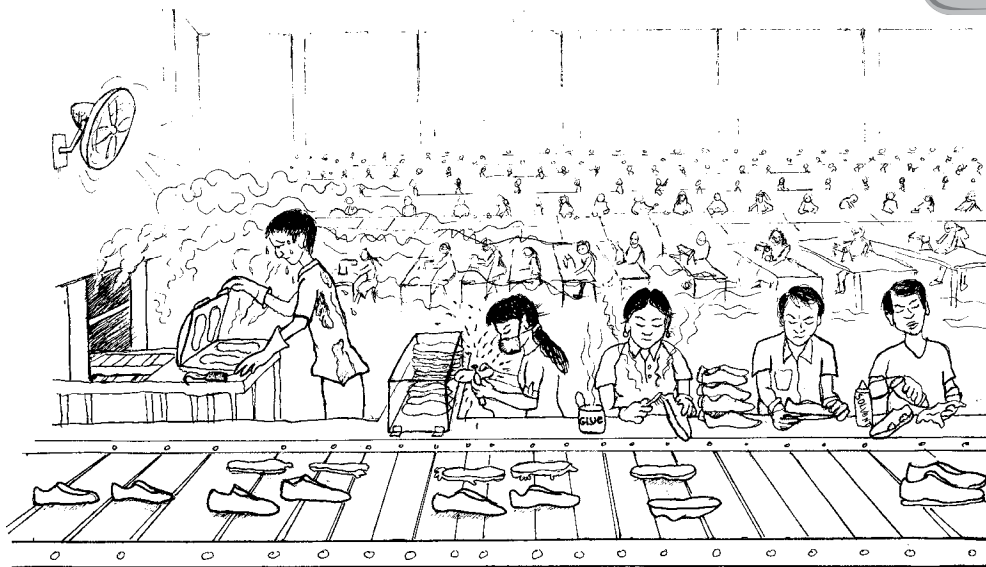


Shoe factories

6



Making the materials for shoes, and gluing and stitching them together, are the jobs in shoe factories where workers are most likely to be harmed. Using glues and heating plastics release chemicals in the air that can make you sick.

To make work in shoe factories safer for workers, employers should:

- Use safer chemicals in all stages of production. Water-based glues are safer than glues made with solvents, but only if workers have good ventilation and protective equipment.
- Design safer work processes.
- Make sure all machines have guards (see pages 193 to 197), especially sewing machines and machines that get hot.
- Have good ventilation (see chapter 17), especially in areas where rubber is mixed or glues are used.
- Give workers personal protective equipment (see chapter 18), especially when working directly with chemicals or with hot materials.

Even the shoe factories that have taken steps to improve health and safety conditions for workers rarely pay their employees a living wage. Workers' right to organize for a decent standard of living must be recognized in the global shoe industry.

Preparing leather for shoes is dangerous work

Processing animal skins into leather pollutes large amounts of water with salts and chemicals such as chromium hexavalent (see pages 503 to 505). Tanning chemicals can cause bronchitis, asthma, and other breathing problems and they are also extremely irritating to the skin. If a person is exposed to them day after day, some of these chemicals can cause birth defects and cancers. Cancer of the nose has long been a problem for shoe workers.

The chemicals and dyes may remain on the leather, even after it is cleaned at the tannery. These chemicals can harm the health of workers when the leather arrives as a material to make shoes in factories.

The waste from tanning is often dumped into rivers and other waterways, contaminating the water of communities near the tanneries.

New ways of tanning leather are less harmful to workers and the environment. See Cleaner Production in Tanneries in *A Community Guide to Environmental Health*, pages 460 to 461.

Making the upper parts of shoes

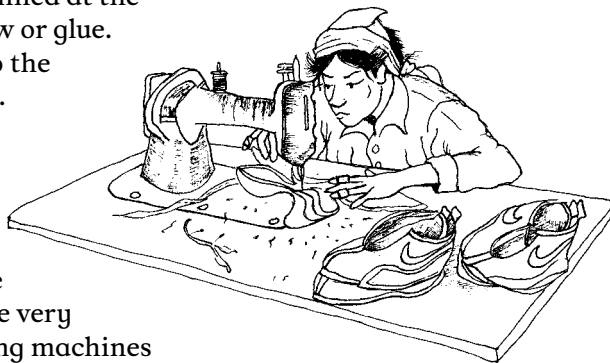
Workers cut, sort, and prepare the material of the upper and lining. The leather, cloth, and synthetic materials are cut to pattern on presses with sharp molds. Then the leather is thinned at the

seams to make it easier to sew or glue.

