



COMFORT THROUGH CLIMATE AT THE HUMAN/TEXTILE INTERFACE

Every human creates an individual microclimate through the thermoregulation. It is an interaction between heat and humidity and as a process develops equal in all humans.

The microclimate is crucial for comfort, performance, and regeneration.

With a mix of consulting, services, and technology sales we support companies to develop and market better climate comfort through its products and applications and to secure existing solutions.

INSIDE COMFORT

Comfort through climate;
objective evaluation,
subjective perception

INSIDE SIMULATION

Simulation of
the thermoregulation

INSIDE DATA

Special measurement
technology
for microclimate

INSIDE TESTING

Comparing, evaluating,
securing

INSIDE TESTING

AS AN INDEPENDENT INSTITUTE WE COMPARE AND SECURE THE CLIMATE ATTRIBUTES OF YOUR PRODUCTS



Defined test procedures with occupants and/or SWEATOR-Simulation

Our focus is set on the analysis of the actual microclimate development between human and textile. We investigate single textiles but also complex ready-made products and make their climate attributes transparent and ready for optimization.

Occupant based climate measurement and visualization procedures: Climate measurements with humans create qualitative data which is based on authentic thermoregulation processes. We capture and provide this data live and if applicable through visualization. Real data is important once the human moves into focus (e.g. medical sector, professional sports, sleep) but also once the client's product actively treats heat and humidity developments and the general human reaction on this is of interest (e.g. sweat behavior on actively acclimatized seating systems or technical textiles).

Simulation based climate measurement and test procedures. Our heat and humidity simulation imitates the human thermoregulation and delivers quantitative and highly reproducible climate data for the mid to long term analysis of product lines. The flexible modelling of the SWEATOR technology also allows the evaluation of ready-made products. Quantitative measurement methodologies offer the derivation of all essential thermodynamic key figures.

We would be pleased to consult you which measurement and test methodologies best fit your needs.

FIELDS OF APPLICATION

Product	Occupant based	SWEATOR based
Mattresses	X	X
Duvets (comforters)	X	X
Pillows	X	X
Automotive Seating	X	X*
Seat toppers	X	X
Head protection devices	X	X
Protection apparel	X	X*
Apparel	X	X*
Footwear	X	X
Socks	X	X
Prostheses	X*	X*
Textiles (textile samples)	-	X
Not found? Please talk to us	X*	X*

**based on available resources*

INSIDE DATA

SPECIAL MEASUREMENT TECHNOLOGY FOR MICROCLIMATE – SALES/LEASING



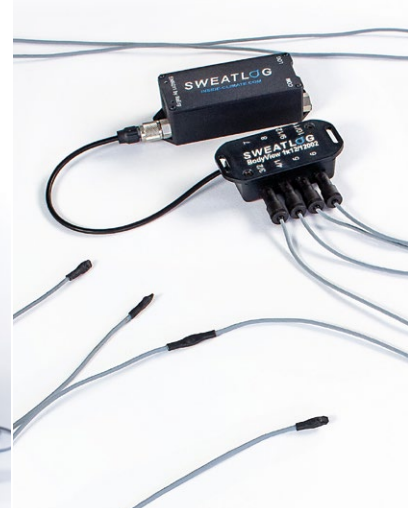
SWEATLOG SeatView



SWEATLOG SleepView



SWEATLOG HeadView



SWEATLOG BodyView

Climate comfort is relevant in all products in which a human enfolds thermoregulation activity. This bears great market potential. Many companies realize this potential and decide to professionally build up their own data know-how.

SWEATLOG AreaView sensor technology tracks and visualizes climate data and presents it ready for optimization. Live and almost in real time, around the body, in systems, and rooms.

INSIDE DATA stands for our preferred measurement technology which we offer to companies in various industry

sectors with individual R&D activities. Our measurement procedures are always transparent for our customers. Mutual rules, instruments, and methods offer an optimal basis for professional data conduction.

SWEATLOG AreaView in an optimal way combines our requirements on high flexibility of the application, precision in the measurement, and simplicity in the handling.

