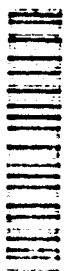


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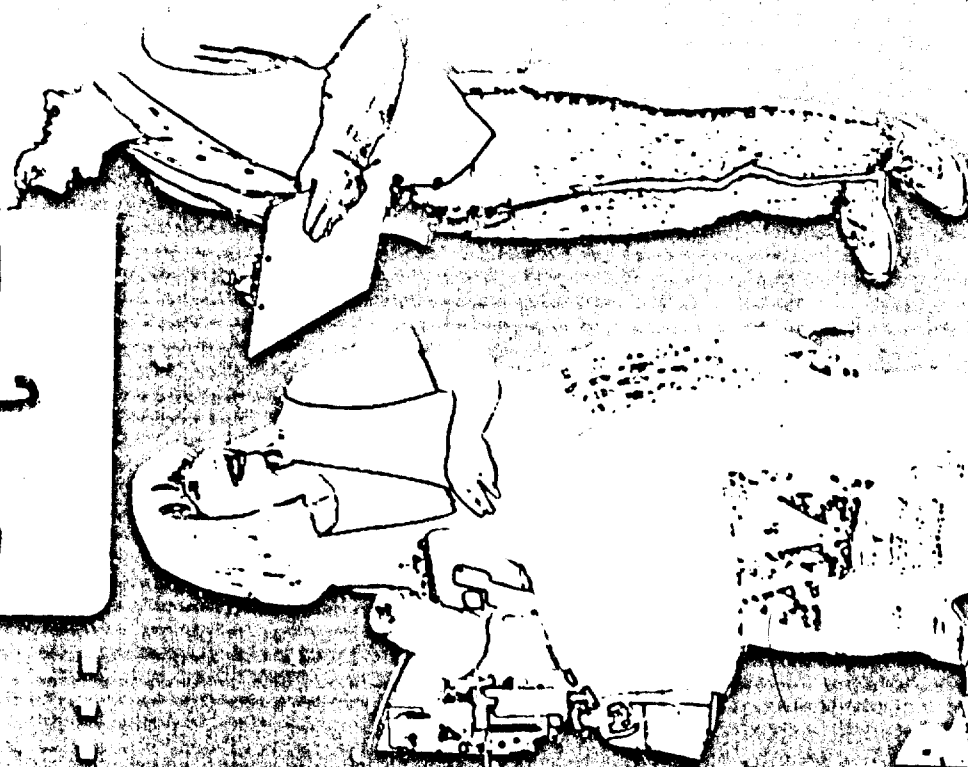
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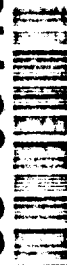
A stitch in time...

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A stitch in time...

the SUPERVISOR'S guide to ergonomics

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A special thanks to Carol Foley for her small, yet important, contribution to the guide. The examples and concepts presented in this manual are not exhaustive. Their application will depend on the nature and type of jobs in a given operation. Careful planning involving management, engineering, and medical staff is needed prior to the implementation of any control measure. Most important is the need to consider safety and equipment safeguarding in all proposed modifications or installations.

A stitch in time...the SUPERVISOR'S guide to ergonomics

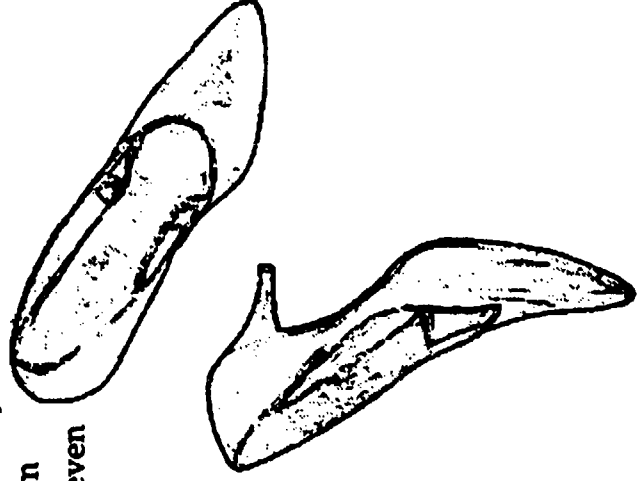
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Chapter 1: Making the job fit the worker

Have you ever bought a pair of shoes that didn't fit? They made your feet hurt, and you probably ended up throwing them away, giving them away, or putting them in the back of the closet.

Your shoes need to fit your feet. In the same way, your work station, tools, and job need to be designed to fit you and the way you work. If they don't fit, they can keep you from doing your best work and can even hurt you.



This book is about fitting the job to the worker. It's written to help you be sure that the workers you supervise do their best job. It will tell you how to help keep workers from having job-related problems. Sometimes that's not possible, so it will also tell you how to spot problems and what to do about them.

Like taking "a stitch in time," catching small problems early can keep them from becoming big ones.

What is ergonomics?

Making the job fit the worker is the goal of a new science called ergonomics. People who practice this science are called ergonomists.

Ergonomists begin by studying people who are doing a particular job. They study people's sizes, their shapes, and the way their bodies work. They study the way people see, hear, think, and learn.

Then the ergonomists study the jobs that the people are doing and look for ways to make the jobs, the tools, and the work stations fit the workers better.

Ergonomists look for problems such as

- work tables and chairs that are too high or too low
- lights that are not bright enough or that produce glare
- noises that are too loud
- jobs that put hands, arms, or backs into clumsy positions.

These kinds of problems can cause pain and injuries. Production rates and quality can go down. Part of the ergonomist's job is to suggest ways to change the work place to correct problems like these.

ergonomics (ur-go-NOM-ix): the science of fitting the job to the worker.

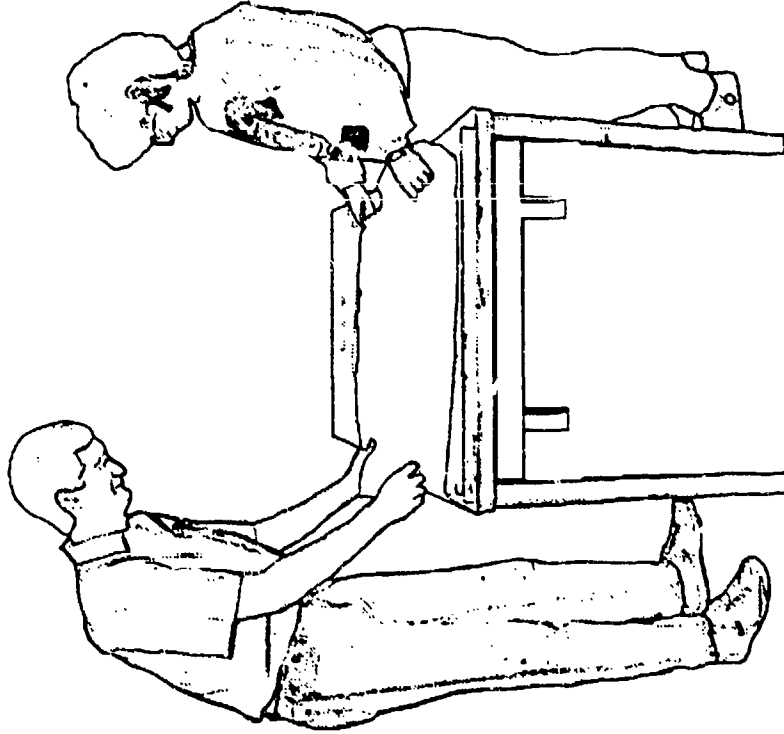
ergonomist (ur-GON-o-mist): a scientist or engineer who finds ways to fit the job to the worker.

