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**BUILDING A  
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JIMS 137HP RACE ENGINE

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1. The bike we had the pleasure to ride with the 131-inch engine was an '08 Street Glide. This model featured the throttle-by-wire EFI unit; consequently, the stock EFI unit was used on the engine, which somewhat limited the power output due to the throat size.

## BUILDING A JIMS Custom Race Engine Program 131ci MONSTER

WORDS AND PHOTOS: JAKE KNOERR

The rain had stopped, the sun was out, and we were heading west on the 101—destination: JIMS Machine in beautiful Camarillo, California. Literally, across the street from a fertile agriculture field (with a winter crop of veggies) is the home of JIMS Machine, manufacturer of high-performance engines and specialty tools for Harley-Davidson and American Big Twin motorcycles. We were here to testride a 131-cubic-inch engine from the custom engine assembly shop, do lunch, and then go inside to watch a 131 engine being assembled.

The 131 we road-tested was installed in an '08 Harley-Davidson Street Glide. The Street Glide featured throttle by wire, therefore the stock bore EFI was utilized along with a set of EPA-compatible Screamin' Eagle mufflers. The 131 produced a hard-hitting 137 horsepower at approximately 2,500 rpm, according to the dyno print sheet. Being that this is a race engine, we took the test bike out to a closed course where we could really hammer the motor. Right off the bat it was evident that torque, power, and fun were at the end of your right arm. Through the tight twists and switchbacks, we stayed in Third gear and moved the throttle only to weave our way in and out of the turns; the engine maintained perfect manners and tractability. Wanting to open it up in the top gears, we hit some long straight-aways and had to really harness the power from getting the bike vertical, we slowly twisted the wick and shifted the transmission at 3,000 rpm until the Sixth gear light lit up on the speedometer face. A casual glance of the speedometer's needle indicated a three-digit number. OK, that was fun, but even on the closed course there are certain rules to observe. So, we backed down to a more sedate speed and enjoyed the ride passing other test vehicles with a small counter-clockwise twist of the throttle.

Only hunger prevented us from emptying the Street Glide's fuel tank, so we swung back around toward JIMS. After lunch, we had the pleasure to watch Joe Valdevieso assemble a 131 at the custom-designed engine assembly bench.



2. The right side of the head has a rectangle where your name can be machined into the surface for the ultimate, personalization—this engine is easily identified as a JIMS 131.



3. Here we have a custom engine laid out on the table. The engine of your dreams can be built, no matter the finish or color.



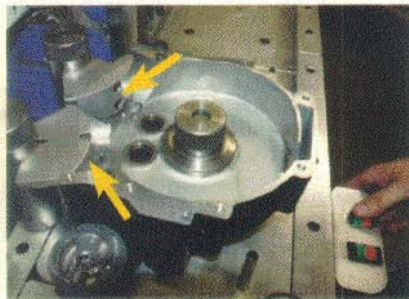
4. Here Joe measured the inner spacer for the Timken bearings for the flywheel sprocket shaft. Each engine starts with some pre-assembled components, such as the flywheels, cylinder heads, and pistons. The bench in front of Joe is specifically designed and built for the custom engine program.



5. One of the first operations is the installation of the inner camshaft bearings into the right crankcase. Here the needle bearings were placed on these two stands and the case was pressed down onto the bearings. The hole in the table (arrow) is for the pinion shaft of the flywheels for the next operation.

## BUILDING A 131ci MONSTER

The JIMS custom engine program is a lot like that fast food restaurant that let's you have it "your way." You can order a high-performance race engine built to just about any specs you want. You have a choice of 120- or 131-cubic-inch engines in three different configurations: Twin Cam A (touring and Dyna) or B (Softails), and the new Twin Cam engine with Evo mounts. Cosmetic finishes include Diamond Cut fins or all-black Night Train. All covers are from Harley-Davidson along with many of the internal components from the Screamin' Eagle line of performance products. Of course, flawlessly chrome-plated timing covers and rocker boxes are also available. There are also displacement kits to take a 120 to a 131. Best of all, all this throttle fun is as close as your local H-D dealer. **HB**



**6.** The right crankcase half was clamped to the table by custom-designed clamps (arrows), the pinion bearing was also installed at the same time—the bearings were pressed in using a hydraulic press.



**7.** The flywheels were positioned on the table and some assembly was lube-brushed on the sprocket shaft followed by the Timken bearing and the left crankcase.



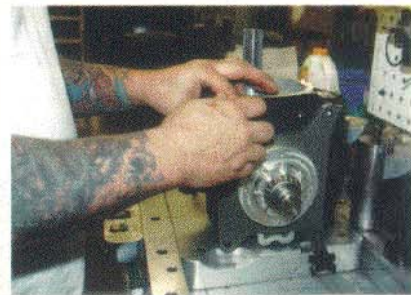
**8.** A threaded adapter was screwed into the end of the sprocket shaft, and then threaded into the hydraulic ram of the overhead press. When the hydraulics are activated, the ram pulls the entire assembly upward, pressing the Timken bearing and case onto the flywheels without distortion.



**9.** Even though Joe measured everything at least three times, he still set up a dial indicator and checked the Timken bearing endplay.



