Billet Uprights

Evo 8/9 Short, Evo 8/9 Long, Evo X

(INCOMPLETE WRITE UP: 09/11/18)

Warning

These parts are motorsport parts that must work with fit, clearances, and updates of other vendors products. If you do not understand the installation, the important aspects of installation or use, or have extensive experience with modifying motorsport parts and vehicles please ask for guidance or seek professional assistance. I can not be held accountable for the use or misuse of parts sold in the variable world of motorsports.

All motorsport parts designed and sold by SSB Designs intend to be frequently inspected for loose or damaged items at regular intervals. Inspect hardware and fit before and after first test drive as well as after each race or 3000 street miles.

Understand every effort is made to create and test the best quality and reliable parts possible with engineering focused on overbuilding, we do not have the same resources as OEM.

If you disagree with this please return the parts uninstalled for refund. Install and use at your own risk.

Intro

The geometry Mitsubishi gave us from the factory is a great balance of variables given with the Macpherson strut limitation. There are a few areas that can be improved like adding caster or increasing tire clearance but the real goal is to get the car lower while maintaining similar specs to the OEM setup.

One thing to really understand is the roll center drops at a rate of 3:1 with ride height. So while we lower to reduce total weight transfer, we end up with a greater roll moment and need for more roll stiffness. More stiffness brings more of the total weight transfer forward. We want to get low without that sacrifice. And I will take the car as low as functionally possible since it's one of our few tools to reduce that total weight transfer.

The goals of the project were to correct geometry, reduce cost, reduce weight, add bump-steer correction, exceed OEM strength limits, and long fatigue limit. Here are some general thoughts on each topic describing the effect on final designs.

Correct Geometry: There are 3 versions for geometry correction, Evo 8/9 1.25" and 2" and Evo X 1.5". The 2" was my first model and meant for cars lowered to a proper race height. On a standard 25.3" tire this should give a rough measurement of 25.5" from the ground to fender. A more street friendly version was made with 1.25" correction which also opened up the ability to run smaller wheels. These are currently running on some special 16" wheels along with RPF1 17" wheels which happen to be some of the worst for clearance.

Evo X is the same body as 2" with only needing a different ABS bore and an abs spacer to compensate for the longer Evo X sensor. With the Evo X upright naturally being longer than an Evo 8/9 this achieves a 1.5" overall correction.

Reduced Cost: I didn't want to make decisions arbitrarily that may drive price keeping things within the average track drivers budget. This gave cause to the multi-piece design reducing the volume of machined material, reduced raw material cost, and flexibility to change one component instead of entire single-piece when small differences are needed.

The modularity has given us opportunity to make custom strut mounts and steering arms depending on need. For example, making longer strut mounts pushing the strut closer to the inner fender maximizing tire clearance. We can also look at things like steering arm geometry to change steering ratio or ackerman angles.

Simplifying machining is more than just reducing the roughing volume, it also reduced the need for more than 3-axis machining.

Reduced Weight: Weight is a secondary concern when compared with strength, stiffness, and function. We want to remove all the weight we can but it will never be removed if that means sacrificing the other needs. The original prototypes were about 0.75lbs lighter per side but by the first production certain areas were strengthened or stiffened and all bolts were increased by one size. Purpose there was if say an M10 was enough for a season of racing mathematically and empirically, M12s increase that margin for expanded conditions.

Bump Steer Correction: After modeling all the geometry it was interesting to find the closest to zero of my bump-steer geometry changes came with the steering arm basically parallel to the control arm. This is likely because we have very little camber gain and different from an OEM setup with massive amounts of camber loss.

