



## HEALTH & SAFETY IN HEAT

Sabine Stein / Christian Schuster

49th EAGOSH Meeting 2023, Leipzig



# ACTIVE COOLING TEXTILES

The air conditioning to wear



## performance international GmbH

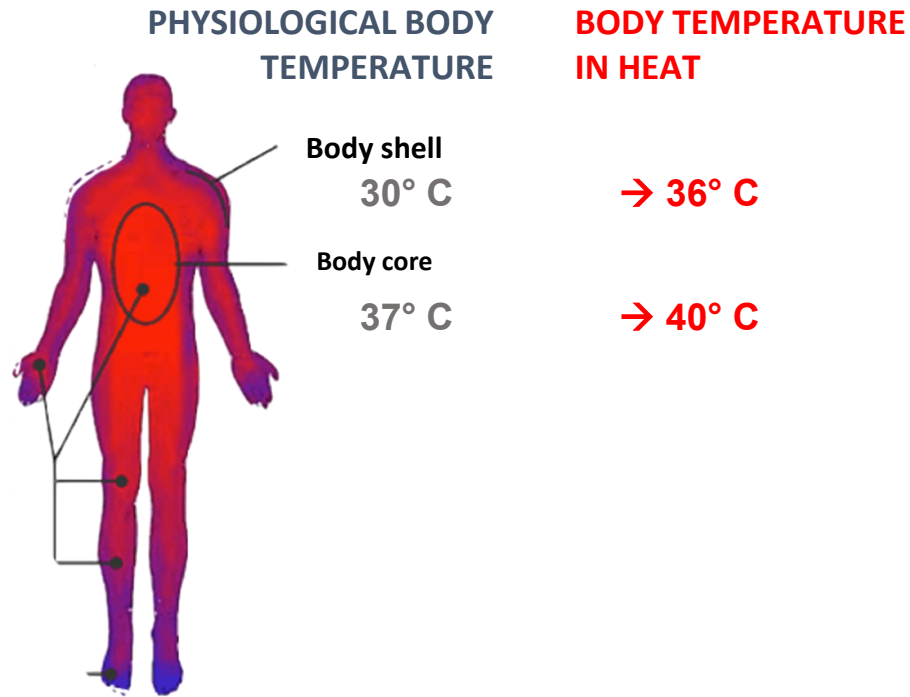
- Foundation: 2010
- Innovative family business
- First company to establish washable, professional and highly efficient cooling textiles on the market
- Leadership in Germany and Europe
- Patented 3D Cool Technology - "Made in Germany"
- 2013 - First climate neutral textile company worldwide
- 2019 - "Climate supporter" award from the Senate of the Economy




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**WE TRANSFORM HEAT CLIMATE  
FRIENDLY INTO HEALTH,  
PERFORMANCE AND WELLBEING**

# HEAT & SWEAT AT WORK



## HEAT & SWEAT AT WORK - PROBLEMS

- Fluid loss & increasing body temperature
  - Increasing heart rate with cardiac problems
  - Exhaustion with high energy consumption
- 
- 
- 👎 Problems with the cardiovascular system
  - 👎 Health problems in the medium and long term
  - 👎 Decreasing concentration & lower performance
  - 👎 Risk of cramps, heart attack, heat collapse or heat stroke

## CARDIOVASCULAR STRESS DUE TO SWEATING

- Fluid loss to the skin for sweating causes lower blood level
- Result: Increase of the heart frequency to keep circulation