People come in different sizes and shapes

People come in many different sizes, shapes, and strengths. There's no such thing as "one size fits all."

Think about a very big person and a very small one who use the same work station on different shifts. If the work station is the right height for the big person, it will be too high for the small one. If it's the right height for the small worker, the big worker will have to hunch over to work.

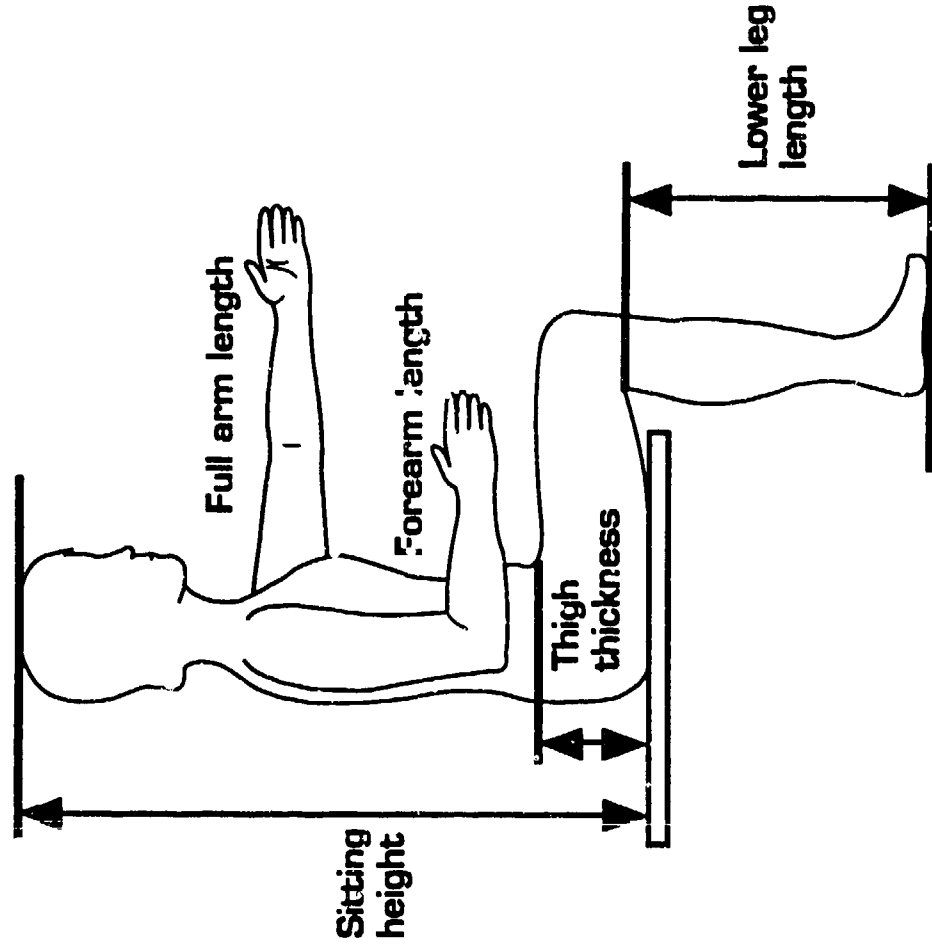
Ergonomists recommend a work station that can be adjusted easily so that almost anyone can use it comfortably.



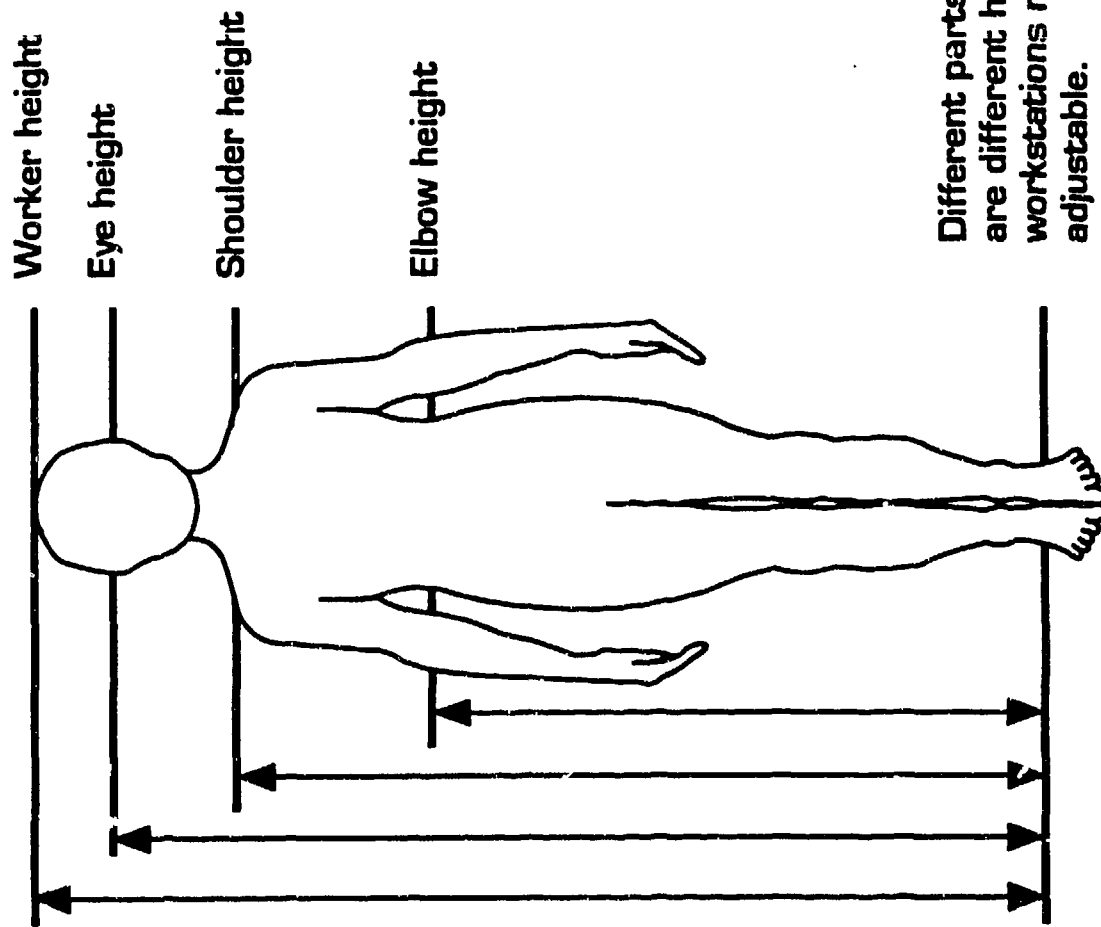
BAD: This work station is too low for both workers, especially the tall one.

