Version 1.9 - Physics notes

Tyres
Pressures & temperatures

Pressure range: 26psi-27psi

Pressures have a wider operation window. The above range is indicative but doesn't mean you'll find perfect grip at 26.5 like in the previous version.
Lower pressures will give you more flex, traction, movement and generate more heat.
Higher pressures will give you more lateral support, precision and generate less heat.

Temperature range: 70°C-100°C core

Temperatures have a slightly wider operation window but at the same time they are even more dynamic on flash surface temperature. Camber and toe greatly affects how the temperature generation spreads across the tyre surface.

While core temperature stays relatively stable at around 80°C to 90°C , the surface flash temperature will vary greatly from down to 50°C at the long straights, and up to 120°C and more while cornering, braking or accelerating. That is normal and expected but it pays to work with suspension alignment in order to achieve a good spread of this temperature across the surface of the tyre (OMI), during cornering.

Setup User Interface OMI temperatures have been modified to indicate close to the surface temperatures. They can be used in the typical way in the pits, but also by pressing ESC in the middle of a turn and noticing how the temperatures spread to the surface.

Avoid having more than 15°C difference between Outside and Inside temperature.

Tyres
alignment, flex, heat

How alignment choices influence tyre flex and heat generation

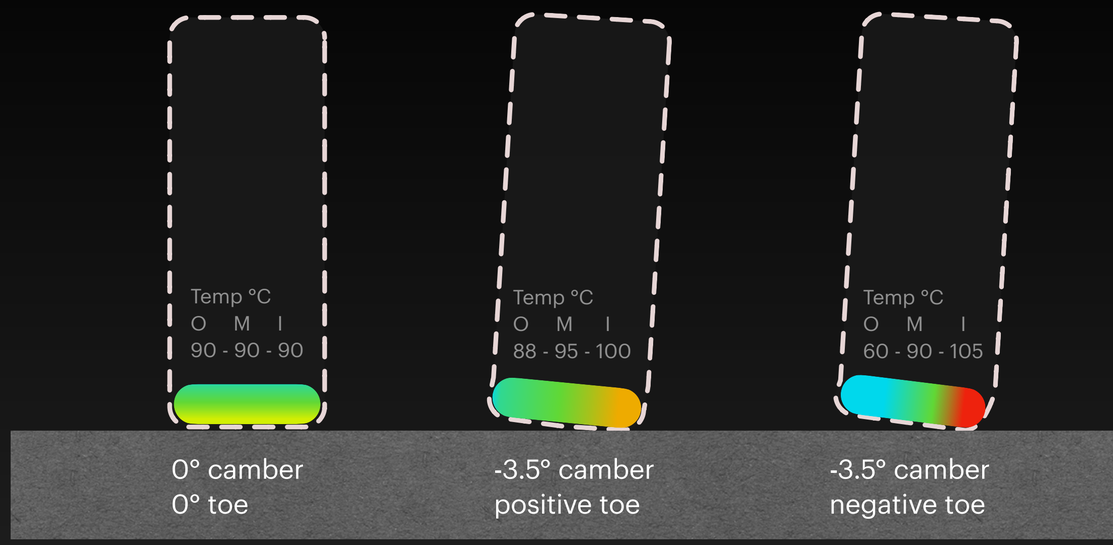
Alignment choices together with pressure, greatly influence the heat generation at the surface of the tyre.

The new physics permit much more rotation than before, especially under acceleration, making setups with negative toe not necessary.
Furthermore, the combination of extreme values of negative camber and negative toe, greatly overheats the Inner part of the tyre surface while at the same time leaving the Outside part cold. This affects grip during braking and initial turn in and also affects heat on the whole footprint are during turns as the tyre starts from different temperatures points.

