Gsxr 750 Gsxr 1100: 1985 - 1987

SUZUKI MOTORCYCLES GSX R 750, GSX R 1100
Generation 1: 1985 - 1987

Etsuo Yokouchi, probably in his sixties but as vigorous as any man in Hamamatsu, sits down across from the Americans in an austere conference room at the **Suzuki** headquarters to talk about the **motorcycle** that changed the world.

A live wire of a man, his hands are always moving. Equal parts of his lecture on the genesis of the **moto Suzuki Gsx R** and lecture, is probably not the best term, sermon is more like it have him writing furiosly on a whiteboard and sitting across the table, teetering on the edge of his chair elboes forward, his gaze absolutely captivating.

Custom dictates orderly proceedings: ask the question, receive an answer. At the beginning of the interview Mr. Yokouchi sits down-barely-hands folded on a large envelope containing rare photos of the periods, and says, "Shall we begin?" But before the translator can form the first syllable of the first question, Mr. Yokouchi is up at the whiteboard, scratching out graphs and specifications, comparing weights and horsepower outputs of bikes before the **Gsxr**.

He speaks forcefully about a story now twenty yers old, a tale he has told probably a thousand times. Hi demeanor, his sheer enthusiasm make it seem like the first recitation a story offered as though you were the first person kind (or perceptive) enough to ask. And he is clearly delighted to be telling it.

Inside of five minutes, you understand the nature of the man, his conviction and drive. You imagine the intense experience of the junior engineers over the years who have had to work under his exquisite dynamism. (Others later recall his passion, commenting that he has, unbelievably, mellowed withage.) He locks eyes on yours, crow's feet visible through his larged glasses, until you have convinced him you understand every detail of the poiny he has just made.

Nodding will not do. Hai (an emphatic "yes" in





Japanese) will not do. He forces you to respond, to repeat the lesson like a first-year chemistry student. His approbation feels like a gift.
You have you lucky soul, just met the feather of the **Suzuki Gsx R**. Mr. Yokouchi's place in history is secure, thanks to the **Gsxr**. Unusual for someone in a position of power in a Japanese company, he has an outspoken proponent of pushinh the technology to improve the breed. Many have misunderstood the apparent lack of passion in japanese engineers (something Mr. Yokouchi neverworried about).
For one thing, it's cltural; to stand pround of the company and accepat credit for accomplishments can be seen as disrespectful to the rest of the team. Moreover, the culture is deeply ingrained with the concept of continual improvement. To great degree, the people, and ven company, are the secondary importance to the product.

In late 1981 and early 1982, racing was on Mr. Yokouchi's mind; it was an endeavor ha viewed asthe ultimate test. "Racing is love", he says, meaning thet it takes you to extremes.
If a machine is to be competitive, it must be a better performer; there are no market surveys at the checkered flag, no success come from playing it safe.
Racing machines must be powerful, of course, but it is equally important that they be light and nimble. With this idea percolating in his head, Mr. Yokouchi surveyed the sportbike landscape of the late 1970s and early 1980s and pltted his course. We look at that period from modern times and see the goal the **Suzuki Gsxr** represented as such a clear target- reduce the weight, and even if you don't dramatically increase horsepower, performance will increase.






It helps to understand motorcycling in that period to fully appreciate the impact of the first **Suzuki Gsxr**. In the years closing out the 1970s, most sportbikes were simple derivatives of so called standard bikes. From Japan, they were almost universally inline four-cylinder, air-cooled engined strapped to simple, round-steel-tube, double-cradle frames.






This was so mauch the orthodoxy that a term emerged: UJM. Universal japanese **motorcycle**. Despite the jingoistic ring, it was not used specifically as a damming term except by those with allegiance to other brands or continents.





In fact, UJM came to mean universally good, if conservative, engineering. The bikes all started on the first try, didn't leak oil, and were typically well enought developed that they didn't shake themselves apart.

The japanese compnies had many of the same resource available, and their engineers had followed many of the same paths, resultings in their bikes looking and working much alike. There was also, undeniably, some copyng, the inevitable "hey, that's a good idea... should have thought of that".

This also was a period of transition from two-stroke to four-stroke power plants, honda unquestionably landed the first punch with the CB750 in 1969.It reset the standars of fit and finish, durability, and broad appeal even if it was a conservative choice.
Enthusiast were lining up for crazy-fast bikes- the air cooled GT380 and GT500, and the liquid-coold GT750, were genuinely middle-of-the road models.

They were two-stroke versions of the CB750 in many respects. By the late 1970s, regulations were making the two-strokes harder to get into certain markets that had set more rigorous emissions and noise standards.As a result, the push was on the develop four-stroke alternatives. For the most part, the other manufacturers took turns stealing the limelight from one another. In 1973 Kawasaki's 900cc Z-1 cemented the firm's reputation for building lightning-quick bikes. Honda joined with more twin-cam engines.

