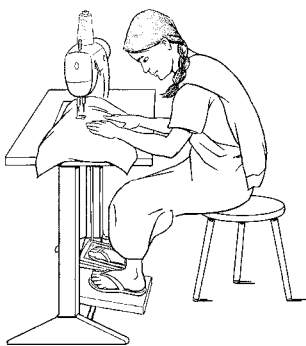


## CHAIRS

A chair should support your legs, hips, back, and body while you work. To be comfortable, a chair needs to fit the size and shape of the worker who sits in it. A work chair should have a **padded seat and backrest**. You may consider asking the boss to supply chairs that each worker can adjust for the height and tilt of the seat and the backrest. A “sit-stand” chair lets a worker alternate between sitting and standing with support. Stools or sit-stand chairs should be available for workers who stand a lot.

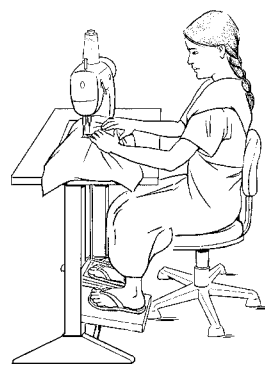
### A better chair



**Bad:** hard chair or stool



**Better:** chair with cushion and backrest



**Best:** adjustable chair with backrest and footrest

## ACTIVITY

### Until you get better chairs, a seat cushion can make a difference

1. Use rough material to keep the cushion from slipping. Attach the cushion to the chair with string, tape, or strips of fabric.
2. Use a firm cushion. Material that is too soft will quickly lose shape and support.
3. Adjust the thickness of the stuffing so you are at a comfortable height for working. Too high will make you bend your neck forward. Too low will make you raise your arms or shoulders.
4. Make the cushion wedge-shaped to allow your knees to be a little lower than your hips.

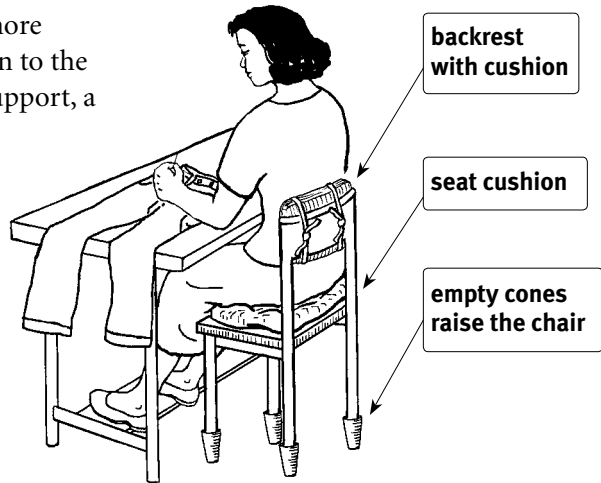


## IDEAS FOR ADAPTING CHAIRS

Garment workers often raise their chairs and work tables by putting empty thread cones or spools under the legs. If you try this, make sure the cones are not cracked. To be safe, the chair needs to be stable and not wobble.

You can make a stool or chair more comfortable by adding a cushion to the seat or backrest. To give good support, a backrest should fit against your lower back and help you sit upright.

Attaching fabric or other padded material to the hard edges of tables and chairs will also protect you from pressure while sitting or leaning.



## Now we have chairs — United States

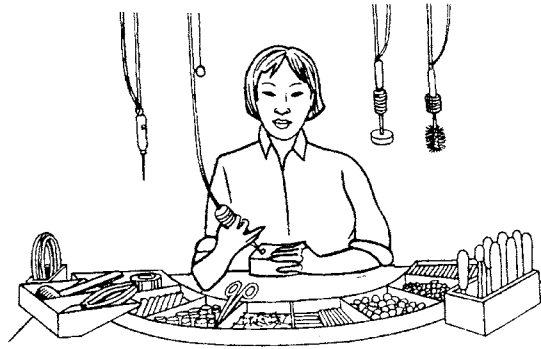
My name is Bob, and I work in an auto parts factory in the United States. Workers in our factory used to make a seat by turning an empty bucket upside down and covering the bottom with foam rubber. We sat on the buckets when our backs and knees hurt from standing too long. We hoped the boss would notice that we needed chairs. He was not paying attention, but our union representatives noticed. They raised the problem with a joint worker-management committee

in charge of preventing ergonomic injuries. Under our union contract, the committee can demand that the boss make changes to protect workers' health. Now we have chairs with backrests and foot rails. I can adjust the height of my chair so it is easy to alternate between sitting and standing. At my job inspecting motors, I like to stand in the morning and sit in the afternoon.

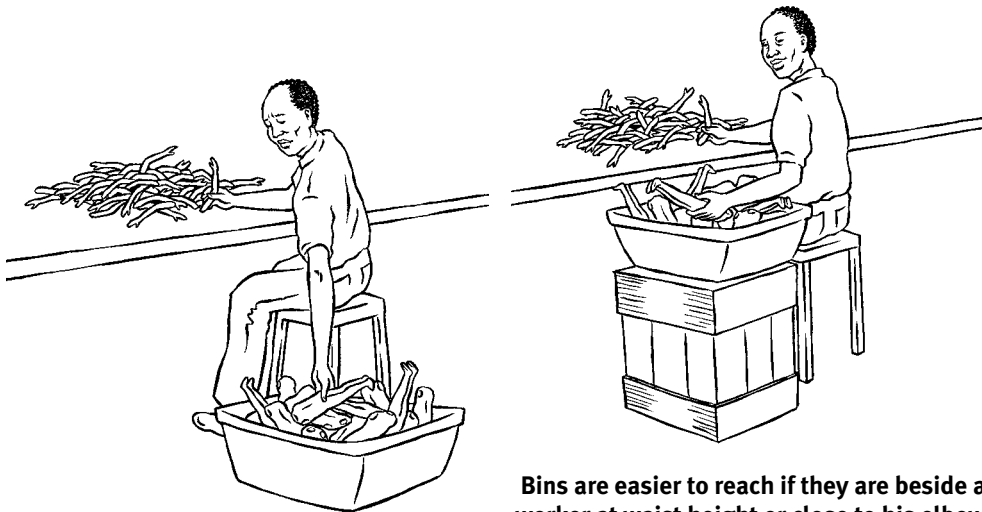


## ARRANGING YOUR WORK STATION

Workers should not have to twist their bodies or bend over to reach parts or tools. You can reduce reaching and bending by placing tools and materials in front or beside you in a way that limits reaching to about 40 centimeters (16 inches) or less.



**Components and tools should be easy to reach.**



**Bins are easier to reach if they are beside a worker at waist height or close to his elbow.**

Workers who sit down can place bins and carts as close as possible to their chairs, or far enough away so that they must stand up and move to use the bins. Alternating between sitting and standing reduces body strain during the work day.



**A conveyor belt at arm's length reduces the need to reach.**



## Kyoung's Story — Korea

My name is Kyoung. I walk home from work with other sewers from my factory in Korea. We talk about problems at home and at work. One problem we all have is pain in our backs and legs. We sit all day bent over our work, and we sit on stools that are uncomfortable. When we started talking, I noticed my stool was too low for me. My friend Yoewan had trouble seeing. Aehwa's legs would get sore and numb. We decided to watch each other work when we had the chance. On our walks home the next week, we gave each other ideas about how we could sit and work so that our backs and legs would not hurt so much. We thought about what we could use to make our stools more comfortable.



I decided to make my stool taller by stacking pieces of cardboard on the seat. Yoewan decided she needed more light near her machine, so she brought in a small lamp she had at home. Aehwa decided to make a footrest from scraps of wood to support her legs during the day. We also made cushions for our chairs out of scrap cloth. Now I see other women trying things like this. We feel better knowing we can change some things.



### What do you think?

Should workers do what they can to improve their workplace themselves without involving the boss?

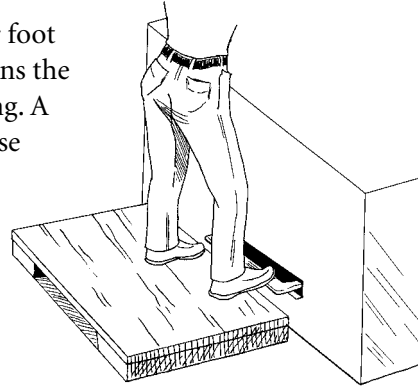
Why or why not?

## SWITCHES AND PEDALS

Foot pedals, knee pedals, and switches are safest when you can operate them without using much force.

**Foot pedals** are best for seated jobs. Raising your foot off the floor every time you press the pedal strains the legs and lower back, especially if you are standing. A pedal wide enough for both feet allows you to use either foot or alternate between feet.

A pedal should be positioned so you can sit or stand at a comfortable distance from the machine. A moveable electronic treadle may be the best choice for machines shared by several workers.



**The platform helps reduce strain from pressing the pedal.**



**Machine switches, levers, and handles** should be easy to reach without stretching, bending, or raising the arms above the shoulders. You should be able to operate a switch with only a small movement of your arm, leg, or foot.

## LIGHTING

Workers need proper light to see their work clearly. Bending, squinting, and straining to see your work can injure your back, shoulders, neck, and eyes. An adjustable task light at each work station can put more light where it is needed most. For more ideas about improving lighting in the factory, see “Light” on pages 140 to 141.

