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Sportmedizin Nottwil

Influence of technical adaptations and seating variations in hand cycling on wind resistance – from the wind tunnel to Brands Hatch

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VISTA 2013
Bonn, 2nd May 2013

Rationale for the research project

- Very close time differences in time trials

Result — Official

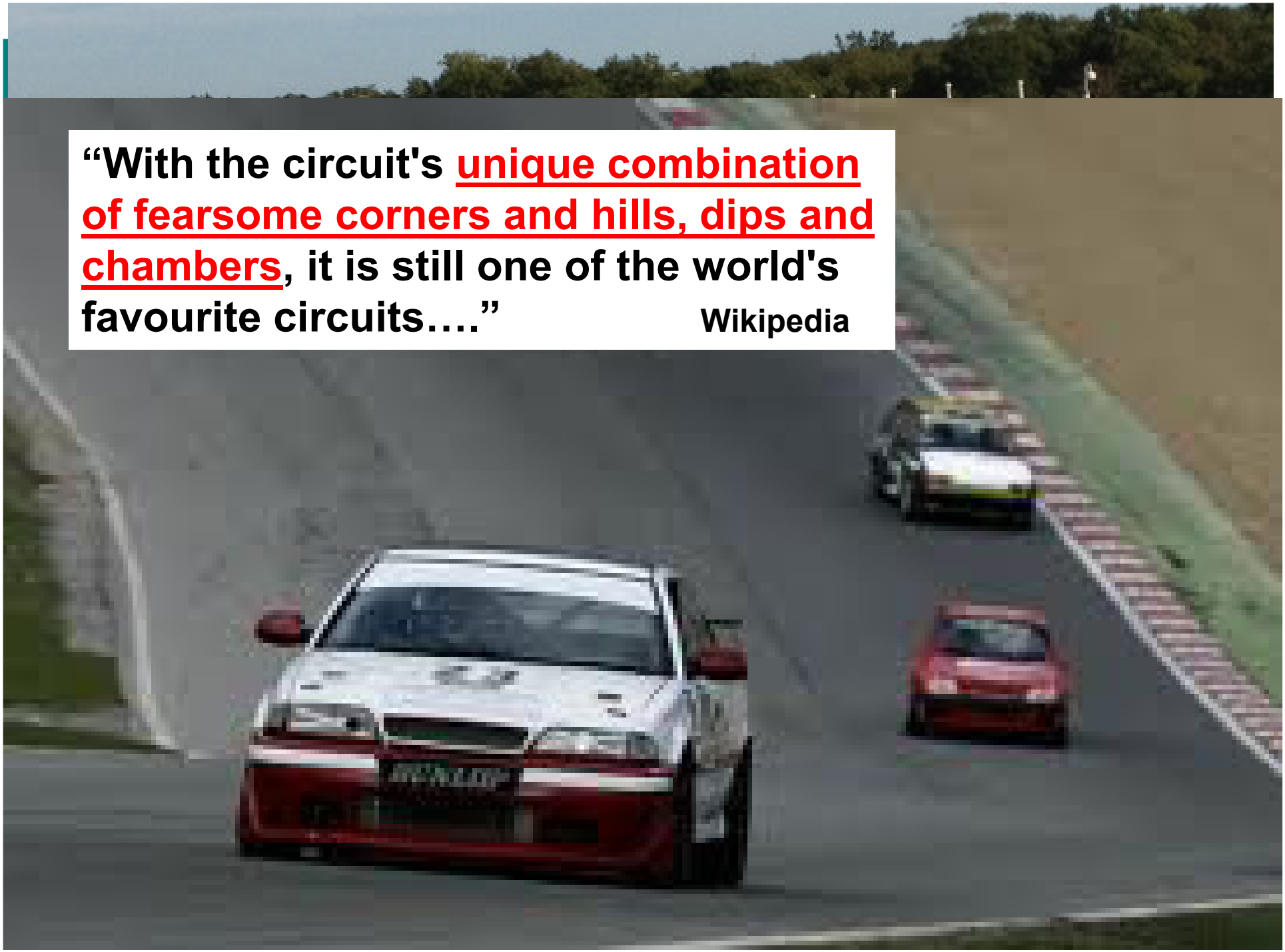
Rank	Bib	Athlete	Final Time
1	324	FREI Heinz	26:52.39
2	314	ABLINGER Walter	26:57.25
3	319	PODESTA Vittorio	27:01.98

Δ 4.9s = 0.30%
Δ 4.7s = 0.29%

→ Every single detail counts!!!

