

Effect of cyclist's position on aerodynamic drag during 4000m pursuit

Introduction

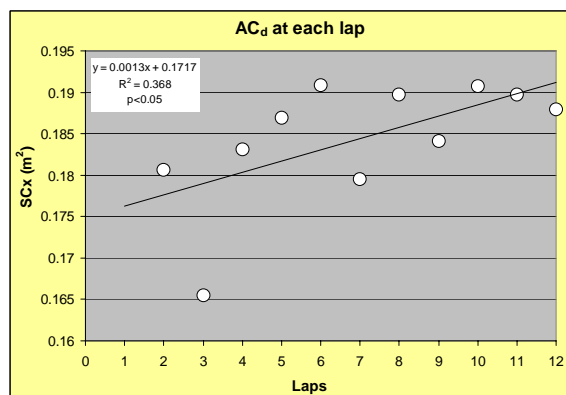
The cyclist's position on the bicycle is an important variable of the performance at high velocities. Indeed, the aerodynamic drag of air becomes the most important force opposing the motion. At 16 m.s⁻¹, 90% of the total resistance is determined by the aerodynamic drag. The 10% remaining is due to the rolling resistance. Also, as the mechanical power (P, W) provided by the cyclist increases with the cube of the velocity it's necessary to decrease the aerodynamic drag and/or increase the cyclist' P to improve the performance in competition. However, the more the level of the cyclist is high the more it's difficult to increase his fitness even with rational training. So, the aim of this study is to measure the changes in effective frontal area (AC_d, m²) of a cyclist during a 4000m pursuit track competition (track world cup) on actual locomotion.

Methods

P was measured with an SRM Training System (scientific model, Schoberer, 0.5% accuracy, Germany). It's a precision strain-gauge-based crank arm and sprocket dynamometer that radio-transmits data to the SRM screen (Powercontrol unit) fixed on the handlebars. The device was fixed on the cyclist's bicycle during the competition and the data (P, velocity, cadence) were stored in the powercontrol unit. AC_d was determined according to P, velocity, temperature, barometric pressure and rolling resistance.

Results

The AC_d of the cyclist increased during all the 4000m of the pursuit. AC_d was increased in 15% during the second part of the pursuit. For a cyclist's P close to 450 W that determines a 67.5 W significant increase in P. The results show that training have to be focused on the maintain of an optimal position on the bike during all the 4000m pursuit in order to avoid to alter aerodynamic drag (AC_d) with the effort.



FEMTO-ST – Applied mechanical department

Address : 24, chemin de l'Epitaphe - 25000 BESANCON

Contact : Frédéric Grappe, Alain Gros Lambert

Tél. : (+33 3) 81 66 60 26 - (+33 3) 81 66 56 81

Mail : frederic.grappe@univ-fcomte.fr

alain.gros Lambert@univ-fcomte.fr

Site : <http://www.femto-st.fr>