



Getting to grips with slips and trips

Real workplaces, real
problems to be
overcome, real solutions
and real benefits.

Sharing experiences
from real life



About this publication

This publication has been compiled from case studies and real life examples of slip and trip situations in actual workplaces. It illustrates the sorts of situations that have faced employers (and others). Many of the cases set out what they did to tackle the slip and trip issues and how they went about it, others illustrate the consequences of failing to take the right sort of action.

HSE's Slips & Trips Programme Team has extensive experience of providing training and briefing sessions on slips and trips and of working to help, equip and motivate people to deal with slip and trip risks as a real workplace issue. That experience has shown that there is nothing quite like using actual examples of situations that have been faced in real life and the practical solutions (or real consequences) to help people come to terms with what needs to be done and how they can go about it. This publication is intended to do just that.

These case studies and examples are real. They are not 'perfect' or 'model' scenarios thought up to get across particular points. They tell of the actual circumstances, how people found solutions that worked for them or suffered the consequences of not doing so.

We hope that you would be sufficiently interested to look at each of the case studies - each has a story to tell or a lesson to learn from - but there are also tables of contents to help you access the information that may be of most relevance and interest to you. They are arranged to lead you to the cases that might be of most interest, examples in the industry sectors most closely related to your own and cases where particular risk factors or possible solutions have come into play.

To set the scene there is some introductory information on slip and trip risks in the workplace, how they arise, what leads to them and what this means for individuals, businesses and the country as a whole. It explains why such an effort is being put into tackling slips and trips and starts to explore what can be done.

This scene-setting information includes a simple but useful visual model of what factors contribute to the existence of slip and trip risks in the workplace. Knowing what goes into slip and trip problems can help us rule the problems out.

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Slips and trips in the workplace

Slipping and tripping accidents happen everywhere. They are often seen as funny or as being the victim's own fault, although some recent high-profile litigation seem to suggest that slip and trip injuries are no longer being accepted as the sorts of things "that just happen". Managers often see no solution and there has been a tendency for health and safety specialists to concentrate on other areas of health and safety where they feel more comfortable.

Studies show that the biggest barriers to getting management and workers to act are:-

- Not taking the risks seriously.
- Not understanding the causes of slipping.
- Thinking that slips and trips are inevitable.
- Poor application of risk assessment and management controls.

Over a third of all major workplace injuries are a result of a slip or trip. Almost all of these involve broken bones. These incidents cost employers hundreds of millions of pounds a year in lost production and other costs. They are the single most common cause of injuries at work and they occur in almost all kinds of workplace.

Slips and trips are responsible for more major injuries in the manufacturing and service sectors than any other cause. They account for over half of all workplace injuries to members of the public. The Government and the Health and Safety Commission have recognised the importance of slips and trips and have included the topic as one of their priorities for action to improve health and safety performance.

Slips and trips are responsible for :-

- Over a third of all major injuries to workers every year.
- 20% of 'over 3 day' injuries.
- More than half of all serious injuries to members of the public in workplaces.
- Costs to employers of £512 million per year.
- Costs to the health services of £133 million per year.
- Research has suggested that 1 in 3 falls from height deaths & injuries & are initiated by a slip or trip.

Most slips occur in wet or contaminated underfoot conditions. Most trips are due to poor housekeeping. The solutions to both are often simple and low cost. In many cases the way to get control of slips and trips involves one of the following simple measures (in no particular order) :-

- Preventing floor contamination.
- Managing spillages and cleaning regimes.
- Effective matting systems.
- Choice of suitable footwear.
- Design of the workplace and work activities.
- Maintenance of plant and the work environment.
- Specification of appropriate flooring.
- Housekeeping.
- Effective training and supervision.

This publication is a showcase of things that have happened in real workplaces, real problems that people have faced, real solutions that have been applied, bright ideas that people have used, real results that have been achieved or even the real consequences of getting things wrong.

We can all learn by sharing experiences.



A simple slip & trip factors model

People often make assumptions and jump to conclusions - we all do! Those assumptions can sometimes let us down. Efforts to tackle slips and trips can fall victim to misleading preconceptions and lead to the wrong conclusions and actions. The real factors that cause slips and trip risks in a particular case can easily be missed or underplayed. The illustration above is a simple representation of the main factors that contribute to pedestrian slip and trip risks. For the most part the factors are quite straightforward, not requiring special skills or knowledge to handle.

Contamination.

Most slips & trips are actually slips and the vast majority of those happen in wet or contaminated underfoot conditions. Keeping walking surfaces free from contaminants is probably the best thing that can be done to prevent slips. Think about what contaminants there might be (Are there spillages, is water walked in on shoes, does cleaning leave floors wet? etc.). Preventing contamination and managing floor cleaning reduce slip incidents. Remember that dry contaminants, such as dusts, cause slips just like liquids. The way that floors are cleaned can have a real

effect on reducing slip risks. Prompt attention to spillages limits the effect of the contamination. Risks can be reduced by leaving floors clean and dry and safe to walk on after cleaning (not 'mop wet'). Proper cleaning methods and materials also play a big part in helping the floor to keep its grip. Bad cleaning methods cause problems, good cleaning methods significantly reduce risks. The 'trips equivalent' of floor contamination are obstacles - litter, debris & things on the floor where they shouldn't be. Floor contamination and obstacles are implicated in most slip & trip incidents - so they are good things to think about as early options for action.

Floor.

Sufficient grip is needed to prevent slipping, especially in wet or contaminated underfoot conditions. This means a certain amount of roughness is needed - measured in microns (millionths of a metre). Thicker, more viscous contaminants mean that this amount of 'microroughness' needs to be greater to protect against slipping. Floor surfaces contribute to tripping risks because of damage, loose surfaces, unevenness and changes in level.

Environment.

What is going on around the workplace can have quite an impact

on the chances of slips and trips happening. Are there distractions (either intentional or not) to pedestrians? How is the workplace laid out and arranged? Does this create or eliminate hazards? What is the lighting like? Is it dark or is there lighting glare? Are there likely to be sudden noises or are pedestrians walking in restricted space or congested areas?

Footwear.

What people have on their feet has an effect on the chances of slipping or tripping. The right sort of footwear can provide better grip in a variety of underfoot conditions and poor footwear can itself cause trips. Proper footwear can be a risk control measure but only where there is proper control over the footwear in use, it is generally of little use in preventing slips and trips to e.g. members of the public.

People.

Human factors play a big part in slip and trip risks. Variables include individual age, fitness, agility and capability, pedestrians rushing, pushing, pulling or carrying loads, the nature of any tasks being undertaken, standards of safe behaviour that can be expected, experience and decision making of individuals, personal attitudes and the organisation's culture, individuals reaching stretching or turning. There are many more human factors that could come into play. It is important not to forget to look at these 'people' aspects as well as the things around them.

Controlling slip & trip risks.

The guidance and publications section gives some very useful references where we can find detailed guidance on how to control risks. These broadly

follow a 'hierarchy of controls' - controls that should be considered in order. The controls listed first are generally preferable or most effective and should be considered first. The case studies in this publication will show these controls in real life situations.

Slip risk controls.

- Eliminate the contamination.
- Stop contamination getting onto walkways.
- Limit the effect of the contamination by removing it promptly.
- Maintain floor grip with proper cleaning methods.
- Increase floor surface roughness.
- Lay a more slip resistant floor with higher surface roughness.
- Deal with any changes in walkway level.
- Are conditions right for good visibility and pedestrian concentration?
- Do the working tasks introduce extra slip risks?
- Exclude vulnerable pedestrians from slip risk areas.
- Have good supervision.
- Establish a positive safety culture.
- Introduce suitable footwear.
- Train & inform employees.
- Set procedures for visitors.

Trip risk controls.

- Eliminate holes, slopes or uneven surfaces.
- Good housekeeping systems and standards to prevent obstructions.
- Good lighting to see obstructions.
- Rearrange task and process flows.
- Establish a positive attitude that trips can be prevented.
- Train & inform employees.

Case studies

Pub-restaurant chain's choice of kitchen floor surface

A local authority Environmental Health Officer (EHO) made a health & safety visit to a large suburban pub-restaurant and noticed that the kitchen floor felt unusually slippery. Kitchen staff confirmed that the floor covering was much more slippery than the similar 'safety' flooring that it had replaced some months earlier.

The slipperiness that staff experienced did not seem to improve after routine cleaning and attempts to reduce grease deposits by improving the extract ventilation did not seem to have an effect.

Tests by the Health & Safety Laboratory (HSL) using pendulum coefficient of friction and surface micro-roughness measurement techniques showed that the floor's slip resistance was 'borderline' when dry and unsatisfactory if wet. This was not felt to give enough grip for a kitchen where there was bound to be at least some splashing onto the floor.



The pub management experimented with different floor cleaning methods to assess whether this could improve the slip

resistance but eventually decided that the most effective option was to replace the floor covering. Management made sure that the new floor covering had been reliably tested for slip resistance and that it would be expected to perform well in a commercial kitchen situation.

The replacement floor (a 'safety' epoxy material with anti slip particles) was tested by HSL and the results indicated that it ought to perform well in both dry conditions and when subject to the sort of contamination that is to be expected in a busy kitchen.

The EHO was satisfied that the pub management had taken the right action to deal with the problem on site but pointed out that the action needed by the company may not end there. The pub-restaurant chain had a number of similar sites across the country. The floor covering that prompted the initial investigation was part of their standard specification used when their pub-restaurant kitchens were being refitted and had already been installed at some of their sites.

The company was advised to review its own flooring

'Get reliable information about the slip resistance of floor finishes'.

specification standards. It also went away to consider what needed to be done about its sites that had already been refurbished and equipped with the type of floor covering that had to be removed from this site.

Getting reliable information about the slip resistance performance of

floor finishes should always be part of the design and specification process and is especially important where there is a risk of floors becoming wet or contaminated.

Slippery store entrance in wet weather - supermarket entrance matting.

The problem.

In a recently opened supermarket, staff and members of the public were having a number of slip, trip and falling accidents. The areas of the supermarket that were most affected were the terrazzo floor tiles in the entrance area and the first few aisles of the supermarket adjacent to this entrance.

Investigations showed that these areas quickly became wet on rainy days with water being walked in on shoes through the foyer.



The entrance matting systems in place were not large enough to cope with the amount of water transferred onto the mats from pedestrian movement.

The solution.

This was looked at both long and short term. In the short term the

company increased the frequency of floor cleaning in the foyer at times of wet weather. This frequency depended upon the number of people entering the building and the amount of rain. A system was arranged so that the staff were constantly vigilant for signs of water on the supermarket floor. When water was identified inside the store cleaning would follow. The method of cleaning used in these areas was also altered. Rather than mopping (which left the floor surface wet), staff used a wet vac, which left the floor dry.

The supermarket also reviewed their store entrance matting system. The existing sunken matting was complimented by extra matting during wet conditions. In the longer term the supermarket built a canopy over the entrance to further reduce the direct ingress of water.

The cost for training staff regarding the frequency of cleaning was approximately half a day per member of staff and the wet vac cost less than £500. The supplementary entrance mats cost about £20 each. The cost of the additional canopy was absorbed during store refurbishment.

After 18 months of these changes being in place there had not been a serious slipping accident.

16 year-old employee flash fries her arm in 360°F oil following slip.

This accident shows that failure to maintain plant, prevent contamination and to provide effective training and supervision can contribute to slipping accidents. Research has shown that slips are caused by a combination of factors.

A 16-year-old girl was employed at a fast food outlet to cook fries at a frying range. She slipped on water leaking from an ice-making machine and instinctively put out her hand to break her fall. Unfortunately her hand went into the deep fat fryer containing oil at a temperature of 360°F and she sustained severe burns to her left hand and forearm.

The outlet was short staffed on the day of accident and the Team Leader was working on the tills instead of monitoring workplace safety.

