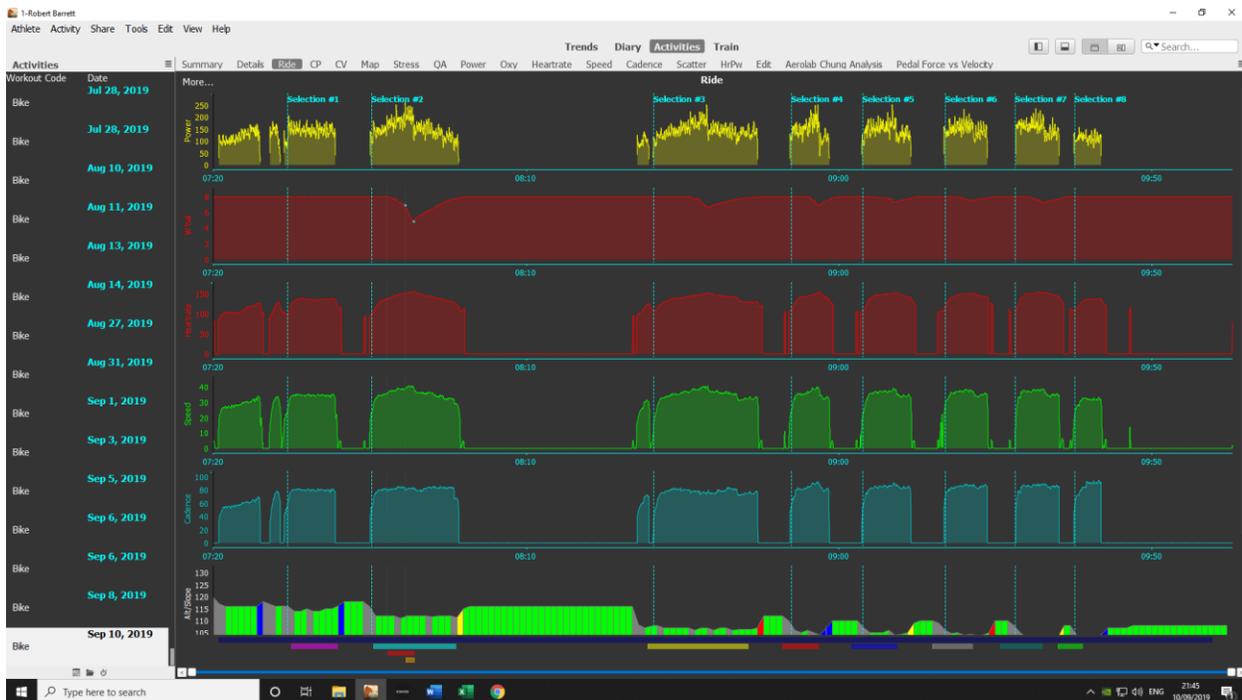


Client: Rob Barrett

Location: Welwyn Velodrome

Date of report: 10th September 2019

Here’s the ride file.



Section two is testing my “current” position. Variable power / variable speed to help with estimating the Crr for the new surface.

Section three is testing with minus 50mm of risers and saddle down by 50mm. Again, variable power / variable speed.

After that I raised the saddle by 10mm for each run, four to seven. Section eight is a cool down in position, lower speed, again to help with estimating the Crr for the new surface.

After a bit of deliberation, I settled on the standard Crr of 0.004000 at 20 degrees C for tarmac.

