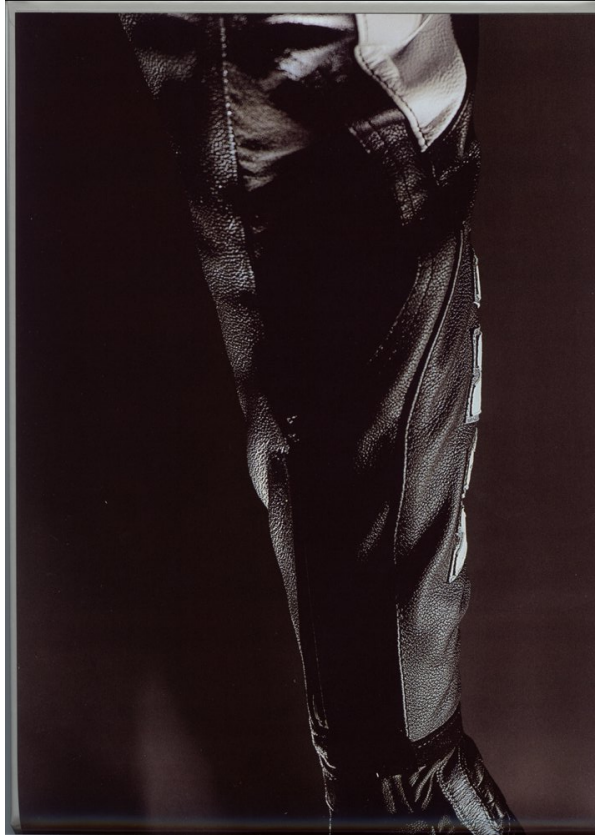
YAMAHA


the one



one original

This is where it all started, where the world changed for supersports riders. Unleashed in 1998, the original R1 was such a leap forward in sports bike technology that journalists from all over the globe acclaimed the machine Motorcycle of the Millennium. And it's been getting better ever since.


YZF
ALPINESTARS

one mission

The mission is super performance and the R1 fulfils that mission with dazzling effectiveness – Yamaha's super engineering delivers super handling which delivers the best-balanced supersport ride in the world. This is Mission Incredible and it's mission accomplished.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one aim

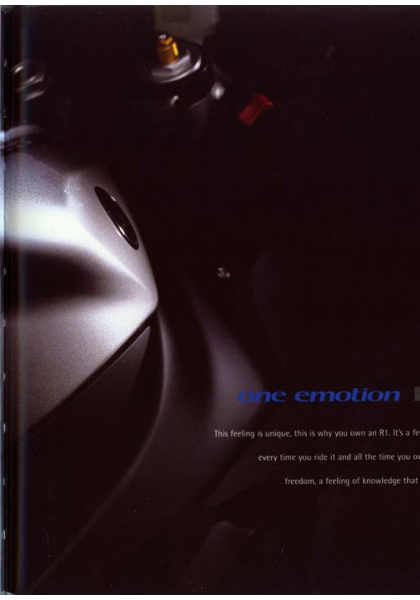
Yamaha's team of engineers had a straightforward attitude to the task of creating the world's most acutely balanced supersports motorcycle – there would be no compromise in producing a machine totally at one with the rider. That theme runs throughout the R1 and explains the latest model's unique tautness and unrivalled ability to give perfect feedback.

one vision

The R1 wasn't the world's first supersports motorcycle but it rewrote the rules on sportsbike design. Its unmistakable razor-edge profile perfectly mirrors the machine's character, captivating hearts and minds all over the world.

And like all true style icons, the R1 has influenced design way beyond its own.


AHA



one emotion

This feeling is unique, this is why you own an R1. It's a feeling that fills your senses every time you look at the bike, every time you ride it and all the time you own it. It's a feeling of exhilaration, a feeling of freedom, a feeling of knowledge that you own the king of supersports bikes.