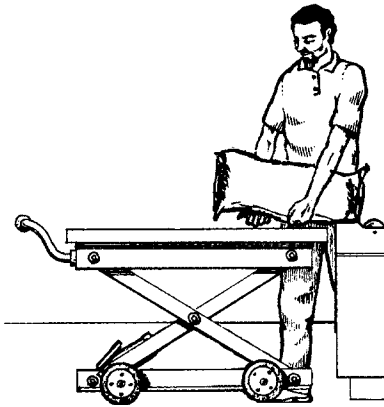


## Lifting, carrying, and moving supplies

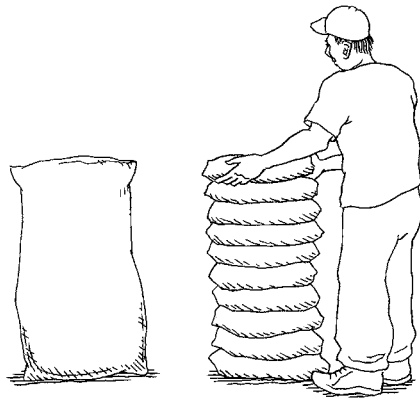
Moving supplies, materials, products, and waste around a factory is hard work and causes many injuries. Here and on pages xx and xx, we show examples of safer ways to move and carry materials. Some of these solutions suggest using more machines instead of people to do the work. These solutions will reduce some kinds of injuries but may also reduce the number of workers needed to do the job. For this reason, it is important for workers to discuss how any workplace change can protect both their health and their jobs.

### AVOID LIFTING HEAVY PARTS OR MATERIALS

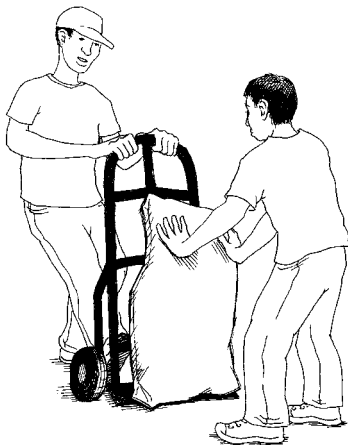
Lifting heavy weights from the ground can cause serious back injuries and other body strains. Here are examples of safer ways to move a heavy sack.



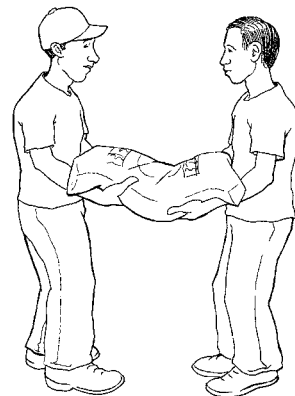
**Use a mechanical lift  
to raise the sack from the floor.**



**Break the sack into smaller loads.**

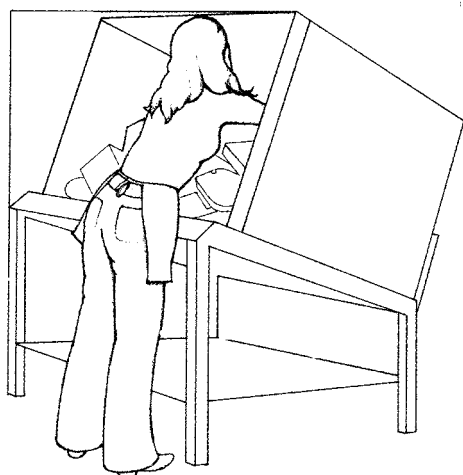
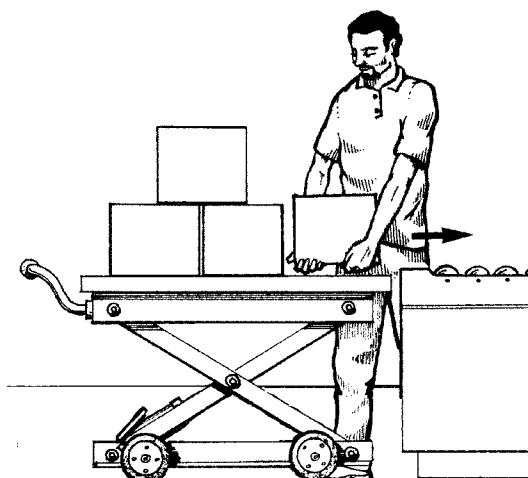


**Move the sack using a hand truck.**



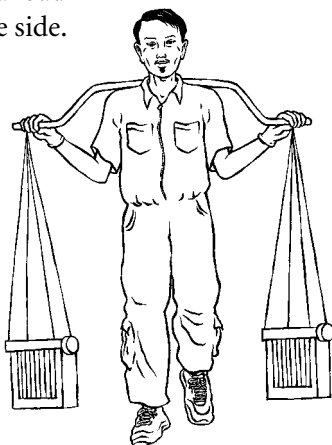
**Share the work by lifting  
the sack with another worker.**

**Factory surfaces the same height** reduce lifting from the ground and above the waist. Carts with shelves at the same height as work tables make loading and unloading easier.

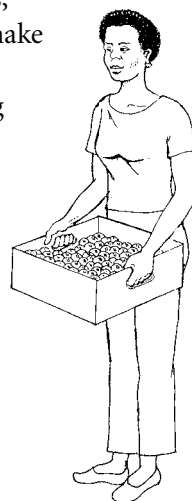


**Raised, tilted bins and spring-loaded bin bottoms** reduce the need to bend over to reach parts at the bottom of the bin.

**Balanced loads** are easier to carry than a load carried on one side.



**Proper handles without sharp edges** on boxes, barrels, bins, and equipment make them easier to lift and carry without straining your hands and arms.

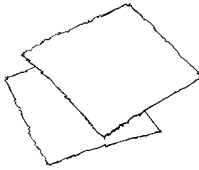


**ACTIVITY****How to make a spring-loaded cart**

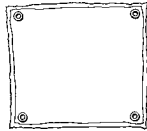
Adding a spring-loaded bottom to a deep cart can make it easier to reach items at the bottom of the cart. The spring-loaded bottom moves up as you unload the contents of the cart.

**Materials needed:** canvas fabric, grommet-holer or button-holer, 4 strong elastic cords (bungee cords).

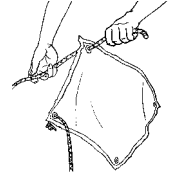
1. Make a rectangle out of the canvas to be the false bottom for the cart. You may need two or more layers of fabric.



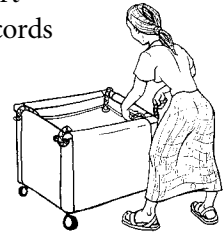
2. Make a hole in each corner of the canvas rectangle. A reinforced button hole or metal grommet will last longer than a torn hole.



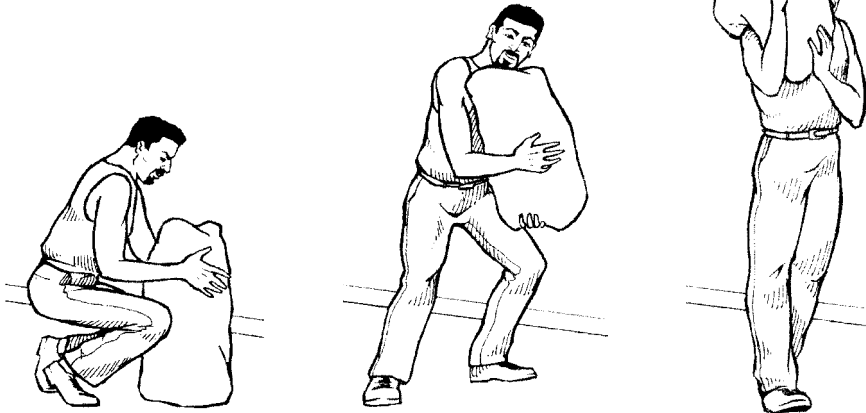
3. Place an elastic or bungee cord through each hole in the canvas and secure it. Place the canvas in the cart and secure the other end of the elastic cords to the top corners of the cart.



4. Adjust the length of the elastic cords to allow the false bottom to rise to just below the top of the cart when it is empty. The cords should stretch to the bottom of the cart when full. If your cords don't do this, find a different kind of cord or a different length.



**Lift with your legs, not with your back.** If you must lift things from the ground, try to lift with the load close to your body with back straight and feet stable on the ground. Use your legs to lift your body and the load at the same time.



**Powered machines**, such as **fork lifts**, **conveyer systems**, and **rail systems** eliminate certain dangers by doing the work of lifting and moving materials.

These machines add new dangers to the workplace, such as injuries from fork lift collisions or moving conveyer parts. They can also cause air contamination from fuel and engine exhaust.

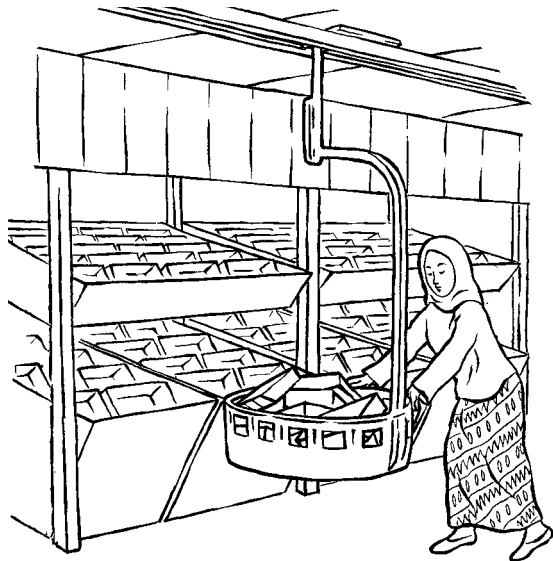


**An electric powered lift truck does not contaminate the air.**

**Passive conveyors** allow you to push parts and boxes over rollers between workstations instead of carrying them by hand or cart.



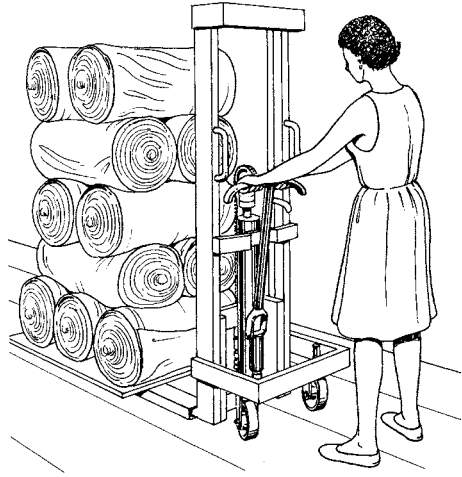
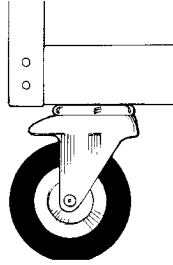
**Rail systems** allow you to push or pull parts or tools around the work area from a rolling holder. This is especially useful when things need to hang, such as finished clothing or material ready for dipping or spray coating.



