

Subject: Flat Tappet Camshaft Failures (Hydraulic & Solid/Mechanical)

Recent changes in oil and engine technology are likely the cause of premature camshaft failure; here's how you can protect your engine!

Premature flat tappet camshaft failure has been on the rise recently and not just with one brand or type of camshaft. In almost every case, the hardness or the taper of the cam lobe is suspected, yet most of the time that is not the problem. This growing trend is due to factors that are completely unrelated to camshaft manufacture or quality control. Changes in today's oil products and "advancements" in internal engine configurations have contributed to a harsher environment for the camshaft and a potential for failure during break-in. But there are several things you can do to curtail this discouraging trend.

Engine Building Tips & Parts Selection

Today's engines are great at providing oil to every engine component except one - your camshaft. Windage trays that limit oil's ability to reach the top of the engine, modification of connecting rod side clearances for less oil splash and special oil pans further complicate both the break-in process and camshaft operation in general. But by carefully selecting your engine components, you greatly reduce your chances of having a failure.

Lifter Selection

COMP Cams® offers flat tappet lifters (solid/mechanical) with oiling holes in the cam face surface, which will increase oil flow to the lifter-camshaft lobe contact point. Furthermore, using a lifter bore grooving tool (COMP Cams® #5003 GM engines; see catalog or website for other engine makes) will enhance oiling throughout the camshaft and valve train. As we all know by now, better oil flow means better initial break-in and increased camshaft durability. Additionally, make certain you purchase only high-quality lifters from reputable sources. Most lifters look alike, but you don't really know where they were produced. "Imported" flat tappet lifters often times use inferior lifter castings and **DO NOT** deliver the durability of COMP Cams® high-quality, US-built lifters. COMP Cams® lifters are built to strict diameter and radius tolerances and designed to fit precisely within their lifter bores. This ensures the lifter rotates properly and decreases the potential for failure. Additionally, COMP Cams® flat tappet lifters have the correct oil band depth and location to properly regulate the internal oiling of your engine.

Camshaft Nitriding

Nitriding is recognized by metallurgists worldwide as one of the most effective ways to increase the case hardness and lobe surface lubricity of flat tappet cams, all in an effort to enhance both break-in and long-term durability. Pro Plasma™ Nitriding is a patented process that uses pulsed nitrogen plasma to infuse nitrogen ions into the part – strengthening and fortifying the steel on a molecular level, through a depth of approximately .010 of an inch deep. Once again, COMP Cams® has proven their technological leadership by becoming the first aftermarket valve train company to own and operate a Pro Plasma™ Nitriding service in-house.

Available for any COMP Cams® flat tappet camshaft, this customer-requested service (COMP Cams® #1-111-1) has been proven to deliver unmatched wear resistance and uniform case hardness. In addition, nitrided versions of the most popular flat tappet grinds from COMP Cams® are now inventoried and available for quick delivery.

Lubrication

Engine Oil Selection

As we touched on earlier, another major factor in the increase of flat tappet camshaft failure is your favorite brand of engine oil. Simply put, today's engine oil is just not the same as it used to be, thanks to ever tightening environmental regulations. The EPA has done a great job in reducing emissions and the effects of some of the ingredients found in traditional oils; however these changes to the oil have only made life tougher on your flat tappet camshaft. The lubricity of the oil and specifically the reduction of the important anti-wear additives such as zinc and phosphorus, which help break-in and overall camshaft life, have been drastically reduced. In terms of oil selection, we recommend a high "ZDDP", Zinc Dialkyl Dithiophosphate, content oil for the break-in procedure and regular operation. There are several companies that are now offering specialized "race/off-road" oils, high in anti-friction and anti-wear content, to combat this specific problem. These oils carry the SL rating and contain up to 1000 ppm of Zinc/Phosphorous (the Zinc content in today's "off-the-shelf" oils have been reduced upwards of 20% since 2001 and approximately 35% since 1997).

Engine Oil Supplements & Additives

Making certain that the camshaft and lifters are properly lubricated upon installation will guarantee that they are protected during the critical start-up of your newly-built engine. COMP Cams® offers the right product for this job (COMP Cams® #153), and it is available in several different size containers for engine builder convenience. Even more importantly, we strongly recommend the use of COMP Cams® Break-In Oil Additive (COMP Cams® #159) during the break-in. While this additive was originally developed specifically for break-in protection, subsequent testing has proven the durability benefits of its long term use. This proprietary blend

of anti-wear and extreme pressure additives promotes proper break-in and protects against premature cam and lifter failure by replacing some of the beneficial ingredients that the oil companies have been forced to remove from off-the-shelf oil. These specialized COMP Cams® lubricants are the best “insurance policy” you can buy and are the first step to avoiding durability problems with your new flat tappet camshaft.

Proper Camshaft Break-In

Proper flat tappet camshaft set-up and break-in, as any engine builder knows, are keys to how long a camshaft will last, both short and long term. The correct procedure allows the lifters to establish rotation and develop a good wear pattern.

Break-In Preparation

Always remove the inner spring during break-in when using dual or high pressure valve springs. An alternative solution that addresses this same concern is using a set of low-ratio break-in rocker arms. Both of these solutions provide your best chance of proper camshaft break-in and long term durability. While these tips may be a slight inconvenience, a little time and effort on the front-end is much better than destroying your new engine.

Proper Procedure

As soon as the engine fires, bring the rpm up to 2000 to 2500 during the first 30 minutes of operation. Slower engine speeds will not supply the camshaft with an adequate amount of oil for the break-in period. The engine rpm may be varied periodically from 2000 to 2500 to direct oil splash to different areas of the camshaft. After the 30 minute break-in period, change the oil and filter again to be sure all contaminants and break-in lube are removed from the engine. The inner valve springs should now be replaced and the correct rocker arms installed.

If you have any questions concerning the break-in procedure, please contact one of our CAM HELP® technical consultants at 1-800-999-0853. We'll be glad to help you with any problems or questions you may have.

Six Steps To Increased Flat Tappet Camshaft Durability

- Double check your camshaft and lifter set-up prior to the break-in process, and use an ample amount of the supplied assembly lube on all lobes, distributor gear and the bottom face of each lifter.
- Use flat tappet lifters with cam face oiling provisions, such as COMP Cams® Part #800-16 (GM) or #817-16 (Ford). Always use high-quality; U.S.-built COMP Cams® lifters to make certain you are receiving the best quality lifter you can buy. Avoid “brown bag” lifters.
- Use a COMP Cams® Lifter Bore Grooving Tool (Part #5003 GM engines; see catalog or website for other engine makes) to increase oiling.
- Nitride your new flat tappet cam to increase the case hardness and lobe surface lubricity; available as an added service for any COMP Cams® flat tappet camshaft (COMP Cams® #1-111-1).
- Use high-lubricity, high-ZDDP content engine oil to help during the break-in process and always use COMP Cams® Camshaft Break-In Oil Additive (Part #159).
- Always remove inner valve springs from dual valve springs during break-in. In addition, COMP Cams® offers low-ratio break-in rocker arms to give you an additional measure of camshaft break-in protection.