The lining is hot-pressed onto the pieces of material to be sewn.

Then the different pieces of the upper are sewn or glued together.

Many different sewing machines are used to sew the upper parts of shoes. They are very powerful machines. All sewing machines should have guards around the needle and on the machine to protect workers from injuries (see pages 193 to 197).



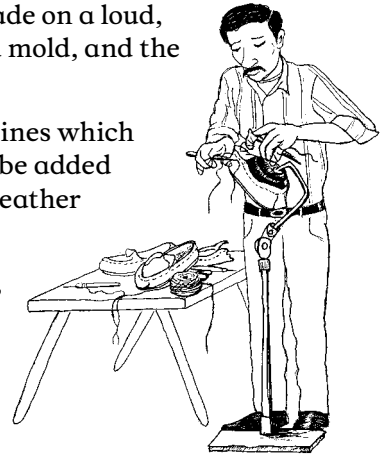
Machine injuries

Eyelets, rivets, and ventilation openings in shoes are made on a loud, puncturing machine. The sewn uppers are then put on a mold, and the insole is nailed onto the mold.

The upper will then go through several shaping machines which heat the material and make it smooth. Stiffeners might be added to the heel and toe so they hold their shapes better. For leather shoes, hot cork is spread on the bottom of the insole.

Presses, stampers, rollers, riveters, sewing machines, die cutters, and other cutting tools can cause serious injury to workers' hands. Sewing machines used to make shoes are powerful and use large needles that can cause severe harm to machine operators. The belts can catch workers' hair or clothing and cause serious injury.

The hole-making machine and the nail machine are not sharp. But to make the holes in the upper and the insole, these machines use a lot of pressure. They also vibrate when they come down fast and hard on the material. Fingers can easily be caught in these machines, crushing them. Over time, the vibration damages nerves and can reduce the amount of blood that goes to the fingers, causing vibration-induced white finger (VWF) where the fingers tingle, hurt, or lose feeling. In the worst case, you can no longer hold objects or use your hands.



Workers who sew leather shoes by hand also get injured with needles.

Hand injuries caused by vibrating tools

Nailing machines and other equipment that vibrates can lead to a problem called “dead hand,” vibration-induced white finger (VWF), hand-arm vibration (HAV), or Raynaud’s phenomenon. The vibration limits blood from flowing freely to the fingers, causing them to tingle and lose feeling, turn white, then blue, and even develop ulcers. This injury is not curable. The best way to reduce the damage from it is to ensure that any person who develops signs is immediately changed to a job with no vibration. It can be prevented by making sure workers do not work too many hours with vibrating tools, regularly rotate out of jobs with vibrating tools, and inspect and maintain tools on a schedule.

Cold and stress can also trigger these problems. Ensure workers stay warm and dress to keep the whole body warm, not just wear gloves for the hands. Smoking reduces circulation and makes the injury worse.



Health
Info

Injuries from cutting, crushing, and catching can be prevented. Machines need:

- guards on the needle areas and on the v-belts above and below the table. See page 193.
- 2-handed controls on cutting, puncturing, nailing, and stamping machines. See page 198.
- electric or other sensors to shut off power to a machine if the worker's body is in the wrong place (see page 198).



In 2006, my hand was crushed by a punching machine. They took the machine apart to try to save my hand, but my hand was already badly damaged. The factory refused to pay for my medical treatment. Without rehabilitation, I am injured for life and can't work any more.

To prevent injuries to workers who are cleaning, fixing, or adjusting machines, it is important to follow lock out and tag out procedures for repair and maintenance work (see pages 201 to 202).

Strain and overuse injuries

Workers often sit or stand in the same position all day. If you can sit, chairs might not support your back and legs. In badly equipped factories, you might have only short stools instead of chairs, causing neck, back, leg, and knee pain. See chapter 7: Ergonomics to find ways to prevent injuries, such as:

- Rotate jobs during the day so no one does any job too long.
- Demand that the factory provide you with chairs and equipment that fit your body and your job.
- Set up your work area so you have what you need close at hand, and you do not have to reach, bend, or twist too much.
- Exercise to stretch and strengthen your muscles.

Some workers sew and glue shoes at home or in other people's homes. Homework may give workers some flexibility with their time, but it also increases problems from strain and overuse injuries and exposure to chemicals. See chapter 20: Doing factory work at home for ideas on setting up a comfortable and safe area in your house where you can work while reducing the health dangers of homework.