Results summary:

I use pen and paper track side to record the data. That's not very neat or I'd include a picture of it 😊

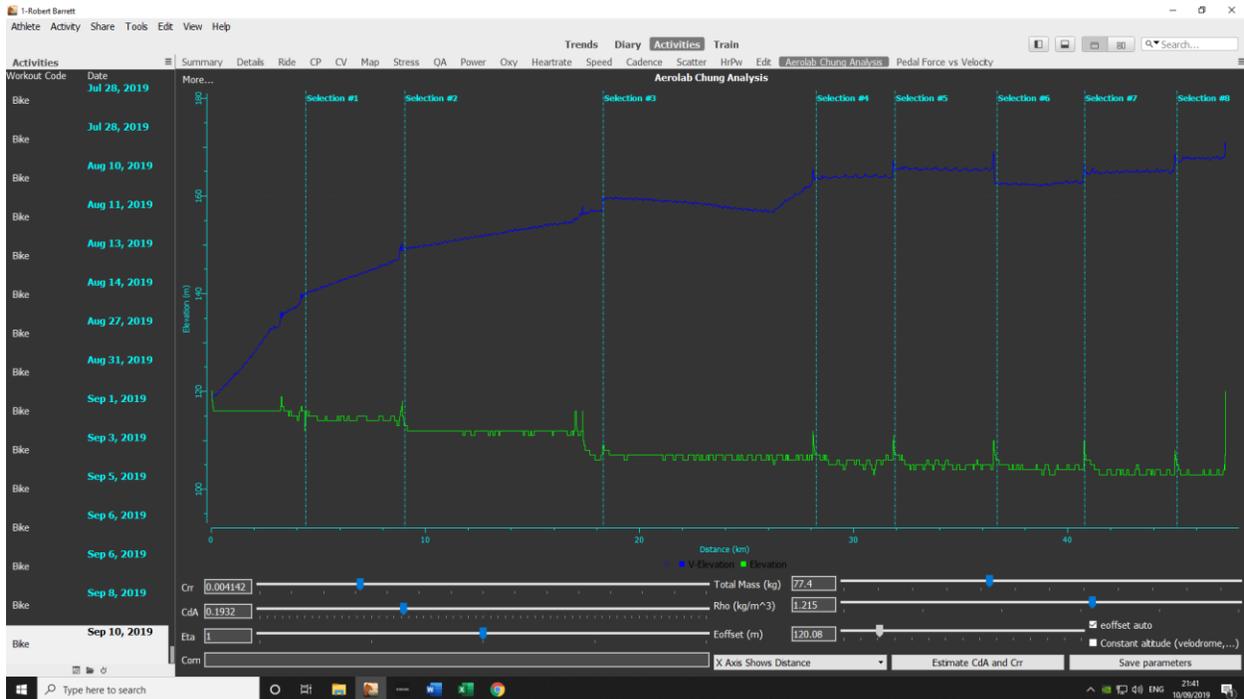
Tyre temperatures are taken immediately after the run. It was overcast most of the time, so direct radiated solar energy / heat was not an issue with tyre temperatures.

There was a period of 25 minutes when I changed the set-up. The ambient temperature went up by about seven degrees in that period, however, the air density took longer to react to the change.

I used the Crr for a nominal 17 degrees for section three to section seven. I allow for a measurement error margin of around half a degree. When mapped to Crr that's roughly equivalent to plus or minus a watt either way.

Interval	Duration	Distance (km)	Av Pwr	Av kph	Direct measurements					Crr	CdA
					Rho	Front	Rear	Track			
					1.223						
Selection #1	07:33	4.326	147	34.4							
					1.22	9.6	9.6	9.7	0.004411		
Selection #2	13:33	8.046	153	35.6							0.1981
Benchmark					1.224	10.7	10.7	10.6	0.004375		
Selection #3	16:27	9.617	146	35.1							0.1884
-50, -50					1.214	16.8	16.9	16.0	0.004142		
Selection #4	06:01	3.543	147	35.3							0.1918
-50, -40					1.221	16.5	16.7	15.9	0.004142		
Selection #5	07:28	4.393	148	35.3							0.1944
-50, -30					1.208	16.4	16.3	16.1	0.004142		
Selection #6	06:38	3.97	152	35.9							0.1959
-50, -20					1.207	16.3	16.4	16.1	0.004142		
Selection #7	06:56	4.129	155	35.7							0.1959
-50, -10					1.207	17.0	17.0	17.0	0.004142		
Selection #8	04:03	2.1	112	31.1							0.1959
-50, -10					1.207	15.2	15.3	15.2	0.004231		
						After slower laps					

This is the Aerolab screen for the whole session with Crr and Rho set at intermediate values. You can see immediately that section three has a lower CdA than section two, and that there isn't much difference between sections four, five, six, seven and eight. Some of the “gain” between section two and section three is due to higher track and tyre temperatures and consequently a lower Crr for section three.



