



# 2022 Riding Series

## Brake like a shark

So there I was, approaching the apex as I realized that I was not going to make it. In my haste to drop time I had upset the chassis by going to the brakes too late, too hard and now I was paying the price. As I started to turn in I felt the bars push back at me and I began to run wide. As I blew past my normal throttle application point (still on the brakes) and knew I needed a better plan the next time around.



This story is familiar to many young, aggressive racers. Think of the last time that you were really motivated to drop some time on the track, what was your first move? For many riders, the answer is to simply stay on the gas longer and brake later. Sometimes this works, but sometimes we find ourselves in the situation in the story above. With some simple planning, most riders can find time in major braking zones without having to miss the apex (or worse).

In addition to the over aggressive issue described above, there is an even more common culprit in inefficient braking. After watching thousands of students at the Penguin School, I have noticed that many riders become quite attached to their brake markers. As these riders pick up corner speed over the course of a season, rather than adjust their brake markers deeper they often simply change the way that they brake. They ride comfortably, to the point where they leave valuable time on the table. A saying that we use at the school to start them down the right path is "don't adjust your braking method to suit the marker, adjust your marker to suit the method".

While there are corners where the "lighter and longer" brake theory is best, top riders always get to maximum brake pressure in a long, upright braking zone. This is the type of corner where our planning begins and the goal is to balance our aggression and comfort to achieve the best braking results possible. The "comfortable" choose to not use full braking force. The "aggressive" riders are not able to use full braking force. We want to brake like a shark – patient, and then with maximum force.

Everything starts with the way our first 5% of brakes are applied. Braking is a two-step process; apply the brake - then BRAKE. This is where aggressive riders often fail. Application time varies per corner and is designed to accomplish two major goals. First, we must fully transfer weight the front tire to spread out the contact patch and give us grip to brake with. Second, the weight transfer needs to be smooth enough that the suspension does not bottom harshly or bounce through the travel during braking. It is only with controlled suspension that true maximum brake pressure can be realized.

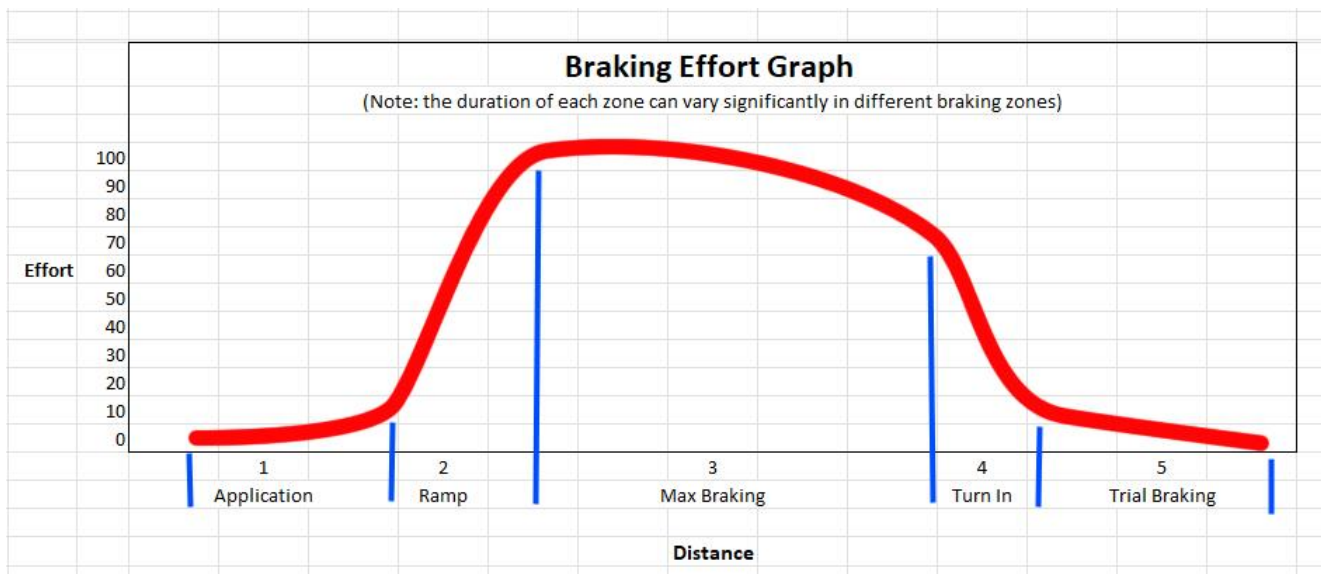
The balance between accomplishing smooth weight transfer and quick application time is subjective. The end goal is simply to accomplish the transfer as fast as you can without upsetting the chassis or locking the front tire. Assuming your bike is upright, the major factors affecting this balance are slope of the track (uphill, flat or downhill) and the surface that you are braking on (smooth or bumpy). Downhill or bumpy entrances typically have a slower application time, and smooth and flat or uphill entrances can handle quicker brake application.