Yamaha, still trying hard with two-strokes, nonotheless developed its own line of four-stroke bikes. Slightly late to the party after playing with rotary engines in tha RE-5 and thoroughly refining two-cycle power plnts, **Suzuki moto** introduced its first modern four-strokes in 1976. The **GS 750** four and the **Gs 400** parallel twin were the company's first toes in the weather of the modern era.
Soon, a **Gs 550** arrived. And by 1978, the company had introduced the mighty **Gs 1000**.






For ' 79, **Suzuki moto** brougth out seminal **Gs 1000 S**, a bike built as a replica of sorts for the machines beings campaigned in Superbike racing at that time. This could also be seen as the first step toward individual sport and standard models. That is, **motorcycles** with clearly different intent lower handlebars and small, wind splitting fairings for the sport models; taller bars and no fairing for the standard models; and shaft drive with a detuned











engine (for more torque). for the touring riders. Te year 1979 also brought the first L model, a cruiser-like **motorcycle** that was little more than a cosmetic alteration of a standard model, and the G model, a shaft-drive version of (again) a standard model with a slightly deeper seat and taller handlebars (but still no standard fairing).

Thought the company was relatively new to building four-stroke, **Suzuki moto** learned quickly and developed the line with astounding rapidity. Scan the brochure from the period and you'll notice something else: **Suzuki**'s line grew fast in terms of the number of unique models.

This was the result of what had become known as the Honda-Yamaha war.
In the late 1970s and early 1980s, Yamaha market share had grown rapidly and was quickly encroaching on the perennial leader, Honda. seeing victory within their grasp, Yamaha's managers and engineers began an all-out assault on Honda's position, building many new models, investing in technology and production equipment, and generally just ramping up as though for war.

In that period, as today, Honda was much bigger than yamaha and could increase its efforts without breaking the bank. For companies with fewer resources than Honda and Yamaha, these were trying times. "the Honda-Yamaha war hurt us all", says Masami Hga, general manager of the **motorcycle** planning departmant. "we were forced to keep up with the new models and the advanced technology. We were carried along in the war and had difficulty surviving in it.
Eventually the war ended with Yamaha calling a truce, but not until every manufacturer had been stretched to the limit developing and producing a tremendous number of models. The result was an oversupply of products placed into a softening economy. No **motorcycle** dealer in the U.S. at the time was particulary happy.
Even in these tough times, **Suzuki moto** continued to innovate. The company's other milestone of the period, beyond the **Gsxr**, was the Hans Muth designed Katana, another model spearheaded by Mr. Yokouchi. although its underpinnings were utterly convetional, using the air-cooled, four valve per cylinder engine from the **Gs 1100** (altered to **1000** cc for the U.S. market with race homologation in mind) and ordinary frame, its radical styling elicited gasps of surprise from the press and enthusiasts alike. **Suzuki**'s styling dessigners attempted to leverage the Katana's unusual profile into restyling jobs for other models- the **Gs 1100 E**, **Gs 550 Katana**, **Gs 650 Katana**, and **Xn 85 Turbo**.

By the early 1980s, the fashion of making sportbike separate from standards, custums, and touring righs had fully taken hold. The engines were becoming incrementally more refined, and the chassis were starting to move toward race-like architecture, using box-section ateel tubing on some models. Swingarms that had beenround steel tube became gusseted steel and the aluminium. Suspension sophistication improved dramatically, as did tire construction and grip. The sport sector began to gain in sales, and the manufacturers quickly realized that successful sportbike-particularly one the raced succesfully-could benefit the entire line through raisng the brand image.In 1983, Honda introduced the VF750 interceptor, also called V45, as in 45 cibes inches.

It was, at time, the most advanced sportbike made, and it was a model that had no direct standard-category sibling. (The VF750 Sabre, introduced a year earlier, was far removed from the V45.) This is an important distinction. Before, all manufacturers built sport models from the bones of the standard bikes. The racier version might have a bit more power, an additional brake, and possibly a lower handlebar and further rearset footpegs. Honda drove the separation of sport and standard models by allowing little of the Sabre's DNA to dilute the interceptor's pure-sport genetics. The interceptor was fast and handled well but was heavier than the inline-four models it replaced.

It won lots of races and more than a few awards. Cycle Guide magazine named it **Motorcycle** of the year and chromed one to put on the cover. (The particular bike was actually a nonrunning early prototype). At the time, the **motorcycle** press openly speculated that the future of sportbiking would folow the interceptor lead without question: the bikes would become ever more sophisticated and feature driven, with the lure of new configurations particulary the V-4 counting for a lot when it came to attracting customers. The same was happening over Kawasaki, as its GPz series grew in performance and weight. Even the Ninja 900R, when it appeared in 1984, was a heavy **motorcycle** whose powerful engine largely overcame the fact that the steel-tube chassis wasn't quite as competent as the Honda's.

