

Ventilation for fresh, clean air



Do workers breathe air full of dust, chemical vapors, or motor fumes?

Does the air irritate workers' nose, throat, or eyes?

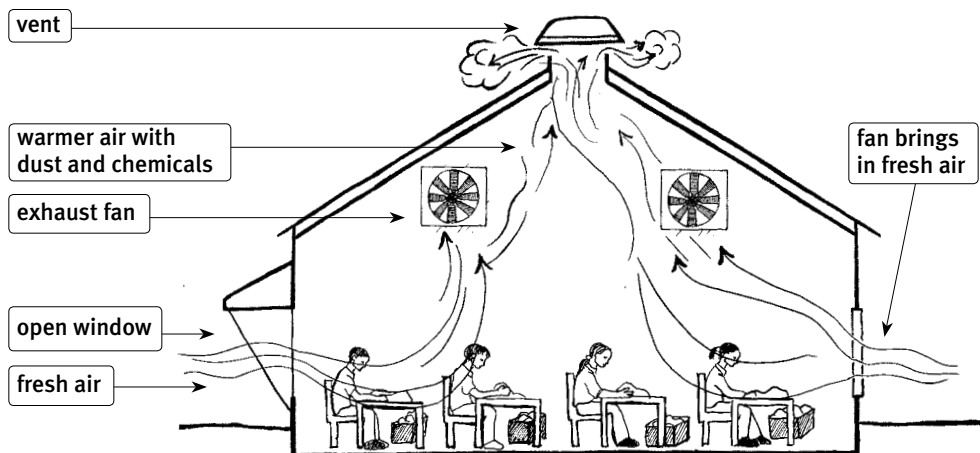
Fresh, clean air keeps workers healthy

Ventilation brings fresh air into a factory, moves air around inside the factory, and then draws the air outside again. As air flows out of the factory, it carries away dust, chemical vapors, and motor exhaust that can cause health problems. Ventilation also helps prevent illnesses like tuberculosis, colds, and flu that spread when a sick person coughs or sneezes into the air.

For more information about health problems caused by dust and chemicals, see 'Dust' on pages 98 to 100 and 'Chemicals' on pages 54 to 93. For more information about tuberculosis, see 'TB' on page xx.

VENTS AND EXHAUST FANS KEEP AIR FLOWING

Windows and doors may not provide enough outside air. The picture on this page shows how a simple ventilation system can improve air flow inside a factory. Fresh air flows in through open windows. Fans in the walls also pull in outside air. Warmer air rises toward the roof. An opening in the roof, called a vent, lets the warm air out so more fresh air can flow in. Exhaust fans high in the walls also blow air outside, so more air flows through the building.

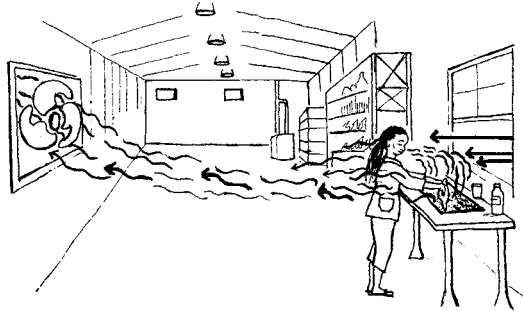


Factories with a lot of exhaust ventilation need to bring in outside air to make up for the air being blown outside. If there is not enough make up air, the local exhaust vests do not work well and may not work at all.

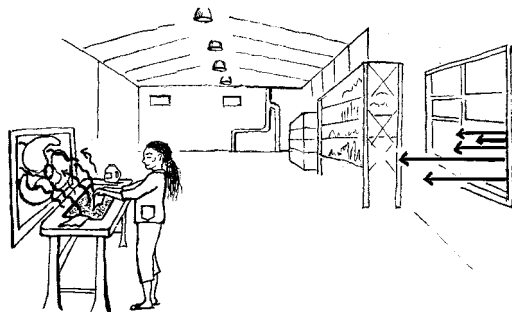
CHEMICALS AND DUST FLOW WITH THE AIR

Ventilation does not always mean workers breathe clean, fresh air. Air flowing through a factory can carry chemical vapors, dust, and fumes toward workers instead of away from them.

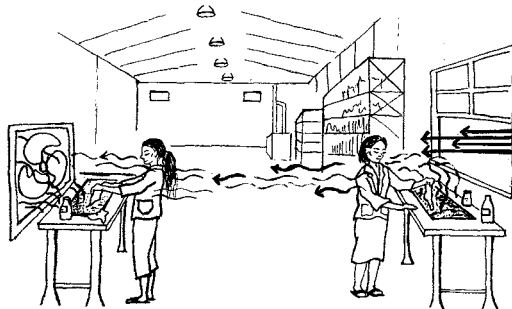
Martina works with solvent in front of an open window. When air flows in through the window toward the exhaust fan behind Martina, she breathes in chemical vapors as well as some fresh air.



Martina moved her work across the room where she faces the exhaust fan. Now she breathes fresh air coming in the window, and the exhaust fan pulls the chemical vapors away from her and out of the building.



Celeste now works with solvent in front of the window, so both workers breathe in chemical vapors with the air.



Local exhaust ventilation can remove chemical vapors, dust, steam, and heat before they get into the air inside the factory. The next 2 pages show examples of different types of local exhaust ventilation.

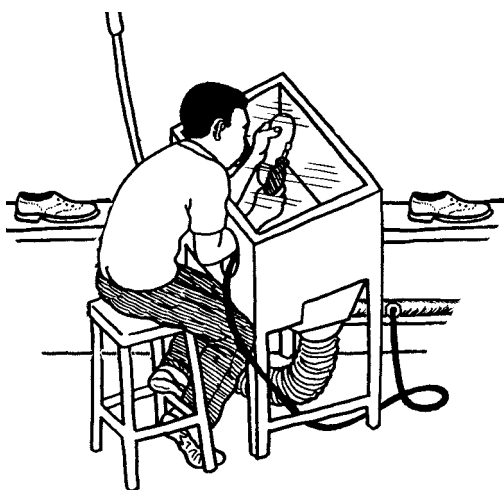
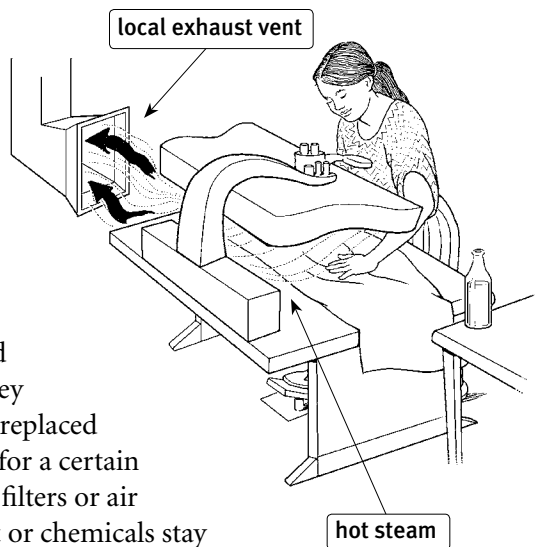
Local exhaust ventilation

Local exhaust ventilation pulls chemical vapors, steam, and dust out of the air right where the chemical is used or the dust and steam are created. Local exhaust ventilation is sometimes called an **extractor**, an **exhaust vent**, or **local ventilation**.

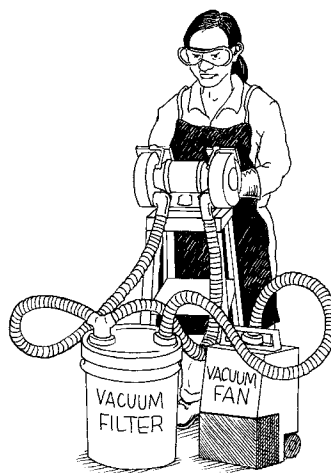
Local exhaust ventilation systems need regular cleaning and maintenance. They often have filters or bags that must be replaced every time the system has been in use for a certain number of days or months. When the filters or air ducts are blocked with dirt, more dust or chemicals stay in the air that workers breathe.

There are different types of local exhaust systems for welding, soldering, metalworking, sanding, grinding, spray coating, and other tasks that produce dangerous chemicals, smoke, or dust.

Local ventilation to catch dust. Grinding, sawing, and sanding all create large amounts of dust and debris. Sometimes these jobs are done inside a **local exhaust booth**. Or a **local exhaust vent** can be attached to a tool or mounted on a work bench to keep dust from these tasks out of the air.



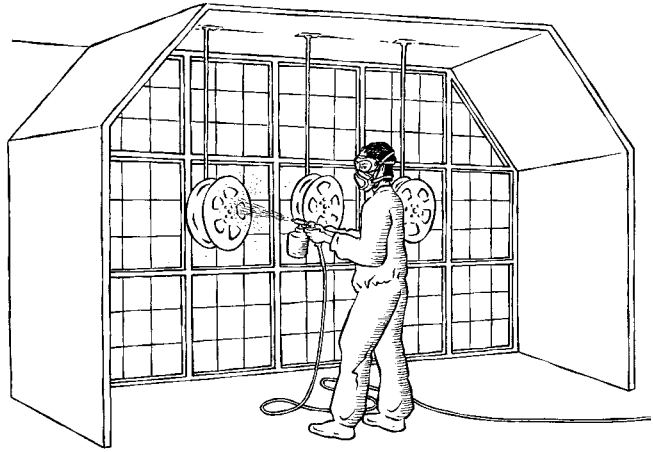
Grinding shoe soles inside the booth prevents the worker from breathing in dust.



This vacuum system keeps dust and debris out of the air

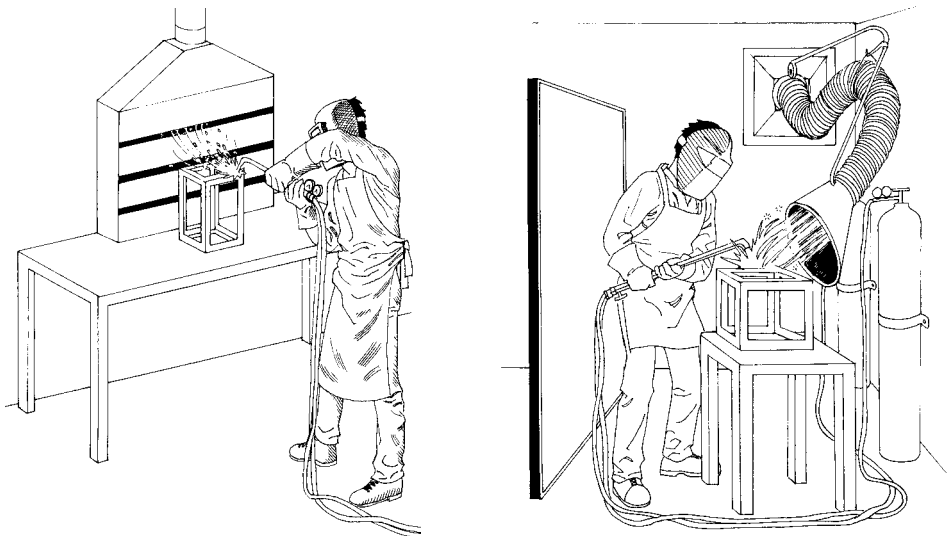
Local ventilation for spray painting and coating. A spray booth of any size can be built to accommodate the size and number of parts being painted or coated. Paint is often made with flammable solvents, so keeping paint and coating spray out of the air helps prevent fires and explosions.

The best way to prevent workers from breathing dangerous chemical vapors is to keep vapors out of the air in the factory. For more information about protecting workers from chemical vapors, see 'Chemicals,' on pages 54 to 93.



A spray booth keeps paint and chemical vapors away from workers and out of the factory air.

Local ventilation for welding. A ventilated welding station has a hood that pulls fumes away from the welder's face. The hood should be about 4 to 6 inches from the source of the welding fumes. A system of ducts connected to the hood will take the fumes out of the air before sending the air outside again. There are also portable ventilation units that a worker can move and set up at different welding sites.



Local exhaust ventilation helps protect welders from breathing in dangerous fumes.

Dust



Are machines, work tables, floors, and stored materials covered with dust?

Can you see dust or haze in the factory air?

Do workers have breathing problems?

Breathing dust causes many health problems

Many factory jobs produce a lot of dust. In garment factories, the air is often full of dust from cutting and handling fabric. In other factories, workers breathe dust created from grinding, sanding, packing, handling, and cutting metal, plastic, leather, wood, and other materials.

Breathing too much dust can irritate your eyes, nose, mouth, and throat, and make working very uncomfortable. Breathing dust can also cause lung diseases and difficulty breathing. Even a little dust can give some people allergies and asthma.

The dust in factory air is mostly fine bits of the material workers handle while making products. Factory dust can also include soot from motor exhaust and from hot or burnt materials. Dust from dangerous materials, such as lead and asbestos, can cause very serious health problems. Some dust contains other dangerous chemicals. For example, fabric dust often contains dyes and formaldehyde that can make workers very sick.

For more information about the health problems caused by chemicals in dust, see 'Chemicals' on pages 54 to 93.

Workers exposed to a lot of dust are much more likely than other workers to get sick from tuberculosis. To learn more about tuberculosis, see 'TB' on page xx.

SIGNS OF TOO MUCH DUST

- Workers wheeze or have difficulty breathing.
- Workers cough, sneeze and blow their noses often.
- The mucus in workers' noses is the color of shop dust.
- Workers' hair, face, and clothes are full of dust.
- The floor, equipment, lights, windows, or walls are covered with dust.
- The air in the factory is hazy.



Yolanda's blue face — Mexico

Yolanda works in a large garment factory in Piedras Negras, Mexico. Every day, after just a few hours of work, Yolanda and her co-workers used to be covered with fabric dust. The ceiling fans did not help. They just blew the dust around. At first, the workers wore paper dust masks, but the masks were hot and did not protect them very much. "If we're covered with this stuff on the outside, imagine what we look like on the inside," said one worker. "I have to wipe off my face every few minutes." When the factory brought in a new manager, the women decided to push for changes.

Yolanda agreed to work 1 day without wiping the dust off her face. By 11 a.m., she was covered with fine blue fuzz from the pants she was sewing. The workers went together to speak with the manager. "You said you did not want to see sad faces in the factory," one woman said. "What do you think of this?"

Seeing Yolanda's blue face, the manager turned bright red with embarrassment.

The women told him, "We need ventilation at each of our sewing machines to pull the dust outside."

He said he would see what the company could afford.

"When will we see the ventilation?" the women insisted.

"Whose idea was this?" he demanded.

The women replied simply, "Everyone's."



Realizing the women were going to stick together, the manager agreed to install 3 exhaust vents each week until all the machines were ventilated.

The women in Yolanda's factory continued demanding and winning changes, including better treatment for pregnant women. They formed a union and learned the law. Through direct actions, they have forced their boss to obey laws, such as the right to maternity leave and year-end bonuses.

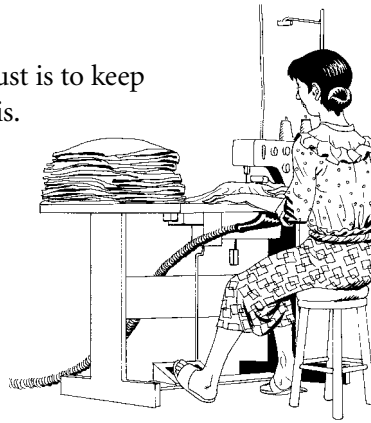


Prevent dust from getting into the air

The best way to protect workers from breathing dust is to keep dust out of the air. There are several ways to do this.

VENTILATION

A good ventilation system pulls dusty air out of the factory, so workers breathe in less dust, and less dust settles on equipment and other surfaces. To learn more about different types of ventilation, see 'Ventilation for fresh, clean air' on pages pages 94 to 97.



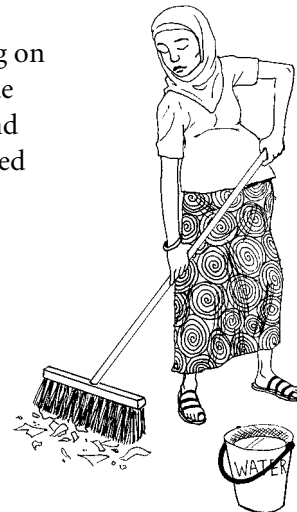
Local exhaust ventilation removes dust before it can get into the air.

CLEAN UP THE DUST

A regular cleaning schedule will prevent dust from collecting on floors and equipment. The cleaning schedule should include hard-to-reach places, such as overhead lights, fan blades, and high windows. Regular cleaning prevents dust that has settled from being stirred up again.

Use a wet rag or mop, or a vacuum machine designed to catch dust. If you have only a broom for cleaning, first sprinkle water on the floor, and then sweep gently.

Using compressed air to clear dust or debris from work surfaces, machines, floors, or clothing blows the dust back into the air to be breathed in by workers. The force of compressed air can also send debris flying into workers face and eyes, causing injuries.



Cleaning should not add to the dust problem by stirring up the dust again.

Face masks for dust

Some workers wear a cloth over their nose and mouth to keep from breathing in so much dust. A cloth may keep a little of the dust out, but it does not protect you very much. You will breathe in less dust if you wear a dust mask that fits tightly over your nose and mouth.

A dust mask will not prevent you from breathing in chemical vapors in the air. Chemical vapors go through cloth and paper. For more information on face masks, see page 83.



If a paper dust mask fits your face tightly, it can protect you from breathing in most dust.

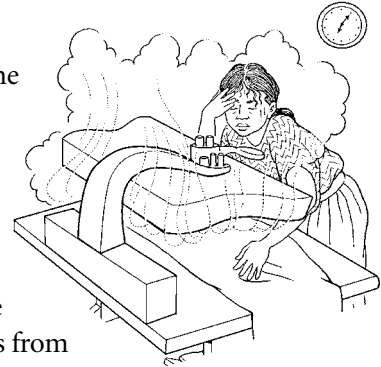
Heat and cold



Do workers sweat while bosses sit in air conditioned offices?
Are workers hands and feet always cold?

It is the boss's responsibility to make sure the air in the factory is not too hot or too cold. In some countries, the law requires factories to keep the temperature at 25°C (77°F) or lower if the work requires hard, physical labor.

You will need to organize to pressure the boss for better ventilation, heat, or air conditioning. But there are some things workers can do to protect themselves from getting too hot or too cold.



Health problems from too much heat

When you get very hot, your body sweats to cool off. And when you sweat, your body loses liquid. To stay healthy, you need to drink enough water to replace the liquid you lose as you sweat. If you do not drink enough water to keep your body cool, or you do not get regular breaks from the heat, you can get sick very quickly.