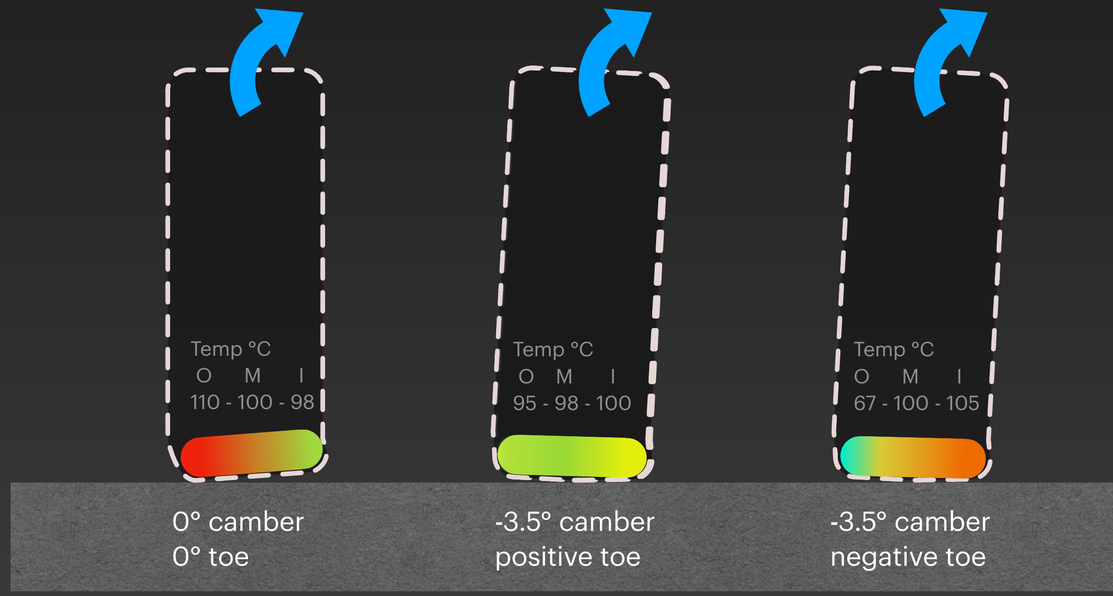
With the correct amount of negative toe and zero or positive toe, the tyre generates heat more evenly at OMI (Outside, Mid, Inside) during straight lines and affects positively grip and heat stability during braking and turning.

You can check surface temperatures in the Setup User Interface page, relative to alignment and tyres.

Straight line



Turning



Tyres
Pressures & flex

How to generate more rotation from tyre flex.

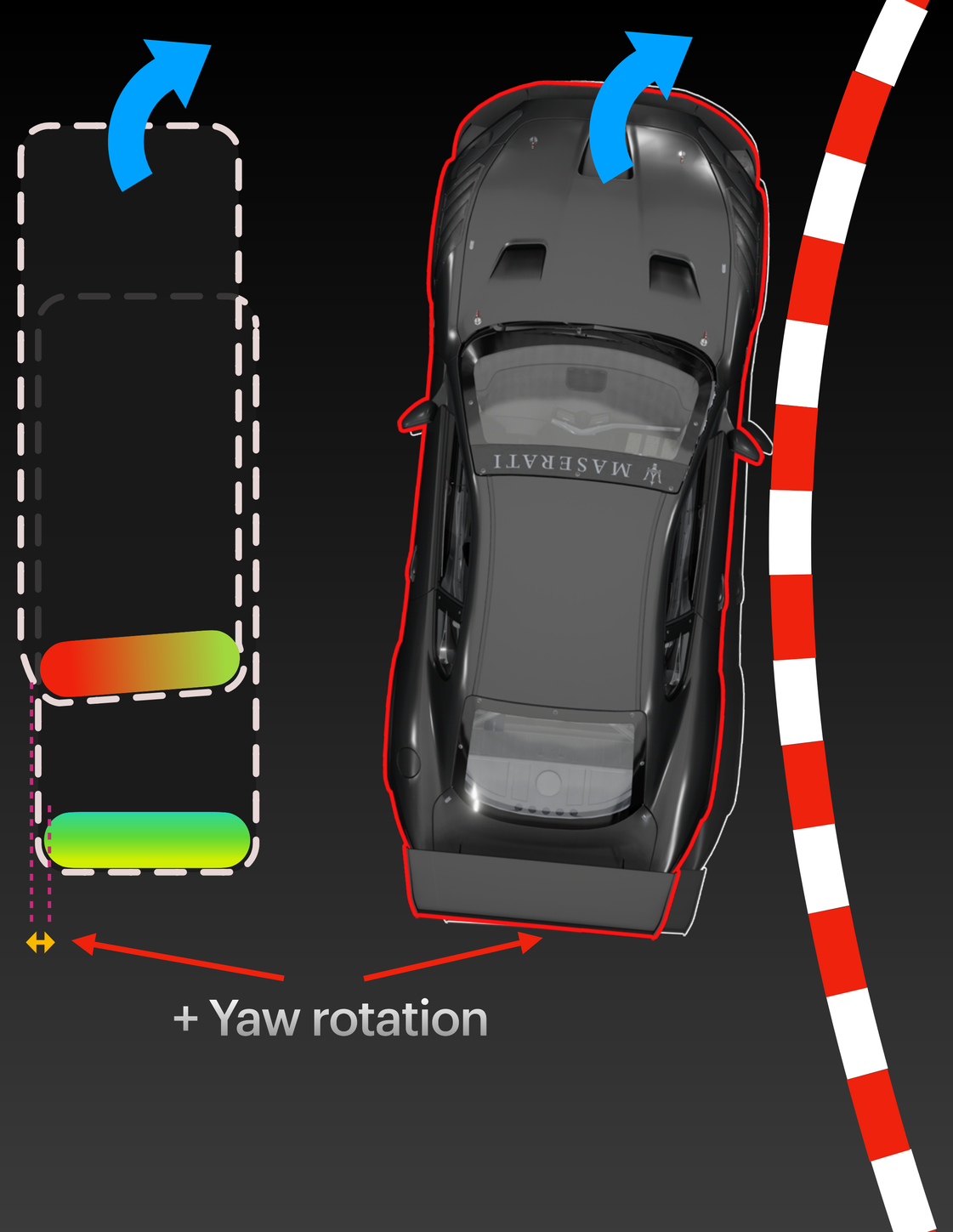
As mentioned before, the tyres have now a wider pressure range where they still give optimum grip. But the grip itself is dynamically influenced by the flex of the tyre