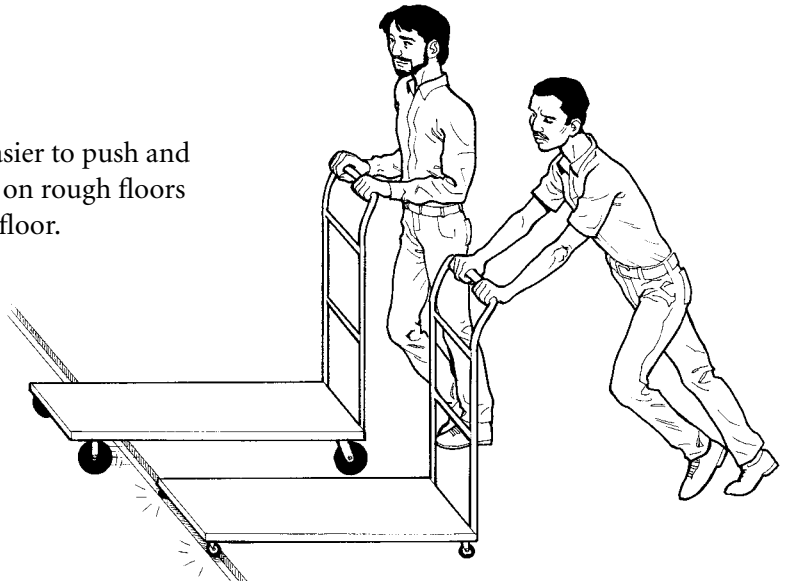
## WHEELS

Wheels make moving easier as long as hand trucks, trolleys, carts, and bins are kept **in good repair**.

**Wheels covered with rubber** or a similar plastic last longer and are easier to move than uncovered metal wheels.



**Larger wheels** are easier to push and maneuver, especially on rough floors and over gaps in the floor.



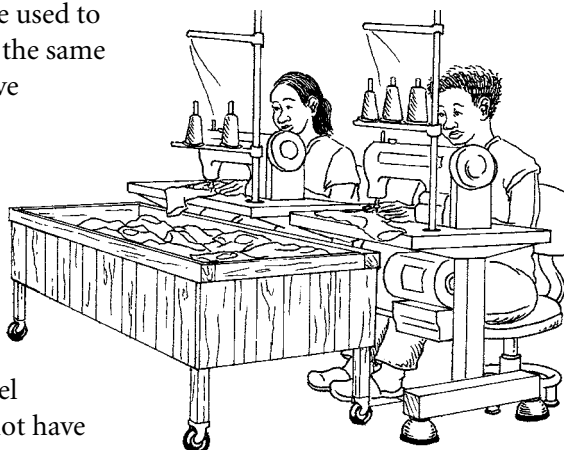
Wheels need to be cleaned often to keep turning smoothly. You can remove dirt and debris from the wheel surface with a stiff brush. Wheels will also last longer with regular cleaning and maintenance.

When a damaged wheel cannot be repaired, replace the wheel right away. This will prevent strains to workers and damage to the cart or trolley. The boss is responsible for keeping a supply of replacement wheels on hand.



A workstation **bin on wheels** can be used to bring supplies and remove waste in the same container, reducing the need to move things from one bin to another.

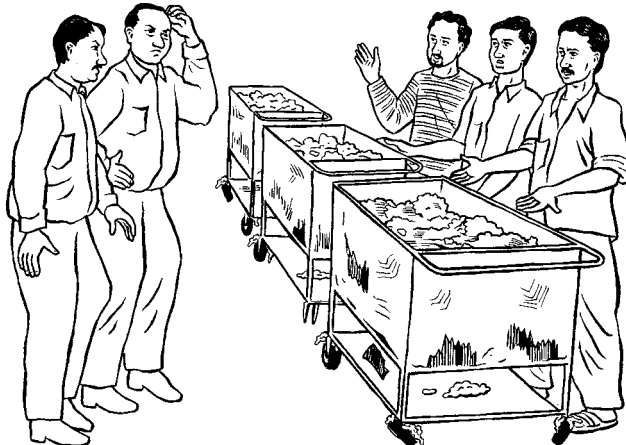
**Wheel brakes** help workers control movable equipment and keep it from moving unexpectedly. Movable bins, carts, and tables should have brakes on the wheels. You should be able to easily lock or unlock wheel brakes with your foot. You should not have to use much pressure or bend over to do this.



## New carts replace old sticky wheels — India

Our factory uses a lot of cotton waste to make a chemical product that is very sticky. It makes the factory floor wet and sticky. Workers use carts to move the cotton waste around the factory, but the carts used to break down a lot. Cotton waste and residue from the floor stuck to the wheels making them hard to roll. The wheels also rusted because they were never cleaned or repaired.

The union had demanded new carts several times, but the boss did not respond. One morning, we lined up all the carts in front of the door to the office block. Every visitor had to pass through that door and look at the exhibit of broken carts. By 10 AM, the managers started to arrive. At first they did not understand why the carts were in front of the door. Finally, the director came and asked what was going on. He ordered us to remove the carts and talk with the managers about the problem. We again demanded new carts. This time they agreed. It took 3 months for the new carts to come, but we got them!



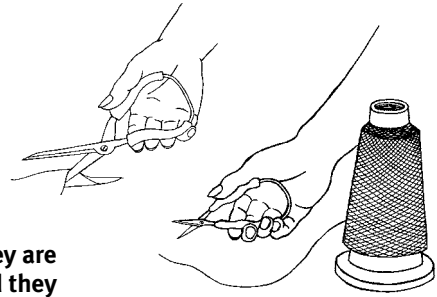
## Tools

Having the right tool for each task means you can do high quality work faster and more safely. Workers usually do not get to choose the tools they use, but you may be able to adapt tools or use the examples on these pages to demand better tools for your work.

### THE RIGHT TOOL FITS THE WORKER AND THE TASK

Workers' hands come in many sizes, and men's hands are a different shape than women's hands. Most hand tools also come in different shapes and sizes. To help prevent strain to fingers, hands, arms, and shoulders, each worker should use tools that fit the size and shape of her hands.

A tool should be only as large and sturdy as needed to do the job. The shape and features of a tool, like a bent handle or a ratchet, can make repetitive or forceful tasks easier.

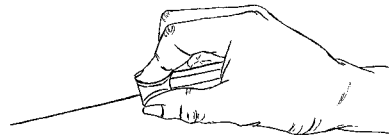


**These scissors are the right size for the job. They are lightweight, sharp, shaped to fit your hand, and they open on their own.**

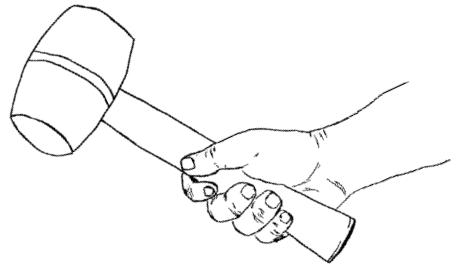
**A comfortable handle** fits in your hand. It is not too large or too small to grip, and does not have sharp edges that press into your fingers or palm.

Tools with 2 handles should close easily and open on their own. Usually they have a spring that pushes the handles back open.

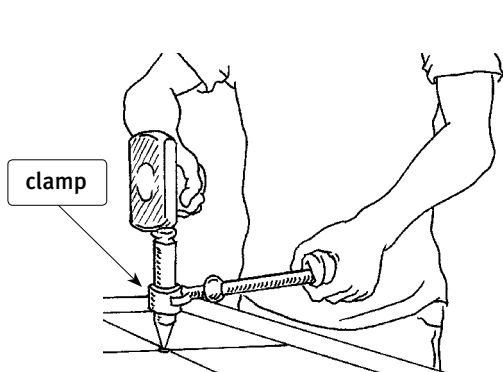
Tools you hold with your fingers for control and accuracy should be small enough to hold between your fingers and thumb.



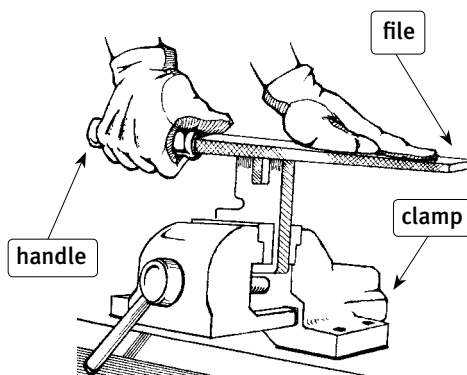
Tools you hold with your whole hand for power, such as a hammer, should be large enough for your fingers to wrap around the handle.



**Clamps and handles** help you grip tools and parts more securely. Handles also help protect your hands from sharp points and edges.

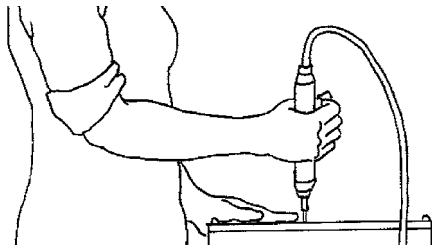


A clamp can be used as a handle to hold a tool.

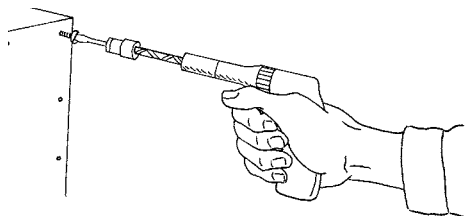
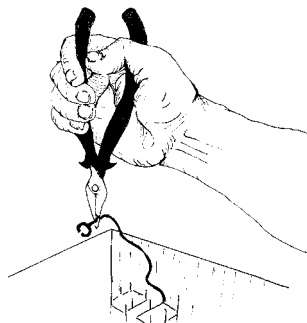


This clamp holds the piece so both hands can do the filing.