The picture shows sizes of body parts that are important in the design of a work station or job for a sewing worker.

- Arm length shows how far a worker can be expected to reach. If the worker with the shortest arms can reach everything easily, other workers can too.
- Forearm length shows how far the work area should be from the worker. That's usually 14 to 16 inches.
- Thigh thickness shows how deep the space below the table needs to be for sit-down jobs. If the space is big enough to fit large thighs, smaller thighs will fit too.
- Lower leg length shows how far the seat of a chair should be from the floor. A worker should be able to adjust the chair for short legs or long legs.



These are the body parts that an apparel worker's work station needs to fit.



Different parts of workers are different heights, so workstations need to be adjustable.

- Worker height and size (how heavy or thin) show how tall and wide to make doors and openings. Most doors are built for tall, big people, so smaller or average height people can go through with no trouble.
- Shoulder height shows how high is too high for reaching and placing.
- Elbow height shows how high a work station should be. For most jobs, work should be at elbow height, whether the worker is standing or sitting down. If the work station is the right height for a tall person, a shorter person can stand on a platform to be at the right height.

Sewing workers must move their hands very quickly and precisely.

Workers who know their jobs well make as many as fifty different movements a minute with each hand.

Very fast hand and wrist movements, done repeatedly and with force, can cause tiredness, pain, weakness and injury. These problems can happen if the job is not

properly designed or if the worker has not been trained properly.

- Jobs should be designed so that workers can keep their wrists straight and use as little motion as possible while working.
- Workers should be trained to avoid using more force and movement than a job requires.

The work environment

Sewing workers use their eyes and ears—mostly their eyes—to run their machines.

They use their eyes to read instructions, to keep track of where machines, tools, parts, and work are, and to look for defects.

They use their ears to learn by talking with co-workers. They listen to their machine to tell how fast it is running and whether it is working right.

Jobs should be designed so that workers can see and hear easily.

- The plant floor needs to be well lighted.
- At the work table, light needs to shine on the work area.
- Workers must be able to see the work area without leaning or bending.
- The work area needs to be free of glare.
- Instructions must be easy to read.
- The noise level should be low enough so that workers can talk in normal voices.
- The noise level must be low enough so that workers don't lose their hearing.

The Occupational Safety and Health Administration, commonly called OSHA, is a United States government agency that protects workers' safety and health.

OSHA develops rules for industry to follow to help make the workplace safer and healthier. When a company does not follow an OSHA rule, the company is breaking the law.

If an OSHA inspector visits a company and finds that the company is not following one or more OSHA rules, the company may be given a citation and fined.

Getting an OSHA citation is like getting a speeding ticket. If you get too many tickets, or if what you did

to get the ticket is very dangerous, you have to pay a fine. If a company gets a citation, they may have to pay a fine.

Right now OSHA has no specific rules on ergonomics. So OSHA inspectors use what is called the "General Duty Clause" if they think a company's workers are in danger of pain or injury related to bad workplace design. This is a general rule stating that a company must provide a safe and healthy workplace for workers.

OSHA is working on general ergonomics guidelines for industry. Reading this book should help prepare you to follow those guidelines.

Common problems OSHA finds

Here are the most common problems OSHA may find that are related to ergonomics:

- The company did not correctly record injuries and illnesses on OSHA logs or forms.
- The workplace contains ergonomic hazards that might hurt workers.

Here are some common ergonomic hazards:

- chairs and work stations that cannot be adjusted to fit the

worker, so workers are forced to use movements or positions that may hurt them or make them uncomfortable

- tasks that make workers use their hands or arms too much, use bad posture, or use too much force
- tasks that require workers to lift heavy loads, which can cause back injuries.

OSHA inspectors have found these problems at some apparel manufacturing plants.

Why fitting the job to the worker is a good idea

Both the workers and the company gain from fitting the job to the worker.	When the job and work station are designed to fit each worker, the company gets
When the job and work station are designed to fit each worker, the worker gets	
• fewer aches and pains • fewer illnesses and injuries • more comfortable working conditions • better morale • higher productivity • less fatigue	• fewer workers missing work • fewer workers getting sick or injured • fewer worker's compensation cases • shorter training and learning periods • fewer workers quitting or changing jobs • workers doing their jobs better • fewer problems with government agencies, such as OSHA

The ergonomics team

Many companies have found that the best way to deal with ergonomics problems is as a team. You and your manager are key members of that team. If your company has engineering, maintenance, and medical departments, they're key members of the ergonomics team too. Your company might need to hire an outside ergonomist to be a temporary member of the team.



The supervisor's role

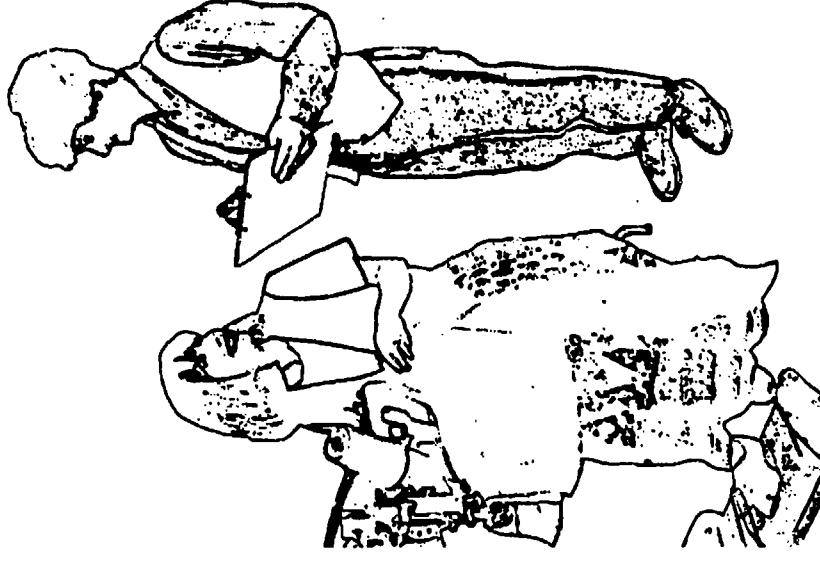
As a supervisor, you'll have several important roles to play on the team.

You're with your workers in the workplace every day. So you're the best person to identify jobs with problems that might harm your workers' safety and health. You'll also work with the ergonomics team on figuring out how to solve those problems.

Then you'll help workers make the changes needed to solve their problems. For example, suppose the solution to an ergonomics problem is to use adjustable chairs. You'll need to be sure workers are making the right adjustments and are sitting in the chairs the right way.

You're also involved in training. Training is part of the way you help your workers avoid ergonomics problems. Workers need to be trained to do their jobs the best way.

Finally, as part of your day-to-day supervision, you'll watch your workers to be sure that they keep on doing their jobs the best way. You'll help them correct risky positions. You'll check with them often to be sure that their hands and arms don't hurt. And you'll help them get medical help if they need it.



Chapter 2:

Work station design

When work stations are poorly designed, workers may have to use stressful postures for long periods at a time. Their muscles can get tired, resulting in pain and discomfort. These problems can keep workers from completing their work or doing their best work.