Heat stress can cause headache, fast pulse, painful muscle cramps, and chest pain. You may also feel weak, dizzy, confused, and nauseous. **These are warning signs that you are in danger of collapsing from heat stroke if you do not cool off.**

Heat stroke happens when your body gets too hot and you can no longer sweat. This can cause permanent damage to the brain and other organs, and can kill you.

Other health problems caused by too much heat include:

- **skin rashes**
- **heart problems**
- **vaginal infections**, especially in women who sit most of the time, and whose clothing stays damp with sweat.
- **pregnancy complications and miscarriage**
- **fewer sperm in men**, making it difficult to conceive a child.

Too much heat is especially dangerous for people with heart problems, high blood pressure, or diabetes, and for people taking certain tranquilizers or medicine for nausea.



Stand Together, Fan Together — Mexico

My name is Maria. I work in an electronics factory in Reynosa, Mexico. After work, I meet with a group of women to talk about problems at work. When the air conditioning in the factory broke a few months ago, the manager said fixing it was too expensive. We started to talk about how sick we felt working in the heat. The manager did not listen to us when we asked him to fix the air conditioner, so our group decided to find another way to convince him. One morning we walked into the factory, but we did not start working. We sat down and started fanning ourselves. Other workers saw what we were doing and joined us. Soon all the workers in the factory had stopped working and started fanning. By the end of the day, the manager had fixed the air conditioning!



Cooling the air inside the factory

Many machines give off heat. For example, workers who use garment presses or die casting equipment are always near hot machines and materials. If the factory does not have good ventilation or a cooling system, the air around these machines can become dangerously hot.

The best way to protect workers from too much heat is to keep the air inside the factory cool. If the outside air is very hot and humid, **air conditioning** may be the only way to keep the factory cool enough inside to be safe for all workers. The whole factory does not have to be air conditioned. Cooled air can be blown through ducts to the spot where each worker sits or stands. Most factory buildings can be kept cool with a good ventilation system, plenty of air space, insulation, and shade.

VENTILATION

Local exhaust ventilation pulls heat and steam from hot machines directly out of the building.

Vents in the roof, exhaust fans, and open windows draw hot air out through the roof and bring cooler air in through the windows.

To learn more about ventilation, see pages 94 to 97.

Fans can help workers in a small area feel cooler, but they do not solve the problem of too much heat in a factory. If the air is hotter than 35°C (95°F), fans do not cool the air, they just blow the hot air around. Fans can also cause problems by stirring up dust and blowing chemical vapors into the air that workers breathe.

INSULATION AND SHADE

Natural roofing materials such as palm leaves, straw, and wood keep buildings much cooler inside than metal, plastic, cement, or asphalt roofs.

Insulating the roof with fiberglass or other insulation material helps keep the sun's heat outside and can reduce the temperature inside a building by 8°C.

Painting the roof white reflects sunlight away from the roof. A white roof does not get as hot from the sun as a dark-colored roof.

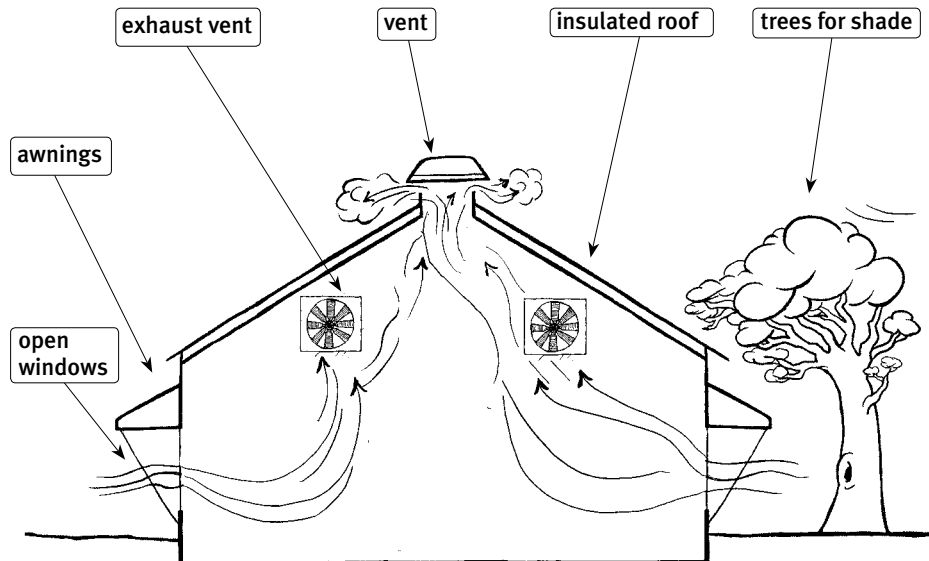
Covering hot machines and pipes with insulation material, such as foam rubber or fiberglass, helps keep heat out of the air.

Shading windows with awnings or reflective coatings keeps out heat from the sun.

Planting trees around the factory can shade the building from the sun.

MORE SPACE

The more people and machines are crowded together, the warmer the work area will be. Open spaces reduce heat and help the air flow through the area.



Ways to cool the air in the factory

Rest and drink water to prevent heat sickness

If the air is very hot in your factory, there are some things you can do to prevent by heat stress and other health problems.

Drink about 1 cup of cool water every 20 minutes, even if you are not feeling thirsty.

Take rest breaks. If your job makes you very hot, you should rest in a cool area for 15 minutes after every hour of work.

Wear loose-fitting, lightweight clothes that let air through to your skin to help dry sweat and cool your body. Loose underclothes made of cotton, instead of nylon, can also help prevent skin rashes and infections.

Limit time working in very hot areas by rotating jobs, so that nobody works in high heat all day or every day.

For more information about organizing for rest breaks and clean drinking water, see “Eating and resting” on pages 146 to 148, and “Water and toilets” on pages 142 to 145.



FIRST AID

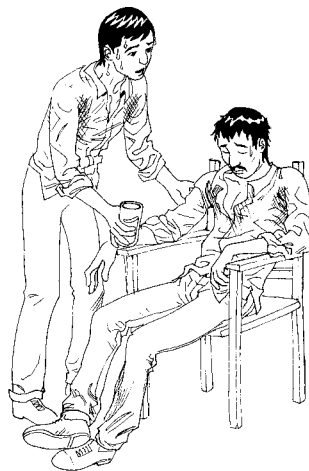
FIRST AID FOR HEAT STRESS

The first signs of heat stress mean a person is in danger if he does not cool his body right away. **Do not wait until a person faints to give first aid.**

What to look for: heavy sweating, headache, and feeling weak, tired, nauseous, dizzy, or confused.

What to do: Have the person lie down in a cool place. Raise his feet and rub his legs. Give him cool water to drink.

If the person faints, get medical help right away.



FIRST AID FOR MUSCLE CRAMPS CAUSED BY HEAT

What to look for: painful cramps, usually in the legs, arms, or belly.

What to do: Have the person slowly drink 1 liter of cool water every hour until the cramps are gone. Have him sit or lie down in a cool place and gently massage the painful areas.

Health problems from getting too cold

When you are cold, your body tries to get warm by tensing muscles and shivering. This is tiring and can make your muscles ache. When your body gets cold, you can also get sick with other illnesses more easily.

Working when you are too cold can be dangerous, because you think and move more slowly. Your hands and feet cannot hold or feel things as well as usual, so you may not notice if they get injured.

Severe cold can freeze your hands, face, and feet, and can kill you, but this is very unusual in export factories.

Warm up the workplace

The best way to protect workers from getting sick or injured due to cold is to make the factory warmer. Here are some suggestions:

Heat the work area with a hot air system, or with hot water or steam radiators that spread the heat evenly.

Insulate the floor — especially floors made of concrete, stone, or metal-- with rubber, wood, or carpeting. Anti-fatigue mats can be good insulation from cold floors.

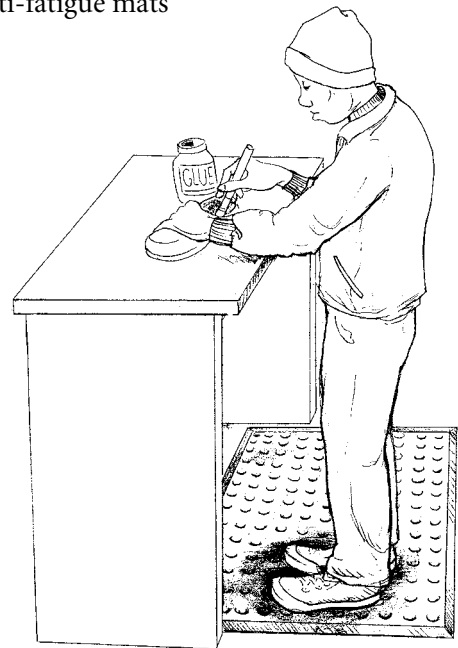
Insulate chairs with cushions, cloth, or foam rubber, especially if the chairs are made of metal. Wood, plastic, and fabric chairs are warmer to sit on than metal chairs.

Heat vehicles with electric seat warmers or hot air blowing on the feet.

Insulate the roof and walls to keep warm air inside the building and cold air outside.

Close doors and windows to keep out cold air. If open windows and doors help ventilate the factory, see 'Chemicals' on page xx and 'Dust' on page xx for information about other ways to keep chemicals and dust out of the air.

Open doors, windows, and window shades to let sunshine and warm air in.




A hat, jacket, and floor mat help this worker stay warm.

Keeping warm in a cold workplace


If your workplace is cold, you will stay warmer if you can:

- **Wear warm clothing**, including socks and closed shoes or boots with thick soles. Several layers of thin clothes can be as warm as 1 layer of heavy clothes.
- **Cover your head** and ears with a hat or scarf. Just covering your head helps keep your whole body warm.
- **Wear gloves**, especially if you touch cold things while working. Gloves with the finger tips cut off may be helpful.
- **Move around** to keep the blood flowing to all parts of your body, especially your feet if you stand on cold floors.
- **Drink hot liquids and eat often** to warm your body from the inside.



**FIRST
AID**

FIRST AID FOR BEING TOO COLD



What to look for: shivering, confusion, feeling sleepy. The person may speak unclearly and walk unsteadily, as if she is drunk. This is a very dangerous condition. Often the person does not realize what is happening.

What to do: Take the person to a warm place and cover her whole body with blankets. Give her warm drinks sweetened with sugar or honey, and sweet food, fruit, or candy. If you do not have anything sweet, give starchy foods like rice, bread, plantain, or potatoes. If she stops shivering but still has signs of being too cold, or if **she unconscious, get medical help fast.**

Fire and evacuation



Are chemicals and other materials stored near heat, sparks, or electricity?

Are there enough exits for everyone to get out quickly?

Are the exits always unlocked?

Fires are a serious problem in factories around the world. In the 10 years between 1990 and 2000, 115 women died and many more were injured in factory fires in just one country — Bangladesh. The stories on this page are part of a long history of worker deaths in factory fires.



New York 1911

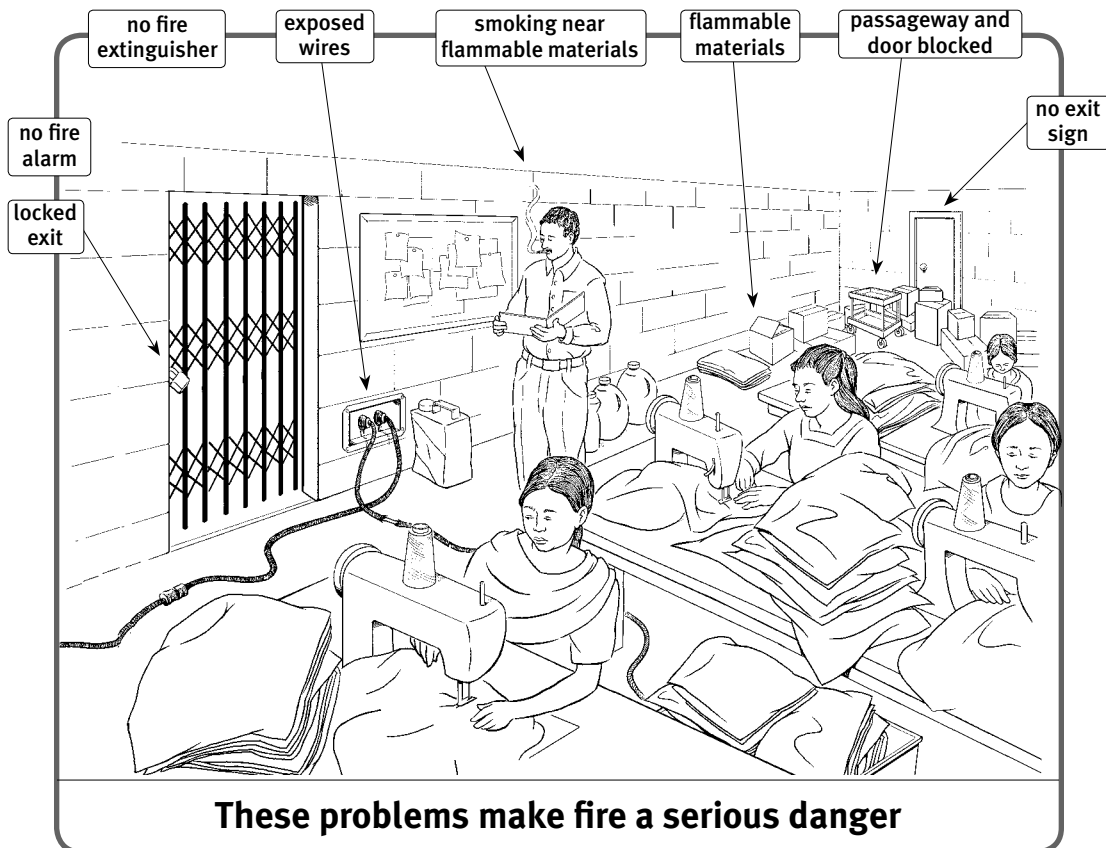
About 500 women were working in the Triangle Shirtwaist factory in New York City when a fire started on the 8th and 9th floors of the building. When the workers tried to escape, the only door to the stairs would not open. The fire escape collapsed from the weight of too many people. Some workers were so scared of the flames they jumped out of the high windows. In just 25 minutes, 146 workers died. That fire convinced more women to unionize the garment factories. Workers' protests and news of the fire also convinced people to support laws for safer factories and better pay. But factory fires continue to kill workers in the United States and around the world.

Bangkok 1993

In 1993, a fire at the Kader Toy factory in Bangkok, Thailand, killed 188 workers and injured more than 500. This is considered the worst industrial fire in history. One woman who survived the fire told this story:

My daughter and I both worked at the toy factory. When the fire started, there was nothing we could use to put out the flames. We rushed to the main doors, but they were locked. Everyone ran to the narrow exits. My daughter fell and could not get up as people pushed over her. The crowd pushed me out the door, but she died there on the floor. We are still fighting for compensation from the company. And where I work now, we are fighting with the boss to keep the doors unlocked.



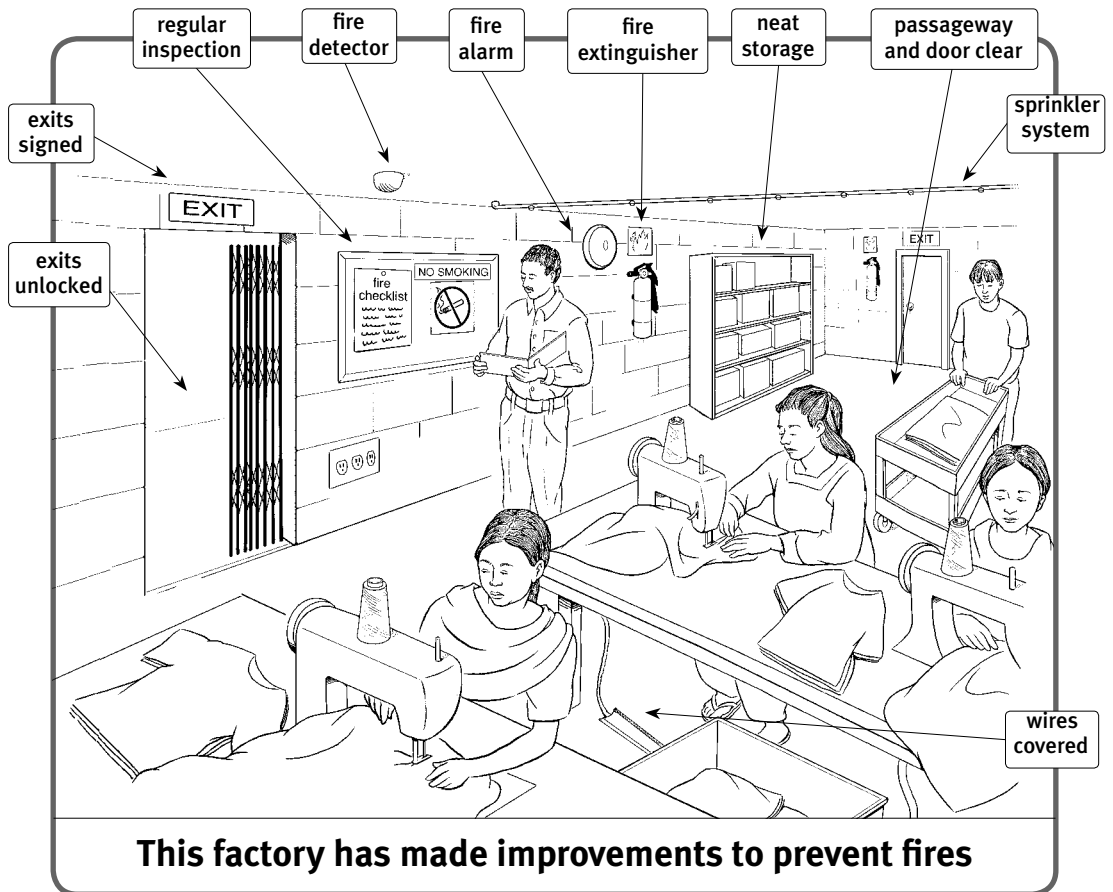


Prevent a fire in your factory or dormitory

You do not need special equipment or knowledge to prevent fires and deaths. Workers and managers can reduce the danger of fire by making a fire prevention plan and taking responsibility for:

- **cleaning up** paper, dust, fabric scraps, cardboard, and other materials that can easily catch fire.
- **storing solvents safely.** Solvents can catch fire more easily than almost anything else. To prevent fires, solvents should:
 - always be stored in tightly sealed fireproof containers.
 - never be stored in dormitories, stairways, or near fire exits.
 - not be stored near other chemicals or materials that catch fire easily, such as fabric and foam insulation.
 - not be used or stored near hot equipment, or machines or work processes that create heat and sparks.
 - be kept in small containers in work areas. Store larger containers of solvents in a fireproof chemical storage room away from work areas.