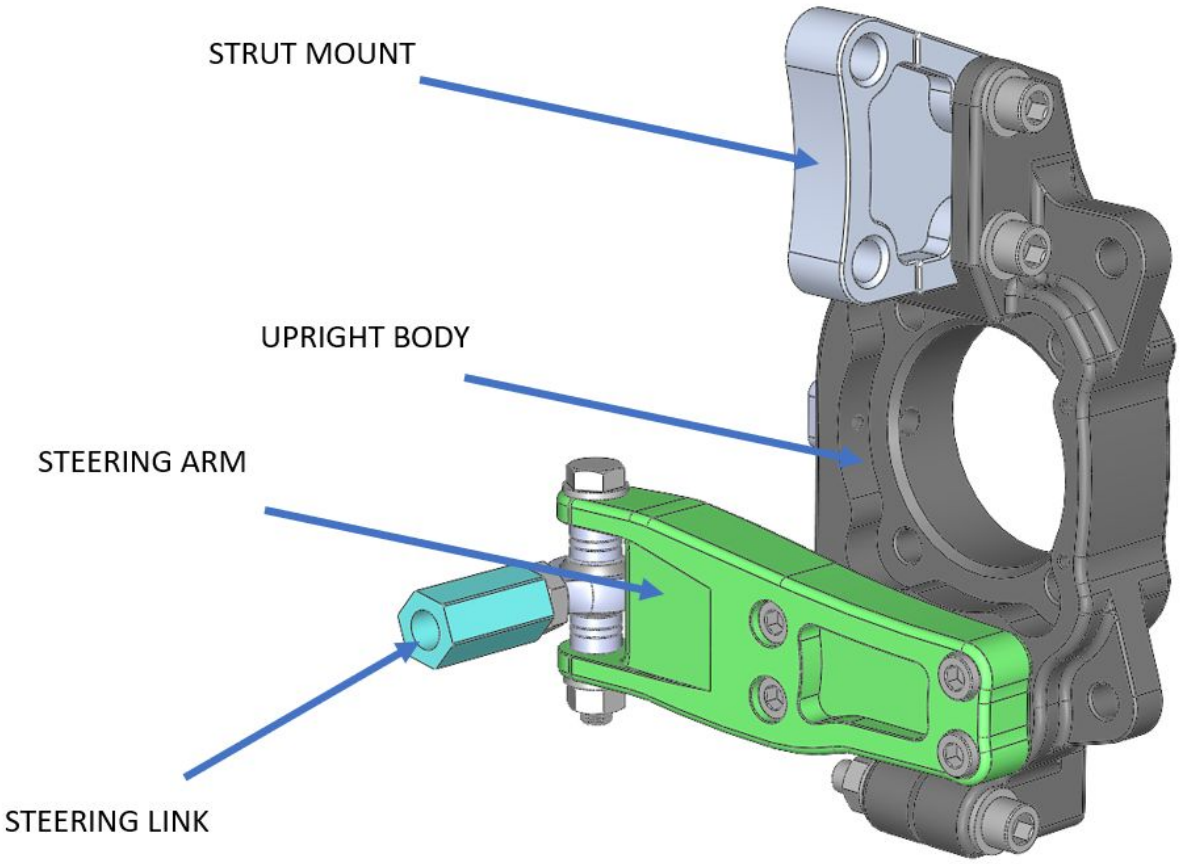
Another major impact to bump steer is adding caster. This effect seems to be missed by most people adding bump steer kits to their car but has a more significant effect than lowering from my modeling.

That said, the range of bump steer has been set specifically to account for the set geometry of the upright, potential of OEM length to +10mm of ball joint length, and 3.5 to 7.5 degrees of caster. A whiteline ball joint gives about +5mm of ball joint length.

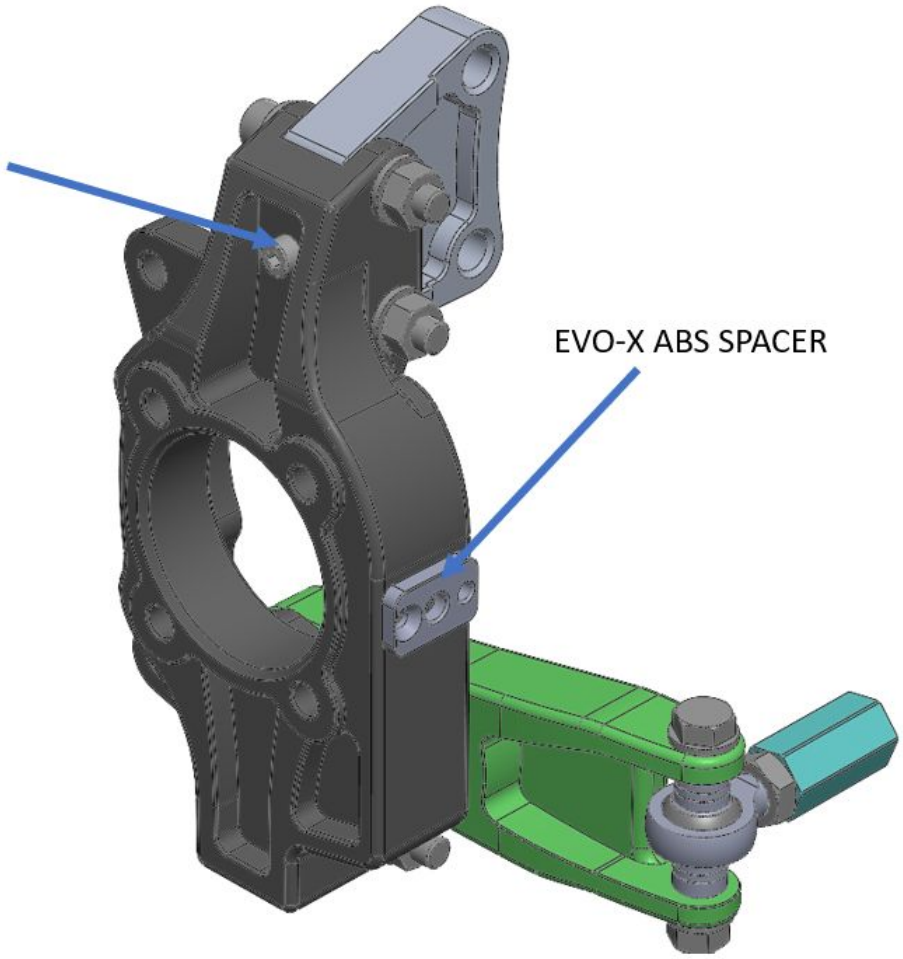
First step in setting up bump-steer is to adjust the shim to make the steering arm and control arm parallel. To refine beyond that, a proper bump steer adjustment is beyond the scope of these instructions.