Painful, tired muscles can also happen when a worker

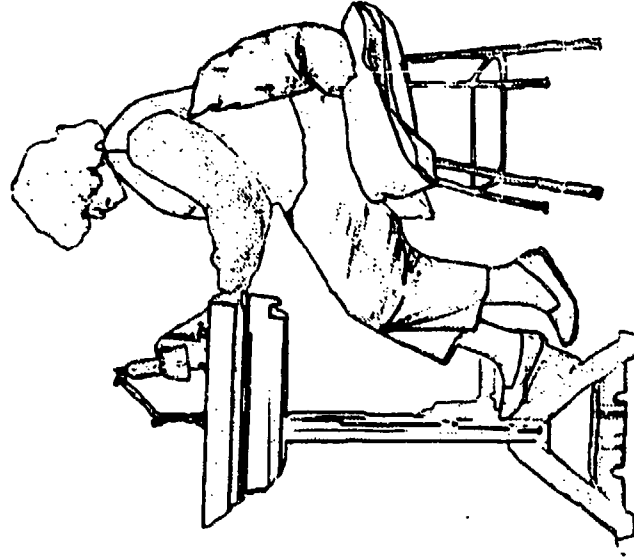
- uses a muscle or muscles too much
- does something the muscles aren't strong enough to do (for example, lifting heavy bundles).

Possible signs of muscle pain and discomfort

Watch your workers. You can

sometimes see them give signals that their muscles hurt. Some clues might be

- often rubbing or shaking a particular body part, such as the hands, arm, or neck
- often changing positions, such as shifting around in the chair
- making excuses to get away from the work
- using aids such as pillows, foam, and wrist wraps.



The parts of their bodies where workers feel muscle aches and pains can give you clues about workplace and job design problems.

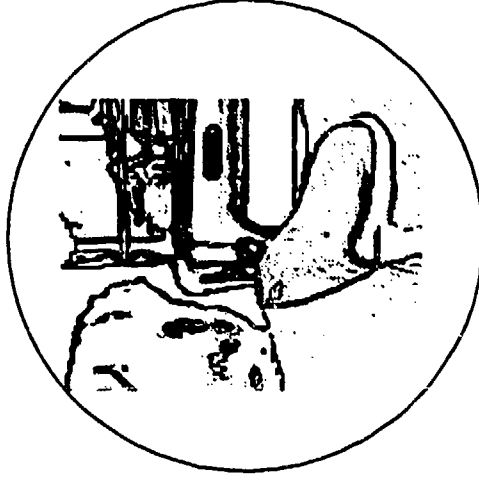
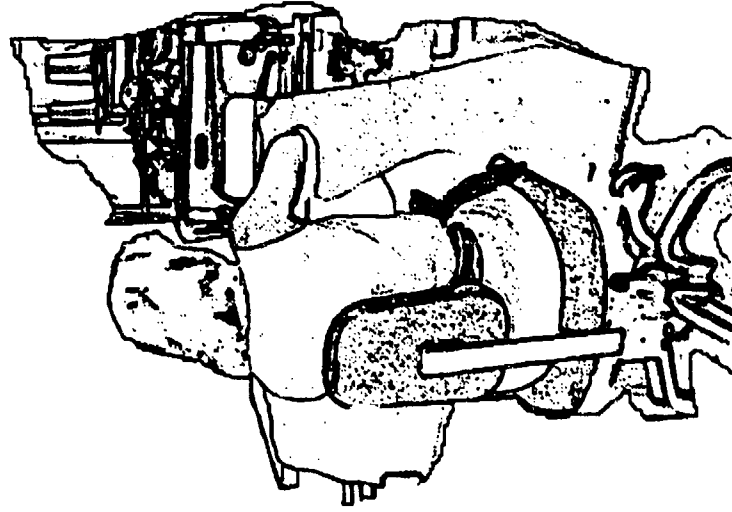
Awkward postures like those shown on the next few pages can cause muscles to tire and are often seen when workers use poor work stations and chairs.

BAD: Instead of using an adjustable, well-padded chair, this worker is using pillows to make her work station more comfortable.

Bad posture:

What hurts:

raising elbows away from the
body arms and shoulders

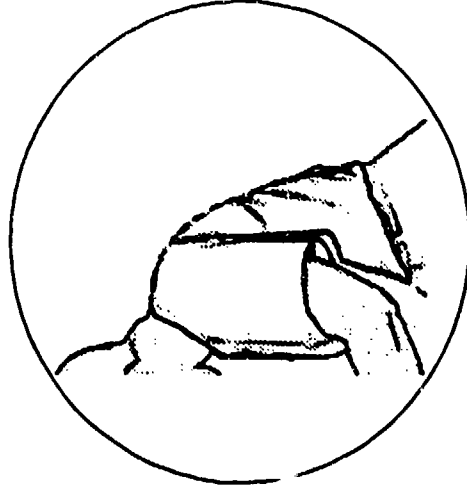
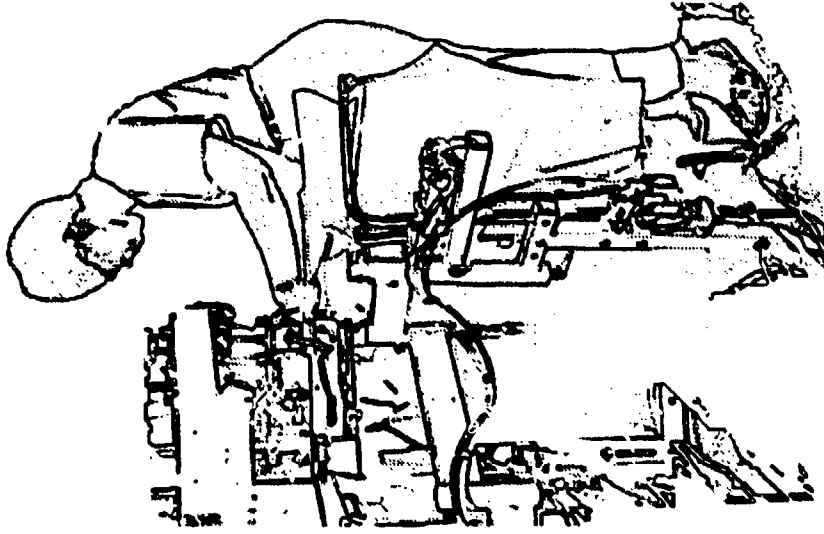