"A supersport bike shouldn't be a machine that takes you along for the ride but one that responds to your will, so you can enjoy the fun of being in full control, down shifting and taking it through the curves aggressively. It should be a bike that takes you from where you feel good going through the turns to a stage where you say, 'How can I really attack this curve like a pro?' The real fun and excitement is not in sheer speed, but in the dialogue between you and your machine," says Kunihiko Miwa on what he envisioned as the true supersport bike back in the days when he led the development of the first YZF-R1.

the men who made it happen

Miwa, the Project Leader of the original YZF-R1, has now handed the leading torch over to Yoshikazu Koike. Formerly leader of the R1 running tests, Koike has now taken charge of overall development for the new YZF-R1, inheriting Miwa's initial vision and achievements and adding to it his own experience and expertise on the test track.

Miwa tells us that with the original YZF-R1 the engine displacement was not set at first. "It could have been a 750 or over 1,000 cc. For us, what mattered was a balance of the right amount of torque and power to enable the rider to really make best use of the machine's massive potential, while still being within the range where they could really enjoy handling the bike aggressively. We also wanted the machine's character to deliver an enjoyable ride and accurate response at about 70 to 80% of full speed, rather than simply focusing on achieving a high top speed," he says.

A few years after the original R1 debut, Miwa and Koike were getting feedback from owners who were saying, "It would be nice to have a little more handling performance in the high-speed range," and "It would be good to have linear throttle response." Miwa and Koike decided it was time to answer the call and return to the test track.

Kenji Abe – Supervisor, Engine Development YZF-R1

Abe and his team developed a new type of fuel supply system that is a fusion of analogue and digital elements (this produces a carburettor-type feeling)

Shoichiro Nishimura – Supervisor, Product Planning Division

Nishimura was instrumental in forming the product concept stressing "Rider-Machine Communication"

Hajime Nakaoki – Supervisor, Chassis Development YZF-R1

He helped fine-tune the chassis design to give the new R1 better handling response when attacking curves aggressively

Hiroyuki Hishki – Motorcycle Designer, GK Dynamics Inc.

He stressed on the qualities of the various "surfaces" of the exterior design to create impressive views from every angle

The theme for the new development project was "Dynamic Cornering Performer". Koike recalls: "What we had to decide first was the direction to take the next evolution, while still retaining the best aspects of the R1. A basic element of the existing R1 was 'a rigidity balance within the realm of smooth flexibility.' It was the kind of machine character that, say, if you decided to let up a little during cornering, the machine would still take you through the curve in an enjoyable way. But, when you are really trying to attack curves aggressively, it could, in rare cases, leave the rider with an unsatisfying impression. That was the kind of character we built into the original R1, and the bike's handling performance set the benchmark for supersport bikes in the late 1990s. With the new R1, we wanted a machine that would respond with more controllability when the rider tries to use it aggressively."

The key would be to achieve linear throttle response together with direct handling response. "From the engine response through to the precise character of the feedback of the brakes, we worked on every element of the overall riding experience to create a new generation of supersport machine," says Koike.

Looking back, Koike says, "The concept of 'Rider-Machine Communication' is part of every Yamaha bike, but I don't think there has been any motorcycle yet that epitomizes that ideal like the new R1." Asked what makes it so, he replies, "Everyone on the development staff just spent a lot of time riding the prototypes we built. And the shared experience of riding puts all the staff on the same vector. We see the importance of each design element and we are able to set clearer priorities. I don't think I have ever seen a team that came together so completely as we did on this project."

Koike: "The place where the staff would end up talking and debating most often was the meeting room behind the pit at the test track. That shows how much time all of us spent riding the prototypes. A bike has got to be something that is fun to ride."

Kunihiko Miwa – General Manager, Motorcycle Development

Yoshikazu Koike – Senior Supervisor, Motorcycle Development, Project Leader YZF-R1

Kunihiko Miwa (left) and Yoshikazu Koike (right)

making a legend

1998-2002

design direction

The styling image is based on three key terms.
The first is 'fusion of mechanisms', a new design concept that involves the fusion of the cowling and the frame, the frame and the engine and the mechanisms to the body parts. The second is 'dynamic movements', an expression of dynamic body movements and sharp, tight sculpturing of form.

The third is 'alluring design', an ideal that brings a sense of mechanics and material quality to the forefront. In fact, this is a concept that brings new design values to the individual parts as well as to the composition as a whole. Our aim was to propose a new design style based on a dynamic fusion of the body parts, the frame and the engine, and in a way that complemented the rider's body in order to achieve an idealized riding position.