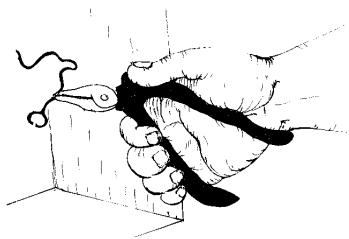
**Bent or straight tools** help keep your wrist straight when pointing tools in different directions.



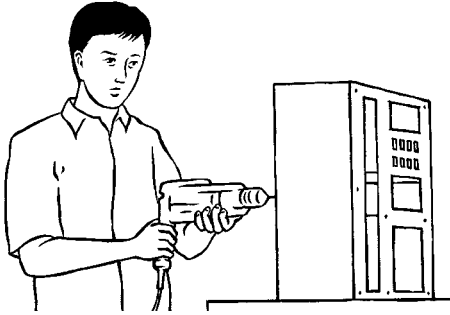
Tools with straight handles keep your wrist straight when you point the tool in a direction other than the way your arm points.



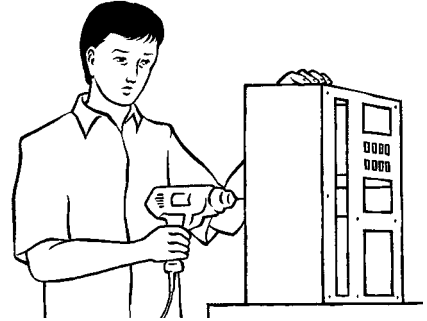
Tools with bent handles keep your wrist straight when you point the tool in the same direction as your arm.



**A balanced tool** is evenly weighted so you do not have to strain to hold the tool in position.



This drill is unbalanced because the handle is behind the heavy motor. To use the drill you must support the front end with your other hand.



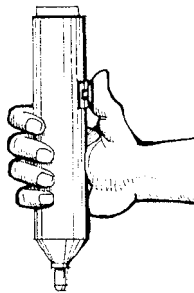
This drill is balanced because the handle is below the heavy motor. This drill can be used easily with one hand.

**A forearm support** holds the weight of your arm in a comfortable position. This makes fine detail work easier.

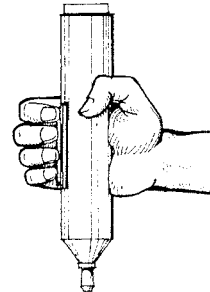
**This worker's arm support helps prevent strain in her back, neck, shoulder, and arms.**



**Tool triggers** are easier to use when they are wide enough to press with all 4 fingers instead of the thumb.

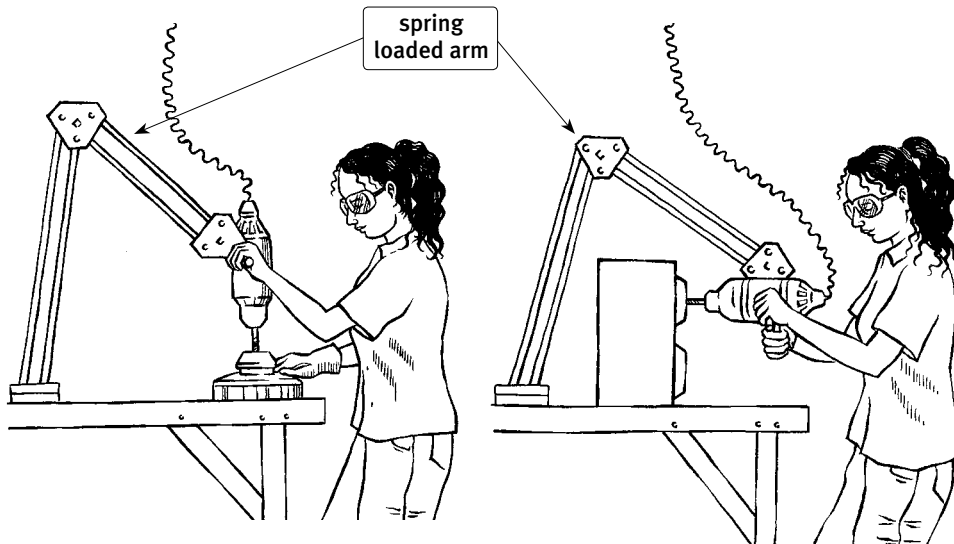


With this tool, the thumb has to stretch and work alone to press the trigger.



With this tool, the fingers can share the work of pressing a wide trigger. The thumb helps grip and guide the tool.

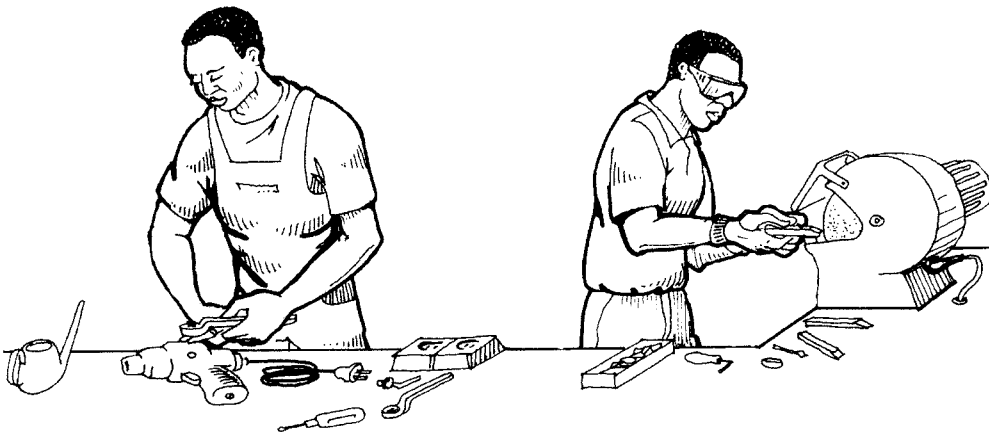
**Hanging heavier tools** by a spring-loaded arm positions them in the right direction for work, so you do not have to pick up, set down, and support the tool each time you use it. A hanging tool should be easy to move around the work area where it is used.



**A spring-loaded arm holds up the weight of the drill while the worker is using it.**

## Maintenance and repair

Workers can do their jobs best when their work stations, tools, and equipment are always clean and in good repair. Dull cutting tools, parts and machines clogged with dirt, and unstable furniture can cause strain and other injuries.



**Regular maintenance of equipment also prevents injuries.**

## Treat injuries sooner than later

Injuries caused by overusing or straining any part of your body can be very painful and slow to heal. The most serious injuries can disable you permanently. If bosses do not protect workers from these injuries, workers have to quit or are fired when they become injured and can no longer do their jobs. This is one reason why there are very few older workers in EPZ factories.

**If you have aches, pains, swelling, tingling, burning, or numbness in any part of your body, you may be injured.**

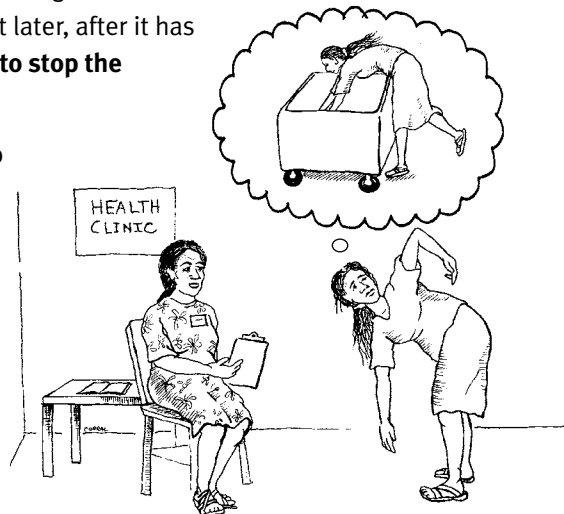
If these feelings last longer than a week, you should see a health worker. The injury may require rest or other treatment, and may get worse if it is not taken care of. Treating a problem before it gets serious is much easier and faster than treating it later, after it has gotten worse. **Taking medicine to stop the pain will not cure the injury.**

Sometimes the best cure is to rest the injured part of your body. If this is not possible at your job, try to look for other jobs at your factory that can rest your injuries. Or, find out if your job tasks can be changed temporarily while you are healing.

When you visit a health worker, explain why you think your pain is due to your work. She has probably never done the work you do, so you must show her. Act out the physical moves required by your work so she can see clearly what you do all day.

Many doctors are not helpful treating work injuries. They do not have training or experience with the dangers of factory work. Some doctors do not believe workers' injuries are real. Ask other workers if they know a good doctor to see for workplace injuries and illnesses.

For more information about getting health care, see "Access to care" on pages xx to xx.



**Anna tells the health worker how her back hurts from reaching into carts.**

## Using your body carefully

Sometimes you can reduce strains by changing how you use your body for some tasks. For example, if you have to bend forward to see your work, try moving closer to the work surface.

If the pressure to work fast makes you grip parts and tools very tightly, try loosening your grip. You may find that you can work just as fast with your hands more relaxed.

When you move a bundle, box, or parts, try turning your whole body, rather than twisting at the waist.

Pushing rather than pulling carts and hand trucks creates less strain on the back, legs and shoulders. Instead of waiting to move a cart when it is completely full, move it when it is less full and lighter. This lowers the chance of tipping the cart or straining while moving it.

Try not to stay in the same position for a long time. For example, can you switch between sitting and standing during the day? Can you do several different kinds of work in the factory each day instead of the same tasks all day?

### TAKE SHORT STRETCH BREAKS

Stretching increases blood flow through your body and helps relax tight muscles.

**Stretching will not keep you from being injured by strain and overuse from work.** Try making time to stretch before work, during breaks, at lunch, and after work. Here are some examples of stretches that can be helpful to factory workers. Repeat the movements in each stretch slowly and gently 5 to 10 times.

