

Another Reason to Own a Power Meter

In a previous article, I described 4 reasons to own a power meter. They are to: 1) set training zones; 2) monitor work done and fitness levels; 3) improve communication with a coach; and 4) improve race pacing, especially for long course athletes. You can read the article [here](#).

Now I want to add another reason to own a power meter. Owning a power meter allows you to perform aerodynamic testing without going to a wind tunnel. The advantage to field testing as opposed to testing in a wind tunnel is that it is much cheaper (only real cost is your time) and you are testing in the real world using your equipment in the same manner in which you race. You don't have to worry about your results "translating" on race day. The disadvantage is that it is quite time consuming and you have to be very careful collecting the data. I have recently undergone this field testing and have come up with some interesting results.

Why do aerodynamic field testing? Basically, I did the field testing to establish a baseline. In essence, I wanted to know under my current race setup, how much drag do I create? In establishing this baseline I can now test new frames, wheels, bottles, helmets, etc.... to see if they actually reduce my drag and if so by how much. Even though a new frame may lower my drag, it might not lower it enough to justify a five thousand dollar price tag. The other advantage to establishing a baseline is to compare yourself to other athletes and see how much time you are gaining or losing to your competitors. A very good cda is .21, while .31 represents a rider on a traditional round tube road bike with box rim wheels (CdA is the Coefficient drag-Area – a measure of forces involved in wind resistance) . The difference in speed between these 2 CdA numbers is roughly 3 miles per hour over a 40 k time trial. What this means is that if you did a 40k time trial at 23 mph on an "unaero" road bike (cda .31), you might be able to save roughly 5-6 minutes by improving your cda down to .21. That is a lot of time. After testing, I have discovered that my cda is only "ok" at .27. This means I have some room to improve and I am working on that currently. If I can lower my cda to .25 that might save me 1-1.5 minutes in a 40k time trial.

How do you perform aerodynamic field testing? Quite frankly, this is a science experiment and should be treated as such. Basically you need to find a flat, smooth road, at least one half mile in length preferably covered and totally wind free. The road needs to be free of cars since cars create excess wind. Because you need it wind free and car free, this means the only time to do the testing is very, very early in the morning. Once you find this piece of road, you will warm up on your bike, make note of the current barometric pressure, wind conditions, relative humidity, temperature and weight of the bike and rider. Once your tires are warmed up, you will make 12 passes on the bike (6 in each direction) at a different speed for each run. The key is to hold your speed and position constant for the length of the run. For example, if you do a 12 mph run, you attempt to hold that exact speed for the entire length of run. This is not too hard at low speeds but gets to be a real change when doing high speed runs.

Once your runs are done, the data is plugged into a spreadsheet (there are a couple different versions out there yielding slightly different results and information) and voila, you now have your drag. If you are not happy with it (like me), you can then change your set up and go back through the testing process

again to see if the changes lower your drag numbers. It is best to change only one item at a time so that you know for sure any changes in drag are due to the change you made.

Good luck with your training and racing!