FULL RACE TRACTION BARS

Applications:

- 88-91 Civic (EF)
- 90-93 Integra (DA)
- 92-93 GS-R (DB)
- 92-95 Civic (EG)
- 96-00 Civic (EK)
- 99-00 Civic Si (EM-1)
- 94-01 Integra (DC)
- 93-97 Civic Del Sol

Under acceleration, deceleration or turning, the soft stock bushings (and even polyurethane bushings) will allow the arm to move back and forth as the force from the tire and car compress and squish the bushing into different shapes. The soft bushings allow for a smooth ride, but the downside of this soft ride is low precision and low accuracy of the suspension components. This movement, known as deflection of the Lower Control Arm (LCA) and Upper Control Arm (UCA), allows the wheel to shift forwards, backwards, up, down, in and out of the geometrically intended location simply due to the fact that **the stock Honda suspension was not designed to handle the forces introduced from a high power / high speed vehicle.**

Because of this movement in the bushings, the alignment settings of the car become useless, and the wheel actually moves forwards into the fender well (on high power cars, the tire actually hits the bumper cover). As the suspension geometry and alignment move around, the car toes out, and caster changes erratically. The available traction of the vehicle decreases as overall traction is reduced and either complete loss of traction aka wheelspin or wheelhop is the result.

The concept of the traction bar is very simple. If the suspension does not have any inaccurate or sloppy movement (due to bushing flex) the suspension geometry does not change. If the car is a high power car with stock bushings, the LCA, UCA, and spindle will all move in paths that are not the desired geometrical suspension path. This is because the high power car places much more force on the bushings then they are designed for, and the flex and movement will actually cause toe out (or toe in on the rebound) and strange caster paths, not the linear caster path you want. With traction bars there is no deflection. Bushings cannot flex/move/change with the solid-mounted heim joint and radius arm. In fact, if you were to simply replace all your bushings with solid spherical bushings, they would work just as well as a traction bar, but would make for a very harsh ride.

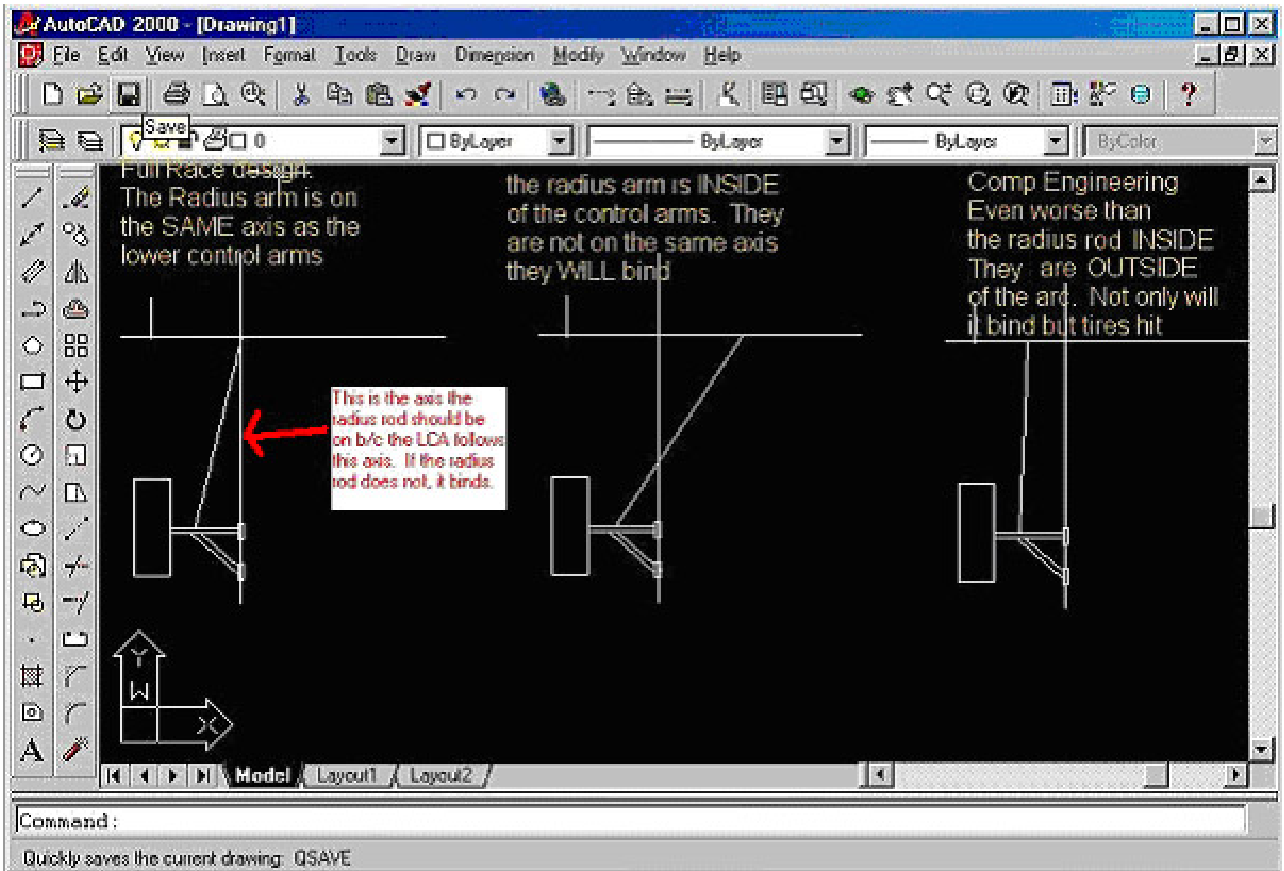
That is why Traction bars designed properly greatly improve a vehicle’s launching, turning, braking and high speed stability.

