

Dynamic Chassis Measuring System



The Dynamic Chassis Measuring System\* was developed and built by Nelson Ingram and the CCI team in 2009 and was the first of its kind. The DCMS was able to accurately measure alignment front and rear, camber in both static and dynamic modes, toe (front and rear), bumpsteer, Ackermann, moment center location in both static and dynamic modes, and rear steer. For more information, check out the [feature article in Circle Track Magazine](https://www.hotrod.com/articles/ctrp-0911-new-dynamic-chassis-measuring-system/).

\*Please note that the DCMS is not currently in operation.

**Technical Data/Findings**

\*All findings/recommendations are based on an asphalt late model stock car setup for Caraway Speedway and would apply to any asphalt track of similar length, radius, and banking.

**Toe/Bump**

Our recommendation is to set Toe Out somewhere between 1/16" and 5/32" at ride height and have the bump set such that at full compression you have a Toe Out of between 1/16" and 3/16"

The DCMS software generates the chart below based on the data received from wheel plate touch tooling.  A negative value in the Toe In/Out row (Yellow) indicates Toe In while a positive value indicates Toe Out.  We also capture what each of the tires are doing to individually to aid in determining the best method for modifying toe or bump should a change be required.

**Camber**
At Ride Height, we set the left tire to anywhere from 7 to 9 degrees of positive camber and the right tire to anywhere from 4 to 7 degrees of negative camber.   Positive camber indicates the top of the tire is leaning AWAY from the center line of the car, while negative camber indicates the top of the tire is leaning TOWARDS the center line of the car.

At full compression, we like to see between 1 and 3 degrees of positive camber in the left side and 8 to 10 degrees of negative camber in the right side.

We have seen cases where the left tire actually goes to negative camber at full compression which is of course undesirable.  It is important to remember that making changes to your camber will move your moment center.  As we have constructed a 3D model of a front end in our 3D CAD software, we can actually import your cars geometry
into that model and make virtual changes to see where the moment center will move before taking a wrench to your race car.

**Caster**

For our purposes, we defined caster as the fore and aft relationship between the upper and lower ball joints.  If the upper ball joint is further back (i.e. closer to the driver) than the lower ball joint this is considered positive caster.  If the upper ball joint is further to the front than the lower ball joint, this is considered negative caster.

At Ride Height, we set the left side  to anywhere from 1 to 2 degrees of positive caster and the right side to anywhere from 5 to 6 degrees of positive caster.

At full compression, we like to see between 0 and 1 degree of positive caster in the left side and 6 to 7 degrees of positive caster in the right side.  We expect to see a larger caster split at compression than we had at ride height which does help the car turn left.

The DCMS software generates the chart below based on the information received from the control arm touch tooling.

**Ackermann**

Ackermann is the difference in the turn radius between the front tires.   A positive number for Ackermann in our charts indicates the left tire turns faster than the right tire.  A negative number indicates the right tire is turning faster than the left tire which is undesirable.

At ride height, we recommend setting the Ackermann to between 0 and .2 degrees.  At full compression we like to see the Ackermann between .1 and .6 degrees.

We have had cases where the driver indicates the car turns better with more Ackermann (i.e. anywhere between 2 and 5 degrees).  What we have discovered that this is actually covering up the real issue of the moment center being either too far right or too far left.  We recommend moving the moment center closer to the center of the car and taking the Ackermann down to less than a degree.  The car turns and you will not be scrubbing unnecessary speed

**Moment Center**

At ride height, we like to place the Moment Center horizontally 0 to 4 inches left of center and vertically 1 to 3 inches above the ground.  At full compression, we like to see it move to 6 to 10 inches left of center to 0 to 2 inches above ground.

In terms of the charts we generate, a positive number in the horizontal column indicates left of center while a negative number indicates right of center.  A positive number in the vertical column indicates above ground while a negative number indicates below ground.

Below is an example of a car with a moment center way too far to the left.  We were able to move it for them while maintaining their camber settings

[Example DCMS Report](https://98a79563-06b6-434e-a599-6846775fe1d4.filesusr.com/ugd/d8f379_683dd563ba6245ecb261a9c38058e0e2.pdf)