Although the company policy was to mop up spillages it was common practice to leave spillages at busy times and cover them with a sheet of cardboard, which itself can create a tripping hazard. At busy times it was usual to give greater priority to serving customers than to cleaning spillages.



Severe burn injury resulting from a simple slipping accident.

The ice-making machine had been leaking for several days and

various attempts had been made by different contractors to cure the leak. No one had sole responsibility to co-ordinate the repair of faulty equipment and a lack of communication between different shift managers left the equipment leaking over a long period of time.

Following the accident, the company did a complete review of its management of wet or contaminated floors.

- Slip control was given priority over serving customers
- Systems were put in place to ensure maintenance of faulty equipment
- Managers were identified as having responsibility to ensure slips procedures were implemented and followed
- Employees empowered to deal with slips as a priority and were given backing by company
- Extra training on slips procedures was given to all staff

The local authority prosecuted the company and on successful conviction the magistrates imposed a total fine of £15000. The investigating Environmental Health Officer believed that the accident was completely avoidable, as the company had failed to maintain a safe system of work or to carry out a suitable and sufficient assessment of the risks associated with slipping within the kitchen.

Badly installed 'safety floor' in a swimming pool changing area.

The problem.

Following a history of slipping accidents a new anti-slip floor had been laid in a swimming pool

changing area as part of a refurbishment programme. The new floor was an epoxy resin incorporating anti-slip particles. However, as soon as the swimming pool re-opened following the refurbishment, over 30 slipping incidents were reported. The Health and Safety Laboratory (HSL) were called in to assess the floor and it was discovered that there were patches of resin floor with no anti-slip particles. Due to the lack of anti-slip particles, these areas were in fact just smooth resin and accident records showed that these areas were indeed responsible for the majority if not all of the slipping accidents.



Assessing the floor surface.

The solution.

The contractors were called back to resurface the floor to ensure a consistent spread of anti slip particles.

The result

The health and safety manager responsible for the swimming pool was very happy with the resurfaced floor, which has been carefully maintained and using the correct cleaning regime, slipping accidents are now a rarity.



The finished floor with an even distribution of anti-slip treatment.

The cost

The contractors agreed to relay the problem areas of the floor at no extra cost.

Wet mopping can increase the risk of slipping

HSE researchers were in a fast food outlet observing activities in connection with slips and trip accidents. A customer bought food and drink but spilled some of the coffee on the way to sit down. The spillage was small, about the size of a 50p piece.

The fast food company was aware of the risk of slipping from liquids or food spilled on their smooth floors and, almost immediately, a member of staff came to deal with the problem.

They mopped up the spillage (and also the surrounding area because it looked dirty), squeezed out the

mop and went over the whole area again, leaving an area of approximately two square metres 'mop dry'. But 'mop dry' meant that there was a fine, almost invisible film of water on the surface.

The researchers took measurements on the 'mop dry' area using pendulum and surface micro roughness techniques, and also timed how long it took to dry completely.

The two square metres of mopped floor, now almost indistinguishable in appearance from the rest of the floor, took approximately seven minutes to dry and measurements showed that the area was extremely slippery during that time.

Research has shown that many slips are caused by a sudden change in floor surface characteristics. In this case, for the seven minutes until the floor dried completely, it would be difficult for customers and staff to realise they were walking from a safe to an unsafe surface.

The company, who had a good awareness of slips and trips risks and an efficient system for identifying spillages, had, in fact, increased the risk of slipping because of the method of cleaning used in this instance. Simply cleaning up this spillage, and drying the small area of floor with a paper towel would have been far better.

'Clean floors to a dry finish.'

The fast food company went on to review their spillage and general cleaning procedures.

Ramped walkways at a railway station

The problem.

Management at a railway station had experienced problems with slipping accidents on ramps down to platform areas. The ramps were covered by ceramic tiles that were slippery when wet. The risk of slipping was increased partly because pedestrians were more likely to be rushing down the ramp to catch their train.

The solution.

Initially, railway station management arranged for the ramps to be treated with an acid etch to try to increase the slip resistance of the tiles.



Ramped walkway surface 'before'.

This did help to reduce the number of slipping accidents. However, it was felt that more could be done. Later a second walkway surface was applied. This was an anti-slip reinforced plastic covering that was simply glued on top of the old ceramic tiled surface giving the visual effect of a brick pavior surface.



Ramped walkways after resurfacing.

The outcome.

In 12 months slipping accidents had reduced by 50% and it was projected that the payback period for the £35,000 cost of the work would be less than 2 years based on reduced claims alone.

Proposals are now being formulated to extend the treatment to the passenger concourse and other areas at the station.

Young woman loses her leg after two slip accidents

Alison's Own Story.

"I worked as a technical instructor in a large hospital. In the autumn of 1986 I was entering the main hospital whilst taking post to the sorting office when I slipped on decomposing leaves on the

concrete steps. Fresh leaves had also fallen on top indicating the decomposing leaves had been there for some time. I fell heavily onto my right knee. I went home and returned to work the next day however my knee was extremely swollen, painful, and still bleeding. I was sent to for treatment and it was sutured and x-rayed. It was found that I had damaged my kneecap, but hopefully time would heal it. I was still in pain three months later and I was told that I needed surgery. The leaves were supposed to be cleared on a daily basis, however, due to staff shortages this was not done.

In 1992 I slipped again, this time on an unmarked wet floor. Snow was falling outside when I entered the building to start work. I went to my office changed out of my boots and into my flat shoes. I left my office to do attendance figures, unknown to me someone had mopped the floor and failed to dry it or place any barriers or warning signs out. In addition, the door mat which was used daily by approximately 100 staff and patients was too small for the area of tiled floor and it did not have the capacity to absorb all of the water being brought in by pedestrians. Some of the water was being transferred on to the dry floor.

I slipped and fell directly onto my right ankle, I was assisted to a chair and it was evident that the ankle was broken, it was also very contorted. I was taken into the hospital and placed in plaster for 6 weeks; however, the plaster was taken off after 3 weeks, as the foot remained contorted. Over the next few years I faced some 32 operations to try to save the foot,

eventually, I was told that I had dystonia caused by the accident and amputation was the only solution as my toes had by now lost their feeling and were turning black. I had my leg amputated on 30th May 1997.

One week after my fall the floors in the unit were made non-slip.



'No amount of money compensates or prepares you for what has happened to me.'

As anyone can imagine, these easily avoidable accidents have had a horrendous effect on my life. I was an active 21 year old, only just married when I had my first accident. I remained working until my second accident and enjoyed dancing, aerobics and jogging, but I cannot do any of these activities now and spend a lot of my time in a wheelchair.

Although I have received compensation, I have lost my job and I will never work again due to ongoing problems. My husband has also lost his business because he now has to care for me. No amount of money compensates or prepares you for what has happened to me."

Anti-slip walkways reduce slip risks in large food factory

Health and Safety Laboratory (HSL) specialists undertook a series of slip assessments in a major food production facility.

A large area of flooring had recently been installed throughout the production, cooking, storage, and transit areas. Although the floor appeared to be durable and easy to clean, operatives using the floor complained that it felt slippery.

Assessments were carried out by HSL using standard pendulum and surface roughness analysis techniques. Results showed that contamination of the floor with clean water resulted in an

'Slipping incidents have reduced and staff are happier.'



Anti-slip factory walkway.

appreciable slip risk. Work processes used within the factory made it very difficult to totally eliminate floor contamination. It was therefore decided that modification of the floor surface was the most practical solution to reduce risks of slipping.

Initially, small test areas of a proprietary anti-slip coating were

applied to the original surface and assessed by HSL over a period of months. The results indicated that the test areas presented a lower slip risk. Consequently, clearly marked walkways that were treated with the anti-slip coating were used throughout the factory.

Slipping accidents have reduced and staff are happier with these improvements.

Company changes cleaning methods following accident investigation

An investigation by a local authority Environmental Health Officer into a slipping accident to an employee at a commercial sales office and showroom highlighted the need for a review of the company's cleaning regime in their risk assessment. The entrance matting was also seen as an area of concern.

The employee had slipped on an area of flooring that had been mopped but not dried properly. The company's 'General Procedures and Safety Precautions' had stated "Do not walk on wet or newly polished floors", however wet cleaning took place during working hours when staff were always moving around their desks. It was suggested that cleaning should take place outside work hours but this was not possible because of security reasons.

Instead the company adopted a new regime that cleaned and dried floors so that they were not left wet for people to walk on. They also made materials available for staff to

carry out spot cleaning of any localised spillages.

The company has now carried out a specific slips and trips risk assessment, they have increased the size and positioning of their entrance matting systems as well as introducing the dry cleaning regime.

There have been no further slipping accidents to date.

Poor floor specification threatened opening of museum

The design and specification of floor surface materials for use in high profile public areas often focuses on the aesthetics of the flooring material to be used. Floor surface slipperiness is seldom considered, despite the high incidence of pedestrian slip accidents.

A local authority Environmental Health Officer raised concerns about the potentially slippery floor surface at a prestigious new museum that was due to open shortly.

Health and Safety Laboratory (HSL) scientists were called in to carry out a range of slipperiness assessments using industry standard pendulum and surface microroughness analysis techniques.

Results



showed that the floor was extremely slippery even with very small amounts of wet contamination. This was of particular concern because several areas within the museum, such as the licensed bar/café area, would be contaminated with fluids under normal working conditions. Spillages could never be totally eliminated in those areas. This showed that the flooring had been incorrectly specified for its intended use.

HSL concluded that a proprietary acid-etching process could be used to increase both the Coefficient of Dynamic Friction and the surface microroughness of the flooring in all 'foreseeably wet' areas. Laboratory-based tests were undertaken, funded by the contractor responsible for the construction of the site, which led to the identification of a suitable acid-etching treatment. Etching was subsequently carried out in all 'high slip risk' areas throughout the museum.

Further on-site testing was carried out after treatment and showed a significant reduction in the slipperiness of the floor surface in all the previously 'high slip risk' areas. The treatment had however incurred significant cost, changed the appearance of the floor and probably reduced the lifetime of the floor considerably. Correctly specifying the flooring in the first instance would have been far more effective.

The Museum still opened on schedule.

A food production company identified a sudden rise in slip accidents after changing a food production line. Production had been changed from a white sauce to a tomato sauce. The floor at the factory was painted red and contamination by splashes of the new tomato sauce product could not be seen by workers.



In the short term the company repainted the floor in a colour that contrasted the colour of the tomato

sauce. Pedestrians could easily spot any sauce contamination of the floor. Spillages could be seen and dealt with quickly by cleaners and the contrasting colour made it easier to do a thorough cleaning job.

'The costs to the company were small but led to a noticeable reduction in accidents.'

In the longer term the company set about at redesigning the machines and the way that they were used in order to reduce spillage. Drip trays were introduced to further reduce the risk of slippery contamination getting onto the floor.

The costs to the company were quite small – floor paint, drip trays, changed methods on the production machines – but led to a noticeable reduction in slipping accidents.

Tomato Sauce Story

Mower removes slip victim's toes

A gardener/handyman - Leonard - working on a sloping grassed area suffered the loss of two toes as a result of a simple slip. He also had to endure other serious lacerations to his foot and surgeons needed to remove much of the affected area in order to be able to close his wounds. Hospitalisation and physiotherapy ensued to try to recover his mobility.

Using a rotary mower on sloping ground to cut an area of grass that had been allowed to become rather too long he slipped on the lush area of grass that he had just cut and his feet slid down the slope. His right foot went under the mower into the moving blades.



When interviewed Leonard said

“This is the sort of job I have done many times before without having a problem, but looking back on it I suppose it was an accident waiting to happen. The grass, having been quite long, was lush and damp once cut. My shoes were smooth soled ones that I had been wearing whilst doing other odd jobs.”

“I don't suppose they would give any sort of grip on damp grass. Thinking about it, even with better boots on, damp grass is bound to be slippery so it was probably not the best idea to be using a rigid bladed rotary mower when it was

possible that I could slip down a slope towards it. When I did slip it all happened so quickly, there was absolutely no time to react. One moment I was standing up – the next instant my foot was in the blade.”