When choosing a traction bar, there are many variables to take into consideration. The single most important consideration is the design of the traction bar. The important elements of traction bar design are:

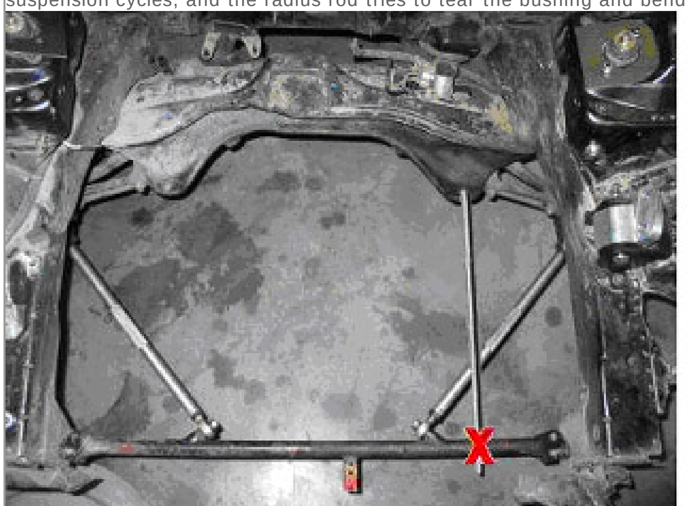
- Geometry
- Strength of Design (Factor of Safety)
- Materials used- completely fabricated from MIL-T6736B Chromoly, welded with ASME specified process
- Radius rods are cnc machine 6061 T6
- Overall Quality of Design

1. Geometry
When referring to suspension geometry, most car enthusiasts can not look at a traction bar and visually see the difference between a traction bar with the wrong geometry, as compared to one that is properly designed. If the design does not use the correct geometry, the car will toe-out, get erratic caster paths, and the bushings actually tear from simply hitting bumps. All of these problems are due to the binding of the suspension components. The traction bar, if designed wrong, will quite literally tear the suspension apart from the binding of the radius arms.

Binding is when two solidly attached (no flexible bushing) arms, which rotate about different axes, try to rotate together. Because they do rotate about two different axes they will either not move at all (unless the metal bends), or in the case of a Honda with soft bushings, stretch/tear the bushing.

