

origin: [http://www.motorradonline.de/d/4422?\\_subrubrik=4111](http://www.motorradonline.de/d/4422?_subrubrik=4111) (written in german)

---

The Suzuki GSX-R 750 was born with a 140 mm wide rear tire - a sensation back then, with the exception of some big bikes, where all athletes rolled on 120 or 130 slings.

In 1989, the birth year of the Kawasaki ZXR 750, a 170 tire was the measure of all things and of course the new green superbike was equipped with it.

A year later, the GSX-R 1100 even went one-up with 180 millimeters.

Meanwhile, in some models, the front tires have grown to a width of 130 millimeters, which five years earlier was still considered a sporty format on rear wheels.

The current final round in this arms race was opened by Honda and Ducati in 1994:

A razor size 190/50 on a six-inch wide rear rim adorns the RC 45 and the 916, and since 1995, the new superbikes GSX-R 750 and ZX-7R of Suzuki and Kawasaki.

So the tires of the sports motorcycles were more and more in width, but gradually the physics seems to set the limits.

"Respect," says every 500cc Grand Prix or Superbike World Championship rider.

In their racing classes, the rear tire width already settled between 180 and 185 millimeters years ago.

Only in exceptional cases, on routes such as "Zeltweg" (Netherlands) with many fast corners, a 190er tire is mounted in order to oppose the abrasion more rubber with the largest possible tire contact patch.

Experiments with 200 mm wide slippers were abandoned because they require barely realizable inclinations:

In the curve, a motorcycle uses a force that is on the line between the center of gravity and the tire contact point, against the centrifugal force and weight force that occurs.

With the same cornering speed and the same radius of curvature, the wider the tire, the more the motorcycle is to be angled, since the tire contact point moves further and further away from the center of the vehicle toward the inside of the curve.

But the larger necessary tilt is not the only downside.

Disturbing forces caused by bumps or heels in the road surface, which act on the off-center tire contact point, especially on bad roads for a tilt driving behavior.

So had the new GSX-R 750 in the conclusion of the individual test "MOTORRAD" (a monthly german newspaper) 26/1995 plug the following criticism:

"Really disturbing in everyday use is the sensitive to uneven ground reacting tires."

Reason enough for MOTORRAD tire specialist Werner Koch to disassemble the Suzuki at the rear on size 180/55 tires and a 5.5 inch wide rim produced by PVM at lightning speed.

Incidentally, the number 55 expresses the ratio between tire width and height in percent:

The height is 55 percent of the tire width, so theoretically 99 millimeters.

In practice, however, the manufacturers usually already exploit the permissible tolerance limit in the tire specifications upwards because of the optical effect.

For example, the actual width of a 180/55 tire on a 5.5-inch wide rim is between 182 and 186 millimeters, depending on the brand.

The in this comparison driven tires "Pirelli Dragon MTR02" the dimensions of 180/55 and 190/50 measured 185 and 194 millimeters.

After all, these nine millimeters ( $194 - 185 \text{ mm} = 9$ ) had an effect:

origin: [http://www.motorradonline.de/d/4422?\\_subrubrik=4111](http://www.motorradonline.de/d/4422?_subrubrik=4111) (written in german)

---

"It runs easier around tight turns, the tilt on wavy surface is almost gone.

For the country road, the combination 180/55 on a 5.5 inch rim is the much better choice, "noted tester Werner Koch in the logbook of the GSX-R.

Only their ruts sensibility has the Suzuki not filed with the narrower tires.

Here probably the contour of the front tire plays the decisive role.

### **The alternative tires on the racetrack provided a real surprise:**

As expected, the Suzuki was handy to turn, but even when accelerating out, she remained stable on track despite the slightly smaller tire contact patch than with the original tires.

The culprit is the wide outward running surface of the 190er tire.

When accelerating in an inclined position acts on the outer edge of the tread and on the tire sidewalls such an enormous pressure that the tire gives in this area and collapses.

A constant pumping of the hindquarters is the result.

With the narrower 180er tire this unrest has disappeared, and therefore he also wins the race track rating.

