

**Discovery Study on Footing and Footwear in the BC Silviculture Sector
BC SAFE Silviculture Program
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Setting the scene:

Slipping, tripping and falling are significant sources of injury in the B.C. silviculture sector. These injuries cost the silviculture industry up to \$1 million annually based on WorkSafeBC claim statistics. There are no figures for the productivity losses involved. Nor are there methods to adequately quantify the suffering involved in these kinds of injuries. It is not unreasonable to induce that slips, trips and falls create losses greater than just the WorkSafeBC figures.



Ground conditions on silviculture projects are typically disturbed and slash-strewn. Along with other factors such as weather, ingrowth and slope, the requirements of establishing and maintaining plantations make forestry workers among the most exposed to uncertain footing. Although some improvements can be made to site conditions through better planning, logging, and silviculture treatments, including prescribed burning and removing residual slash, finding sound footing is a constant of moving around in the

silviculture workplace. This is a significant task since tree planters, for instance, walk anywhere from five to ten kilometres in a day of work, much of this burdened by the weight of seedlings and planting equipment.

In this context just where a worker puts their feet becomes critical. Perhaps just as important is what they have on their feet. Footwear and footing have an inseparable relationship.

Purpose of this report:

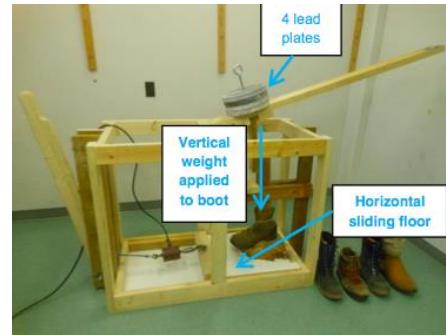
Notwithstanding the circumstances—the site conditions typical of silviculture work and the number of injuries sustained through slips, trips and falls—footwear and its possible relationship to injuries has largely gone unexamined in the sector. It may be the case that footwear is so obvious it has gone unnoticed. With that in mind, the



BC SAFE Silviculture Program thought it would be timely to undertake a discovery exercise to observe, report and make recommendations identifying opportunities where footwear products and practices could be improved for both employers and employees in the silviculture sector. The intent would be to create positive gains in behavior regarding footwear, which could contribute to reducing loss and suffering related to slips, trips and falls.

What was done:

Four field visits to planting camps were conducted during the spring of 2014 in the south-west Interior, the East Kootenay and the Prince George region. During the visits approximately fifty workers were interviewed using the appreciative inquiry technique. Workers were also observed in the field at work and were asked to comment on their footwear and related equipment. One camp completed a written survey. During the field tours some workers who were using caulk boots were offered sets of ceramic and steel caulks and asked to attach the different styles on each foot. These caulks were returned at the end of the season to compare wear rates. FPInnovations was contracted to undertake laboratory experiments comparing the available traction between various treads and caulks commonly used by workers. A static test method was devised approximating ground conditions typical of work sites. Further studies focusing on dynamic traction are proposed. Visits were made to boot manufacturers in B.C. and Idaho examining work boot design and construction. Cobblers familiar with work boot repair were interviewed and asked to contribute assessment of good and bad boot design and construction based on their experience. One private silviculture firm on their own initiative purchased special sets of boots and tested them on planting projects in the fall sharing the results and observations with this study.



Initial Thoughts and Observations:

- After visiting camps and observing workers and speaking with them, followed by more discussions with supervisors and owners, including boot manufacturers and cobblers (who have their own unique insights on planter behavior) there is one salient observation that informs the gist of this report. The more experienced a silviculture worker, the more likely they are to have one or more pairs of well-made climbing/hiking boots or caulked boots or both. Well-made implies boots priced around the \$400 range and up in most cases.



- Inversely, there was a strong correlation between the inexperience of workers and the likelihood they would be found wearing cheaper, light work boots more suitable for construction sites, even light cross-training style runners, and various thrift store bargains. Often these boots were breaking down showing broken or punctured soles, delaminated seals, or badly worn stitching. In some cases, even when the boots were obviously worn out, the workers were managing by duct taping the boots together for

another day's work.

