



Risk Control

Slips and Falls Study: Objective Auditing Techniques to Control Slips and Falls in Restaurants June 2007



The information, examples and suggestions presented in this material have been developed from sources believed to be reliable, but they should not be construed as legal or other professional advice. CNA accepts no responsibility for the accuracy or completeness of this material and recommends the consultation with competent legal counsel and/or other professional advisors before applying this material in any particular factual situations. This material is for illustrative purposes and is not intended to constitute a contract. Please remember that only the relevant insurance policy can provide the actual terms, coverages, amounts, conditions and exclusions for an insured. All products and services may not be available in all states and may be subject to change without notice. Use of the term "partnership" and/or "partner" should not be construed to represent a legally binding partnership. Any references to non-CNA Web sites are provided solely for convenience and CNA disclaims any responsibility with respect thereto. CNA is a service mark registered with the United States Patent and Trademark Office. Copyright © 2007 CNA. All rights reserved.



Risk Control

Slips and Falls Study:

Objective Auditing Techniques to Control Slips and Falls in Restaurants

More than 3 million food service employees and over 1 million guests are injured annually as a result of restaurant slips and falls, according to the National Floor Safety Institute (NFSI). The NFSI indicates that the industry spends over \$2 billion on such injuries each year and that these injuries are increasing at a rate of about 10% annually.¹

According to the National Restaurant Association, slips and falls are the greatest source of general liability (GL) claims within the restaurant industry.² CNA's loss results mirror the National Restaurant Association information. Slips-and-falls injuries continue to be the leading source of GL losses incurred by our policyholders.

According to the National Safety Council, slips and falls constitute one of the leading causes of accidental death in the United States.³

With the aging baby boomer generation, the size and scope of this issue is expected to grow significantly. The NFSI estimates that between 2005 and 2020, the number of seniors in the U.S. will increase from 35 million to 77 million.⁴ Statistically, seniors are far more likely to experience a slip-and-fall accident. For those that are injured, the cost of treatment and recovery time is significantly greater than the average for non-seniors. According to the Centers for Disease Controls and Prevention, these types of injuries are also the leading cause of hospital admission for older adults.⁵

There are five major causes for slip-and-fall accidents:

1. Lack of slip resistance on walking surfaces
2. Poor walking surface conditions
3. Poor visibility
4. Lack or poor condition of handrails and guardrails
5. Poor accessibility

Wanting to help policyholders improve safety and continue profitable growth, CNA conducted a case study on slips and falls in the restaurant industry, which experiences more of these events than other industries we service. This paper reviews the approach taken by CNA Risk Control in our case study to deal with the first two causes stated above with a CNA policyholder, a large national restaurant chain.

Our white paper will focus specifically on the application of a new technology and a systematic auditing technique to help objectively identify problem areas and communicate findings and suggestions for improvement. One of the primary objectives of the study was to monitor and document the results of floor cleaning and maintenance activities so the decision was made early on to complete readings and measurements during non-business hours. Furthermore, since the primary issue for the company was customer slips and falls, the



Risk Control

decision was made to limit our study sampling to only “front of the house” areas of the stores, where customers have primary exposure to slips and falls.

BACKGROUND

Since 2001, CNA’s policyholder had identified patron slips and falls as the leading source of GL claims. While the company, a fast-growing national restaurant chain, tried several remedies and experienced some progress in this area as measured on a per-store basis, falls continued to serve as their primary “loss leader” from a GL standpoint.

CNA initially began working with the customer on slips-and-falls issues in April 2004. At that time, a series of floor slip resistance tests were completed at selected locations. Guest slip-and-fall injuries were confirmed as the primary driving force of the company’s GL losses, both in terms of frequency and severity. By December 2004, the company approached CNA for assistance in developing and implementing a more aggressive slip-and-fall prevention program.