“I think I probably stacked the odds against myself really – better footwear and a trimmer would have been safer choices. Obviously things are always clear in hindsight but I could have seen what was likely to happen, it would have been so little trouble to avoid the risk.”

Leonard is now retired and has recovered sufficiently to once again be able to indulge his passion for golf.

Costly supermarket slips

Mushroom slip leaves woman compelled to use a wheelchair and cost a supermarket over half a million pounds.

A female shopper, left compelled to use a wheelchair after slipping on a mushroom in a supermarket, was awarded £550,000 in compensation in January 2003.

The accident happened in 1997. Although the fall was painful, doctors initially diagnosed nothing worse than minor damage to the woman's fingers. But within months, she was complaining of pains to her right hip. Her condition worsened and became so painful that she was forced to give up work in November 1998.



Doctors eventually decided the only remedy was a hip replacement and she had the operation in August 1999. Unfortunately the prosthetic joint later failed and had to be removed, leaving her needing to use a wheelchair.

Supermarket worker awarded £200,000 following slip

A supermarket worker was awarded a compensation payment of £200, 000 for injuries she suffered when she slipped in cream spilled by a customer.

Cleaners had mopped the original spillage but the worker fell heavily at the same spot because the floor had not been cleaned efficiently and was left greasy.

Prosecuted over a leaking chiller cabinet

On 29 July 2002 an Environmental Health Officer (EHO) visited a large retail site and noticed two large areas of wet flooring adjacent to some chiller cabinets. An attempt to mark the extent of the areas and exclude people had been made using yellow cones, wire hand baskets and produce trays. These measures were unsuccessful as people were walking through the water. The EHO decided that a

formal approach was necessary and investigated further.

The EHO established that the chiller cabinet condensate drain had been leaking onto the floor all morning and into the afternoon. The manager was spoken to about taking action to keep the floor dry i.e. station a cleaner in the area at all times until the leak was repaired and using absorbent materials to soak up and contain the water. By the time the officer left the store the floor was dry and the situation was being effectively managed.



The company had a spillage procedure and this clearly set out the ways in which the manager should have managed the leak and the wet floor.

The company pleaded guilty to a breach of Workplace (Health, Safety and Welfare) Regulations, Reg 12 and the court imposed a fine of £2500 and awarded costs of £4562.

Pet food company reduces slip accidents after

introducing new footwear.

The problem.

A company processing animal material to produce fats and also manufacture pet food identified a significant risk of slipping in many areas of the factory. Accident data over a period of 22 years showed that there had been a consistent problem with slip related accidents and various interventions had already been tried e.g. new floorings and cleaning regimes and previous footwear trials (footwear was already being issued as personal protective equipment). However none of these had made any significant difference. The company had tried to address the risk of slipping by various means, but were unsuccessful.

The solution.

The Health & Safety Laboratory (HSL) were contacted and were able to suggest suitable footwear that had already been identified during laboratory footwear tests and using this information, the company was then able to choose a suitable product for a trial.

Data indicated an average number of 20 accidents per year over the 6 years prior to the trial.



During the 6-month trial, no slip accidents were reported and this saved the company about £12000 through fewer accidents and lost time etc. Since the trial, the footwear has been issued to 75% of the company's employees and the company has remained slip accident free for 2 years. The new footwear was more acceptable to workers in terms of comfort, fit and style and therefore it was looked after and workers were happy to wear them.

The initial cost of the shoes was more than existing footwear, however the new footwear lasted longer and was therefore cost neutral. In addition, the company reported higher levels of morale and productivity and are negotiating lower insurance premiums resulting from lower accident rates.

Lessons learned.

Slip resistant footwear can make a difference provided it is suitable. The

'There is a lot of misinformation about slip-resistant footwear but it can make a difference providing it is suitable for the conditions.'

company could not prevent contamination at source and had tried various other control methods i.e. cleaning, using different flooring types and different footwear and therefore an informed choice of PPE became very important.

There is a lot of misinformation about slip resistant footwear.

Without a recognised standard, industry can find it difficult to source suitable



products. It is important that companies consider the environment and type of contamination when choosing a product and then trial products to identify better performers. It is important to consider that the footwear used in this trial performed well, however, other products will perform better in other situations.

New floor required a different cleaning regime, but did anyone tell the cleaners?

Health and safety managers in a hospital decided that they needed to replace an old floor in a kitchen area following a number of slipping accidents.

They decided on a new bespoke epoxy based floor with specialist anti-slip surface.

The floor was duly laid and some time afterwards the flooring supplier was asked to visit the site because they were having problems keeping the floor clean.

The supplier was surprised to find the floor was stained in various areas and generally didn't look very clean. He discussed the problem with the cleaners who said that the new floor was extremely difficult to clean, was becoming slippery in parts and in fact was damaging their mops.

The supplier discovered that the

'The wrong cleaning methods can harm floor slip resistance. Proper cleaning can restore it.'

cleaning instructions appropriate to the new floor were not being followed; instead they were filed on a shelf in the health and safety manager's office.

He asked for a stiff brush and a bucket of warm water with the appropriate amount of cleaning detergent and then set to work on the floor. He merely swilled the cleaning solution across the floor, leaned on his brush for a few moments and then brushed away the dirty liquid. The supplier explained that if the floor was not cleaned properly it would lose its slip resistant properties.

The cleaners were amazed to see, almost immediately, that the stains were lifted from the surface and the original floor colour had returned.

All this could have been avoided if someone had bothered to tell the cleaners about the appropriate cleaning regime for the new floor!

Airport carries out a wide-ranging review of pedestrian slip risks

A busy regional airport had enjoyed considerable growth in traffic over recent years. This growth had meant higher pedestrian levels and the development of on-site facilities to handle the increased passenger throughput. Airport management decided that it was an appropriate time to carry out a review of pedestrian slip risks on site. The review looked at risks to passengers, their own staff and those working for other

organisations (such as the airlines and franchise holders).

The review involved looking at a number of areas of the site where informed judgement suggested that there was at least the potential for slipping incidents. Microroughness measurements were taken of the floor surfaces in the areas under review. (Microroughness, in microns, is a significant factor influencing slip resistance of floors, especially in wet or contaminated conditions.) These measurements were considered together with other factors to provide a holistic picture and real-life assessment of slip risk.

Other slip risk factors incorporated into the overall assessment included

- Floor type and finish.
- Tasks and activities in the area under review.
- Who was using the area.
- Water or other floor contaminants.
- Staff footwear.
- Environmental influences in the area.
- Cleaning regimes.

A selection of the areas they investigated, conditions found, conclusions drawn and responses made are summarised here.

Passenger check-in.

The passenger check is an area where pedestrians (including young and old) are likely to be pushing, pulling or carrying loads, be rushing and possibly distracted. It has an epoxy painted concrete floor that is regularly cleaned with a mechanical scrubber dryer. The entrance is well protected from the elements and has extensive built in

matting. Under normal conditions the check-in hall presented a low slip risk but should water be walked in on wet days or accidental spillages inside not be attended to there would be a significant risk.

Response. The objective is a clean and dry walking surface. Monitoring to see if walk-in water occurs, supplementary matting if necessary. Staff briefing on spillage spotting and the action to be taken.

Public concourse.

Extending through a large part of the inside of the terminal the floor has a textured epoxy surface. It is subject to the same sorts of conditions and use as the check-in. The fixed matting is not so good in the concourse entrances with some being ineffective as it is not always placed to coincide with the direction that most pedestrians walk in after entering the door, walk-in water results. Weather canopies are provided at most entrances to limit water contamination. Floor surface roughness is moderate and will not cope with dirty or heavily contaminated conditions.

Response. Routine cleaning systems reviewed to handle 'walk-in' water during wet weather and to respond to spillage spotting, methods introduced to ensure that the floor is fully dry immediately following planned cleaning.

Main revolving door entrance.

The principal passenger entrance to the terminal building is a large powered revolving door. The outer half of the floor within the revolving door is covered with ceramic tiles. These tiles have very low microroughness, are exposed to rain and dirt and are located where encumbered pedestrians (young

and old) are rushing, turning and distracted. Slip risk was identified as being high. The inner half of the floor within the circumference of the revolving door consists of coarse grit/dirt removal matting. Although this has some absorbent qualities its design (and heavily worn condition) render it of little use in preventing walk-in water being carried onto the adjacent concourse where control of contaminants is known to be important.



Response. Arrangements are being made to have the revolving door removed and pedestrian flow redirected to a better-controlled area. A decision made easier by the 'temperamental' nature of these particular powered doors.

'Duty Free' shop.

High gloss ceramic decorative floor tiling with low microroughness. Originally thought to be likely to be a high-risk area but this proved not to be the case. The duty free shop is sited in the heart of the terminal building with no risk of walk-in water.



Floor cleaning takes place at night when the shop is closed to the public. A 'no food & drink' policy is enforced. There are no open products to contaminate the floor and bottle breakage responses and procedures are very well organised.

Response. Although the floor is glossy pedestrians never have anything other than a clean and dry floor to walk on. No action is needed.

Passenger toilets.

Toilet facilities exist to serve the concourse in the 'land side' concourse area and the 'air side' departure lounge. All are cleaned to a high standard with a fully dry floor before being reopened to the public. However all toilet areas are likely to be subject to water contamination to the floor and will be used by people of varying physical capability. The toilet facilities 'air side' have textured epoxy resin flooring offering high microroughness that does not impair cleaning but does offer high slip resistance. The 'land side' facilities have gloss terrazzo floors – a beautiful finish visually but with very low microroughness and very slippery when wet.

Response. 'Air side' – slip risk is low even in foreseeable wet circumstances. No action. 'Land side' – a real likelihood of slips

occurring. There would be difficulties in bringing forward the floor replacement in advance of the next planned refit. Greater (labour costly) frequency and diligence of splash clean ups were implemented while investigations were made into possible etching treatment to the gloss terrazzo to improve surface microroughness and slip resistance in wet conditions.



Means of access to aircraft.

Pedestrians boarding and alighting from aircraft can be expected to be carrying items, rushing and distracted. Some will be the young or elderly. Two main means of access exist: wheeled movable aircraft steps and powered 'umbilical' air-bridges.



The movable steps are kept outside and are exposed to the weather and a variety of potential contaminants to the walking surface but the profiled rubber treads to the steps still offer reasonable slip resistance.

Response. Periodic cleaning of the treads to control contamination and monitoring of the condition of the rubber surface for hardening or perishing brought on by exposure to the elements.

The air-bridges are floored with textured vinyl sheet for the most part and are cleaned to a high standard. Even with young and old, encumbered, rushing and distracted pedestrians the textured vinyl – protected as it is from foreseeable contamination of any significance – performs well. The last few feet of the air-bridges (where they dock with the aircraft and where the operative stands) are floored with metal chequerplate.



Experience and experimentation suggest that the slip resistance of metal chequerplate is not a direct function of the raised profiling pattern but related more closely to the microroughness of the upper surface (the foot contact surface) of each profile cleat. Microroughness measurements and analysis of the other relevant conditions indicate there is little problem if the chequerplate is kept clean and dry but that it offered poor slip

resistance if wet or contaminated. The most likely source of contamination is rainwater if the docking roller doors of the air-bridge are opened early in the docking process. This is of particular concern as, if the roller door is opened early, the operative is standing on a moving slippery surface close to an open drop to the tarmac below.

Response. Maintaining the high standards of floor cleaning and ensuring that strict operating disciplines are followed to prevent the opening the air-bridge docking end door until the last seconds of the docking manoeuvre.

Baggage handling hall.

Where staff load luggage to and from trailers and conveyors in a handling bay opening onto the airport apron. The matt concrete surface has become ingrained with oily contamination and gets wet from pedestrians and baggage trucks from outside. Workers are manhandling loads and, although footwear standards are controlled, there is significant slip risk in this area. No real floor cleaning takes place.