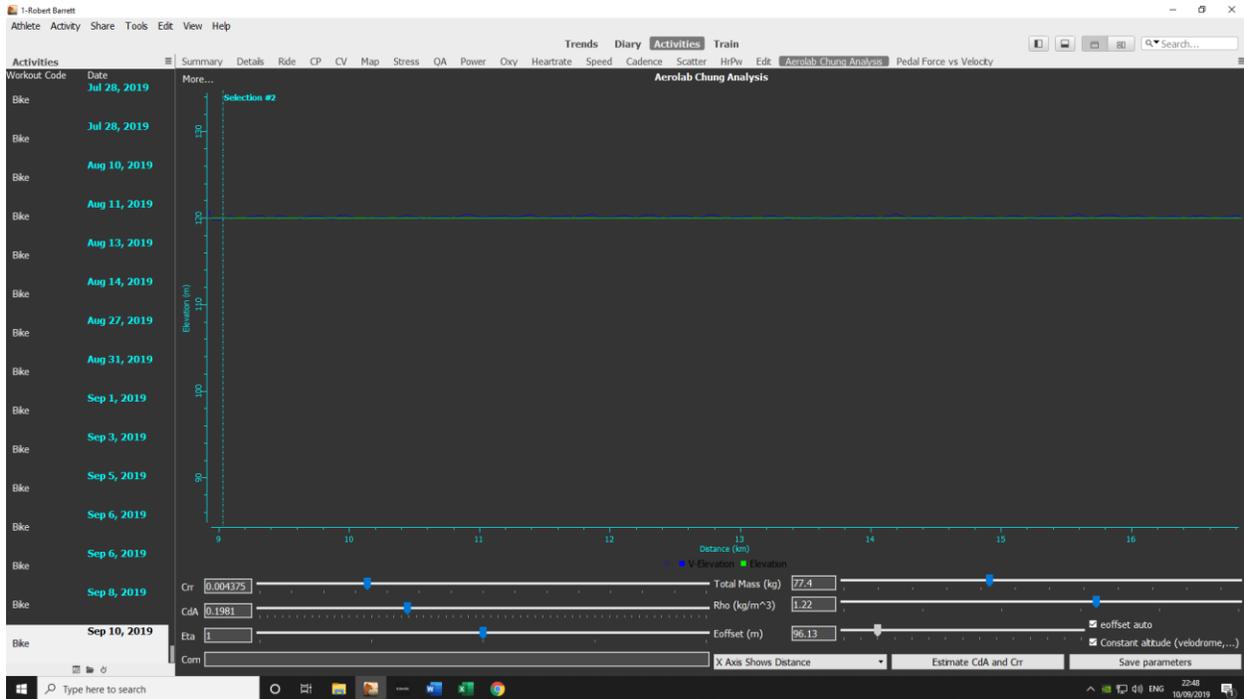
With section three, the lower position, has a lower CdA after adjusting for the conditions. The question then becomes what impact does this lower position have on power production under race conditions.

I wanted to look at the effect of saddle height and body angle on CdA with the pads lower, hence the tests with increasing the saddle height in 10mm increments. I also wanted to look at the effect on power at the same perceived effort.