- **inspecting machines, electrical wiring, and other equipment**, such as gas, and kerosene stoves, heaters, and lights, to make sure they are safe to use and located in a safe place. In crowded dormitories, make sure curtains, bedding, and clothing are kept away from stoves, heaters, and lamps.
- **keeping equipment and tools that produce heat in good repair.**
- **replacing or repairing broken or frayed electrical wires** right away.
- **not smoking** near anything that could catch fire, such as fabric, dust, chemicals, or containers of gas, kerosene, or propane.



Be prepared in case of fire

Many lives can be saved if workers and managers plan together what to do if a fire breaks out. It is the boss's responsibility to make sure the factory has:

- **a fire alarm** that makes a loud noise so everyone will know a fire has started. Workers in one part of a building may not see or smell a fire in another part until the fire is large and dangerous. An alarm can also alert workers who may be sleeping in a dormitory in the same building.
- **fire extinguishers** that are well-marked and easy to reach. If a worker can put out a small fire quickly with an extinguisher, she can prevent the fire from spreading. Make sure all workers are trained to use a fire extinguisher. Water buckets do not hold enough water to put out a fire. It is dangerous to put water on electrical or chemical fires.
- **exits** that open outward and are always unlocked when people are in the building. Exit doors should be well-lit and marked with a sign workers can understand.
- **open passageways** that lead directly to exits. Passageways should be at least 1 meter wide, even wider in large work areas. It is very important to keep passageways clear and not cluttered with boxes, racks, and containers.
- **an overhead sprinkler system** with water pipes and plenty of water. The sprinklers should open automatically when a fire starts.



A fire extinguisher can put out a small fire quickly if workers are trained to use it and the extinguisher is easy to reach

PRACTICE EVACUATION

Everyone needs to know how to get out of the factory or dormitory quickly and safely, and where to meet outside. Practicing evacuation helps prevent people from panicking if there is a real fire. It is a good idea to practice at least twice a year, more often if there are many new workers.

During a fire, the smoke is thick and can make the room too dark to see which passageways are clear and which doors are open. You will be able to see and breathe more easily if you drop to the floor and crawl on your hands and knees.

If possible, keep an up-to-date list of workers at the factory. If a fire happens, the list will help you know who to look for outside after evacuation, and who might still be inside the factory.

FIRST AID FOR BURNS

Minor burns that do not form blisters: Put the burned area in cold water immediately. This will reduce pain and lessen the damage. No other treatment is needed.

Burns from hot water or oil: Take off any clothing that has the hot oil or water on it. Immediately rinse the burn with cool water.

Burns that cause blisters: Put the burned area in cold water immediately. Do not break the blisters. If the blisters break by themselves, wash gently with soap and clean water. Keep the burn clean and protect it from dirt, dust and flies. If the burn is slow to heal, or the skin stays red, swollen, or painful, see a health worker. You may need treatment for an infection.

Large or deep burns: Burns that cover a large area of the body, or expose raw or charred flesh, are always serious. Take the burned person to a health center immediately.

Note: *Never put grease, fat, hides, coffee, or feces on a burn.*



FIRST
AID

FIRST AID FOR BREATHING SMOKE

Breathing smoke can burn the lungs. This can be very serious. If the person has difficulty breathing, a burning feeling in the lungs, a tight feeling in the chest, or severe coughing, take him to a health care center immediately.

Electrical safety



Are electrical cords hanging from the ceiling or lying on the floor?

Are electrical wires frayed or broken?

Do workers always disconnect machines before making repairs?

Electricity powers the lights and machines that make factory production possible. But if electricity is not properly wired and maintained, it can injure and kill people. The factory boss is responsible for making sure the electrical wiring and equipment in the factory are safe. All machines should have proper wiring and earthing when they are first installed. Wiring and electrical equipment should be inspected regularly and replaced or repaired if they are damaged or worn out.

Common electrical dangers

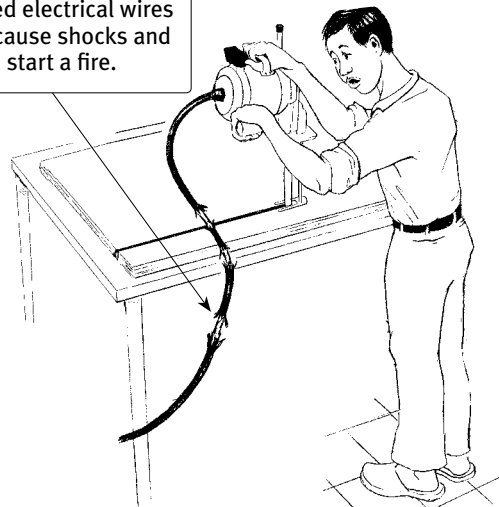
Unsafe electrical cords and uncovered wiring can cause fires, burns, and dangerous shocks. Workers can also trip and fall over cords lying on the floor.

DAMAGED EQUIPMENT

The best way to keep electrical equipment safe is to handle it carefully and protect it from damage. Stretching and pulling electrical cords can break their coverings and expose the wires inside. If you touch uncovered wires, you can get an electrical shock. Sparks from exposed wires can also start fires.

Inspect electrical cords and wiring regularly. If the coverings are cut or frayed, the cords should be repaired or replaced.

Frayed electrical wires can cause shocks and start a fire.

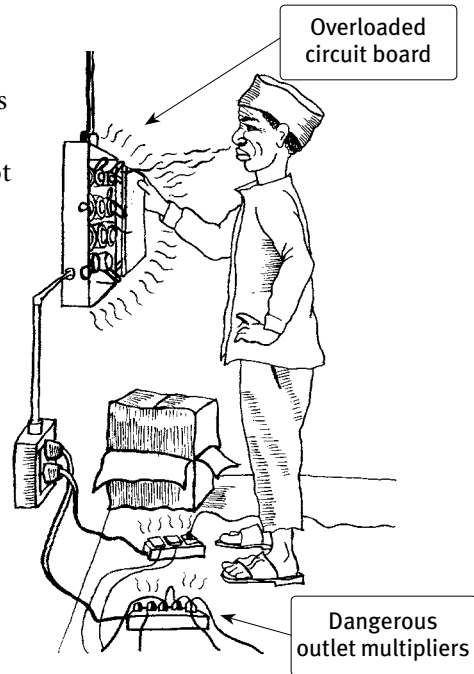


UNPROTECTED PARTS

Covering the wires inside the electrical system of a building or equipment protects the equipment and the workers. Keeping electrical equipment dry, also prevents shocks, because water on or near the equipment can carry electricity to anything the water touches.

OVERLOADED CIRCUITS

Electrical wiring in a factory can safely operate only a certain number of machines or lights. If too many machines are using one circuit, the wiring can become very hot and cause a fire. If a circuit box, machine or wiring feels or smells hot, it is probably overloaded. An experienced electrician will know how to make the wiring safe.



An overloaded electric circuit can cause a fire.

OUTLET MULTIPLIERS

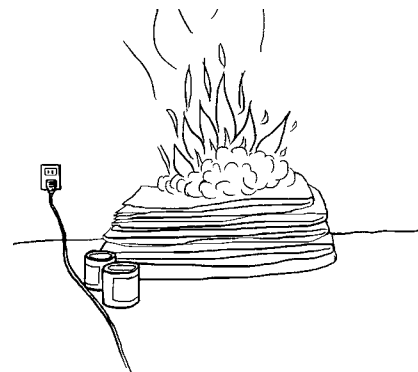
These are sometimes called an “outlet octopus” or a “multiple outlet power strip.” An outlet multiplier is used to connect many electric tools or cords to a single outlet, but this can easily overload the outlet and cause a fire. Workers can also trip over the tangle of cords connected in this way, injuring themselves and damaging the cords.

EXTENSION CORDS

Extension cords are not made to be used in place of permanent wiring. It is dangerous to run extension cords through walls, doors, or ceilings. When they are connected for a long time, extension cords can get hot and cause fires. If you use an extension cord to connect a light or machine for a short time, make sure the cord is out of the way where no one will trip over it. Extension cords are often used in places where they can be damaged, so it is very important to inspect them often and replace them if they are damaged.

LOOSE CORDS

Like extension cords, loose cords can be damaged easily and can cause workers to trip and fall. You can fasten loose cords to the wall or floor with tape, or cover them with pieces of carpet or rubber mats. But do not cover or tape an electrical cord when you can see the wire inside.



Do not store material that catches fire easily near electrical cords or equipment. Flammable materials include chemicals, cloth, paper, cardboard, and foam padding.

EARTHING (GROUNDING)

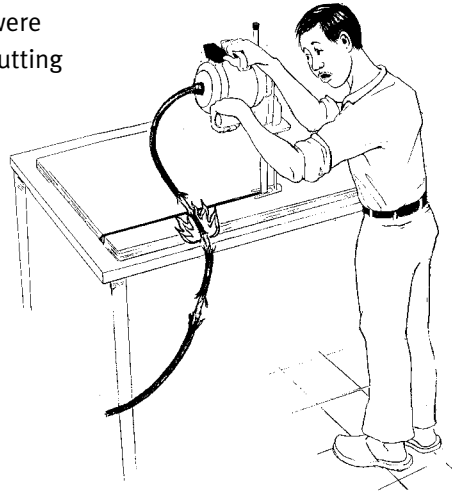
Electrical outlets, tools, and machines should be wired correctly and earthed (grounded). Earthing is a way of connecting machines and electrical wiring so they do not shock people. If the metal parts of a machine cause tingling or give shocks when touched, the machine is not earthed and can be very dangerous. A 3-point outlet on the electrical system does not mean the electrical system and outlet are earthed. To know for sure whether an electrical outlet or machine is earthed, it must be tested using equipment made for this purpose. Your employer should have a qualified electrical inspector check every outlet and machine to be sure they are earthed.



Liang's Story — China

Liang grew up in a small farming village in China. When he was fifteen, he went to the city and got a job in a clothing factory. He worked long hours every day, trying to save money.

Liang became a cutter in the factory. There were uncovered wires on the electric cord of his cutting knife, and they shocked him many times. The manager said it was his fault for touching the wires. One day, while he cut cloth for shirts, the cloth touched the exposed wires and caught on fire. A worker near the wall grabbed the fire extinguisher and ran to Liang's table. They put out the fire before it spread to the piles of cloth nearby.



The manager yelled at Liang for letting the cloth catch on fire and for using so much of the fire extinguisher. But everyone knew that Liang had stopped the fire from spreading to the rest of the factory. The cutting room workers saw that the fire had scared the manager, so they demanded he fix uncovered wires like the one that started the fire. Before the fire, the boss had said it was too expensive to repair Liang's cutting knife and that he should just be more careful. This time he hired an electrician to fix all the wires and cords.

Encouraged by this success, Liang and his co-workers met to discuss other problems, like locked exit doors. They used the fire to make their factory safer. Liang hoped they could win more changes before any other accidents happened.



The boss is responsible for electrical safety

Workers who know the most about electrical safety can train other workers to prevent problems. But you will need your boss's cooperation to fix most electrical safety problems.

Organizing a group of co-workers to talk with your boss about electrical problems is a good way to begin.

Keep a list of the problems you report to your boss, when you report them, and what your boss says he will do about the problems. If your boss does not make changes quickly, consider other ways to pressure him. Some groups of workers have refused to work with unsafe electrical equipment or cables.

And the fuse box still smells. It still has jumper wires and gets too hot. When did we talk to the manager about it the first time?

Four months ago. It is time to talk to him again.

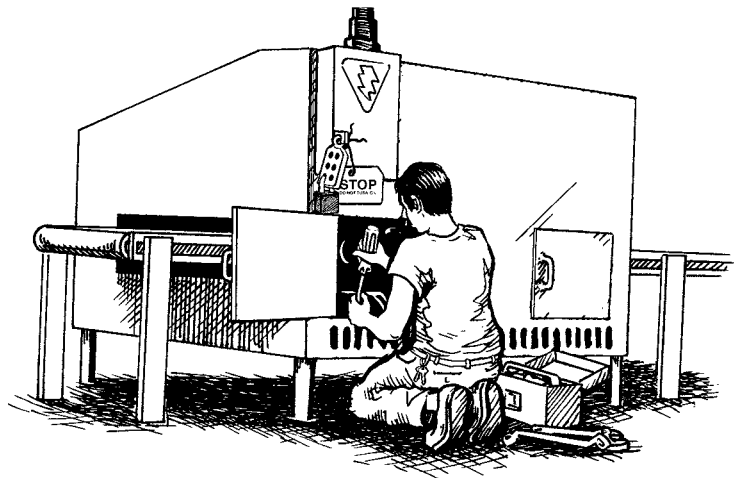


Lockout wiring and equipment for repair

To prevent shocks and other injuries, workers should always **lock, block** and **tag** electrical systems and equipment before doing maintenance and repairs.

Lockout is more than just disconnecting the electricity from a machine.

For information about how to safely lockout machines, see 'Lockout machines for safe repair' on pages 126 to 127.



Maintenance and repair workers need time and training to prevent electrical injuries.

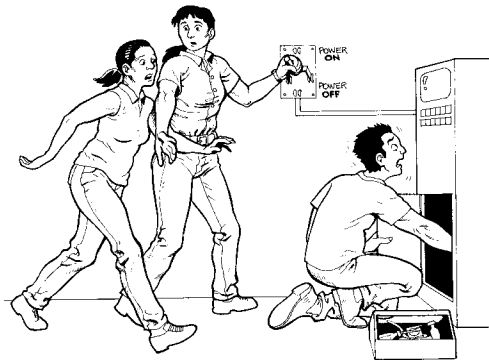
FIRST AID FOR ELECTRIC SHOCK

Always have a shock victim examined by a health worker.

A small electric shock may cause only a mild burn to the skin. But a big shock can cause deep burns and stop your heartbeat and breathing.

If a worker is being shocked:

Do not touch the person. The electricity can pass through his body and shock anyone who touches him. First, unplug or turn off the machine or tool causing the shock. If you cannot turn off the power, use a piece of wood, like a broom handle, or dry clothing, or rope to separate the victim from the power source. Do not use anything that is wet or made of metal.



After a worker has been shocked: Keep the worker lying down. If he is unconscious, lay him on his side and cover him with a blanket until a health worker arrives. Carefully examine the victim for burns on the skin. Sometimes burns from electric shock do not look serious on the skin but are much worse inside the body. Cover burns loosely with a clean, dry cloth until a health worker arrives.



If a shock victim has stopped breathing, or his heart has stopped beating, he needs medical treatment right away or he will die.

For more information on burn care, see page 111.



FIRST
AID

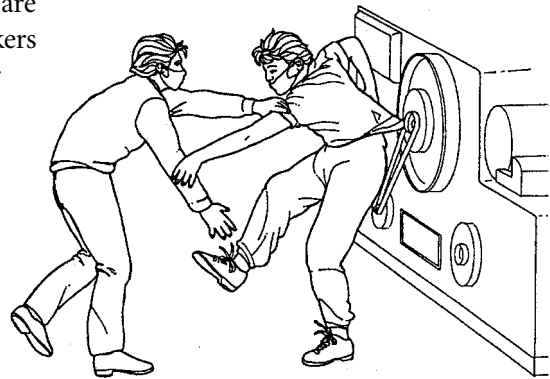
Machine safety



Do the machines in your factory have guards that protect workers from getting cut, crushed, or burned?
Are all workers trained to use machines safely?

Preventing injuries caused by machines

Sharp, hot, or moving machine parts are always dangerous. Many factory workers have lost fingers, hands, arms, legs, or eyes, because they were not properly protected from the danger areas of a machine. Machine injuries can cause permanent disabilities and sometimes death. Broken machines can also harm workers by leaking dangerous chemicals or liquids that make floors slippery and cause workers to slip and fall.



Most machine injuries can be prevented with proper machine guards, by training workers to use machines safely, and by keeping machines in good condition.

The best way to prevent injuries is to make sure machines and job tasks are designed so that a worker never has to put any part of her body near the dangerous parts of a machine.

Your boss is responsible for making sure machines in the factory are safe and for keeping them safe. The boss should make sure all new machines have built-in safeguards and are set up with guards in place and working properly. All workers should be trained to use the machines with these safeguards in place.

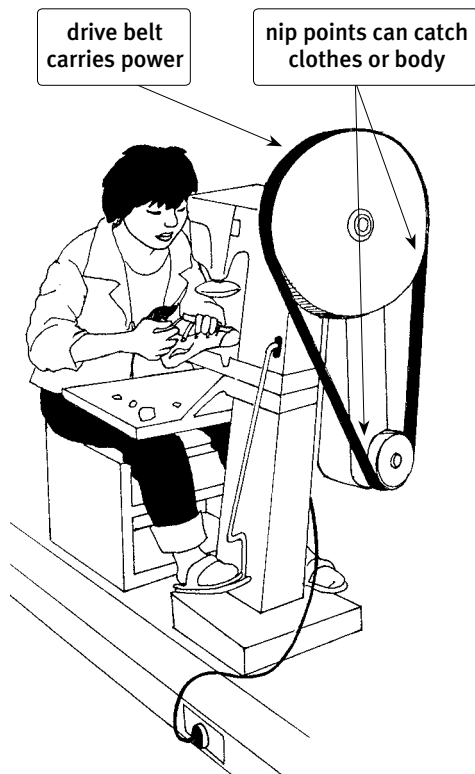
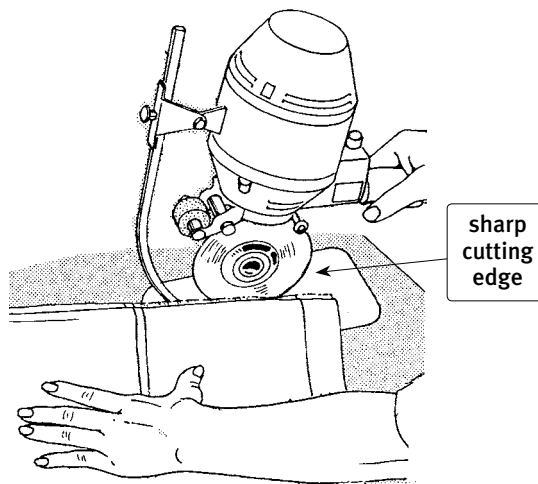
Experienced workers know machine dangers better than anyone else. They can show the boss and other workers the dangerous areas of a machine that need guards or other protections.



