

Honda **RedRider**TM

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2008 CBR1000RR: Innovation Personified
First Ride: CRF450R
Gold Wing Development: The Human Touch





Legacy: Something handed down from an ancestor or a predecessor or from the past.

Heritage: Something that is passed down from preceding generations.



rations; a tradition.

2008 CBR1000RR

FAMILY TIES

New 2008 debut provides pleasant surprises for the Honda family

Whether you choose to call it part of a legacy, a heritage, a family tradition or perhaps something else of similar ilk, the latest arrival to Honda's 2008 coming-out party makes its debut in a big way, signaling major-league changes far and wide across the powersports industry. More to the point, the 2008 CBR1000RR carries key qualities from its predecessors that have been sharpened, refined and elevated to the next level in order to establish new standards for function and style.

With the 2008 CBR1000RR, Honda reinforces a long-standing legacy of creating breakthroughs in the literbike class. Reaching back 15 years to the beginning of the CBR-RR era (the CBR900RR), Honda is going back to the roots of the original 900. This ideal has never been better embodied than it is within the CBR1000RR—smaller, more compact, faster, lighter and featuring a slipper clutch and other driveability-enhancing systems (see *technical sidebar beginning on page 34*), the CBR1000RR holds stunning advantages in power-to-weight ratio, acceleration and handling in the open class.

Enjoying a long-standing legacy is one thing, but it's quite something else to roll up your sleeves and bring that vision ever closer to perfection. With each successive step, the pathway to ever-decreasing size and weight plus ongoing increases in power becomes more and more difficult to follow. There are no silver bullets to be found; all the easy answers have been consumed by previous generations.

With the 2008 CBR1000RR, progress came from incremental improvements across the board. Smarter engineering propagates simple and efficient solutions to new designs. Look closely at the CBR1000RR and you'll find component designs that are simple and understated; these are true gems, uncompromising and full of performance, culminating in a whole new machine from the rubber sipes up.

The sum total of this work can be found in one telling specification: The 2008 CBR1000RR is significantly lighter than the 2007 CBR1000RR, an achievement reached by trimming ounces and grams everywhere.

New, More Compact Head

Beginning at the heart of the CBR1000RR, the engine is both lighter and more compact than the powerplant in the previous-generation CBR1000RR. The 2008 engine is lighter by 2.5kg (more than 5 pounds), and the completely new



cylinder head stands a full 15mm shorter than before. To accomplish this feat, the exhaust valves were shortened 3mm (which also makes them lighter), and as a result the camshaft could be placed lower in the engine for enhanced mass centralization.

New, lighter-weight camshafts were also developed and are manufactured using a new chilled thin-wall steel casting process that makes possible a reduction in camshaft wall thickness (from 4mm to 2.5mm) to save weight while maintaining the same levels of strength and rigidity. For further weight savings and quicker, higher-revving performance, new, larger-diameter titanium intake valves (29mm to 30.5mm) replace the steel poppets used previously, and they feature high strength to match their lighter weight. The steel 24mm exhaust valves have not grown in diameter, but new lighter-weight dual valve springs are used all around.

New Separate Sleeveless Cylinder Block

The CBR1000RR's engineering team designed an engine with a larger bore (75mm to 76mm) and a shorter stroke (56.5mm to 55.1mm) in order to achieve the stronger, higher-revving power output from 999.8cc (up from 998cc). However, the 2007 engine featured an

Look closely at the CBR1000RR and you'll find component designs that are simple and understated.





European model shown

integrated cylinder block and upper crankcase fitted with ceramic-composite cylinder sleeves. This previous design would not permit a larger bore of even 1mm without requiring a wider cylinder block and therefore a wider engine. Not acceptable.

The solution? Nothing less than a complete redesign of the cylinders and crankcase to eliminate the cylinder sleeves. In place of the integrated one-piece cylinder block/crankcase, a new separate cylinder block was created, permitting the cylinder sleeves to be replaced with a super-tough Nikasil coating applied directly to the cylinder walls. This elimination of the cylinder sleeves permitted the cylinder bores to be increased from 75mm to 76mm, reducing cylinder spacing from 6mm to 5mm while maintaining the same cylinder pitch and overall cylinder width as before.