The 2002 YZF-R1's design achieves a high degree of rigidity centred at the pivot assembly that contributes to the handling performance that characterizes this model. This is also why the pivot assembly becomes a visual focal point. From this pivot point the shapes of the frame, seat and tank have been composed to appear to enclose tightly the newly stiffened front-end assembly.

Particular attention has been paid to the surfaces on the latest YZF-R1, and the aim of the design team was to achieve a unique fusion between the motorcycle and the body of a human being. The former is composed of many straight lines and circles, while the latter has no straight lines or circles, and yet the R1's specially-developed form and ergonomic seat/footrest/handlebar relationship create a unique feeling of rider/machine unity.

As well as its ergonomically-advanced design, the latest YZF-R1 is also an aesthetically pleasing machine whose sophisticated bodywork presents a variety of different faces when viewed from different angles, thus adding to its enormous appeal.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Although technical specifications such as the bore and stroke, the shape of the combustion chamber and the cam profile remain the same as the original R1, the new model achieves new levels of driveability, thanks to the new frame, fuel injection and an array of new parts and components throughout.

Take the new cooling system, for example. It speaks eloquently of the design philosophy of the new R1. Everything from the radiator body to the housing thermo were newly designed for both better performance and greater compactness. But this was not merely motivated by the need to increase cooling capacity to accommodate the higher revving engine.

In order to achieve the design aim of raising the engine position 20 mm (0.79") without raising the upper surface of the fuel tank, it was necessary to make more efficient use of the cooling system space. In other words, this was a cooling system design born of the designers' desire to achieve the driveability they were after but without having to make any compromises.

ENGINE

■ Type > Liquid cooled, 4-stroke, slant block, DOHC, 20 valves, inline four ■ Displacement 998 cc ■ Bore and Stroke > 74 x 58 mm ■ Compression ratio > 11.8 : 1 ■ Lubrication > Wet sump ■ Fuel supply > Suction piston type fuel injection ■ Clutch type > Wet, multiple disc ■ Ignition > TCI (digital) ■ Starting system > Electric ■ Transmission > Constant mesh, 6 speed ■ Final drive > Chain ■ Primary reduction ratio > 1.581 ■ Primary reduction ratio > 1.581■ Primary reduction ratio > 1.581■ Gear ratio > 1st - 2.500; 2nd - 1.842; 3rd - 1.500; 4th - 1.333; 5th - 1.200; 6th - 1.115

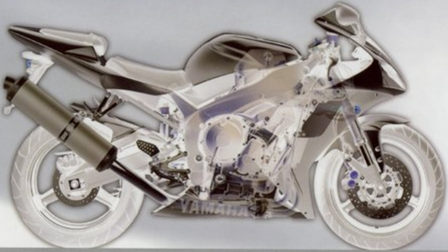
Other important engine improvements included new cylinder sleeves of a high silicon content alloy containing magnesium that minimizes heat-induced distortion and thus reduces oil consumption. Also, to increase reliability in the higher-revving engine, a reverse-tightening bolt was adopted for the carburized connecting rods, and new piston rings were introduced.

The new-design air cleaner box utilizes a front-facing fresh-air intake duct to avoid the adverse effects of sucking in hot air from the engine. This new design typically achieves a 5-degree drop in intake air temperature compared with the previous model, thus contributing to improved overall performance. Furthermore, the shorter funnel improves airflow to boost torque characteristics.

under the skin

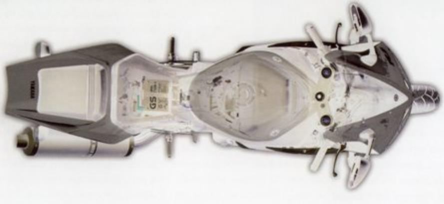
The exhaust system features titanium exhaust pipes for reduced weight, and to increase controllability a 4-into-2-into-1 exhaust pipe format replaces the existing 4-into-1 system, while the curves in the pipes have been made straighter for reduced exhaust resistance and a more dynamic exterior image.

