

TECHNICAL BULLETIN

What You Can't See Can Hurt Your Camshaft

And other parts of your engine...

A human hair is about 80 micron, and the smallest particle you can see with a naked eye is about 40 micron. That seems pretty small. Can something so small you can't even see it really cause problems?

Clearance size particles do the most damage. They are small enough to get into that space just ahead of the cam lobe and lifter contact area. Small particles can get in between the roller and the axle on a roller lifter. Even worse, hard particles can score the bore of the plunger in hydraulic lifters, and this can cause hydraulic lifters to bleed down. This leads to lifter "rattle" on start up.

In any case, the cams and followers (both flat tappet and roller) need to be properly cleaned and lubricated prior to installation and break-in.

Here are a few practical steps can you take during the assembly and initial break-in of an engine to rid yourself of these unseen assassins.

1 - Wash off the cosmoline coating that is on the parts just prior to installation. A foaming degreaser is recommended to really lift the greasy film from the part. That film seals out moisture and keeps it from reaching the surface of the part, but it also traps fine particulate. You don't want an abrasive slurry working on your flat tappet lifters, so make sure the metal surfaces have been degreased before you apply the break-in lubricant.

2 - Apply a high zinc break-in oil before assembly. Break-in oil is like primer for your engine. The Break-In oil establishes an anti-wear film in your engine, and that is the foundation for lasting protection. After cleaning the camshaft, dip the camshaft in the break-in oil. Next, clean the lifters, and dip them in the break-in oil. For hydraulic lifters, allow them to soak for several hours on their side with the oil hole pointed up.

For flat-tappet lifters, apply engine assembly grease to the foot of the lifter prior to installation. It is better to get an extra coat of primer, than to leave a few spots thin.

3 - Use a finer micron filter during break-in. A production car filter will have a finer micron rating than a racing filter will have. For example, a WIX 51061 small

block Chevy filter has a nominal micron of 21 with a GPM flow rate of 11. A WIX 51061R racing filter has a flow rate of 28 GPM and a nominal micron of 61. WIX even offers a specific break-in filter for dry-sump systems.

4 – Prime the pump before firing the engine. It is critical to have a supply of oil to the cam and lifters at initial start-up, so the oil system must be primed to avoid a dry start.

5 – Do not idle the engine. Upon start-up, bring the engine up to 2,500 RPM. Vary the speed of the engine by a few hundred RPM for 20 to 30 minutes.

6 - After the initial 30 minute break-in, change the oil filter. Now you have removed all the larger particles that could cause problems. Now you need the high flow rate filter when you start making dyno runs or go to the race track.

The tighter the micron, typically the less flow you have. Ideally, you want a micron tight enough to filter out clearance sized particles and a flow rate high enough to supply the required volume of oil to your engine.

7 - Change the oil. Most of the wear metals that will be created in an engine's life will occur during the first 1 hour of operation. While everyone hates to throw away something that looks perfectly good, it is cheap insurance to change the oil after the initial break-in. Again, high quality break-in oil is like primer for your engine. It establishes the anti-wear film in your engine, and that is the foundation for lasting protection.

This is especially true for a hydraulic lifter engine. Any particle that gets trapped in the lifter can cause the lifter to bleed down and make noise. The best plan of action is to use a high quality break-in oil to reduce the amount of particulate created during break-in, and then change the oil and filter after initial break-in. Continue to use a high quality break-in oil during dyno runs, the first weekend at the track, or for the first 500 miles in a street car. After that, change to a high quality oil designed for that application and follow normal change intervals.

	Joe Gibbs BR Break-In Oil	Other Brand Break-In Oil
Wear Metals		
ALUMINUM ppm	10	27
LEAD ppm	43	67
COPPER ppm	18	44
IRON ppm	37	84

Used oil analysis reveals that Joe Gibbs BR oil reduces wear during the break-in process.

Keeping clean, high quality oil in the engine is insurance against lubrication related problems – because what you can't see, can hurt you.