

# CASE STUDY

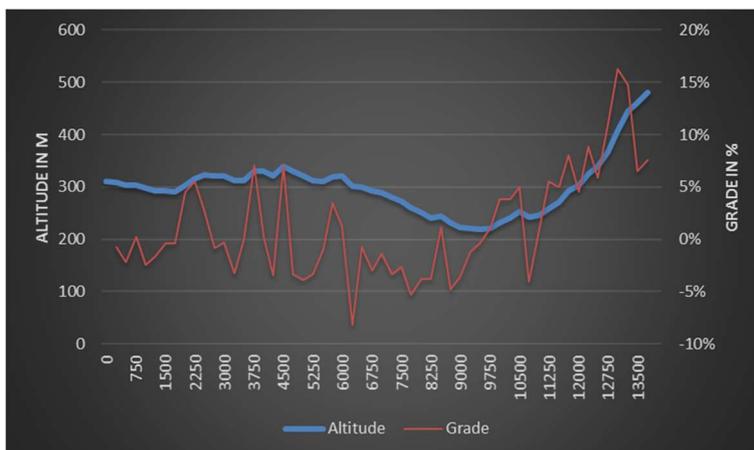
## PARIS – NICE 2017 – TIME TRIAL

### THE COURSE

The 4<sup>th</sup> stage of the 2017 race Paris – Nice was an uphill time trial. Therefore, a normal road bike – maybe with additional extensions – may be superior to a classical time trial bike.



The course is more or less flat for the first 6km, followed by a downhill section and a final climb of 4km and 300m difference in altitude; the total distance is 14km.



### MODELLING

We have modelled Alberto Contador with a body height of 1.76m and a body weight of 62kg being able to produce a power of 6 Watt per kg. 5 different bike set ups have been chosen, from a time trial bike (set 1, perfect aerodynamics, higher weight) to a normal road bike (set 5, less aerodynamic, lower weight):



Cycling Power

Catalyst provides MS

Excel based analysis

applications:

- Power to Speed
- Course to Speed
- Simple Calculator
- CdA Estimation



	1 (Basis)	2	3	4	5
Drag coefficient CdA	0.22	0.24	0.26	0.28	0.3
Rolling resistance coefficient	0.005	0.005	0.005	0.005	0.005
Drive and slip loss Cm (%)	3%	3%	3%	3%	3%
Weight bike (kg)	8	7.8	7.4	7.2	6.8
Weight rider (kg)	62	62	62	62	62
Constant power	370	370	370	370	370
Height above sea level (m)	800	800	800	800	800
Temperature	20	20	20	20	20
Wind (km/h)	0	0	0	0	0
Wind direction (degree)	250	250	250	250	250

## RESULTS

Distance in m	13'765				
Total Time	0:22:18	0:22:40	0:22:59	0:23:18	0:23:36
"Best" Race Set	0:22:17				

The time trial bike is – despite the uphill section – superior to all other setups, even if we take into account, that a perfect position cannot be hold in the uphill sections. With a 2km longer climb, a normal road bike with extensions would be competitive to a time trial bike. This can be seen from the sector analysis:

Sector	Race Set				
	1	2	3	4	5
0 to 2500	+				
2500 to 5000	+				
5000 to 7500	+				
7500 to 10000	+				
10000 to 12500					+
12500 to 13765					+