New butterfly-type EXUP valves minimize valve interference with the exhaust pipe and increase exhaust efficiency. Also, repositioning the EXUP drive motor helped simplify the wiring between the motor and valves and reduce wire friction loss. All of these detail improvements further contribute to the enhanced driveability of this new model.



CHASSIS

■ Frame > Diamond-type DeltaBox III ■ Front suspension > Fully adjustable 43 mm inverted fork ■ Rear suspension > Fully adjustable link-type Monocross
■ Front wheel travel > 4.7" ■ Rear wheel travel > 5.1" ■ Caster angle > 24° ■ Trail > 4.06" ■ Front brake > Dual 298 mm discs
■ Rear brake > Single 220 mm disc ■ Front tire > 120/70 ZR17 ■ Rear tire > 190/50 ZR17 ■ Overall length > 80.3" ■ Overall width > 27.8"
■ Overall height > 43.5" ■ Seat height > 32.3" ■ Wheelbase > 54.9" ■ Min. ground clearance > 5.5" ■ Dry weight > 383.6 lbs ■ Fuel tank capacity > 4.5 gal.



Like frame rigidity, the settings of the steering assembly are an important element determining the handling character of a motorcycle. In the development of the new R1's handling, we returned to one of the most fundamental points in a motorcycle – the balance between steering feeling and cornering performance.

The new R1 has a new Deltabox III frame that is 30% more rigid than the existing model. When referring to rigidity in a motorcycle chassis, we generally speak in terms of fixing the head pipe solidly in place and then applying lateral, longitudinal and torsional force to the pivot assembly to see how resistant it is to distortion. The steering shaft is taken as the set point because it is so important in determining the machine's running characteristics.

ground control

As everyone knows, a motorcycle is not just ridden straight forward, but is constantly maintaining balance while being subjected to slight directional changes to the right and left. In all this, the steering shaft is the axial point. It is a balance created between the inertial moment of the steering assembly and the moment of the chassis, through which the drive force is communicated. And there is a larger circular motion that occurs while the wheel is spinning on its axle. Perhaps it is best understood by imagining the slow gyration of the rotation axis of a spinning top.

In developing the handling characteristics of the new R1, a lot of time was spent perfecting the inertial moment of the front wheel and steering assembly. It was an intense battle to get to within millimetre accuracy of the target values. Finally, it was a combination of many elements from the material quality and processing techniques for the handlebars to the specifications of the fork bracket that give the new R1 its distinctive handling quality.

The fork offset on the new R1 is 25 mm (0.98"). That is 10 mm (0.39") narrower than the existing R1 and, coincidentally, the same as the YZF-R7. However, this is not simply a measure to create a lighter handling feeling. The character we had in mind was that of a machine that responds with more potential the more aggressively you try to attack the curves, and also allows experienced riders to push harder around corners than on the original R1.

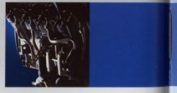
The new YZF-R1 also features an all-new asymmetrical aluminum swingarm featuring a delta-shaped left side and an arch-shaped right side – a configuration that facilitates the fitment of an uprated exhaust system which has been designed to achieve the desired engine character. Also new is a cast aluminum pivot, and in order to maintain optimum balance with the revised engine mounting position, the new R1's swingarm pivot axis has been raised by 17.5 mm (0.69"), while the arm angle is increased from 9.7 degrees to 11.8 degrees. By fine-tuning the machine's rigidity and balance, these important changes ensure outstanding cornering performance and enhance the overall driveability of this dynamic new supersport machine.

The engine on the new R1 adopts the industry's first suction-piston type fuel injection system on a production motorcycle. This is the biggest difference with the existing model and the feature the development staff devoted their greatest efforts to; another reflection of the ideal of Rider-Machine Excitement.

powerful character

The aim was clear and simple: to create a machine that responds with more potential the more aggressively you try to attack the curves. This would require an engine with direct response and outstanding performance in the high-speed range. And this fuel injection system was one way to achieve such a character.

This system uses the motion of a free piston to regulate air intake flow during low-speed operation. It is designed to combine the characteristics of a carburettor's natural intake smoothness and response together with the reliability and outstanding flexibility of electronic control. In this sense, it's a fuel supply system that combines the best features of analogue and digital systems control.