Response. Restoring of the original roughness of the concrete floor surface with a one-off rigorous clean. Routine mop and detergent cleaning to introduced with occasional use of a mechanical scrubber to prevent ingraining of contaminants compromising the surface roughness and associated slip resistance.

Airport apron.

Used as access and thoroughfares by aircrew, passengers moving to and from smaller aircraft and by airport staff. The concrete pathways are sufficiently textured

that, even in wet and contaminated conditions and with additional problematic human and environmental factors, they provide excellent slip resistance. However, walkways and other important points on the apron are marked out with coloured lines using a purpose made paint-like material. These lines exhibit very low microroughness and involve a high slip risk in the unavoidably wet and contaminated conditions.

(Motorcyclists will be familiar with the loss of grip when crossing broken white lines to overtake.)

Response. As the apron markings have to be replaced or refreshed at intervals, that is the time when alternative, possibly textured, surface marking products are to be considered.

Airport fire station.

The dock bays housing the airport's fire appliance are, not surprisingly, smartly kept. The floors of the appliance bays are light coloured paint on concrete and visibly clean and smooth – too smooth in fact, having very low surface microroughness. Although fire crews' footwear can be controlled to a high standard, a regularly wet environment with shiny painted floors, cleaned by hosing down, detergents from appliance cleaning and inevitably hurried, distracted users indicate a significant slip risk. Getting injured on the way to the appliance is not a good way to respond to an emergency.

Response. The uses of, and activities in, the fire station dock bay seem fixed and largely unavoidable but the floor paint is just starting to show its age in parts. To attempt to identify a floor paint or other surface treatment with the required combination of

cleanliness, durability and microroughness.

Mobile work equipment and workplace vehicles

Metal chequerplate is in use on many items of workplace transport and mobile work equipment at the airport including fire appliances and working at height platforms. (See also 'means of access to aircraft – air-bridges', above.) It is generally placed where people stand on the equipment to work or on footholds used to climb up onto vehicles and equipment. The experiences of staff using these vehicles and equipment (usually outdoors and subject to water and other contamination) accord with the assessment made that metal chequerplate can be particularly slippery when wet. Ad-hoc attempts have been made to tackle this experienced slip risk by applying adhesive anti slip strips or sheets although this has been far from comprehensive.



Response. Each vehicle and piece of equipment to be inspected and assessed for retrofitting of adhesive anti slip coatings. 'Fitting as standard' of chequerplate is to be raised as an issue when specifying for or procuring new vehicle or equipment.

Changing attitudes, tackling risks and reducing slip & trip injuries – a multi-

faceted approach in a factory environment

A recently appointed safety manager at an East Anglian food processing and packing plant carried out a trend analysis of the company's accident statistics. He identified that the majority of minor injuries and at least one major injury could be attributed to slips and trips of one kind or another.

The reportable injury cost a worker a broken elbow and over £2000 in lost time alone. Despite the bumps & bruises nature of the minor injuries to staff it was still possible to directly attribute several thousand pounds worth of incidental costs to these accidents.

Factory management consulted with shop floor colleagues and agreed that these incidents would no longer be accepted. There would be a positive programme to stop hurting colleagues and to avoid the attribution of blame. The main point was to be to remove these injuries.

'We don't come to work to hurt people or to get hurt.'

Past incidents were reviewed to identify their underlying causes and the site was surveyed with a critical eye for slip & trip risks. Initial hazards found included –

- Chilled atmosphere processing rooms suffering from condensation causing wet floors.
- Product spillage and poor housekeeping.
- Oil required to be added to some products.

- Unsafe acts by individuals – pallets strewn across floors, hoses not rewound.
- Poor appreciation of personal risk by staff.
- Poor ergonomic design of certain work areas.
- Footwear inappropriate for some tasks and locations.
- Floors in some areas were not designed to cope with their operating environments.

The workforce was involved in a process of risk assessment, identifying solutions and prioritisation. Management set a budget and a plan was established to tackle the most significant hazards and the highest risks first.

- Housekeeping training was provided to all colleagues along with awareness sessions on the significance and dangers of slips and trips.
- The 'product oiler' machine was relocated away from pedestrian traffic and fitted with a bund to contain any splashes or spillages.
- Risk assessment training has been given to all colleagues.
- 'Safe Behaviour' workshops are run for all colleagues with the emphasis on collective ownership of health & safety and empowerment of all colleagues to intervene to have hazards and risks tackled.
- *A place for everything and everything in its place* housekeeping regime.
- Flooring consultants have been brought in to advise on appropriate flooring throughout the site.
- Footwear trials introduced in areas subject to unavoidably wet conditions.

Company weekly and quarterly safety inspections have been introduced and are supplemented by trained colleagues carrying out daily, planned risk spotting and by near miss/no injury incident reporting.

Management's message to the workforce was that "We don't come to work to hurt people or to get hurt." The workforce contribution has been particularly strong in the enhanced cleaning regime, improved awareness and reporting, challenging unsafe acts by others and the formation of a company slip & trip action group. Unsafe behaviour has moved from being commonplace to now being something that colleagues and management alike will not accept and will challenge.

There is still work to do on tackling some of the hazards and incident reporting is now more keenly observed. Despite this, recorded incidents have fallen by over a quarter already and with none requiring medical attention.

The programme is now being rolled out to the company's other factory sites.

Ice build up in cold store costs time and money in a frozen food factory

The problem.

Over a period of time, employees in a frozen food factory reported a

number of slipping accidents resulting in time off. The main access to the cold store was via a 6-metre sliding door and was electrically operated by pull cords at either side of the door. Access using the forklift trucks (FLT) was difficult and consequently the door suffered continual damage, which in turn made the door difficult to open and close. Due to the door being ajar for long periods, humid air entered the cold store and it was found that employees were slipping on the ice being produced. In addition, the cold store had to be defrosted at regular intervals at great cost. The company had already spent money on repairing and replacing the existing doors but this was clearly only a short-term solution. The objective was to look for a completely new concept that would allow quick closure of the door, minimal contact with vehicles and reliability.

The solution.

Firstly, a new cold store rated rapid roller

***'Investment payback
in 8 months and
£35K savings per***

door with crash out facility was fitted. This was designed to cope with impact from vehicles and also had an automatic reset. In addition, small design changes were made to the cold store to allow the FLTs to make larger turning circles thus reducing the likelihood of any vehicle impact with the roller door and racking and eliminated ice build up.

The result.

During the nine months after these changes had been implemented, the roller door remained undamaged and there had been no slipping accidents reported by staff.

The cost.

The company reported that the initial cost to supply and fit the new door was recouped within the first 8 months. This was because savings were being made due to improved efficiency and a reduction in maintenance costs. For example, the cold store did not have to be defrosted so often. Every time this happened the cold store had to be emptied and alternative storage paid for. Evaporators no longer had to be cleared of ice on a weekly basis. The company also saved on refrigeration running costs and on the repairs that were regularly being made to the main door and damaged racking. Insurance costs and liability claims reduced and the reduction in accidents also meant savings in investigation time. In addition to recouping the initial capital outlay, the company also believes that by addressing the slipping issue on site through reducing ice build up, it is now saving £35k per annum due to increased efficiency and savings in maintenance and running costs.

Mechanical floor scrubber-dryer in shopping mall

The problem.

A contract floor cleaning company were using rider-operated scrubber-dryers to clean a large shopping mall after it had closed for the day. Unfortunately a pedestrian slipped over an unattended pool of water that had been left by the scrubber dryer. The pedestrian suffered head injuries and spent time recovering in hospital.



Mechanical scrubber-dryer.

On investigation it was found that when the scrubber-dryer turned around to begin another run down the mall, the operator raised the blade at the rear of the unit that deposited water and debris onto the floor.

Rather than cleaning up this water it was left unattended. It is important to note that the floor surface was typical of that found in many shopping centres being a polished terrazzo tile which when dry provides adequate slip resistance, but is often very slippery when wet.

The solution.

New barriers were purchased so that the deposited water was totally enclosed until the floor was dry. The operator had to dismount the scrubber-dryer and set up the barriers, this meant that his cleaning took a little longer. However there have been no more slipping accidents as a result of this improvement.

Knowing when and where hazards and risks arise plays an

important part in incident reduction

Why more shopping centre slips in the middle of the day?

In a large and busy city centre shopping mall the safety manager succeeded in reducing pedestrian slipping incidents by starting with a simple analysis of known incidents. It was found that there was a pronounced peak in incidents on the mall walkways over the lunchtime period and that these were mostly slipping events.

The mall being rather busier at lunchtime could not account for this peak. Not surprisingly shoppers at around this time of day, often workers from nearby offices etc on their lunch break, were eating their lunch whilst browsing the mall. Dropped food and spilled drinks were bound to happen and led to slips. To compound matters the mall's cleaners' meal break was at just this time leaving no one to identify and deal with these slip-risk spillages.

Altering the cleaners' meal break pattern so that spillages were cleaned up quickly during this busy pedestrian period eliminated this mid-day peak and consequently significantly reduced overall slip incident levels.

This analysis focussed management's attention on the importance of cleaning in slip and trip prevention. Redesigning the cleaning system for dealing with any floor contamination so that it is responded to quickly, isolated from pedestrians and cleaned to a fully dry finish before returning it to pedestrian use has contributed to

reducing slip & trip incidents to less than a third of previous levels.

An error in pedestrian flow management

The same shopping mall has three pairs of escalators, one 'up' and one 'down' in each pair located at the north end, centre and south end of the mall. All of the escalators were replaced during a mall refurbishment. Analysis of fall incident records showed increased levels following the refurbishment work, furthermore there was a concentration of incidents close to the central pair of escalators. Why should this be?

It was quickly discovered that the north and south pairs of escalators were configured so that the left hand escalator went up and the right hand one descended (as the old escalators that they had replaced had done), the central pair of escalators ran in the opposite directions – the left hand one going down and the right hand one up. Pedestrians were found to be approaching the wrong end of the central escalators and either quickly changing direction when they realised their 'mistake' or bumping into people alighting from the escalators. Falls inevitably occurred.

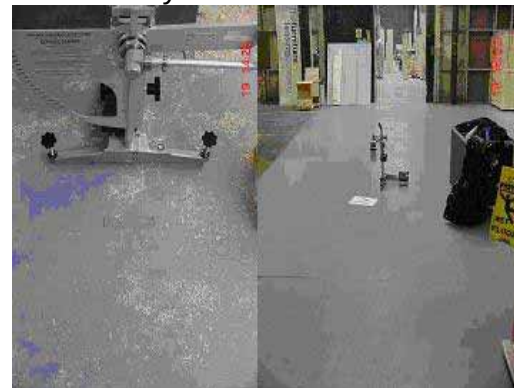
Reversing the running direction of the central escalators to match its predecessors and the other new escalators immediately eliminated this rise in incidents. Adding high visibility paint to the nosings of the escalator moving treads further reduced fall incidents associated with the escalators to levels lower

than had ever been experienced before.

A worker was injured when he slipped onto a woodworking machine

The problem.

An employee in a pine factory slipped and cut himself on a poorly guarded machine whilst in the course of his work. As a result of this injury, HSE served a health and safety improvement notice on the company because the floor was found to be unacceptably slippery even in dry conditions.



'Pendulum' tests on the factory floor.

In addition, it was also found that furniture wax was being transferred directly onto the floor as products were being pushed around the factory and this may have contributed to the original accident.

The solution.

Trolleys were introduced to move large items of furniture around the factory. This also helped to reduce manual handling. Areas of the floor around machinery were also painted with an anti-slip treatment to improve the slip resistance in

these areas where people were working close to other hazards.

£55,000 for teacher who slipped on a chip

A schoolteacher who slipped on a chip outside the canteen has been awarded £55,000 compensation. The teacher had been at the school for 20 years prior to the accident that took place in December 1998. She had been carrying jotters when she slipped and fell on a ramp and strained knee ligaments. Following the accident she was on crutches for five months and underwent intensive physiotherapy.

