Some General Suspension Thoughts for street performance

BMW makes great performance cars. Stock BMW's perform exceptionally well and this is great for most owners. However for us enthusiasts, there is still room for improvement. Most suspension upgrades focus on increasing roll stiffness and lowering the center of gravity (CG). Both these reduce body roll and therefor reduce body roll induced positive camber change. To explain: When the body leans over in a corner it causes the outside tires to tip as well. When the tire tips outward (positive camber) it 's tread is not flat on the road so traction is reduced. Since the tire is your only connection with the road, maintaining the maximum tread contact on the road is one of our main goals. So to reduce body roll, stiffer springs and sway bars are used. There is always a debate about spring stiffness vs. sway bar size. Very stiff springs result is poor ride quality and passenger discomfort. Most all tuners chose springs that are 25% to 40% stiffer that stock and recommend sway bars that are often 100% or more stiffer than the stock sway bars. On street cars all tuners, including us, offer spring sets that are stiffer than stock and lower the car some reasonable amount. They also offer stiffer sway bars for additional roll stiffness. As to spring rates some tuners are very conservative and some are more aggressive. I prefer a medium approach to spring rate but recommend extra heavy duty sway bars. The stiff sway bars reduce body roll without affecting ride quality like increasing spring rate would. In fact, the stiffness we desire is not often available so we make them ourselves.

Besides increased roll stiffness most tuners offer camber plates that increase negative camber on the front suspension. This helps cancel out some of the body roll positive camber change. These negative camber plates are very effective on BMW's and really help to reduce the typical understeer of front engine cars. As long as negative camber is not to radical tire wear will not be seriously affected.

Since the tires are your connection to the road, using stickier and larger (up to a point) tires will increase grip. Tire upgrades are probably the single most effective way to improve handling. However, stickier performance tires will increase body roll as you approach the limit. So to realize the potential improvement tires offer, you still must reduce body roll.

Shock absorbers are critical to ride comfort and performance. I've found Bilstein and Koni to be the best choices. They are a bit more expensive than Boge and KYB but worth every penny. This is not an area to save a few bucks.

Race cars also need very stiff sway bars because their greatly increased grip causes more potential body roll. Race cars also use much higher spring rates than street cars (about double). However, if spring rates are too high the car will skip over rough pavement, be upset by bumps or curbs, and will not be able to get the

power down. Therefore, with a practical upper limit on spring rate we turn to sway bars to get the additional roll stiffness we want. So with production based race cars, there is always a debate about spring rate vs. sway bars. Choosing the best combination is often the difference between running up front or middle of the pack.

I talked mostly about roll stiffness, but good handling is influenced by many other factors: Tires - type, size and inflation pressure, chassis stiffness, suspension alignment, suspension compliance (rubber bushings move), and shocks absorbers. I'll cover these topics in more detail in other tech articles.