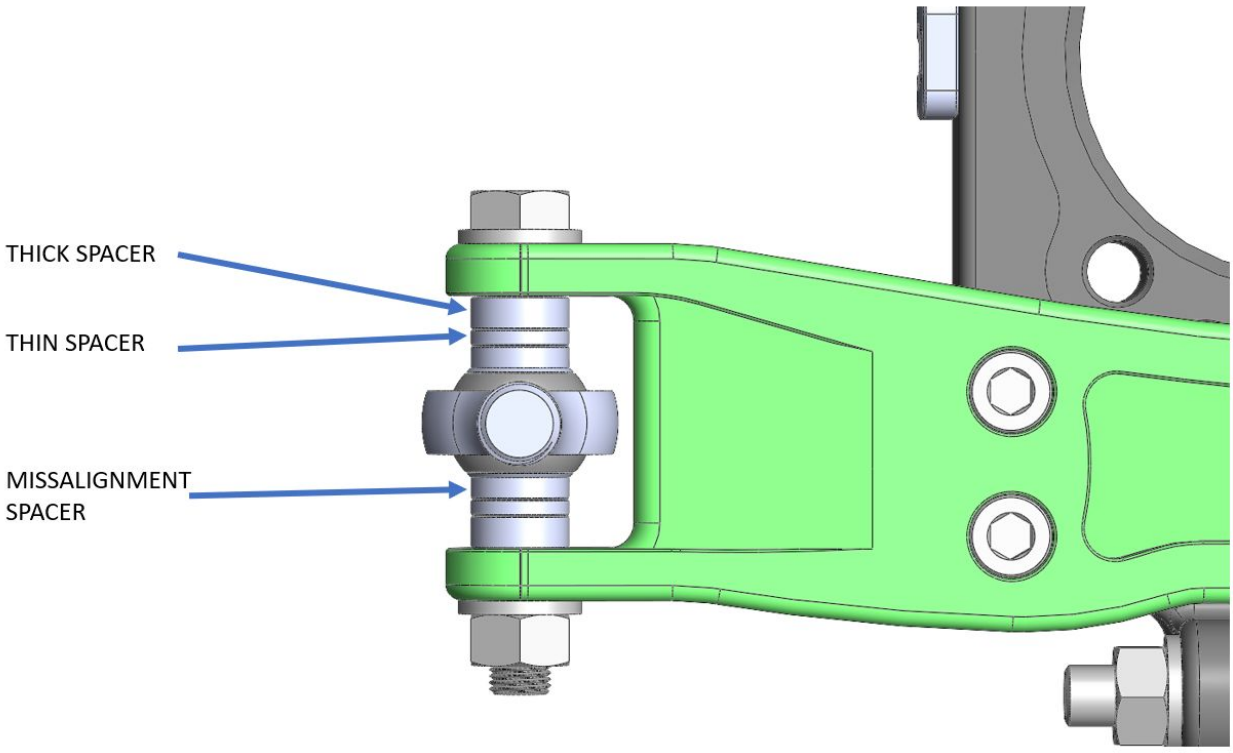
Torque Specs

Location	Size	Torque	Note
Strut Mount outer bolt	M8x1.25	10 ft-lb	Loctite- Meant to enforce seating, doesn't need to be excessively tight
Strut Mount	M12x1.25	60 ft-lb	Blue Loctite
Ball Joint	M12x1.25	60 ft-lb	Blue Loctite
Steering Arm	M10x1.25	45 ft-lb	Blue Loctite
Factory Hub bolts		65 ft-lb	Factory Spec
Factory Caliper bolt		80 ft-lb	Factory Spec



STRUT MOUNT
CLAMPING BOLT

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