Dangers from dust

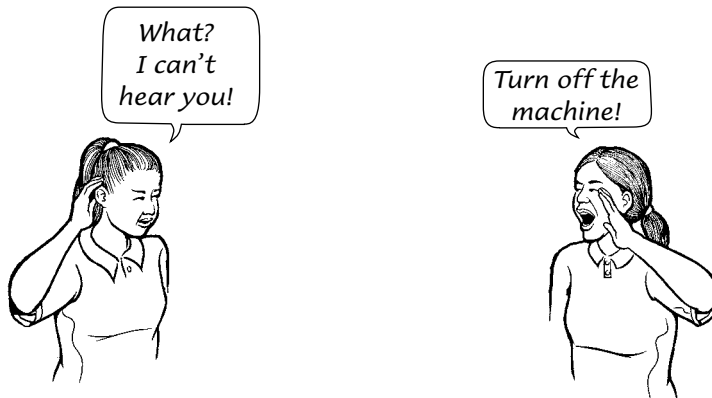
Cutting, buffing, and skiving (thinning seam edges) generate a lot of dust and small bits of material. Breathing these can cause irritation and other breathing problems. Breathing leather dust, which may contain heavy metals such as chromium, nickel, cadmium, and other chemicals used to tan leather, can cause problems for very young, pregnant, or older workers, and over time can cause skin irritation and allergies, sinus and nasal cancers, and other problems.

- An extractor can remove most of the dust from the workstation and area around it (see pages 250 to 251).
- A cloth over your nose and mouth may keep a little of the dust out, but it does not protect you very well. Use a dust mask that fits tightly over your nose and mouth (see pages 266 to 270).
- Use a vacuum cleaner or at least a damp cloth to clean the dust from surfaces around your work area at least 2 times during your shift.
- Use leather that was tanned without heavy metals and toxic chemicals.
- Wash chemicals and dust off your hands regularly, especially before eating or drinking.

Dangers from noise

Shoe factory workers operate many large and noisy machines. When possible, noise should be controlled at the source by enclosing and insulating the machine. Well-maintained machines make less noise. (See chapter 13: Noise.)

- Ask the boss to measure noise at different places around the factory.
- Where it is too loud, workers should wear earplugs or earmuffs (see pages 271 to 272).



Making the soles

Plastics and synthetic rubber are the most common kinds of soles made today. Natural and synthetic rubber is mixed with various chemicals to make it more flexible, stronger, and give it color and other qualities. The rubber is then kneaded and rolled over and over again to complete mixing and get the right texture. The rubber or plastic is shaped into soles on revolving or sole-molding presses. Workers then trim, scour, and clean the soles.

Chemicals mixed into the material for soles

With so many chemicals mixed together to make soles, it can be difficult to know which are causing problems for your health:

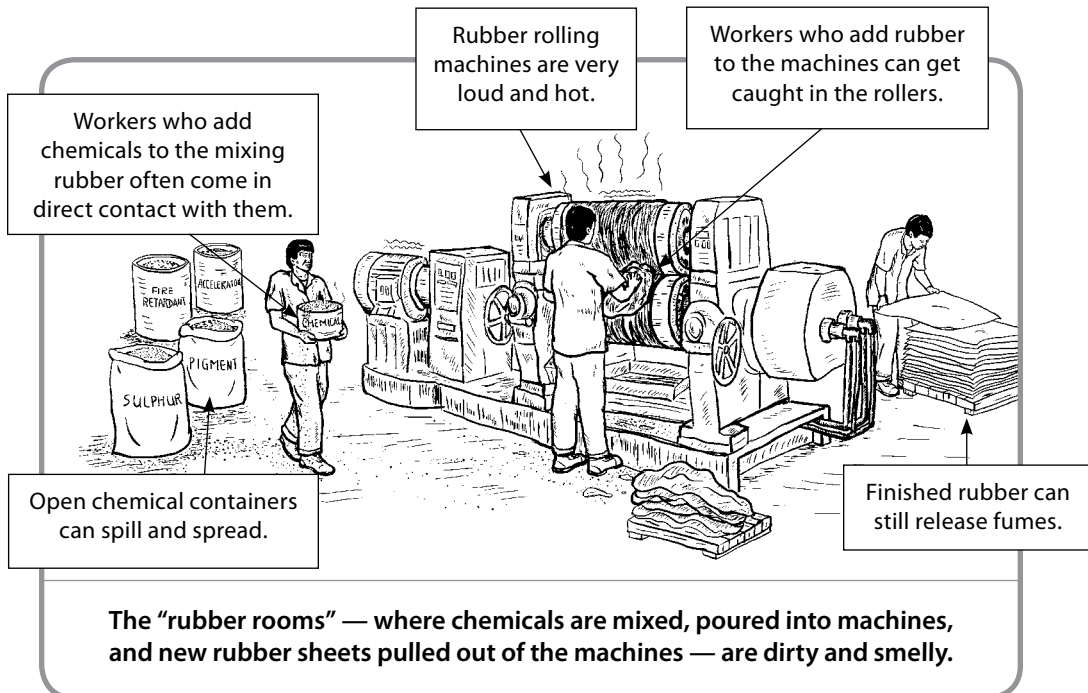
- **Binders** make the material for soles flexible. Binders are often sulfur or peroxides but sometimes nitrosamine.
- **Pigments** give soles color, such as iron oxide, carbon black, azo dyes, and other synthetic dyes.
- **Fillers** make plastic and rubber stronger, such as silica, magnesium carbonate, calcium silicate, and sawdust.
- **Plasticizers** make it easier to mix and make soles more flexible. Phthalates are the most common plasticizers.
- **Accelerators** cure soles faster, such as mercaptobenzthiazole (MBT). These chemicals create allergic reactions very quickly and are quite dangerous to use. Most health problems in making soles come from the accelerators.
- **Fire retardants** make soles fire resistant, such as antimony trioxide, phosphorus, and halogen.
- **Dusting agents** keep soles from sticking, such as zinc stearate.

