

NOVAK

Ask The Tech



Timing It Just Right

It's all about the timing. We don't mean your ability to hold a tune, or your rhythm over the back-side doubles. This is about ESC and motor timing! There are two types of timing when you are talking to a racer about their ESC and motor: the end bell (or static timing of the motor itself) and the ESC's electronic timing advance features.

Motor Timing

Motor timing is static, or mechanical in that it gets set based on the physical position of the sensors inside your motor. As you increase the timing of the motor, you are doing two basic things to operational characteristics. The maximum revolutions per minute (rpm) goes up, as does the minimum rpm of the motor.

The maximum rpm increasing makes sense to most — more timing means more rpm. However, the confusion comes with the response of the motor's lower rpm and when this change happens. As you increase the timing of the motor, the rpm across the board tends to go up — even the low speed rpm, so you may feel an increase in "punch" from the motor as well.

Often the same thing happens when you increase the pinion size. However, too much timing, or too much gearing, and this does not happen. You actually get a boggy feel, which is a good way to know if you've got something setup incorrectly as well. For the most part, a modern brushless motor won't suffer much bogging or lack of punch from proper gearing or timing increases. As you increase the timing, you are increasing the amount of power the motor is going to want to use all the time. This means it will run hotter and require closer attention.

There Is No Ideal Static Timing

Some setups run great with lower timing and bigger gearing. Other setups require lots of timing and very safe gearing. The timing is more the rpm and temperature adjuster. The idea that it "adds power" is not really true. You do in fact use more power, but you do not really make more power. The motor only has so much power to give. Moving the timing around simply shifts how the motor makes that power. More timing will give you power in the high rpm ranges and require small pinions to keep the temperature of the motor in check. Some vehicles have limited gearing options. The motor's timing can be used when gearing changes are not possible. Lowering the motor's timing is a great way to tone them down or take off the edge. Most, if not all, brushless motors feel softer with less timing. The opposite of what average racers assume.

ESC electronic timing is the ability of the firing sequence of the motor controller to be altered, or advanced, to increase motor rpm. This can be done on the fly. The idea is that the racer gets the best of both worlds: a motor setup for optimal low timing, with a smaller pinion gear, and the ESC kicking in the boost to increase the motors rpm down the straight sections. The balance of efficiency and power can be reached a bit more directly. The motor can be tuned for ideal low speed, while the ESC will easily take care of the high speed. This can also be used when running mild motors on larger tracks. Slippery conditions may require a tame motor, but the size of the track needs the higher rpm of fast motors. Novak's Dynamic Timing Advance™ allows you to fine tune when and how your timing kicks in for the long straights while maintaining mild low to medium speed throttle control from the mild motor!

Spec Racing and Timing

If you have club raced you have likely raced stock, or what is more commonly called, Spec Class. In Spec Class, there are fixed rules over the power plants of the cars. Depending on where you race, you may find some very complex rules in place to govern the classes. Most places require a specific motor turn be used for their Stock/Spec Class, but that is all. Rules after that can be foggy, and motor timing adjustments to the motor itself are typically always permitted. ESC timing however is another story. Be sure to check the tracks rules for Spec Class, and the ESC technology they allow. It is common to find "Blinky" rules in place. This name is given to classes that run "No Timing ESC Tech." The ESCs are not allowed to operate the motors with any advanced timing, they have a special mode they operate in, and they often "blink" a light to prove they are in the mode. Not all ESCs actually blink, but the name became catchy over the years!