The judge ruled that the council should have realised that the ramp posed a risk. On the day of the accident the ramp had been slippery and exposed and had not been maintained in an efficient state. He added that non-slip flooring should have been installed and priority given to cleaning it. He also stated that it would have been difficult to spot the chip on the ramp due to the colour and pattern of the tiled flooring.

Even the messiest of slip potential environments can be improved.

The management of a clay processing plant estimated that around 40% of their accidents were attributable to slips & trips and that each injury at work had direct costs to the company of around £100 per day. The company identified a number of areas for action.

In the production areas clay deposits can be a problem, the fine chalky clay is

'40% of the company's accidents were slips & trips.'

slippery when wet but also slippery when in dry powder form.

Manufacturing the clay is a messy business as large amounts of water are needed during the production process and water is the main agent used by workers to clean their work areas down. Substantial underfoot contamination is almost unavoidable but the company looked at ways it could reduce the risk. Suitable safety footwear is issued to workers and the company is now looking at identifying footwear that offers best slip resistance performance in their particular working environment.

Housekeeping has been improved in engineering areas with better-defined walkways and work areas. These have enabled workers to keep pedestrian areas trip hazard free and encourage pedestrians to stick to the marked walkways. 'Spill kits' have been made available in all areas in order to respond to oil leaks or spills from machinery.

'Toolbox talks' have been given to the workforce on the subject of slips & trips. Their aim has been to improve staff awareness on how slip & trip injuries occur and how they can be prevented. They try to encourage the workforce to play their part in injury prevention and to report all incidents.

The company uses a large amount of earth moving equipment and identified a slip issue with one of the machines. It was difficult to keep the access route to the drivers cab free from clay debris.

The driver had to mount the earthmover at the front onto metal surfaces and access the cab via the wheeled track. These areas could not realistically be kept free from contamination by clay. The machinery suppliers were called in and agreed with the company that the best solution was to redesign the driver access route so that the driver climbed onto the machine from the rear, an area much less prone to contamination. By co-operating in this way the slip risk has been reduced and the machinery manufacturer has gained valuable feedback on its product's use in practice.

Tackling slips & trips in a further education establishment

A member of a college's Health & Safety Team attended a Health & Safety Executive seminar on preventing slip, trip and fall injuries. They also consulted HSE's free Education Information Sheet No 2 – 'Preventing slip & trip incidents in the education sector.' and decided to assess the risks on their own college site.

Initial assessment found that some areas were not a problem in clean and dry conditions but became 'high risk' when dirty or wet. Water walked into the vinyl-floored corridors from outdoors, spillages on common room vinyl floors and dust created & deposited on the painted floors of the college workshops presented just such wet or contaminated conditions and so had a high slip risk.

The college Senior Management Team was involved at the earliest opportunity and were able to give backing to the Health & Safety Team's recommendations for action.

Initial action included

- Providing good quality entrance matting to remove water from the footwear of people entering the building. Care was needed to be sure that the matting extended across the routes that pedestrians actually took when entering the buildings. This is not always in a straight line forwards from the doorway.



- Main corridors are now carpeted.
- Anti-slip flooring with good surface roughness has been installed in the workshop areas most vulnerable to unavoidable contamination.

Other action taken or under way:-

- New main entrance doors designed to reduce the amount of rainwater getting in onto the floors.
- Take-away drinks from the staff and student refectories are now issued in lidded containers to reduce the risk of spillages in walkways, stairwells etc.



- Anti-slip and 'hi-vis' treads have been fitted to stairs.
- More workshop areas (e.g. hair & beauty studio, craft workshops) are being surveyed to assess the potential for liquid and non-liquid floor contaminants to cause slip risks.



The college has experienced a year-by-year decrease in the number of slip-trip-fall incidents since the instigation of the action programme.

Grateful acknowledgements to Aberdeen College.

Carpet company fails to look after its own carpets

A carpet company in the midlands had been subject to two health and safety inspections from the local authority. On both occasions the local authority officer had to challenge the poor system of work for storing carpets in the warehouse part of the premises. On the second visit the condition of

carpets towards the back of the store presenting a trip hazard was also raised with management.

The company was once again visited following an accident to the manager of the store who had sustained a fractured wrist.



The shop floor was very congested with stock and goods were left in the main walkways. There were also areas of worn and damaged carpets in the public area. The warehouse at the rear of the premises was even more congested with stock, restricting access to the racking and obstructing the fire exit

Following the accident investigation, the company were prosecuted with contravening the Workplace (Health, Safety and Welfare) Regulations 1992 as the sales floor was obstructed with goods and also had badly worn areas of floor covering that were likely to cause a person to slip, trip or fall.

They were also prosecuted for a breach of the Health and Safety at Work etc Act 1974 in that the system of work in place for storing carpets in the warehouse was

unsafe. The company pleaded guilty and was fined £8,000 in total.

Temporary staff miss out on anti-slip footwear

A risk assessment in a food processing plant identified areas of high slip risk. One area was the room in which 'jelly' for pork pies was handled. This was despite frequent cleaning of the floor.

The company made a decision to restrict access into this area. Only staff wearing a new brand of Wellingtons were allowed in. The special footwear afforded better grip than the normal boots still used in the remainder of the factory.

Staff shortages on the night shift resulted in an agency worker being transferred into the 'jelly room' to cover for the remainder of the shift. Unfortunately, supervisors failed to recognise the need to provide the more slip-resistant Wellington boots to temporary staff. The agency worker slipped and bumped into a person who was carrying a bucket of hot jelly. The jelly spilled onto his left arm causing burns.

After the accident, all supervisors and managers were instructed that controls identified by their own risk assessment were mandatory and all staff, including agency workers must wear the special footwear in the high-risk area. In fact the company are now considering providing these boots to all staff on site.

As a further development even though the boots are more expensive, the company is

introducing the new boots progressively in all seven of their factories, as they are convinced of their benefits in terms of grip, comfort and durability, which outweigh the extra cost.

Poor housekeeping causes trip injury

A convenience store was prosecuted in January 2002 following a tripping accident to a customer. The customer tripped over newspaper plastic binding (used to hold the newspapers together), causing an injury to her hip. She was unable to work for 5 months.



The management of the store had previously been warned about housekeeping issues and were in fact served with an Improvement Notice.



Good housekeeping & work organisation?

The company was fined over £4,500 in the Magistrates Court.

Tackling slip problems in a manufacturing bakery

A HSE inspector received reports of injuries to workers resulting from slip accidents at a factory producing filled pastry products. The inspector found that staff in

manufacturing and ancillary areas were experiencing slip problems and that not enough was being done to prevent them. The inspector decided to require the company to take action and served an Improvement Notice on them. Although this legal notice spurred the company into initially taking action, they went beyond the specific requirements of the Inspector's notice to try to get the slip accident rate down to zero.

Problems faced by the company included a range of different floor finishes on different parts of the site, the

'They had to deal with a variety of floor surfaces, different contaminants and workers pushing & pulling loads in the factory yet slip accidents dropped by over three-quarters.'

floors were often exposed to harsh wear and treatment, the complete elimination of all floor contamination risks (water and ingredients) was not practical and workers were often pushing or pulling loads. The company took advice from their HSE Inspector and decided to introduce several changes to try to reduce slip risks.

Training was given to managers and the workforce in slip prevention, the co-operation of workers was also sought in assessing the effect that the changes had..

Staff were issued with different types 'anti-slip' footwear. Some were initially assessed as performing well but were said to be difficult to keep clean as food debris clung to the tread pattern. Trials of one type of footwear were

carried out using some of the male workers, when these were subsequently issued to female workers they found them heavy on the feet and tiring. Another footwear type which was initially felt not to have quite as high a slip resistance seemed to deliver better results over time as the tread pattern did not clog with food debris (better for hygiene) and offered greater comfort to many staff.

The factory had been in existence for many years and had changed hands. Not much was known about when the floor finishes had been installed and why certain choices of floor finish had been made. An expensive floor repainting exercise had been carried out but the finish was not durable. Epoxy 'anti-slip' floor finishes had been installed in areas where there was perceived to be the greatest slip risk.

In fact the area felt to be most at risk because of the amount of water spillage – the tray wash area – was not such a problem, the micro-roughness of the floor surface was enough to give good slip resistance without compromising hygiene. More of a problem were the pastry preparation areas where the floor surface roughness was not enough to cope with the type and extent of contamination that was happening.

Rather than looking at replacing the floor the company introduced measures (such as drip trays around machines and conveyors) to reduce and capture potential spillages – making floor contamination much less – and introducing 'anti-slip' footwear that did not clog. Another important aspect of the slip prevention

programme was improved cleaning regimes designed to effectively deal with the food spillages that did get onto the floor.

The company found that the number of slip accidents dropped to less than a quarter of that which they had been experiencing prior to the preventive measures.

Raised plinths cause trips at electrical retailer

A major electrical retailer has been fined for two tripping accidents that occurred in one of their stores.

In Summer 2002 a member of the public tripped over one of 21 unmarked plinths and fractured their arm. The plinths are a serious tripping hazard as they are covered in a similar carpet to the rest of the floor, which makes them difficult to distinguish especially as the attention of pedestrians is intentionally distracted by the goods on display. An improvement notice was served on this company for all raised areas to be clearly identified. An extension was granted due to a refurbishment of the store, yet later in the year further inspection still identified tripping hazards within the store.

In early 2003 there was a further accident involving a trip caused by one of these plinths. A prosecution was launched by the local authority Inspector and as a result the group were fined £9000 and ordered to pay the authority's prosecution costs.



Worn out stairs carpet causes serious fall – yet still goes un-repaired

A city centre office received a routine health & safety inspection visit from a local authority inspector. The worn out nosings to the stairs carpet were pointed out by the inspector and the proprietor gave a written undertaking to replace the carpet.

Some months later the inspector found that the carpets had still not been replaced. The inspector gave a written warning to the proprietor about his obligations to deal with trip hazards. The company again gave assurances that they were to be replaced shortly and that temporary repairs would be carried out in the meantime.

Fifteen months after the initial inspection an employee at the office suffered an injury when she tripped on the stair carpet nosing when descending from the first floor. Tape placed across the worn out nosing had come away. The employee suffered a broken ankle and a dislocated foot. Ten days in hospital and ankle surgery followed. She was unable to walk

for several months and still in pain and using a stick almost a year later. She has been unable to return to work since.

The accident was not reported to the local authority until three weeks after the incident yet when a visit was made to investigate there was no evidence of any improvements having been made even after the accident.

In the ensuing prosecution the proprietor pleaded guilty to offences under the Workplace (Health, Safety & Welfare) Regulations 1992 with a substantial fine being imposed and the proprietor being ordered to pay the prosecuting authority's legal costs.

Local council reduces slip & trip injuries

Boulevard Project, Camden, London

The Boulevard Project aimed to bring to Camden the style, levels of cleanliness and feelings of safety and security that can be found in the best cities in Europe and North America. This ambitious street improvement programme was backed by a major capital investment of around £24 million. A significant aspect of the project was the improvement of the pavements within the borough.

Cleaning was identified as a key aspect, with the introduction of continental style washing, rather than simply sweeping. The Boulevard Project has developed a special "Camden Slab" so that borough streets can withstand the continental cleansing regime the council has introduced. The

pavement has to "withstand" the cleaning in two respects - the machines weigh up to two and a half tonnes and the cleaning water would quickly erode traditional slab bedding. The Camden Slab is fifty percent thicker than conventional paving, it is close jointed (no gaps between slabs) and the bedding is a mixture of sand and cement, rather than just sand. The paving is also laid to a much higher standard, a change that is reflected in new paving contracts, which place emphasis on quality rather than speed.

'Claims dropped from over £367 000 to zero.'