Not all of these kinds of chemicals are always present. For more information about these chemicals, see Appendix B: Common chemicals and materials.

Dangers from mixing materials and chemicals to make soles

Most soles are made from ethylene vinyl acetate (EVA), polyurethane, or rubber, both synthetic and natural. These are heated and mixed with many other chemicals while getting rolled into sheets. Putting all the chemicals together creates dust, vapor, and fumes that are all dangerous to breathe.

Workers who measure and mix chemicals may be exposed to chemicals through spills, splashes, dusts, and fumes. One way of reducing the risk of exposure for workers is to use pre-mixed chemicals. Nike, for example, uses a pre-mix process in which the chemicals are measured, mixed, formed into pellets, and packaged, all before they arrive at the shoe factory. The shoe workers then add a packet of pre-mixed pellets into the machine that mixes the rubber or plastic to make the soles. This not only limits exposure for workers but also reduces waste. If the process of manufacturing the pellets at the supplier factory is also safe, it is an improvement for everyone.



Workers in this area need:

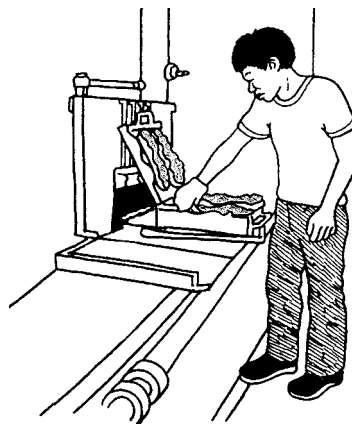
- safe, well-ventilated places to store and mix chemicals.
- good maintenance for both the work area and the machines.
- good ventilation to take heat and fumes out of the work area and factory.
- access to respirators, gloves, and other protective equipment when needed.

Dangers from molding the soles

Soles can be made by putting a sheet of rubber in a mold that is heated and cuts to the right shape. Or the rubber can be injected directly into a mold in an enclosed machine.

No matter which method is used, when workers remove the soles from the molds, the soles are hot and release fumes from the chemicals used to make them and release them from the molds. The soles continue to release these fumes as they cool in the waiting area.

- Molding machines should have good local ventilation to remove dust and fumes (see pages 250 to 251).
- If workers are exposed to fumes, they should tell the boss to repair the ventilation system and demand he provide respirators with the right filters until it is fixed (see pages 266 to 270).
- Molding machine temperatures can rise to 150° C or higher. Guards on the machine can protect you from burns.



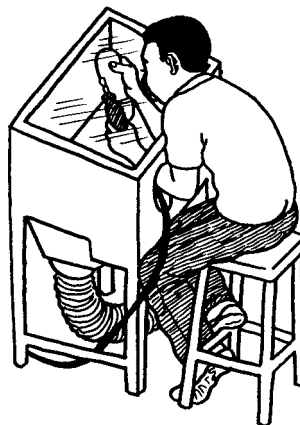
After the soles have cooled and cured, they are usually not harmful to handle.