Bad posture:

bending the back

What hurts:

back, neck, and shoulders



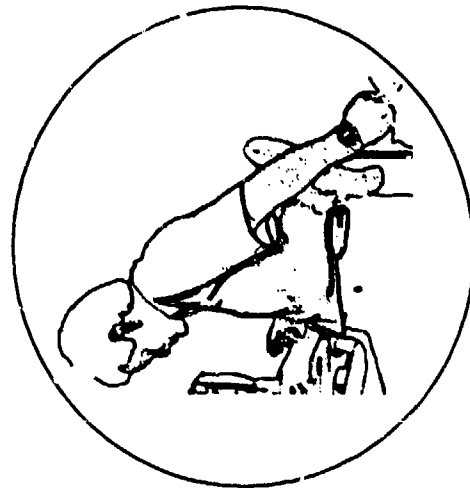
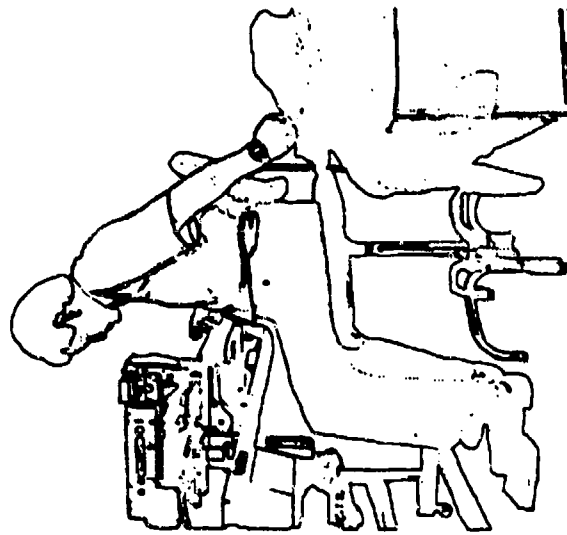
Bad posture:

reaching in front or behind



What hurts:

arms, neck, and shoulders

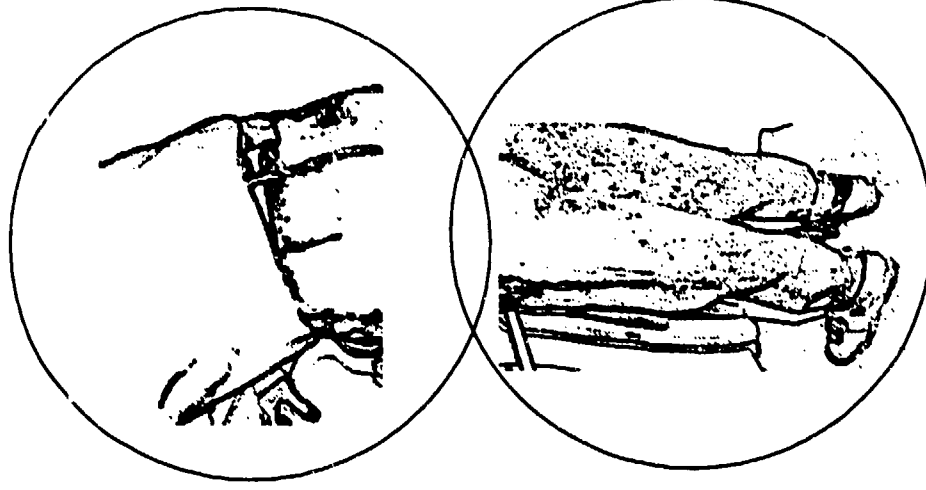
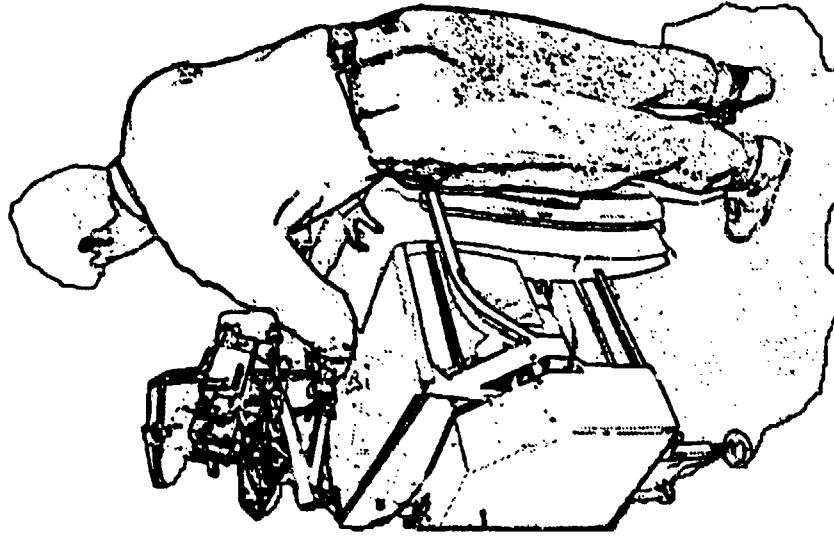


Bad posture:

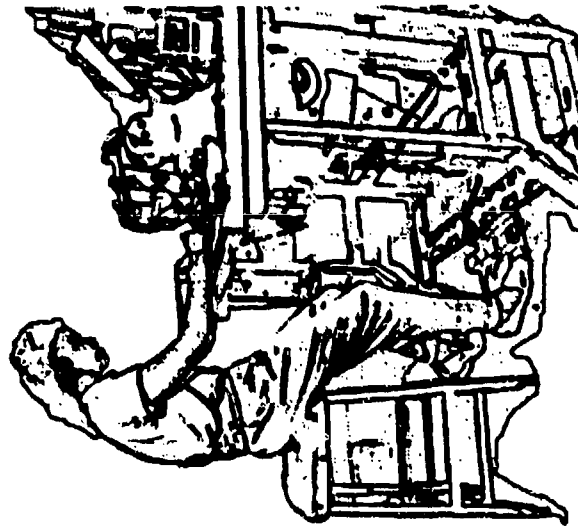
What hurts:

prolonged standing

back, legs, feet

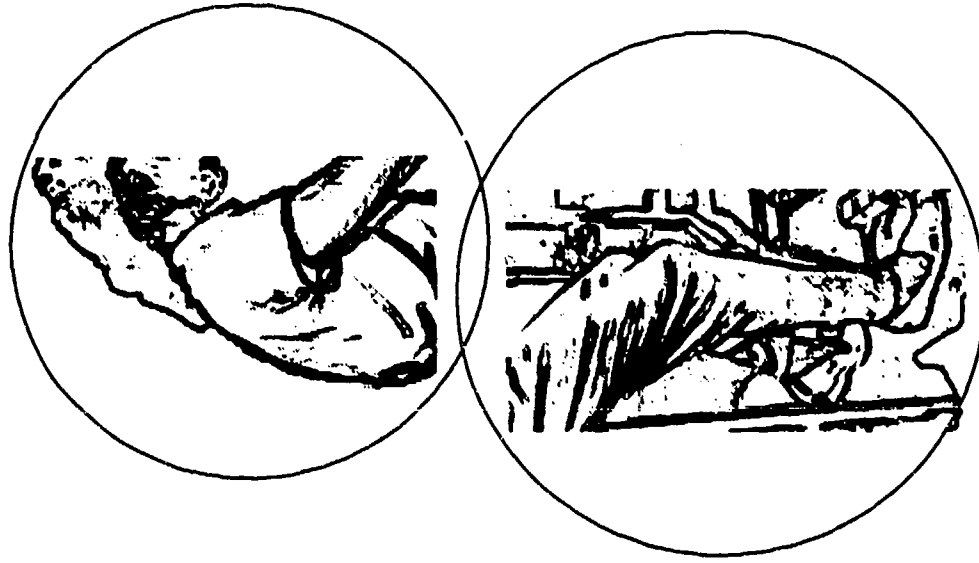


**Bad posture:
sitting wrong**



What hurts:

