

Thinking about buying new wheels? Some things to consider

Any car will benefit from a set of good-looking wheels. Our Panteras are no exception. Wheels and tires play an important role to boost the sporty image of the car. It does not take so much knowledge to select a nice set, and happily bolt them on the car. A deep dig in the wallet and that's it... Not necessarily. The wheels must physically fit under the car, which could be a pain to measure. Let us assume the wheels look good; they fit perfectly on the car. Is everything OK then? Well, for the average driver, from now on named "A", yes. But for those of us that want performance, given the name "P", we are only just beginning.

Wheels and tires are very important in making a Pantera fast. Of course, for some of us it is acceptable to select new rims and "gumball" tires. If they will physically fit on the car, modern rubber is far superior to old tire technology. In addition, the car will have taken a big step forward with better road holding and appearance.

The car is not that much more fun to drive on its edge at 0.95g than at 1.0g around corners. A good driver will be almost as fast under any circumstance. However, I am a person who likes to experiment and to see how far one can go. And, in my book, 1.0g is faster than 0.95g. The cutting edge Koenigsegg supercar boasts 1.15g cornering capability. I will not be satisfied until I can beat that mark with my own, "stone age", Pantera. One way to advance my cornering capability is with maximum capability rims and rubber. The following information is my recommendation for those of you who would like to get that last little extra bit out of your tire combo.

As an overview, these steps must be taken into consideration:

1. The total **weight** of the wheel.
2. Rim **dimensions**
3. Tire **profile**.
4. What **ride height** does the tire allow the car to be set at.
5. **Rubber** blend.

The wheel.

There are two main considerations; strength and weight. Please consider the following:

The weight of the wheel plays an important roll in maintaining contact with the asphalt. As long as the road is completely flat, weight is not so important, but as soon as some bumps show up, the whole picture changes. EVERY action we take to cure-control high unsprung weight

has a great downside. In fact, we never get rid of the problem, we just move it elsewhere. If, for example, we "spring and shock" up the car to force the wheel back to the road after a bump, the whole car will move accordingly in the opposite direction.

Billet wheels are very popular, as is any billet stuff to bolt on your car. CNC machines have made this market explode. CNC machining is a cheap way to produce smaller quantities of high-quality parts. No casting forms or expensive forging tools. Now, "billet made" and "made out of aircraft material" (which is a misused word implying the very best), does not specify any quality and is thereby NOT a guarantee of quality. When it comes to billet wheels, the quality depends on the manufacturer. I have seen strange spoke designs that could be made by the customer himself. Everything is possible with the CNC machine. Sorry, but the CNC machine does not say "NO" when the engineering is out of line. One way to be sure the design is not dangerous is to make it heavy. This also makes for a lower production cost, as there is less material for the CNC machine to machine away.

Special design. If we like a very special design that is great looking, a



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Above: Roland Jackel's GT5-S, 17-inch diameter. PLS Brand rims made in France.



Above: Kirby Schrader's 18-inch diameter Kinesis brand wheel. Ride height+ (1=Parking height) RH=2.5"

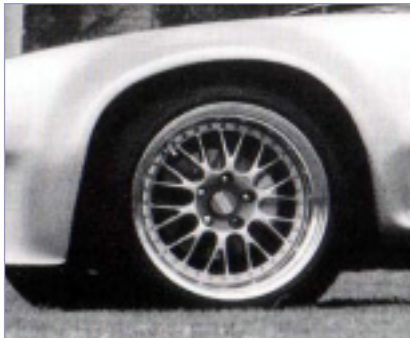
billet wheel is unbeatable. Almost any shape can be made. But design may come into conflict with function.



Above: Hall Brand 17 inch aluminum wheel as used on "Purple Passion"



Above: The author's original Campagnolo Group IV, 15-inch magnesium wheel.



Above: Garry Withtaker's GT5, 17-inch tall BBS aluminum wheel.