Dangers from grinding the soles

Workers grind and clean the soles. Grinding produces a lot of dust that can be harmful to workers. Often, this process takes place inside of semi-enclosed, clear plastic boxes.

- The box should contain an extractor that removes most of the dust (see pages 250 to 251).
- Workers who add and remove soles from the boxes need to have local ventilation. If they do not, they should also wear dust masks (see pages 266 to 270).
- Workers should also have gloves and a face shield with goggles, since rubber dust can irritate skin. (See chapter 18.)

Sometimes grinders are used to rough the surface of soles so glue will hold better. Because this creates harmful dust, newer methods use a water-based detergent to achieve the same thing.



Assembling the shoes

The soles are glued to the uppers with glue or hot cement. Leather soles are sewn. Then the shoe is heated to cure the glue before the shoes are inspected, cleaned, and packed.

Many chemicals are used to join the sole and the upper together, including primers and glues (see Most glues and primers are harmful to workers, on page 116). Solvent-based glues and primers contain different kinds of solvents (see Solvents on pages 517 to 529).

Water-based glues are made with different chemicals and are considered safer than solvent-based glues. Some of them, especially isocyanates, can still harm workers.

Pay attention to any signs that people are getting sick from primers and glues. Breathing problems, headaches, and fainting are signs that you are breathing in these chemicals.



To prevent harm while using glues, your factory should:

- replace toxics with less toxic alternatives.
- use closed, mechanical systems to apply glue. If glue must be put on by hand, use containers with smaller openings and smaller tools to apply only as much as is needed (see page 166).
- store glues and solvents safely, and mix them in a work area with the right tools, work surfaces, and ventilation.
- label all glues in the languages workers speak.
- provide workers with Safety Data Sheets (SDS) including information about the glue, such as ingredients, danger signs for exposures, safety procedures, and so forth, in your language. (See How to get and read an SDS on pages 180 to 182.)
- make sure there is good ventilation (see chapter 17).
- give gloves, respirators, safety glasses or goggles, and personal protective equipment to workers who need them (see chapter 18).
- install body and eye wash stations in areas where glues and primers are used, and give first aid trainings on how to handle chemical spills and splashes (see page 175).

Most glues and primers are harmful to workers

The most dangerous chemicals in glues are the solvents added to make them stickier, stronger, or quicker to dry.

Benzene is very harmful to people's health. Benzene causes cancer and reproductive damage, and is so bad that many countries and companies have banned its use. But it is cheap, it dries quickly, and it smells nicer than other solvents. So though it is banned, it is still widely used, sometimes on purpose and sometimes unknowingly as an ingredient in a mix of chemicals. For more information on benzene, see Aromatic hydrocarbons on pages 522 to 523.

Toluene and xylene are often used instead of benzene. But they are also in the same chemical family as benzene, called "Aromatic hydrocarbons." They might cause birth defects and cancer, as well as many health problems. See pages 522 to 523.

MEK (methyl ethyl ketone) is another benzene replacement. If MEK touches your skin or eyes, they will get irritated and red. If you inhale it, you might feel dizzy, drowsy, and have headaches and blurry vision. MEK smells like mint. Getting exposed to MEK repeatedly can cause problems with your nervous system, and it may affect the brain or cause birth defects. See Ketone solvents, page 529.

Other chemicals used in glues and primers include **acetone**, **ammonia**, **cyclohexane**, **di-chloromethane** or **methylene chloride**, **di-methyl formaldehyde (DMF)**, **ethyl acetate** (can cause cancer), **tetrachloroethylene** (may cause cancer), **polychloroprene**, **polyurethane**, **propane**, and **trichloroethylene (TCE** – a known irritant).

Water-based glues are thought to be safer, but are still considered dangerous chemicals.



The company gave us new water-based glues, called isocyanates, and told us they were totally safe. When many workers began to develop asthma and other breathing problems, it was clear that isocyanates were not safe.

Safer chemicals for the whole factory

The owner of Elegant Top Shoes factory decided to stop using toluene-based glues because toluene is toxic to people and the brand he sold shoes to was pressuring him to change. To replace the glues made with toluene, he found a new glue that was supposed to be safer.

But in one section of the factory, the team leaders still wanted to use the old glue. They said, “The new glue does not work as well,” and “The new glue makes the shoe harder to clean.”

