/196950-wet-sumping/page7#post4311455
[2] [3]
,
aswracing of the XLFORUM
https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-motor-engine/sportster-motorcycle-motor-top-end/5818-oil-puking-from-breather?highlight=variable+volume#post281111
[4] [8]
,
bunny32 of the XLFORUM
https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-motor-engine/sportster-motorcycle-bottom-end/35356-install-new-crankcase-vent-04/page2?t=67658&page=2
[5]
Jorgen of the XLFORUM
https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-motor-engine/sportster-motorcycle-engine-conversions/38153-xr750-883-series-race-engine-venting-etc/page7?t=75740&highlight=reed+valve&page=7
[6] [7]
,
Hopper of the XLFORUM
https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-era-specific-and-model-specific/ironhead-sportster-motorcycle-talk-1957-1985/74149-engine-breather-101-crankcase-vent-101?t=518948&highlight=cam+chest+breather