back, neck, shoulders, legs

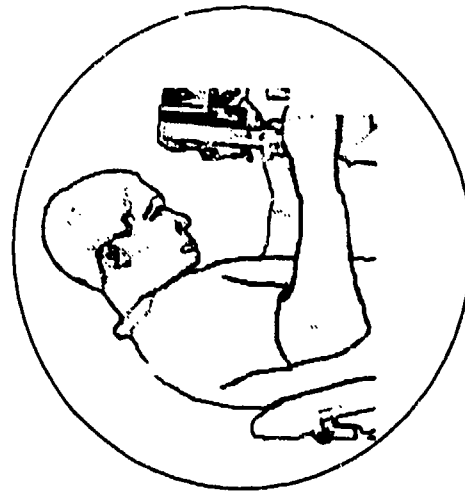
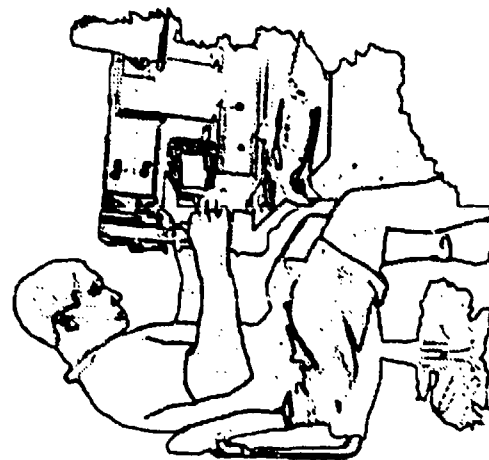


Bad posture:

tilting the head

What hurts:

neck



Using a body map

You need to talk to your workers regularly to learn about their muscle aches and pains. A body map like the one on this page can help you get the information you need from workers.

Near the end of their work shift, ask workers to use zero to four (0-4) to grade how different parts of their bodies feel.

If a worker has no pain in a particular part (say, a shoulder), write a 0 on that spot on the body map.

If the worker feels a lot of pain, write a 4 on that spot on the body map.

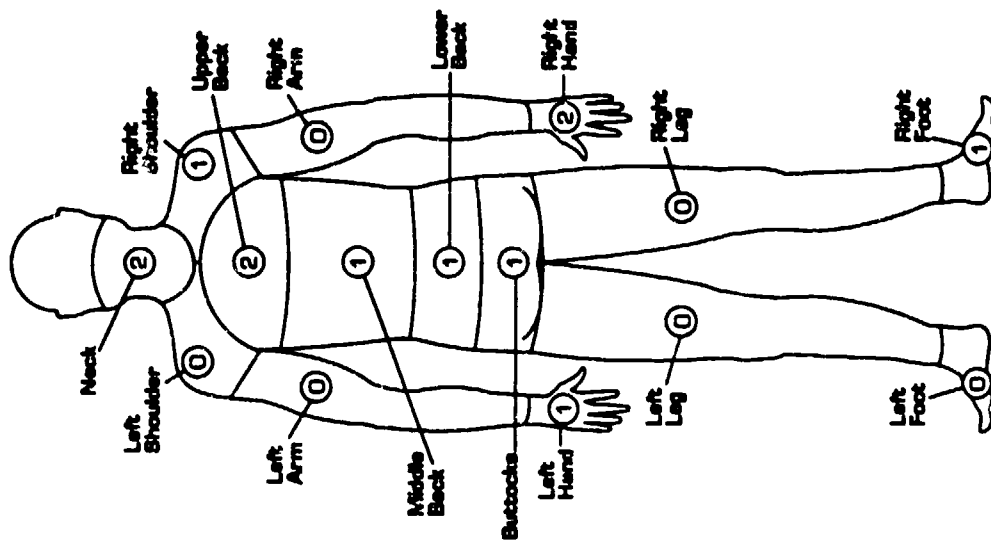
Use 1, 2, and 3 to describe discomfort that is more than none (0) but less than very painful (4). The less pain, the smaller the number.

Then, look at the numbers you've written down.

A 3 or 4 on a body part strongly suggests that a worker has a problem in that area. A 2 should alert you to begin checking on that worker's job and work station—a problem may be starting.

Make copies of the master body map on the next page. Use one each time you want to check a worker for aches and pains.

When you identify common problems (like several workers having 2 or higher in the same area) or serious problems (3s and 4s), tell your manager. If your company has an ergonomics team, share your results with them, so that together you can come up with solutions.



0	Comfortable
1	Very Little Discomfort
2	Uncomfortable
3	Painful
4	Very Painful

Body Map

Ask your workers to describe how different parts of their bodies feel. Using the numbers 0 to 4, write what they tell you in the circles.

