Proposal of "New Technology Cooling Vest for improvement of summer work"

Proposed By: A-MEC Corporation, Japan

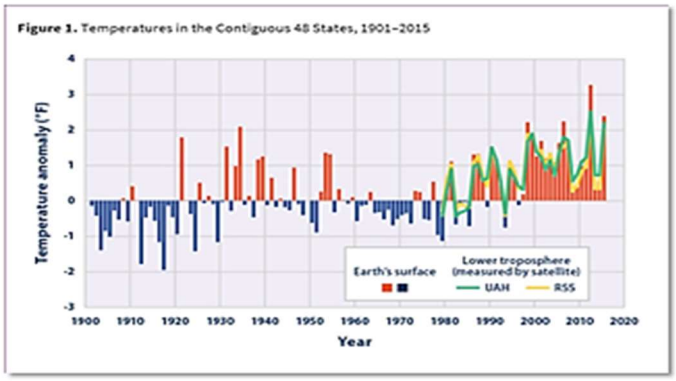
Innovative Cooling Pack Products
Horay World®
http://ryozai-ya.com/html/page22.html

A- MEC would like to propose a solution for improving your employees' working environment during hot season as an important risk management for your company.

1.Temperature changes

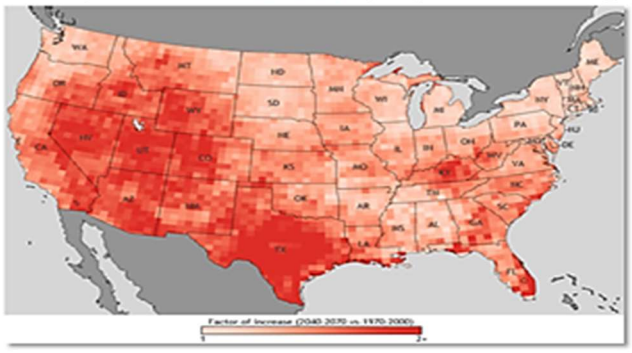
As you know, temperatures are rising significantly due to global warming.
Please review couple charts below from Environmental Protection Agency (EPA). The chart on the left illustrates the increase in temperatures that we have seen from 1901 to 2015. The chart on the right shows a regional forecast of temperature increase when we reach the midpoint of the 21st century.
Over 90,000 cases of heat-related hospitalizations have happened in past 8 years.

Temperature changes in 48 States, 1901-2015

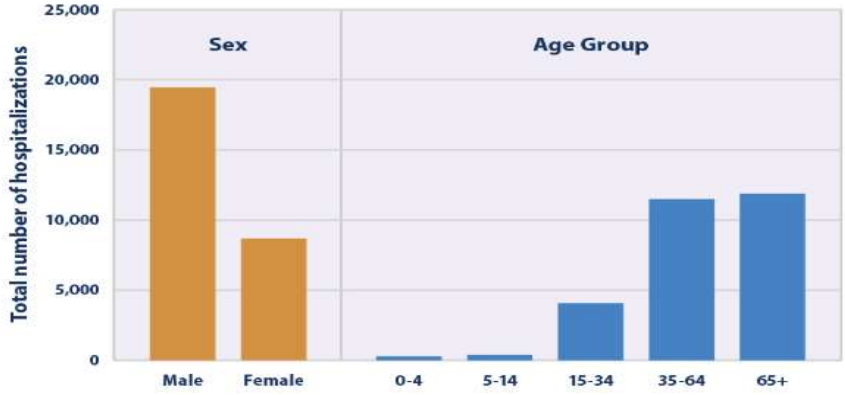


Temperature forecast by mid-century

Over 75days estimates above 95F per year at south region



Heat-Related Hospitalizations in 20 States by Sex and Age



2.OSHA's Campaign

OSHA states on its website (https://www.osha.gov/heat/index.html); "Every year, dozens of workers die and thousands more become ill while working in extreme heat or humid conditions." As temperature keeps increasing like the chart from EPA, OSHA realized that actions must be taken. "OSHA's Heat Illness Prevention campaign, launched in 2011, educates employers and workers on the dangers of working in the heat… millions of employees and employers have learned how to protect workers from heat."

