



Rethinking Slip, Trip and Fall Prevention Through Tribology

October 10, 2025

Course Objectives

- 01** Tribology Overview
- 02** Statistics and Claims
- 03** Root Causes
- 04** Slip Testing
- 05** Leading Practices/Solutions



What is Tribology?

1

Tribology:

The science and engineering of understanding friction and wear phenomena for interacting surfaces in relative motion.

2

Origin of Tribology:

The word derives from the Greek root “tribo,” meaning “rub,” and the suffix, “-logy” from “study of” or “knowledge of.”

- 1493 – Leonardo da Vinci first noted the two fundamental 'laws' of friction.
- 1966 – Peter Jost first coined the word “Tribology,” which highlighted the cost of friction, wear, and corrosion to the UK economy.





Statistics and Claims

STF Statistics

65%	of slips and falls are caused by same-level walking surface	30%	of people who slip/fall suffer moderate/severe injuries
2nd	leading cause of injury are slips, trips, and falls	46%	of fatal fall injuries happen to older Americans*
1800	annual slips and fall deaths	15%	of all accidental deaths are from slips, trips, and falls*
\$40K	average work comp payout on each slip/fall incident	\$70 Billion	is paid toward medical costs and compensation associated with employee slip and fall accidents*

Occupational Health and Safety Administration - Bureau of Labor Statistics - National Floor Safety Institute



U.S. BUREAU OF LABOR STATISTICS

Costly Consequences of Claims



An Alabama man won \$7.5 million in a Walmart slip-and-fall injury claim when his foot got lodged in a pallet used to display watermelons. Walmart surveillance caught this incident on camera and Walmart was found guilty of negligence and recklessness.



The largest settlement ever awarded in a STF lawsuit was over \$20 million. This was awarded to the plaintiff. The case went to trial, and the jury found that the hotel had failed to warn its guests of the hazardous condition and was liable for her injuries.



A woman slipped on a wet floor while shopping at a grocery store in Maryland. She suffered serious injuries, including broken bones and facial fractures. She sued the grocery store chain for negligence and was awarded \$10 million as compensation for her medical expenses, lost wages, pain and suffering.

The background features a series of concentric circles in the center, with a color gradient from light yellow to white. Two thick, dark green diagonal stripes cross the image, one from the top-left to the bottom-right and another from the bottom-left to the top-right, creating a dynamic geometric pattern.