Rationale for the research project

- Very close time differences in time trials
- High average speeds: 16km/280m: Ø 35.7km/h
- Brands Hatch: downhill speeds over 60km/h


“With the circuit's unique combination of fearsome corners and hills, dips and chambers, it is still one of the world's favourite circuits….” Wikipedia

Rationale for the research project

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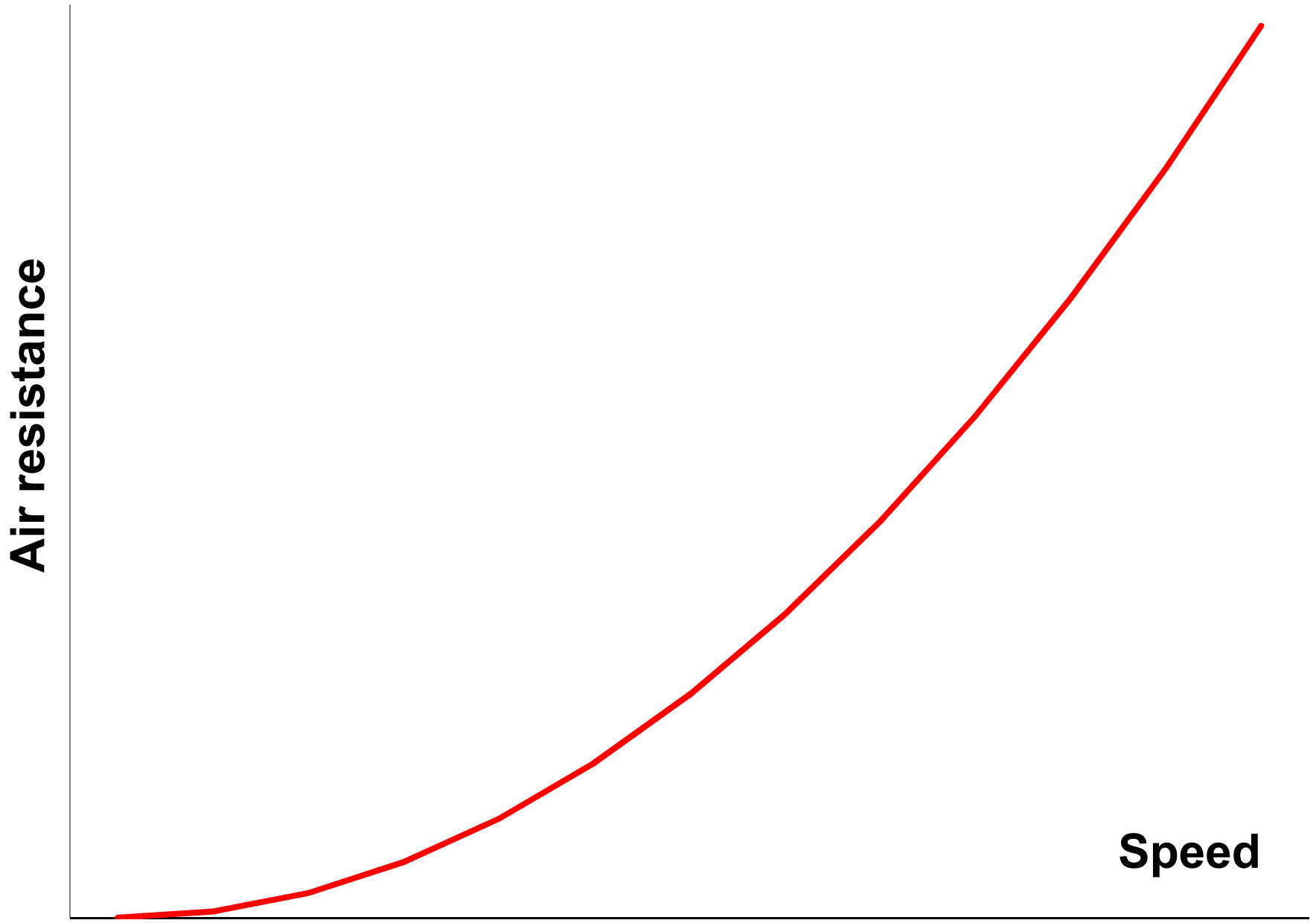
- Air resistance increases quadratically with speed