The effect of slope on braking application time is simple. On downhill entrances the track is falling away from you, leaving less weight on the front tire. Even small bikes can wheelie down a hill, and riders must wait a few extra moments for the weight to transfer before there is enough grip to provide stopping power. The opposite is true on uphill entrances, where the front tire is significantly loaded before the brakes are even applied.

Bumps in a brake zone cause a different issue. Assuming you have transferred weight to the front tire, the signal that modern motorcycle is braking at maximum is when the rear tire comes off the ground. Physics says that the lower the center of gravity, the harder it is to lift the tire off the ground. For those of you can ride a wheelie (a similar action to a stoppie), think about the how easily the bike will come up when you sit up high versus lay low on the tank. When bumps feed extra load from the bottom as the suspension collapses under initial brake application, it's easy to see how the forks can blow through the stroke and take time to settle. This same principle applies on a smooth surface when an over aggressive rider ignores the importance of the first 5% of braking (our intro story). The resulting extra front suspension motion raises and lowers the center of gravity in rapid fashion. This motion both reduces the max lever pressure available (forcing earlier braking) and often prevents decisive turn ins (causing late throttle application). Proper first 5% brake application is required for all riders who want to brake at maximum (whether you're breaking lap records or dodging a car on the street).

With the application process in place, we need a report card to evaluate the grip that you have available for max braking. The "heaviness" of the bars in your hands serves as an excellent indicator. The ability to easily change direction while braking is a clear signal that there is more grip available to stop with. If your bike resists direction change, then you are likely braking efficiently. Since most riders fall into the "comfortable" category, this is the most common test we prescribe to evaluate if your bike is near the limit.

Maximum lever pressure changes throughout the brake zone. We instinctively know that it is easier to lift the back wheel off the ground at 20mph than it is at 120mph. As the bike slows throughout the brake zone, the amount of brake pressure needed to lift the rear tire off the ground decreases. To maximize your braking it is important to maintain maximum lever pressure for as long as possible. Top riders change braking force constantly. The chart below shows an example of constant adjustment through brake application, ramp to full pressure, max braking, and the replacement of braking load with turning loads (this is an article all by itself). The resulting graph looks like a shark fin.



**Step one** of using your brake more effectively is evaluation. Most riders simply don't squeeze the brakes hard enough. Focusing on the max braking area (zone 3), ask yourself if you have more lever pressure available. If the back wheel is firmly planted on the ground and you can easily change your line then you have room to go. 90% of riders find that they are using only a fraction of the pressure that they could use. However, if you are in that 10% that has the back tire sliding, skipping or in the air, your evaluation will be if your initial application is creating an artificial ceiling for max pressure.

If you are in that 90% where there is room to go, then **step two** is to prove to yourself that you are correct. Make an estimate of how much harder you can pull the lever (10, 25, 50% ?) and do a simulation before you ride. Physically go through the brake zone in your mind and do a few actual reps at higher lever pressure in your garage. Out on the track, continue to use your present brake marker and ramp the brake pressure up to your new "setting". It does not take a large change in effort to make a significant impact on your speed the apex. You should aim to apply the brakes as strongly as you comfortably can while upright. Note: not all brake zones allow this – only longer ones.

Most riders can nearly double their braking effort. The result of this extra lever pressure is that riders will find themselves approaching the apex much slower than normal. As a result, they release the brake pressure early and coast to the apex. The "shark" method has done its job!

The **final step** is to move the brake marker forward until coasting is eliminated. Adjust the marker to suit the method! After 3-4 incremental laps most riders can move their brake marker up  $\frac{1}{2}$  to 1 full sign (for those corners that have 5,4,3,2,1 brake markers) and will shave nearly a full second from their lap times. All this for simply ramping up brake pressure when straight up and down – a low risk move!

This three-step process is both simple and intuitive, which is why we have found it to be very effective in dropping lap times. Until next time, ride fast - ride safe!