Root Causes of STF

Primary Root Causes



People



Employees



General Public

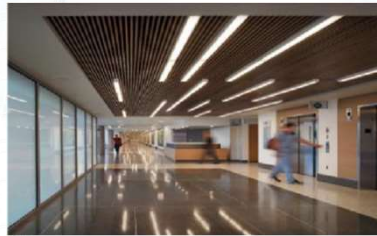


**Elderly and
Disabled Persons**



**Children and
Young Adults**

Ambient Parameters



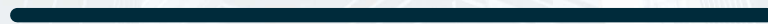
**Handrails and
Warning Postings**

**Walking and Working
Floor Surfaces**

Lighting

**Environmental
Exposures**

Uneven Surfaces



Floors and Maintenance



Floor Porosity



Floor Restoration



Daily Cleaning Program



Flooring Chemicals

Footwear



Dress Shoes



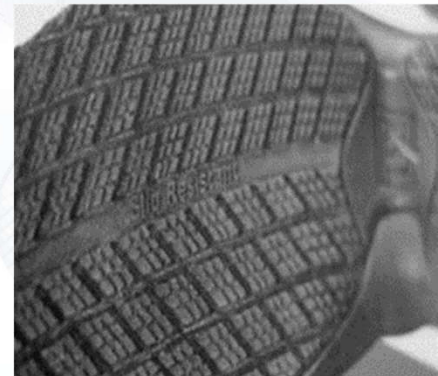
Athletic Shoes



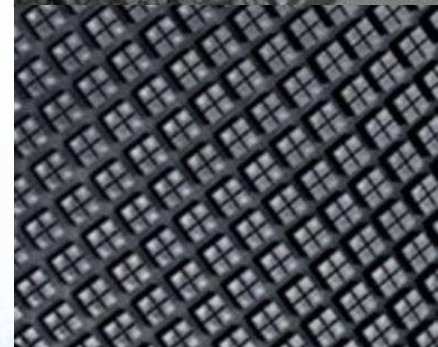
Work Boots

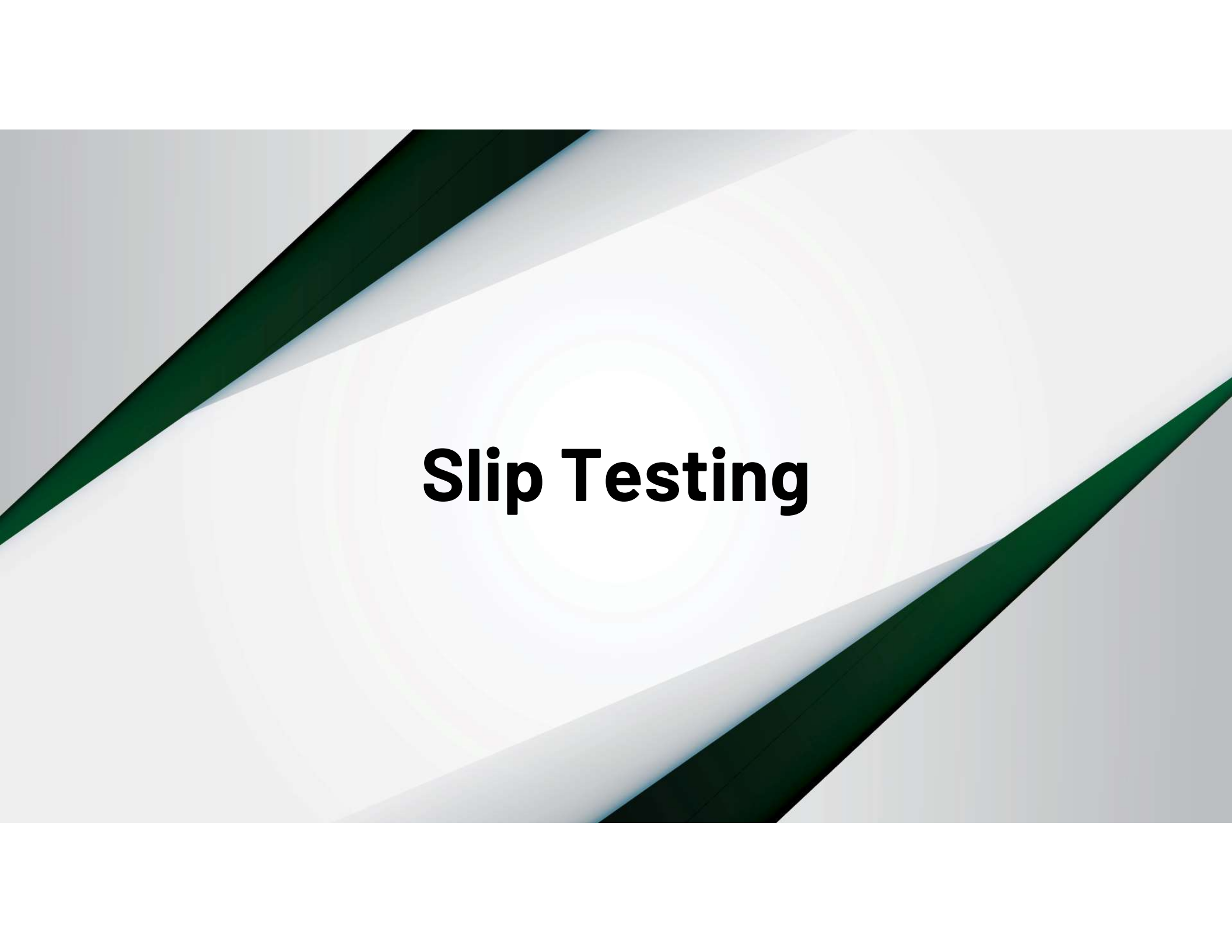


Casual Shoes



Slip-Resistant Shoes



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Slip Testing

What is Slip Testing

- Definition: Slip testing measures the slip resistance of a walking surface to evaluate safety (COF).
- Purpose: It provides valuable COF data to help determine the condition/performance of your floor surfaces (specific areas, cleaning protocol, design decisions, etc.).
- Common Standards:
 - ASTM (American Society for Testing and Materials)
 - ANSI (American National Standards Institute)
 - OSHA guidelines
 - International (EN, AS/NZS)



Slip Testing Methods

- Tribometer Test: Mimics the dynamics of a slipping foot by simulating a heel strike motion (COF readings).
- Type of Testing: A true slip test provides multiple COF readings for dry and wet conditions.
- Stair Testing: Focuses on stair nosing and tread surfaces.
- Key Metric: Higher COF means the floor is less slippery.