You may be wondering what this means for Slips and Trips? Well, in the three years up to the summer of 2000, when the Boulevard Project began, total claims on the first fourteen streets to be overhauled amounted to £367,496 for 152 trips or falls. In the period since each of these streets had a makeover, claims have dropped to zero. This is an impressive outcome, and one that financially justifies the improvement in quality of paving in the borough.

The Boulevard Project is a holistic approach to the streetscene, tackling graffiti, flyposting, disabled access, excessive street furniture, drainage, lighting, shop frontages and anti-social behaviour. The project aims to engage with local stakeholders to give them a sense of ownership, which will help to maintain the improvements for the long term.

Entrance matting still wet when shopping

centre opened to the public

The new owners of a shopping centre in the Midlands wanted to cut costs. They decided that their overnight cleaning operation could be provided cheaper if carried out first thing in the morning, before the shops opened.

Following the change a number of slipping accidents occurred near to the entrance of the shopping centre. Investigations soon showed that the entrance mats, which had been cleaned using a wet process, were still damp when customers first entered the building. Customers, unaware that the mats were damp and were actually wetting their shoes, stepped onto the smooth floor..

Research has shown that even tiny amounts of liquid on some smooth floors can have a dramatic effect on the floor slipperiness. The water adhering to the sole of a shoe is more than enough to cause this.

The owners quickly re-instated the overnight cleaning regime so that floors and entrance mats were completely dry well before opening.

Walkway level changes hard to spot

Alterations were made to walkways in a government office after an alert administration manager identified a risk to pedestrians.

The walkways were covered in dark maroon tiles and were in good condition throughout but close to

two entrance doors there were sloping areas of walkway and another area on a staff corridor. The building was quite old and the changes in level were part of the building structure but, because of the dark colour of the floor, it was not obvious that there was a change in level.

All of the areas were part of fire escape routes and one was at the



'Sloped walkway which was not apparent at first glance.'

entrance to the main reception. The manager knew that visitors could not be expected to know about the change in level and

some visitors may be less steady on their feet than others.

It would have been difficult to change the structure and to remove the slopes by introducing a single step into the walkway would probably not have lessened the



'Highlighted changes in floor level.'

risk. He decided to highlight the slopes with contrasting, light coloured areas of carpet tiles so that the changes in level attracted the attention and were apparent to pedestrians.

Although there had been no reports of accidents (neither injuries nor 'near misses') on these walkways he decided that the very low cost of retiling these areas was worthwhile when compared to the potential cost of just one fall injury.

Designing pedestrian safety into buildings

A group called Designers Initiative On Health And Safety (DIOHAS) represent much of the top hundred architectural practices in the UK and meet regularly on issues relevant to design aspects of health and safety in workplaces and other parts of the built environment.

At one meeting of DIOHAS a member architectural practice was keen to share with the rest of the group its experience in helping an important client to make the right design choices for protecting pedestrians from slip risks.

The DIOHAS meeting was held in the same offices that had, a day earlier, hosted a presentation to clients on a prestige commercial refurbishment project in London with all the usual expensive finishes. All the samples of these finishes were still on display in the meeting room.

The project architect illustrated to the group how every sample had been tested by independent engineers using UK Slip resistance Group (UKSRG@AOL.com) guidelines to validate the claims made by the manufacturers of the floor finishes. The manufacturers had also had earlier tests carried out to the same standard. The practice was able to show that the

slip resistance tests results from the manufacturers and the independent testers matched exactly. It is important to understand and have confidence in test data supplied by manufacturers.

The right coefficient of friction and floor micro-roughness levels were present in all the floor finishes proposed for relevant areas without there being any compromise in quality or cost. The designer told the group that a workshop held in conjunction with the Health & Safety Laboratory (<http://www.hsl.gov.uk/capabilities/pedestrian.htm>) had helped their practice be better informed and better able to guide clients to choices of floor finish that do not add to pedestrian slip risks in the finished buildings.

Oily floors in an engineering workshop

For years a lot of the machines at a specialist engineering company had leaks that meant oil and sawdust continuously on the shop floor.

Accidents reported by people slipping on the slippery floor were running at about 14 every year. For the size of the operation this represented quite a high incident rate.

'Oil leak plan reduces slip accidents by two thirds and delivers big savings in the oil usage bill.'

What was done?

- Oil Leak plan – a list of machines that had leaks was prepared for maintenance staff to fix. This list is updated each time a leak is fixed or another leak is reported.
- Bunding – all machines with leaks that cannot be fixed (often older machines) have a metal bunding around the whole of the machine that collects all the leaking oil to stop it spreading across the floor.
- Planned maintenance regime – each machine is serviced regularly and part of the service sheet is to fix leaks.

Benefits of the Oil leak plan.

- Slip accident rates have been reduced by about two-thirds.
- The oil that is collected in the bunding is vacuumed out and recycled for re-use.
- Oil usage has been significantly reduced where leaks have been fixed – a big cost saving and less oil needs to be stored on site.
- Use of sawdust to soak up oil has significantly reduced.
- Housekeeping is a lot better – a better environment for people to work in, improved motivation and they are more inclined to keep their work area tidy.
- There is now a weekly housekeeping audit that is carried out and challenges supervisors of areas if they have machines with oil leaking onto the floor.
- Environmental impact – the company has ISO14001 accreditation and audit results from the external auditor show a significant

improvement in oil usage and oil leaks and risks of contamination.

- There is an action & improvement scheme whereby employees can pick a problem/improvement and work on it as a team and implement it. If there are cost savings to the company then the team get 10% of the savings. Two of these worker initiatives have contributed to improving how oil leaks are dealt with which has made yet further improvements.

Logical approach cuts slips & trips by two-thirds at food processor.

There is no single answer - but identification, prioritisation and staff involvement pave the way for some straightforward actions and solutions.

When a company producing pre-prepared meals set about improving its health and safety performance reducing slip and trip injuries became the first target. A review of their incident records clearly showed that the majority of accidents to employees were slip and trip incidents.

Management taking responsibility and taking the lead.

A senior managers steering group was set up to 'raise their game' on health and safety and, in recognition of the significance of slips & trips in their food processing environment, set a target of

reducing slips & trips by a third within a year.

Tapping into workforce knowledge and experience.

Managers recognised that success would rely heavily on the involvement and commitment of the whole of the workforce. Staff working groups were asked to hold their own meetings and to look for problem areas, opportunities for improvement and suggest possible solutions. These were fed back to the steering group who could collate them, prioritise what had been identified and arrange whatever correction was needed. In playing their part the staff working groups were often able to remedy problems there and then without the need to report to managers. They found that the extra awareness created by being actively consulted and involved meant that they were more alert to problems and felt better able to deal with them. Workforce safety representatives were also given incident investigation training so that they could play a part in identifying the real, underlying causes of any accidents that did happen.



Fostering workforce commitment for working together for safe premises and safe behaviour.

This steering group, working group and 'problem spotting' activity ran parallel with training and awareness sessions for all staff. Their purpose was to make the workforce better informed and more able to identify and deal with problems. They were also intended to start to change what managers felt had come to be an unacceptable workforce culture and attitude towards hazards and risk. Unsafe behaviour and tolerance of risk had become to be accepted, even normal practice. Managers' objective was to make unsafe behaviour and risk taking unacceptable amongst the workforce. Challenging of unsafe acts, collective responsibility and peer expectations were found to be strong influences in changing the pre-existing culture.

When this culture shift was combined with the real improvements that the workforce was able to see in response to their working group reports their motivation was reinvigorated. They could witness the improving situation as it happened.

Employing solutions in a hierarchical sequence – floor contamination, safe floor surfaces, safe

behaviour, improved footwear.

Management were able to arrange for a number of worthwhile improvements thanks to the information coming out of the staff working groups and their own initiatives such as incident mapping – plotting incidents on a plan of the

premises, seeing where (& when) they happen most and establishing why. For example, this process helped management to identify that sauce getting onto the floor seemed to be responsible for a number of slipping incidents. (A market driven change in product specification actually did away with their sauce line, so that issue went away on its own.)

Production lines no longer had fixed hose-pipes for swilling down as it was found that they had often been just left running resulting in a lot of water on floor surfaces and wasted money on water bills. Hoses can now be collected from the equipment stores when they are needed for cleaning down but must be returned. Instead, one person on each processing line is designated as being responsible for clearing away any food spillages as they happen. Floor contamination by water and product is now much less – so fewer slips.



Some food spillage was inevitable.

Trip incidents were looked at too. Records showed that these were caused most often by the uncontrolled way in which movable items, usually pallets, were placed around the work areas during production. Designating 'pallet points' and marking them with floor lines kept the pallets used for work where they were needed, away from walkways, where everyone knew that they were and made it obvious when they had been left where they should not be. It became an ingrained good habit for staff to follow and 'self police' this simple safe practice.

The floor surfaces were looked at and some areas were found to be life expired – they were worn out. These were prioritised for replacement. Other floors not in the processing areas were also looked at and matting introduced to stop wet soles transferring water from production rooms onto smooth floors elsewhere.

When the initial decision was made to put the spotlight on health & safety, starting with slips & trips, management did wonder whether it would be a long process to achieve noticeable improvements. They were, in fact, able to show a 34% drop in slip & trip incidents over the course of the first year. It was also apparent that this went hand in hand with the shift in attitudes towards these incidents. From senior managers to the shop floor, everyone 'signed up' to making a difference and they were encouraged to see that their efforts and involvement were having a real effect.

Building on success

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Assigning a designated person to removing spillages.

eting the reduction target that they had set themselves the company started to look at another part of the slip equation. They continued to work on issues of floor contamination, good walkway surfaces, behaviour/task/human factors and they turned their attention to the footwear issued to the workforce – wellington boots



suitable for use in a hygiene critical environment. Discussions with their supplier revealed that there was a new food-standard wellington in development

that the supplier was confident had

improved slip resistance performance over its predecessor.

The company reached an agreement with the supplier for a field trial of the prototype and a test batch was issued to a group of workers. Their reaction was immediate and universally positive. Straight away staff reported that they felt the new boots had much more slip resistance, their subjective impression was that the boots were actively gripping the floor. Management were sufficiently impressed to take the decision to roll out the new footwear across all production areas. Although this was a gradual process they found that they were quickly able to identify another marked drop in slip incidents with incident rates down by over 60% on their original level even before introduction of the new footwear was fully complete.

Taking the lessons forward.

Real results had been achieved in quite a short period of time but no one rested on their laurels. The outcomes had relied on sound techniques – analysing the situation, utilising workforce knowledge, getting everyone involved, fostering the right culture, prioritising action and demonstrating the positive outcomes. These same techniques were used again as the company looked to raise its game on health and safety across the board with manual handling & musculoskeletal risks taking centre stage.

Slipping on dust contamination in a machining workshop

The slip risks resulting from machining dust became a point of discussion when a HSE inspector slipped on the workshop floor during a routine health and safety visit. The inspector was not hurt but the company did agree that processing dust finding its way onto the floor in that area did make it rather slippery. Workers too said that the walkways and working area floors were very slippery, even more vulnerable were visitors to the workshops (such as staff from the offices) as they were often taken unawares by the slippery nature of the floors.



The painted concrete floors of the workshop could not be completely prevented from becoming contaminated with fine dust (up to 10 microns) from the cutting and machining of graphite components. Extract ventilation at machines was effective up to a point but the filtration systems did not seem to be able to capture as much of the dust as was needed, allowing some to be deposited on surfaces. This was compounded by the system of emptying by hand the bags holding the filtered out dust; the manual process resulted in some dust being re-released and contaminating walkways.

The company set about dealing with this in two ways. Improving the floor grip so that it was better able to cope with the conditions and reducing dust contamination finding its on walkways.

Carbon dust on the workshop floor.

Tests were carried out on various areas of workshop floor to measure its microroughness and its slip resistance. When the floor surfaces were free of dust contamination they actually offered reasonable

grip for pedestrians but when they got any dust on them, as they inevitably would, their slip resistance became very low. These were exactly the results that the company had expected the tests to reveal.