Still following the traditional routes in the early 1980s, **Suzuki moto** was producing new versions of its main models, introducing air cooled engines that were far more modern and compact than the old (but still popular) two-and four-valves engines. (the roller-bearing-crank Gs1100 engine, as locomotive-like and loved as it was, nevertheless was a massive, heavy power plant.)
It was a matter of timing. **Suzuki moto** elected to take a conservative approach to the sporting philosophy, choosing to develop a bike with good sporting credential that was also reasonably comfortable and flexible. Honda and Kawasaki went the other way, producing ever more serius-minded sportbikes, with Yamaha not far behind. History shows that the interim **motorcycles** weren't a great success, even as the air-cooled **Gs 1150** forged on, still selling reasonably well. (that's a relative term. By 1984 and 1985, **motorcycle** sales were hurting in the U.S).

Still, in the early 1980's even as sportbike technology seemed to accelerated, in truth the models from every manufactured progressed gradually in terms of technology and performance. As they took small steps up in many categories at the same time-engine power, chassis rigidity, braking performance they also put on weight. Honda's interceptor weighed more than 500 pounds dry, and the air cooled Kawasaki Gpz **750** was just a few pounds lighter.
Meanwhile, back in Mr. Yokouchi's lair in 1983, domestic market custumers caught a glimpse of **Suzuki**'s technology to come in the RG 250 Gamma. It was light, very light, but you'd expect that of a two stroke.

Next, in 1984, came the **Gsxr 400**. Think of it as the trial ballon, a relatively low risk peek at what could be done. The engine, a liquid cooled inline four, was placed into an all aluminium frame. as result of the frame and abnormal obsession with detail weight reduction, the little bike came in 18 percent lighther than its japanese market competition. It was heralded as one of the best sportbike of the time. No doubt the other three of the Big Four were eyeing the new think **motorcycle** with concern. Even if they took it seriously right from the start, they would begin a retalation already behind schedule.
"I felt tht if we could do a 40cc bike that was 18 percents lighter, we should be able to do the same with a **750**", recalls Mr. Yokouchi. It was an audacious assumtion: as engineers will tell you, scaling effects are hard to predict. The critical task would be to keep everything in balance, to make every part as light as possible.
"I knew that lights was right direction", he says "we had a voluntary 100PS (the metric equivalent of 98.6 hp) limit. We were getting close to having 100 PS already, so the only avenue open for better performance was to reduce weight".

Mr. yokouchi pushed his team relentlessly. "I asked the engineering team to bring in a **Gs 750 E4** (the 1984 air cooled **Gs 750 E** in the U.S. market) and take it completely apart. I had them paint components that we had no trouble with no breakage or durability issues in blue. I had them paint parts that had broken in the field in red. When we brought all the parts together, they were almost all blue! We were building the bike too well; noting ever broke. As an engineer, I say this is wasteful. We have become too conservative".
His story is corroborated by Hinori Iguchi, the engineer in charge of all the engine's moving parts during **Gsxr** development: "we were building very conservative engines at the time Nothing broke". Emboldened, Mr. Yokouchi set the goal: 100PS from a 750cc engine and 20 percent less weight than the bikes of the day, which were all around 480 pounds (220 Kgs).

Thus, the target was 379 pounds (176 Kg). The race was on. Chassis development took place simultaneously with engine development, with each department charged to reduce weight wherever possible. And if such weight saving measures called for unusual orexpensive materials, new technologies would be developed to produce them economically. **Suzuki moto** was a small company at the time and simply could not afford to produce a **motorcycle** at a loss, no matter how important it might be to the long term health of the company.
Mr. Yokouchi was convinced that race bike dimension would translate to the street. "The **motorcycle** doesn't know where it is being ridden", he says. In other words, good handling on the track would make for good handling on the street. (In retrospect, Mr. Yokouchi and his team overstepped this idea ever so slightly, as a lengthening of the wheelbase for the 1986 model attested.

Still, you have to admire his calrity of vision and willingness to says the course.)
Suzuki moto had campaigned and won on the **Gs 1000 R** endurance racer. It had won the Suzuka 8 Hour with riders Herve Moineau and Richard hubin en route to winning the 1983 Endurance World Championship for the HB **Suzuki moto** team. Although its **Gs 1000** derived engine was primarily air cooled, it did employ a version of oil jets aimed at the undersides of the pistons, as used on the production **XN 85 Turbo**. The chassis was forward looking. It used a short wheelbase, tight rake, comparatively little trail, 18 inch slicks, and, most important, an aluminium tube construction that foretold the development of the **Suzuki Gsxr**. These tubes were a combination of rectangular and round stock welded together in true one-off fashion. But while the material was new, the overall concept was not.