### Stretches for the neck

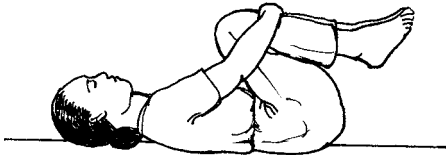


**Neck:** Roll your head slowly in a full circle.



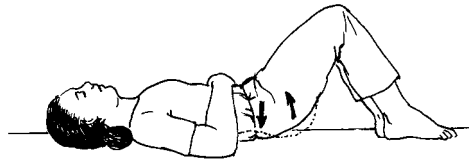
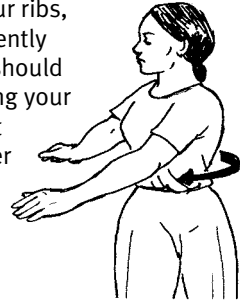
**Shoulders:** Move them up and down, roll them forward and backward, pull your shoulderblades behind your back.

## Stretches for the back



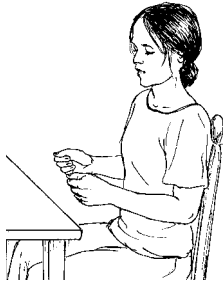
**Lower Back:** Lie on your back and hug your knees. Relax, still holding your knees.

With your back long and straight, twist your ribs, chest, and face gently to one side. You should feel a stretch along your whole back. Twist gently to the other side.



**Hip tilt:** Lie on your back with your knees bent. Push your lower back into the floor by slowly tightening your stomach and buttock muscles. Relax, and your back will curve up the way it usually does.

## Stretches for the hands and forearms



1. Make a fist, gently.



2. Open your hands, stretching your fingers out.



3. Curl your fingers into a claw. Then open your hands again.



Gently roll your hands in a circle at the wrist.



# Chemicals

Do you know what chemicals are used in your factory?

Do you know how chemicals used in your factory can harm your health?

Are workers trained to use chemicals safely?

## Working with dangerous chemicals

Most people use chemicals every day. Soap, plastics, and many cosmetics are made with chemicals. Some chemicals do not cause any harm. Other chemicals can cause minor or temporary health problems. But some chemicals are very dangerous and can cause serious health problems and death.

Dangerous chemicals are used to make products in export factories. Some job tasks also produce dangerous chemicals that workers breathe or absorb through their

*My expert says there is nothing in the air. No violation of health standards. Come see for yourself!*

*Then why do we get dizzy and sick when we use the cleaner a lot?*

*It smells and makes my head hurt.*

*Chemicals get on our hands and clothes, too!*



Who knows best?

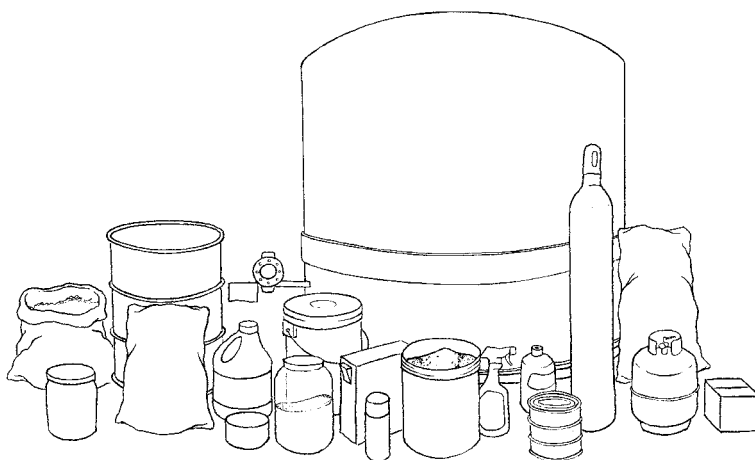
skin as they work. In this section we show how chemicals in factories cause health problems for workers and their families, and how to prevent health problems caused by dangerous chemicals at work. For more information about how chemicals from factories can harm the health of everyone in the community, see 'Pollution from factories' on page xx.

There are many different kinds of dangerous chemicals, and they can cause different types of health problems. You can use this book in different ways to learn more about chemicals and their effects on health. For example,

- For more information about how you can be exposed to a chemical, see pages 56 to 57.
- For more information about how chemicals can harm different parts of the body, see pages 58 to 59.
- For more information about the dangers of some common chemicals used in factories, see pages 64 to 73.
- For more information about how to prevent exposure from different jobs, see pages 75 to 87 and the Health effects of chemicals chart on pages 156 to 179.

## Chemicals can be in many forms

The chemicals used in a factory can be a watery or oily liquid, powder, pellets, granules, paste, or an invisible gas. During the production process, chemicals are often released in the air as smoke, fume, mist, gas vapors, or dust. Chemical flakes, dust, and sticky residue can settle on floors, windows, and work surfaces.

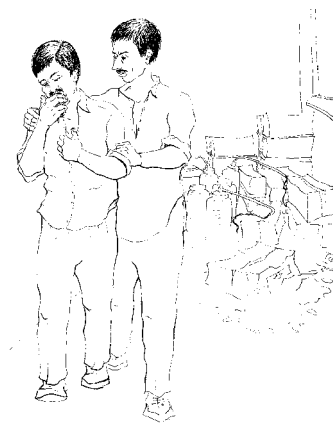


**Chemicals come in all kinds of containers, such as bottles, cans, jars, barrels, sacks, pressurized cylinders, large tanks, trailers, and rail cars.**

## How dangerous chemicals can harm your health

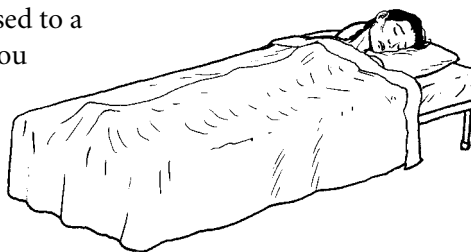
Chemicals can cause **short-term health problems**, such as irritation that makes your eyes water and burn. Short-term problems can happen as soon as you are exposed to a chemical or right after exposure.

**Short-term problems can be mild or serious.** For example, if you breathe in a small amount of the solvent methylene chloride during 1 hour, it can make you dizzy and give you a headache. But if you breathe in a lot of methylene chloride during 1 hour, it can cause you to lose consciousness and die.



**Some chemicals can make you feel sick right away.**

Chemicals can also cause **long-term health problems**, such as cancer or permanent damage to the brain, nerves, or lungs. Long-term problems happen after you have been regularly exposed to a chemical for many months or years, and you may not get sick until many years after you stopped using a chemical.



**Some chemicals cause serious illness many years later.**



**Some chemicals and chemical vapors are flammable.** They can catch fire or explode easily if they get too hot or too close to a spark or flame.

## Exposure and harm

You can be exposed to chemicals at work if you use the chemical **and** if you are working around other people using chemicals. The health problems caused by most chemicals depend on: **How** you are exposed to a chemical. **How much** of the chemical you are exposed to. **How long** you are exposed to the chemical. **How dangerous** the chemical is.

## HOW ARE YOU EXPOSED?

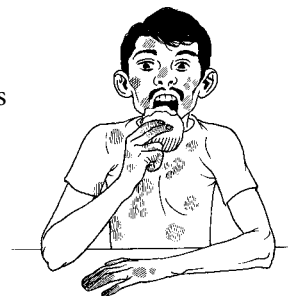
There are 3 ways a chemical can get into your body and cause harm.



**Skin:** You can absorb a chemical through your skin or your eyes.

**Air:** You can breathe in a chemical through your nose and mouth.

**Mouth:** You can swallow a chemical. This usually happens when the chemical is on your hands and you touch food or a cigarette that goes into your mouth. But chemical dust or a splash can get on your lips or inside your mouth. You also swallow chemicals that are already in cigarettes, the food you eat, or the water you drink.



## HOW MUCH ARE YOU EXPOSED?

If a worker gets a little chemical on his hand and washes it off very quickly, this is not much exposure. If a worker is splashed with the same chemical and breathes it, this is a lot of exposure. Different chemicals are dangerous in different amounts.

## HOW LONG ARE YOU EXPOSED?

For some chemicals, a few minutes of exposure is not harmful, but many hours of continuous exposure is very harmful. Some chemicals are harmful even if you are exposed for a minute. A few minutes of exposure to a chemical only 1 time may not harm you, but short exposures repeated over many years can cause harm.

## HOW DANGEROUS IS THE CHEMICAL?

Some chemicals are dangerous in small amounts and some only in large amounts. Some chemicals can cause death right away. Other chemicals can make you ill but do not cause death. And some chemicals can cause an illness, such as cancer, that can cause death many years in the future.

## Common health problems caused by chemicals

**Irritation**, such as red, itchy skin and eyes, sneezing, coughing, sore throat, runny nose, and difficulty breathing. The irritation usually stops and will heal when you are away from the chemical.

**Allergies** that cause a skin rash, eye or nose irritation, coughing or breathing problems. These are usually short-term health problems caused by an allergic reaction to a specific chemical. If you are “sensitized” to a specific chemical, you will have an allergic reaction every time you are exposed to that chemical. Other workers can be exposed in the same way and not have any reaction, because they are not sensitized or allergic to the chemical. The reaction usually goes away when you get away from the substance you are allergic to. But severe allergies, and asthma caused by an allergy, can cause you to stop breathing, and you can die if you do not get immediate medical care.

**Asthma and other breathing problems** caused by chemicals that harm the lungs. Signs of asthma are wheezing, coughing, shortness of breath, and feeling tightness in the chest. Asthma can be a short-term health problem that stops when you are away from the substance causing asthma. But some chemicals cause long term harm to the lungs or cause workers to have asthma for the rest of their lives. If you already have asthma, breathing in chemicals can make the asthma worse or cause you to stop breathing.

**Burns**, of skin and flesh. Swallowing or breathing some chemicals can also cause burns inside the body.

**Cancer**, a serious illness that causes cells in the body to grow out of control. Different chemicals cause cancer of the skin, lungs, liver, blood, bone marrow, and other parts of the body. Cancer can be hard to cure and can kill you. Most cancers develop very slowly, and signs of illness do not appear until many years after exposure to the substance that caused the cancer.

