

建造業工人抗熱工作服

Anti-heat Stress Clothing for Construction Workers in Hot-humid Weather

抵抗高溫高濕環境的夏季工作服

Summer work uniform for protecting construction workers from hot and humid weather

此項研究旨在評估一套新型建造業工人夏季工作服在緩解熱應力方面的有效性。基於布料物理性質測試以及計算機模擬，研究小組設計了一套具有優良熱濕性能並兼顧行業特性的工作服。人工氣候室實驗證實該套新型工作服能夠有效緩解生理及心理熱應力。實地研究進一步發現該套工作服為工人提供更加涼快，乾爽，舒適，靈活的感觉。



建造業工人抗熱工作服的正面及背面設計
Anti-heat stress uniform's front and back design



抗熱織物樣品
Anti-heat fabric samples



織物重量測試
Fabric weight test

The aim of this project is to design anti-heat stress clothing and evaluate its effectiveness on alleviating heat strain. Based on the results of fabric testing and computer simulation, a newly designed uniform was devised with consideration of the heat-moisture performance of fabrics, garment style, and industry-specific requirements. Quantitative assessment inside a climatic chamber manifested that the new uniform was effective in alleviating thermo-physiological and psychological strain during and after exercise. For on-site qualitative assessment, the uniform was considered as cool, dry, and comfortable without impediment of work performance. The new uniform exhibits marked benefits for construction workers.

特色與優點

- 工作服布料及設計體現優良的熱濕性能
- 新工作服所選用的布料輕透薄軟之外，亦提供良好的防曬保護
- 加入單一方向水分運輸的技術，讓汗水從緊貼皮膚的內層排出外層，保持乾爽
- 所採用的網狀織物及反光帶提供較佳的散熱及蒸發效率，改善其安全性及透氣度
- 制服正面及背面不同的設計，更容易分辨工作人員是面向或是背向
- 大大減少16.7%的生理疲勞及28.8%的身體熱能
- 88% 的地盤工人的支持此新制服 (樣本數量為122人)

應用

- 建築業工人抗熱工作服
- 香港建造業議會已於2015年9月正式採用及訂制20,000套此新型工作服給予其學徒使用
- 香港特別行政區政府計劃於2016年10月採用這新制服為所有政府項目的標準制服
- 此項目的研究可以因應不同國家及環境需求以設計適用的制服

獎項

- 理大卓越知識轉移項目獎 - 卓越社會項目大獎 (2017年6月)
- 第44屆瑞士日內瓦國際發明展 - 金獎 (2016年4月)
- 中國發明與創新代表團特別大獎 (2016年4月)
- 英國CIOB 國際創新及研究獎 - 創新成就獎 (2016年2月)
- 香港建造業議會創新獎 - 創新大獎 (本地組別) (2015年12月)
- 香港理工大學院長特設卓越表現獎 (技術轉移) (2015年11月)
- 香港項目管理學會 - 項目研究獎 (2015年11月)

Special Features and Advantages

- Remarkable heat-moisture performance in terms of fabrics and garment design
- Fabric of the newly designed uniform is lighter, thinner, and provides better UV protection
- The dry-inside technology for one way liquid transferability enables better thermal and moisture properties
- The meshed fabric and meshed reflective strips provide better heat dissipation and evaporation, as well as ensure safety and breathability
- Different designs of the front and the back of the uniform ensure clear identification of whether the construction worker is facing the work station or not
- A remarkable reduction of physiological strain by 16.7% and body heat storage by 28.8% were achieved.
- Overwhelming support by 88% of construction workers (with a sample size of 122) of the new clothing

Applications

- Work uniform for construction workers to alleviate heat stress
- The Construction Industry Council in Hong Kong adopted and produced 20,000 sets of the newly designed uniform for their apprentices in September 2015
- The HKSAR government plans to adopt and specify the newly designed uniform as the standard uniform for all government projects by October 2016
- The study can be used to develop uniforms for other outdoor workers and other countries

Awards

- Grand Award in Community Excellence - PolyU Distinguished Knowledge Transfer Excellence Awards (Jun 2017)
- Gold Medal - 44th International Exhibition of Inventions of Geneva, Switzerland (April 2016)
- Prize of China Delegation of Invention and Innovation, China (April 2016)
- The Innovation Achiever's Award - CIOB International Innovation & Research Awards 2015, United Kingdom (Feb, 2016)
- Local Grand Prize - CIC Innovation Award 2015, Hong Kong (Dec, 2015)
- Dean's Award for Outstanding Achievement in Technology Transfer 2015, Hong Kong (Nov, 2015)
- The Category F, Research Award - Hong Kong Institute of Project Management Award 2015, Hong Kong (Nov, 2015)

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