Machine guards protect workers

Machine guards prevent a worker's body or clothing from getting caught or cut by moving parts. Some guards also keep workers from getting burned by hot surfaces or materials. Other guards protect workers from material or parts that can break off or fly out of a machine. **All machines need guards around the dangerous areas shown on these 2 pages.**

Point of operation where the machine does the work, such as the cutting edge of a saw or knife, the molds of an injection molding machine, or the needle of a sewing machine. Workers may have to put their hands inside the point of operation to hold or change the part of the product the machine is working on.



Parts that carry power from one part of the machine to another, such as belts, chains, flywheels, pulleys, connecting rods, cams, spindles, gears, and cranks. Workers' hair, clothes, or body can get caught and be crushed by these moving parts.

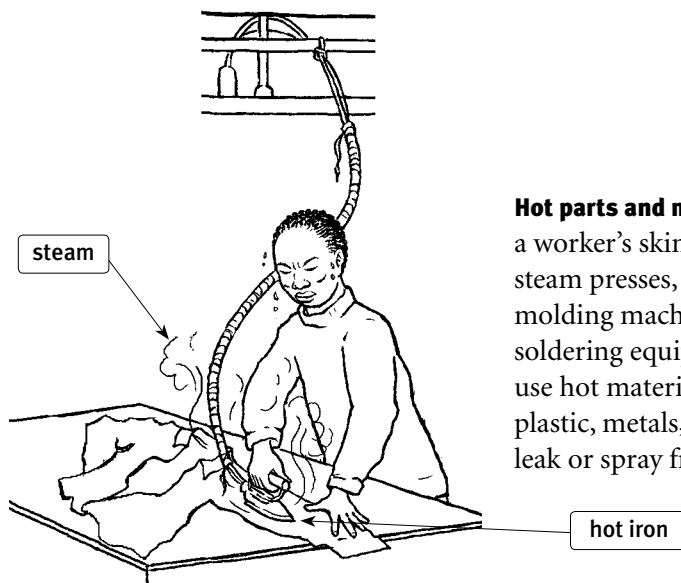
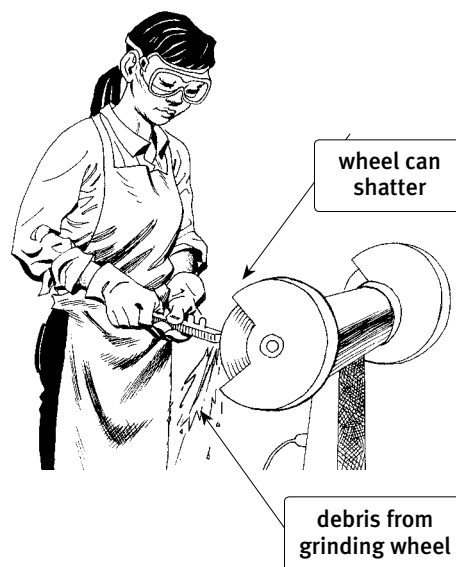
The danger areas of parts that carry power are the **nip points** or **pinch points** where 2 moving parts meet. For example, the point where a drive belt meets a pulley, where 2 gears mesh, or where 2 rollers come together.

You can help prevent injuries by not wearing loose clothes, scarves, veils and jewelry such as rings, bracelets, and long chains, necklaces or earrings that can get caught in the moving parts of a machine.

Points that throw debris into the air, usually on grinding and cutting equipment, including powered saws, grinding wheels, sanding belts, and riveters.

Points that can break or shatter, such as a sewing machine needle or a grinding wheel.

Debris and shattered parts can fly into your eyes and body causing deep wounds and blindness.



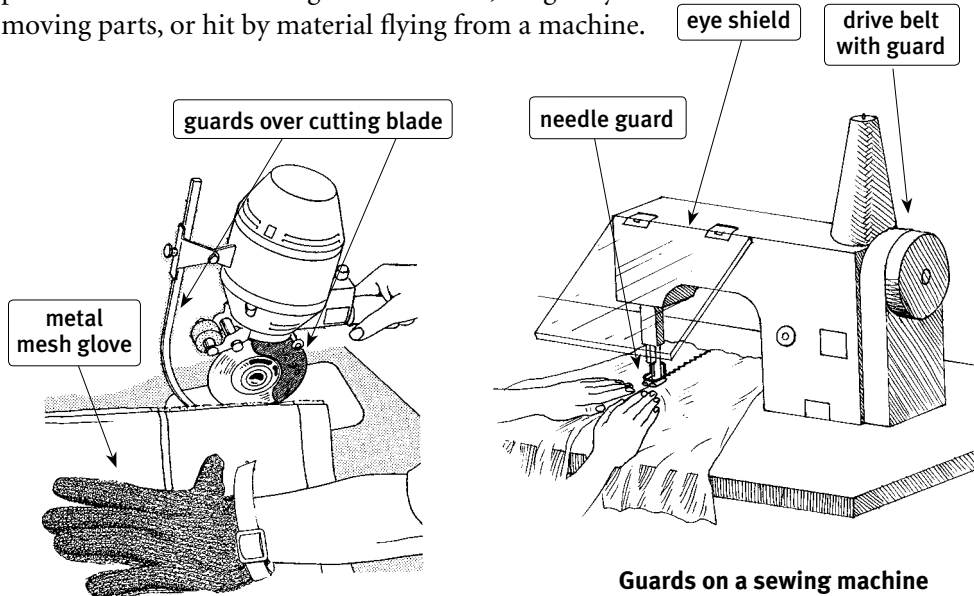
Hot parts and materials that can burn a worker's skin or clothes, such as steam presses, curing ovens, injection molding machines, and welding and soldering equipment. Some processes use hot materials, such as molten plastic, metals, dyes, or acids that can leak or spray from equipment.

There is no one kind of guard that is best for all machines and all tasks. Workers must be protected during regular production, during set-up for a new product run, when making adjustments during use, when clearing parts that get jammed. A machine guard needs to allow the worker to do all these tasks without getting injured. The best guard protects the worker the most and also makes her job as easy as possible. Examples of different types of machine guards are shown on pages 120 and 122 to 124.

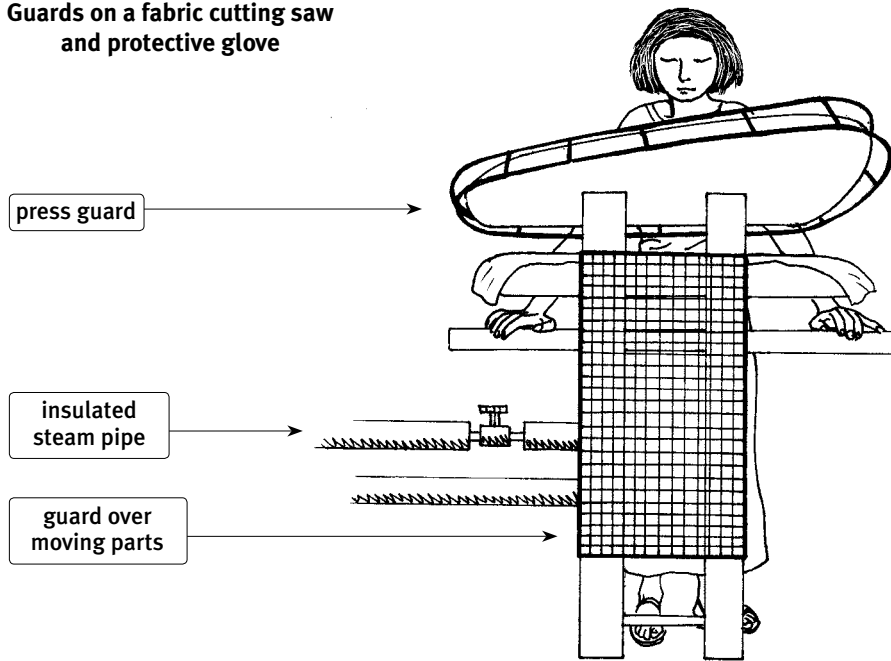
All machine guards should be inspected and tested regularly to be sure they are in place and working.

FIXED GUARDS

A fixed guard prevents a worker's body from getting near dangerous areas of a machine, or from being hit by broken parts flying out of a machine. The drawings on this page and page xx show examples of guards that protect workers from being cut or burned, caught by moving parts, or hit by material flying from a machine.



Guards on a fabric cutting saw and protective glove

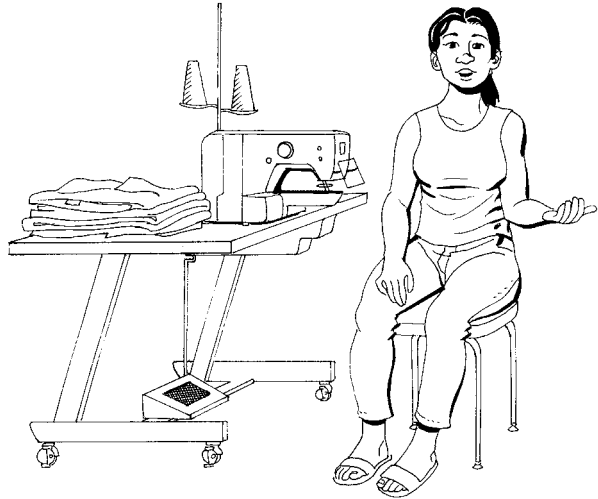


Guards on a garment press



Cecilia's story — Mexico

My name is Cecilia. I work in a large garment factory in Mexico. Workers in my factory have organized for many years, and we have won changes that make our work safer. Each time we unite to pressure the boss, we become stronger. Now the boss agrees to some of our demands right away instead of making a conflict, because he knows we are unified. That is why we were able to get new needle guards on our machines.



Needle guards keep our fingers from getting caught under the sewing needle. The guards are made of thin wire that breaks easily. At first, when a needle guard broke, we just kept sewing, and the boss did not replace the guard. But we work very fast with powerful sewing machines. Without needle guards, a few workers injured their fingers very badly.

We decided every sewing machine should have a needle guard so workers would not get hurt. Needle guards are cheap and easy to replace. The boss agreed to keep guards on all the machines. Now when a needle guard breaks, we can have it fixed the same day. And with the guards, no workers' fingers have been seriously injured by a needle.



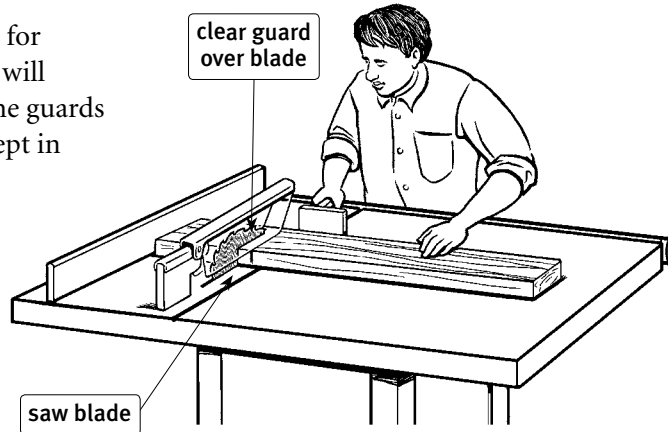
What do you think?

Why do workers and bosses sometimes remove or disable guards and other protections on machines?

What can workers in your factory do to make sure all machines have proper guards?

ADJUSTABLE GUARDS

Guards that can be adjusted for different uses and materials will protect workers as long as the guards are adjusted properly and kept in place. Sadly, some bosses remove or disable these guards rather than give workers time to make the adjustments. Workers who are under pressure to meet production goals also sometimes move adjustable guards out of the way.



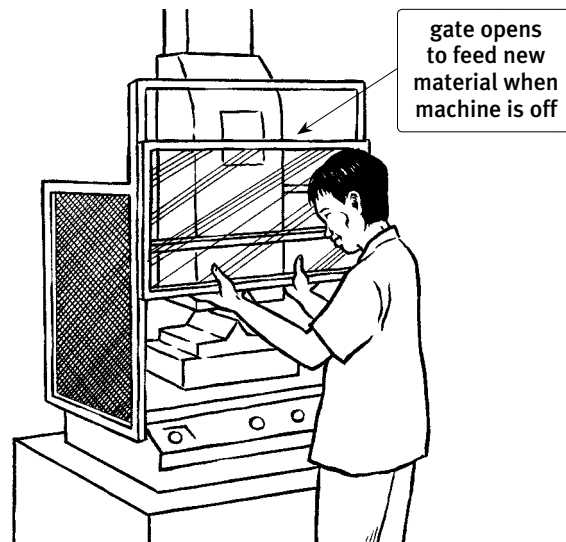
Saw for cutting wood with moveable guard

INTERLOCKING GUARDS

This kind of guard shuts off power to the machine when the guard is not in place. A worker can remove the guard to safely adjust or clear a machine, and replace the guard to safely restart the machine. **Removing an interlocking guard does not make the machine safe to repair.** To safely repair a machine, you need to lock, block, and tag it first. For information about lockout, see page xx.

MOVABLE BARRIERS

Some machines have a gate that opens only when the machine is off. You can feed material into the machine when the gate is open. The gate will not close if a worker's hand or arm is in the way.



Metal press with moveable gate

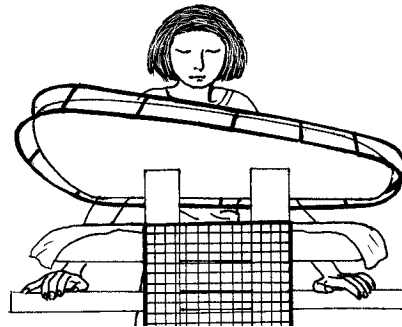
Other types of safeguards

AUTOMATIC SHUT-OFF DEVICES

Machines with doors or gates that open and close often have safety controls that automatically cut off power to the machine when the door is open. Automatic shut-off devices can fail, so they must be regularly maintained and tested to be sure they always work.

TWO HAND CONTROLS

Machines with this type of control will start only when you push 2 buttons or control points at the same time. These controls are separated so you must use both hands to push them. You can never start the machine with one hand in the danger zone.



The worker must use both hands to close the press.

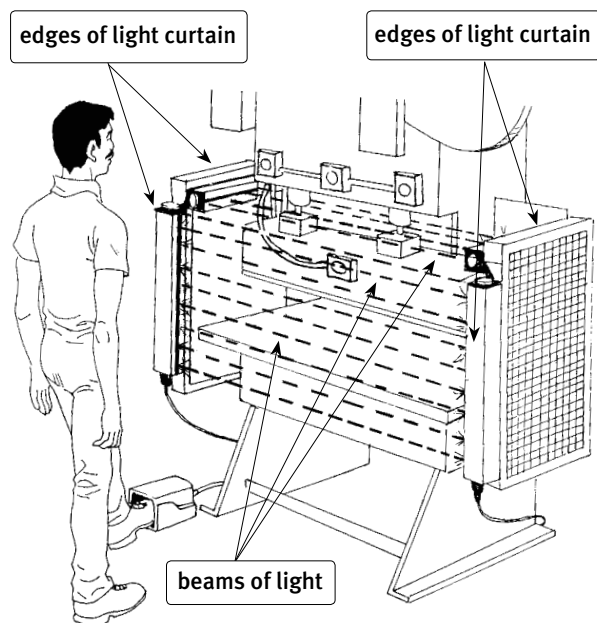
This system protects only the worker who pushes the controls. It does not prevent other workers near the machine from getting caught by moving parts.

LIGHT CURTAINS AND PRESENCE-SENSING MATS

A **light curtain** is made of many rows of light that sense when a worker gets too close to a machine. When you cross the light curtain, the machine automatically shuts off.

A **presence-sensing mat** shuts off a machine as soon as someone steps on the mat.

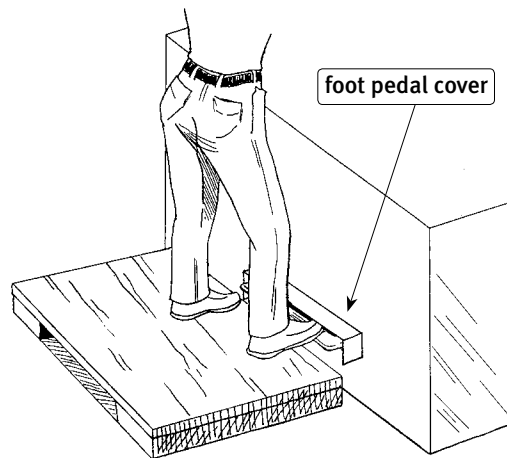
Light curtains and presence-sensing mats must be far enough from the machine so you cannot reach the danger zone before the machine stops moving.



Machine with light curtain

COVERED FOOT PEDALS

Many machines start when someone presses a foot pedal. If a person presses the pedal by mistake, or if something falls on the pedal, the machine can start while a worker's hands are in a dangerous area. A solid cover over a foot pedal prevents this from happening. Machines that start with foot pedals should also be protected with light curtains or other safeguards.

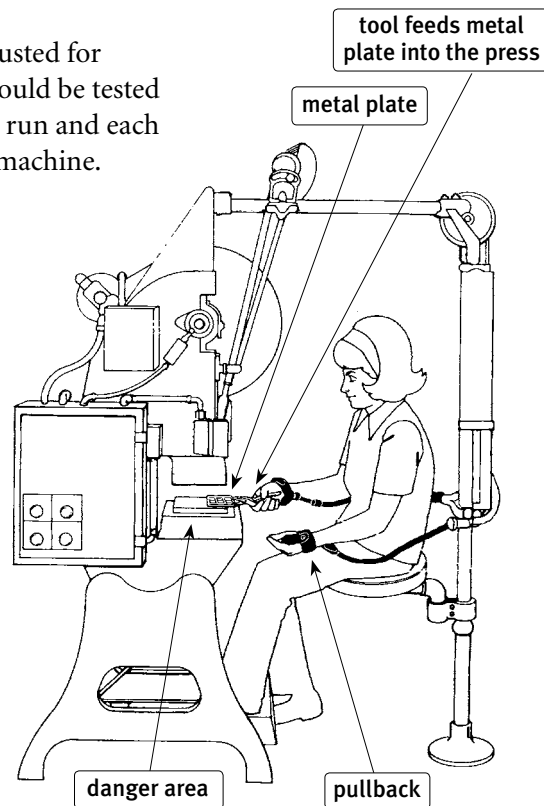


RESTRAINTS AND PULLBACKS

A **restraint** is a strap tied to a worker's wrist or arm that keeps his hands away from the dangerous areas of a machine all the time. A **pullback** allows a worker's hands to enter a dangerous area to feed and remove material while the machine is stopped. When the machine starts, the straps pull her hands away from the dangerous area.