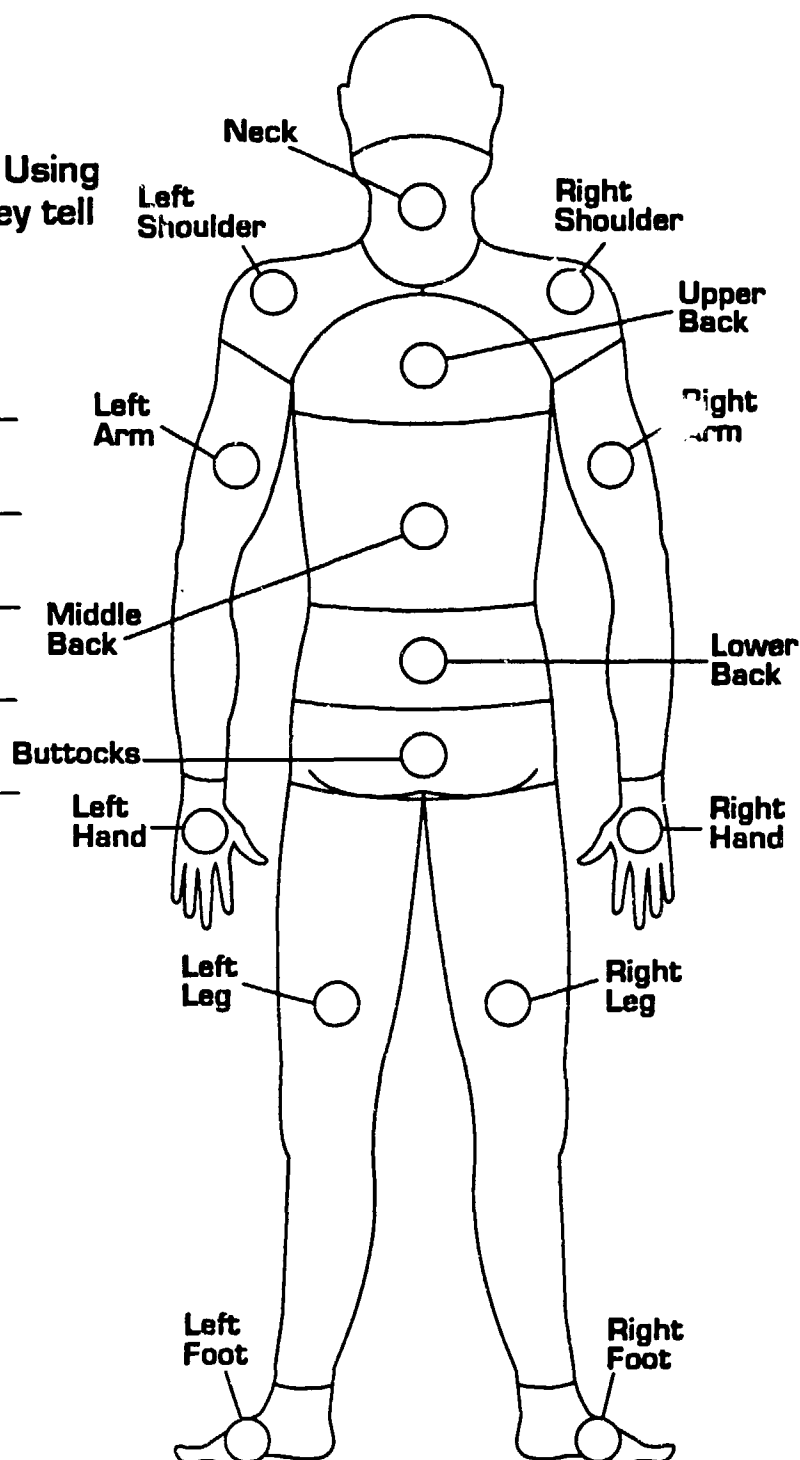
Department _____

Job _____

Your name _____

Survey date _____

Survey time _____



- | |
|----------------------------|
| 0 - Comfortable |
| 1 - Very Little Discomfort |
| 2 - Uncomfortable |
| 3 - Painful |
| 4 - Very Painful |

Some solutions are simple, like adjusting a chair. Other solutions might call for major changes that only management can make, like buying new equipment. Whatever the solution, the job must fit the worker.

Since you work directly with the people using the equipment, you need to know something about job design.

When you're looking for ways to improve the workplace, look at how all the different parts of the work station work together.

For example, your company might buy the best chairs available, but, if the treadle is too close to the worker or if the table is too low, the worker will still have problems.

Different kinds of jobs require different types of work stations.

Some jobs require a lot of movement, reaching, and force. For jobs like these, it may be better for workers to stand rather than sit.

Whether the worker is sitting or standing, work should be close to elbow height.

Some jobs require very precise work that is done over and over. For these kinds of jobs, sitting may be better than standing.

Both standing and sitting can cause muscle aches and pains if the work station is not well designed, especially if the worker doesn't move around much throughout the work shift.

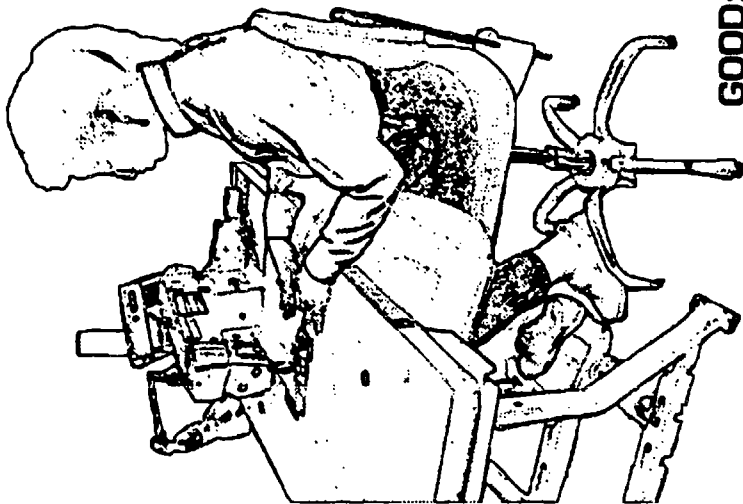
In fact, what's best is a job that allows workers to switch back and forth between sitting and standing. Working this way allows workers to move and use different muscles.

Whether they work sitting or standing, workers should be able to work with their elbows down and close to the body most of the time. To allow them to do this, each worker's machine table or work area should be adjusted to the correct height for that worker. For most work, this is between elbow height and two inches below elbow height.

If the work is too much below elbow height, workers will have to stoop forward to reach their work.

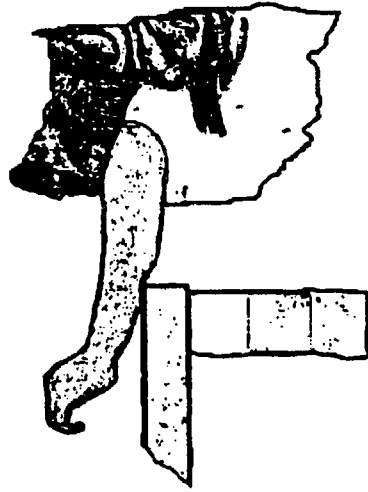
Very precise work that is hard to see should be two to four inches above elbow height. But working at this height might mean that workers have to work with their elbows raised, which can make their shoulders and forearms uncomfortable. To help avoid problems like this, raised elbows should be supported with padded elbow rests.

Materials and work should be located within 14 to 16 inches of the worker (the length of a short forearm), so that workers don't have to do much reaching with extended arms.



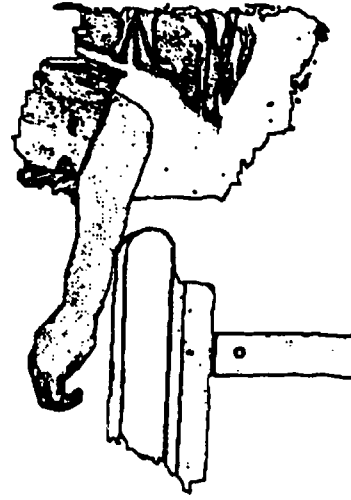
GOOD: This worker is working at elbow height. Her arms are bent close to her body and her work is close enough but not too close.

BAD: Worker's arm pressing against a sharp edge



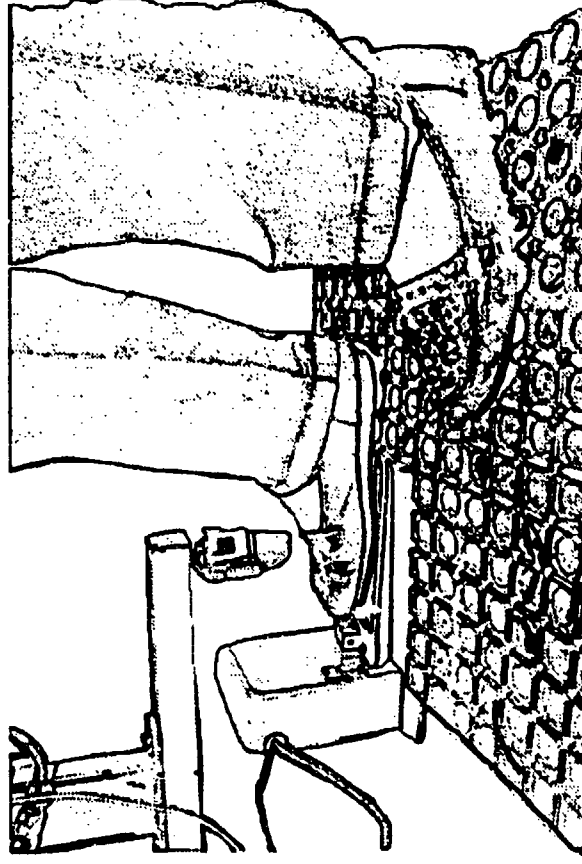
When workers rest their arms on work stations or tables that have sharp edges, blood flow to the muscles can be cut off, causing pain and discomfort.