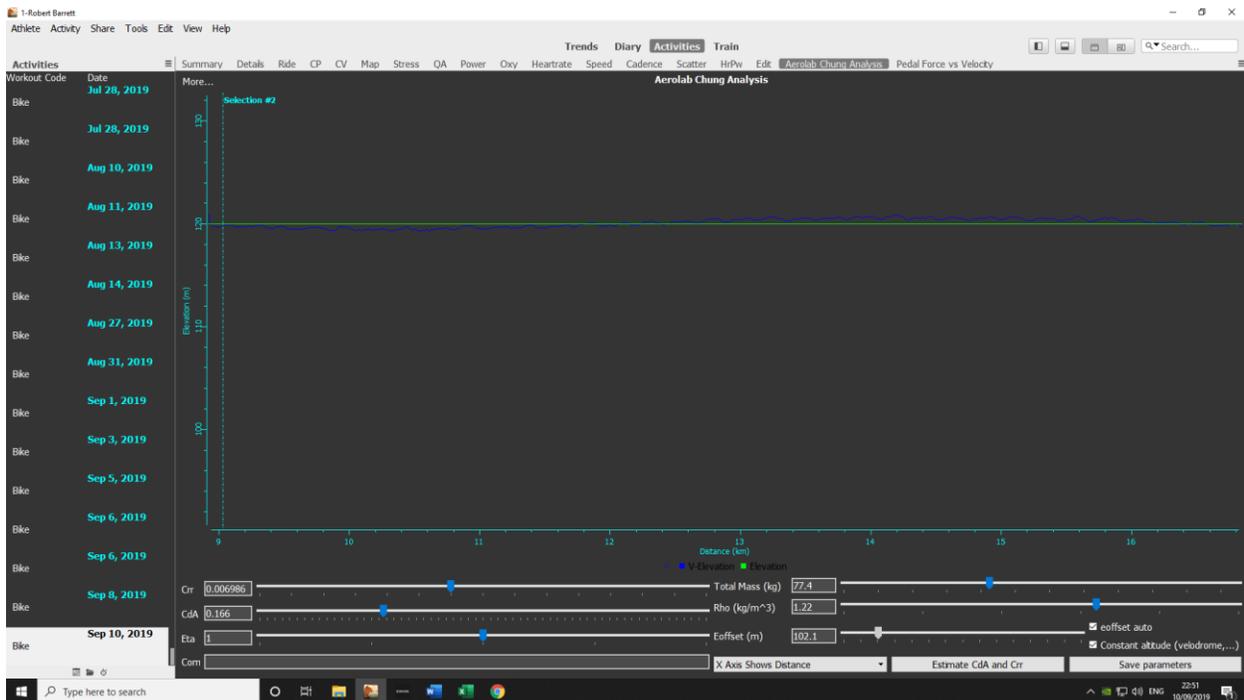
Float Aero

..... getting aero "in a Nutshell"

This is section two, testing my "current" position. The trace is very consistent even with the variable power / variable speed. This is indicative of having the Crr set to a sensible value.