Restraints and pullbacks must be adjusted for each worker who uses them. They should be tested before each set-up for a new product run and each time a different worker operates the machine.

Some countries ban restraints and pullbacks because they are considered unsafe. For most machines, a guard or a light curtain will give better protection to workers.



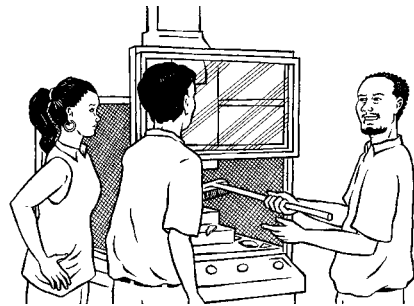
HAND FEEDING TOOLS

A hand feeding tool keeps your hands away from a dangerous area, but you must be trained to use these tools properly. Hand feeding tools should always be used together with other safeguards.

Working safely with dangerous machines

TRAINING

Each worker should be trained to safely use every machine she operates. If the employer does not provide training, ask an experienced worker to show you how to use a machine and then watch to make sure you are working as safely as possible.

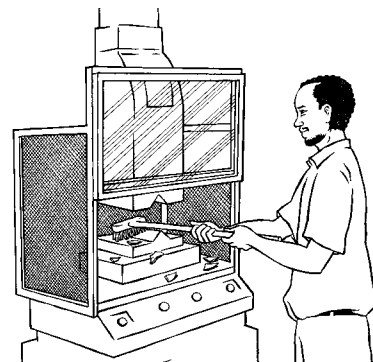


An experienced worker can train new workers to use machines safely.

CLEARING JAMS AND DEBRIS

Machines that are well-maintained and used properly do not often jam. If you must clear a jam or remove debris from inside a machine, always use a tool that prevents you from putting your hands or body in a dangerous area. If you do not have the right tool, or if you cannot clear the machine with the tool you have, be sure you disconnect and lockout the machine before you get near a dangerous area.

If you are not trained to lockout the machine, do not try to clear the jam or debris yourself. Get help from a worker who is trained to safely lockout the machine. For more information, see pages 126 to 127.



Use a tool, not your hands, to clear a machine.

SAFETY CLOTHING

The boss is responsible for providing workers with clothing that can help protect them from machine injuries. Workers are responsible for properly using safety clothing, such as:

- **wire mesh gloves** to keep hands from being cut by blades.
- **eye or face shields** to protect you from flying debris or broken parts.
- **leather or fabric gloves and sleeves** to protect your skin from sharp edges and from hot parts and materials.
- **hats, hair ties, and hair nets** to keep your hair from getting caught in moving machine parts.
- **coveralls, aprons, and uniforms** to protect your clothes and skin from dust and chemicals, and to help prevent clothes from getting caught in moving machine parts.

Lockout machines for safe repair

Workers who clear or repair machines need additional protection, because they must work inside dangerous areas. To prevent a machine from starting or moving during repairs, workers need the time, training, and tools to **lock, block, and tag** the machine. Sometimes workers are told how to lockout a machine, but it takes so long workers do not bother to do it. Employers are responsible for making lockout and tagout easy and routine.

Lockout is more than disconnecting the electricity from a machine. Sometimes a belt or drive shaft from another machine drives the machine being repaired. This power source is just as dangerous as electricity and needs to be disconnected or blocked to prevent the machine from starting to move unexpectedly.

BLOCKING STORED ENERGY IN MACHINES

Machines often store energy that must be released or blocked to prevent the worker from getting an electric shock and to prevent parts from moving when the machine is turned off. For example, machines can store energy in springs; in electronic parts such as capacitors; and in the water pressure and air pressure in pistons, hoses, and pipes.

The sources of water, chemicals, or other materials that flow into a machine also need to be completely blocked or shut off during maintenance and repair.

GUIDELINES FOR LOCKOUT

Every factory should have a lockout program to prevent repair and maintenance workers from being killed or seriously injured by a machine. A good lockout program will follow these guidelines:

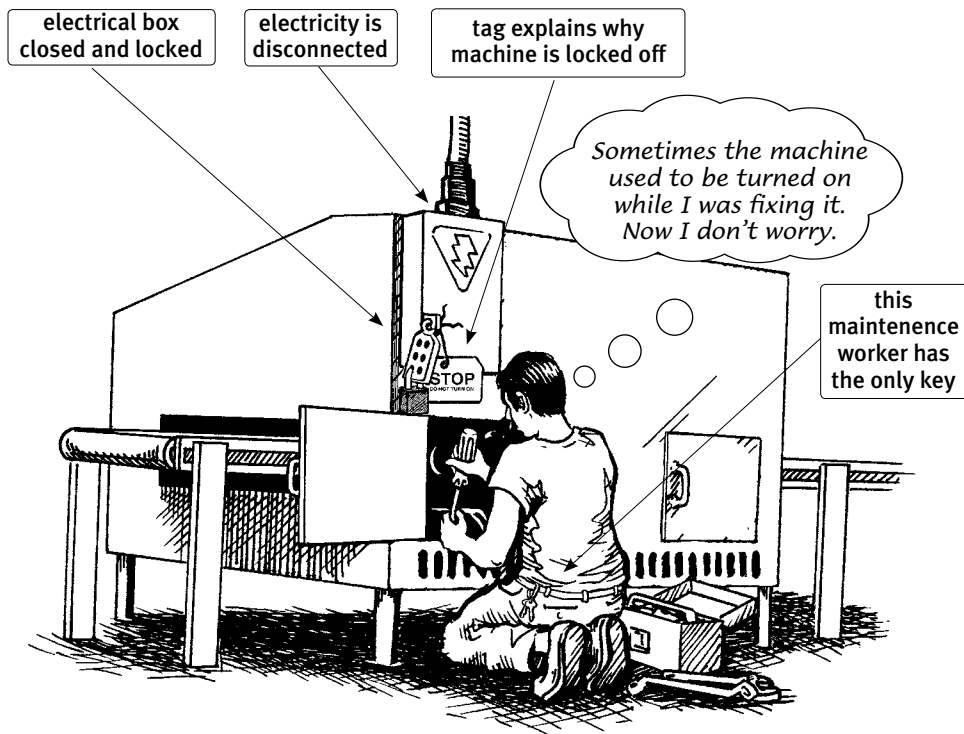
- A worker never repairs or maintains a machine until all the **energy sources to the machine are disconnected, blocked, and locked**. This will prevent the machine from starting up unexpectedly.
- A repair worker attaches a **tag to his locks** that says why the machine is locked out, says who is responsible for the lockout, and tells other workers and supervisors not to reconnect and start the machine.
- **The repair worker has the only key** to his locks and is the only person who can unlock the machine, remove the blocks, and reconnect the power.
- **All workers are trained** on why lockout procedures are used and why respecting these rules is important.

LOCKOUT INSTRUCTIONS FOR EACH MACHINE

To make a machine safe for repair, you need to know exactly how to disconnect the machine and block all the sources of energy to the machine. Some factories have many kinds of machines and several types of the same machine. Putting individual lockout instructions with pictures on each machine helps workers be sure they are locking out and blocking each machine the right way. Lockout instructions should be easy to read in a language workers understand.

REPLACE GUARDS AND OTHER SAFETY DEVICES

Machine technicians and maintenance workers sometimes need to remove guards and disconnect other safety devices while they work on a machine. These workers should always replace the guards and reconnect safety devices before unblocking a machine and reconnecting the power. It is the boss's responsibility to make sure that maintenance workers have the parts and training needed to repair or replace all broken or missing safety devices before restarting a machine.



Always lock, block, and tag a machine before beginning repairs.



FIRST AID

FIRST AID FOR MACHINE INJURIES

Most machine injuries are very serious and should be treated by a health worker right away. If no health worker can come, or will take a long time to get there, transport the injured worker to the nearest clinic or hospital right away. Try to keep him lying down on the way.

In the meantime, here are some things you can do for an injured worker:

Watch for shock – A person who is bleeding heavily from any type of injury can go into shock and die. Bleeding inside the body — although you cannot see it — can also cause shock.

Signs of shock are a weak, rapid heartbeat; pale, cold, damp skin; weakness, confusion, and fainting.

To prevent or treat shock, have the person lie down on his side with his feet a little higher than his head. Stop any bleeding. If he vomits, clear his mouth immediately. If he is cold, cover him with a blanket. If he is awake, give him water.

Rubber gloves for your hands –

If a worker is bleeding, do not touch blood with your bare hands. Fresh blood can carry dangerous germs, including hepatitis and HIV/AIDS. You can protect your hands with rubber gloves, gloves for handling chemicals, or plastic bags with no holes. Try to use clean gloves to keep dirt, germs, or chemicals out of the wound.

Big or deep cuts – Have the person lie down. Raise the injured part of the body. Press a clean, thick cloth directly on the wound with your gloved hand. Keep pressing until the bleeding stops. This may take 15 minutes or more than an hour. Never use dirt, kerosene, lime, or coffee to stop bleeding.

Deep wound in the stomach – Have the person lie down and cover the wound with a clean cloth. Do not give any food or drink, even water.

Part of body crushed – Have the person lie down and watch him for shock.



**First call a health care worker.
Stop the bleeding while you wait.**


**FIRST
AID**

Part of the body cut off – Have the person lie down and raise the injured part of the body. Press a clean, thick cloth directly on the wound to slow the bleeding until a health care worker arrives.

Objects stabbed into the body – If part of a machine or another object stabs deep into a worker's body, have the person lie down and leave the object in his body while you wait for a health worker, or transport him to a clinic. If the object is connected to something large or heavy, try to separate the object from the large thing it is part of. But do not move the object or push it farther into his body. If he is bleeding, press a clean, thick cloth on the area. Keep pressing until the bleeding stops.

Eye injury – Have the person lie down and cover the wound with a clean cloth. If you think there is something in the eye such as a piece of fabric, thread, plastic, or metal, rinse the eye with water for 15 minutes. If something is stabbed into the eye, do not take it out. Leave it in the eye while you wait for a health worker or take the injured worker to a clinic.



**Direct pressure will stop
bleeding of nearly all wounds.**

Head injury – Have the injured person lie down with his chest and head raised half-way to a sitting position. Support his head and chest with a pile of cloth, blankets, pillows or clothing. Cover the wound with a clean cloth.

Cuts and scrapes – Wash the wound with clean water. Dirt in the wound may cause an infection. Cover the cut with a clean cloth or bandage. Change the bandage each day. If the skin around a wound is red, swollen and tender to the touch, it is infected. If it is not healing or is infected, see a health worker.

Cleaning up after an injury – Once the injured person is taken care of, make sure everyone in the area washes off any blood they got on their skin and hair with soap and water. Remove clothes with blood on it right away and put them in a plastic bag until they can be washed. Clean up any blood in the work area using rubber gloves and a germ-killing cleaner. (Water with some bleach in it will work.) To keep other people from touching the blood, put rags and bandages with blood on them in a plastic bag, tie it closed, and put it in the trash.

Burns from hot materials



Do workers use gloves, face shields, or special tools to handle hot materials?

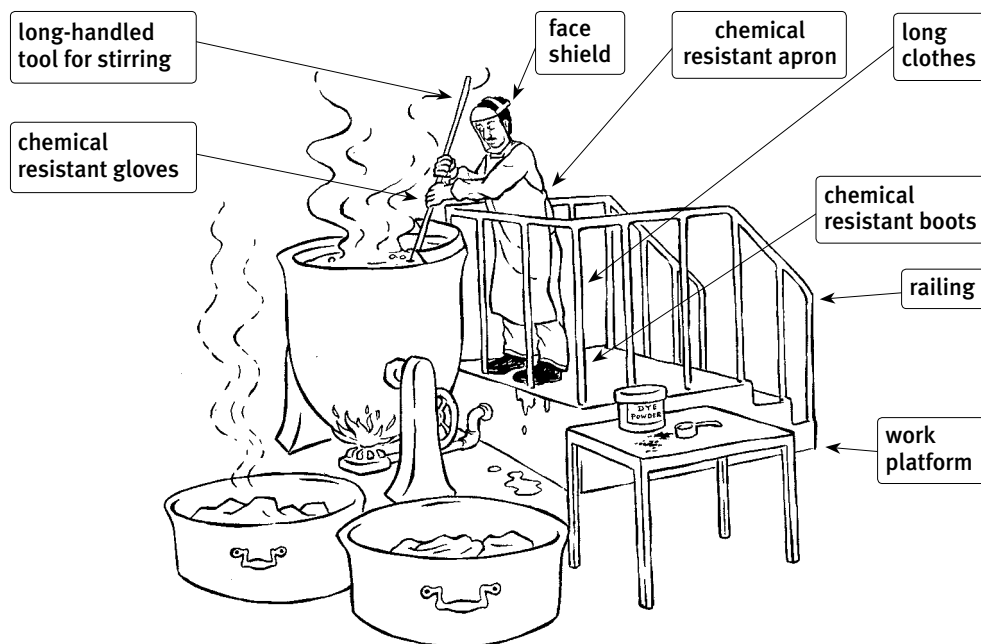
Have workers been burned by hot materials leaking from machines?

Many factory workers handle hot materials, such as plastic, molten and welded metal, and chemical baths. These workers are in danger of being burned at any time. Workers who do other jobs can also get burned by hot materials that leak or spray from machines.

This section has information about preventing burns caused by hot materials used to make products. For information about burns caused by touching hot machines, see 'Machine safety' on pages 117 to 129. For information about burns caused by fire, see 'Fire' on pages 107 to 111.

Preventing burns from hot materials

Wearing gloves and other protective clothing can prevent some burns. But other protections, such as guards around areas where hot materials are used, need to be put in place and maintained by the boss.



TRAINING

In areas where hot materials are used, make sure workers are trained to handle the materials safely. The more you know about operating, inspecting, and adjusting machines that use or produce hot materials, the more you can protect yourself and others from getting burned.

KEEP MACHINES IN GOOD REPAIR

Machines that are regularly maintained and repaired are less likely to leak. Preventing leaks is especially important when workers could be burned by hot liquids. The information about preventing chemical leaks on page xx is also useful for preventing burns from hot materials. For more information about how to safely repair machines, see 'Machine safety' on pages 117 to 129.

GUARDS AND RAILS

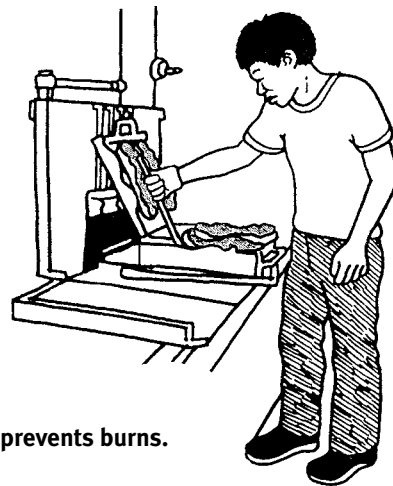
Even if guards and railings are in place, hot machines, pipes, and chemical baths should be located away from walkways and other work areas.

Machine guards can protect your hands, face, and body from steam, radiant heat, and sprays or splashes of hot liquids or plastic. For more information about machine guards, see 'Machine Safety' on pages xx to xx.

Platforms and railings around vats of hot liquid, such as metal plating bath or fabric dye, prevent workers from getting splashed or from falling into a vat.

TOOLS FOR PICKING UP HOT THINGS

To safely handle some hot materials, you may need a tool with a long handle, an insulated handle, or a specially designed end. For more information about using tools that make work safer and easier, see 'Strain and overuse injuries' on pages 24 to 53.



Using a tool to pry hot rubber from the mold prevents burns.

PROTECTIVE CLOTHING

Protection for face and eyes.

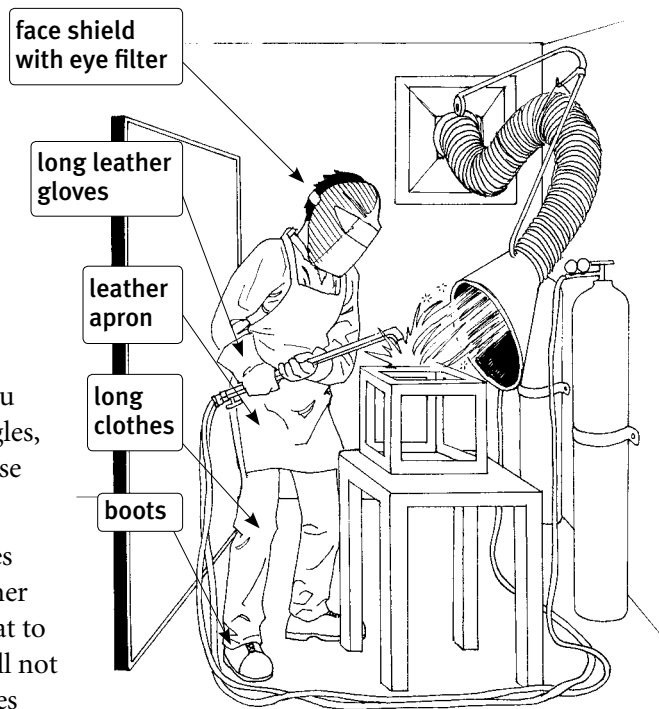
Face shields should be made from material that will not melt, burn, or shatter from heat. Welders should use a special face shield, or a welding helmet and goggles.

To prevent hot particles from falling into your eyes when you remove the face shield or goggles, tip your head forward and close your eyes.

Protection for hands. Use gloves made of cotton, leather, or other material that will not pass heat to the skin, will not melt, and will not catch fire. Always change gloves right away if they get wet or covered with chemicals.

Protection for body and feet. Wear long clothing and closed shoes made of leather, wool, or canvas that does not burn easily or melt. **Clothes made of nylon, polyester, plastic, or other synthetic materials are dangerous.** If these materials get too hot from sparks or splashes, they can melt and stick to your skin, burning you very badly.

If you work with hot liquids, such as chemical or electroplating baths, a heavy rubber apron and rubber boots will keep splashes from burning through your clothes.



Protective clothing prevents from burns.

What to do if a worker is burned

Wash right away. A body shower and eye wash should be near all work areas where hot materials are handled. For more information about body showers and eye washes, see page 88.