In March 2005, the company rolled out an internal slip-and-fall prevention program nationwide. Over this same time frame, CNA formed a strategic partnership with the NFSI. The NFSI was founded in 1997 as a not-for-profit organization whose mission is to “aid in the prevention of slip and fall accidents through education, training and research.” The NFSI, headquartered in Southlake, TX, is the only organization of its kind exclusively focused on slip-and-fall accident prevention.

Nationwide testing of the policyholder’s floors began at selected sites in July 2006 and concluded in October 2006.

WHAT IS SLIP RESISTANCE?

Slip resistance is generally measured by defining the coefficient of friction (COF) between two surfaces. An example is the relationship between a shoe and a floor surface. There are two COF measures:

- Static – The force necessary to start a body moving
- Dynamic – The force necessary to keep this same body moving

In the U.S., the static COF is the customary method of measuring slip resistance.

The COF is generally measured between 1.0 for very rough surfaces (e.g., sand paper) and extremely slippery surfaces at 0.0 (e.g., water on ice).

The American National Standards Institutes’ (ANSI) A 1264.2-2001 “Standard for the Provision of Slip Resistance on Walking & Working Surfaces” suggests a Static COF of $\geq .05$ for walking surfaces under dry conditions.⁴

However, the NFSI has developed an additional test method, NFSI B101,1. This standard defines a “High Traction” walkway as having a measured static COF of $\geq .06$ for wet walking surfaces. The NFSI is the first standards developer to create a wet slip resistance



Risk Control

standard and estimates that more than 80% of slip-and-fall accidents take place on wet surfaces. According to the NFSI, floor surfaces maintaining this level of slip resistance when wet have proven to reduce slip-and-fall claims by between 50% to 90%.⁴ We chose to use this standard as part of our study because we felt it more closely replicated real world situations.

WHAT FACTORS INFLUENCE SLIP RESISTANCE?

Any factor that changes the level of friction between two surfaces affects its slip resistance. When the floor surface and the sole of an individual's shoe are clean and dry, there is generally a high level of friction between the surfaces. In this case, the likelihood of slips and falls is reduced. Over time, as flooring surfaces and shoe soles become covered by foreign materials or become wet, the level of friction is reduced. As this occurs, the likelihood of a slip or fall increases.

Foreign materials include dirt, grease and water. However, we also know that some cleaning products used on flooring surfaces can build up a film in the pores of flooring material. This reduces the friction produced by the surface, increasing the likelihood of slips and falls. We call this buildup of materials "polymerization" and know that the longer the buildup continues, the more difficult it is to remove. This becomes extremely important in cases where the floor surface occasionally becomes wet, such as in restaurants.

Frequently in the hospitality industry, we find occasional spills, weather-related hazards, wet and oily surfaces and changes in the degree of traction as the primary causes of slips and falls.

OUR APPROACH

In preparing for the study, a presentation was made to the top management of the restaurant chain. The purpose for the presentation was twofold.

- First, provide education on the slip and fall issue and also relay the study's potential benefits to their organization.
- Second, solicit their support and commitment for the project. We also used the session to discuss the equipment and suggest how the sampling could be accomplished.

With management commitment secured, the company communicated to the managers of the four restaurants selected about the project and what they should anticipate in terms of the onsite testing.

We decided to include a series of restaurants in our study whose layouts and interior finish materials were consistent with what would be included in new restaurants as the company expanded across the U.S. The sites were also located within a relatively tight geographic area to allow multiple retesting in an efficient manner.



Risk Control

Due to our existing relationship, we already understood the company's market and guest demographics, cleaning and floor maintenance procedures and products, and risk management/slip-and-fall prevention programs. Historical data of previous guest slip-and-fall incidents was reviewed and categorized. This information provided a historical perspective to losses and suggested keys to study during the upcoming onsite sampling.

For purposes of this study, we received onsite assistance from engineers representing Universal Walkway Tester LP, the Texas-based manufacturer of the equipment used to gather the data (BOT-3000). Their expertise in operational aspects of the equipment and knowledge of the NFSI-101A floor auditing guidelines helped us structure the study and interpret the resulting information.