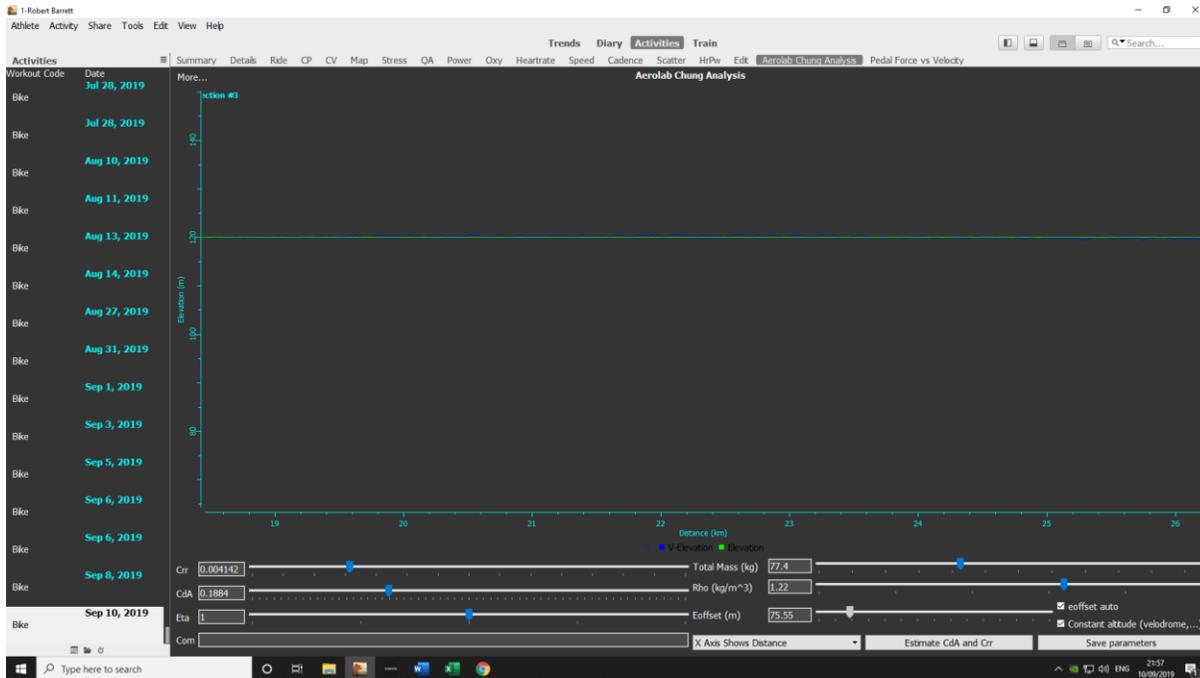


If the Crr is set way too high you get this shape of trace from a variable speed test. CdA appears to vary.



This is section three, testing with minus 50mm of risers and saddle down by 50mm. Again, variable power / variable speed.

The CdA of 0.1884 is lower than the 0.1981 from the test in the higher position. At 40kph the difference of roughly 0.0100 is equivalent to 10 Watts at the pedals.



The question is will I lose power at the pedals compared to the higher position.

It's the ratio of average power over CdA that we look to maximise.

This table shows the duration and distance of each test run, plus the average power, average HR, average cadence and average speed.

Interval Name	Duration	Distance (km)	Work (kJ)	Ave Pwr	Ave HR	Ave Cad	Average Speed (kph)
Selection #1	07:33	4.326	67	147	134	79	34.4
Selection #2	13:33	8.046	125	153	140	81	35.6
Selection #3	16:27	9.617	144	146	139	76	35.1
Selection #4	06:01	3.543	53	147	142	82	35.3
Selection #5	07:28	4.393	66	148	144	83	35.3
Selection #6	06:38	3.97	60	152	145	85	35.9
Selection #7	06:56	4.129	64	155	146	85	35.7
Selection #8	04:03	2.1	27	112	131	85	31.1

Looking at the power numbers, I was seven watts down on section 3, and slower. I can tell you that from a perceived exertion point of view it felt much harder and less sustainable, and that's leaving aside the question of those one to two minute over FTP efforts that are sometimes (always?) required in events. There is the potential to train into the lower position. I did that with some success in the 2013/2014 off season, but it was a six to eight month process.

If we look at the power numbers and speeds for the subsequent runs the power numbers increase as the saddle height is increased. Sections six and seven have a CdA of 0.1959 compared to the original "high position" CdA of 0.1981. The difference of 0.0022 is within the margin of error. There is potentially a marginal advantage with section six edging out section two, however, given that I have better forward visibility with the section two position I am inclined to return to that.

A few words on the testing protocol:

For the section two test I rode 16 laps, changing the power every second lap.

For the section three test I did the same but preceded by three laps to equalise the tyre temperatures, and then a stop to check the SRM off-set, and then another three warm up laps before the 16 laps for the test.

Equipment:

P3C 51, Zipp Super 9 disk, ENVE 7.8 front, both running Conti 5000 TL tubeless, SRM power meter.

Clothing:

Winter bib tights, Endura winter base layer, summer short sleeved road top (tight fitting), Met Drone Wide Body helmet, Northwave shoes with Castelli shoe covers.

I've used this clothing combination quite a few times and established that it adds about 0.0100 to the CdA numbers.

Ends