

Case Study – Air-Conditioned Container

Bundeswehr (German Military) Research Institute

PILOT CONTAINER DETAILS

Container Size: 10ft (1/2TEU)
Controlled Internal Temperature: 22.5°C
Average Ambient External Temperature: 25.8°C
Average Ambient External Humidity: 64.9%
Average Energy Consumption: 4.15 kWh

WITH CHILLSKYN COATING:

Coverage: 7.3 m²
Average Energy Consumption: 3.46 kWh
Estimated Payback Period: Less than 8 months
(based on average USA grid pricing of
\$0.18/kWh)



17%
Energy Reduction

RESULTS:

By applying ChillSkyn's passive radiative cooling polymer, the German Military achieved a significant energy reduction of 17%, demonstrating the effectiveness and economic benefits of this innovative cooling solution.

CHILL SKYN

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Challenge



The Bundeswehr (German Military) Research Institute is actively seeking solutions to reduce energy consumption in their air-conditioned container units. Currently, these containers rely on power-intensive AC systems to remove heat and moisture, maintaining a comfortable indoor temperature. However, this approach contributes to greenhouse gas emissions and exacerbates the heat-island effect in surrounding areas.

Solution



ChillSkyn Inc. offers an innovative, electricity-free cooling solution leveraging the coldness of outer space. **PolyFrost™**, our proprietary passive radiative cooling polymer, reflects the sun's radiation while strongly emitting in the atmosphere's transparent infrared window (8µm to 13µm). This technology enables sub-ambient cooling of 6°C even under direct sunlight and can be easily retrofitted to various outdoor surfaces.

Benefits



Significant Energy Savings

ChillSkyn's passive radiative cooling polymer reduces average energy consumption by 17%, leading to lower operational costs and a quick payback period of less than 8 months.



Environmental Impact Reduction

By eliminating reliance on power-intensive cooling systems, ChillSkyn's technology significantly reduces greenhouse gas emissions and mitigates the heat-island effect, fostering a greener and cooler environment.



Enhanced Durability and Performance

Our coating has demonstrated superior adhesion, scratch resistance, and color stability under UV exposure, ensuring long-lasting effectiveness and minimal maintenance.

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PERFORMANCE TESTING

TEST (T) | STANDARD (ST) |
BUNDESWEHR REQUIREMENTS (BR) \
RESULTS (R)

TEST 1: CROSS-CUT TEST

- ST: EN ISO 2409
- BR: $\leq 1, \leq 1$
- R: Value: 0,
Value: 0 (24hr water storage)

TEST 2: SCRATCH RESISTANCE TEST

- ST: EN ISO 1518 (Load: 1500 g)
- BR ≥ 1500 g
- R: Fulfilled

TEST 3: UV AGEING / COLORIMETRY

- ST: EN ISO 11664, (UV Ageing)
- BR: $\Delta E_{ab} \leq 3.0$
- R: $\Delta E_{ab} = 0.70 \pm 0.20$,
 $\Delta E_{ab} = 0.36 \pm 0.01$

TEST 4: COATING THICKNESS

- ST: EN ISO 2178
- BR: -
- R: 220 mm \pm 28 mm

About PolyFrost™



PolyFrost™ is a groundbreaking polymer coating created through phase-inversion, delivering exceptional solar reflectivity and infrared emittance. This versatile coating cools surfaces by an average of 6°C below ambient temperature during peak hours. Intrinsically hydrophobic and UV resistant, PolyFrost™ is suitable for a wide range of surfaces, including metals, fabrics, plastics, and wood, and can also be made free-standing.

PolyFrost™ Metrics



96 % Solar Reflectivity



97 % Infrared Emissivity



100 w/m² Cooling Power

About ChillSkyn



ChillSkyn Inc. specializes in advanced passive cooling technologies. Our innovative nanostructured coating provides a zero-energy cooling solution, achieving below ambient temperatures both day and night without any energy input.

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