OSHA Standards:

Employer Responsibility to Protect Workers

Under OSHA Standards, employers are responsible for providing workplaces free of known safety hazards. This includes protecting workers from extreme heat. An employer with workers exposed to high temperatures should establish a complete heat illness prevention program. An employer should provide workers with some measures on prevention of heat illness.

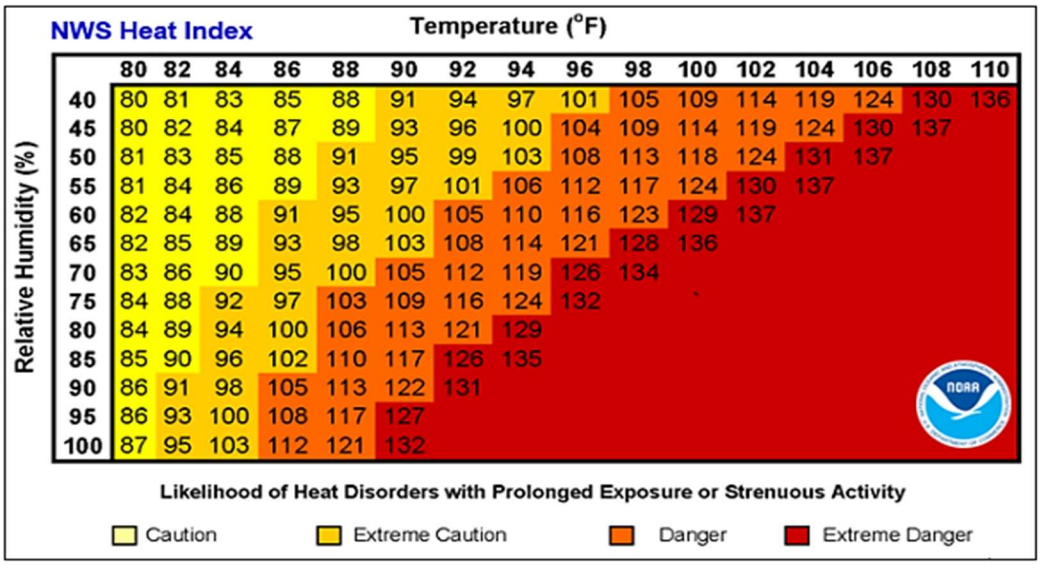
Therefore, in accordance with OSHA Standards, many states are enacting and moving to set the Standards.

1) **California's** Heat Illness Prevention Standard requires employers to provide training, water, shade, and planning. A temperature of 80°F triggers the requirements. Please refer to the OSHA's website to see the full text of the California heat standard.
2) **Minnesota:** The standard applies to indoor places of employment.
3) Washington: Washington State's Outdoor Heat Exposure Rule.

States of **Oregon, Arizona,** and **New Mexico** are moving to set regulations as well.

3.What Is the Heat Index

The Heat Index is a measure of how hot it really feels when relative humidity is factored in with the actual air temperature. To find the Heat Index temperature, look at the Heat Index Chart below or check our Heat Index Calculator. As an example, if the air temperature is 90°F and the relative humidity is 70%, the Heat Index--how hot it feels--is 105°F. The red area without numbers indicates extreme danger. The National Weather Service will initiate alert procedures when the Heat Index is expected to exceed 105°-110°F (depending on local climate) for at least 2 consecutive days.

