

Some Tech Talk from Mikey

Hello to all of you. First a little background on me, so let me introduce myself. My name is Michael Lichner (AKA Mikey) and our company is Knucklehead Motorworks. I work with Cass and Donna Rae Kuzba of Deluxe H-D restorations and Fred Borchardt with VMBLLC, and we are located in Dousman WI.

With our collective experience and specialties we feel that we offer a restoration, rebuilding and service second to none in the area. I have over 30 years of experience working on Harleys at a dealership. My duties and roles in the past included basic service work and repairs, engine and transmission rebuilding, development of street engine performance enhancements and kits, design and construction of championship winning racing Harley Davidson's and service department management. Along the way my journey has crossed the paths of other well respected people in the industry such as folks @ Harley, S&S, Zippers Performance, Andrews, Redshift cams, Axtell sales, Ron Trock, Baisley performance, Slinger Airflow, Don Tilley, Bill Bartell and Ron Berman to name a few.

This journey of mine in the service industry has given me vast exposure to a large variety of situations and problems that can occur with Harley Davidson Motorcycles. I am able to draw upon this large inventory of experience in determining the best resolution for my customers in the repairs, restoration or performance work that I provide.

I have been riding kick start Harleys for over 45 years and currently the only E start bike in the household is a 07 ultra that belongs to my wife. Among the bikes I have owned, I have been riding the same knuckle for 29 plus years now.

My formal education and schooling with Harley Davidson motorcycles started in 1981 at the factory and I have helped them out in teaching performance related classes. I have learned over the years to pay close attention to any situation or problem that I encounter for my customers. At times it may seem to be a waste of time, but I can assure you taking the time when taking a component apart while taking whatever notes needed will pay off in the end. To put it simply you do not read a book from the back end forwards. In this article we are going to go over the high points in the buildup of a Harley Davidson Evolution engine to the once popular 89" displacement combination from S&S, using components sourced from some of the above mentioned aftermarket suppliers. We will be building up this engine so that it will create a broad and powerful torque band. This particular customer

has had this bike since it was new and just wants a reliable build up that will keep up with most of the stock Twin Cams that he rides with out on the highway. We will be working on a well taken care of 1986 Softail with 42,000 + miles on it this time around. I have been taking pictures as the work progresses to give a illustration of what is going on, this may help some of you better understand the buildup.



It is very important that you are organized in both your work and in your work area. After the fluids were drained and the tanks removed, I pressure tested the lower end of the engine before removing it. There were crankcase problems in the very late 80s and more so in 1990, these problems involved the integrity of the crankshaft sprocket bearing insert in the case "they came loose" in the case. Just like in building a house, it makes no sense in constructing a home on a questionable foundation. If found bad the cases could be repaired, but you might not find out that they are weak until you have it back together unless you check them first.



Mark parts as they are taken apart

The cases were found to hold pressure so I removed the engine and began the tear down after making sure that the loose grime on the outside was removed before disassembly. I mark all critical parts as they come off with stamps, or a scribe mark, I quickly inspect and rinse them off and lay them out in a orderly fashion for a closer inspection later on. As I continue on I make notes of

anything found abnormal, keep in mind that this is a 25 year old engine and has miles on it. Because this is a early Evo, I am finding that it is evident that care was taken in the manufacturing process. Normally on a stock rebuild with the heads off, I would clean the tops of the pistons off and check the piston protrusion in the cylinder of both pistons at TDC, but because we are changing the stroke I will by pass this step.



Now we remove both the cylinders and pistons off of the engine. I check for any excess physical movement in the connecting rod lower bearings, no excessive movement is felt. The connecting rods are then checked for straightness to the cases, using a long hardened precisely ground checking pin that just slides into the upper bushing in the connecting rod end and we find them pretty true. The rear has a slight twist which I will take care of now with a rod straightening fixture. Many times we find that the connecting rods are slightly bent or twisted when we take a engine apart so this is a normal operation for us. When either of these situations take place excessive wear can take place with the pistons/rings or cylinders, and excessive side thrusting of the piston wrist pin can take place, stock connecting rods can be straightened. (As an example at the shop, I have a Harley connecting rod dating from the 1970s that I have cold twisted a full 1/2 of a turn and no fracturing of the rod material is evident.) Next I remove the tappet blocks and set them aside and check the camshaft end play prior to removing the cam cover and note that measurement. I do this because if I find something unusual in the cam chest, this clearance if wrong may provide a reason why the abnormality. Then I check the flywheel end play and the run out of the flywheels at the end of the pinion shaft. I find the run out @ .0015, pretty darn good if you ask me and I cannot feel any measurable end play. As a side note, Harley accepts a run out of .012 on the flywheels in the later Twin Cams.



Check the camshaft end play prior to removing the cam cover.



Connecting rods are then checked for straightness.



Checking Pinion Shaft Run-out

I should stop for a moment here and explain something. All manufactured products have production tolerances, and many also have service wear tolerances. Your wrench should be very aware of where to find them and what these tolerances are; they can differ between similar components in engines. A Flathead may and does have a different set of tolerances between its parts than in a Knucklehead or an Evolution. The standard of measurement used in most manufacturing that the USA has used for years is in thousands of an inch, not in millimeters. One thousand of a inch is .001 and a tenth of a thousand of a inch is .0001. A hundredth of a thousand looks like this .00001.

An example you may be able to relate to is that a hair taken from the top of your head will probably measure around .003, that is just three thousands of a inch in diameter, this may help you better understand what I am speaking about when I give a measurement, it is in either thousands or tenth of a thousand of a inch. Well for now that's all folks, see ya next month when we continue on the tear down and inspection processes. Mikey



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Specializing in:
Flathead - Knucklehead - Panhead - Shovelhead - Evo -
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