Leading Practices and Solutions

Floor Designs

Three Level Changes

Effective designs of the walking path (from the parking lot to the entrance)



- Consider slip resistance characteristics and surface roughness
- Evaluate floor materials under different conditions (wet, dry, cleaning process, traffic conditions, etc.)

Floor Mats that Absorb and Abrade



- Mats at the entrances should have adequate length.
- Rain: 8 - 10 walking steps (12-15 feet)
- May need more than one on a rainy day. Prepare to exchange mats if they are saturated.



- Walk-off mats that abrade well.
- Dry: 6 - 8 walking steps



- Mats with absorbent material are recommended in front of water fountains, ice machines and restrooms.

Innovative STF Prevention Strategies



COF Boosters

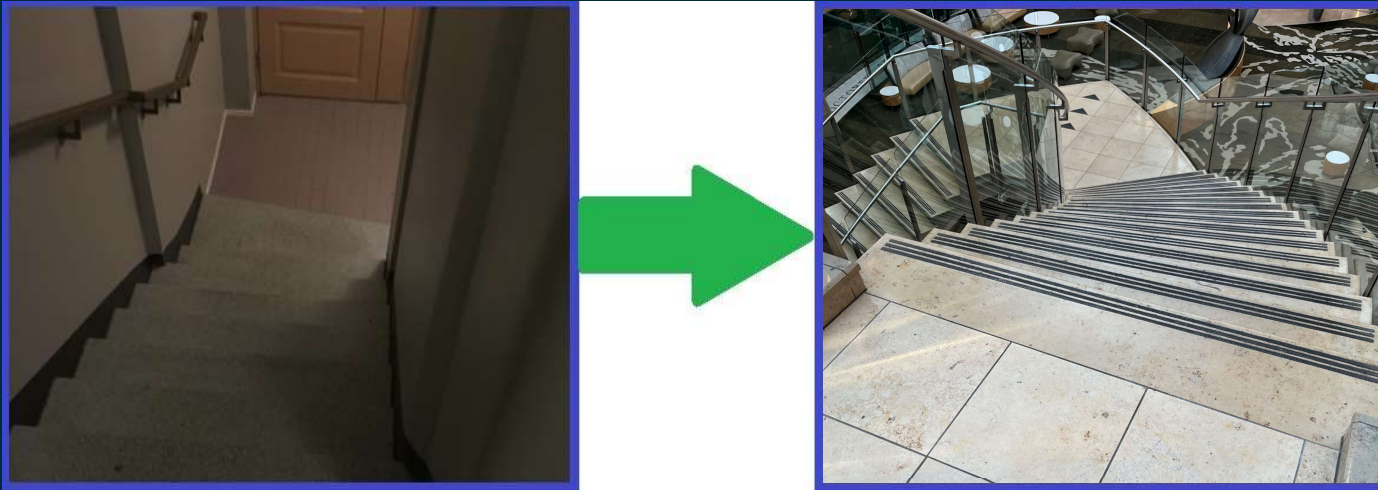


Spill Detection Cameras



Liquefied Floor Treatments

Best Strategies for Stairs



- Tread/riser dimensions or variation (tread depth: 11 inches and riser height: 7 inches)
- Installation of handrail (color design)
- Lighting (leading practice: 12–15 lumens per square foot)
- Handrails are typically required for stairs with 4 or more risers
- If a stair is wider than 88 inches, a handrail is required at intermediate points
- Handrails on both sides
- Handrail height: 34 to 38 inches
- Stair nosing, edges, surfaces, etc. (visibility)

Conclusions



Recommended Leading Practices

- Formal STF Program
- Specific STF Checklist
- Formal Plan for Matting
- Formal Cleaning Process
- Slip Testing

Thank You