- On the crews with ongoing and obvious boot problems it seemed supervisors were either not noticing, or did not appear to have a plan to remedy the situation, or both.
- At the other end of the performance spectrum some experienced workers had taken their footwear seriously enough to customize their high-end climbing boots by installing caulk treads. If the caulking is done properly the evidence suggest this to be an almost bullet-proof combination boot: estimated price for boot and caulking \$700.
- Caulk boots are the minimum standard for Coastal work and are accepted as required by workers. Experienced workers report that frequently replacing their steel caulks in order to always have sharp points give them the needed traction bite to navigate slash and slopes. Pointy caulks have one drawback in that they can damage boots, particularly the toes, and they can tear up rain gear.
- In the Interior caulks boots are less worn and almost rare among less experienced crews. This is the case in spite of many slash-strewn and site-prepared sites covered with slash and large debris including round wood segments and unutilized waste logs. Particularly during wet weather these sites would create footing problems for crews wearing non-caulked treads. In one camp a worker wearing hiking boots commented on a rainy morning, "It's going to be a slippery day."
- The general argument heard from workers and some supervisors is that traditional logging caulk boots are too heavy. In interviews, nevertheless, many of the same workers said they had never worn caulk boots. Interestingly, in some camps, those few wearing caulks were generally very partisan, praising and commending their boots' advantages. There was no complaining about weight or maintenance of the boots. Again, these workers tended to be among the more experienced.



- Although the sample size was relatively small, having visited only four individual camps, it was apparent that each camp had its own culture and disposition around equipment including boots, gators, gloves, rain gear and so on. It suggests that isolated camps, even within the same company, develop their own norms and practices. It was obvious that the industry would benefit if there was better knowledge transfer between crews; particularly between the veteran crews and the rookies.

- In one camp, which may be typical, supervisors expressed some frustration with attempts to get workers to show up for work at the beginning of the season with better boots, socks and foot hygiene habits. Workers are too broke, or uncertain about their prospects as planters, to consider investing the kinds of dollars in boots that experienced workers have figured out are the best deal over the long run. Worse, when cheap boots do break down, the selection of replacements in town may be minimal if not non-existent. This leads to the purchase of another pair of boots that won't likely last. Even though it can be demonstrated that cheap boots can cost more, it is difficult to sell that idea to workers.

- Notwithstanding the behavior of workers, which in many cases is at least understandable, even though counter-productive, the general selection of equipment available to silviculture workers in many cases is not built to the industrial standards needed for this kind of work. This includes work boots, work gloves, gators, and other personal and work-related equipment. Hiking and hunting equipment, which is widely used in the sector is often not built or priced for industrial applications like tree planting and other silviculture work. This deficiency contributes to problems in the field and the inappropriate choices some workers make.
- Individual companies do not appear to be tracking slipping and tripping incidents in a way that might shed light on whether footwear is a contributing factor. It is unclear whether WorkSafeBC's statistics could be manipulated to yield any clear footwear correlations or causes for footing related injuries.

What was seen and heard:

Field Interviews:

- Workers were very welcoming and generous in their cooperation and appreciation for the interest the study took in hearing their stories and experiences with work. By the time four camps were visited we were able to immediately facilitate the sharing of information around specific problems found in some camps and solved in others, such as finding quality gloves or the best boot cement to use on seams and repairs or the better brand of gators.
- Among the younger workers interviewed price, comfort, weight, moisture resistance, durability, support, protection, traction, were among the footwear characteristics they rated as important: more or less in that order. Specifically on price \$200 seemed to be the limit with an expectation the boots would last at least one season if not two.
- Among the crew where all the workers had at least five years or more experience price was not the prime concern. Given that almost everyone had boots, in some cases two pairs that would have priced from \$400 and up, price was not as important as durability. The only exception was one worker who wore Viking rubber caulks lace-ups, which he said were inexpensive and lasted about half a season per pair. He figured buying two pairs of "disposable" caulks per season was a good deal. Comfort, weight, dryness, protection, ankle support, caulks when needed, were the characteristics this group sought in work boots.