The frame formed a convetional double cradle, with massive main struts leading back from the steering head toward a point just aft and above the carburetors. This part of the frame then turned down to meet the swingarm pivot section from below. The upper tubes were moved otboard from the convetional location steel tube frames of this period had their main member or members close to the centerline of the bikes, with the horseshoe-shaped lower part of the fuel tank draping over. Widening the upper frame members increased rigidity without having a big impact on weight, but new ways of manufacturing and mouting fuel tanks had to be considered. Plus, room for a large airbox behind the bulky engine had to be in the plan as well. Little did competition or race fans appreciate that they were seeing a configuration that would become synonymous with sportbike performance. And while a great deal of the **Gs 1000 R**'success can be laid at the feet of its stout engine and well organized team, the low weight afforded by the alloy frame should not be underestimated.

A lighter bike is easier on its tires and on the rider, which is of particularly high importance in endurance racing."It was an amazing time", says Akimasa hatanaka, part of the **Suzuki Gsxr** chassis design team. "We had aa lot of heated discissions. How should we weld the frame? What materials are best? In a lot of ways, we were gropings in the dark. But we had the racing experience to lead us. We Knew that folowing what worked in racing would help". The team did more than just folow; they quite faithfully reproduced the **Gs 1000 R** in the new **Suzuki Gsxr**. Rake was dramatically steep 26 degrees, trail was 4.2 inches, and the wheelbase was a terrifically short 56.1 inches.

Put in perspective, Honda's V45 Interceptor had a rake of 28.2 degrees, 3.8 inches of trail (not an Unusually small number, thanks to the 16 inches front wheel), and a wheelbase of 58.9 inches. The **Gsx R**'s dimensions weren't just smaller than others' they were tiny. **Suzuki** had made other aluminium frame street bikes before the **Gsxr 400** and the **RG 250 Gamma** two stroke and had worked hard to hone the material into something that could be produced within costt and time guidelines. With these requirements in mind Mr. Yokouchi's team had elected to make the frame from combination of material. The headstock and swingarm pivot area are both area castings Aluminium castings can take fairly complicated shapes easly and, if made properly, require a minimun of machining and preparation before assembly. Between the cast pieces were extruded aluminium, box section tubes. Where the tubing runs are relatively straight and uncomplicated, extrusions offer a high strength to weight ratio; the key is to use each material where it is best. Moreover, **Suzuki moto** had developed an aluminium alloy that did not need to be heat treated after welding, which saved production costa. Advances in materials also led **Suzuki moto** to use Lightweight cast wheels.

Mr. Iguchi recalls: "We built a boldly lightweight frame. We were pushing ourselves very hard".
With the **Gsxr**, **Suzuki moto** showed its willingness to reinvent even propietary technologies in the pursuit of reduced weight. An example is the **Gsxr**'s Full Floater rear suspension. Previous examples of the system for street bikes used a pair of vertical struts rising from the swingarm that connected to a rocker arm. The fulcrum of the rocker arm bolted to the frame, while the free end compressed the top of the shock. The bottom of the shock was connected directly to the swingarm.

But with the **Gsxr**, **Suzuki moto** recast the idea, solidly mounting the top of the shock to the frame. Below the swingarm is a banana shaped linkage housing an eccentric cam that, along with the natural changes in the linkage ratio throughh suspension travel, made the system fairly progressive.
The reason for the change? Weight, for one, but it also lowered the overall center of gravity. Mr. Yokouchi anticipated that his new engine design might be more top heavy than the previous generation's power plant, and he wanted to compesate. Moreover, the simplified system created room for the battery and electrical components.

The fork was also comparatively beefy. The Showa unit had 41mm tubes, where the de facto industry standard was a 39mm unit. A fad of the time was some form of antidive damping; the **Suzuki moto** had a simple rate sensitive mechanism on the leading edge of the fork leg. This system did not reduce braking feel, and a similar one, electrically activated by the brake light circuit, would later be used on the **Gsx R 1100**.
Eighteen inch wheels were fitted front and rear and given either Bridgestone or Dunlop radial tires. The size 110/80VR18 front and 140/70VR18 rear seem impossibly small by today's standard, but they were cutting edge stuff in 1985. Many have asked **Suzuki moto** did not use the then popular 16 inch front wheel on the **Gsxr**. There are three answer: One, the 18 incher followed the **Gs 1000 R** race bike pattern. Two, the bike was expected to be very light and therefore maneuverable. The lighter steering respose of the 16 inch tires was not necessary. Third, the taller tired permitted slightly larger brakes and rotors than would be possible on a 16.

This groundbreaking chassis would carry an equally graoundbreaking engine. **Suzuki** had done V-4 engines in the Cavalcade touring bike and the Madura cruisers, but such a layout wasn't even considered for the **Suzuki Gsxr**. Market research and basic packaging demands pointed to the inline-four.
The turning point for the **Gsxr** project actually took place two years earlier, as Mr. Yokouchi and his engineering staff were trying to lower temperatures in the XN85, **Suzuki**'s sole turbocharged **motorcycle**. The two valve, air cooled 650 engine was having trouble staying together under the kind of turbo boost that would create reasonable power. Mr Yokouchi looked toaircraft engines for a solution. Many of the large piston engines developed during World War II relied upon a generous amount of oil used for cooling; many radial engine aircraft had dipsticks calibrated by the gallon rather than by the quart. Many used oil squirted at the pistons from underneath to remove some of the combustion heat. When the piston are large, as they were in these massive radials, heat conduction to the bore is a problem. In addition, these engines were turbocharged andran on a tremendous amount of boost, further raising combustion pressures and temperatures.