If the shoes are not clean when they come off the production line, the quality standard of that production line goes down. The line is penalized if it takes too long to clean and finish production of the shoes. Because the pressure to meet production quotas never lets up, the team leaders continued to force the workers on their line to use the toxic toluene glue.

The factory administration knew about this but did nothing to stop it, because the toluene glue was less expensive. Finally, when the problem was pointed out during a factory visit by a representative of the brand that purchased the shoes, they stopped using the harmful glue.

A few months later, workers started to feel sick. They wondered if it was from the new glue. The new glue was water-based and only bonded well when they used a primer that included a chemical called MEK. Although the boss said it was safer than toluene, it made them feel worse more quickly. When the workers asked for and got a safety data sheet (SDS), they found out MEK was dangerous too.

The workers were mad at their supervisors, and the supervisors were mad at the boss. The boss was angry at the chemical salesperson who told him that the glue and primer were safe, and at the brands for demanding he change. He felt he had tried to do the right thing and everyone got mad at him anyway.

The only way to make the situation safer was to install new, more powerful extractors and use better protective equipment. But that cost more money, and most of the workers were hired through a temporary worker agency and would soon be gone anyway.

Dangers of finishing

Final finishing of shoes includes shaping and leveling, waxing, coloring, spraying, cleaning, threading, polishing, and packaging.

- **Dust** from finishing machines must be ventilated away from the workstation. (See chapter 12: Dust.)
- **Polishes, stains, and color dyes** may irritate your skin. Solvents used to clean the shoes can quickly harm your health. Work areas must have good ventilation, and workers should have gloves, aprons, safety glasses, masks, and good washing and sanitary facilities.
- **Unguarded and unsafe machines** that can cut and crush must be repaired. (See chapter 9: Machine injuries.)



It is frightening how the hands of a person change after gluing soles for a long time.

Fire dangers in shoe factories

The solvents and sprays used as glues and finishing materials are usually petroleum-based, causing them to catch fire easily. Being heavier than air, when solvents are not ventilated away they tend to drift toward the floor where they can concentrate. They then create an increasingly dangerous possibility for an explosion, which could be set off by a spark or bad electrical connection. (See chapter 11: Fire.)

- Use solvents that will not catch fire at low or normal temperatures. Water-based solvents are safer.
- Install good ventilation and local exhaust in spraying booths and drying racks to remove the dangerous fumes from the work area.
- Remove wastes from workstations, as well as other material that can burn, such as rags and cardboard.
- Use fireproof metal containers for solvents and oily wastes.
- Keep aisles and exits open and unblocked.
- Make sure fire extinguishers are full, charged, and of the right type for the materials in your workplace.
- Regularly check electrical equipment to be sure it is in good condition and grounded (see pages 205 to 206).

Pollution from shoe factories

Most factories haul their waste materials off to be disposed of in dumps. When their waste contains chemicals, this can result in the contamination of the ground and groundwater. Where it is prohibited to dump chemicals in ordinary landfills, unethical companies try to save money by pouring wastes such as dyes, glue, and other chemicals directly into the sewer. While this practice may be against the law, it can be difficult to find a government official willing to challenge the company to stop this practice.

But there is another environmental problem with shoe wastes that is harder to stop. What happens to shoes when they are worn out? Some leather shoes are made to last a long time. But most of the shoes we buy break easily (such as plastic sandals) or go out of style quickly (such as sport shoes).

In some countries, shoes get repaired or reused. In others, shoes go straight into the dump. From there they go to the landfill or incinerator. As the soles degrade, the chemicals used in processing the rubber or plastic while making them become a pollution problem as they are released into the environment. If they are burned, chemicals get into the air even more quickly.

Phthalates are one of the most common chemicals released. They are harmful to the reproductive system. Other harmful substances include heavy metals such as lead, cadmium, and mercury as well as aromatic hydrocarbons. See Appendix B: Common chemicals and materials.

Old shoes make new things

A few shoe companies have programs to reuse and recycle old shoes.

Nike uses waste materials and old Nike shoes to make flooring for playgrounds. The material is ground up and divided into rubber, foam, and fibers, and then mixed with other chemicals to make flooring. Many people who buy and use Nike shoes like the idea that their old shoes can become new things. However, the flooring made from Nike contains the same harmful chemicals used to make the shoes and can poison the land and water. To make shoe production truly sustainable, the company should eliminate all toxic chemicals from production and ensure that reused materials do not contain toxic chemicals.

Some plastic shoes, such as sandals and Crocs, are easier to recycle because they can be ground up and melted to make new ones.