You can use different pressures at the front or the rear axle to generate different amounts of flex and stabilise or help the car rotation, depending on the car, track and handling necessities combination.

As a rule of thumb:
A high downforce, high speed corner will ask for a higher pressure to support the extra load and give better precision and stability.
A low downforce, low speed corner, will ask for lower pressure that will let the tyre flex more and add rotation, give better traction while the driver might be comfortable dealing with less precision at lower speeds.

Example for the rear axle.
Less pressure = softer sidewalls = more flex
More flex = less precision = more yaw rotation (!)

note: it only takes 0.5° of extra rotation to get a completely different feeling and handling on a given turn.
So instead of asking the front end for more and more grip we obtain the rotation adding extra yaw from the rear end.

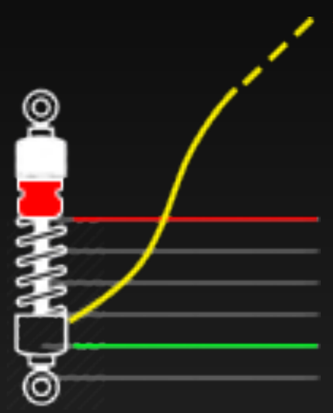


Bumpstops
Suspension travel

Bumpstops travel: 20-30mm max.

Bumpstops now have a maximum compression travel. When this is reached, the suspension ends it's travel range and stops compressing.

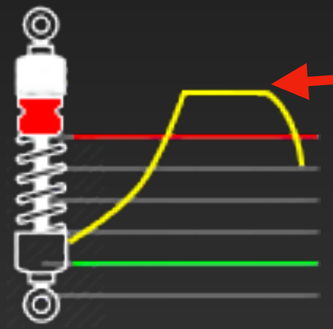
Previously bumpstops could compress infinitely. They would become very stiff, but there was no limit to the compression and suspension travel. Setups would use this issue and go very soft on springs and ride the bumpstops continuously, forcing the car to go lower and obtain less drag. Eventually the suspension would hit a big enough bump or kerb, and the bumpstops would absorb massive amounts of energy and eventually release it in rebound, making the car bounce on kerbs.



ACC V1.8 old version

Suspension can compress bumpstops infinitely

Now the bumpstops stop compressing after a short travel. The energy is then transferred to the chassis which flexes and doesn't have any damping. This is detrimental to mechanical grip so it is better to use the correct combination of stiffer springs and rebounds and make sure the suspension has enough usable travel. The gains in mechanical grip are usually higher than the gains in drag from running very low, except maybe on specific tracks like Monza.



ACC V1.9 new version

After 20-30mm of travel, suspension stop compressing

Bumpstops
Suspension stiffness

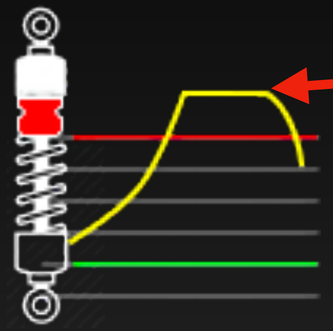
Bumpstops travel: 20-30mm max.

Bumpstops now have a maximum compression travel. When this is reached, the suspension ends it's travel range and stops compressing.

If you use too soft springs (wheel rates) the bumpstop will compress to their limit and then the suspension travel will stop. While this can result in lower aero drag because the car will ride lower ride heights, you'll be loading the chassis with energy, forcing it to flex which is detrimental to mechanical grip and tyre load.

