Cam Lobe and Lifter Base Wear

There are a number of things that may contribute to the cam lobe & lifter base wear issues, and several elegant solutions.

1. Some years ago, it all started when the EPA mandated reductions of anti-wear additives (ZDDP) in engine lube, as these additives affected the efficacy of anti-pollution Catalytic Converters.
2. As lobe and lifter base wear escalated to become a widespread problem in engines with flat lifters, various solutions evolved.

   a. Traditionally, most lifters & cams were case hardened or here made of Chilled Iron. These worked fine until anti-wear additives were diminished.
   b. To minimize excess wear on lifter bases (which also destroyed cam lobes) vintage engines historically used lifter bores that were offset marginally from being exactly under the center of the cam lobe. This encouraged lifters to rotate, spreading loads across a wider area of the lifter base. If the lifters do not rotate aggressively, this will encourage premature wear, and if wear penetrates through relatively thin case hardening, damage to lifter base & cam lobe will escalate dramatically.
3. The first evolution of solutions was to crown the base of the lifter convex. An additional improvement on this was to axially taper top lobe of cam. This combined with convex base of lifters resulted in aggressive anti-wear rotation of lifter. A cam with axially tapered lobe **must** be used in conjunction with a crowned lifter base to maximize lifter rotation potential.

4. In some cases there were still premature wear issues, generally traced to lack of lifter rotation due to worn, oversize lifter bores, i.e. lifter no longer stably offset from under center of lobe, also lifter bore may have been inaccurately located when machined by OEM. **Fix**: Fit new Bnz. lifter bushings. See: Trend Performance, www.trendpreform.com or Jesel, www.jesel.com et al. Both, et al offer replacement .903" Bnz. lifter bore brushings. (Hone to fit.)

5. OEM's more long term solution to lack of lubrication has been to redesign flat lifters to incorporate a waisted/recessed oil capture band around circumference of lifter. Pressurized oil is introduced to lifter bore through an oil delivery hole in block, oil exiting block into lifte bore where it transitions from oil capture band via a horizontal drilling that intersects a vertical EMD drilling from base of lifter. This provides constant flow of pressurized oil directly to cam lobe/lifter base interface. Some post vintage OEM roller lifters incorporate this system too, some rely on splash oil to provide roller lifter lube. Their other solution has been to go to roller lifters (heavy, if chasing HP related RPM). See:
http://www.compperformancegroupstores.com/store/merchant.mvc?Screen=CTGY&Store_Code=CC&Category_Code=LFTRS

6. On engines w/o the capability to provide pressurized oil to lifter bore, several solutions have evolved for getting additional oil more directly to lifter cam lobe interface.
   a) A DIY solution is to broach a slot in lifter bore wall to gravity feed oil to cam/lifter base interface. This tool is available for DIY from several aftermarket cam suppliers such as Comp Cams, perhaps Crane cams & others, in .904" size. See: http://www.compperformancegroupstores.com/store/merchant.mvc?Screen=PROD&Store_Code=CC&Product_Code=5007&Category_Code=TLS3
      This is undoubtedly a better solution than slotting lifter itself. This is because the lifter Rotates & will not always be in correct position to present gravity fed oil to oncoming cam lobe.
   b) For many years some competition engines (Porsche e.g.) have use axial drilled camshafts to provide pressurized oil to cam lobes that are cross drilled to feed oil directly through cam lobe to bucket. One English aftermarket supplier of MG parts supplies such a cam for XPAG engine.
   c) Moss, et al offer lifters with elongated lightening slots in lifter to transfer more oil to cam lobe.
7. For flat lifter engines w/o capability to provide pressurized oil to lifter bore, there are yet other long term solutions:
   a) .904" lifters are available (Trend Performance) e.g. www.trendperform.com that are **hardened through & though and come with a crowned base.** This allows base to be re-crowned convex, virtually indefinitely, if detritus damaged, scored, or pitted from atmospheric moisture accumulated in sump oil. Moss apparently sources all their lifters with flat bases, then outsources some to be profiled with a convex base,. They then dimple hardness test new base to determine if re-profiling has penetrated case hardening. Depth of case
      hardening can range from .1mm (.004”) 1.”” A 5mm depending on process & QC.
   b) For ultimate protection, Trend can also provide same crowned lifters DLC coated for virtually unlimited service life.
   c) Fully hardened & crowned lifters are about $17 ea. More for DLC lifters. These are compatible with heat treated steel camshafts. Trend also supplies Bnz. lifter bushings. See: www.trendperform.com Downside of using Trend Lifters is that longer pushrods must be used as lifters are shorter. **NOTE:** These lifters & pushrods are **NOT XPAG** specific.

Lastly, **never** use a new cam with used lifters or vice versa. If reusing cam/lifters **always** replace lifter in bore it originally came from!

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