*(as far as the rear wheel)*

---

### *(to the front wheel)*

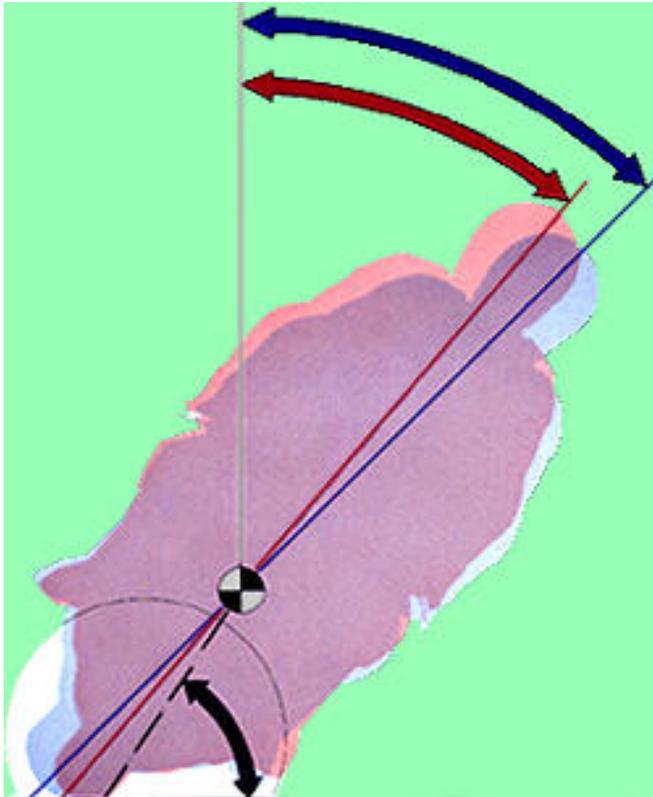
At least as far as the growth in the width of the front tire is concerned, a few years ago, rationality prevailed over visual appeal, and one is usually satisfied with a width of 120 millimeters.

In front of the outwardly migrating tire contact point brings the additional disadvantage that enormous steering moments occur when braking in an inclined position.

So are the few motorcycles, which are still delivered with a 130mm front tire, regularly because of their strong "righting" pushing man and machine to the corner outside edge, in the criticism.

origin: [http://www.motorradonline.de/d/4422?\\_subrubrik=4111](http://www.motorradonline.de/d/4422?_subrubrik=4111) (written in german)

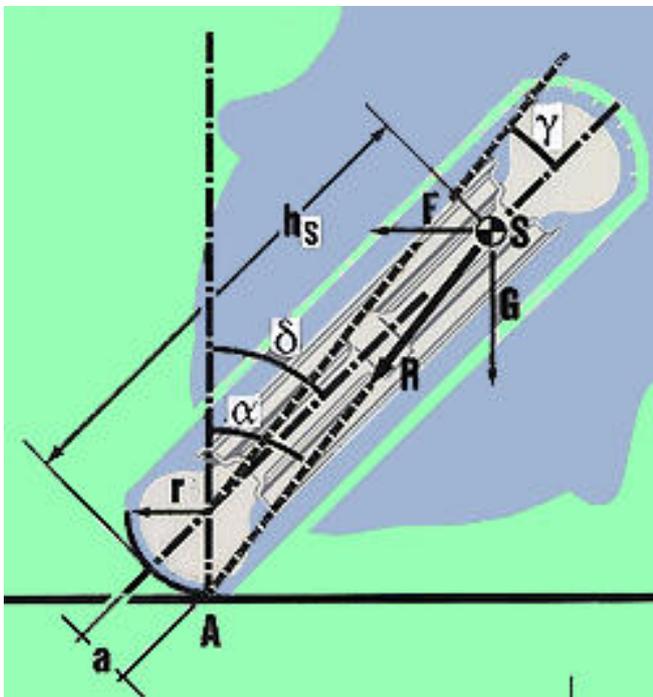
The physical basics shown in pictures / coloured drawings :



The blue silhouette shows a driver with wide tires (e.g. 200/55), the red shadow biker with narrow tires (e.g. 180/55) *at the same speed.*

*It follows :*

**The wider the tire, the more skew / inclination is necessary for the same cornering speed and the same radius of curvature.**



## Tire width and skew / inclination

In an inclined / skewed position, the weight  $G$  and centrifugal force  $F$  acts in the common center of gravity  $S$  of the driver and the machine. An equilibrium state is reached when the resulting force  $R$  intersects the imaginary connecting line between the contact points  $A$  of front and rear wheel tires.

The occurring angle of inclination  $\alpha$  lies between the vertical and the connecting line between  $A$  and center of gravity  $S$ .

Since the tire contact point  $A$  is not in the center of the vehicle, but by the amount  $r$  moves towards the curve inside, the motorcycle must be additionally inclined by the increasing with increasing tire width correction angle  $g$ .

This correction angle and the inclination angle  $a$  together give the actual banking angle  $d$  between perpendicular and vehicle center.