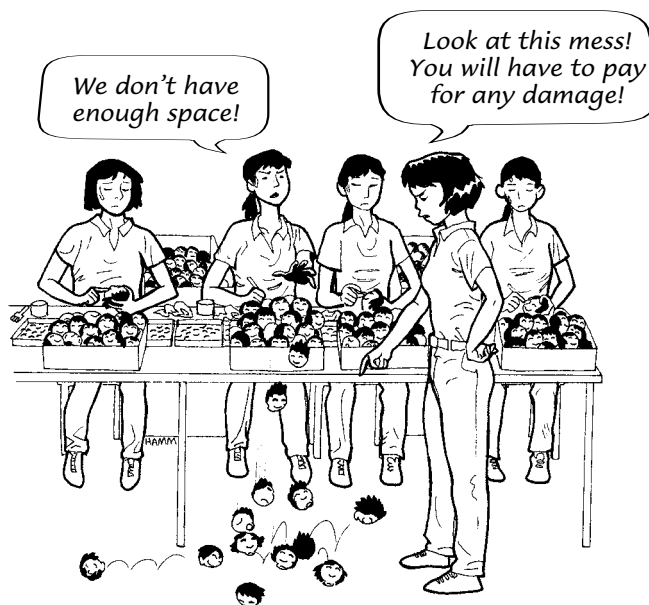
See 'First aid for burns' on page 111. Treatment for burns caused by hot materials is generally the same as for burns caused by fire.

Have an emergency plan. Workers and managers can plan together and make sure everyone knows what to do if a worker is burned. This is especially important in a factory where a large leak of hot materials could cause severe burns or burn many workers at once.

Overcrowding makes other dangers worse

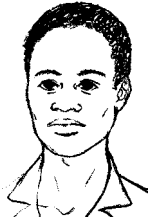
When workers and machines are crowded close together, workers are more likely to have health problems caused by these dangers:

- **heat and noise.**
- **strain and overuse injuries** from not having enough space to work in a comfortable body position, or from straining to move materials around narrow spaces.



- **chemicals and dust** because more workers are close to areas where chemicals are used or dust is created. Overcrowding also prevents air from moving through the factory and makes cleaning more difficult, so dust and chemicals are more likely to stay on surfaces and in the air. Where machines are close together, local exhaust ventilation is especially important, but the boss may not install local ventilation because it takes up more space.
- **fire** where flammable materials are stored or used near hot machines, electrical wires, or work that gives off sparks. In an overcrowded factory, passageways are often blocked or too narrow for all the workers to get out of the building in an emergency.
- **machine injuries and burns**, because workers do not have enough room to keep a safe distance from machines, steam pipes, and hot material.
- **falls and falling objects**, because stored material is crowded on shelves and into spaces near walkways and work areas.
- **vehicle injuries**, because drivers do not have enough room to maneuver safely or cannot see around piles of material.
- **stress**, because the more dangerous and uncomfortable the workplace is, the more difficult it is to do a job well. Overcrowding often leads to conflict, arguments, and harassment.

Noise



Do workers need to shout to be heard at work?

Do workers' ears ring when they leave the factory?

Dangers from loud noise

Loud noise can cause many hearing problems. The damage to your hearing depends on how loud the noise is, and how often and for how long you are exposed to loud noise.

Some health problems caused by noise last only a few hours or a few days, but others are permanent.

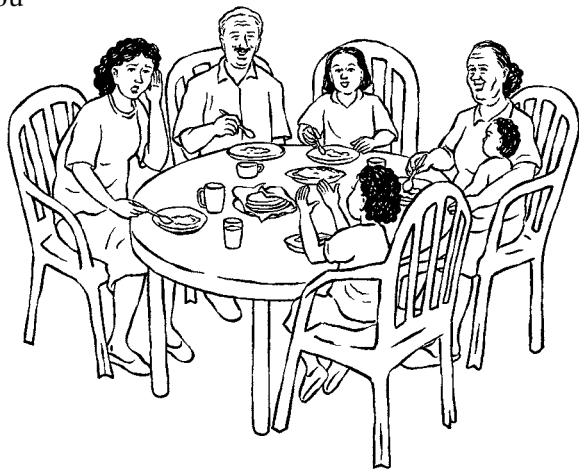
Temporary hearing loss: You may temporarily lose some of your hearing while you are in a noisy place. After you leave the noisy area, you may not hear well, and you may also hear a ringing or buzzing noise in your ears. If you stay away from loud noises, these problems should go away. If you stay close to loud noises, the problems can get worse or become permanent.

Permanent hearing loss: As we grow older, our hearing naturally grows weaker. You may lose your hearing more quickly if you work in loud noise every day.

Your ears may also change the way you hear noise. Sounds may become unpleasant or seem louder than they really are.

An extremely loud noise, such as an explosion, can damage your hearing right away and cause permanent hearing loss.

Other health problems: Loud noise can cause other health problems, including feeling tired, headache, stress, miscarriage, high blood pressure, heart disease, muscle tension, stomach problems, and dizziness.

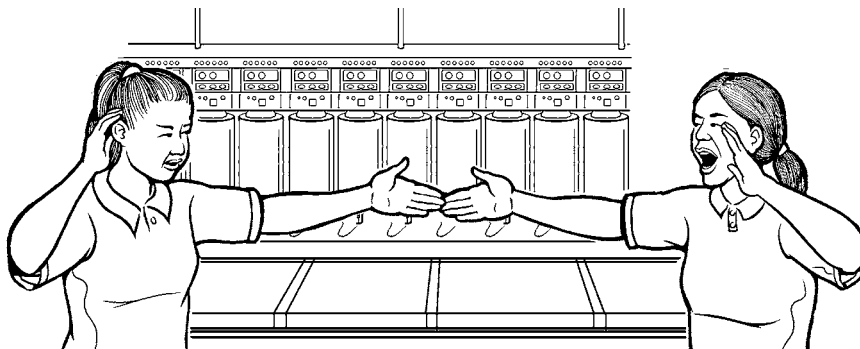


Tania's hearing has been damaged by working in a noisy factory. Now it is hard for her to hear her daughter's soft voice.

How to tell if noise is too loud

These are signs that the noise in your workplace is too loud and can damage your hearing:

- you have to shout to talk to someone who is 2-arms-lengths away.
- you have problems hearing at the end of the work day, but you can hear better after resting away from the factory.
- you ears ring at the end of the work day.



If you cannot hear someone talking 2-arms-lengths away, the noise is too loud.

If you keep working in a loud area, your hearing will be permanently harmed. You may not notice you are losing your hearing right away. Most people notice it when they begin to have difficulty hearing conversations clearly. By the time you notice hearing loss, the damage is usually permanent.

The boss should not wait for workers to begin going deaf before reducing noise in the factory. You can prove that the noise at work is dangerous by measuring the sound level and by testing workers' hearing over time.

Measuring noise. A sound level is a small device that can measure sound on a scale from very soft to very loud. The measure on the scale is called a decibel. Working in areas with sound levels louder than 80 decibels will harm workers' hearing. A safety professional may be able to use a meter to measure noise in your workplace.

Testing workers' hearing. An audiogram is a test that measures your ability to hear sounds that are low or high and soft or loud. If a worker's hearing is tested every 6 months, the audiogram will show if her hearing is the same or getting worse. The tests must be given by a trained person in a very quiet room using the proper equipment. If you use ear plugs all the time at work, the tests can tell if the ear plugs give enough protection.

How to make factories quieter

Even if each piece of equipment in a factory is not too loud, when all the equipment and people work at the same time, the noise can be very loud. There are several ways to make a factory less noisy:

GET QUIETER MACHINES

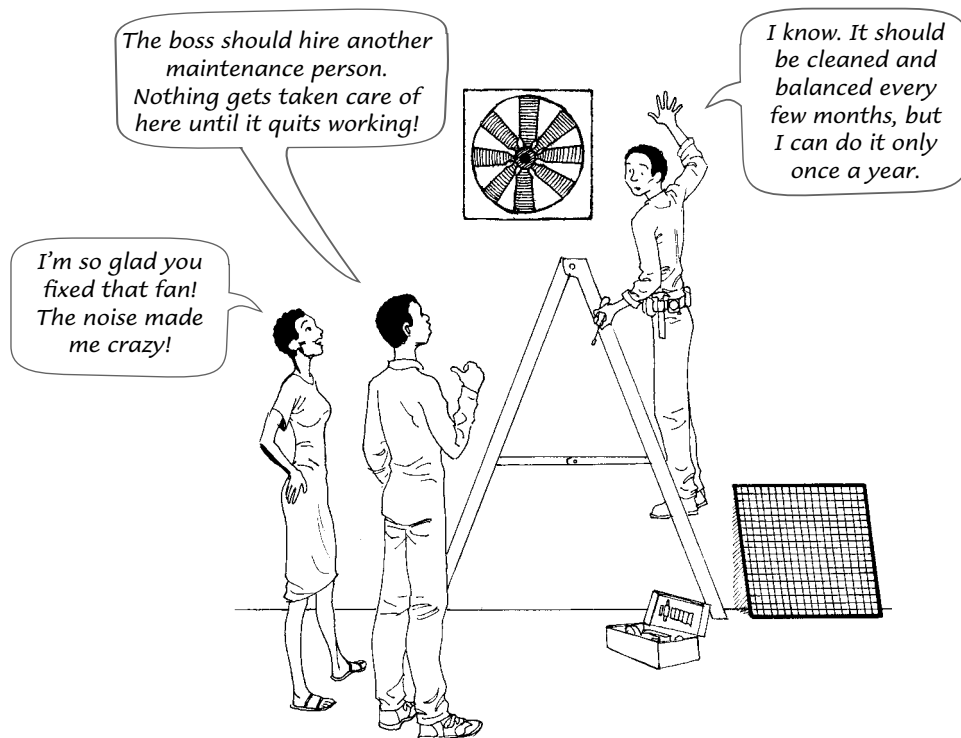
Newer machines are often built to be more quiet than older models. If possible, get the boss to replace older machines with new, less noisy equipment. Sometimes older machines can be rebuilt in ways that make them less noisy.

PUT NOISY MACHINES IN A BOX

Putting a wall or a closed box around a machine can keep some of the noise inside. Sometimes the box is only put around the noisiest part of a machine. The wall or box should be made of material that absorbs sound, such as cork, rubber, felt or foam rubber.

KEEP EQUIPMENT IN GOOD REPAIR

A machine may be noisy because it needs oil or adjustment, or a part is wearing out. Regular maintenance and repair can keep machines from getting noisier.



Good maintenance keeps machines quiet.

ABSORB SOUND

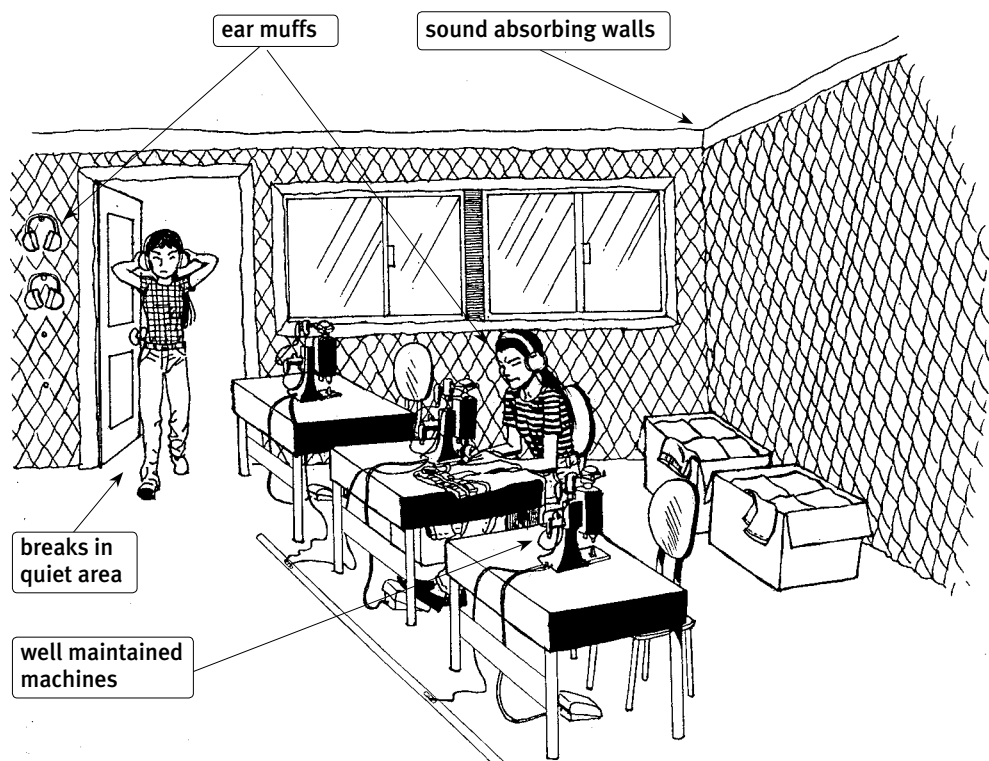
On walls, ceilings and floors: To make the whole factory quieter, cover the ceiling, floor, walls, and work-area dividers with panels or curtains of sound-absorbing material at least 5 centimeters (2 inches) thick.

On metal work surfaces and tools: Rubber-lined carts, bins, tumblers, and rubber-coated work surfaces and tools reduce the sound of metal parts and tools hitting metal surfaces.

On air powered tools: A muffler on the release valve of an air-powered (pneumatic) tool can reduce noise of air coming out of the tool.

A SEPARATE SOUNDPROOF ROOM

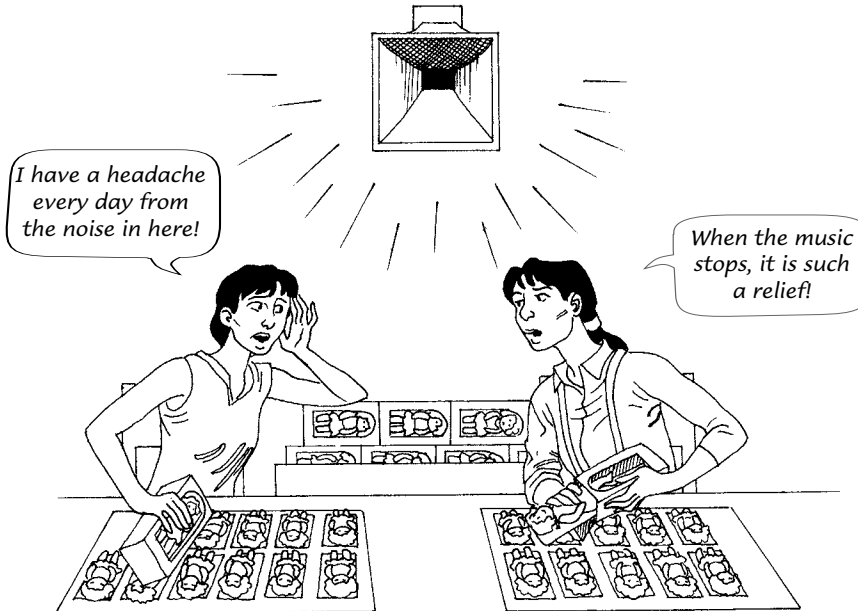
Loud machines can be put in a separate soundproof room, so only a few workers are exposed to the noise. These workers should always wear ear protection and take regular breaks outside the room. You can keep the noise from building up inside the room by covering the walls with materials that absorb sound.



Workers inside a soundproof room need protection from noise.

TURN OFF THE MUSIC

Some factory bosses play loud music to keep workers from talking and to keep them working fast. This often makes noise in a workplace even louder and more dangerous for workers' hearing.



SHARE THE BURDEN

If you cannot make the machines less noisy, workers can rotate jobs so that a person does not work in the noisy area all the time. This is not a good, long-term solution to noise problems. Rotating workers among noisy and quiet jobs can result in many workers with some injury to their hearing instead of a few workers with all of the injury.

Protect your ears

Workers in noisy areas should wear ear muffs or ear plugs. These can help protect workers' hearing while you organize to make the machines and the work area quieter.

Ear muffs give good protection if they gently but firmly touch your head and completely cover your ears. Ear muffs should be cleaned often and replaced when they no longer fit snugly and keep out noise.



Disposable foam ear plugs can protect your hearing if they are the right size and properly inserted in your ears. They should be small enough to fit comfortably and expand to fill the hole of the ear.

Most foam ear plugs are inexpensive and are meant to be used 1 time. If you re-use them, make sure they return to their original shape after you pinch them. If they do not expand to fill the hole of your ear, they no longer protect you. Cotton or cloth earplugs do not give good protection.

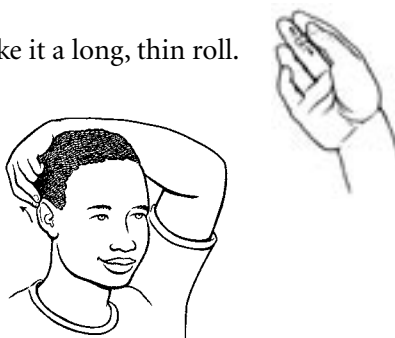
USING FOAM EAR PLUGS

If ear plugs are not inserted carefully, they will not block noise enough to protect your hearing. To make sure ear plugs fit well, follow these steps:

Step 1: Be sure your hands and the plugs are clean when you insert the plugs. This will help prevent ear infections.

Step 2: Roll the plug between your fingers to make it a long, thin roll.

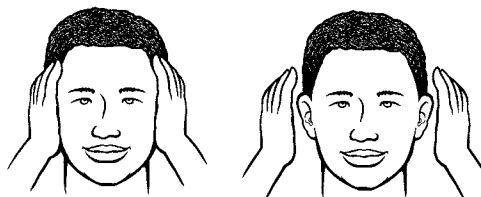
Step 3: Open the ear. To put the plug in your right ear, hold the rolled plug in the fingers of your right hand. Reach your left arm over the top of your head to grab the top of your right ear lobe. Gently pull your ear lobe up and back a little. This opens up your ear canal to make it easier to fit the plug in.



Step 4: Insert and hold the plug. Insert the narrow tip of the rolled plug into your ear canal as far as it will go. Press the ear plug gently into your ear with the tip of your finger while it expands to fill your ear canal. This takes about 30 seconds. You should feel the foam expanding to fill your ear and notice noises become much quieter.



Step 5: Check the fit. Cup your hands over your plugged ears and notice how loud noises are. Remove your hands from over your ears and notice how loud noises are. If they sound about the same, the plugs are in your ears the right way. If the noise is much louder when you remove your hands, then the plugs are not in your ears well and you need to pull them out and try to put them in again. If you still can't make them fit well, they may be the wrong size for your ears or the foam may be too worn to be effective.