Lighter, Larger-Bore Forged Pistons

Despite a 1mm-larger diameter, the CBR1000RR's new forged-aluminum pistons also maintain the same weight as the pistons they replace. Carefully redesigned to be both structurally stronger and effectively lighter, these new pistons combine with a 1.5mm-shorter stroke to make an important contribution to the engine's higher revs and quicker acceleration. A further contribution to the engine's quicker revving capability is made by its new high-precision cold-forged connecting rods, which feature smaller dimensions and tighter tolerances for significantly reduced reciprocating weight while maintaining the same strength and rigidity of the earlier hot-forged items they replace. The compression ratio increases slightly in the new engine as well, with a bump from 12.2:1 to 12.3:1.

New Low-Mount Exhaust System

One of the most obvious changes to be seen in the new 2008 CBR1000RR is its compact exhaust system, which is now positioned almost entirely underneath the engine to increase mass centralization in keeping with the MotoGP doctrine of Honda's current RC212V. In the interest of quicker handling, the CBR's previous center-up exhaust system was moved from its under-seat location to a position as close as possible to the motorcycle's center of gravity, thereby reducing the inertial effects of the system's weight and mass on the machine's ability to quickly change directions. Testing showed marked results: With the low-mount exhaust, roll inertia was reduced by 13 percent and yaw inertia by 10 percent.

Maximum cornering clearance was also a critical element in the design of the new exhaust, and the bulk of the stainless steel system fits within the small triangular area described by the lowest point in the center of the belly pan and the two foot pegs, with nothing protruding that might touch the ground and interfere with extreme cornering angles.

The exhaust then exits out the two ports at the end of its right-side secondary muffler, reaching up just below and behind the swingarm pivot.

This complex secondary muffler has also been specially designed for optimum cornering clearance, rising well out of the area of contact when cornering hard to the right, and the new swingarm's distinctive pressed-aluminum right-side arm was formed in a new gull-wing shape to provide ample clearance.

To maintain top performance throughout the engine's wide rev range while still reducing noise output, the large, triangular-section secondary muffler features a three-path chamber configuration. Additionally, an electronically controlled exhaust valve between chambers 1 and 3 automatically switches the muffler to a more direct, less restrictive, two-path system at engine speeds over 7000 rpm for improved performance in the mid-to-upper rev range. Another electronically controlled exhaust valve is located just inside the uppermost port of the muffler. It remains closed at engine speeds under 6000 rpm to constrict exhaust output for improved low- to mid-range performance, reduced noise and smoothly enhanced driveability, and it opens up at more than 6000 rpm for less restriction and enhanced top-end performance.



By concentrating the exhaust system's weight low and close to the machine's center of mass, the CBR1000RR gains significant advantages in handling.

New Four-Piece Fine Die-Cast Frame

In the quest for further weight reductions and better handling through improved mass centralization, the number of component parts used in the construction of the CBR1000RR frame was reduced from nine pieces to only four main castings. With fewer, slimmer and lighter parts, and fewer welds needed to hold them together, the new frame allowed significant weight savings. The frame's four sections include a large, new steering-head casting with two large holes through which pass new straight-shot ram-air ducts, two side spars and a single large U-shaped rear pivot mount section that wraps under the rear of the engine to surround the swingarm pivot and further ensure the frame's exceptionally rigid form. While all sections are still hollow-formed with approximately the same 2.5mm wall thicknesses found in the 2007 CBR1000RR, the new frame is significantly stronger than the