**Sexual and reproductive health problems**, including changes in a man’s sperm or a woman’s monthly bleeding that can make it difficult to conceive a child and have a healthy baby. If a woman is exposed to certain chemicals before or during pregnancy, these substances can cause pregnancy complications, miscarriage, or problems with the baby’s health and development. A baby can also have health problems caused by certain chemicals in the father’s body. For more information, see ‘Sexual and reproductive health’ on pages xx to xx.

**Harm inside the body.** Some chemicals slowly destroy specific parts of the body, such as the brain, nerves, liver, kidneys, or lungs. Swallowing or breathing some chemicals can cause **immediate poisoning** that makes you very sick and can kill you if you do not get medical help right away. Other chemicals can cause **slow poisoning over time** that can make you very ill and kill you. Chemicals can also weaken your body’s ability to resist infections and other illnesses.

Each person is different. Some people will become ill from a chemical, and some will not. When 2 people are exposed to the same amount of the same chemical in the same way at the same time, they will not always suffer the same harm. Some people feel sick from a small exposure to a chemical. Other people may not feel sick until they have much more exposure. Your chances of becoming ill from exposure to a chemical depend on your body, the type of exposure, other chemicals you may also be exposed to, and on chance.

Here are some common ways chemicals can harm your body:

**BRAIN AND NERVES.** Temporary dizziness, nausea, confusion, blurred vision, headache, sleepiness. Long-term harm causing mood changes, difficulty learning, memory loss, speech problems, trembling, and numbness of hands and feet. Cancer.

**LUNGS.** Difficulty breathing, asthma. Harm that can cause death. Cancer.

**STOMACH.** Temporary nausea and upset stomach. Cancer.

**LIVER.** Harm that can cause death. Cancer.

**KIDNEYS.** Harm that can cause death. Cancer.

**BLOOD.** Anemia. Cancer. Sickness caused by changes in the blood.

**BONES.** Cancer of the bone marrow (the soft tissue inside bones).



**EYES.** Temporary irritation. Burns. Blindness.

**EARS.** Loss of hearing. Ringing in the ears.

**NOSE AND THROAT.** Temporary irritation. Burns. Nose bleeds. Wounds in nose. Cancer.

**TEETH.** Wears away teeth.

**HEART.** Irregular beating. Stops heart.

**BABY.** Born with incomplete development, harm inside the body, or physical deformities caused by the mother or father's exposure to dangerous chemicals.

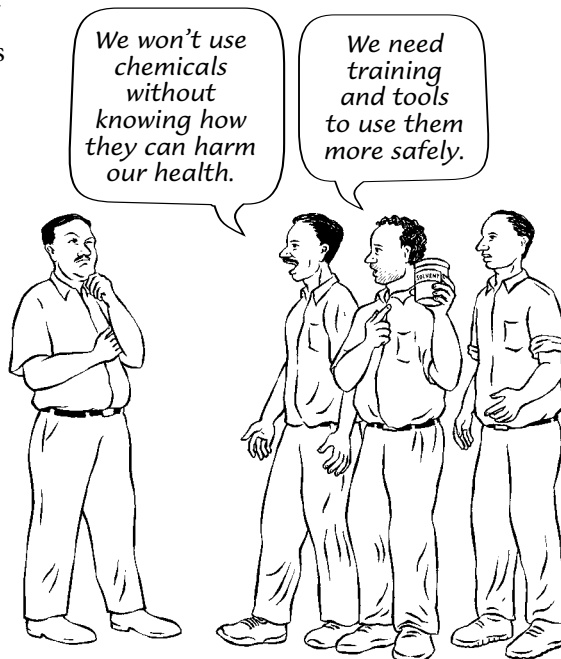
**PREGNANCY AND MONTHLY BLEEDING.** Loss of sexual desire in men and women, difficulty getting pregnant, pregnancy complications, miscarriage.

**SKIN.** Rashes. Allergy. Burns. Cancer.

## How to know if you use dangerous chemicals

Workers often know that chemicals in the factory cause headaches, dizziness, skin rashes, and other short-term problems. But some chemicals can be causing other health problems without any signs of sickness for a long time. To know if you are being exposed to dangerous chemicals, you need information about all the chemicals used where you work.

All workers have a right to know which chemicals they are exposed to from their jobs. This includes the chemicals used by other workers in the factory, and chemicals produced by work processes and machines. Workers have a right to know what health problems can be caused by these chemicals, and how to work as safely as possible to prevent health problems.



## How to get information about a chemical

### SURVEY WORKERS

Ask workers what health problems they notice from chemicals they are exposed to at work. Do they feel ill at work or after work? Do they feel better when they are away from work for a few days? Ask if they know what chemicals they use, and collect the names and labels of these chemicals. For more information about surveys, see 'Survey your coworkers' on page xx.

### THE LABEL

All chemical containers should be clearly labeled with the name of the chemical and information about the known health dangers of the contents. In some countries, these labels are required by law. The labels and warnings should be in the local language workers read. See page 77.

## CHEMICAL INFORMATION SHEET

Some companies that make chemical products also publish an information sheet for each product. In some countries these sheets are called **Material Safety Data Sheets (MSDS)**. A good sheet will name all the chemicals in the product, describe how these chemicals can affect your health, tell you whether these chemicals can cause cancer or birth defects, describe protections you need to work safely with the product, and give other information about the product, such as how easily it catches fire. Sometimes the information on these sheets is wrong or incomplete, making the product look safer than it really is.

The boss should have an information sheet for every chemical product in the factory. If you cannot get information from the boss but you know the name of a chemical product, you can contact the company that makes the product and request an information sheet.

## TRAINING

It is the boss's responsibility to give workers chemical information in a language workers understand, and in a way workers understand it. Workers who cannot read can learn about chemicals from pictures, videos, demonstrations, or hands-on practice. When you start a new job or are assigned new work, your supervisor should tell you about the chemicals you work with and how to use them safely.

## COMMUNITY RESOURCES

Labor unions, labor support groups, and environmental organizations may be able to help you get information. If you know the name of a chemical, you can find information about it in libraries and on the internet. For more information about using community resources, see 'XX' on page xx.

### Caution! Do not sniff! Your nose does not always know!

Some chemicals are very dangerous even when you cannot smell them. Other chemicals smell very bad but are not very dangerous. You can get used to an odor and not smell it at all after awhile. Some people cannot smell odors well.





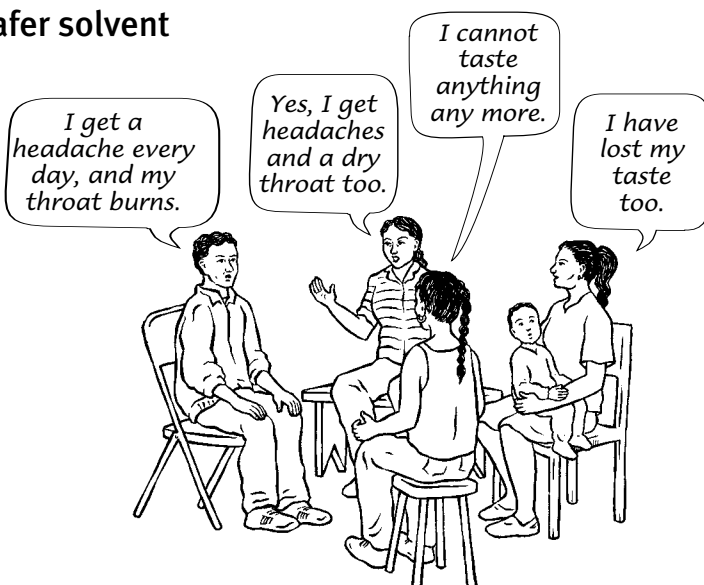
## Workers in Mexico win a safer solvent

We worked at a factory in Mexico that made plastic drinking straws with people's names shaped into them. This is what happened when a group of us started meeting to learn about our rights under Mexican labor law, and to learn about health.

*Here is the label. The chemical is called methylene chloride.*



We took the label to the office of the Comité Fronterizo de Obreras (CFO), an organization that supports and organizes workers in our community. The CFO has a file of chemical information sheets. We found the sheet for methylene chloride and learned it does more harm than just burn throats and cause us headaches. It can cause cancer and harm the liver. We took the information about the solvent to the boss, but she did nothing.



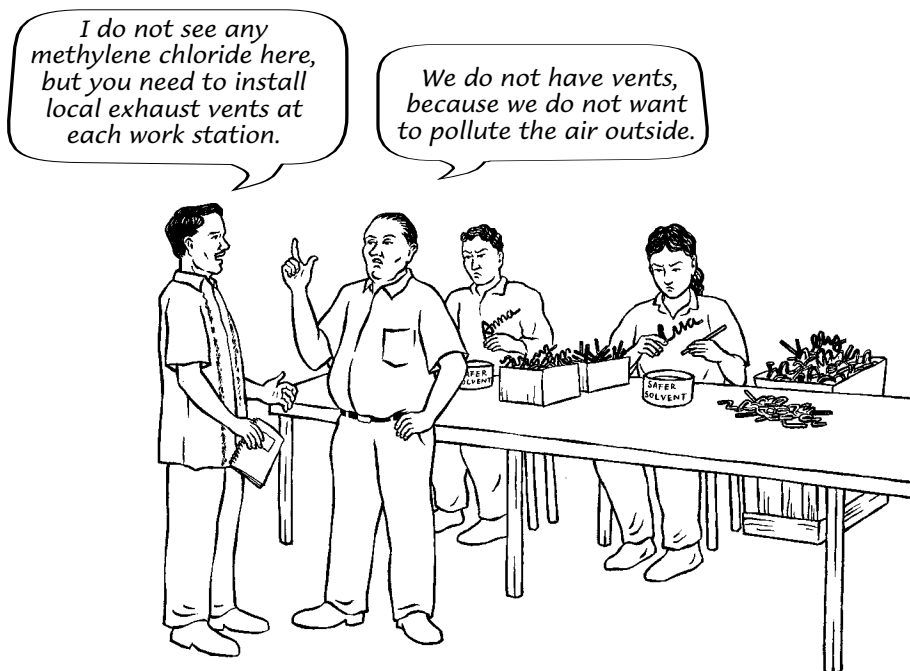
We found that we all had the same health problems. We suspected these problems were caused by the solvent we used to fuse the straws together. We did not know the name of the solvent. There were no labels on any of the containers we used. So, we asked one of the chemical storeroom workers to give us the label from one of the large containers of solvent.