Light



Do workers squint and bend over to see their work?
Does bright light shine into workers' eyes?

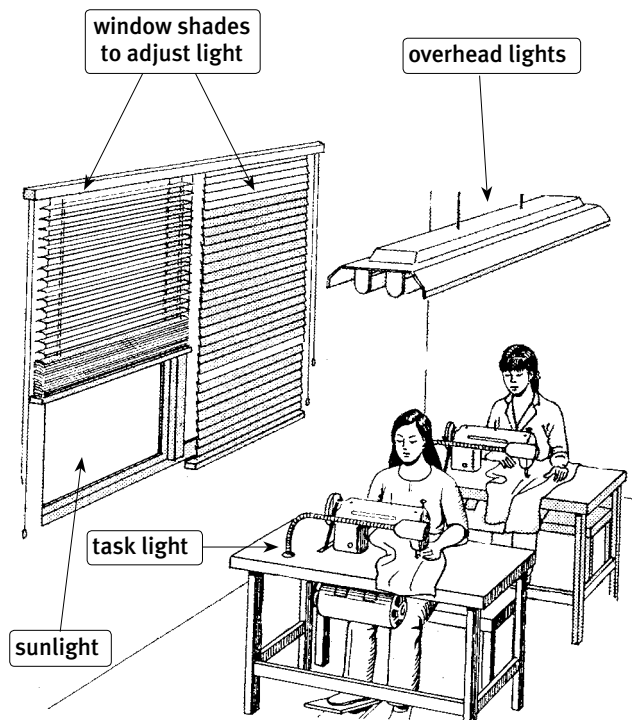
Many export factory workers must keep their eyes focused on small parts and details. To see well, your work area should be lit evenly and brightly. Too little, too much, or uneven light can harm your eyes and cause other health problems.

How to know if light is a problem

The best way to find out if the lighting in your factory is harmful is to ask other workers how they feel. Do they need to bend over to see their work better? Do they often get headaches while working? Are their eyes tired, aching, dry, or irritated at the end of their shift? Do they get body aches from working in uncomfortable positions so they can see better.

Bright light shining in your eyes from lamps, windows, or reflections from shiny floors, tables, or equipment can be a problem. Bright sun from windows can cause dark shadows that also make it difficult to see the work.

Some jobs, such as welding and metal casting, create intense light that can cause permanent eye damage unless workers use proper eye protection.



Adjust the lighting to see better.

How to see better and protect your eyes

Add or change lights. Your factory may need more lights or different kinds of lights for different tasks. Lights that hang high above the work area should provide a soft, even light. Many workers need a task light they can adjust so there are no shadows on their machine or their work. Older workers may need brighter lights to see their work. Get the boss to repair flickering and broken lights, and broken window shades.

Move for better light. If you cannot change or move the light, you may be able to turn or move your workstation, or change the way you sit or stand as you work. Some workers wear a hat with a brim to keep bright overhead light out of their eyes.

Cover surfaces that reflect light. To reduce glare, cover shiny surfaces with fabric, paint, or other coating that does not reflect light.

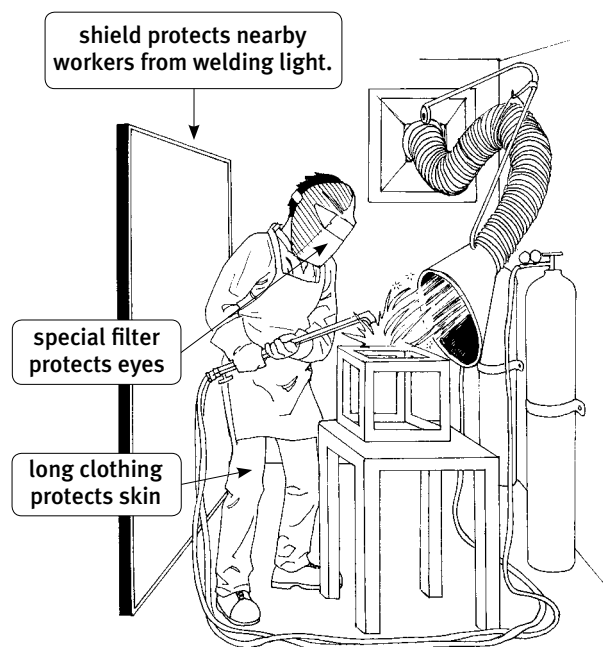
Cover windows with cloth, curtains, or blinds when the sun is too bright or casts shadows.

Eye glasses. If your eyes are tired or irritated, or if you have trouble seeing your work, you should have an eye examination to find out if eye glasses can help. Each person's eyes are different, and lenses for eye glasses are made to fit one person's eyes. Your eyesight can change over time. If you wear glasses and still have trouble seeing, you may need different lenses.

Special goggles or light filters for welding and metal casting. Welders and workers who handle molten metal should use special goggles or face masks with filters that protect the eyes from dangerous ultraviolet (UV) and infrared (IR) light.

This intense light can also burn the skin, so workers also need to protect their arms, face, and neck with long clothing.

Welding shield to protect nearby workers. Workers who are not welding can be protected from the light by a shield surrounding the area where welding is done. The shield can be permanent if welding is done in a fixed place, or movable if welders move from one area to another.



Protect the eyes and skin from welding light.

Water and toilets



Can workers drink when they are thirsty?
 Can workers go to the toilet when they need to?
 Is the toilet room clean?

Meeting basic needs

To stay healthy, everyone should drink plenty of clean water and use the toilet when they need to. You also need to be able to wash your hands with clean water and soap, before eating and after using the toilet or working with chemicals. But factory workers are often denied these basic needs. Limiting access to water and toilets is one way bosses pressure workers to meet high production goals.

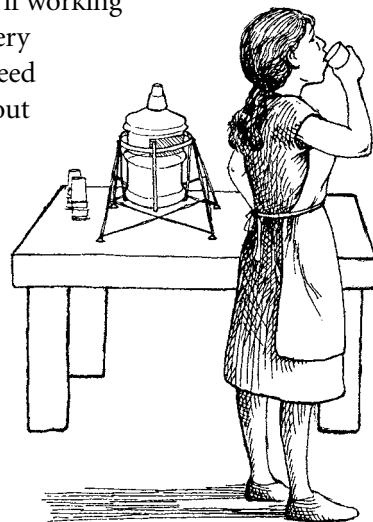
WATER FOR DRINKING

If you do not have to pass urine during the day, or you pass only a small amount of urine, you need to drink more water. Other **signs of not drinking enough water** are:

- thirst
- feeling weak or dizzy
- nausea
- dark-colored urine
- headache
- bladder or kidney infection
- muscle cramps
- stomach pain

If you work in a hot climate or near hot machines, or if working makes you sweat, you should drink 1 cup of water every 30 minutes to prevent heat stress. Pregnant women need to drink even more water. (For more information about health problems caused by heat, see “Heat and cold” on pages 101 to 106. For more information about pregnancy, see “xxx” on page xx.)

Drinking plain water is the best way to give your body the liquid it needs. In places where the water is not safe to drink unless it is boiled, workers often drink tea. But with tea, less liquid stays in the body. If you drink a lot of tea, you also need to drink plenty of plain water. Your body will also need more plain water if you drink coffee, alcohol, or soda drinks.



Safe drinking water and clean cups should be available in each work area. Some illnesses, such as colds and flu, can be passed from a person who is ill to another person who drinks from the same cup. To help everyone stay healthy, try to find a way for each worker to use a clean drinking cup each day. Used cups should be washed once a day with warm water and soap or bleach (1 part bleach to 10 parts water) and rinsed with clean water.

If your factory provides disposable paper cups, there should always be enough for each worker to use 1 new cup each day. Paper cups can be recycled with other paper products. For more information about factory waste and recycling, see 'Pollution from factories' on pages xx to xx.

WATER FOR WASHING HANDS

Washing hands with clean water and soap prevents illness from spreading among workers and their families. You should always be able to wash your hands after using the toilet, after using chemicals, and before eating. Hand washing is especially important for workers who handle lead and asbestos, even if they wear gloves.

In my factory, you must ask the supervisor for a pass to go to the toilet. If you go without a pass, you are given a letter of warning. I work in the T-shirt department where there are only 12 toilets for 1,500 workers. I always have to wait in line.

TOILETS AND URINALS

Workers need to be able to use the toilet whenever they need to.

If you often cannot pass urine as often as you need to, you may get a bladder infection. This problem affects women more than men, because women get bladder infections more easily than men.

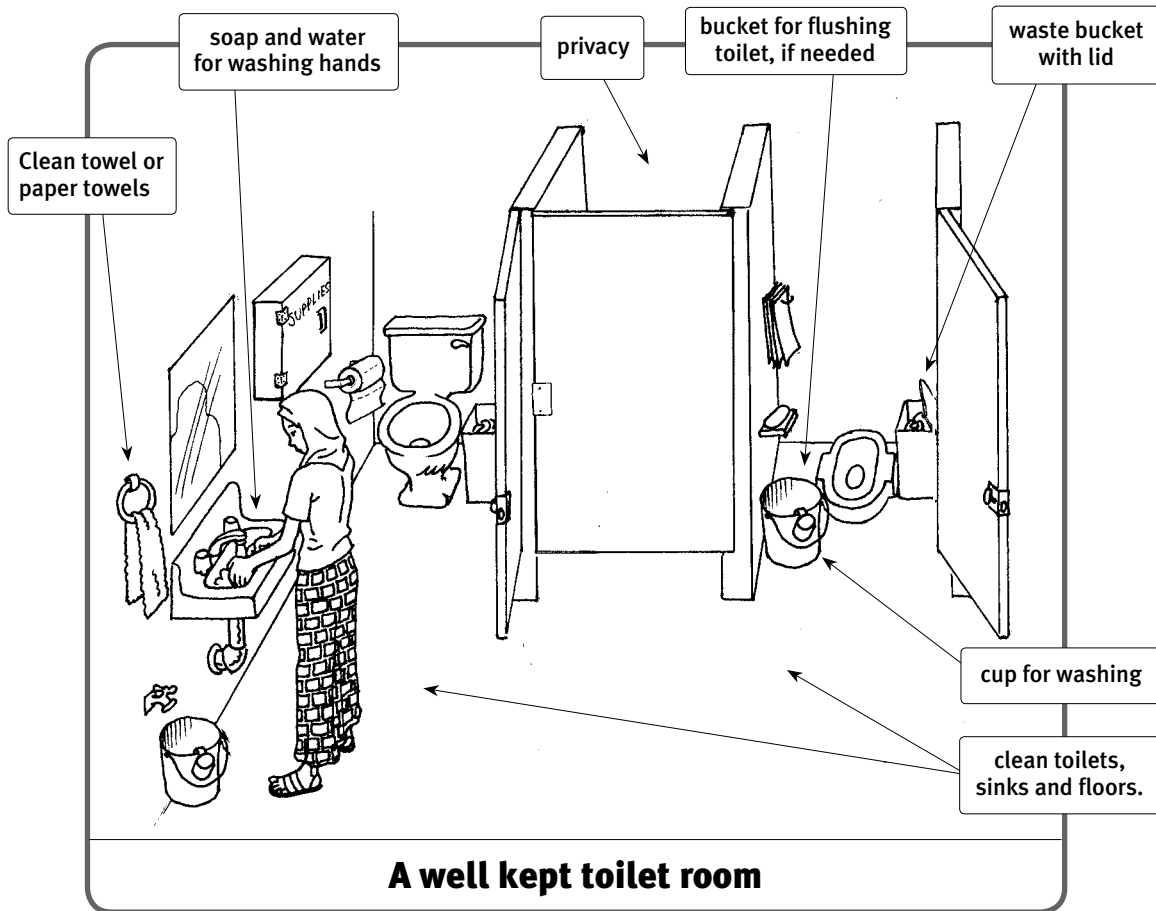
Factories should be organized so that toilet rooms are close to work areas. There should be enough toilets so no one has to wait in line. This may be 1 toilet for every 20 men and 1 for every 20 women. In very large factories, several toilet rooms around the factory are better than one large toilet room.

It is the boss's responsibility to make sure toilets, wash basins, and water areas are kept clean, in good repair, and supplied with toilet paper and towels. Waste buckets should be emptied and cleaned every day.



WOMEN'S NEEDS

When women have their monthly bleeding, they need soap, water, and privacy. If they cannot change pads or wash during monthly bleeding, they are more likely to get infections. The boss should keep a supply of clean cloth, cotton, or sanitary pads in women's toilets for women workers to use whenever they need to. Each toilet for women should also have a waste bucket with a lid.



Taking action for water and toilets

If there are not enough water and toilets in your factory, you will need to organize and **pressure the boss to:**

- **provide safe drinking water** for all workers near their work area. Allow workers to drink as much and as often as they need to.
- **allow all workers to use the toilet** any time they need to. You should not have to ask permission, get a pass, or explain why you are going to the toilet.
- **consider the needs of women and other workers** who may need to drink more water and use the toilet more often. Make sure to include these workers in discussions about the best way to meet everyone's basic needs.
- **add more toilets and urinals** so workers do not have to wait in line. It is also easier to keep toilets clean when fewer people use them.
- **place toilets close to work areas** around the factory so workers will take less time to get to the toilet.

- **make sure each toilet room has a door** that separates it from the work area.
- **place wash basins with soap and towels** around the factory near toilets, drinking water, and eating areas.
- **keep toilet rooms supplied** with toilet paper, soap, and clean towels.
- **keep a supply of cloth, cotton, or pads** for monthly bleeding in the women's toilet rooms. Women workers can also make a shared space together to keep supplies for monthly bleeding. Each woman can contribute supplies and replace what she uses each time.
- **hire workers to maintain and clean toilets, empty and clean waste buckets, maintain the water supply, and wash or restock drinking cups.** This will help prevent illness among all workers.
- **make sure there is always enough water** for washing hands, flushing toilets, and cleaning.



Workers take over the bosses' toilet — Mexico

My name is Elena. I work in an auto parts factory in Mexico, near the border with the United States. We used to have only 3 toilets for more than 300 workers. There were always lines, and the toilet rooms were always dirty. When my coworkers and I talked about problems in the factory, the toilets were one of the things that bothered us most. One day, when there was a long line, I said to 2 of my coworkers, “Why don’t we

use the toilet in the bosses’ office?” We left the line for the toilet and walked into the office. The bosses were surprised and asked us what we were doing. We told them our toilets were dirty and there was a long line. That time, the bosses let us use their toilet.

Then we told the rest of the workers they could use the office toilet when there were long lines for the factory toilets. When workers started going to the office to use the toilet all the time, the bosses got upset. They said, “This is our toilet, you have your own in the factory.” We told them again that we did not have enough toilets, and that the toilets were too dirty to use. Finally, the boss added 10 more toilets for the workers and kept them cleaner than before.



Eating and resting



Is there a time and a place for all workers to eat a meal?
 Is there a clean place in the factory to store food?
 Do workers get regular rest breaks?

Eating well to work well

Everyone needs good food to do any job well and to stay healthy. There are many reasons why factory workers may not get enough nutritious food to eat. Their pay may be so low, they cannot afford to buy enough food. Or the food they can afford may not be very nutritious. They may be under so much pressure to meet production goals that they do not stop working to rest or eat. Sometimes they work such long hours they never have time to shop for fresh food when markets are open.

In this section, we talk about **conditions in the factory** that can keep workers from eating at least one healthy meal and taking rest breaks during their shift. For information about other causes of not eating well, the effects of poor nutrition on health, and solutions for workers and their families, see 'Eating well for health' on pages xx to xx.



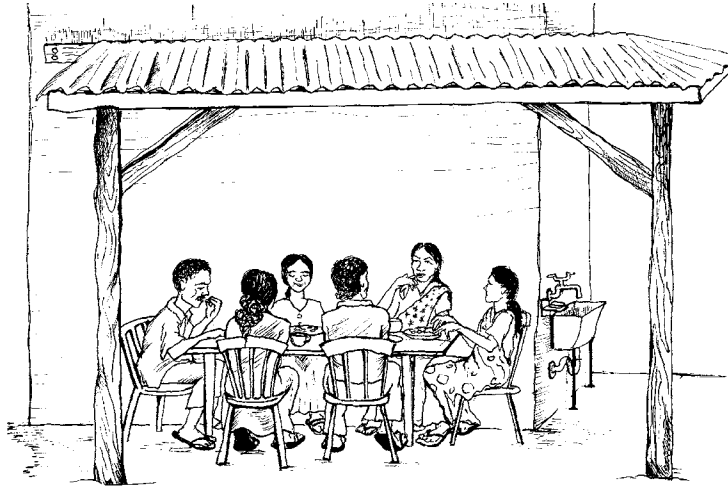
Workers need regular rest breaks and time to eat a meal during each shift.

REGULAR REST BREAKS

Eight hours is a long time to do the same task over and over again. In many factories, people work much more than 8 hours every day. To help prevent stress, exhaustion, and other health problems, you need to stop for a short rest about every 2 hours, and stop for a longer rest and a nutritious meal in the middle of your shift. The boss should also make sure you get a break to rest and eat again before any overtime work begins.

GOOD FOOD AND A CLEAN PLACE TO EAT

Some factories have a cafeteria or dining hall where food is prepared and served to workers. But workers sometimes report that factory food makes them sick instead of healthy. If the company does not provide a nutritious meal, it is the boss's responsibility to make sure workers have a clean place to store food and an area where they can sit and rest while they eat. The eating area should be away from work tables, machines, chemicals, dust, and factory noise.



Eating outdoors in the shade gives workers a chance to rest, relax, and breathe fresh air.

TAKING ACTION FOR REST BREAKS AND MEALS

In some countries, factory workers are entitled by law to regular rest breaks during their shift. In Bangladesh, for example, the law limits the regular work day to 9 hours and requires at least a 1-hour break for more than 6 hours of work, a 30-minute break for more than 5 hours of work, and either a 1-hour break or two 30-minute breaks for more than 8 hours of work.

For ideas about using labor laws to pressure for changes in working conditions, see 'xxx' on pages xx to xx. For more information about organizing for decent working hours and no forced overtime, see 'Overwork: long hours for low pay' on pages xx to xx.

You can also organize to:

- **Demand a free or low-cost meal for all workers.** A worker committee can also make sure the food is fresh and well-cooked, and report problems to the boss.
- **Make sure the eating utensils and eating areas are kept clean and free of pests.** Local governments often have an agency that inspects restaurants, food vendors, and factories for safety and sanitation. If the factory food or dining hall is dirty, ask the agency to make an inspection.