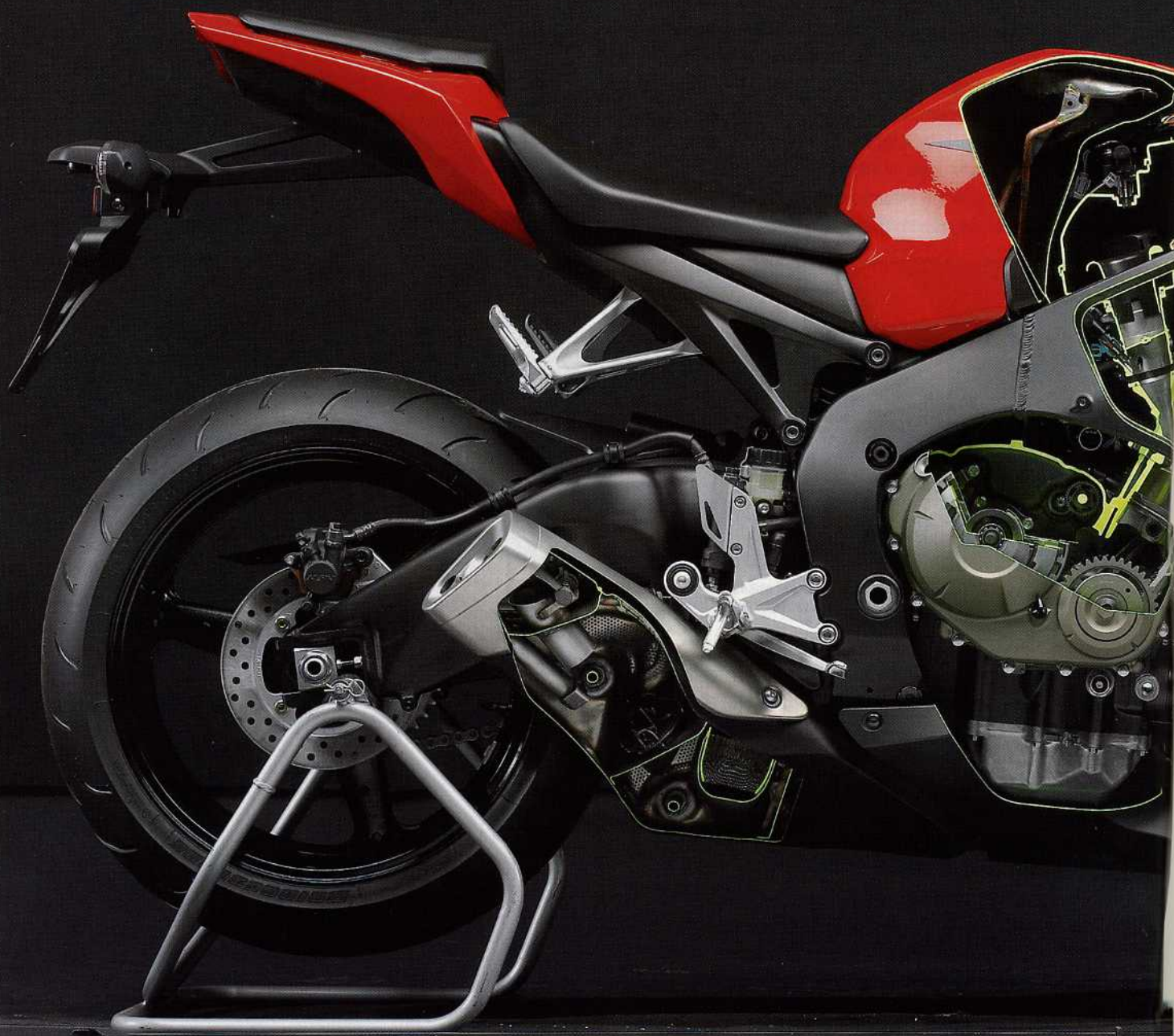
Continued on page 37



European model shown

Technically Speaking: 2008 CBR1000RR Technology

A unique blend of three technologies establishes a new standard for sporting literbikes



The new CBR1000RR now offers sportbike aficionados a more refined and highly advanced package that sets



European model shown

A newly derived blend of three Honda technologies bestow upon the CBR1000RR an exceptional degree of rideability. Thanks to an innovative level of whole-cloth engineering and sheer technological brilliance, Honda engineers have endowed the CBR1000RR with an Idle Air Control Valve (IACV), an Ignition Interrupt Control System (IICS) and a cutting-edge slipper clutch that incorporates a built-in mechanical assist system. These features work together to create the most controllable deceleration and acceleration traits in the literbike class.

As a result, this triad of systems greatly assists in entering and exiting corners because disruptions to smooth throttle operation are minimized. Moreover, these three engineering elements allow riders of all levels to hold the smoothest lines, and they help riders make smooth and quick throttle applications without undue distractions. Therefore, skilled pilots lapping a track can pare chunks of time off the stopwatch, and all riders will enjoy distinctly smoother, more comfortable riding on the street.