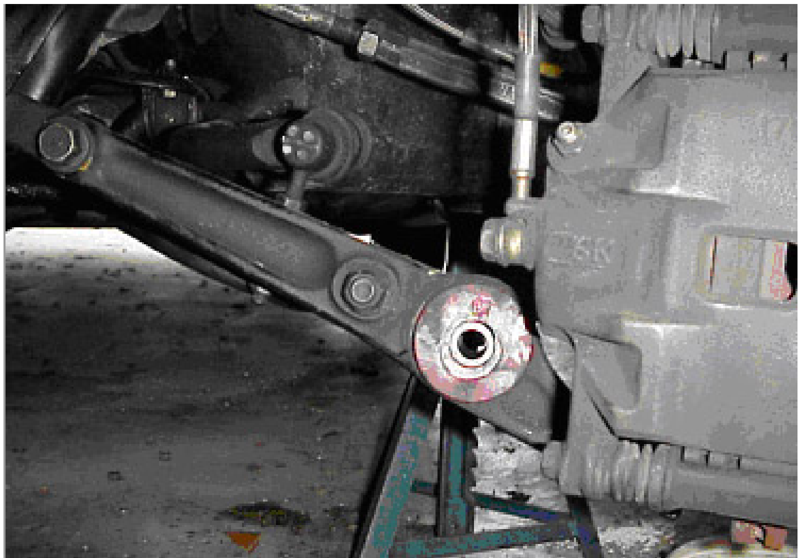


The following images show a traction bar kit, which does not utilize the correct suspension geometry. As the wheel goes up and down, the suspension cycles, and the radius rod tries to tear the bushing and bend the metal subframe, crossmember, lower control arms and frame rails.



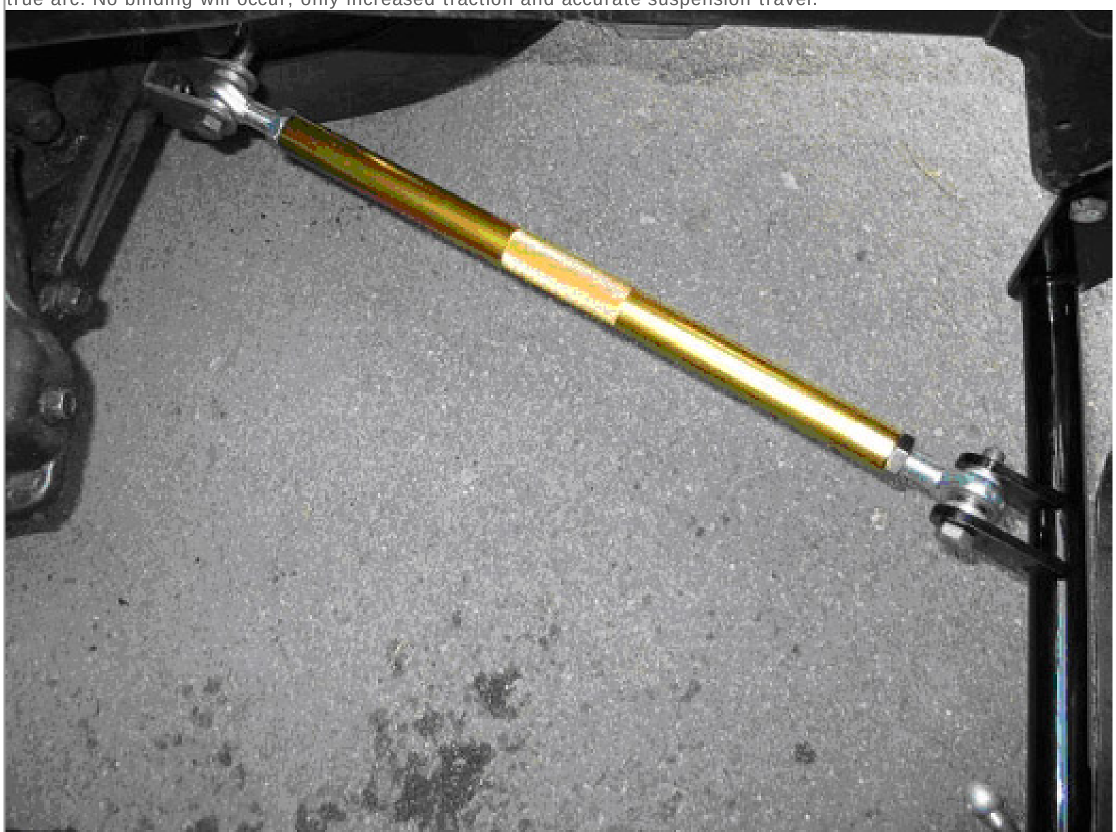
The radius rods MUST mount where the line intercepts the crossmember (at the **X**) in order to not ruin suspension geometry. If the radius rod mounts elsewhere the geometry is not correct and binding will occur.