Without  
cooling

high heart rate – may lead to health problems



With  
cooling

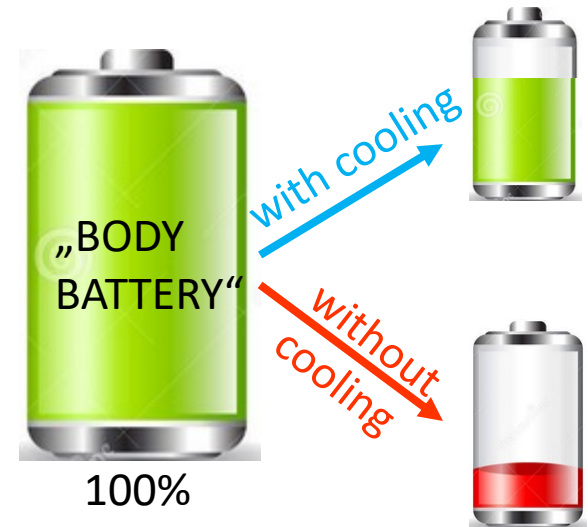
lower heart rate - normal function/health



## ENERGY LOSS BY SWEATING

-75%

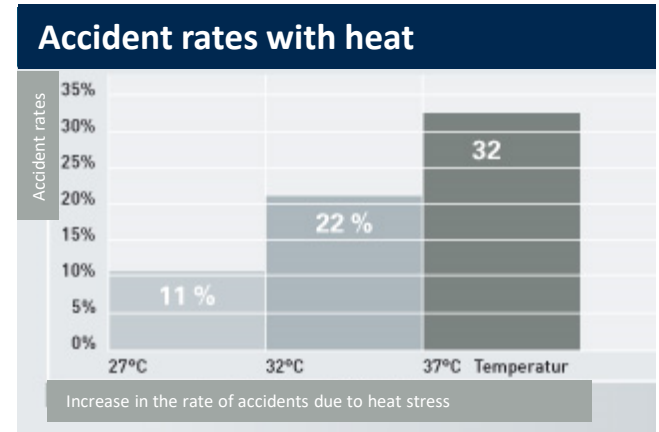
- Thermoregulation (vital process!) needs energy
- 70-80% energy loss due to heavy sweating
- Energy levels are decreasing - productivity?
- Decreasing concentration - accidents - safety ?





## LOSS OF CONCENTRATION

**32%**  
MORE ACCIDENTS

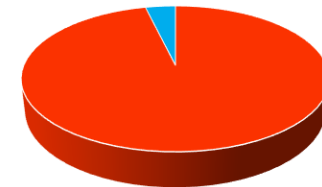


SOURCE: University Wuppertal

## PRODUCTIVITY LOSS

**-12%\***

**96% OF INTERVIEWEES:  
PERFORMANCE AND  
CONCENTRATION  
IS LOWER IF EXPOSED TO HEAT**



■ Lower 77 (96%) ■ Equal 3 (4%)

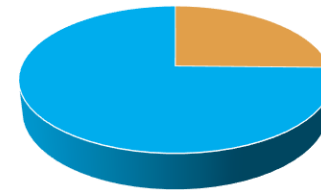
\*SOURCES: INSTITUTE OF WORLD ECONOMY, Kiel ; University Ulm

## HEAT INCURS COSTS

- 12% loss of productivity per day (IfW, Kiel)
- Days lost by employees (approx. 500 Euro/day) due to heat
- Costs for faults in production
- Costs due to late completion
- Costs to find new employees (replacement)

**MOTIVATION?  
HEALTH?**

**75% OF THE INTERVIEWEES:  
ACCIDENT AND ILLNESS RATE IS  
HIGHER IF EXPOSED TO HEAT**



■ no 20 (25%) ■ yes 59 (75%)

## CLIMATE CHANGE IN THE NEXT YEARS

- 100% more heat days (United Nations studies)
- Extreme weather conditions are increasing - adaptation?
- The last 5 years were extremely warm and hot, characterized by exceptional heat waves
- Climate experts forecast more dramatic scenario than 2-3 years ago

*„We will be toasted, roasted and grilled.“*

Christine Lagarde, Director Finance European Union

## AIR CONDITIONING WORSENS THE PROBLEM

- High energy demand - high costs (acquisition, maintenance, servicing)
- High CO<sub>2</sub> emissions
- Intensifies climate change - further rise in temperature



- E.COOLINE saves over 90% CO<sub>2</sub> compared to air conditioning systems
- E.COOLINE products function in a climate-neutral way!