We will be pleased to consult you in detail or provide a best fit offer. Please also ask for our individual fact sheets for the *SWEATLOG* models or visit our website for download www.inside-climate.com

SWEATLOG MODELS

Model	Application	Kind / Climate layers	Measure- ment spots	Measure- ment field
SeatView	Automotive Seating, wheel chairs, office chairs, seat toppers	Fixed sensor array, quick setup time, one climate layer	24 + 1 31 + 1	40x40 cm 50x50 cm
SleepView	Mattresses, duvets (comforters), laying areas of all kind	like SeatView	31 + 1	ca. 80x170 cm
HeadView	Helmets, hats, caps, hoods, head protection of all kind	like SeatView	14 + 1	Sensor hood
BodyView	Systems of all kind, apparel systems, sleep systems, seat cores, rooms	Sensor spider with single sensors: Sensor spider with double sensors: Sensor line (sensor distance may vary): Each applicable in multiple climate layers	up to 7+1 up to 14+1 up to 42	Up to 10 m per sensor

INSIDE SIMULATION

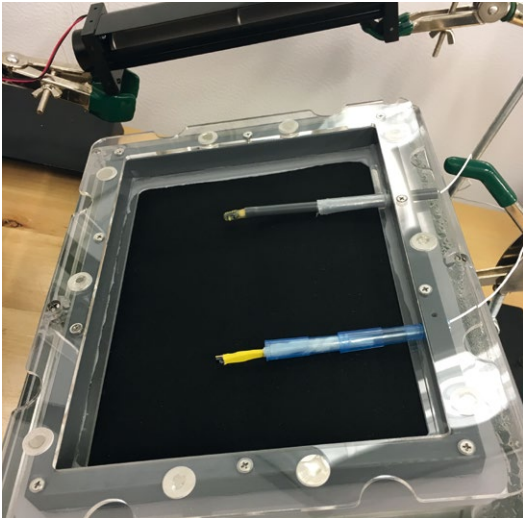
SIMULATION OF THE THERMOREGULATION IN THE READY-MADE PRODUCT – SALES/LEASING



SWEATOR HEAD



SWEATOR FOOT



SWEATOR SKIN

Humidity derived from the thermoregulation can be seen as a body own signal which points towards the perception of too warm heat conditions. At the same time humidity can contribute to a cooler heat sensation. From a comfort perspective humidity is to be kept ideally.

Out of a co-operation between INSIDE CLIMATE, the University for Applied Sciences, Munich, and the Institute for Applied Ergonomics the *SWEATOR* technology has been developed ready to go into production. *SWEATOR* is a quantitatively reproducible source for humidity and heat which can simulate human thermoregulation processes in virtually every test body shape.

In combination with the *SWEATLOG* AreaView technology the climatic processes may be tracked within various

textile layers. Thus *SWEATOR* is capable of investigating whole textile systems or ready-made products on their thermodynamic attributes.

We will be pleased to consult you in detail or provide a best fit offer. Please also ask for our individual fact sheets for the *SWEATOR* models or visit our website for download www.inside-climate.com



SWEATOR MODELS

Model	Application	Kind / Size	Sweat rate
SWEATOR TORSO	Mattresses, duvets (comforters), laying areas of all kind	Back area 3D, Front area 2D, Appr. 60x40 cm per area	90 - 120 g/h*m ² at 21° room T and 50 % RH with standard shells
SWEATOR HEAD	Helmets, caps, hats, hoods, and more	Normed head (Sheffield Head) 59 cm girth	See above
SWEATOR FOOT	Footwear of all kind	Normed size, 42 EU	See above
SWEATOR SKIN	Textile samples of all kind	Sweat area appr. 14,5 x 19,5 cm	See above, 90 - appr. 250 g/h*m ²

Data output: T (°C), RH (%), AH (g/kg), HI (°C), p (Pa), Q_{et} (W/m²), Q_{ct} (W/m²), MVTR (g/m²/h), R_{et} (m²Pa/W), R_{ct} (m²K/W), t (sec)

INSIDE COMFORT

OBJECTIVE EVALUATION OF SUBJECTIVE CLIMATE PERCEPTION



Climate comfort = efficient thermoregulation with different heat perceptions of humans

Climate comfort at the human/textile interface is directly linked to the human thermoregulation. It is an interaction between heat and humidity.

If people are asked about their preference of warm or cool the answers are diverse. The choice between humid or dry, however, is distinct.

The thermoregulation seen as a process operates equal in all humans. It's like kind of a body language indicating a demand for more or less heat.