*This chemical is very dangerous! It makes us sick now, and it can kill us later!*



Next we took the information about the solvent to the local office of the national environmental protection agency, PROFEPA. We asked them to inspect the factory.

We had to pressure them several times. The inspectors finally came, but they told the boss ahead of time. Just before the PROFEPA inspection, the boss replaced the methylene chloride with a less dangerous solvent.



The boss claimed to care about polluting the air outside, but he did not care if we breathed dangerous chemicals all day inside the factory!

PROFEPA never required the boss to install the local exhaust fans. But after the inspection, the boss kept buying the less dangerous solvent, even though it was more expensive.



## Dangers of chemicals common in export factories

From this page through page xx, we give information about the most common and most dangerous chemicals workers are exposed to in export factories. These include **specific chemicals**, such as formaldehyde and asbestos; **groups of chemicals**, such as solvents and dyes; and **chemical mixtures**, such as welding fumes and diesel exhaust. On pages xx to xx, we give examples of protections from these chemicals.

There is not enough space here to include all the chemicals workers might be exposed to in every factory. And this book cannot tell how the chemicals used in a specific factory may be harming the health of workers in that factory.

For health information about more chemicals found in export factories, see ‘Health effects of chemicals’ on pages 156 to 179. For ways to find more information about chemicals and health, see ‘Resources’ on page xx.

### Asbestos

Asbestos is a mineral mined from the earth. It does not burn or get destroyed by other chemicals. Asbestos has been used for decades to make insulation and many other durable products.

#### ASBESTOS CAUSES SERIOUS LONG-TERM HARM

Asbestos does not cause any short-term health effect. But millions of people around the world have died from painful lung diseases many years after being exposed to asbestos.

You can be exposed to asbestos by breathing in dust that has tiny asbestos fibers in it. The fibers are too small to see. If you are exposed to a lot of asbestos dust, or exposed to a little of it over a long period of time, you can get a deadly hardening of the lungs called asbestosis, a cancer called mesothelioma or lung cancer. The cancers usually do not appear until 10 or 20 years later.

Workers who breathe asbestos at work are harmed more by smoking than other workers. Cigarette smoke and asbestos in the lungs together cause more harm than either one alone.

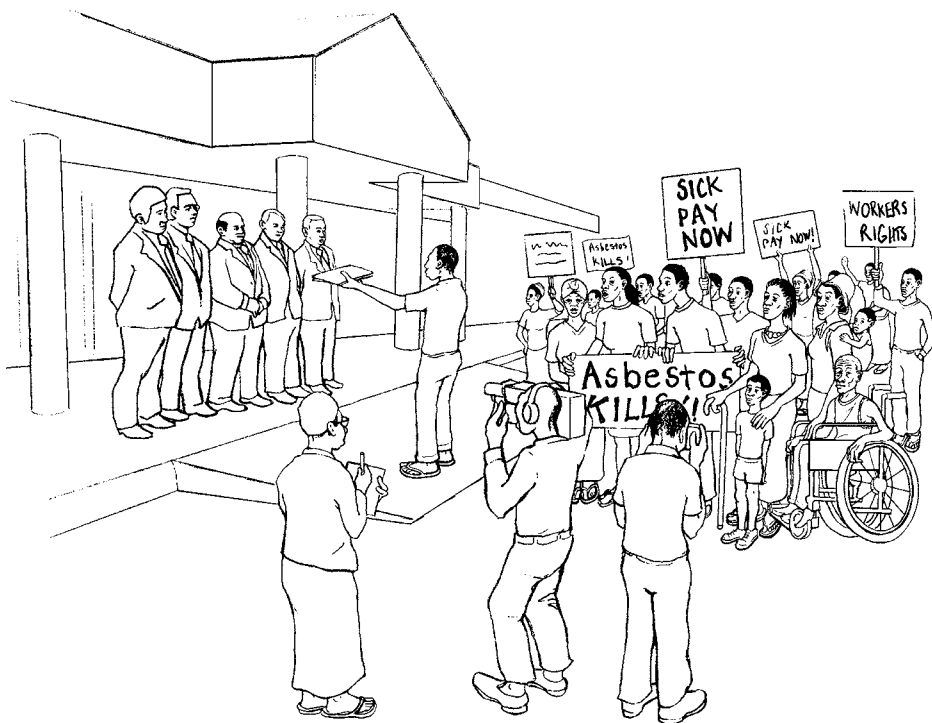
Families of workers can also get these diseases from breathing in asbestos dust that workers bring home on their hair, skin, and clothes. For more information about protecting workers’ families from asbestos and other dangerous chemicals, see ‘Leave work clothes at work’ on page 92.

**The most effective way to protect people from asbestos is to stop using it.** There is no reason for asbestos to be used in new products, machines, and buildings. For almost all uses of asbestos, there are safer materials that can be used instead. There is now an international campaign to ban asbestos everywhere in the world.

Many countries have passed laws that ban or severely limit the use of asbestos, but some developing countries continue to make and use asbestos products. Even in countries with bans, asbestos is still found in older buildings and machinery.

Workers in some export factories may handle asbestos in the following ways:

- **using and maintaining machines and tools lined or insulated with asbestos**, such as furnaces, ovens, and boilers. Pipes carrying steam and hot water or chemicals may be covered on the outside with asbestos insulation. Ladles used for pouring molten metals are usually lined with asbestos.
- **installing, maintaining, or removing insulation and fireproofing** in buildings and building materials, such as synthetic floor tiles, roof shingles, siding, and cement.
- **wearing or making heat protective clothing**, which is often made with asbestos. Shields used to protect workers from intense heat sources, such as furnaces and molten metal, may also be made of asbestos.
- **making brake pads, clutch plates, and other friction parts** for cars, trucks, and machines, although most factories now make these parts without asbestos.



**Campaigns by asbestos workers and their families have won them compensation and won bans on asbestos for workers in the future.**

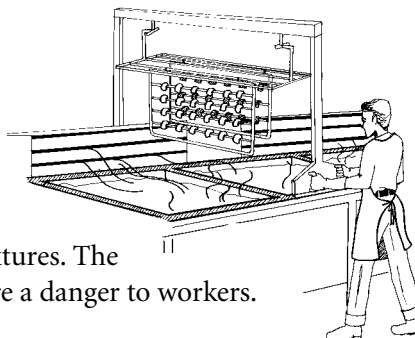
## Chemical baths

Some metals, plastics, and fabrics are treated with bleach or acids to change their color or surface finish. Two types are electroplating baths and garment finishing baths.

### ELECTROPLATING BATHS

Workers coat metal parts with another metal by dipping the parts in electroplating baths. For example, steel car parts can be plated first with nickel to prevent rust and plated again with chromium for a shiny surface.

These baths are usually strong acid or alkali mixtures. The chemicals can vary, but all metalplating baths are a danger to workers.



**Dangers** of electroplating include:

- **skin irritation and burns of skin, flesh, and eyes** from splashes or chemical mist in the air.
- **burns inside the nose, throat, and lungs** from breathing in chemical mist, causing nose bleeds and difficulty breathing.
- **cancer and permanent harm to the lungs** from breathing acid mists over a long period of time.
- **cancer** from breathing vapors from toxic metals, such as chromium and nickel, over a long period of time.
- **poisoning or death** from swallowing a bath mixture that contains cyanide salts. This can happen if you are splashed by the bath, or if the bath mixture on your hands gets into your mouth.

### CLEANING AND GARMENT FINISHING BATHS

Some parts or finished garments are washed in a mixture of water, detergent, and an alkali or acid. For example, “stone-washed” and “acid washed” jeans have been treated with bleach or acid.

**Dangers** of these baths include:

- **skin irritation** from splashes or chemical mist in the air.
- **eye injury**, including blindness, from splashes.
- **cancer** from formaldehyde and other chemicals used on fabrics, and from breathing BCME (bis-chloromethylether) vapor, which is created when fabric treated with formaldehyde is acid washed.
- **sudden death** from breathing poisonous gases that form when certain chemicals mix with some chemical baths.

**Do not use chlorinated hydrocarbon solvents near acid and alkali baths.**

This can create deadly phosgene gas. Chlorinated hydrocarbons include those with “chlor” in the name, such as methylene chloride, trichloroethylene, and tetrachloroethylene.

**Do not use acids near alkaline cyanide baths.** This can create deadly hydrogen cyanide gas.

## Formaldehyde

Workers in different industries can be exposed to formaldehyde in treated fabric and in fume that is sometimes created from metal casting and plastic processing.

**Treated fabric:** The most common and dangerous chemical in garment factories is formaldehyde in fabrics that have been treated so they do not wrinkle or fade. If fabric is “wrinkle free” or “permanent press,” it was probably treated with formaldehyde.

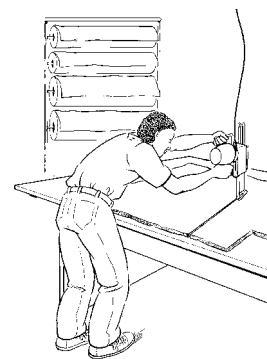
**Metal casting:** The cores of dies and molds are usually made with resin. Formaldehyde fume is created when molten metal touches cores that have resin in them.

**Plastic processing:** Formaldehyde is in plastic fume created when some types of plastic are overheated and break down in hot process machines, such as injection molding and film blowing machines.

In some countries, formaldehyde use is strictly regulated, because it is so dangerous. Some countries require a warning label on fabrics treated with formaldehyde.