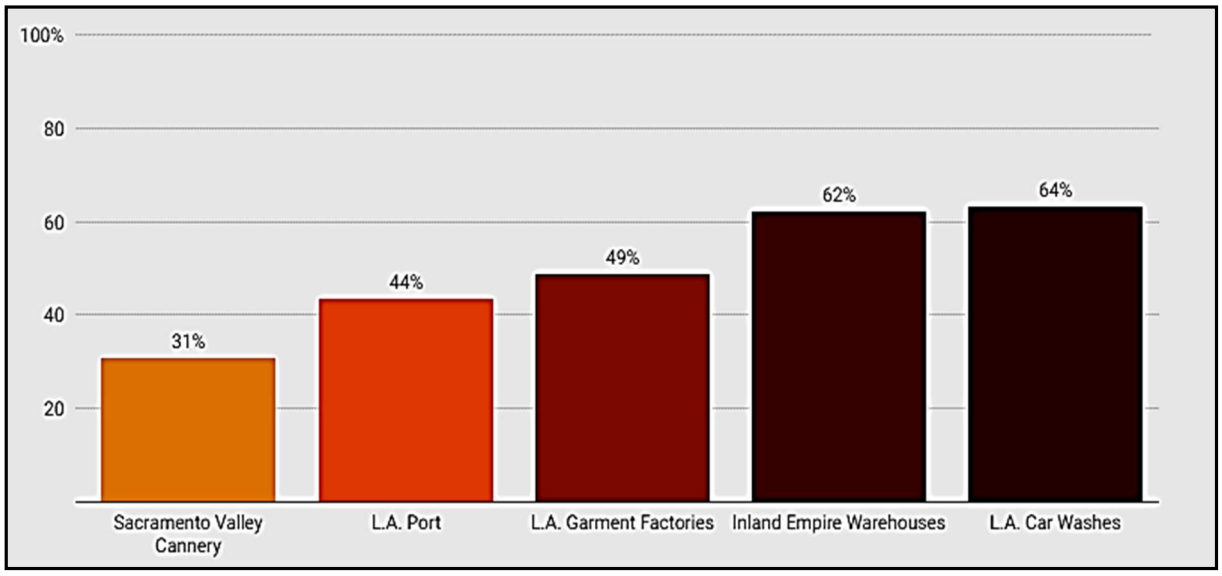


4.Case Studies of Work Environment

Case Study-1: Working Environment and Heat Index in State of California

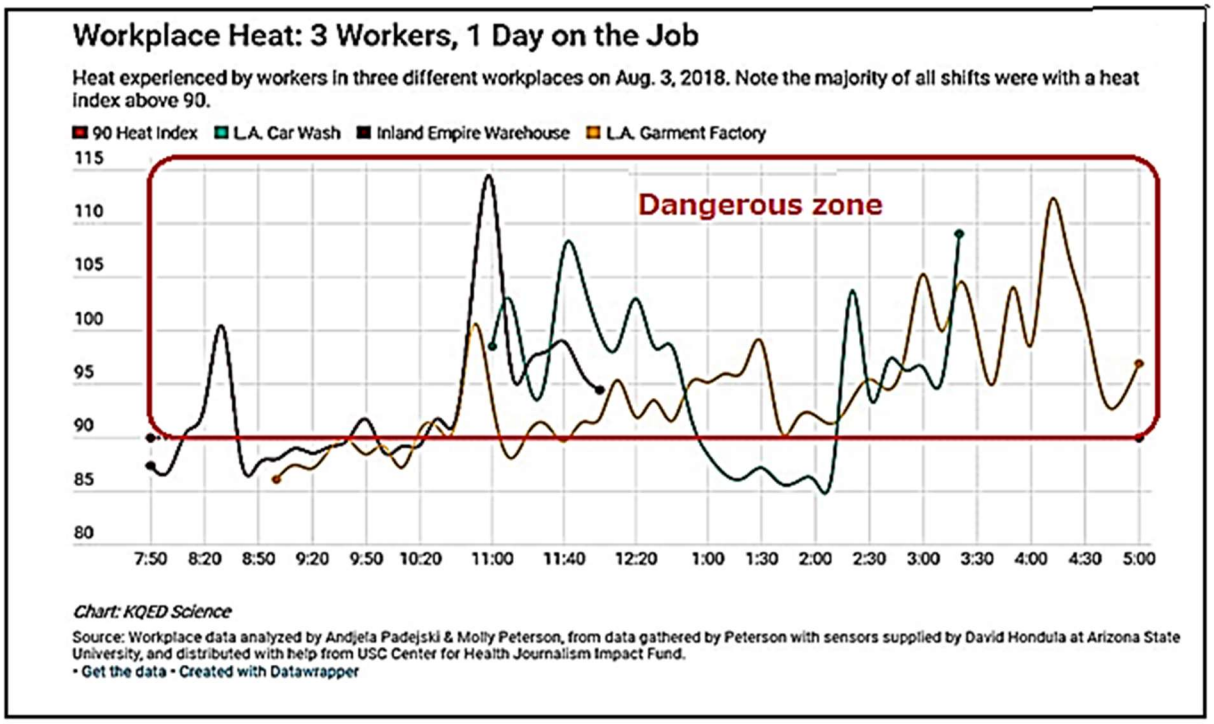
Average % of time that workers in five locations spent above a Heat Index of 90°F.

