ANTI HEAT STRESS CLOTHING FOR CONSTRUCTION WORKERS IN HOT AND HUMID WEATHER

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Aim and Objectives of the research

Aim of the research
• The aim of the study is to assess the effects of heat stress on construction workers and to design clothing which is suitable for work in hot and humid weather.

Objectives
• Examine the current dress patterns of construction workers in hot and humid weather;
• Identify the shortcomings of these current dress patterns in dealing with hot and humid weather;
• Determine the physiological conditions of construction workers when subject to different degrees of heat and humidity exposure;
• Design and engineer clothing for construction workers which is appropriate for extreme physiological conditions;
• Evaluate the effectiveness of the newly designed clothing for construction workers.
Work clothing

• Protective clothing can be water-cooled garments, air-cooled garments, ice-packet vests, wetted over garments, heat reflective aprons etc.

• Work clothing should not be any more than a long sleeved shirt and trousers (NIOSH, 1986).
Existing clothing 1: Long sleeved shirt and trousers
Existing clothing 2: Short sleeved T-shirt and long trousers
Existing clothing 3: Cooled garments
Anti heat stress clothing development

• Phase 1: field survey on construction workers’ requirement for clothing
• Phase 2: Fabric and garment objective measurement
• Phase 3_1: computer simulation for screening new fabrics
• Phase 3_2: Design, pattern and production of new clothing
• Phase 4: Evaluate the effectiveness of existing clothing and newly designed clothing for construction workers
• Phase 5: Design evaluation field wear trials
Phase 1: Field survey on construction workers’ requirement for clothing
Phase 2: Fabric and garment objective measurement

- Collecting existing clothing and recruit new fabrics according to the requirement

- Testing items:
  - Fiber content;
  - Thickness
  - Weight per unit area
  - Thermal conductivity
  - Air resistance
  - Water vapour permeability
  - Moisture management capacity
  - UV-Blocking
  - IR Radiation
  - Anti-static properties
  - Hand properties
Phase 3_1: computer simulation for screening new fabrics
Simulation results

- Temperature of core (°C)
- Temperature of skin (°C)
- Relative humidity of skin (%)

Thermal Sensation

Dampness Sensation

Comfort Value
Phase 3_2: Design, pattern and production of new clothing
Outside long sleeved shirt and trousers + inside T-shirt

Possible style

Short sleeved T-shirt and long trousers

Cooled garments
Phase 4: Evaluate the effectiveness of existing clothing and newly designed clothing for construction workers

- Heat stress
- Physiological stress
- Psychophysical evaluation
Phase 5: Design evaluation field wear trials

- Clothing: Newly designed clothing 1 type and existing clothing
- Experimental location: selected construction workplaces
- Protocol: follow daily routine activities with filling questionnaires and feedback comments after wearing each time.
Thanks