- From discussions and correspondence with workers it seems to take at least one, if not two, seasons before workers begin to discover the idea of “investing” in work boots. At that point they begin to try out various brands of boots with Vibram rubber soles, limited exposed seam work, full grain leather, caulks (both leather and vulcanized rubber styles) etc. typical of more expensive hiking and work boots.
- Workers among the less experienced crews were able to demonstrate a catalogue of boot failures. Many of which they were still using.
- Shoe Goo was a product generally known among crews. But the better seam and welt cements and boot protection treatments recommended by cobblers such as Freesole and Tuff Toe were not recognized except on the experienced crew. Workers commented that cobbler and boot repair places are disappearing from the towns they work in across the province.
- There was a general view held among the Interior workers primarily that leather caulks were good boots, but too expensive, heavy and uncomfortable. At the same time those few among them who wore them had no complaints and recommended them.
- Gators were worn in varying numbers among the crews visited. These offer some shin protection, but primarily keep debris and water out of boots as well as protect the laces from coming undone or snagging on sticks and debris. There were problems associated with both brands Mountain Equipment Coop (MEC) and Outdoor Recreation (OR) with either the fabric (MEC) or the instep band (OR). Workers generally agreed some improvements could be made to this kind of recreational gear to better suit it for industrial use such as planting.
- There was universal agreement among workers that silviculture work is extremely hard on equipment and that much of the personal protection and production gear was deficient in



design, durability, availability, practicality and affordability. A selected list offered from workers included many types of boots, work gloves, gators, hard hats, work clothing, fertilizer holders, with some complaining of declines even in the quality of shovels available to them recently.

- Most everyone, including the rookies, felt that a hiking boot adapted with caulks would make a good planting boot.
- Workers claimed that they were most prone to tripping on the recovery phase of their stride i.e., when the lagging foot swings forward ahead of the other.

Field observations:

- On the crews where there were evident problems with workers wearing inappropriate footwear there seem to be no supervisory intervention to encourage workers to show up for work better equipped. Nor did there seem to be any minimum standard for footwear in place.

- It was obvious on one worksite that it contained so much debris and round wood that caulk boots would be far safer than the hiking and general work boots most of the crew was wearing. There is obviously a great range of debris, both in terms of size and extent, left on logged and site prepared blocks throughout the interior. Nevertheless at some point caulks have to be the safest way to get around on foot and need to be required.
- Reasons given by frustrated supervisors for the worn or inappropriate footwear on site is that workers refuse to spend money on boots, workers don't know what boots to buy, and once out in the field there are few if any options to get better boots from town.
- Generally footwear is seen as something left up to the planter.
- Workers use their boots to screef as was observed on some sites. This is obviously hard on boots. But it is harder on knees. In some cases it was obvious the screefing requirement was not likely to enhance the performance of the trees. One has to wonder how much gratuitous screefing is taking place across the province at the expense of both boots and limbs.
- Workers were observed kicking their shovels as well.
- First Aid attendants were not tracking data related to cause and conditions contributing to treatment of injuries sustained by slipping, tripping or falling.
- The people most capable of setting examples and standards for footwear, including how workers use their feet to screef or plant, are the field supervisors who directly oversee, and in some cases hire their crews. It is not clear from conversations with these people if they have any awareness of the various initiatives the BC SAFE Silviculture Program has developed to benefit workers or themselves as supervisors.

Ceramic vs steel caulks sampling:

Approximately 600 caulks, half of which were steel and the other ceramic tipped caulks, were distributed to planters in the Interior. Planters were asked to outfit one boot with all steel and the other with ceramic caulks. At the end of the planting season participants were asked to mail back a select (by sole location) number of caulks from each boot. A total of 12 planters returned the caulks as instructed. The number of days the caulks were exposed to wear ranged from 35 to 50.



Of the steel caulks returned there was a wide range of wear from 20% by weight right to the point the caulks should be replaced. The ceramics, on the other hand (or foot), showed negligible wear or damage. Although there were various exposures to wear that were not controlled in this sampling the overall one-sidedness of the outcomes show that ceramic caulks are likely very durable in comparison to steel caulks in many conditions. They can provide steady and long lasting traction. Even with the price differential between steel and ceramics (more costly), over the long run ceramics are likely the cheapest cost to employers and the best value in providing safety through reliable traction in many areas of the BC Interior and Alberta where they're worn.