(Garment Factories, Car Washes, Warehouses, Port Terminal – July to Aug. 2018, Cannery – Aug. and Sept. 2018)



Case Study -2: Change in Heat Index by Time (Warehouse, Car Wash, Garment Factory)

NOTE: In a warehouse and garment factory, the Heat Index exceeded 110°F, at car wash work, the Heat Index exceeded 105°F.



5. Several Ways to Prevent Heat-Related Illnesses

Q: What would be the most effective Personal Protective Equipment ?

For example, the ordinance of the **State of California** recommends the following methods;

- Using misting machines
- Using water-cooled garments
- Using air-cooled garments (e.g. suits or hoods)

(Misting Machines)

(Water-Cooled Garment)

(air-cooled garments)

● We still have a problem…

1) **Misting Machines**

A misting machine does not have strong cooling power like an air conditioner. It also causes a condensation and increases humidity. Products quality could be affected.

2) **Water–Cooled Garments**

A water-cooled garment has strong capability to cool down human body. It is used for special works such as melting metal process in a factory. However, a garment needs to be connected to a hose which limits workable spaces and workability.

3) **Air–Cooled Garments**

Cooler Machine Method: Just like a water–cooled garment, work-spaces are limited due to the leading hose to a machine, and workability will also be restricted.

Fan Method: Its function is only to blow air. This can possibly lead to heat-related illnesses when it blows hot air from surrounding environment that reached over 93°F.

→ Here are some experts warning about this danger; Current guidelines from most public health authorities, including the World Health Organization, that suggest fans may not be beneficial when the temperature rises above 35℃ (95°F).

6. Best Solution

Using "A-MEC Horay Cooling Vest" : Most Effective and Economic!

【The Lightest Weight and the Longest Cooling Time】

Horay Cooling Vest developed by A-MEC has been designed to assure the best workability and cooling-ability. As shown in the table below, A-MEC's Horay Cooling Vest is the best cooling vest with the lightest weight and longest cooling time among commercially available cooling products.

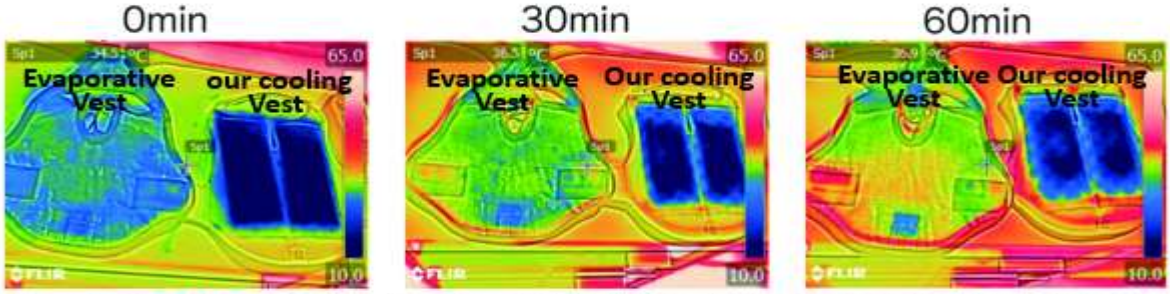
Weight / Cooling Duration Comparison Table