Quelle: climate partners, München

## CURRENT SOLUTIONS AGAINST HEAT

1. Technical: Air conditions, ventilator, air circulation ...
2. Organizational: Shift working hours, more breaks, ventilate early in the morning and close the blinds during the day, Water, ...
3. Personal: cooling textiles → the most effective, quick, and direct solution

→ Why do we cool complete rooms when we only want to cool people?

## What is necessary?

*"A new way of thinking is necessary if  
humanity wants to live on."*

Albert Einstein, Physicist (1879-1955)

## E.COOLINE PROTECTS AGAINST HEAT STRESS

- if air conditioning systems / technical solutions are not possible (e.g.outdoors)
- when air conditioning or technical solutions are too expensive (costs for purchase, installation, maintenance, energy costs)
- when air conditioning/technical solutions are not desired (risk of colds, bacterial contamination, etc.)
- or if air conditioning/technical solutions are ecologically no alternative (CO2 pollution/climate change)



## BIONIC SYSTEM

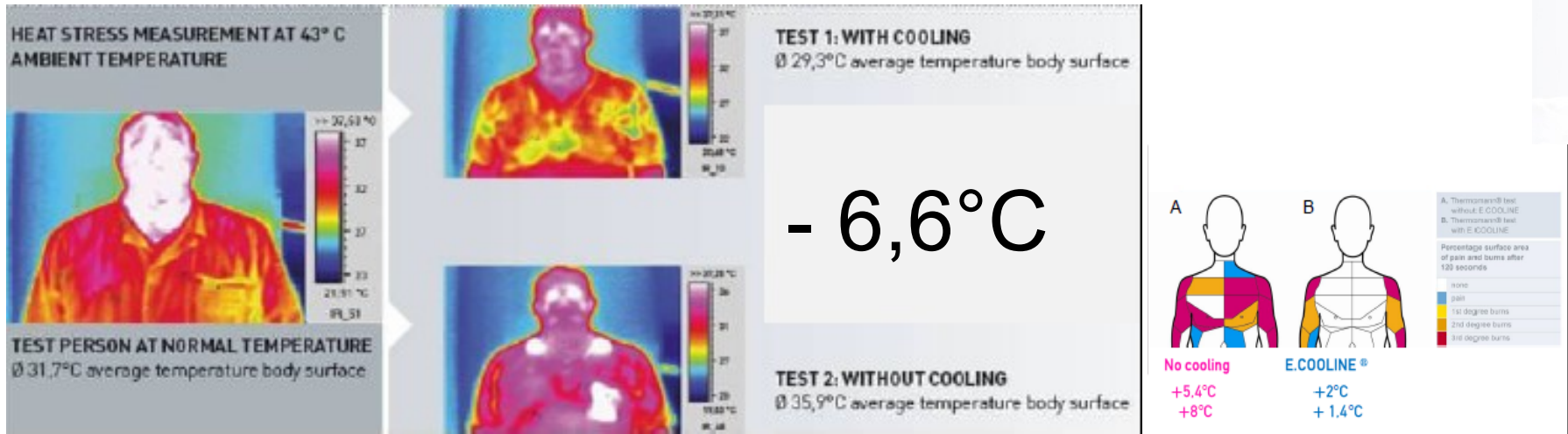
- Use of evaporative cooling energy of 2600 KJ/l (660 Wath/l)
- Cooling temperature between 16°C and 18°C for health
- Cooling in seconds – dry and mobile for many hours, anytime, anywhere



