Dienstleistung

Case study – Helmet Aeration

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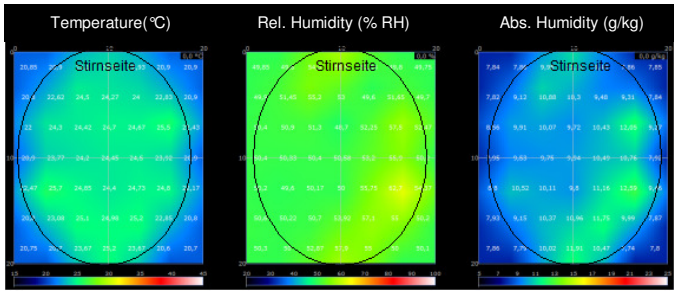
Objective:
Comparison of the aeration attributes of various helmets (here: Mountainbike helmets).

Realisation:
Feb 2010 based on client project (22 helmets).

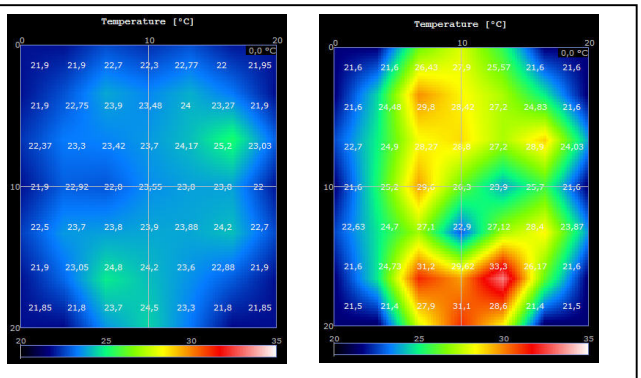
Measurement tools and setup:
THG AreaView technology with 14 sensors. Measurement of temperature T, relative RH and absolute humidity AH in two zones.



Pic 1: Climate sequence of the head within a helmet with airflow on.

Setup of the measurement in a climate chamber at 20° C and 50 % RH. The bike ride was simulated with an airflow fan at a speed of 20 km/h. Per helmet a driving performance of 15 minutes at a constant physical exposure of 200 Watt were completed. THG AreaView was applied to the head with a special 14 sensor cap (Pic 1 ellipse). The area outside the head zone illustrates the conditions of the climate chamber.

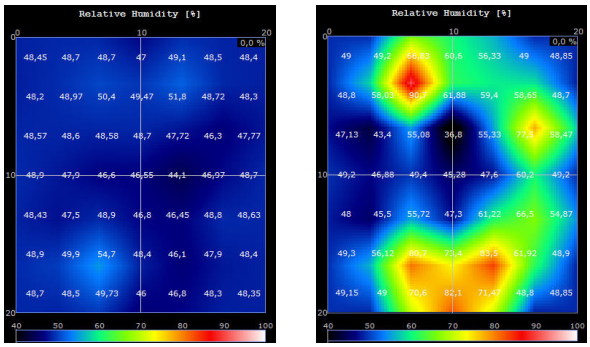
Results:
22 helmets took part in this measurement scenario (see MountainBIKE 4/10*). It can be concluded that all helmets show different aeration results during the ride phase. Setting the base at 33°C at the heads surface the best helmet cooled down a strong average of 9.5° C due to the airflow, which is only about 2° C above the environment. Its weakest opponent in contrast over time accumulated heat in several sections. Higher humidity rates can be expected (transpiration, cooling attempt).



Pic 2: T-values of the best and weakest helmet after 7,5 Min.

*Evaluation criteria in the magazine may differ from here.

The RH-charts (pic. 3) confirm this conclusion under the right helmet. The accumulated humidity due to its higher heat capacity captures heat at the head inspite of a cooling attempt (transpiration) of the driver.



Pic 3: RH-values best and weakest helmet after 15 Min.

Pics 2 and 3 visualize the difference after 7,5 and 15 minutes. The left helmet almost reaches the conditions of the environment with an outstanding evacuation of humidity and without mentionable accumulations. The right helmet creates several heat traps which are mainly caused by captured humidity. Good aeration only happens in the mid head section. In average a difference of over 20 % RH must be outlined. Lower RH values ease the metabolic burden (transpiration) to regulate heat and improves both physical performance as well as comfort perception.

Climate is a clear source for comfort in a helmet and bears opportunities for competitive advantage. THG AreaView makes helmet climate visible.

Advantages:
- Representative climate tracking
- Very low setup cost (appr 1 min/helmet)
- Live imaging (up to 2 sec intervals)
- Absolute humidity tracking (T-independent)
- Clear uniform view how aeration performs

Fields of application:
- Climate measurement within helmets
- Development of aeration and deaeration
- Optimization of comfort aspects and extension of competitive advantages.

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