Coastal workers were not available at the time to participate in the sample. In correspondence with some coast planters and supervisors there is a general skepticism about ceramic or “self-sharpening” caulks. It may be that ceramic caulks initially suffered from quality problems when first produced a few years ago. More likely, as planters said, they prefer the initial bite provided by steel caulks which come with a sharper point than the slightly rounded ceramic tips. As the steel point wears down quickly, in as short order as a few days, workers change out their sets frequently to ensure they have maximum purchase for the conditions they encounter on the coast.

Caulked boots are not acceptable for operating trucks or ATV/UTVs. Light truck drivers need to change into appropriate driving shoes when driving. Operating ATVs or UTVs wearing caulks can lead to operators losing grip on the foot boards or catching in an emergency dismount. Leather motocross boots with Vibram rubber soles are recommended.

FP Innovations tread traction study:

FP Innovations¹ was brought on board to assist in scientifically studying the traction properties of various treads commonly used on silviculture footwear including rubber Vibram treads and caulks. Three approximations of typical ground/footing conditions were created in the laboratory so that controlled weight and force could be applied to the treads to produce a coefficient of friction for each type and condition under static conditions. The goal of the experiment was to measure any noticeable difference in the traction available between the various treads, including worn examples, and the three ground conditions when dry and wet.

In almost all settings in the lab caulks in good condition provide significantly more traction than rubber treads. The only exceptions were dry rock surfaces and wet rock. On wet rocks rubber treads were only marginally better. On wet and dry wood and wet and dry duff/soil caulks have a significant advantage in traction. Dull caulks on any surface amount to a hazard.

The laboratory experiment provided only a facsimile of reality. And the static tests may not represent accurately how forces act in the dynamic exercise of walking in the bush. Nevertheless the results remain highly indicative, if not conclusive, that caulks can provide better traction in the vast majority of settings common to silviculture work. Since traction is a key factor in footing, caulks could play a part in improving workers' ability to generally get around on all work sites, in particular sites loaded with round wood debris and heavy slash.



¹ FPInnovations agreed to design and perform the proposed experiments for \$5000 cost to the BC SAFE Silviculture Program while matching that sum with \$5000 of their own as a contribution. FPInnovations is seeking funding to complete the research by designing a more complex dynamic study to measure traction under field conditions with live subjects.

Recommendations:

1. Owners and supervisors can play a more active role in encouraging workers arrive for work with right boots in the right condition each season and every work day.

- Provide clear guidelines as to what is adequate foot wear to both new hires and returnees prior to the work season.
- Provide proper drying facilities and required supplies in camp with instructions to workers encouraging them to take proper care of their footwear, socks and feet.
- Provide incentives and opportunities for workers to invest in appropriate footwear.
- Pay more attention to what people have on their feet at work.

2. Owners and First Aid attendants can help their operations and the industry as a whole by better tracking incidents, first aid, and claims resulting from slips, trips and falls.

- Note for example: use of caulks or treads, and wear; time of day, shift and field season; weather; site conditions, slope and slash; worker direction, load, experience; specific injury and incident type; gait cycle etc.
- Develop technical definitions for slips, trips and falls

3. Owners can help their employees, their operations and the industry as a whole by contributing to developing minimum standards for footwear for the industry.

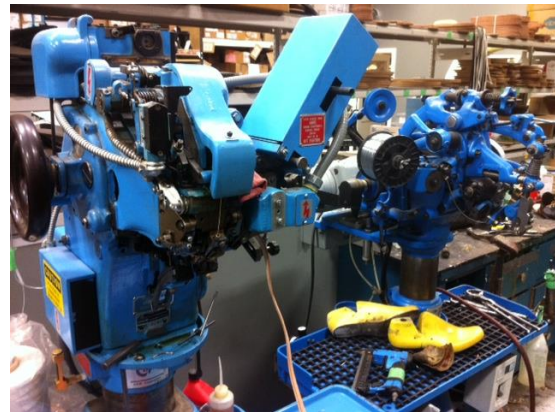
- Establish what is acceptable footwear based on the key components of a bush boot including design, materials and construction.
- Provide practical guidelines to workers on how to select appropriate footwear.
- Work with WorkSafeBC to develop clear guidelines on what is required by regulation for the various conditions typical of silviculture work sites.

4. WorkSafeBC can assist the industry by conducting more detailed analyses of the current claims data to gain better insight into the specific circumstances that contribute to slips, trips and falls injuries.