For the purposes of the study, one lead and one back-up floor auditor were selected to work with the Universal Walkway Tester LP engineers and the management at the policyholder-selected locations.

WHAT WE DID

Our plan included securing two data sets for each location tested. The first slip resistance samples were obtained after the facility had closed for the evening. The walkway auditor would then return to the site the following morning, after the cleaning crew had completed their work but before the facility had opened for business. Back-to-back testing was employed to reduce the possibility of any intervening factors affecting the results of our operational and cleaning protocols.

Our pattern called for testing two facilities at a time, with all sites visited during a two-week period each month. The following month's testing would then be completed four weeks later and within the same week. In general, testing was completed the same week for each facility in the study.

Initial evaluations of the test sites were completed in a four-week period. During these visits, operations were observed and information was gathered from staff to help determine areas to be addressed in the sampling. Armed with detailed diagrams of each facility, an assessment was carefully completed to identify those locations that would serve as future sampling sites. One important component in the initial testing was taking the time to explain the equipment, purpose and nature of the testing and potential outcomes to facility staff and management. In each facility, this was their initial contact with the equipment and it was important they understood how it worked and what it was used for.

Criteria outlined in the NFSI's proposed floor auditing standard NFSI B101.0 "Walkway Surface Auditing Guideline for the Measurement of Walkway Slip Resistance"-101A served as a resource in location selection. The auditing guidelines subdivide floor surfaces into three groups: normally dry, normally wet and occasionally contaminated. The occasionally contaminated surface definition best fit the layout and operations present at the facilities selected.



Risk Control

THE TESTING PROCESS

For occasionally contaminated floor surfaces, we conducted tests using a Neolite™ (rubber) sensor on wet surfaces. Distilled water was used as the base of each test. Each test consisted of a pair of samples – one taken in an east-to-west orientation and the second completed in a north-to-south orientation. This allowed us to obtain samples both going with and against the grain of floor surfaces where grain was present.

Based on the layout and arrangement of facilities, between 9 and 13 individual sampling sites were selected for each location. Following our master diagram, subsequent sampling was to be completed at these specific sites. Areas tested included dining/seating, bar, beverage stations, serving routes, restrooms, hostess stations and entrance/exit points. Special attention was paid to high-traffic areas where different flooring materials met. These transition areas frequently were a source of slip-and-fall incidents.

Ultimately, a pattern was established with the auditor arriving at the store 15 to 30 minutes prior to closing. This was done to prepare and validate the equipment before each day's testing, as well as observe operations and determine if any additional information could be obtained regarding the firm's customer slip-and-fall injury trends. Once the facility was closed and free of guests, sampling began. Generally each set of samples would take 5 to 10 minutes to complete. During this time, sample media needed to be prepared, testing surfaces prepared with distilled water, samples run, data recorded and sample sites cleaned of water.

Subsequent testing the following morning generally went quicker as testing commenced following validation of the equipment upon arrival at the site.

Understanding the individual restaurant's loss history was very important in the planning of the study. Detailed incident reports identifying flooring material, location, time of day, nature of the incident and information on the claimant were used to help determine where and when to sample. The information helps train staff on situations and conditions likely to result in an incident.

Sampling in consistent locations month after month, both before and after cleaning, provided good information on the success and challenges faced by each facility's floor care and maintenance program. Having specific site diagrams that outlined sampling locations aided in the consistency of collecting information.

Following a consistent pre- and post-survey process helped ensure the proper operation of the equipment and consistency of the results achieved.

WHAT WE USED

We used a Binary Output Tribometer (BOT), Model 3000, manufactured by Universal Walkway Tester LP. The BOT-3000 is a self-propelled machine based on a modified drag-sled principle. The device can perform both wet and dry surface testing. The digital instrument can record, print and output data that can be cataloged and analyzed. One



Risk Control

key feature of the unit is that it can be field calibrated, ensuring results are user independent. The BOT-3000 is currently the only device recognized by the NFSI.

