

WOODHEAD PUBLISHING SERIES IN TEXTILES



Thermal Protective Clothing for Firefighters

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The Textile Institute



WOODHEAD
PUBLISHING

Flash Fire Protective Performance of Textiles

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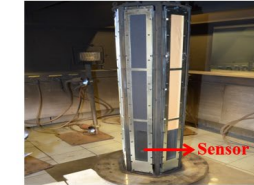
DEPARTMENT OF
**DESIGN AND
MERCHANDISING**

- Established in 1900 – Ranked top 15 (design) and 20 (merchandising) in US in 2020
- Our Research Focus: Functional Textiles for Apparel and Interior Furnishing; Personal Protective Equipment (PPE) and functional design; Fashion business; Interior design for large buildings (hotels, nursing homes, apartment building – non-residential)
- Our department has 7 US Patent on PPE and Clothing
- Student Population: 300 +
- Number of Tenure-Track Faculty: 12

3-Degree Full Scale Manikin Tests for Testing Turn-out Gear Protective Performance



1D: First-Degree (D) Complex
Bench-scale (Small Fabric Size)



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Bench-scale (Small Fabric Size)



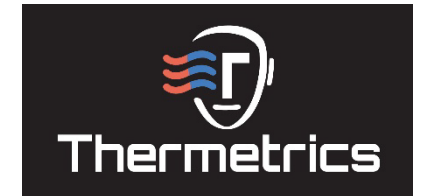
3D: Full-scale Manikin (Clothing)

Available Standard – American, Canadian, NFPA

Manikins (available in standing posture) available and developed by:

- ✓ *DuPont, USA (ThermoMan);*
- ✓ *North Carolina State University, USA (Pyro-Man);*
- ✓ *Empa, Switzerland (Henry – Similar to ThermoMan*
- ✓ *University of Alberta, Canada (Harry Burns)*

<https://www.youtube.com/watch?v=ih1ubWzYBQA>



Follow our publications:

https://www.researchgate.net/profile/Sumit_Mandal9/publications

Protective Performance Testing in Our Laboratory

<https://education.okstate.edu/research/labs/textiles-apparel-sciences-lab/research-service.html>

<https://fpst.okstate.edu/content/facilities.html>

Available Standards: American, Canadian, British, ISO

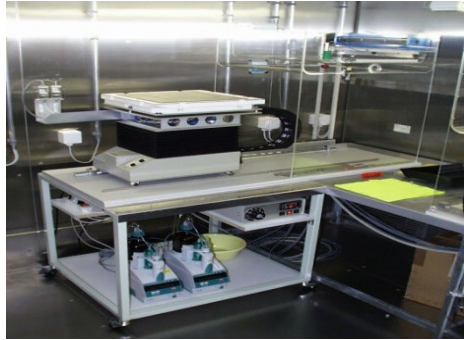
Our Key Research Area

- [Oil Contaminated Textile Performance](#)
 - Oil Contamination and PAH
 - Wildland Firefighting PAH
- Bioburden in Daycare and Adult Care Textiles

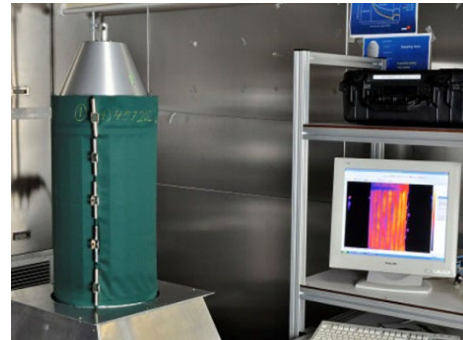
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Testing Comfort Performance of Firefighters' Turnout Gear



1D: Bench-scale
(Small Fabric Size)
ASTM F 1868



2D: Intermediate-scale
(Large Fabric Size)
ISO 18640



3D: Full-scale Manikin
ASTM F 1291, ASTM F 2370
ISO 9920



4D: Human Trials
ASTM F 2868

1. To Measure Comfort Performance by Temperature and Vapor Sensors
2. To Measure Comfort Performance in terms of Thermal Resistance and Evaporative Resistance

Manikins (available in different postures and movable) developed by:

- ✓ *Tampere University of Technology, Finland (Coppelius)*
- ✓ *Hong Kong Polytechnic University, Hong Kong (Walter)*
- ✓ *Empa, Switzerland (SAM)*
- ✓ *Thermetrics, USA (Newton)*

<https://www.youtube.com/watch?v= Ql8KipTDKw>



Mrs. Newton (Thermetrics, USA)
Ruth (9 month old Thermetrics baby in Royal Melbourne University, Australia)
Tommy (8 years old Thermetrics boy Kansas State University, USA)
Timmy (10 years old Thermetrics boy in Seattle, USA)