Of these three cars, Roland's has the tightest ride height. Probably as low as practical with 17-inch rims and 24.4" diameter tires. GT5-S style fenders helps. Garry Withtaker has a GT-5 like my own, and he uses 17-

inch wheels. His ride height is around two inches more than my set up, with 25-inch rubber. Gary Hall has adjustable ride height, so I can't tell what is used in different situations. Kirby Schrader was unlucky to encounter "tire-flair" problems. He is now trying to machine the front wheels for another 1/2" of negative offset in order to be able to cut an inch in ride height.

Rim dimensions.

Performance wheels. Assuming we are more sportscar oriented, the best bet would be to choose a BBS type wheel. The original Campagnolo mag-wheels are fairly good but they measure 15 inches in diameter. I use the GT-5 10x15 and 13x15 wheels myself. They weigh in at 35 to 39 pounds with racing rubber. As for comparison I had a 12x17 billet wheel here that weighted 79 pounds with rubber! I couldn't think of a worse situation. This is bad even from an acceleration standpoint as it concerns a rotating mass. It has the same effect as putting 320 pounds of extra weight on the chassis, compared to my 39-pound wheel. As a comparison a BBS Formula 1 wheel weighs 6.6 pounds and the tire 16.3 pounds.

What about carbon fiber wheels??? For those of you that have been thinking about it, I have some information. At first glance, this may look promising. A Formula 1 car uses forged magnesium wheels. And there is a reason for this. A carbon fiber wheel would be light, strong and stiff. But, the relatively poor impact behavior of carbon fiber would make it leak air. Also, the heat generated by the brakes while in the pits, is a threat to the integrity of composite material. Forged aluminum does not leak through the material after an impact. The wheel will simply dent.

BBS forged wheels, or anything equivalent, are the best in my judgment, for the serious driver. They have a very good Y design cross-spoke center that connects to the rim at 20 points. A light and load-distributing pattern. Did I say light? How about 17 pounds for a 13 x16" wheel. Keep this low weight in mind as a baseline when you consider buying another brand of wheels.

Depending upon the demands of the consumer and with cost, design and availability, a billet wheel may be the choice of those who even have high demands for their wheels. There are a number of good billet wheels on the market, so compare different brands, put them on the balance-scale, and try to be mindful of the design-strength.

Tires

Tires, tires, tires, the same sad story for Pantera owners. 15-inch tires are

hard to get. And the bigger 16-17-18-19-20, are too big in diameter. The "A" Pantera driver should have no problem. He can live with a regular ride height. But the serious P driver is lost. He uses a lower ride height in order to get better weight distribution. With ground clearance of 4 inches, a 23.42 inch diameter, 10-inch wide tire on a GT-5, leaves 3 inches before the tire hits the wheel well roof. (The GT-5 S, may accept a little more wheel due to different fender configurations).

With a 23.42-inch tire, (or better still, 23") and 4" ground settings we have...

I) Good A-arm geometry,
II) 1 1/2 inch upward wheel travel before the shock hits the silasto rubber.

III) A good compromise for function, weight and aerodynamics.

With a 25.5-inch tire, and 4-inch ground settings we have...

I) Only 1-inch of upward wheel travel left!!!

II) A constant rest on the silastos.

III) A less than favorable A-arm angle.

There is no escaping the fact that we must elevate the car from 4 inches by the same amount the tire is bigger than 23.42 inches for 6 inches of ground clearance.

What about lower profile tires to retain the outer diameter within limits? If the tire is 10" wide, a 16-inch rim should offer us a 35% profile tire. An 18" rim ends up with a 25% profile to maintain the 23.5" outer diameter. I could live with the 35% tire but the 25% tire is not acceptable to me.

And even worse, if the wheel selected is on the heavy side, since the tire has no deflection, the whole tire mass will follow every tiny road irregularity. Remember, the portion of tire rubber that contacts the road is **the smallest unsprung weight we have that will work to our advantage**, if we only could have a sidewall big enough to use it. Even if we do not think about it, tire sideways flex is useful to absorb sideways shock loads, just like the sway-bars, in the same manner vertical flex assists springs and shocks.