Workers demand better food and win a new union — Mexico

When a Korean company opened a new garment factory in Puebla, Mexico, the owners promised workers “model” conditions, including pay above minimum wage, 2 meals, transportation, and representation by a local union. But the company did not keep these promises. The pay was low, the work hours long, and the bosses harassed and threatened workers who were slow to meet production quotas. Worst of all, the food in the factory dining hall was often spoiled or raw, full of worms, and served on dirty plates. Many workers became sick and some were hospitalized for food poisoning.



Some of the workers on the sewing line asked the union representative to do something about the food. When conditions did not improve, 20 of the workers called a meeting to discuss the problem with other workers. The union representative also came to that meeting. The workers decided to boycott the dining hall for 1 day to demand better food.

On the agreed day, no workers went to the dining hall. When the bosses asked the union representative why nobody was eating, he blamed the workers who had called the meeting. After the boycott, the company fired 5 workers and refused to give any reason. This showed the workers that the union did not really represent them. More than 600 of the 850 workers in the factory then went on strike and occupied the factory, demanding:

- fresh, safe, well-cooked food in the factory dining hall.
- a new union chosen by the workers.
- reinstatement of the fired workers.

The striking workers were violently evicted by police a few days later, but the campaign for a democratic union continued for 9 months. The workers were supported by allies in the United States, where most of the clothes from the factory are sold. These allies pressured the Korean company, the Mexican government, and the brand-name buyers of the clothes --including Nike and Reebok-- to accept a new union as required by Mexican law and ILO conventions. The workers finally won, and their union became the first independent union in a garment factory in the state of Puebla.



Falls and falling objects

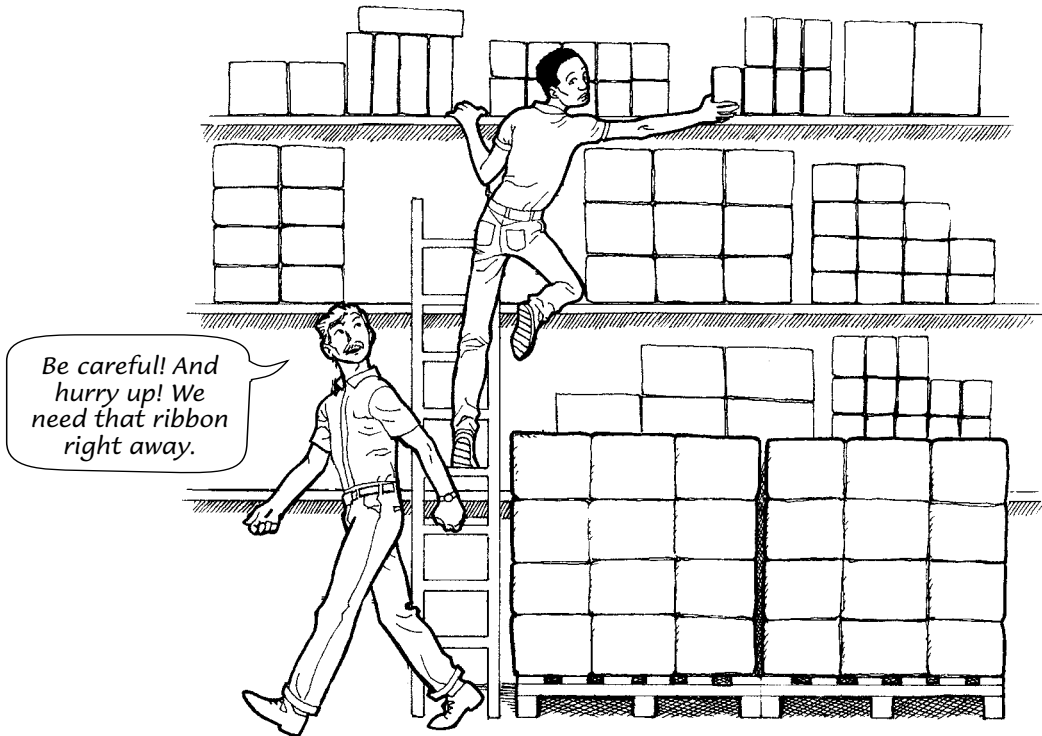


Do workers stand on ladders, chairs, or crates to do their jobs?

Have workers been hit by material falling from high shelves or stacks?

Do workers trip on uneven floors, loose cables, or debris?

When a worker is hit by a tool or container falling from above, people usually say, “He had an accident.” When a worker falls from a high place, or trips and falls on the floor, he is often blamed for being careless or clumsy. But these “accidents” are not the worker’s fault, and they can easily be prevented.

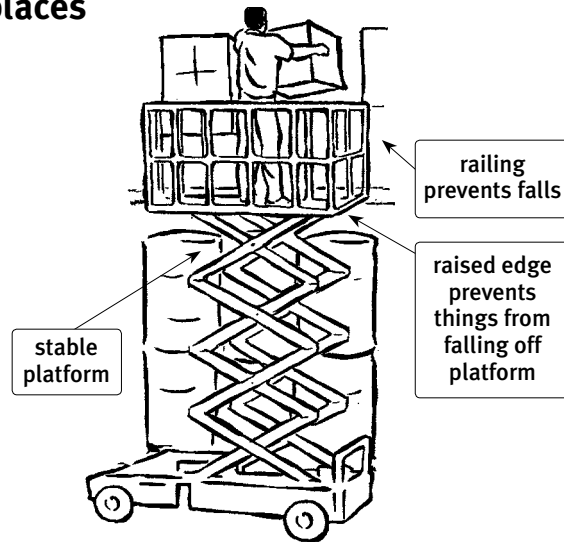


Who is to blame when this worker falls?

Preventing falls from high places

Working above the floor on a stable platform is the best way to prevent a worker from falling, and to prevent tools or parts from falling into the work area below. A platform can be moveable or fixed in one place. The platform should be large enough for a worker to do his job with room for tools and materials.

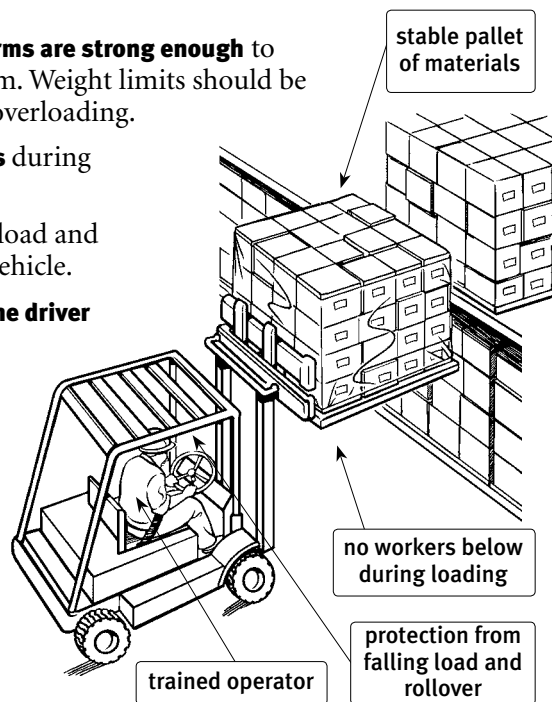
A moveable, elevated work platform is safer than a ladder.



PREVENTING INJURIES FROM FALLING OBJECTS

A worker can be severely injured or killed by tools or materials falling or dropped from above. To prevent things from falling onto workers, make sure:

- **work areas and walkways are not directly below** overhead rail systems, platforms, and stored materials.
- **stacks of materials and containers** will not tip over from too much weight or uneven stacking.
- **shelves and raised storage platforms are strong enough** to hold the materials stored on them. Weight limits should be posted and followed to prevent overloading.
- **no workers are below high shelves** during loading and unloading.
- **lift truck operators are trained** to load and unload within the limits of the vehicle.
- **vehicles are equipped to protect the driver** from falling loads.
- **workers wear hard hats under elevated work areas.** A hard hat can reduce the seriousness of some injuries caused by falling materials hitting your head, but will not protect you from larger objects or protect your neck and body from being injured.

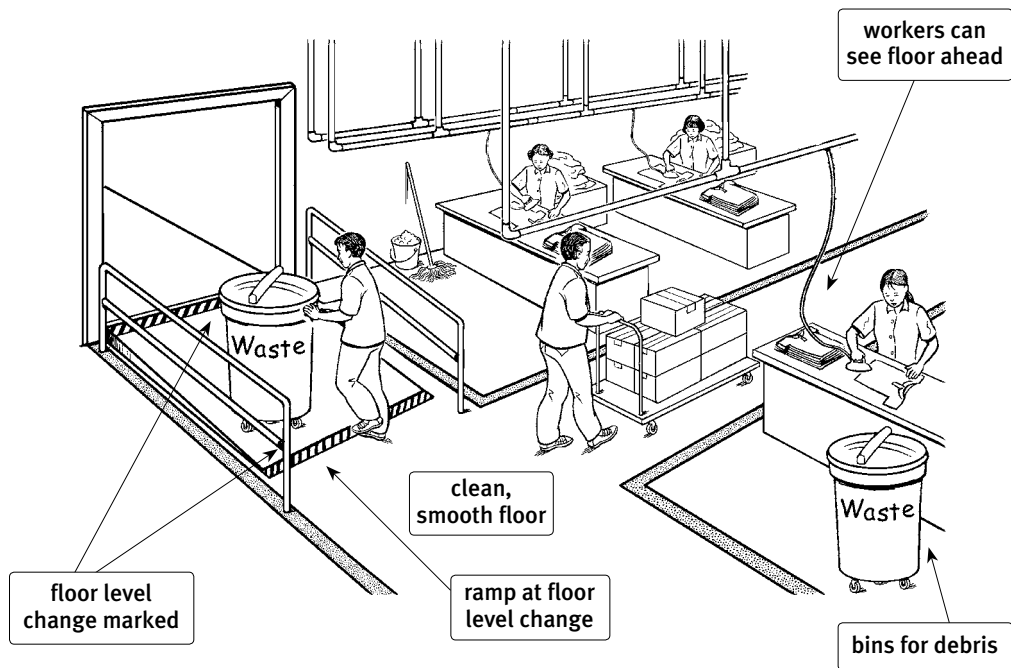


Preventing slips, trips, and falls on the floor

Uneven floors, holes in the floor, changes in floor levels, wet floors, and cables and debris lying on the floor cause workers to slip, trip, and fall.

Many falls can be prevented by:

- **repairing rough floors.**
- **marking changes in floor level**, such as stairs and ramps, with paint or different surfacing, so workers can see them clearly.
- **cleaning up water, oil, and chemical spills immediately.**
- **regularly cleaning up debris, dirt, and dust.**
- **keeping loose cords out of the way** by fastening them to the wall or floor with tape or a smooth covering.



Trips, slips, and falls are common and can be prevented.



What do you think?

Are there “accidents waiting to happen” in your factory?

How can you prevent workers from falling or being struck by a falling object?

Motor vehicle injuries



Have workers been struck by motor vehicles, such as lift trucks, in the factory?

Does the boss enforce vehicle safety rules?

Most motor vehicles used in factories are large, heavy machines with moving parts. The motors get hot and run on flammable fuels. Exhaust from the burned fuel is dangerous to breathe. In addition to these dangers, vehicles in factories carry heavy loads and may move around in areas where workers stand and walk.

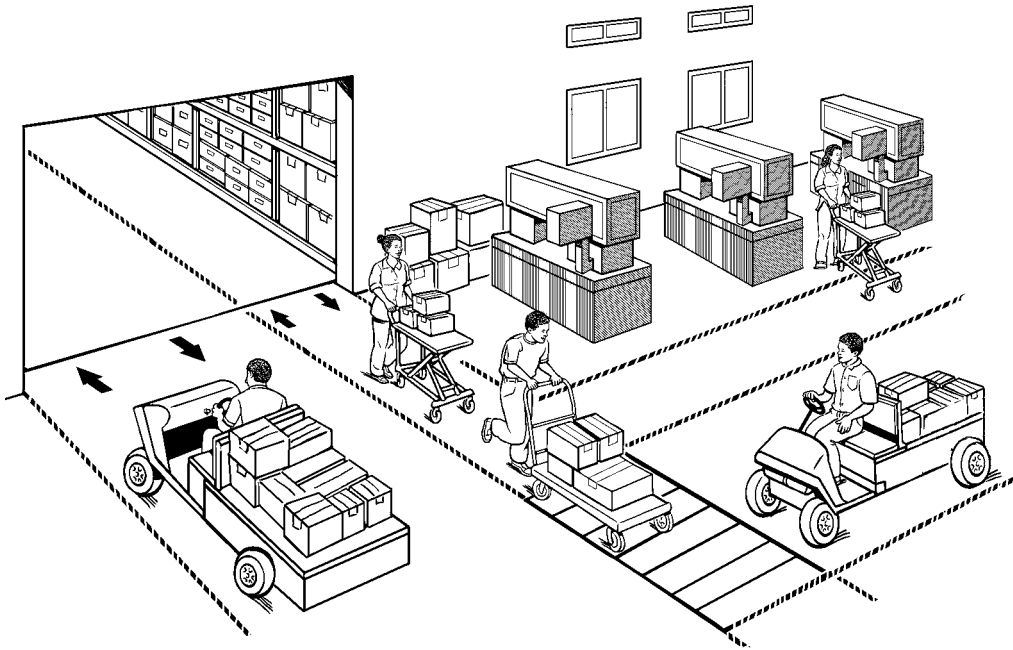
The dangers from motor vehicles are the same in and outside factories. Injuries from motor vehicles on roads and in factory zones can be prevented by separating vehicle traffic from walkways, and by making sure vehicles are operated safely.



Protecting people from vehicles

More injuries happen when vehicles take over the spaces where people normally walk. These are some ways workers can be protected from vehicle traffic in and around a factory:

- Walkways are clearly marked and separated from vehicle traffic areas.
- In areas of busy vehicle traffic, separate lanes are marked for vehicles traveling in different directions.
- In areas where vehicle traffic crosses walkways, vehicles must stop and give people walking the right-of-way.
- Walkways are wide enough for the number of people using them.
- Vehicles have enough space to move around work areas without colliding with machines, equipment, stacks of materials, other vehicles, or workers.
- Walkways are kept free of parked vehicles, stored supplies, and debris.
- Vehicles must park in designated areas where they do not block lanes or walkways.
- Drivers and people walking can see ahead clearly. Stored materials, large machines, or other objects do not block their view.



Operating vehicles safely

Bosses are often quick to blame a vehicle driver for a collision, a rollover, or a spilled load. But blaming the worker just as often misses the root causes of unsafe motor vehicle use. For example, a driver may be exhausted from overwork, or he may be distracted by pain from an untreated work injury. Pressure to work faster can cause workers to overload a vehicle or drive it too fast. A badly maintained vehicle may have brakes that fail or broken lights. If a mirror is missing, a driver cannot see things in “blind spots” on either side of the vehicle.

Bosses and supervisors must be held responsible for vehicle safety in the factory.

Many injuries can be prevented by:

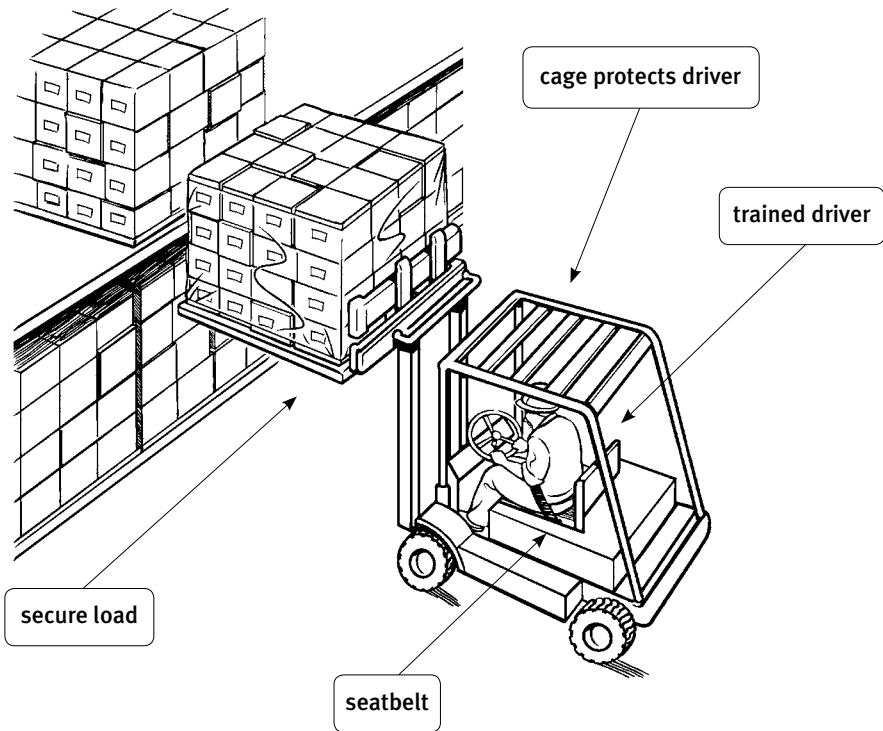
- Training drivers to operate each vehicle safely, including how to load, unload, lift and lower loads, and limit the size and weight of loads.
- Maintaining and repairing vehicles regularly, including brakes, hydraulic systems, lights, and turn signals.
- Keeping windows and mirrors clear, clean, and firmly attached.
- Limiting driving speeds, so drivers and people crossing vehicle paths have plenty of time to stop and prevent collisions.
- Turning a vehicle instead of driving in reverse. If there is not enough space to turn a vehicle around, the driver should always ask another worker to make sure the way is clear before moving in reverse.
- Enforcing vehicle rules, including speed limits, loading limits, and driving only in designated lanes.



Lift truck safety

If lift trucks are not properly loaded and operated, they can roll over, or their loads can fall onto the driver or other workers. These problems can be prevented by training drivers to operate, load, and unload lift trucks safely. The driver can better avoid problems when there is enough room to move the lift truck safely and to turn around instead of backing up in reverse.

A cage or bars around the driver can help protect him from injury if the truck rolls over or the cargo falls off the lift. A secure seat belt will also prevent the driver from falling out of the vehicle at a corner, while turning in his seat, or if the truck rolls over.



What do you think?

Who benefits from more motor vehicles and faster traffic going to and from factories? Who is hurt by this?

How can workers organize to make walking and driving motor vehicles safer in their factory area?