By now, IACV is a familiar friend. Introduced last year aboard the 2007 CBR600RR, this system minimizes unwarranted torque reaction and smoothes throttle response upon acceleration and deceleration by allowing a measured amount of intake air to bypass the throttle bodies' closed butterfly valves. This extra air-bleed circuit works to elevate engine idle speed fractionally for less engine braking on deceleration and for a more even transition upon reapplication of the throttle. Bottom line: smoother throttle transitions when the throttle is opened and closed.

To augment this useful system, the CBR1000RR now also incorporates an IICS, which is technology new to Honda motorcycles. In essence, the IICS uses sophisticated ignition mapping to reduce abrupt transitions and the

Advances abound in the 2008 CBR1000RR, including the all-new engine and frame, assisted slipper clutch, sophisticated multi-path exhaust system with two electronically controlled exhaust valves, lighter monoblock front brake calipers and new wheels for less unsprung weight, and much more.

Honda far ahead of the crowd.

shock forces generated as gearset and driveline lash is taken up at small throttle openings. Sensors compare engine speed to the speed of countershaft sprocket rotation and also factor in the degree of throttle opening; when engine speed surpasses countershaft speed by a predetermined threshold under hard acceleration, the IICS acts to interrupt some of the ignition pulses. In addition, the amount of interrupt is specifically programmed according to the gear selected—each of the six gearbox speeds has its own profile. This interruption allows a more gradual buildup of power, which reduces the shock forces that would otherwise be felt as a surge of driveline lash. However, all this begins and ends within milliseconds—the rider never consciously feels the brief interruption. Instead, it simply feels as though throttle applications with the CBR1000RR occur with regular and remarkable smoothness.

In addition to these two feats of throttle-application wizardry, Honda's engineers also created a unique slipper clutch that acts in concert with these systems to further smooth off/on throttle transitions. In total, these three systems greatly enhance the CBR1000RR's rideability on the street or at the track. The sophisticated slipper clutch incorporated into the new CBR1000RR not only represents the first use of a slipper clutch in a production Honda, but this unit, which is exclusive to Honda, also features an innovative built-in mechanical assist system to ensure clutch lockup while also reducing the pull effort required at the lever.

Generally speaking, slipper clutches have been used in racing to moderate the effect of deceleration torque (or "back torque") on the rear wheel during aggressive corner entries with heavy braking, thereby allowing engine braking to slow the bike without causing the rear tire to chatter. How is this accomplished? At the engagement area between the clutch center and clutch pressure plate, radiused surfaces act as cams to adjust forces incrementally. Under heavy deceleration, when back torque from the slowing rear wheel grows greater than the slipper clutch capacity, clutch slip occurs to relieve that excess portion of the engine-braking action and eliminate rear-wheel chatter.

However, a common shortcoming inherent in conventional slipper clutch design—especially for street-going applications—is the large amount of pressure required to force the clutch plates back together once no more slip is required. Naturally, the most expedient means of counteracting this issue is to employ very stiff clutch springs—which then create uncomfortably stiff clutch action. Such a penalty was not an option with the CBR1000RR, so Honda's engineers set out to find a better way.

Instead, with the CBR1000RR, when forces generated under

acceleration act upon the clutch center and pressure plate in the driving mode, another set of cammed surfaces acts in the opposite direction to automatically increase the amount of pressure generated on the clutch stack by the clutch pressure plate. Think of it as something of a reverse of the slipper clutch concept—an elegantly simple engineering solution. As a result, clutch springs lighter than those in standard slipper clutches could be selected, yet clutch lockup occurs quickly, securely and reliably. Bottom line: The rider enjoys a marked reduction in clutch-lever load for a light pull at the clutch lever. And thanks to this more efficient design that augments clutch pressure, the CBR1000RR can also incorporate a cable actuation system, which yields twofold benefits: A cable system is lighter than a hydraulic clutch actuation mechanism, and a cable also yields a direct mechanical link for better "feel" at the clutch lever.

With the 2008 CBR1000RR, Honda once again delivers the whole package—1000cc power, middleweight-class handling and a superior power-to-weight ratio, plus a new degree of sophistication for increased rideability. In short, the new CBR1000RR now offers sport-bike aficionados a more refined and highly advanced package that sets Honda far ahead of the crowd.