Items/Products	Horay Cooling Vest (ICP Method)	F-Vest (Ice pack method)	G-vest (PCM method)	T-vest (PCM method)
Weight	2.4 LB (STD)	3.95 LB	4.7 LB	7.0 LB
Cooling Duration	4.0 hours	1.5 hours	2.5 hours	3.0 hours

【Comparison of Different Types of Cooling Vests 】

-1- Evaporative method (Price level $40~$100)

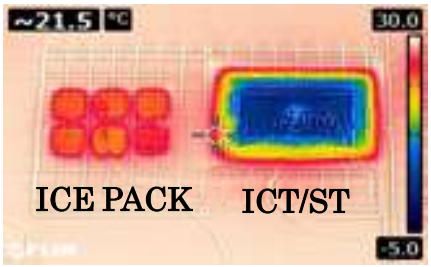
Comparing Cooling Effects of Evaporative vest vs Horay Cooling Vest



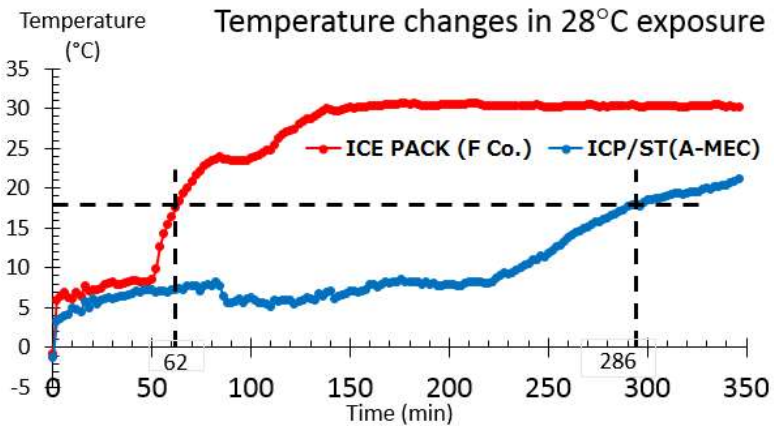
Dog vest S size, Thermal change test which we used thermography FLIR

-2- Ice Pack method (Price level $70~$150)

Comparison Test between ICP (Innovative Cooling Pack) and ICE PACK method

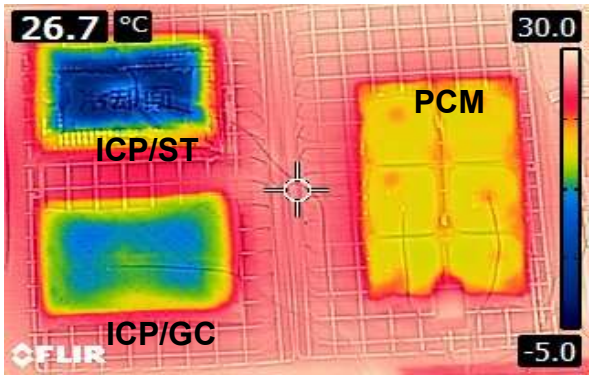


Result of thermography after 75 minutes



-3- PCM method (Price level $150~$300)