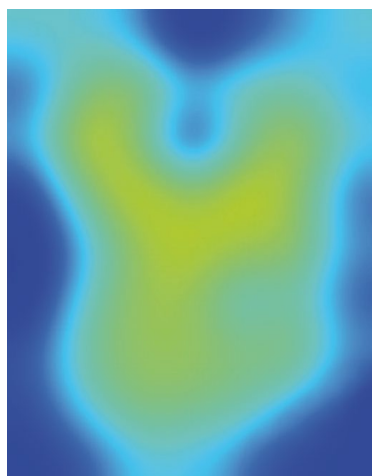
Humidity through perspiration is an objective signal for subjectively sensed heat. An optimized humidity management is key for an efficient thermoregulation and thus climate comfort.

Our INSIDE COMFORT consulting follows the question how climate comfort can be best possibly measured, evaluated, communicated, and strategically used in any corresponding product environment. In consequence we support our clients as an external project partner with the development of passive and active solutions for more comfort through climate.

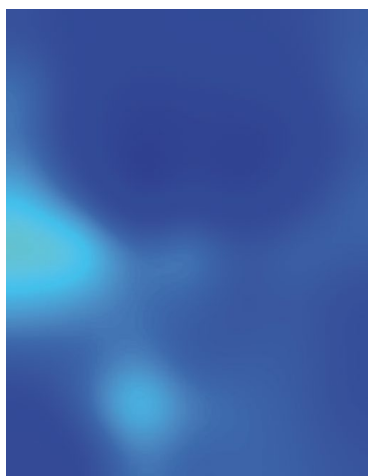
EXCERPT OF OUR ACTIVITIES

Field of application	Activities
Automotive Seating	Development of climate comfort solutions in seat systems
Sleep systems	Climate comfort through active or passive solutions
Medical sector	Optimal skin climate for pressure ulcer prevention, wheelchair seating, hospital beds, laying ares of all kind
Textiles and technical textiles	Measuring, evaluating, documenting and optimizing climate related attributes
Apparel	Measuring, evaluating, documenting and optimizing ready-made apparel systems
Head protection	Better comfort through optimized humidity and heat management
Footwear	Investigating climate relevant aspects within boots, shoes, socks, stockings
Fashion	Climate comfort, new paths, new focus, new trends

Heat and humidity between a human and a car seat while sitting



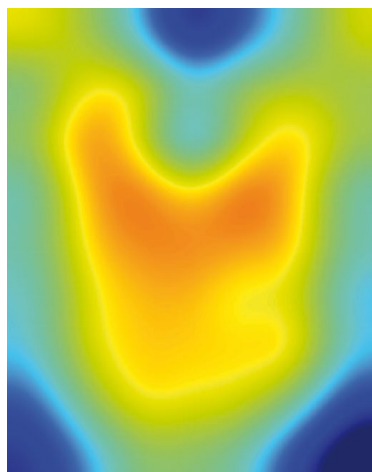
Temperature [°C]



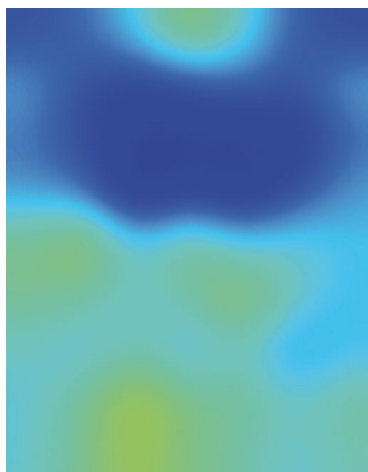
Relative Humidity [%]



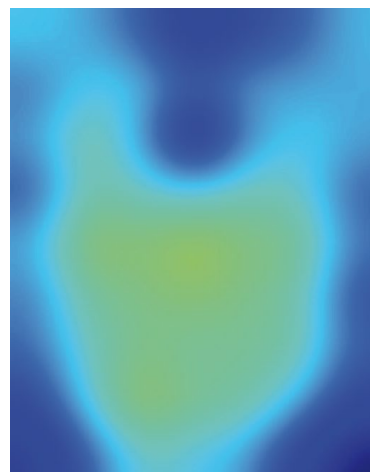
Absolute Humidity [g/kg]



Temperature [°C]



Relative Humidity [%]



Absolute Humidity [g/kg]



Inside Climate GmbH
Hilpoltsteinerstr.1b . D-83607 Holzkirchen . Germany
T +49 8024 6080572
info@inside-climate.com . www.inside-climate.com

QZV Certified:
DIN EN ISO 9001