Without the use of complicated electronic control, an ideal air/fuel mixture can be easily achieved by controlling the airflow in the low-speed range, and the resulting seamless transition between the rpm ranges provides a feeling very close to that of a carburettor. Yamaha found this to be the best way to get the right combination of a carburettor-like control feeling and improved performance in the high-speed range.

The reason we sought a control feeling close to that of a carburettor is related to the basic principle behind a carburettor, which is to suck up fuel by means of the pressure created by the increase in speed of airflow that occurs when passing through a narrow passage. Skilful use is made of the laws of gravity. And, in fact, the R1 rider's sensitivities are also influenced by the laws of gravity. One of the underlying factors behind the natural feeling of the new R1's handling derives from the hidden presence of the laws of gravity as a common language in what we call Rider-Machine Excitement.

global feedback

There's no-one better to talk to about R1s than the people who ride them – that's the owners who use their R1s every day and the journalists who test bikes for a living. We travelled the world to find out what these people really think about Yamaha's R1: how the bike changed their lives, how it gave them the purity of performance they'd always dreamed about and why it's topped sales charts all over the globe, from Europe to Australia to North America.

Thierry Traccan Chief road tester, Moto Revue, France

"The R1 is a motorcycle of passion and an object of fantasy. When the bike was first launched in 1998 it was a new concept of hypersport machine – more radical, more effective, more powerful, lighter and with excellent braking. It set astonishing standards, offering top-level sports performance."

Shunji Yatsushiro Journalist, Bike Magazine, Japan

"I would say that the incredible sense of satisfaction you get when you're able to fully control this bike is something that only the R1 offers. The unwavering desire of the R1 development staff to build their ideal bike without compromise has resulted in a very high-level fun bike that owners really appreciate. The purity of the passion of its creators has communicated itself straight to the hearts of the users. I believe that is what makes the R1 a truly revolutionary motorcycle."

Kent Kunitsugu R1 owner and bike journalist, USA

"Look up the word 'groundbreaking' in the dictionary, and you'll find a photo of the Yamaha YZF-R1. Sure, there were plenty of sportbikes introduced before the R1 that offered a similar combination of liter-class power in a 600-size chassis. However, none had been melded together into a package that not only established benchmarks for performance, but also set a new standard for engineering innovation and styling as well. Even some of Italy's best engineers and designers admitted they were impressed by the creativity displayed by the R1.

"Actually, all that doesn't really mean diddly-squat to me. I just wanted a bike that can scythe through twisty tarmac like the proverbial hot knife through butter. And that's exactly what the R1 does."

Ken Wootton Editor, Australian Motorcycle News, Australia

"Australia in general, and myself in particular, seem to have developed an ongoing love affair with Yamaha's R1. For me, it began at the world launch in November 1997. Back then I wrote: 'Here's a bike with the physical size, lightweight and nimbleness of a 600-class machine. It's also got a super responsive engine that has the horsepower to take it to the top of the class, but with enough grunt that you don't have to use your left foot like a flipper to get there.' Boy, was I on the money.

"So, has the R1 helped redefine what a sportsbike should be? As a three-time winner of the Australian Motorcycle News Motorcycle Of The Year, and three times Australia's top-selling streetbike, you betcha!"

Carlos Checa R1 owner and MotoGP road-racer, Spain

"My R1 is my hobby, away from the bikes I race for a living. It's a tuned machine, with many special parts from Yamaha. I enjoy riding my R1 and also adapting it for the racetrack with special tuning bits. It's a really incredible machine, I use it for fun on racetracks around Spain, and I have to say that I enjoy riding the bike as much as my YZR500 I raced over the last few years! My R1 has incredible performance, both from the engine and chassis, I have a lot of fun with it!"

John Ulrich Editor, Roadracingworld.com, California, USA

"The YZF-R1 seemed to break all the rules when it was introduced to the press at Alicante, Spain, in November 1997. It made 150 horsepower, met ever-tightening emissions standards, ran without a hitch and carved its way around racetracks. And for gearheads, it was a neat technical package, so it was no surprise that the R1 immediately became the must-have big-bore streetbike and also took over the racetracks of America. The bike was a sales hit, so when I wrote about the R1 after the press intro, I concluded: 'The lesson seems to be, build the best sports bike, and the buyers will come.' Now, four years later, I think that still sums up the lesson the R1 taught the motorcycle industry at the time."