5. FPIinnovations can assist the industry by conducting further research into footing traction in order to improve bush boot performance and reduce injuries related to footing.

6. The BC Forest Safety Council can benefit the silviculture industry by providing a dedicated silviculture sector safety advocate.

- Tour silviculture crews and camps during the field season gathering narratives, spreading information, and noting in particular field level problems and promising practices to do with how workers adapt to their work.
- Report to the BC SAFE Silviculture Program Strategic Advisory Committee (SAC).



7. The BC SAFE Silviculture Program can assist the industry by:

- Continuing work with footwear and other work-related equipment manufactures to develop equipment durable and practical enough to meet the safety and production requirements of silviculture work;
- Incorporating boot and other related equipment opportunities into its Participatory Action Research (PAR) cycle of improvement process as part of its 2015 Work Plan;
- Assist owners with development of minimum guidelines for their operations for durable bush boots including general criteria, common terms, minimum standards and possibly rating popular boots and employing videos and related internet and social media outreach strategies.
- Work with WorkSafeBC to develop appropriate guidelines for protective footwear for silviculture operations consistent with the OHSR Regulation.
- Facilitating all the above recommendations.

Acknowledgements:

This report would not have been undertaken without the support of WorkSafeBC Industry and Labour Services, the BC Forest Safety Council and the BC SAFE Silviculture Program Advisory Committee. Special thanks to Chris Akehurst, Scooter Clark, Gordie Saunders and Crawford Young who assisted along with their many supervisors and workers who took time to talk and share their experiences. Noteworthy as well was the assistance of Timo Scheiber in sharing his own research with this study. In particular recognition and thanks to Glen Viberg at Viberg Boot in Victoria and Mat Devito at Devito Shoe Repair in Nelson who took time away from their family businesses to patiently explain the craft of boot construction and repair.

Appendices:

Some advice for recognizing durable boots

There are various styles of boots that can be considered for silviculture work. Some include:

- Traditional leather work/logging boots
- Leather hiking/climbing boots
- Leather hunting boots
- Vulcanized rubber boots
- Combination vulcanized rubber and leather boots
- Combination synthetics and leather boots

Because there are so many brands and styles in the market for these kinds of boots, from hand made to mass manufactured, along with plastics to rubber to leather and combinations of these, it is beyond the scope of this report to comment and evaluate each one. But there are certain criteria, particularly when it comes to durability, that should be considered in choosing boots better suited to the exceptional demands of silviculture bush work. Based on these considerations firms can undertake their own task analyses and recommend specific brands and models to their workers as meeting their minimum standards in compliance with the OH&S Regulation.

The first general rule is that there is usually trade off, in terms of durability, between the weight of a pair of boots and how long they are likely to last. Less weight comes from less material and less

structure, which leads to a shorter life span for boots. It also may make the boots less safe by reducing their ability to provide sufficient support and protection to a worker's soles and ankles. This general rule applies to all styles.

On that point the market for hiking boots has shifted towards offering increasingly lighter models to satisfy the demands of the large urban-based camping and recreation market. And these lighter boots, often with high-end brands on them, dominate the shelves of the stores catering to this market. It is less easy now for workers to find the superior technical climbing and expeditionary style of boots that can best measure up to silviculture work.

Any leather boots headed for the bush should be full grain leather. That is basically the hide from just below the animal's hair. It is the strongest material. It is also the tightest grain and able to resist water better. Leather can also be sanded, sliced, buffed and so on. These treatments can produce a lighter material, but nicer looking. In some cases they improve the leather's ability to absorb oils. Full grain leather comes in various weights as well. The heavier weight the stronger the material.

The strongest and most durable boot part of leather work, logging, or hiking boots, is going to be made primarily from one piece of full grain leather. This would include all the principal boot parts: the stack (upper), the vamp (the toe); the heel; and the bellows (the piece under the laces that keeps water and debris out of the boot by fully extending to the top of the upper).

The reason the fewer pieces of leather is better is that it means there is less seam work needed to hold the boot together. Seams are potential weak spots since their exposed threads can wear out under the abrasive assault that boots have to stand up to. Seams, of course, are no substitute for the natural integrity of a continuous piece of leather.