For calculation purposes, **all work done by the tires could be subtracted from the otherwise needed wheel travel**. Don't get me wrong, I

am not saying the higher the better. A higher than 45% profile tends to present too much sideways instability.

Ride height

What does all this tell us?

A good street performance ride height for the Pantera is 4 inches, which is impossible with larger than 23.50 inch front tires, which in turn is impossible with a wheel (front) larger than 16 inches. Read PI number 102 where Dick Guldstrand discusses ride height.

How important is ride height?

A general public discussion has circulated about mounting the engine lower in the chassis. The difference between 6 down to 4 inches ride height has the same effect as lowering the engine (300 pounds) by 9 inches. Just dig a hole in the ground first. Or, lowering the engine by 2 inches is the same as lowering the ride height by 0.39 inches. More numbers to consider: 2 inch lower ride height will shave off 112 pounds from the outer wheels in a 1g turn and put it on the inner pair of wheels, giving us a gain of 0.05g in cornering power. The same goes for the front-rear axle. We will keep 65 pounds more at the rear axle under 1g of braking, giving us 0.01g better stopping power. Any drawbacks? Well, the acceleration traction will be limited by 0.01g, which is not a problem if you have under 500 horsepower (moving the battery to the right hand side of the engine compartment should compensate.)



Above: Kirby Schrader's new 18-inch Kinesis wheels. The front wheels were delivered with 1/2 "too much + offset. Together, with the bigger diameter tires, the car ended up very high.



Above: The Gary Hall car has 17 inch wheels. This car obviously uses a higher front rake of about 1 inch. Any rake should be the opposite, with a lower front. As we see on the picture, the top part of the tire hides in to the wheel well. An impossible

driving condition. Showing that the car uses adjustable ride height for shows. Even so, the car is higher in the front than my car.

Many racing cars use 19-inch rims with very low profile tires. Why is that?

Racing cars have rules to follow. The rules could be there for several reasons. Advertising products, to create fair racing or keeping costs down, are a few examples. Professional racing teams also have race engineers to set the car up the best way within those rules.

A large diameter-racing wheel with racing rubber makes for a VERY low total weight, 26 pounds for a BTCC car. Racing circuits are very flat, which makes these light tire movements easy to control with their suspension systems.

This is far from the case for our Panteras which are equipped, in the worst cases with a 19-inch rim, a 20 profile road legal tire that weighs in at 80 pounds. Riding on the silastos on a rough road with only 1 inch of wheel travel left is not worth how ever good your wheels may look.

Rubber blend

A softer rubber compound offers better traction. But on a street tire we do not have much of a choice. This is a race tire field. I run racing tires myself in order to use the 15-inch GT-5 wheels and to use medium to soft rubber. My tires last for 5000 miles which is two seasons. But even if the tire is not worn out, the racing rubber is "aged out." Racing rubber does not have aging agents, as the tires are not supposed to be on a car forever. I use soft rubber because the tires run cooler on the streets. Even after a few laps on the track they become slippery.

Race tire on the streets?

I would never recommend them. They might be dangerous. I NEVER let anyone drive my car in order to keep track of what happens to my tires is one of the reasons. Parking against the curb definitely will ruin a race tire. Incidents that are of no problem or concern with regular tires call for immediate replacement of a race tire. That is why the street tire is almost twice as heavy (but if proper care has been taken and if one accepts a short tire life, they would be unbeatable tires.)

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Above: Jim Kucera's Budnik brand 18 -inch billet rims.



Above: Vintage '80's Gotti brand 5-Star aluminum 3-piece rims. No longer made.



Above: Hall Pantera brand 17-inch billet aluminum rim, also used on Purple Passion. Owner: Steve Eggert.



Above: Pi Motorsports, Inc. 17-inch billet aluminum rim.



17 inch Kinesis brand rims shown on Shari Stock's "HERZ" Pantera.



Left: Pi Motorsports, Inc. 17-inch billet wheel. No longer in production.

Bottom left: Tjaarda Design 17-inch billet wheel is SFI tested to 1,700 PSI.

Bottom right: Pi Motorsports, Inc. brand 5-Star, billet aluminum rim.

