

*More from the Colorado Premier Training Wind Tunnel – Segments of Air and What is important  
By: Coach Peter Cummings*

If you have read, ***Don't Leave Valuable Time out on the Course***, you may have noticed and found interesting the section where I wrote ... *we tried to form a better "unity" between his head and arms almost as though we were trying to make them one unit and close up any holes between them. These holes were between his arms and between his hands and face. You see, the air, or wind reacts with what it comes in contact with and with arms apart it is contacting and creating two separate contact points, and separate flow and exit systems. By bringing Will's arms together we were able to create one contact point with the flow going around the arms and exiting off each arm. This cut back the amount of air that was "Tripping" behind his arms.*

At the end of Will's wind tunnel session, Robby Ketchell gave me an opportunity to ask some questions about what we had done and how it was accomplished. During this interview I mentioned it was always my contention that the trailing edge of the object was the MOST important part of the system of the object in question when discussing aero dynamics. Robby was quick to point out that this was not the "right" perspective.

You see what Robby then described was more along the lines of the statement above where we had to start with the front or leading edge of the system and try to keep the air in restful state as it traveled over the remaining surface of the system. So, the trailing edge was as important as the leading edge and the leading edge was important because if the leading edge created Tripped or Dirty air then nothing the trailing edge did would correct it. In other words, as soon as you "Messed" the air or "Tripped" the air you were creating drag for the rest of the system. I found this concept to be very interesting.

This trip to Colorado increased my interest and search for knowledge about aerodynamics. When I discussed my trip with a friend he brought to my attention an article on John Cobb's website. My discussion with my friend and the article he steered me to was about front brakes. However, while on the website I noticed a one page article about the new Blackwell 100 front wheel and Blackwell fork COMBINATION. I almost attended John Cobb's seminar this past fall where he was planning on giving a presentation on the importance of the Synergy of Components Aerodynamic Properties. In the seminar advertisement it mentioned John was going to be using smoke to help attendees "see" the aerodynamic properties and how important it was for equipment to "mesh well" aerodynamically. So here John was talking about the same thing I am talking about above. John's article was accompanied by a few very good pictures of this wheel/fork combination in action. If you are interested in aerodynamics and this concept I highly recommend this article. It can be found at [http://www.blackwellresearch.com/pdf/tech\\_articles/wheel%20fork%20air%20interaction.pdf](http://www.blackwellresearch.com/pdf/tech_articles/wheel%20fork%20air%20interaction.pdf). What John's Wheel and fork do is to first keep the air clean and then they direct the air NOT towards the feet and legs, which is the "dirtiest" part of the system, but funnel it back towards the down tube and frame. This is the part of the system that manufacturers have spent great time, money and energy developing into a place for clean air flow and movement.

While at the Colorado Premier Training Wind Tunnel, Robby showed me how we can use Tufts to almost accomplish the same thing as John's smoke. While using smoke is an excellent exercise way to see and

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study the air properties and air motion, to do it the speed of the wind in the tunnel has to be changed (dropped) and this takes time and time is pricey and a major issue. With other people scheduled behind us Tufts were a very good alternative. These “Tufts” are little pieces of yarn, about 4-5 inches long on the end of a stick. I found it amazing that in this 30 mph environment a little piece of yarn was such a great tool.

You can see in the pictures below that when the tufts are in clean air (first picture on the left) the tuft is straight. Yet, when I moved the tuft behind Will’s “perpendicular to the wind, upper arm” it shows the dirty air.



You can see the Tuft straight out in nice clean air



Here you can see the Tuft in Dirty Air.

This was a great exercise, as I used the tufts to test many parts on Will and his bike checking his position and equipment.

This is where I noticed some things I think everyone needs to take a closer look at, cables and parts that stick out. This is one of the areas I have always been critical of and this exercise proved to me that my attention to these details has been well worth it. I have always been a NUT over cables that stick out from the frame and brake arms that stick out. Check out John Cobb’s front brake customization. Do you think he would have gone THAT FAR to fix the front brake if it wasn’t such a big deal?

In **Road Cycling**, a publication by the UCI, they listed that a cable in housing that is perpendicular to the air it is moving through (versus no cable) increased drag by 500mN per meter of cable. Now, I know that we don’t have a meter of cable perpendicular to the air but even 1/10<sup>th</sup> of a meter (a little over 3 inches) will increase drag by 50 mN. That 50mN (or the drag equal to 3 inches of perpendicular cable) would account for 4/10<sup>th</sup> of 1 percent of Will’s TOTAL drag in his new position. Sure doesn’t sound like a lot but that is 1.3 watts. How many watts can you afford to throw away? And, throwing away watts is exactly what you are doing. With a little time, thought and work, you can clean up lots of cable. I see them sticking up in the air on plenty of TT bikes.

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How about those brake arms? That tuft was dancing all over the place behind his arm. I recommend the Campy Delta brake or the Shimano AX brake if you can get your hands on them. Or how about using John Cobb's method? (See; Cobb's article **Aero Brakes** on [www.blackwellresearch.com](http://www.blackwellresearch.com))

Time Trialing isn't just about power it is about proper pacing, aerodynamics and attention to detail. You can, and probably will, spend hundreds of hours improving your fitness to go faster. Yet I see so many riders leaving valuable time that they could get back easily out on the course. Odds are, if you time trial long enough, you will lose a big placing over a second OR LESS. Trust me I see it EVERY season. In 2002, it happened to me. I was racing for a spot on the Western New York Empire State Games team. This team went on to dominate the ESG's and win the Team Gold Medal. That day at the team qualifications we had to do a hilly 72 mile Road race and 30 min later an 8 mile time trial. There is a point system for each race and the top 10 point getters make up the men's team. I knew I had to place well in the road race and trained appropriately. I finished 12<sup>th</sup> in the road race and thought with my TT strength that this TT would be little more than a formality. Well, as it turned out a few guys pulled off some of their best ever TT's and I ended up in 8<sup>th</sup> in the TT, placing me in 11<sup>th</sup> at the end of the day. (Reminder, the team took the top 10.) What made matters worse wasn't that I was just 11<sup>th</sup> but the fact that the difference between my 8<sup>th</sup> place in the TT and 5<sup>th</sup> place was 4 seconds! 1 second would have gotten me 7<sup>th</sup>, 2 seconds would have gotten me 6<sup>th</sup>, and 4 seconds would have gotten me 5<sup>th</sup>. ANY one of those placing would have earned me on a spot on the Gold medal team.

My question to you is, how many seconds can you afford to GIVE away?

Special thanks to Robby Ketchell at Colorado Premier Training. Robby really was great to work with and his data reporting was excellent.



Peter Cummings was certified by the American College of Sports Medicine in 1993 and is the founder of One on One Health and Fitness Center. He is a Certified and Licensed USA Cycling Level II (Expert) Coach, and Certified USA Cycling Skills Instructor. He has directed and overseen the programming of over 10,000 individual and has been racing bicycles since 1991. His many athletes have stood on podiums at Nationals, State and Local championships and have worn the Stars and Stripes National Championship Jersey. He is available for consultations, presentations, testing, programming or coaching. Those interested can contact him at [Peter@Plan2Peak.com](mailto:Peter@Plan2Peak.com). For more articles on training, racing and other cycling specific topics by Coach Cummings visit [www.Plan2Peak.com](http://www.Plan2Peak.com).