

Observation of surface temperature at Kinmen Senior High School

Abstract

Significant temperature differences were observed between the polyurethane (PU) track and air during summer training. This study examined temperature variations on PU track, grass, and concrete under different weather conditions. Data collected weekly at noon for 17 weeks at Kinmen Senior High showed that on sunny days, the red PU track's temperature exceeded air temperature by over 15°C, while grass varied less. Cloudy and rainy weather reduced differences. Findings highlight the impact of material and weather on heat retention, affecting athlete safety and facility design.

Discussion

PU tracks, especially red ones, retain more heat than grass and concrete, posing risks to athletes in hot weather. Grass, with lower temperatures due to evapotranspiration, is preferable for high-temperature training. The study underscores the importance of weather and material in sports facility design. Additionally, it highlights the limitations of infrared thermometers on reflective surfaces, suggesting contact-based methods for accurate measurements.

Research Methods

Observation site: Grass area and PU track in front of the teaching building
Data Collection Process:
Measurements taken every Wednesday at noon for 17 weeks
Tools used: Infrared thermometers, notebooks, and mobile phones
Recorded surface temperature of PU track (green and red), grass, and concrete under sunlight and shade
Noted weather conditions (sunny, cloudy, rainy) and ambient temperature

Conclusions

This study demonstrates the significant impact of surface material and weather conditions on surface temperature variations. The findings provide valuable insights for optimizing sports training environments, suggesting that athletes avoid prolonged exposure to PU tracks on sunny days and instead consider training on grass. Further research could explore alternative materials that balance performance with heat mitigation to enhance athlete safety and comfort.



Results

Sunny Days: The red PU track showed the highest temperature, often exceeding the air temperature by more than 15°C.
Cloudy Days: The temperature differences between different materials were significantly reduced.
Rainy Days: The temperatures of all surfaces were relatively close to air temperature.
Material Impact: Grass had the lowest surface temperature, whereas metal surfaces exhibited extreme temperature fluctuations.
Observation on Water: Pool temperature changes were slower than air temperature due to water's high specific heat capacity.