Cooling effect confirmed by  
**HOHENSTEIN** ●  
Test No.: 22.1.11.0048

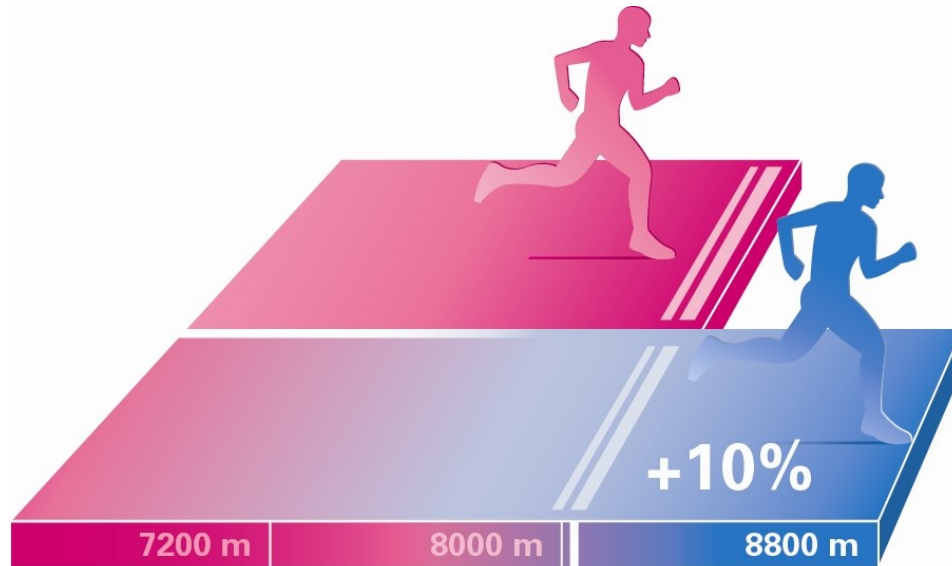
# CASE – INDOOR – RADIATION HEAT - OVEN

Production: Reduction of heat on normal body temperature although there was a radiation heat of 300° radiation heat of the oven



## EFFECTIVNESS PROVEN IN STUDIES

- LESS EXHAUSTION – MORE ENERGY
- UP TO 110 % PRODUCTIVITY



**TO PERFORM ALWAYS  
ON YOUR BEST LEVEL.  
IN ECXTREME SITUATIONS  
EXTREMELY EASY.  
EXTREMELY EFFECTIVE.**

## 3-D COOL® COOLING TECHNOLOGY COOLINE SX3®

- Fast
- Dry
- Smooth and lightweight
- Effective
- Absorbs sweat
- Natural antibacterial finish
- Machine washable
- Long cooling time
- Climate neutral

## HOW IT WORKS? ACTIVATION SIMPLE, FAST, EFFECTIVE

Activate both sides in max. 5-10 seconds  
with max. 0,5 – 1 l of water

Squeeze out slightly and roll in a towel,  
dry – ready to wear!



## COOLING PRODUCT PORTFOLIO

Cooling on the upper body (cardiovascular area)

Cooling at the head (heat exchange, concentration)

Cooling of the arms (heat radiation)

Cooling of the legs (radiant heat, vein problems)

KIDNEY FREE  
FOR YOUR  
HEALTH

WASHABLE AND  
HYGIENIC WITH  
DEOXX fresh\*

\*NATURAL ANTIBACTERIAL SILVER FINISH



## THE E.COOLINE COLLECTION – LIGHTWEIGHT – DRY - HYGIENIC



**INDOOR & OUTDOOR**

100% CLIMATE NEUTRAL

"The first  
climate-neutral  
textile company  
of the world"

SINCE 2013



NO ENERGY SOURCE – NO CO<sub>2</sub>

UPCYCLING OF WASTE FIBERS

UNISEX COLLECTION



PRODUCTION IN EU – SHORT  
WAYS, NO FLOGHTS

NATURAL ELECTRICITY IN ULM

RECYCLABLE PRODUCTS



RESTCOMPENSATION WITH FOREST  
PROTECTION PROJECTS IN PAPUA  
NEUGUINEA (GOLDSTANDARD), PARA  
BRASILIEN (VCS, SCS)

SUSTAINABLE DEVELOPMENT GOALS





*"It always seems impossible until it's done"*

Nelson Mandela

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