The silver rod coming out of the subframe shows the actual axis of rotation of the LCA



The bushing in this lower control arm shows the result of using incorrect suspension geometry in a traction bar. As one can clearly see, there is a severe tear all the way around the bushing.

Full Race Strip bars are designed to not bind. The radius rod follows the exact arc of the lower control arm, forcing the suspension to follow its true arc. No binding will occur, only increased traction and accurate suspension travel.



2. Strength of Design
Full Race prides itself on engineering excellence. As a result, we have performed complete stress calculations and Finite Element Analysis simulations on every brand of traction bar on the market as well as other designs we that have not even been created. The latest EF and DA crossmember design looks nothing like any other competitor’s product, and in fact it is actually similar to the EG/EK/DC bars with a few very important design elements.

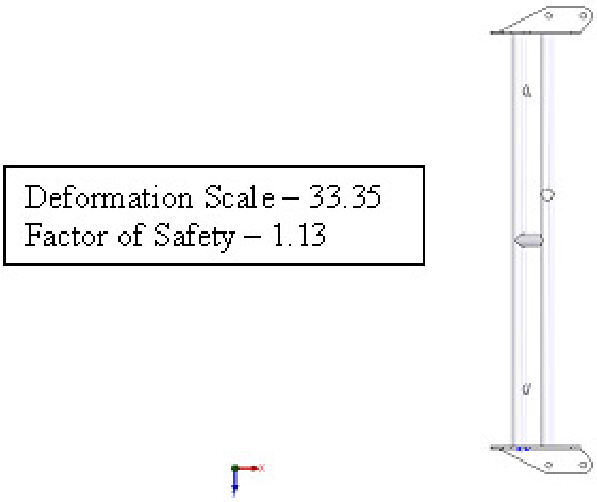
When a component is properly engineered, using actual math and engineering principles, by actual engineers, there is a number called the "Factor Of Safety." This number is developed using a stress calculation technique called “Von Mises criterion” (there are many ways to do it, but Von Mises is generally accepted to be the most thorough/accurate). Von Mises tells us exactly how strong a design is, and how much it will bend from the forces that are placed on it. Using this engineering technique, and solidworks/cosmos FEA (finite element analysis), we have actually designed a simpler, lighter, stronger, stiffer, space saving crossmember that retains full functionality, is competitively priced and is 5 times stronger than the next (twice as heavy) competitor.

By solving equations with the largest possible force as your force variable, it makes your factor of safety the smallest it can be, to ensure that you do not have a design that can break. A good design encompasses all the ideas of rigidity, low flex, moment cancellations and effectively cancels out the forces that the control arms place on the crossmember. By using these design elements, the structure cancels out the forces and the result is an extremely stiff/strong crossmember that works effectively.

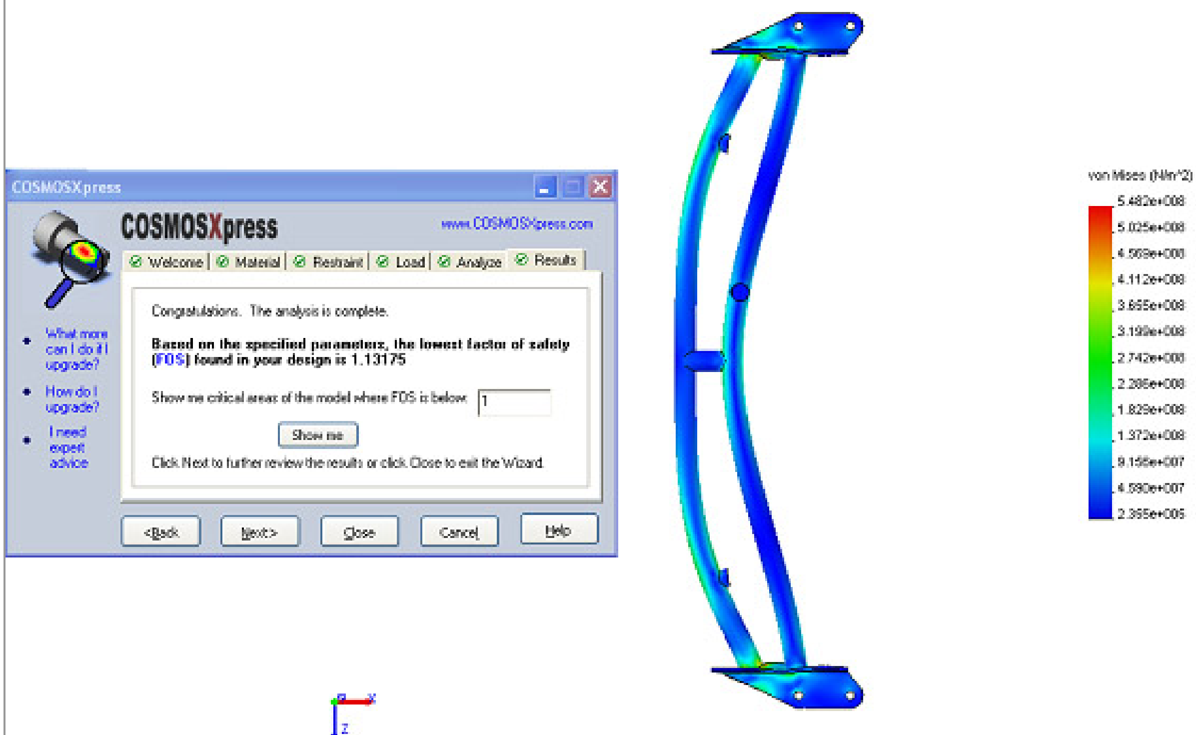
Full Race’s design actually has less tubes than most of the other companies, but the design is such that a fewer number of tubes placed in precise locations results in a stiffer/stronger member.