Trial treatments were carried out on various parts of the floor using epoxy paints with 'inclusions' of various sorts and particle size to give increased surface roughness and grip. The best seemed to be gritty particles in a two-part epoxy – workers found it gave secure footing whether clean or with dust on it. Tests confirmed that the surface (with about 33 microns of surface roughness) did indeed give very good slip resistance when clean and still performed well when deliberately coated with carbon dust.



Treated walkways and work areas.

The treatment was progressively extended throughout the workshop. Workers, who were somewhat sceptical to start with, quickly realised how well the treatment worked and were soon asking,

“When is my work area going to be done?”



The company even found the treatment worked on profile-surfaced metal stairs that, although only occasionally used, had been said to be especially slippery when dusty.

Floor audits are carried out as part of scheduled safety checks and any areas needing attention are identified. Indications are that the service life of the 'grit paint' finish is between 12 & 48 months depending on the type and amount of use of the area. Treatment costs for the whole of the workshop worked out at around £1000.

Cleaning of the new floor finish is no more demanding with industrial grade dry vacuum cleaners doing the job day to day supplemented by a periodic clean with a mechanical scrubber-dryer.

When the company looked at the amount of carbon dust being deposited throughout the workshop they resolved to do something about that too. They saw benefits in the contribution that it would make to preventing slips, providing a better working environment and

reducing the size of the general cleaning task.

The existing dust capture and extraction system serving the workshop machines was not 'state of the art' and the filtration system was housed within the workshop. Plans were formulated to integrate all local exhaust ventilation into a single, more effective and efficient centralised system with the filtration plant located outside the workshop to avoid recontamination.

Of course, in addition to these benefits, the company hopes that the next HSE inspector's visit will pass without any 'slip ups'.

Fast food restaurant owners ponder; "Which are the right slip prevention options for us?"

A local authority Environmental Health Officer (EHO) visited a fast food restaurant (one of a chain) to investigate a slip accident which broke the arm of a female employee. The EHO identified that there were several good aspects about the safety standards on site – a generally positive company attitude to safety, adequate training well-kept documentation & records, proper floor cleaning systems – but the servery area was found to be very slippery. The nature of the business meant that the floor in the busy servery area was bound to become wet at some stage. When the EHO spoke to members of staff they stated that the incident "had been waiting to happen".

Investigation revealed that several floor areas had been replaced in the past. However, the floor covering in the servery seemed to be the original, having been in place for more than seventeen years. The EHO looked at the accident records and found that there was a higher incidence of slip incidents in the servery than elsewhere. Discussion with the Duty Manager revealed that the company response to this had been to deploy "Caution! Slippery floor." signs.

The owners arranged for testing to be carried out on the floors to find out about the surface roughness. This was found to quite good in most areas of the premises but not in the servery. The original tiling in the servery had very low surface roughness – much less than was needed to be able to provide grip in a kitchen/servery situation. The EHO used this floor roughness information with the Slip Assessment Tool software (then undergoing field trials, for free access to the finished software go to www.hsesat.info) which takes into account information about work activities, the environment, likely spillages and many other relevant factors. The assessment indicated that there was a significant risk of slip injury – an indication borne out by the area's incident history.

The company were advised that the floor surface in the servery was at the heart of the problem and that the floor should be first thing to be looked at. The owners however wanted to try some special 'anti-slip' overshoes for their staff and despite the EHO's advice that the working environment should be put

right before the use of personal protective equipment is considered, the overshoe trial went ahead at three of the owners' sites.

Experience showed that the mainly young staff were reluctant to wear the overshoes (a fashion issue!), enforcing the wearing of the overshoes impaired good staff relations, a good fit was hard to achieve as only 'S, M & L' sizes were available for the trial which increased tripping problems. Although the overshoes did provide extra slip resistance (so might be a viable option in some circumstances) the associated problems at the site negated the benefit.

The owners decided that the best option was, as the EHO had originally suggested, to tackle the problem in the work environment.

The relatively small cost of reflooring (extended by the company to areas beyond the highest risk server) led to the conclusion that it would probably have been cheaper in staff and administration time to have pursued this option at a much earlier stage. Technical specifications of the proposed floor covering were obtained to ensure that it was suitable for the purpose – providing good slip resistance and being readily cleanable to meet food hygiene requirements.

A subsequent review showed that the slip accident rate had reduced by 70% since the replacement of the floor covering and that staff on site were much happier with the conditions.

Japanese '5S' system in an aluminium foundry – better control, fewer injuries.

The Problem.

A large aluminium foundry identified slips and trips as being a significant risk to employees. This was mainly due to poor housekeeping and poorly maintained machinery leaking oil etc onto the floor. Realising the scale of the problem the company set about implementing a programme of cost effective improvements based on a Japanese system of workplace controls.

The Solution.

The size of the premises meant that improving housekeeping would not be an easy task. However the company was able to make substantial improvements by implementing the '5S Philosophy'. The system is based on 5 Japanese words which when translated mean Sort, Set in order, Shine, Standardise and Sustain. Once implemented, the system aims to eliminate unnecessary items from the workplace, improve order and tidiness (making sure everything has a home), maintain a clean workplace, ensuring that a workable system is in place and that these improvements are sustained.

In addition to the obvious improvements in housekeeping, savings were also made, as fewer items were lost. Obsolete equipment was more likely to be discarded thus increasing storage

capacity. The company also reduced slipping and tripping hazards by removing trailing cables, demarcating pedestrian routes, introducing non-slip surfaces and reducing walkway contamination at source.



Result.

The company have been using the 5S system as part of a 'Total Productive Maintenance' system and this has evolved over the past 8 years. Although it has been difficult to quantify, the benefits of using 5S are apparent.

1. Clutter is removed, tripping hazards are eliminated and the risk of slipping reduced.
2. Plant and equipment is cleaner. Maintenance problems can be identified at an earlier stage thus reducing production downtime due to mechanical breakdown.
3. Tools and equipment are placed in an ergonomic position to help reduce strains and fatigue.
4. Duplication is avoided as every team takes responsibility for its own equipment thus making savings by not



Anti-slip coverings on walkways.

Ensuring that pedestrian routes are clear.

purchasing or keeping excess equipment. In addition it is less likely that equipment is lost or 'goes missing' because of improved and 'visible' storage.



Everything in its place.

5. The operation gives the impression that everything is under control and this has a good impact with customers and visitors. Everybody takes responsibility for the cleanliness of their work area and hence no need for a special clean before major visits.

Conclusions.

It is clear that by successfully implementing better standards of control over the workplace and it condition the risks of slipping and tripping can be reduced. However there are other noticeable benefits. Financial savings can be made by improving maintenance and reducing production downtime. Working days lost due to injury from slipping and tripping accidents are reduced. This company also reported an increase in morale and consequently productivity, as it was clear that employees appreciated the improvements made to their work environment.

Holed walkway went unrepaired for

months before injuring a health service worker.

Prosecution, fine and enforcement notice for a NHS trust.

A hole had been dug in a concrete walkway at a hospital in order to repair a leak. The walkway was a busy access route to the hospital kitchen and restaurant. Five months later the hole in the walkway had still not been repaired, nor was it properly protected despite repeated requests to management from staff in the catering department.

When a catering assistant pushing a trolley tripped on the dug up walkway she fell into the shallow hole and sustained injuries that kept her off work for several months. Only after the catering assistant was injured were the necessary repairs carried out to restore the surface of the walkway.

A Health and Safety Executive Inspector investigated the accident. The Inspector concluded that the hole was an obvious and significant hazard and on a busy thoroughfare. The risk was known to the employers (the NHS trust) having been created by them and brought to their attention on a number of occasions before the incident. There was evidence of several 'near miss' or minor injury incidents involving the hole prior to the catering assistant's accident and there were indications that repair work on the walkway was deliberately delayed so that several jobs could be 'batched' together.



**Busy access route to a
hospital kitchen.**

The Inspector served Improvement Notices on the trust requiring them to carry out risk assessments of all their pedestrian traffic routes and floors – a task that they should already have carried out as a routine good management practice. The Inspector also prosecuted the trust for breaches of the Health and Safety at Work etc Act 1974 and, on hearing the trust plead guilty to the offence, the court imposed a penalty of a fine plus costs totalling more than £7000.

Fractured skull from a “*wholly preventable*” catering slip.

A kitchen worker fractures her skull. Injured member of staff unlikely to work again. Prosecuted employer ordered to pay over £36,000 including prosecution costs.

On hearing a prosecution case against a retailer arising from a slip accident in a store restaurant the District Judge said..

“This was a very serious accident, one which was wholly preventable. Every employer has a duty under

*has a duty to
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law to protect its employees from physical harm – something that [the company] blatantly failed to do. There had been four similar accidents in their kitchen during the previous 12 months, yet they still failed to act.”

When a Local Authority Health & Safety Inspector visited the restaurant to investigate the circumstances surrounding the serious injury sustained by a member of staff he quickly became concerned that the floor surface in the kitchen was very slippery with even the smallest amounts of water or grease on it.

The inspector found that the tiled floor appeared to be in good condition yet it still felt slippery even when the tiles looked to be clean and dry. When just small amounts of water got onto the floor it was found to be very slippery. To make matters worse, some areas of the kitchen floor sloped, increasing the slip risk. Kitchen staff could be seen walking with a very peculiar gait to try to avoid slipping. Floor ‘safety’ mats had been put down in some parts of the kitchen, such as in the dish wash area, but these were slippery to walk on too, especially when wet.



Cleaners had removed these mats at the time of the worker's accident, leaving her to walk on the slippery tiled floor that quickly became

contaminated with food waste, water and oily residues.

The worker experienced an uncontrollable slip and hit her head on the hard tiled floor. She was rushed to hospital where she drifted in and out of consciousness, suffered seizures and spent a lengthy period in the hospital's high dependency unit.

The company's safety records examined by the Inspector showed that there had been other slip incidents in the area but the response had been to provide the most heavily contaminated areas, such as the dish was, with matting – matting that was itself slippery, especially when wet. Scientists from the Health and Safety Laboratory examined the tiled floor surface and the matting and confirmed that the Inspector was right to conclude that risk of slipping was unacceptably high because of the lack of slip resistance of the tiles and the matting. The floor surface was clearly not fit for the purpose



The company was also aware of numerous other slip accidents in similar situations at their other sites around the country. The Inspector served an Improvement Notice on the company to require them to deal with the slip risks to employees. After a number of other options were considered by the

company, but concluded to be inadequate or inappropriate, they eventually replaced the floor surface with one that was suitable for use in an area where the total elimination of floor contaminants would never be possible. The new floor was specified to provide enough grip, even in wet or contaminated conditions.

Slip risks on a supermarket's smooth floors – sensible long and short-term action.

Slip issues.

When management at a large supermarket, part of a nationwide chain, carried out an assessment of health and safety risks and an analysis of known incidents they identified pedestrian slipping was amongst their most significant safety issues. It was clear that customers and workers were equally vulnerable and that the costs (actual and potential) associated with slipping accidents were very high. A single slipping incident could cost the company £15,000 or more. A lot of groceries have to be sold to generate the profit to pay for that.

Looking at the risks and what they knew about incidents, two areas in particular were targeted for action.

1. The customer entrance where people would enter the store

'Safety' matting on the kitchen floor.

walking water in on their shoes in wet weather, and

2. Spillages occurring in the retail area on which people could slip.



'Old style' store entrance.

The floors in the store had been in place for several years and were quite smooth, even light contamination of the floor by water or spillages could cause people to slip and fall. The fixed matting at the store entrance was quite limited and of a type intended to remove grit and dirt from shoes rather than to dry them.

What was done?

The company had already initiated a rolling programme of making improvements to store entrances and floors but this would not be completed overnight so they needed a sensible plan to reduce risks (and the vulnerabilities of the company) in the meantime.