Comparison Test between ICP (Innovative Cooling Pack) and PCM



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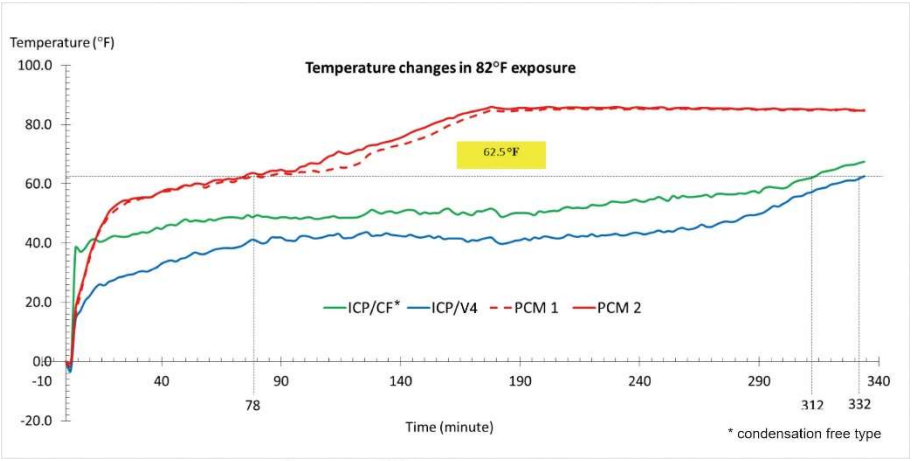
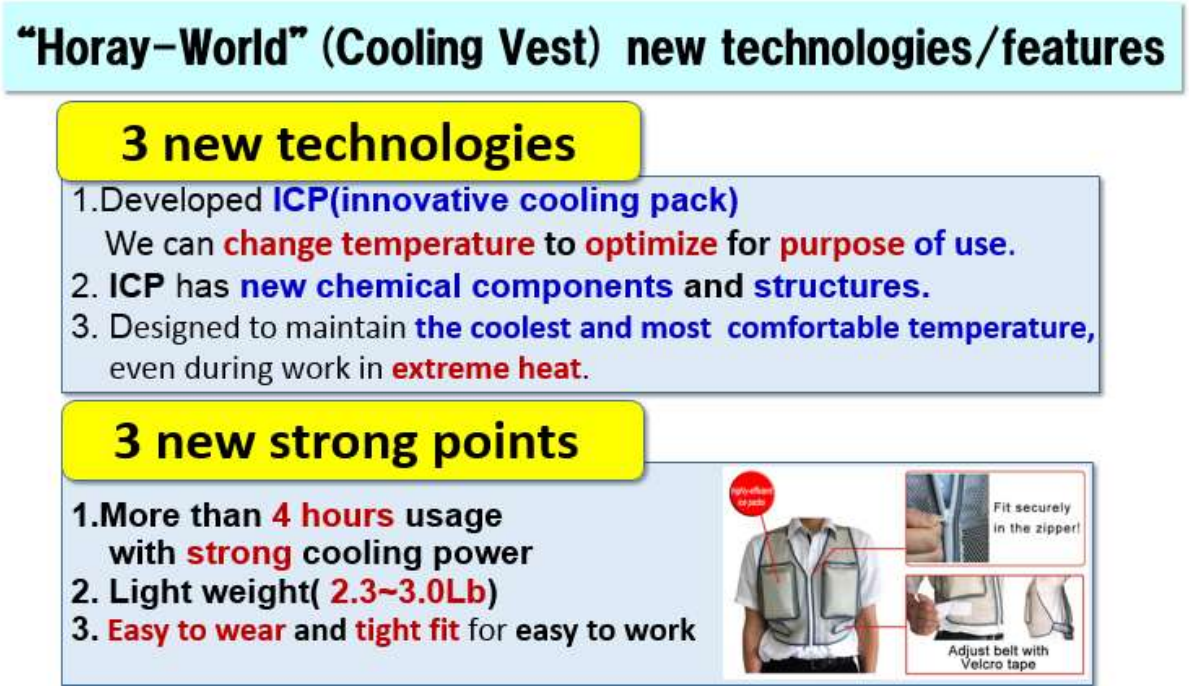


7. Technical Proposal of Horay Cooling Vest (HV)



Proof of trust on "Horay-World"

Market achievements, Horay-World is the best seller of ice cooling vest in Japan in 2019.
Certified by METI: Awarded Innovative Manufacturing Award 2017 in the Small and Medium Business category. (METI : Japan Ministry of Economy, Trade and Industry)

NSC-Expo 2019 (at San Diego)

There are 152 visitors to our booth. Thank you!