Design 1
This is the most common crossmember design. This design uses two parallel tubes with an H beam connecting the two tubes. The end plates are 3/16 steel and the material used for simulation purposes is 1.25 0.095 thick chrome-moly tube. Most manufacturers of this style crossmember do not use 4130 chrome moly, rather DOM mild steel, which lowers the factor of safety and makes it weaker.

-Static Nodal Stress Plot 1500 lbs per radius arm / no load from motor mount
-2 Bar Style- 3/16 plate, 1.25 x 0.095 Chrome-moly



The FEA analysis shows the maximum sustainable stress load to be 33.35 times the input load of 1500. This means it only takes 33 times the force to deform the member this much:



Design 2) This is the second most common crossmember design. This design uses one maintube which has (2) bent arms welded to it. The radius arms mount to the bent arms. The end plates are 3/16steel and the material used for simulation purposes is 1.50 0.095 thick cromoly tube.

-Static Nodal Stress Plot 1500 lbs per radius arm / no load from motor mount
-2 Bar Style- 3/16 plate, 1.50 x 0.095 Chrom-moly

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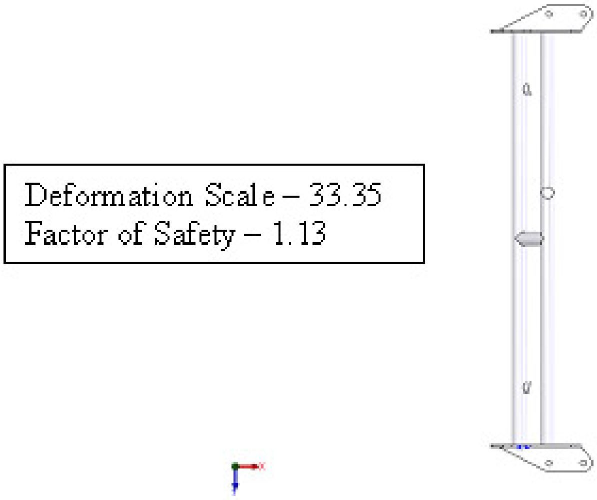