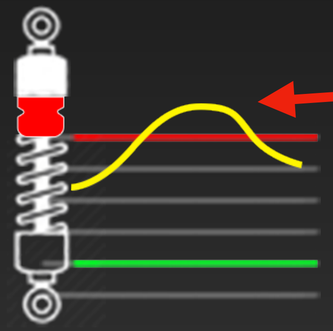
Using the correct compromise of wheel rate stiffness, bumpstop range and bumpstop stiffness, the suspension will be capable of absorbing most of the track undulations, bumps, and kerbs. Better mechanical grip, more predictable handling and less heat stress on the tyres. Proper stiffness will also achieve less pitch and roll and a more stable aerodynamic balance.

Hint.
Some tracks, like Monza, will still probably be faster if you use a soft suspension to force the car go lower in ride height and gain the last km/h of top speed. If you experience side hoping on turns, unpredictable behaviours on kerbs and a generally unbalanced car, that would be good indicators to try and find a better compromise with suspension stiffness.



Soft suspension

Soft wheel rates will result in end of suspension travel, worse grip and handling issues.



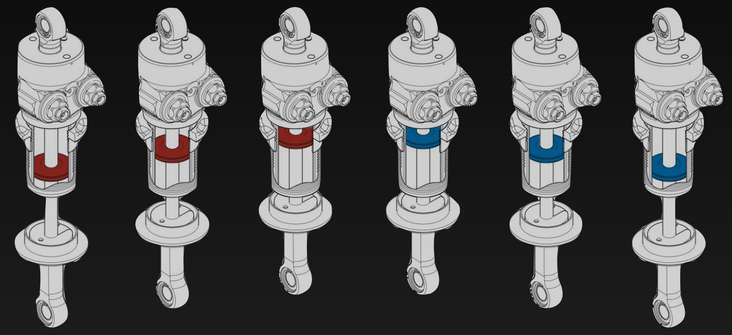
Stiff suspension

Stiffer wheel rates will control the suspension travel and result in better mechanical grip and more stable aero.

Extra features
Dampers, Force Feedback etc.

Dampers

Damper simulation has been improved.
You should be able to notice important handling changes when altering slow speed damping stiffness. It’s good to keep in mind that having min and max slow bump and slow rebound values, can provoke jacking and undesirable handling effects if you don’t know why you’re using them. Make sure to double check your older setups and change values accordingly.
Fast damping simulation has also been improved and you should be able to change the suspension handle of high kerbs, bumps and undulations.



Force Feedback

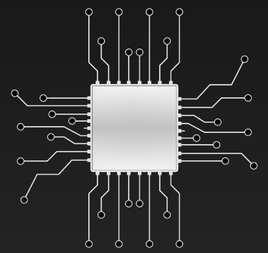
The improvements in the core tyre model, realignment torque, sidewall damping and flex, have a distinct impact in the Force Feedback. Wider range of buildup forces during grip transitions, improved controlled in direction changes and over the limit situations.
Excessive negative toe at the front will result in some vagueness around the center.
Similar values of negative toe at the rear can provoke fishtailing during braking.
Positive toe at the front and the rear will offer more steering wheel stability but less agility
Tyre pressures influence the sidewalls movement and those movements are translated to the steering arm and column. Low tyre pressure results in softer sidewalls, moving the footprint more and changing the steering feedback while necessitating more steering input to follow a given trajectory. Vice versa, higher pressures give more precision and require less steering inputs.

Extra features
Rolling resistance, Electronics etc.

Tyre rolling resistance, combined grip and more
In addition to the previously mentioned tyre pressures, flex and heat generation improvements, the tyre model has improved rolling resistance, load sensitivity, combined grip, realignment torque, damping and many other big and smaller details. All those details should offer improved top speed and acceleration, better feedback of the state of the tyres and an all around improved driving experience both on and over the limit.

5km/h to 10km/h
higher top speed

Electronics
The electronics research and evolution is non stop.
New TC logic on various modern cars, permits more control on the slippage of the tyres. It can be a double edge sword, giving better control and improved performance, but also risk of losing control of the car under acceleration and excessive tyre wear.



TC1 - TC2 - ABS

Many more small breakthroughs, improvements and details have been included in this version 1.9 of Assetto Corsa Competizione.
As usual, what you drive in ACC is our maximum effort and updated knowledge in terms of tyre modelling and vehicle dynamics.
We hope you will enjoy it.

ASSETTO CORSA COMPETIZIONE
THE OFFICIAL GT WORLD CHALLENGE GAME