The oil effectively improved the life of the engine and, in turn, allowed them to make more power with out additional displacement.

Mr. Yokouchi turned to oil jets for the **XN 85**, and they worked. File that away for future reference. At the times of the **Gsx R**'s development, it was assumed that air cooling alone wouldn't do thejob. Already the company had trouble tuning the air cooled engines for maximun power without overheating. Compromises in valve timing and compression ratio eased the work of the air cooled engines but clearly were not going to hack it when 100PS from **750**cc was the goal.

Contemporany casting techniques prevented switching to liquid cooling while still maintaining the low calorie diet. So the idea of making oil do more work was floated. This is the original story that has been circulated for the past twenty years, the linchpin to the **Gsxr**'s success. Hemmed in on one side by the desire for horsepower that an air cooled engine could not generate reliably and on the other side by production limitations that would have forced extra weight on the machine, Mr. Yokouchi kept thinking. In fact, he had three rules for his engineers (four if you count never sleeping): One, don't copy. Do your own thing; forget whta the competition is doing. Two, go for new technology. It might be harder in the beginning, but it pays off very quickly. Three, avoid conventional wisdom. The last is probably the most persuasive. After all, the convetional wisdom of the days was that you could not building a durable, street legal bike the weight of the **Suzuki Gsxr**.

Oil would carry the load, so to speak. And while most refer to the **Gsx R** engine as being oil cooled, it's worth remembering thta it's still largely air cooled. Think of the oil system as a necessary supplement, a way of getting heat out of places that vexed air cooled engine's designers, namely, the top of the combustion chamber. Not wanting to deprive the engine of oil for lubricting purposes, a double chamber pump was designed. The high pressure side fed the bearings and the piston squirt jets; a low pressure (and therefore high volume) side fed cooling circuit. The engine oil was, obviously, shared between these two circuits. Just tohedge bets, the engine carried 5,3 quarts (5 liters) of oil in a wet sump.

It was also assumed that the new engine would have four valves per cylinder. It was the new standard exceping Yamaha's insistence on five per jug, a technology that debuted the same years as the **Gsxr** and the right way to go for the power goals. But ait cooled engines need as much finning around the spark plug and valves as possible; the more valves, the less area for such finning. The solution was to completely rethink cylinder head architecture. Instead of having multiple fins across the top of the head was cast as a flat plate with tall tunnels for the spark plugs. The valvetrian resided in a large aluminium valley, topped by a wide magnesium cover with thin, short fins. External oil lines came up the back of the cylinder block and fed spigots that shot a great volume of oil into the valvetrain cavity.
But it wasn't just a matter of filling the top of the head with oil and hoping for the best. Mr. Yokouchi explains how he arrived at that Eureka! moment that brought him to next leap.

"It was a lazy boy... it's true. In my home, we had a cast iron bath heated by a wood fire underneath. My grandmother would tell me to continue to stir the water in the bath while it heated. well, i was lazy, as I said, and didn't do that. I don't remember what i was doing, but i didn't think stirring the bath was important. But, over time, I realized that doing it my way took one or two extra piece of wood to get the bath hot. I was amazed that my grandmother was right but, many years later, grateful because she gave me the key (to the **Gsxr**'s cooling system). It was boundary layer! Central to this design's seccess was his realization that a fluid flowing past a fixed object breaks ino zones of flow. The flow nearest the object in this case the cylinder head tends to slow in what is called a boundary layer. As it slows, the rate of heat conduction is reduced. This could not be allowed. Oil by itself is approximately 10 percent less effective than water at picking up heat; it could not be left to languish.

Recalling his boyhood lesson, Mr. Yokouchi decided that the oil around the combustion chambers had to be kept moving to break up the boundary layer, therefore improving heat conduction. To that end, small baffle plates were installed adjacent to the spark plug tunnels. These kept the oil moving briskly past the hottest part of the head for maximun heat transfer.
So far so good. Lots of oil is in there, and it's routed to best effect. Now what do you do with it? It seemed straightforward to let the oil drop down the central cam chain tunnel to the sump, but that was tested and found to be insufficient. Windage losses from the oil striking the cam chain in the tunnel were one thing, but the oil foamed as well. (Common oil wasn't as good as it is now).