Seams can be single or up to quadruple threaded on most boots. The better boots are going to have the most threads in the seams and the least seams with a single thread doing all the work. The best threads will be polyester. The weakest boots will have fewer threads holding pieces together where there is continuous heavy wear. Boots with elaborate-looking, extended stitching patterns joining together numerous components will risk more chances of the seams failing somewhere. Less seams with more threads is best.

Another detail in looking at how boots are put together is how seams are lapped. Boots generally move forward through the slash so that from their perspective everything is coming at them. The best seams are going to have the lap facing backwards wherever that is possible, particularly the vamp seam. That way the overlapping piece is not sewn so that it faces and catches incoming sticks and stones increasing the wear on the seam. Boots appropriately made this way for the bush are rare.

The outsoles or treads of boots need to be made with either caulks or an aggressive, lugged rubber tread, the Vibram brand being a good example. Vulcanized rubber boots that come without caulks, need to have a sole thick enough to protect feet and provide traction. Although there are no specific guidelines on sole thickness for silviculture work, any light boots where you can twist the sole beyond some reasonable flex are probably not thick enough for support or protection.

The hiking and work boots that are bound to last will likely be built with a midsole often reinforced with a full or partial shank usually made of steel, plastic, or wood. The fuller the shank the more rigid the boot when it comes to longitudinal flex e.g., a mountaineering boot will have a fuller shank than a comparable hiking boot. Traditional leather work boots will have the midsole made usually from leather. Some work, hiking and hunting boots now have the outsole bonded to a layer of synthetic rubber, which forms the midsole providing cushioning, rigidity and protection.

Whether a boot can be resoled is not a perfect indicator of whether it is appropriate for bush work. Even running shoes can be resoled with caulks. But if hiking or work boots are constructed in such a way that they can't be resoled, due to the way the sole is molded or glued to the boot, it is likely an indicator these boots are too light built for a silviculture application.

The exception to this advice on resoleability would be the styles of vulcanized rubber boots available for bush work, including rubber lace-up caulks, protective gumboot style with or without caulks, and combination rubber caulked bottoms sewn to leather uppers. Vulcanized rubber boots can work well for people whose feet fit the mold the boots are made from. But if a worker has to stuff their rubber boots with extra socks to get a fit the boots will be a problem. These rubber boots are pretty much set the way they come out of the mold and won't adapt much to the shape of the wearer's feet.

How a boot is attached to the sole is critical to the life of a pair of boots. Durable styles will have the boot stitched and/or nailed to the sole directly. The boot can also be attached to the sole with a leather, plastic or rubber welt around the perimeter of the outsole. Through a combination of stitching and glue the welt attaches the boot to the sole (the most common is known as a Goodyear welt after its inventor). Like stitched boots, welted boots can be resoled. Less durable boots will have the boot attached to the sole with glue or a vulcanizing process. Some boots may show stitching along the perimeter of the outsole to make it look like they are sewn together. These lighter styles are generally not resoleable.

Many hiking boots come now with a rubber rand covering portions of the boot, usually on the toe, or wrapping completely around the bottom of the boot. This construction can add life to the boot provided the rubber doesn't delaminate, which may occur where the boot flexes, or on the toe where all the slash meets the rubber so to speak. On mountaineering boots a crampon connection on the toe of the sole may add life as well.

Boot Modification

Taking rubber soled hiking boots and converting them to caulk boots can be done on most models. The stiffer the boots, the better. Full shank mountaineering boots are great from a cobbler's point of view. Their work lasts longer and has less chance of sole separation. The worker/customer can ask to have no caulks installed in the instep (arch) of the sole to allow for kicking a shovel. One proven outsole for caulked boots is a special rubber product known by the brand name TOPY. A good cobbler experienced with modifying boots for bush work i.e., planting, firefighting, survey work etc., will know this product, and be familiar with the best resoling process.

Tuff toe protection is a product that allows you to add protection to hard-wearing parts of the boot. It is a bit like icing a cake and can be easily spread before being left to cure. Besides reinforcing

the toe it can be applied along seams, and rubber rands to resist wear and delamination. Basically it's handy to have along in camp as a quick repair.