  → If speed doubles air resistance increases 4 times


Air resistance
Speed

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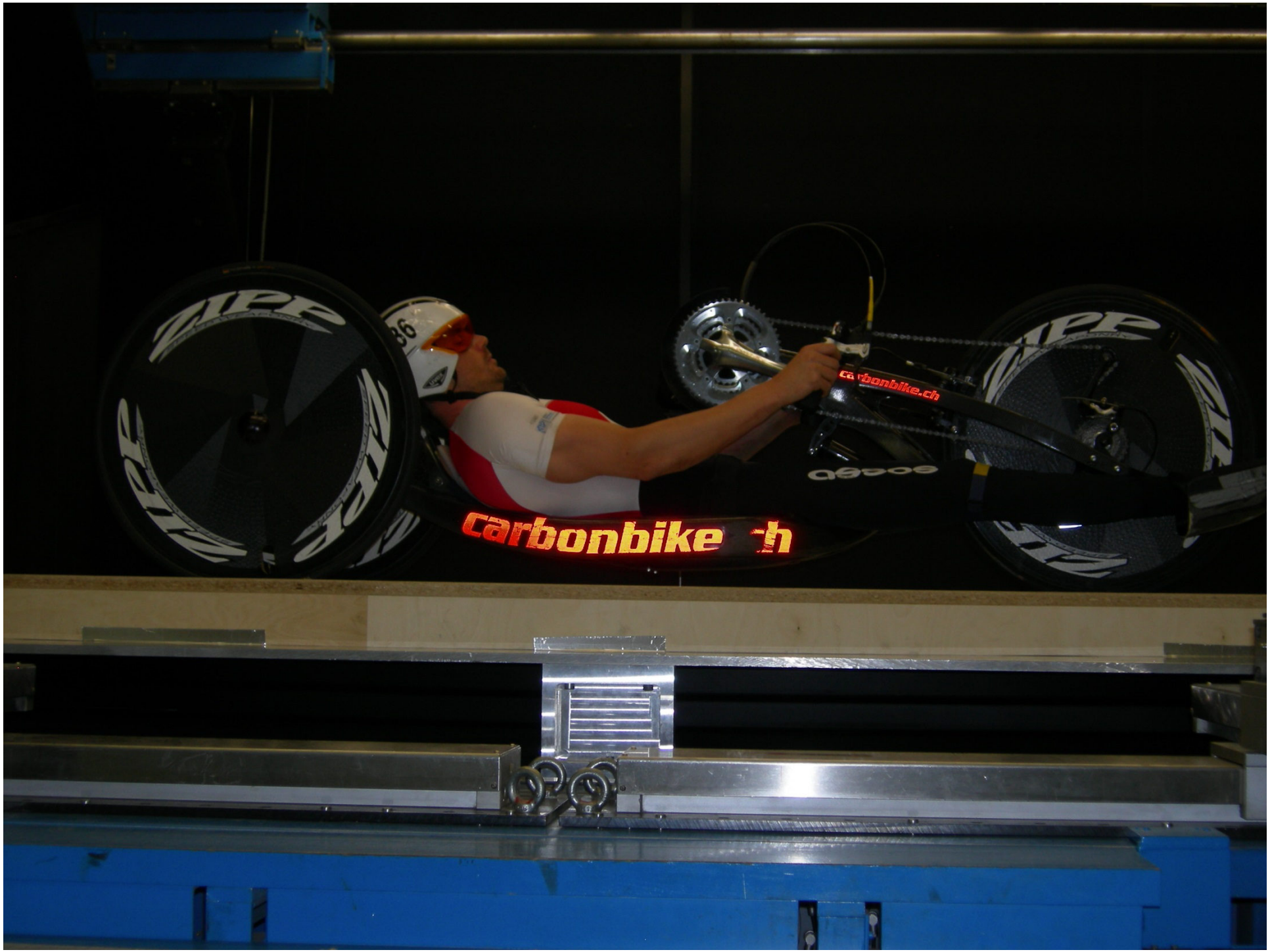
  → Importance of aerodynamics increases with increasing speeds

- Make athletes feel well prepared (self-confidence)
- Advantage compared to other nations