They decided on three interim actions for the store entrance. These were designed to do three important things.

- Improve the drying of customers' footwear as they entered the store.
- Identify when water was being walked in onto the store floor.
- Respond to and remove any 'walk in' water.

They provided supplementary matting to be laid out in wet weather to provide a large, continuous shoe-drying surface.

Sufficient mats were provided to be able to replace them throughout the day as the mats themselves became wet.

Store 'greeters' were already permanently on duty at the customer entrance. They were instructed to ensure that the supplementary mats remained in position, did not fold so as to cause tripping and to continually check to see if water was being walked in beyond the mats.

Cleaning staff were told to respond immediately to a call from the greeter to replace any wet supplementary matting and to dry mop any walked in water. In particularly bad weather or periods when there was a lot of pedestrian traffic a cleaner would be continually on duty at the entrance to deal with floor contamination. A small cost compared to the potential losses from just one slip injury.

Spillages within the store needed a slightly different approach. Regular floor cleaning of the floor was carried out throughout the day but spillage incidents do happen. Top priorities were to identify floor contamination without delay, to remove the contamination as quickly and thoroughly as possible and to keep pedestrians clear of it until it was cleaned up.

Enough staff members were active in the store to be able to quickly spot any spillages. Training was given to all staff in the importance of being alert to spillages and what to do about them when they occurred. They were trained to use warning signs and cones to keep people off the contaminated area

and the cleaning techniques and materials to be used to quickly restore a clean and dry walking surface. So that staff were able to do this several 'spill stations' were installed throughout the store, each with the equipment needed to deal with spills there and then.

The benefits.

The interim changes to the store entrance were not seen as a long-term solution but were adopted as sensible responses pending the more permanent floor surface and store entrance systems being introduced as part of the rolling store refurbishment programme. The spill station system – providing the right awareness, right training and right equipment – is being introduced into more and more stores and the company is already able to demonstrate a 25% fall in slipping incidents where the system is in operation.



A store entrance following improvement work.

Caution! Wet Paint!

How bad can it be, coming across some newly applied paint? You get some on your jacket sleeve? Or it breaks your arm!!and it doesn't always get much better when it has dried.

A repainting job at a Midlands warehousing company ended up costing a lot more than the price of a few cans of paint through not really thinking about what they were doing and how they were doing it.

The company used painted floor marking to identify pedestrian routes and vehicle access points to their distribution warehouse. On the face of it it's a good thing to do to try to segregate pedestrians from moving vehicles in the workplace. The company arranged for the floor of the goods access point to the warehouse to be repainted but when the work had been done they didn't close the shutter door or barrier the area off until it had dried or even post "Wet paint. Keep off!" signs. The vehicle entrance happened to be right next to the pedestrian access door where staff came into work.

An employee arrived for work and, on finding the normal staff entrance obstructed by a pool of water and carelessly discarded cleaning equipment, had to go in through the adjacent vehicle entrance. She had no way of knowing that the paint on the floor was still wet and, quite unsurprisingly, slipped on it and fell heavily. Not only did she get covered in the wet paint but the fall broke her wrist too.



Pedestrian access route and painted vehicle access route floor.



The Local Authority inspector who investigated the incident expressed his disappointment saying that the accident was completely preventable. The carrying out of the work on the goods entrance had not been the subject of any risk assessment – a simple process of thinking the job through along with considering its possible consequences. He said that slip and trip incidents, the biggest single cause of major injuries at work, should receive particular attention yet are still not given the priority they deserve by many employers. The Magistrates Court agreed and ordered the company to pay over £10,000 in fines and prosecution costs for breach of the Health and Safety at Work etc. Act and for inadequate risk assessment.

Wet Paint? Dry Paint?

Clearly a freshly painted floor surface is going to be a hazard to pedestrians – as well as making a real mess of the paint job if people do walk across it – but allowing the floor paint to dry is not the end of the matter. Things are not always as straightforward as they may seem. Even when paint has dried it can often leave a very smooth surface (one with very low 'microroughness'. Smooth floor surfaces may be OK when they are kept thoroughly clean but if they get

any dust or moisture on them (such as from water being walked in on people's feet or from vehicle tyres) they can become very slippery, in fact much more slippery than the original surface before it was painted.

Trying to do the right thing by painting out floor markings for walkways, vehicle routes or for organising storage areas can result in very smooth and slippery walking surfaces. This applies just as much to outdoor areas (which will get rained on) as indoors. Choosing and using a floor paint that will have good grip (sufficient microroughness) when it has dried is a wise thing to do if you do need to paint areas of floor. Make sure that any floor paint described and bought as 'slip resistant' will, in fact be slip resistant in the actual conditions it will be used in – if it might get wet then it needs to be slip resistant in the wet, not just in dry conditions. People rarely slip and injure themselves on dry & clean floors!

See HSE's free information sheet ["The assessment of pedestrian slip risk: The HSE approach."](#) for more information on the importance of floor surface microroughness in preventing costly slip injuries. Take it into account in *your* risk assessments.

Trip risk warnings ignored!

**Improvement Notice served!
Prosecution followed!**

**District Judge sets bigger fine
for tripping hazards than for**

food hygiene offences saying that "The safety of employees is imperative." & the conditions were "An accident waiting to happen."

An Environmental Health Officer from South Derbyshire District Council prosecuted a restaurant proprietor after tripping hazards were found during a routine visit and again on an enforcement re-visit.

An initial inspection by a local authority resulted in the service of an Improvement Notice for tripping hazards in a restaurant storage area. The notice was subsequently complied with and the proprietor was given advice at that time about ensuring that the premises were kept free from such hazards. A subsequent visit undertaken by the EHO again revealed tripping hazards. Although no tripping accidents had occurred, the prosecution was taken after the previous advice was apparently ignored.

An electrical cable was seen trailing across a step. A storeroom, which had to be regularly accessed by staff to obtain items such as toilet paper and the highchair provided for customer use, was almost completely obstructed and virtually inaccessible because of the clutter of things being haphazardly stored there.



A prosecution for the tripping hazards was taken alongside various food hygiene offences. The proprietor pleaded guilty to not keeping floors free from articles which may cause a person to trip, contrary to Regulation 12(3) of the Workplace (Health, Safety and Welfare) Regulations 1992.

The case was heard by a District Judge who said that 'the safety of employees is imperative'. He said the tripping hazards, particularly the trailing cable, were 'an accident waiting to happen'. The proprietor was fined £1000 for this offence, compared to fines of £500 for non-compliance with Food Safety Improvement Notices and £250 for the food hygiene offences, showing the significance that the Judge gave to the tripping hazard. Full costs were also awarded to South Derbyshire District Council.



The problems in the storeroom were sorted out and the trailing cable was re-routed after the visit. The local authority's decision to take the prosecution was influenced by the impact that it would have on other duty holders through raising awareness of simple tripping hazards such as electrical cables and the importance of avoiding them.

Swimming pool slip accident sparks a change for change for the better.

A member of staff working at a public swimming pool had a slip accident and broke her arm whilst at work. Although this was an unhappy event for the member of staff concerned, it cost the pool owners a significant sum to meet the compensation claim and it prompted the involvement of the local Health and Safety Executive Inspector it wasn't all bad news.

The slip accident happened on an area of tiled floor between the poolside and the pool users' changing rooms. A similar accident had happened some time previously when a staff member had been carrying a bulky load from one area to another. The Inspector found, with advice from specialists at the Health and Safety Laboratory, that there was a high risk of pedestrians slipping when the floor was wet – which it was bound to be for most of the time. Together the pool management, the Inspector and a pedestrian safety expert from the laboratory looked at the floors in the different areas of the pool complex that could reasonably be expected to be wet in normal use.

The tiled floors were rather smooth and offered little grip, especially for pool users going barefoot or the staff wearing training shoes. They were also rather old and, having had a lot of foot traffic for many years, rather worn. The clear conclusion was that something had to be done about the floors throughout these areas of the site.

The pool facility was used by a wide variety of people, some of whom may be considered to be more vulnerable such as children, the elderly, customers with disabilities or those less steady on their feet.

Taking advice from the Inspector and laboratory specialist the pool manager considered the options for dealing with the slip risk. Trying to improve the grip of the existing tiled surface was looked at. This would have involved using an acid etch treatment to alter the characteristics of the walking

surfaces to provide more grip. The manager decided against this on the grounds that upkeep of an etch-treated floor requires regular re-treatment of the tiles to maintain enhanced grip and that involves the use of chemicals for which special training and handling would be needed. He felt that he would rather avoid that if he could. He also did a costing exercise and found that the costs of the initial acid etch treatment, periodic re-treatment and the equipment needed did not seem to offer any financial savings when compared to replacing the old and worn tiles with something more suitable, especially as it proved possible to lay new and better tiles straight onto the top of the old ones. This offered a big saving on removal and preparation costs.



The manager also saw an opportunity to deal with another important aspect of service for the pool users. He took advice from his local Disability Access Adviser who pointed out that the facility would be better suited to people with

visual impairment if tiles of clearly contrasting colours or 'tactile' surface patterns were used to identify pedestrian routes, the pool edges & areas where floor mounted equipment was located.



Tiles able to satisfy the requirements for pedestrian grip and for assisting visually impaired

customers were identified and installed. Although the Inspector had the power to compel the pool owners to take action he found that he had no need to use them. The management recognised the need to sort the problem out, took the right advice and got the job done – tackling more than just the pedestrian slip risks in the process. The pool manager declared himself well satisfied with the results, the 'lift' that the look new floor gave to the appearance of the facility, setting better standards on provision for customers with disability and that the lighter coloured floor has given greater encouragement to maintaining the high standard of floor cleaning that he expects.

Useful guidance and other publications

- HSE catering information sheet 6 (rev1)
Slips & trips: Summary guidance for the catering industry. [PDF]
www.hse.gov.uk/pubns/cais6.pdf
- HSE food information sheet 22
Preventing slips in the food & drink industries – technical update on floor specifications. [PDF]
www.hse.gov.uk/pubns/fis22.pdf
- HSE food information sheet 6
Slips & trips: summary guidance for the food industry. [PDF]
www.hse.gov.uk/pubns/fis06.pdf
- INDG 225 (rev1) Preventing slips & trips at work. [PDF]
www.hse.gov.uk/pubns/indg225.pdf
- HSE information sheet – Slips & trips: the importance of floor cleaning. [PDF]
www.hse.gov.uk/pubns/web/slips02.pdf
- HSE information sheet – The assessment of pedestrian slip risk: the HSE approach [PDF]
www.hse.gov.uk/pubns/web/slips01.pdf
- Education Information Sheet EDIS2
Preventing slip and trip incidents in the education sector [PDF]
www.hse.gov.uk/pubns/edis2.pdf
- HSG 155 Slips & trips: Guidance for employers. (priced)
- HSG 156 Slips & trips: Guidance for the food industry. (priced)
- L24 workplace health, safety & welfare:
Approved code of practice and guidance. (priced)

Practical support

Slip Assessment Tool.

Developed by HSE and the Health & Safety Laboratory for easy use on site. Guides the user through the process of assessing the risk of pedestrian slipping and supports the identification of appropriate remedies. (Use requires a surface microroughness meter.)

Free download of the assessment software from
www.hse.gov.uk/slips or
www.hsesat.info

Web links

- HSE slips and trips web site.

- www.hse.gov.uk/slips
- Health and Safety Laboratory - Pedestrian Safety
www.hsl.gov.uk/capabilities/pedestrian.htm
- HSE Food Manufacturing web site slips pages
www.hse.gov.uk/food/slips.htm
- Royal Society for the Prevention of Accidents
www.rospa.com
- Tile Association - slip resistance of hard flooring
www.tiles.org.uk
- UNISON - Health and safety information sheet: Slips and trips [PDF]
www.unison.org.uk/acrobat/B1213.pdf
- Contact Group for Slips, Trips and Falls
www.safeworkresearch.com/