**10.** It's time for the crankcases to be assembled. Joe applied a bead of sealer to the mating surfaces of the cases. The left side case (with the flywheels) will be carefully slid into the right case—the case bolts installed and torqued to specs.



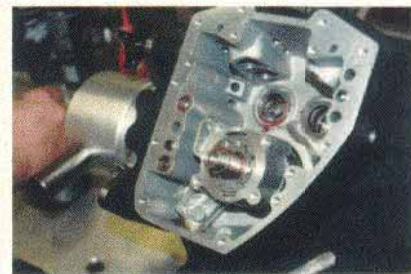
**11.** Once the cases have been bolted together, the pivot for the revolving engine stand was bolted to the rear of the crankcases.



**12.** The sliding table with the crankcase assembly was moved over to the engine stand and the pivot was locked in place.



**13.** The lower end has been swiveled and turned on the engine stand to receive the oil pump and camshafts.



**14.** Next to go in is the oil pump, pre-lubed along with the necessary O-rings that seal the oil passages in the crankcases to the cam plate.

## BUILDING A 131C: MONSTER



**15.** The camshafts come pre-assembled using the cam grind specified for the size and output of the engine—the cam plate is a JIMS billet item.



**16.** The camplate has reference lines machined into the outer surface for aligning the camdrive gear to the pinion gear, (in addition to the number sequence for tightening the camplate bolts).



**17.** The camdrive chain assembly was installed and then torqued followed by a hydraulic chain tensiometer.



**18.** For this custom engine, a chrome gear case cover was installed with chrome hardware.



**19.** Joe kept a few sets of JIMS Powerglide II lifters soaking in engine oil for at least a day before going in the cases—the lifters won't take so long to "pump up" when the engine is started. The lifters have flats at the top of the lifter body, machined 90 degrees from the roller axis, to locate them in the cases (A), the pin (B) indexes the flats. The tappet block covers hold the pin in place.

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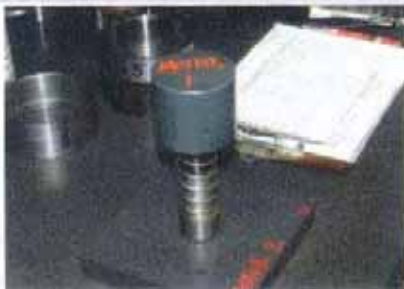
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## BUILDING A 131ci MONSTER

**20.** One of the enlightening aspects of watching the engine being assembled is the number of neat tools that are used. Here, all eight of the cylinder studs in eight installers were all set to the correct height.



**23.** On the bench we saw another neat setup tool for installing the pistons in the cylinders. The cylinder was placed over the tool head-side down and the piston was placed in the bore.



**21.** This is what the engine looks like with the cylinder's studs being installed—almost like a little porcupine or a mini metal forest.



**22.** To prepare for the top end, the connecting rods were centered in the crankcase openings by custom-cut pieces of foam. Not only does the foam hold the rods in place, but also prevents anything from falling down in with the flywheels.



**24.** Here is a better view of the piston in the cylinder. The tool holds the piston at the correct height so the rings are in the bore, allowing plenty of clearance for the wristpin to be slid into the piston.



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## BUILDING A 131ci MONSTER



**25.** Joe placed a base gasket on the cases, and then the cylinder and piston assembly over the cylinder studs, lined up the connecting rod, and pushed the wristpin in through the rod and finally fit the second wristpin keeper. The cylinder was carefully slid down over the piston and seated on the cases. Next is the head gasket. The head gasket only fits on the cylinder one way—notice the tabs with rivets (arrows) on the multi-layered gaskets. If the gaskets were flipped over, the tabs would interfere with the gasket surface of the head and cylinder.



**26.** The heads were placed on top of the cylinders, the head bolts were lubed on the threads and the underside of the bolt head. Then they were torqued down, using the factory-stated pattern and torque specification. The next logical step in the engine assembly is the rocker boxes. The lower rocker box was placed on top of the gasket and torqued down—again to factory specs. The rocker boxes openings for the valve springs (arrow) have been machined to provide clearance for any valve spring combination.



**27.** Yet another special tool—this one for pre-adjusting the pushrods. Each pushrod is placed in a groove of the fixture and adjusted until it's a slip fit. Of course, each slot in the tool is identified to the location in the engine; front intake, front exhaust, and so on. It's a lot easier and quicker adjusting the pushrods this way than in the engine—they will still need to have a final adjustment.



**28.** The pushrods go in the engine through the rocker box and head, and then through the pushrod tube assemblies.



**29.** The rocker arms and mount were pre-lubed and assembled on the bench and once the engine was rotated (so the piston has been placed at top dead center, meaning both valves are closed), then they were placed on the cylinder head and torqued to spec.



**30.** The last piece of the custom-engine puzzle is chrome rocker box covers. With the engine assembly done, Joe slings the engine from the build table to the test stand. The engine is not fired but run to check oil pressure and vacuum.



**31.** The engine passes the testing and is ready for crating to the lucky customer. Here Joe posed with the engine on the test stand, but there's no resting; another custom engine awaits his trained hands.

### SOURCE

JIMS USA  
(805) 482-6913  
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