Challenges

- Finances: CHF 55’000 (€45’000 / £37’000 / $58’000)
- Adaptations: Wind tunnel


carbonbike.ch

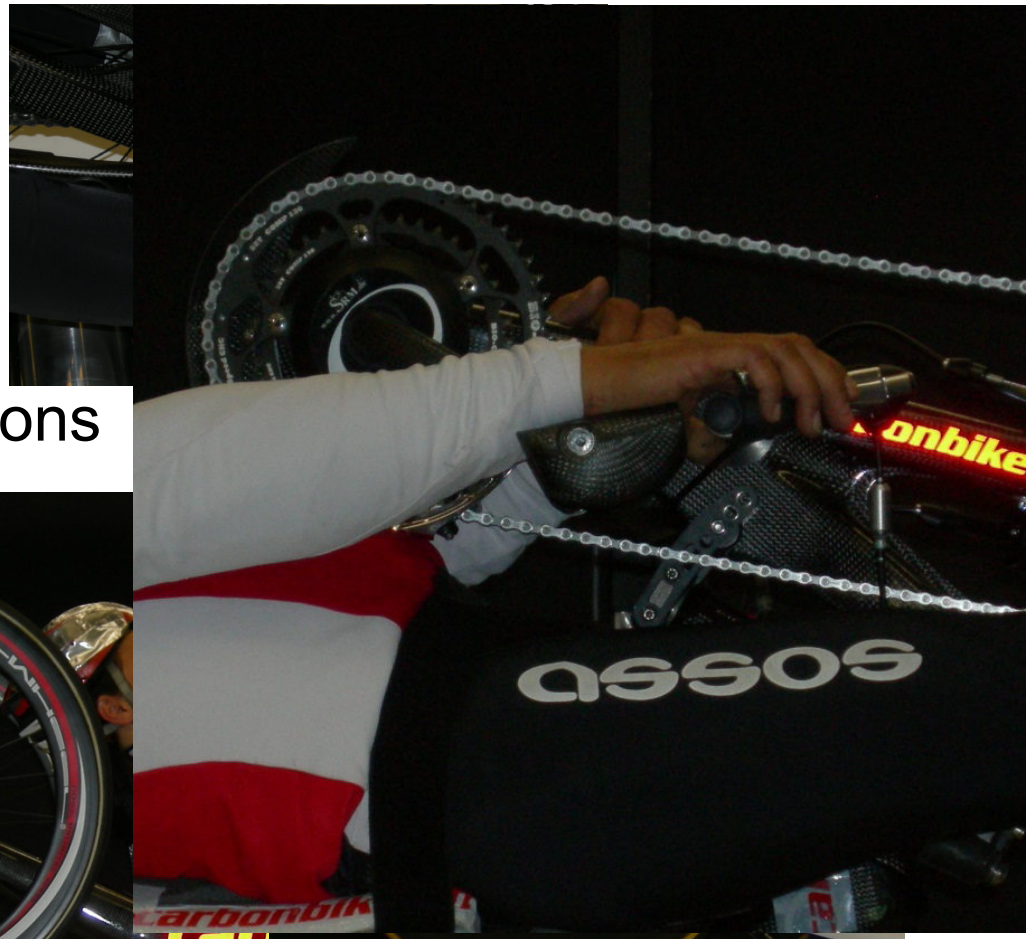
Challenges

- Finances: CHF 55'000 (€45'000 / £37'000 / $58'000)
- Adaptations: Wind tunnel
- Time: Only 3 months to go to London 2012
- How to get presence of the media

Each athlete has 2h time to (systematically) find the optimal bike setting and the best position!

Tested equipment

- Helmets
- Wheels
- Footrests
- Leg / hand positions



Results

Athlete	Time trial- vs. road helmet	Disc vs. spoke wheel	Leg position corrections	Footrests with tape	Best vs. worst setting
1	-0.8%	-5.0%	no measure	-1.9%	-10.1%
2	+1.6%	-4.2%	-0.1%	-2.4%	-8.8%
3	+1.3%	-3.1%	no measure	-1.8%	-11.6%
4	-1.7%	no measure	-2.6%	no measure	-3.5%
5	-0.9%	-10.4%*	no measure	no measure	-11.4%

→ Adaptations could make the critical difference!
→ Athletes travel to London with a good feeling!
→ Maybe some nations were made insecure?

Perret, unpublished data

Practical applications at the Paralympics

Conclusions

- The project seemed to be successful and possibly…
- …helped to make a small but important difference
- 6 handcyclists won 6 medals
- Only positive feedbacks from all athletes

→ Athletes (and coaches) were happy!!!

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Thank you very much for your attention!