Reduce Vibration, Increase Longevity, and MAKE MORE POWER

Revolution Performance Dynamic Crank Balancing

WORDS: Greg Friend of Gearhead, Inc. PHOTOS: Courtesy of Revolution Performance

1. We shipped out a 96-inch Twin Cam motor completely stripped down to Revolution Performance’s facilities in Plymouth, Wisconsin. The Revolution guys removed it from its protective crate and readied it for their improvements.

2. The motor’s cases were split, and the crankshaft assembly was removed. Note that they save and label all the original hardware—a good practice whenever disassembling a motor so later it will go back together faster.

3. All the gasket surfaces and material used for the original case sealing were carefully removed with a razorblade and a steady hand. Always be careful when using a hard steel blade against the relatively soft metal of the aluminum cases. A blade scraped against it at the wrong angle can damage the gasket surfaces.

4. A little dip in a solvent bath and a scrub quickly removed road grime and caked-on oil from the case halves.

5. Dirty solvent was drained from the cases...

6. ...and further cleaned by blowing off any remaining solvent into a hooded and vented box designed specifically for that purpose.

There are so many different ways to bolt on a few extra ponies that some people forget that in order to make real power, a person must start with the heart of the motor and build it up from there. All factory motors, no matter what the brand, are built to meet averages. Most motors today will easily hit the 100,000-mile mark but only in 100-percent stock form. Start adding power and aftermarket parts, and they usually don’t last anywhere near as long. But, fear not friends, there are many ways to make more power and increase longevity, and dynamic crank balancing is one of the best ways to do it. While it is hardly a bolt-on affair, if you have any reason to split the cases of your motor, that is the perfect time to dynamically balance your crank.

Revolution Performance is one of the few companies in the nation that offers dynamic crank balancing. It services all models of flywheels from every year, make, and model. And the guys there know that all Twin Cam motors eventually shift and create excessive run-out on the pinion shaft, which could cause extensive damage to your cam plate and oil pump. I spoke a little with Andrew Dellenbach at Revolution about what they do to balance the crank to make such a big difference in
the longevity of that part of the motor. “When we receive the flywheel, we measure and weigh components in order to utilize as many of the original parts as possible, like the pistons, the connecting rod weights, wrist pins, and wrist pin clip. That info from the components is used to balance the flywheel and dynamically balance all crankshaft assemblies,” Andrew said. “Whereas static balancing is making adjustments on a stand, dynamic balancing is a lot more accurate, and we can get the correct weights necessary for real balance within one-tenth of a gram.” The better balanced a crank is, the less vibration the motor will cause, which also creates more usable power and less wear and tear on all the bearings on the lower end. “On a bone-stock motor (from 88ci to 96ci), we remove...
anywhere from 35 to 65 grams. That’s a lot of weight. The bigger the motor, the more weight we tend to remove. For a 124ci or 131ci motor we might remove up to 100 grams,” Andrew explained. When compared to a balanced wheel on a car that might receive a few grams to balance, removing 35 to 65 grams from a flywheel is a considerable amount of weight and proves how out of balance a stock motor really is—even when it’s brand spanking new.

We happened to have a crankshaft from a 2009 Road King with a Twin Cam 96-inch that could use a bit of balancing and decided to send it to Revolution Performance at its Plymouth, Wisconsin-based shop. Usually, this procedure takes about three to five business days, not including shipping time, and includes a two-year warranty against any workmanship defects. Check out the involved and precise process that Revolution employed to make our motor vibrate less, last longer on the road, and make more potential power.

15. Finally, the crank assembly and simulated rod weight are spun up to speed. The dynamic crank balancer works much like a wheel balancer, and it serves the same purpose. A tire on a balanced wheel will last longer than an unbalanced one; a balanced crankshaft will last longer than an unbalanced one, and it will produce more power and less vibration.

16. This crank was way out of balance yet still within factory specs—a sad yet very common occurrence. While still assembled for balancing, the crank halves were drilled to remove weight where necessary.

17. Then each drilled hole was cleaned and chamfered with a hand drill.

18. After machining, it went back to the truing stand and was tested for run-out again…

19. …and then tested on the dynamic balancer again to check to make sure enough material was removed.

20. A diameter gauge was used to check the inner diameter of the connecting rod…

21. …and measured with a caliper to verify the correct tolerances.

22. The crankpin was also measured and was found to be within Revolution’s exacting specifications.
23. This device is a Federal Dimensionair Gage. It's an air-powered gauge that uses precision machined ring gauges for calibration of the connecting rod bearing surface wear and verifies that the rod is within specs and can be used again.

24. Each connecting rod was honed for reassembly and then prepared for reverification before final assembly.

25. The crankpin is pressed into place.

26. A liberal amount of assembly lube was applied to the main bearings.

27. Just the right amount of assembly lube is used for the moving parts during final assembly.

28. One final pass with compressed air is used to remove any debris in preparation for welding the pin.

29. Precision welding is an art form, but it's nothing for a guy who does it just about every day. Here, the crankpin is welded in place to prevent any parts from moving around during high revs or large loads the engine might experience. The weld prevents the crankshaft from twisting, and the plug they press into place prevents it from flexing and spreading apart.

30. With a light grit flapper wheel, the tech polished the surface of the weld and cleaned it up to prepare it for final assembly within the cases.

31. The relentless testing and measuring of every crank before, during, and after balancing and machining is what sets Revolution Performance apart from other shops. And it's the reason its motors make more power than others. Plus, it's the reason top builders and manufacturers come to Revolution for help. This one is ready for final assembly.

32. A liberal amount of assembly lube was applied to the main bearings.

33. Threebond 1211 is what Revolution Performance used to seal the case halves, which they say helps eliminate the possibility of leaks in the future.

34. Lastly, the crank halves are bolted together to factory specs, and the motor was re-crated so it would stay safe during its journey back to the bike from which it was removed.