Chiaki Hirata, one of the **Gsxr** engineering staff, remembers: "we continued to develop the oil cooling system but found that at high rpm we lost oil pressure. We had used colored water to trace the flow of the oil, but then discovered that the oil falling down the cam chain tunnel was foaming badly. Eventually, the oil pump could not take up the oil, and the pressure dropped".
Another creative solution: a pair of drain back tubes were fitted to the front of the head, leading down to the sump. This cured the foaming problem, but Mr. Yokouchi had to prove that the flow worked. His test was disarmingly simple. He used one of the prototype engines with a cutaway cam cover. By means of common water hose, he showed that the drainbck tubes could handle a great deal of volime without backing up. "I remember standing outside the engineering office, showing the staff how it worked. We must have looked crazy, standing there getting our pants wet, " Mr. Yokouchi recalls.
With the cooling medium decided upon, the team continued to work to get the power and to trim weight. "we were told to make it as light as possible", says Mr. Iguchi. "We were told to go ahead and hit the wall' and try to break the engine.

Before that, the engine was made as solid and durable as possible it didn't break very much and the instruction was to go ahead and break it. We had very aggressive design schemes, so it broke very often".
Every component was scrutinized. Pistons, connecting rods, main bearings, crank all came in for steely eyed weight control. All were smaller in some cases much smaller than on the previous 750. Smaller bearing have less friction. According to a preview report in "Cycle World" in 1985, the diminuitive bearings were responsible for a 3 hp savings at 11,000 rpm. Continue this kind of efficiency-seeking throughout the engines, and horsepower will come.
Of course, the traditional ways to acquire power also worked. The **Gsx R** engine had large valves, aggressive cams, large carburetors, and a free flowing four into one exhaust system tuned to be benefit high rpm power. Oil cooling allowed for thin stemmed valves with big heads, which were lighther yet flowed more. Light valves also tolerate aggressive cam timing and lots of lift.

Packaging played a role, too. The cylinder pitch was made as narrow as the engineers dared, given that the barrels were still air cooled. Fine pitch finning was used on the head and block to facilitate cooling. Such finning increases the cooling area without dramatically increasing weight. This was another idea that Mr. Yokouchi borrowed from aircraft technology, but not before he had to convince the production department to improve the company's casting abilities so they could actually make the parts.

With the bores packed closer together, the bottom end was becoming narrower, but the placement of the alternator behind the cylinder bank was the next logical step. Other manufacturers had done this, mainly to get the alternator off the end of the crank as **Suzuki moto** had done. The main benefit to a narrow engine is that it can slide down and forward in the frame without affecting cornering clearance. Look at a photo of the early **1000**cc Superbikes and you'll see replacement engine covers cut at an angle to get any amount of precious clearance.

It was all coming together. "In early testing, I asked the riders and engineers to try their best to break the bike," recalls Mr. Yokouchi. "I wanted to find the weak spot. When we did find something, I had to convince them to fix only what broke. The feeling at the time was that nothing should break, so the natural reaction was to make everything heavier. But the bike has to flex if you want to keep it light." Later, Mr. Yokouchi admitted to an American journalist that he was circumventing the normal development process, in which the race bike was derived from the street bike. "We were develop ing a race bike," Mr. Yokouchi said. "We had to pretend that we were making a street bike. At the end of development, we had a race bike and then had to make minimal changes to prepare it for the street." Pretend.No doubt if anyone could "pretend" to **Suzuki moto** management and get away with it, it was Mr. Yokouchi. In the styling design department, there was no pretending.

"There are many approaches to styling, but this is a racer replica," says Tetsumi Ishii, styling designer of the **Gsxr**. (In **Suzuki** parlance, a styling designer is responsible for the shapes and colors of the bike but is, by and large, subservient to the engineering group.It's his job to make good looking what the engineers have determined is the right way to make the bike.) "What is most important is to keep the feeling of a racer replica," Mr. Ishii says. "I learned a lot from this project. The fairing comes from the **Gs 1000 R**race bike as closely as we could. We wanted the racer look. We spent some time in the wind tunnel to determine the best shape. For example, the small wings on the fairing came directly from the Gs 1000 R, as did the bubble windscreen." The **Gsxr**'s distinctive two light face was dictated by regulation as much as by styling.

"At the time, it was required that we place the headlight face at or behind the front axle," Mr. Ishii recalls. "This is why the **Gsxr** has this kind of face. We wanted to maintain the endurance racer look but had to find just the right headlight to do the job and still be street legal.We could not use a single light, as on the racer, also because of the rules." Other aspects of the bike's styling resulted from more mundane concerns."The side panel [beneath the seat] is large because we wanted to cover the pipe hanger," Mr. Ishii says. "On the **Gs 1000 R**, this was exposed, but we couldn't allow it to get in the way of the rider's feet on the **Gsxr**."