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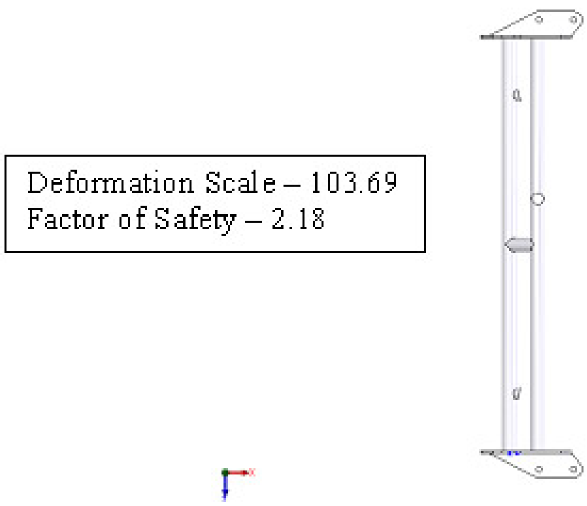
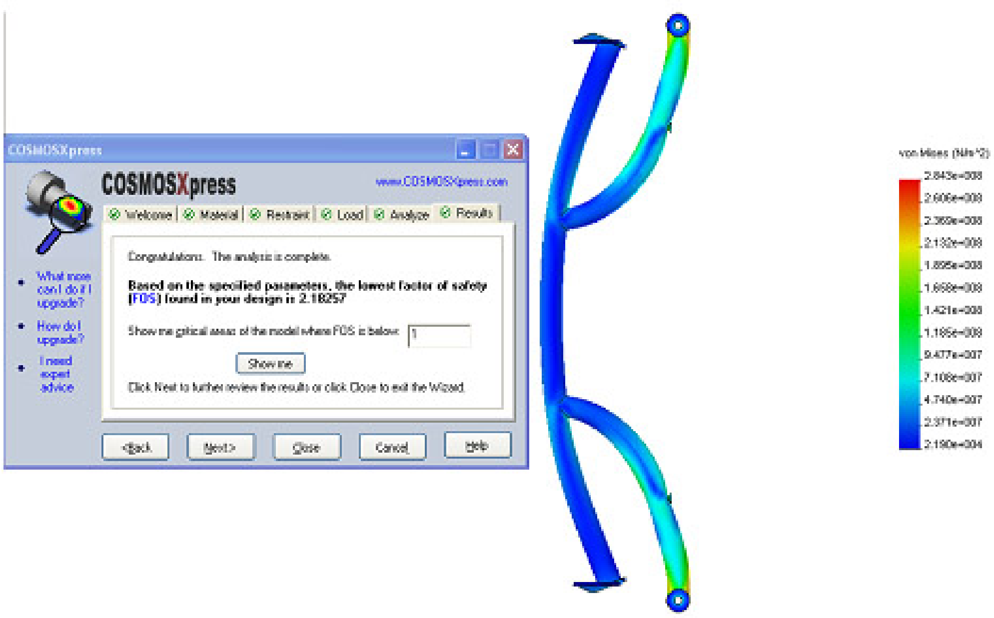
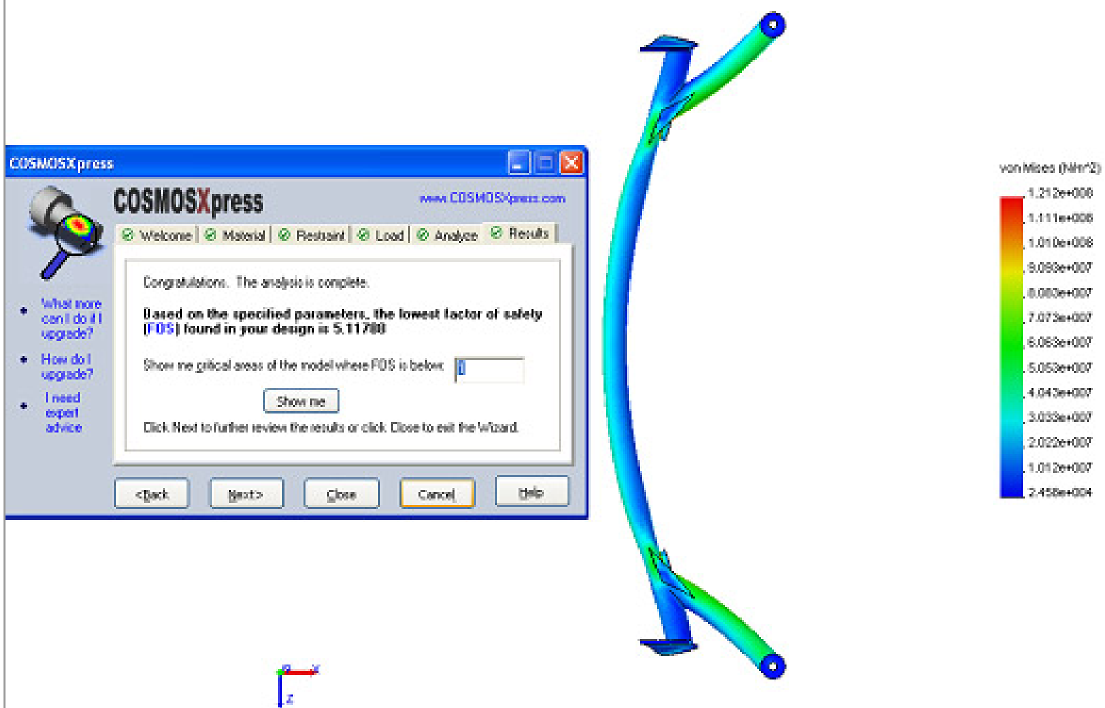