**Dangers** of formaldehyde include:

- **rashes, eczema, burns, and other skin problems.**
- **cancer.**
- **irritated eyes, nose, throat or lungs.**
- **blindness.**
- **bronchitis or asthma.**



**Formaldehyde in treated fabric gets in the air and on workers' skin.**

## Lead and other toxic metals

Toxic metals are minerals mined from the earth. Common toxic metals used in export factories are lead, cobalt, zinc, nickel, cadmium, chromium, beryllium, mercury, and manganese. In factories, these metals are often combined with other substances, so workers do not always know they are handling dangerous material. For example, some steel contains cadmium. Welding on steel that contains cadmium creates a fume that can kill you if you breathe a lot of it at once.

### LEAD

Lead has been used in paints, pigments, glass, pottery glaze, metal pipes and alloys, and other products for hundreds of years. This common metal has caused serious, long-term health problems for many people who did not know lead was dangerous or that they were exposed to lead.

Lead usually gets in your body at work from breathing in lead dust or fumes. You can also swallow lead in paint or solder paste that gets on your hands and on food or cigarettes that you put in your mouth. Each time you are exposed to lead, the amount inside your body increases.



In export factories today, workers doing these jobs are sometimes exposed to lead:

- casting and fettling or cleaning metal parts with lead in them.
- making batteries.
- mixing or using plastic, paint, primer, and other coatings containing lead.
- soldering electronic parts or radiators for cars and trucks using lead solder or solder paste.
- welding or grinding parts made of lead or a coating that contains lead.

**Solder paste contains lead and other toxic metals.**

Lead causes serious long-term harm to the brain, nerves, and other parts of the body, called **lead poisoning**. The health problems caused by lead sometimes do not appear for many months.

**Signs of lead poisoning** include:

- **stomach ache, loss of appetite, and constipation**
- **tiredness and trouble sleeping**
- **headaches**
- **memory loss**
- **irritability**
- **muscle and joint pain**
- **shaky hands and muscle weakness**
- **weak blood (anemia)**
- **high blood pressure**

**Other dangers** of exposure to lead include:

- **harm to the kidneys.**
- **cancer.**
- **harm to a baby conceived by a man or a woman with lead in the body.** Lead in either the mother or the father's body can cause a baby to die before birth or to be born with health problems, including damage to the brain and nerves. Lead can harm the baby's ability to concentrate and learn as she grows up.
- **harms to men's ability to have children.**
- **harm to children** from exposure to lead brought home on workers' clothes. Lead harms children's brains and nerves, and affects their ability to learn and concentrate.

For more information about protecting children and other family members from dangerous chemicals, see page 92.

## COBALT, ZINC, NICKEL, CADMIUM, CHROMIUM, BERYLLIUM, MERCURY, AND MANGANESE

These metals are sometimes found in pigments, metal alloys such as steel and brass, metal coatings, metal plating baths, electrical parts, mirror coatings, batteries, welding rods, solder, and metalized vapors used to coat plastic parts.



These jobs can expose workers to toxic vapor, dust, and fume:

**Paint pigments may contain lead and other toxic metals.**

- mixing pigments into paints and other coatings.
- applying paints and coatings to parts and products.
- scraping, grinding, cutting, or welding coated surfaces.
- die casting, welding, grinding, or cutting metal alloys.
- preparing and using metal plating baths.
- vacuum metalizing plastic parts.
- soldering using solder made with these metals.

Breathing the fume of several of these metals causes **metal fume fever**. Signs of metal fume fever include headache, fever, chills, muscle aches, nausea, vomiting, weakness, and tiredness. These effects usually start several hours or a few days after exposure and can last from 6 to 24 hours.

For information about the specific health dangers of each toxic metal, see the Health effects of chemicals chart on pages 156 to 179.

## Dyes and pigments

Dyes are used to change the color of fabric, leather, plastic, rubber, and other materials used in many garment, shoe, and toy factories. Pigments are mixed with paints, coatings, and plastics to change their color. Some workers add dyes and pigments to parts and products. Other workers handle material that has already been dyed or already contains pigment.

**Dangers** of some dyes and pigments include:

- **skin and eye irritation.**
- **poisoning if swallowed.**
- **cancer.**

*My arms itch so much they are red since this new fabric came in. I hope the fabric changes again soon!*

*This fabric doesn't bother me. I wonder what it is?*



It is almost impossible to get information on the kinds of dyes and pigments used in different paints, coatings, and fabrics. Workers often do not learn about the danger until they get sick. For example, garment workers have noticed that dyes in black and other dark-colored fabrics cause more irritation than dyes in light-colored fabrics.

## Silica

Silica is a mineral commonly found in rocks and sand. In factories, silica dust is created from sand blasting, sand casting or die casting metal, using sand cores, and from grinding cast metal, such as car engine parts. Silica dust is so fine that you can breathe in a lot of it without feeling it and without seeing it in the air.

Breathing a lot of silica dust for a short time, or breathing less silica dust over a long period of time, causes permanent harm to the lungs called **silicosis**. There is no cure for silicosis, and it usually gets worse over time, even if a worker stops being exposed to silica dust. Silicosis makes breathing very difficult and often causes death from heart failure. Silica can also cause lung cancer. Workers exposed to dust and workers with silicosis are more likely to get TB and other lung diseases than other workers.



**Grinding cast metal parts creates silica dust.**

## Solvents

A **solvent** is a chemical used to remove dirt and grease, or to dissolve or thin other chemicals, such as paint pigment, adhesive, or finish coatings. Solvents are sometimes mixed with other chemicals into a product with a brand name. These products may not have content labels, so it can be hard to find out if the product you are using contains a dangerous solvent.

Solvents can cause a variety of health problems. Not every solvent causes all of the health problems listed below. You need to know the name of solvent you are using before you can learn more about the dangers specific to that solvent.

**Dangers** from solvents include:

- **irritation and burns** to skin, eyes, nose, and throat
- **allergic skin rash**
- **headache, nausea, confusion, feeling weak and dizzy**
- **hearing loss**
- **breathing problems** and **asthma**
- **harm to liver, kidneys, blood, brain, heart, nerves,** and other parts of the body
- **harm to baby** during pregnancy
- **harm to ability of men and women to have healthy children**
- **cancer**



## SOME “SAFER SOLVENTS” ARE MORE DANGEROUS

Some solvents, such as ethanol and isopropyl alcohol, cause less serious health problems but catch fire very easily. Other solvents, such as trichloroethylene, methylene chloride, or 2-methoxyethanol, are often sold as “safer solvents,” because they are less likely to catch fire. But these chemicals are more harmful to the kidneys, liver, brain, and nerves. They also harm the ability of men and women to have healthy children, and they are more likely to cause cancer.

## SOLVENTS CAUSE SHORT-TERM AND LONG-TERM HARM

A lot of solvents give workers headaches and nausea, and make them feel weak, dizzy, or confused. Solvents that cause these short-term problems can also cause long-term harm to the brain if workers are exposed continuously for years. This harm to the brain causes memory loss, difficulty concentrating and learning, irritability and depression, loss of sexual desire and ability to have children, headaches, and fatigue. This harm is permanent, cannot be cured, and does not stop if a worker is no longer exposed to the solvent.

For information on the health effects of specific solvents, see the Health effects of chemicals chart on pages 156 to 179.

## Metalworking fluids and machine lubricants

Fluids are used in metal machining, stamping, cutting, and grinding to keep the machine and the parts being worked on from getting too hot. These fluids are sometimes called “cutting fluids,” “cutting oils,” or “coolants.” They are a mixture of chemicals in either water or oil.



**Lubricating metal parts with oil before cutting or stamping**

**Dangers** from metalworking fluids include:

- **rashes, itching, and other skin problems** from touching the fluids, or touching tools or machine parts with fluid on them.
- **irritated nose and throat, and dry cough** from breathing in mist with fluid in it.
- **asthma and other long-term breathing problems.**
- **cancer** of the skin, throat, stomach, and intestines.
- **breathing problems and hypersensitivity pneumonitis** from bacteria that grow in metalworking fluids that are not kept clean. To stop the bacterial growth, other chemicals are added to the metalworking fluids, but these additives can cause skin and lung irritations.

## Motor exhaust

Motor exhaust contains many chemicals and fine particles that contaminate the air. Workers can be exposed to exhaust from trucks, forklifts, and other vehicles and machines powered by diesel, gasoline, or propane motors. Older vehicles and motors that are not regularly maintained create more exhaust.

One of the most dangerous chemicals in motor exhaust is carbon monoxide, a gas you cannot see or smell. Carbon monoxide from motors used indoors can make you pass out and die within a few minutes.

**Dangers** of breathing in motor exhaust include:

- **irritation of the eyes, nose, and throat.**
- **chest tightness and wheezing.**
- **headaches, dizziness, nausea, and vomiting.**
- **unconsciousness and death.**
- **numbness in fingers and toes.**
- **harm to baby during pregnancy.**



**Motor exhaust contains deadly carbon monoxide.**

Dangers of breathing motor exhaust over a long period of time include:

- **difficult breathing, frequent coughing with mucus, bronchitis, asthma.**
- **cancer.**

Motor exhaust can be more harmful to people with emphysema, asthma, and heart disease.

## Soldering and welding fumes

Welding uses heat to melt and fuse together 2 pieces of metal. Soldering uses heat to fuse 2 pieces of metal by melting a soft metal called solder. Welding heats the metals to a much higher temperature than soldering. Both processes create fumes that are harmful to breathe.

Welding and soldering fume can contain toxic metals, such as cadmium, nickel, or lead. For more information about the health dangers of these metals, see 'Lead and other toxic metals' on pages 67 and 68.



**Soldering parts on a circuit board creates dangerous fumes.**

### SOLDERING FUME

Soldering fume is not as dangerous as welding fume because it does not heat the metal as hot. **Flux vapor, or smoke from burning flux, can cause eye, nose, and throat irritation, and asthma.**

If any solvent from degreasing is on the parts being soldered, burned solvent will be in the solder fume. For more information about the dangers of breathing solvents, see 'Solvents' on pages 70 to 71.