Credit: Roadracingworld.com - Brian J. Nelson

Jason Palmer R1 owner and electrician, England

"The R1 moved everything on, it was a big step forward for sports bikes. It was the bike's power, lightweight and looks that made me buy one, plus it's small and compact. I can't see myself buying anything different for a while, there's nothing around that's been such a leap forward as the R1. I use it on the street all the time, plus for track days now and again. Mine's stock apart from an end can and a steering damper."

Jim Crooks R1 owner and riding school proprietor, Australia

"My R1 was the first to be registered in Australia and I've been out to play on the bike pretty much every day since. I've clocked up 80,000km and each time I ride my R1 I'm still as crazy about her as I was the day I first picked her up – the power, the build, the quality, the reliability. My R1 has never let me down and that's really important as I use the bike when I'm conducting training courses at my motorcycle riding school. The R1 goes, stops and turns better than any motorcycle I've ridden. I can never see me wanting any other bike. Can't wait to try the new one out!"

Jason McVicar R1 owner and record breaker, Canada

"I first started riding at Bonneville Speed Week in '96. In '99 the buzz was all around the R1 so I purchased one and started preparing it for speed runs. The engine wasn't even cold from my first ride home when I started the stripdown, marvelling at the craftsmanship within the engine. That year at Bonneville we set records for production bikes and altered gas, then we went to El Mirage in California and set the production-bike record there, too.

"Since then we've continued to set records with no mechanical failures, even though the engine was sealed in August '99 and hasn't been apart since. That's very impressive considering the number of miles I've travelled at red line. My R1's three year evolution culminated with my entry into the Bonneville 200mph club at Speed Week in August 2001. There's only 36 riders in the Bonneville 200 club – that's less than the number of people who climbed Everest last year!"

R1 rules the racetrack

Yamaha's R1 took the global race scene by storm when it first hit the tracks in 1998. Since then the bike has ruled all over the world in just about every big bore category going. Proof positive that the R1 works magic with riders, wherever they want to perform.

From Australia's Formula Xtreme series to the American National Endurance Championship and the Isle of Man TT, the R1 is number one. Arguably the greatest test of all for any high-performance streetbike is Britain's TT races – a unique high-speed race around a closed public roads circuit that features hundreds of corners over each 37 mile/60km lap. It is around this ultra-demanding track that the R1 has won some of its greatest victories – dominating the last two Production TTs for near-stock machines, defeating rival full-race machinery in the Formula One and Senior events and establishing a new lap record at a staggering 126.69 mph/202.36 kmh in the hands of Briton, David Jefferies. Over on the continent the R1 has proved its speed and toughness with back-to-back successes in the European endurance cup for Stocksport machines.

In Australia, R1 star Kevin Curtain dominated the 1998, 1999 and 2000 Aussie Formula Xtreme Championships, but the bike had its finest hour Down Under in 2001 when fellow R1 riders Robert Baird, Jamie Stauffer and Craig Coxhell monopolized the hard-fought Xtreme series, taking the top three championship positions. Total domination.

In the USA, a near-stock R1 entered by the Semoff Brothers humbled their better-financed rivals to win back-to-back crowns in the country's ultra-gruelling WERA National Endurance Championship. And generous Yamaha contingency money helped R1 heroes dominate numerous regional Supersport series around the nation, some riders able to earn up to $60,000 a season racing their R1s! North of the border in Canada the R1 has made the country's Open Sport Bike series its own, riders Benoit Pilon and Frank Trombino winning a hat trick of titles in 1999, 2000 and 2001. And Canadian land speed record holder Jason McVicar is officially the world's fastest R1 rider – he clocked an amazing 206.162 mph/331.776 kmh at Bonneville in August 2001, riding a mildly modified three-year-old machine running special fuel.

R1. Race One.

Professional rider depicted on a closed course

one world

YAMAHA