Also of note are the **Gsxr**'s distinctive bullet shaped mirrors. "We tried several designs," says Mr. Ishii. "But we came to the bullet mirrors because they worked well in the windtunnel and were appropriate for the bike's look." Some other detailing that was picked up right from the race bike: the small vapor reservoir and external vent hose on the fuel tank, as well as the flush filler cap. In a period of design when such appurtenances would have been considered vulgar on a street bike, they were instead noticed and appreciated by enthusiasts who really wanted a "race bike with lights." Cementing the impression was a masterstroke of design: the race inspired instrument panel.

A trio of gauges, surrounded in foam, reflected back the same image every racing enthusiast saw when peeking over the velvet rope in the pits of a G P race. The tachometer didn't even register below 3,000 rpm, just like the **Gs 1000 R**. Today we might consider this an affectation, but it was meant to convey the spirit of the endeavorto replicate, as much as possible, the race bike. Development continued at what seems, even today, like a breakneck pace. And then it was ready. **Suzuki moto** showed the **Gsxr 750** to a stunned crowd at the 1984 Cologne show, promising production for the 1985 model year. You can imagine: the carpet around the display was worn to threads. Immediately, European and domestic press were lauding **Suzuki**'s **motorcycles** courage in producing a full on race bike for the streets.

Enthusiasts waited as patiently as they could. And those who said, "Great, a racer for the street. It won't make a good street bike," would in many ways be proven right. But they were also to be roundly ignored by a suddenly large and vocal subset of hardcore enthusiasts for whom this was the perfect **motorcycle**. In March 1985, Cycle magazine said, presciently, "Sportbikes will soon be divided into two categories: before the **Gsx R**, and after." In the May 1985 issue of Cycle, Kevin Cameron wrote: "What **Suzuki** has done with every part of this machine is what has had to be done with every part of GP and endurance racing machines several times a year, and the technique works; detailed design with critical thought to preserve or enhance function while simplifying and adding lightness.

Suzuki moto has done more even than that the company has brought this kind of reasoned design to the marketplace at a competitive price. And that is the best integration of design and manufacturing technology seen so far." For the April 1985 issue of Motorcyclist, Jeff Karr, who attended the world press launch in Japan, reported: "The **Gsxr 750** put on an impressive show [at] Ryuyo. When recently shod and ridden well, it's a tremendously fast race bike, which should make it a wickedly fast bike on a racetrack like road. Its cafe racer riding position will hurt it on tight roads, but the tremendous motor will let it make up a lot of ground."

In concluding the story, he said, "The **750** class has gone from stale to startling this season. For now we Americans will have to be content with the [Yamaha] FZ 750. Next fall the **Suzuki Gsxr 750** will arrive on our shores and the sporting motorcyclist will be confronted with one of the most pleasantly difficult decisions in memory." Comments in the American press mirrored those in Europe and Canada where the **Gsxr** was a smash hit, as everyone had hoped. But the bike was not brought into the U.S. until 1986. Why? "We had a production limit," says Takeshi Hayasaki, group leader of the planning group for overseas marketing. "And the American market was very different, less into sport riding than in Europe.American **Suzuki moto** was concerned that they would not have as much success with the bike." On the other side of the ocean, American **Suzuki**'s **motorcycles** Mel Harris explains: "In 1985 they were not sold in the U.S. That became a sore spot for our dealers, but also that time was turbulent in the indus try and we had insurance problems. Part of the reason the bike didn't come here was the ITC tariff on bikes 700cc and above. We had to pay the tariff in 1986, but it wasn't as high as it would have been in 1985. The retail price with the tariff would have been too high."

The so called ITC tariff im posed by the International Trade Commission placed a steep financial burden on imported motor cycles of greater than 700cc. Japanese manufacturers were allowed to bring in 6,000 bikes per year on a quota system without the tariff. But the new tariff, signed into law in 1983 by President Ronald Reagan, imposed stiff sanctions on bikes 700cc and larger. The first year into law, the tariff was a staggering 49.4 percent in subsequent years, the tariff would be reduced to 39.4 percent, 24.4 per cent, 19.4 percent, and 14.4 percent, respectively. For most of the manufacturers, this rule required expensive changes to the existing **750** class machinery so they would fit under the 700cc rule.

Suzuki moto reduced the **GS 750**'s displacement to 699cc, but never tampered with the **Gsxr**. The belief was that its top line sportbike should not be emasculated and that, when finally introduced in 1986, the 24.4 percent tariff would be slightly more tolerable than the 39.4 percent tariff of the year before. So the **Gsxr** except for those bikes brought in through Canada didn't grace American roads until 1986. By then, **Suzuki moto** had reacted to complaints of a slight lack of stability from European riders and extended the **Gsxr**'s swingarm by a full inch. Continues Harris: "In the second year, when we rolled them out, I think there was a lot of apprehension on everybody's part with the insurance. We were disappointed because we thought it would be a huge sales success.