Freesole is a product experienced workers and cobblers recognize as a superior boot glue. It is easy to use and works well for gluing leather and rubber back together. It can be used for rubber patches and as a sealer on seams and other areas of the boot that may come apart in the field. Because it remains more flexible once it is cured it often provides a better bond than other similar boot glues.

A custom kick pad/plate can be added by experienced cobblers to the boot underneath the instep (arch) for protection when using a shovel. This protects the sole and the boot. A good cobbler will measure and custom-design them. They can be nailed onto most boots.

Padded tongue shawls are available from some manufacturers and cobblers. These pieces of padded leather fit underneath the laces above the bellows or tongue to take away lace bite caused by crimping when the boot flexes. They also can tighten the fit around the ankle. They work well on logging and work boots with a higher stack.

Adding insoles should be considered for support and comfort. They can address problems such as structural misalignment, plantar fasciitis, and foot roll (supination, over-pronation). They can improve fit to prevent heel slippage, foot elongation and low or collapsed arches.

Boot care:

Regular maintenance is critical to extending the life and function of a pair of boots. At the end of the work day boots should be inspected and aired out. The insoles need to be pulled so the boots can breathe. Moisture trapped beneath the insole and the boot liner leads to mold and rot. Dry boots, but don't bake them. Glues and cements are heat sensitive, as is leather. If the boots are soaked they should be stuffed with paper to absorb moisture and left in a warm and dry place overnight. Special boot drying racks are available from manufacturers.

Boots with leather components need to be oiled regularly to last. If they look dry, they are dry. They can be kept looking almost like new (at least the stressed leather look) with regular treatment. These regular maintenance opportunities can be used to reapply any glues and covering treatments before you oil. At the end of the season boots need to be properly cleaned before being put away. Mud and dirt left on the boots over time will draw moisture out of the leather and lead to life-shortening cracks.

Socks:

Socks need to be clean and changed often. Avoid cotton socks. The market is full of exotic combinations of wool and synthetic fabrics that wick, slide and breathe. The venerable Bama Sock is a recommended product as well. Wearing proper socks should be part of an individual worker's personal foot hygiene to prevent cracked callouses, trench foot, blisters and other debilitating conditions caused by not looking after your feet.

Compression socks used in some endurance sports may work well to increase comfort. Worn underneath a thin wool sock they can reduce friction and provide some cushioning. The knee high style can reduce foot swelling and improve circulation to the feet and muscle groups.

Fitting and breaking in boots:

First rule is don't break in boots at work. New leather work boots should be soaked in water overnight, then worn for a day in socked feet wrapped in plastic. This investment will pay off in having boots that "fit like slippers." Workers should get as much experienced and professional help as possible to ensure a proper fit when buying good quality boots.

Occupational Health and Safety Regulation

Footwear

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8.22 General requirement

(1) A worker's footwear must be of a design, construction, and material appropriate to the protection required.

(2) To determine appropriate protection under subsection (1) the following factors must be considered: slipping, uneven terrain, abrasion, ankle protection and foot support, crushing potential, temperature extremes, corrosive substances, puncture hazards, electrical shock and any other recognizable hazard.

(3) If a determination has been made that safety protective footwear is required to have toe protection, metatarsal protection, puncture resistant soles, dielectric protection or any combination of these, the footwear must meet the requirements of

(a) [*CSA Standard CAN/CSA-Z195-M92, Protective Footwear*](#),

(b) *ANSI Standard Z41-1991, American National Standard for Personal Protection - Protective Footwear*,

(c) *British Safety Institution Standard BS EN 345:1993 Specification for Safety Footwear for Professional Use*, or

(d) *British Safety Institution Standard BS EN 346:1993 Specification for Protective Footwear for Professional Use*.

(e) Repealed. [B.C. Reg. 312/2003, effective October 29, 2003.]

(4) A worker must wear the appropriate footwear and ensure that it is in a condition to provide the required protection.

(5) If it is not practicable for workers in the performing arts to wear safety footwear meeting the requirements of subsection (3) other effective measures must be taken for protection from injury.

[Amended by B.C. Reg. 312/2003, effective October 29, 2003.]

8.23 Slippery surfaces

(1) If a workplace has slippery surfaces, appropriate non-slip footwear must be worn.

(2) Caulked or other equally effective footwear must be worn by workers who are required to walk on logs, poles, pilings or other round timbers.