WHAT WE LEARNED

More than 650 individual measurements of flooring surfaces in “front of the house” locations were compiled at four locations participating in the pilot throughout a four-month period. The results highlighted the importance of establishing and adhering to a regular floor care maintenance program. Study results showed consistent improvement in flooring slip resistance following cleaning.

We observed that the actual degree of improvement was in large part dependent on the training and technique of the cleaning personnel. Testing also highlighted the importance of floor mat care and maintenance in preventing cross contamination of flooring surfaces. Finally, our sampling revealed that the most heavily used traffic routes between the kitchen and seating areas must be the focal point in any cleaning and matting strategy.

Following a manufacturer’s exact directions when applying floor cleaning compounds is crucial to the success of a floor maintenance program. Proper training and outfitting of applicators must be monitored. Targeting cleaning and floor maintenance activities to those areas known for producing low-slip resistance make a slip-and-fall prevention program more efficient.

Even though the flooring surfaces, facility layouts, operations and cleaning products used were consistent over the locations involved in the study, there were considerable differences in the slip resistance readings between locations. The common difference that each facility shared was that floor maintenance and cleaning was performed by an outside contractor. Allowing for all other factors, contractor application emerged as a critical variable in our study.

Following cleaning, each flooring surface exhibited a significant improvement in its individual slip resistance. The actual degree of improvement differed with each facility and sampling location. This was noted to be especially true in heavily contaminated areas, such as entrances to the kitchen, food preparation and beverage stations. Also, the improvement was generally consistent in sample areas, measured on a month-to-month basis.

The tracking of materials, such as grease, oil and water, from the kitchen to the serving and seating areas emerged as the primary controllable source of improving overall slip resistance. Our slip resistance readings consistently improved the further we moved away from the entrance to the kitchen or serving areas.

Floor mats, especially when used at the entrance to the kitchen and serving areas, effectively reduced the movement of materials, such a grease and water, from other portions of the facility. To maintain their effectiveness, the mats needed to be changed out at regular intervals before becoming saturated. We observed that saturated mats



Risk Control

can make the situation worse. Heavily soiled mats allowed contaminants to migrate to the clean dining area floor affecting its slip resistance.

Similarly, areas with permanently installed mats and carpet runners need to undergo regular maintenance and thorough cleaning to remove the buildup of contaminants that could otherwise be tracked throughout a facility.

Employing separate color-coded mops and buckets for “front of the house” and “back of the house” areas helped reduce cross contamination. Using mops that typically are used in the kitchen and preparation areas in the customer seating areas are a frequent source of the spread of materials that lower slip resistance.

RECOMMENDATIONS

Based on our study and findings, we made these general recommendations to the restaurant chain. These recommendations can be applied to most restaurants to help lower their risks for slip-and-fall incidents.

- Select high-traction, slip-resistant flooring materials when you build, expand or remodel facilities. Installation of such materials with proven high traction characteristics is one of the best ways to avoid slip-and-fall issues.
- Know what the “out-of-the-box” slip resistance is on the floor materials in your facility. These numbers provide a baseline when considering changes to cleaning and floor maintenance practices. Have flooring COF audited after installation to confirm slip resistance.
- Select floor cleaning and maintenance products with proven slip resistance characteristics that are compatible with the particular flooring surfaces in your facility. A good place to start are materials certified by the National Floor Safety Institute (www.nfsi.org).
- Be alert for workers substituting cleaning materials or supplies. Ensure sufficient quantities of cleaning supplies are available.
- Apply floor cleaning and maintenance products in accordance with the manufacturer’s recommendations.
- Verify with the cleaning personnel that they are familiar with and are using the correct application procedures. If there is a change in personnel or contractor, monitor usage again.
- Remove any unauthorized or incompatible cleaning products and educate staff of the potentially dangerous consequences using the wrong products can have on the slip resistance of flooring surfaces.