But it actually started slowly. At the end of the year we were wondering what we had to do. That's when we developed the **Gsxr** Cup, which ran out in Riverside, California, for the first time. At about that time late in the season it really kicked in. People realized we had a real race replica. They saw that it was everything you wanted to have if you were a **motorcycle** enthusiast. It took off." The **Gsxr** Cup was a one make national racing series built to encourage privateers' involvement.It has since evolved to include the popular **SV 650** model as well. Early on, there were suggestions that a bike so light could not be durable. Aiming to test the theory, Cycle World conducted a twenty four hour endurance test. It took place at Uniroyal's massive five mile long circular track that would allow the **Gsxr** to run flat out for as long as it could. "We wanted to see just how good the **Gsxr** was," recalls Paul Dean, then editor of CWand now editorial director.

"And we wanted to do the test with a stock bike." (The previous record was held by a modified **motorcycle**.) "We sent David Edwards [then feature editor and now editor in chief of Cycle World] to the **Suzuki moto** factory, where he randomly picked two bikes off the assembly line and then sealed the engines with wire and a tamper proof seal. I had met with American **Suzuki moto** president Mr. Shigenoya, and he liked the idea. He claimed that durability of the bike would not be a concern. 'We have already run the engine at its power peak for twenty four hours on the dyno,' he told me." In the end, despite problems with tires chunking a malady that Dean says he later discovered to be the result of replacement tires being put on the track without any heat cycling; the "green" tires just didn't make it the team got its record. The quicker of the two bikes averaged 128.303 mph for the twenty four hours, beating the old record by more than 10 mph.

Other magazines decided to test the **Gsxr**'s mettle on the track. In a 1986 racetrack comparison by Cycle Guide magazine, Wes Cooley and Kenny Roberts rode the **Gsxr 750** and the Yamaha FZ

750 against their old race bikes to illustrate how close each new production **motorcycle** had come to real race technology. They discovered that the gap from racetrack to street had closed dramatically from where it had been just a few years before. The article's author, Jerry Smith, concluded, "Based on what we learned at willow Springs, the blurring of the distinction between street bikes and race bikes is anything but sales hype .... For the next generation of high performance street bikes, the jump from the racetrack to the street might be so short that you'll be able to smell the hot oil and hear the fans cheer every time you push the starter button." For the first generation of **Gsxr**'s, **Suzuki**'s **motorcycles** engineering staff barely had time to draw a breath.

The **Gsxr 11OO** was ready for 1986, based strongly on the **750** but significantly altered for the crankshaft horsepower. It was scarcely heavier than the **750** and, as a result, a featherweight com pared to the liter bikes in the class. To bolster its racing efforts, in 1986 **Suzuki** also produced a special limited edition of the **Gsxr 750** that sported larger brakes, a dry clutch, solo seating, and a host of other small changes. As expected, the race bike ambitions of the **Gsxr 750** were played out for real. Remembers Yoshimura's Don Sakakura: "Back then, Superbike racing was based off a production bike. **Suzuki moto** would supply us with production **motorcycles** in the crate.

They'd require extensive modifying of the chassis and the suspension, including strengthening of the chassis. Switching to the 750E4 [the **Gsx R**'s predecessor], it was a lot easier. They were more designed for performance.The chassis didn't need all the modifications and gusseting the **Gs 1000 S** did. We still had to develop our own camshafts, and we worked with Mikuni back then to develop the VM series of carburetors for racing. But the **GS 750** was a lot easier to work with, from a racing standpoint, than the **Gs 1000**." Everything changed when the **Gsxr 750** finally arrived for stateside racing in 1986. Mr. Sakakura says: "With the **Gsxr**, we got the aluminum chassis and the engine performance; from that point it made our job that much easier. We didn't have to go all through it, strengthening the frame. It worked really well as a production bike for the track. Most of what we did was to make changes to make the rider comfortable rather than wholesale

changes in the engine and chassis. It was just a very balanced package that worked well everywhere. The engine we continued to develop, but the chassis we left alone. It was a huge advantage."

And so it continued. While the **Gsxr** did not come to dominate AMA Superbike racing against the better funded factory teams from Honda and Kawasaki, it was a complete and total sales success. Though few fully understood the impact of the **Gsxr** in the mid 1980s, it's clear in retrospect that it turned an industry on its ear. Says Masaaki Kato, president of American **Suzuki moto**, "The **Gsxr** put **Suzuki moto** on the map."

Suzuki Gsxr 750-Gsxr 1100: 1985 - 1987

Suzuki Gsxr 750-Gsxr 1100: 1988 - 1991

Suzuki Gsxr 750-Gsxr 1100: 1992 - 1995

Suzuki Gsxr 600-Gsxr 750-Gsxr 1100: 1996 - 1999

Suzuki Gsxr 600-Gsxr 750-Gsxr 1000: 2000 - k1 - k2 - k3

Suzuki Gsxr 600-Gsxr 750-Gsxr 1000: k3 - k4 - k5

Suzuki Gsx R 600-Gsxr 750-Gsxr 1000: k5 - k6 - k7