Engine Type: 999cc liquid-cooled inline four-cylinder

Bore and Stroke: 76mm x 55.1mm

Compression Ratio: 12.3:1

Induction: Dual Stage Fuel Injection (DSFI)

Transmission: Close-ratio six-speed

Wheelbase: 55.4 inches

Rake (Caster Angle): 23.3°

Trail: 96.2mm (3.8 inches)

Specifications subject to change.



Now more compact than ever before, the new CBR1000RR literally brings it firmly within the domain

Continued from page 33

unit it replaces, with lateral rigidity increased 13 percent, torsional rigidity up 40 percent and vertical rigidity up 30 percent. In addition the new frame is now a full 30mm (1.2 inches) slimmer and is significantly more compact overall as well.



For those planning to head to the track with the new CBR1000RR, the rear turn signals and license plate holder is removable, leaving a sleek and unburdened subframe and tail section.

Gull-Wing Aluminum Swingarm

To provide clearance for the new low-mount exhaust system, the CBR's strong and lightweight hybrid aluminum swingarm was redesigned with a new gull-wing shape formed into its pressed-aluminum right-side member. This new swingarm is 12mm longer than the one it replaces, with a 15mm-longer effective length that endows smooth high-speed tracking while still maintaining a short wheelbase (1405mm, up from 1400mm) for exceptionally responsive cornering characteristics.

Significant Savings in Unsprung Weight

The CBR1000RR's new hollow-section triple-spoke cast-aluminum wheels feature thinner-wall spoke castings for a weight savings of 240g (8.4 ounces) in the front and 310g (10.9 ounces) in the rear—a huge savings in unsprung weight that begets extremely beneficial effects on both ride and handling.

In addition, the CBR1000RR's powerful radial-mount front disc brakes now feature new four-piston brake calipers of a stronger and lighter monoblock design for an additional 126g (4.4 ounces) of weight reduction per caliper and a much more rigid configuration. Inside, new chrome-plated aluminum brake pistons replace heavier steel units for an impressive total of 430g (15 ounces) of reduced unsprung weight just at the calipers alone. These combine with narrower, lighter brake lines and a modified brake-lever ratio to increase braking performance with a livelier, more responsive feel at the brake lever. Furthermore, the brake rotors front and rear were also lightened with new six-point floating inner rotors

replacing the current 10-point units for a 90g (3.2-ounce) reduction in weight. The drilled rotor hole pattern, essentially the same year after year, has also been significantly changed, with several different hole sizes used across the surface to achieve both better feel and lighter weight in a design innovation that debuted on Honda's Suzuka 8-Hour Endurance racers.

Lightness Is Where You Find It

In 2004, the new CBR1000RR introduced a startling innovation to motorcycle handling in the form of the Honda Electronic Steering Damper (HESD), which helps maintain high-speed confidence while remaining virtually transparent at slower speeds. A lighter, more compact, second-generation HESD made its debut on the 2007 CBR600RR, and now it too finds its way to the CBR1000RR.

As a final example of light-think/bright-think, consider the battery on the 2008 CBR1000RR. Virtually ignored in most performance evaluations, motorcycle batteries tend to pose weighty problems calling for special design measures. A typical 10-amp-hour battery can weigh close to 7 pounds and takes up a considerable amount of space that could be devoted to other components. On the new 2008 CBR1000RR, the engine's starter ratio and starter-motor characteristics were revised to produce the same strong engine-turning torque with less electrical-current draw, changes that made it possible to achieve the same number of repeated starts—and quicker starts—with less battery output. Therefore, you'll find the CBR1000RR carries a battery that's smaller than the one carried in any other motorcycle in its displacement class, and this new 7AH battery saves more than 2 pounds over conventional setups.

Smart thinking? You bet. Honda's engineers have once again extended a fine family tradition by reengineering even the smallest details to redefine a new state of the super-sport art—part of a legacy of innovation and excellence. Moreover, with the 2008 CBR1000RR we have proof positive that efficiency and simplicity have come to life more dramatically in this new Honda than in anything else in the world.

Available in These Exciting Colors for 2008



Candy Dark Red/Metallic Silver



Black/Metallic Grey*
* 2008 special color. Limited color run, less than 500.



Black/Metallic Silver



Red/Black



Pearl Yellow/Black

erbike handling
in of middleweight sportbikes.