Static Nodal Stress Plot 1500 lbs per radius arm

Full-Race Motorsports Style- 3/16 plate, 1.50 x 0.083 and 1.50 x 0.095 Chrom-moly
FOS 5.11
Deformation Scale 330.61



Quality of Design --The connection points will be different in two ways, both at the crossmember and at the LCA.
At the LCA we will mount to the LCA bolt next to the shock fork on all vehicles except for the 99-00 civics. These vehicles do not have the bolt on the LCA, so they must use the shock fork as the attachment point.

The advantages to using the LCA as athe attachment point are:
1) You do not need to take the radius arm off when you need to change an axle.
2) It is a rigid point, not a sloppy bushing at the base of a shock fork. Mounting the radius arm here is not nearly as accurate as mounting it on the LCA itself, which is why we still recommend that Si useres switch LCAs, however it is *not* necessary, just recommended.
3) Also the crossmember mounts are on the identical axis (x, y and z axes actually) as the axis of LCA rotation. This will ensure that there is absolutely no binding and the LCA follows the path it was intended to follow.

Some Common Questions we have had:
How well do these traction bars work on the street, will these tractions bars affect the ride of the car? Its my daily driver so roads aren't smooth all the time.
The difference is night and day. After driving my civic every day for the past 6 months, I pulled the motor out to redo a bunch of stuff and have been driving my close friend's Integra. The Integra does not have traction bars, the civic does. The integra is turbo so it does make power and I can really feel the front-end slop, its unreal but the difference is huge. I am probably going to put my bars on the Integra so it stops bugging me every time I drive it.

Some customers have asked us if our selling point was that the StripBars retain perfect geometry, wouldn't attaching the radius arm to a different location on the lower control arm change that geometry?

Quite simply, the answer is no. The geometry is independent of LCA mounting location. Whether you mount the bar to the shock fork or directly to the LCA, you will keep the correct geometry. The geometry is dictated by the Full Race cross member, not the LCA mount.

I noticed that the length of the traction bars increased/decreased the caster of the car. So when I "dial-in" my traction bars do i want to adjust them based on the stock caster settings or do I want them +/- those settings?
That is correct, the shorter you make the bars, the more they pull the LCA forwards. You can use this to bring a Honda into perfect alignment, as there is no caster adjustment from the factory.

I am really interested in buying these traction bars but I don't want to buy them if I don't know how to adjust them properly... I keep seeing people say that if you don't adjust them you will bend and break stuff. Well I don't want that to happen to me. How would I learn how to adjust them?
It's very simple, take the car to any alignment shop, and they will adjust the bars for you. Just set the car to factory specs and the radius rods hold the LCA in place preventing any movement from that point on.

What makes your setup better in function than Jimfab? You said something about better stability, but can you please explain. Someone also said that the install and adjustment should be easier than with yours than the Jimfab?.... if true, then how so?
The full race setup allows you to adjust the rod length without removing the rod from the lower control arm, unlike jimfab. There is also much more room for headers/down pipe. Stability will not be a factor, being that this piece is made of thick chromoly and tig welded at every spot needed. I don't know about install being easier than jimfab, I have never installed one before. It's most likely the same considering your taking something off, and putting something in its place.
It is stronger to place it farther out like us. The jimfab bars have the arm coming off at a point farther from the outer lower control arm ball joint, thus reducing the torque that the radius arm places on the LCA. The farther out, the greater the torque. Just think of a seesaw, with a little kid on the long end, and a fat guy on the pivot point. The downside to following this is that the farthest point is at the shock fork, which allows a slop location due to the shock bushing. If you use the LCA bolt as the mount there is no flex, no slop just direct and accurate LCA control