Risk Control

- Separate cleaning materials and equipment between the “front of the house” and “back of the house” to reduce the likelihood of transporting a problem from one area to another. Color coding materials can provide instant recognition for personnel using the wrong equipment in the wrong area of the facility.
- Ensure that permanently installed features like carpet runners and mats are included in the maintenance and housekeeping program. These materials need to be regularly inspected for the buildup of contaminants and deterioration that could lead to the creation of fall hazards. Keep in mind that while mats reduce the likelihood of producing slips, improperly maintained mats can create trip hazards. Consider using mats that have been certified by the NFSI.
- Limit the difference in heights between flooring surfaces and mats to no more than $\frac{1}{4}$ ” to $\frac{1}{2}$ ”. Frequently inspect mats to ensure they have not buckled or curled. Make sure that your mats are firmly secured to the floor to prevent migration and that the floor beneath the mat is clean and dry. Make sure to evaluate the condition of these changes in height since they can deteriorate and create trip hazards.
- Regularly review all the slip-and-fall incident reports associated with your facility and understand the critical factors associated with them. Look for trends in location, time of day, etc., and focus staff training on your cleaning procedures for these factors. Train your workers how to properly respond to slip-and-fall incidents.
- Ensure that staff is well trained in spill prevention and response programs. They need to know where the materials are located and how to use them in the event of an emergency. It’s also important that staff understand the importance of reporting incidents and conditions that could result in incidents, even if none have actually occurred. These will be your first indication of a potential issue that should be addressed.
- One of the surest ways to prevent the transmission of grease, water and other materials from the “back of the house” to the “front of the house” is to implement a good mat program. Ensure the mats are frequently inspected and checked regularly for wear and the buildup of contaminants. A poorly managed and maintained mat program can significantly increase your likelihood of reducing the slip resistance of flooring surfaces.
- A walkway auditing program can help identify trends within your facility that can result in reduced slip resistance to flooring surfaces. To be effective, the testing should be completed in a consistent manner and include more than a single set of measurements. Consider using NFSI Certified walkway auditors. A complete



Risk Control

list can be found on www.nfsi.org.

- Maintaining open and clear communication between the staff, cleaning personnel and the walkway floor auditor is crucial to the identification of trends and elimination of factors that could reduce the slip resistance on floor surfaces.

CNA Risk Control works with business owners in all industries on slip-and-fall programs. **To learn more about how CNA Risk Control can work with you to help you mitigate risks, please speak with your local independent agent, call us toll-free at 866-262-0540 or view our other Risk Control tools online at www.cna.com/riskcontrol.**

Sources:

- 1) The National Floor Safety Institute. "Restaurant Slip & Fall Accident Prevention Program." Produced as part of the NFSI Best Practices Project, 2003.
- 2) Busche, Linda. "Slip and Fall Claims Lead the list of restaurant General Liability Insurance Claims." Restaurant Insurance Corporation. December 6, 2004.
- 3) Van Fleet, Eric L, (PhD). "Trips, Slips & Falls." Facts & Resources, V1 #2, p. 1-2. August 1995.
- 4) The Measurement of Walkway Slip Resistance: Walkway Surface Auditing as Recommended by the National Floor Safety Institute (NFSI). October 25, 2006.
- 5) Centers for Disease Control and Prevention. "Falls Among Older Adults: An Overview." February 2005.

RC S&F 062907

The information, examples and suggestions presented in this material have been developed from sources believed to be reliable, but they should not be construed as legal or other professional advice. CNA accepts no responsibility for the accuracy or completeness of this material and recommends the consultation with competent legal counsel and/or other professional advisors before applying this material in any particular factual situations. This material is for illustrative purposes and is not intended to constitute a contract. Please remember that only the relevant insurance policy can provide the actual terms, coverages, amounts, conditions and exclusions for an insured. All products and services may not be available in all states and may be subject to change without notice. Use of the term "partnership" and/or "partner" should not be construed to represent a legally binding partnership. Any references to non-CNA Web sites are provided solely for convenience and CNA disclaims any responsibility with respect thereto. CNA is a service mark registered with the United States Patent and Trademark Office. Copyright © 2007 CNA. All rights reserved.