GOOD: Worker's arm pressing against a rounded edge



To help keep these problems from happening, work-station or table edges should be rounded or padded.

Standing on hard floors can make workers' feet and legs uncomfortable. One way to make workers more comfortable is to have them stand on anti-stress mats. A mat helps spread out a worker's weight more evenly on both feet.



GOOD: An anti-stress mat makes standing less of a strain.

Foot rails or foot rests that can be adjusted can help workers to rest first one foot, then the other. But a foot rest shouldn't be used if it makes workers stand too far from their work, because that could make a worker lean forward to reach the work. Foot rests are also not good if a standing worker uses a foot control or treadle.

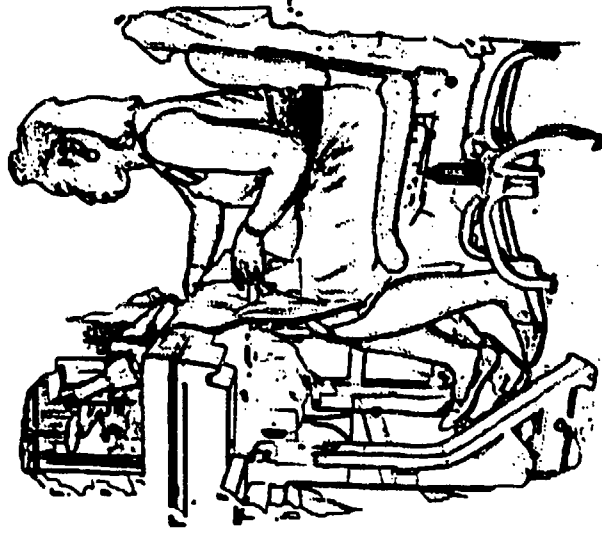


GOOD: Using a foot rest can take stress off a worker's back and legs.

Working sitting down can be more stressful than standing. In fact, seated workers whose work stations are poorly designed may be more likely to have problems with their backs, necks, and shoulders than standing workers doing the same kind of work. Here are some possible reasons:

- Workers' chairs are poorly designed or adjusted. If workers are using pillows and pads, they may be telling you they have chair problems.

- The work table or machine is too high or too low.
- The treadle is too close or too far away.
- The work area layout is poor. Trucks, horses, and bundles are hard to reach.
- The work area or worker may have other problems, including poor lighting and work that's hard to see.



BAD: This worker's table is too high and too far away.

Chairs

Ligaments connect muscles to bones. Discs act as spacers, cushioning and supporting spine bones.

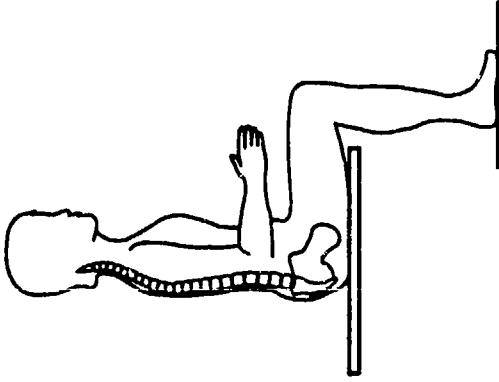
Discs and ligaments are often what get hurt in back injuries.

When workers sit in a seat that doesn't have a good backrest, their back muscles tire quickly and they slump forward to relieve them. This slumped posture puts stress on the ligaments that help to hold the spine in place and on the discs between the bones in the spine.

A well-designed chair helps a worker to have good seated work posture. On the next couple of pages are some things you want a chair to do.

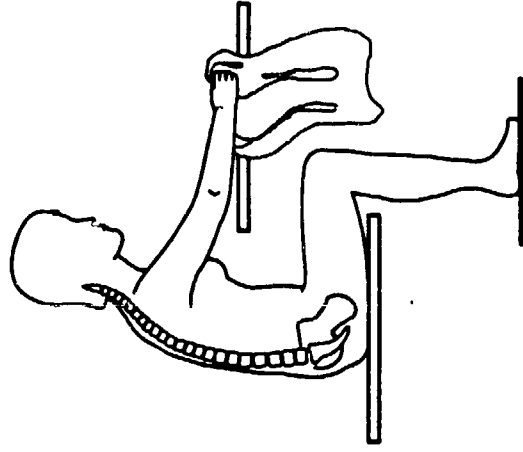
- Maintain the natural posture of the worker's spine.

When viewed from the side, the spine should make an S curve .

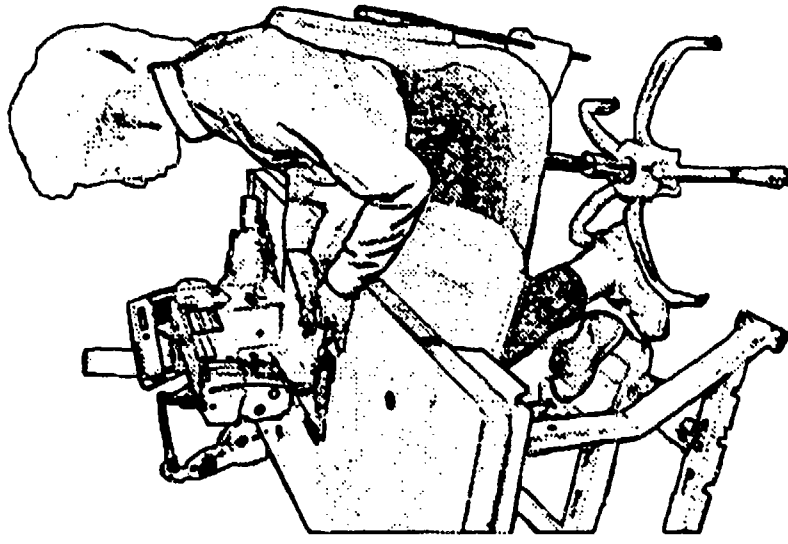


GOOD sitting posture

It should not curve like a C, as it does when a person slumps forward.



BAD sitting posture



GOOD: This well-designed chair is at the right height, so the worker's posture is good.

The person sitting in the chair is more likely to use good posture when the chair has a well-designed, padded backrest, and the seat tilts forward slightly.

- Avoid pressing unevenly on the buttocks and thighs.

A cushioned seat distributes the worker's weight so that no body part gets all the pressure. Chairs with a gently sloped or "waterfall" front edge also help prevent the chair's edge from pressing into the thighs.

Having a chair with this kind of design is especially important for

a worker who uses a treadle or pedals, because this worker's legs may have to be stretched out.

- Provide proper support for the worker's legs to avoid putting strain on them.

To provide proper support, the seat needs to be adjusted to the proper height.

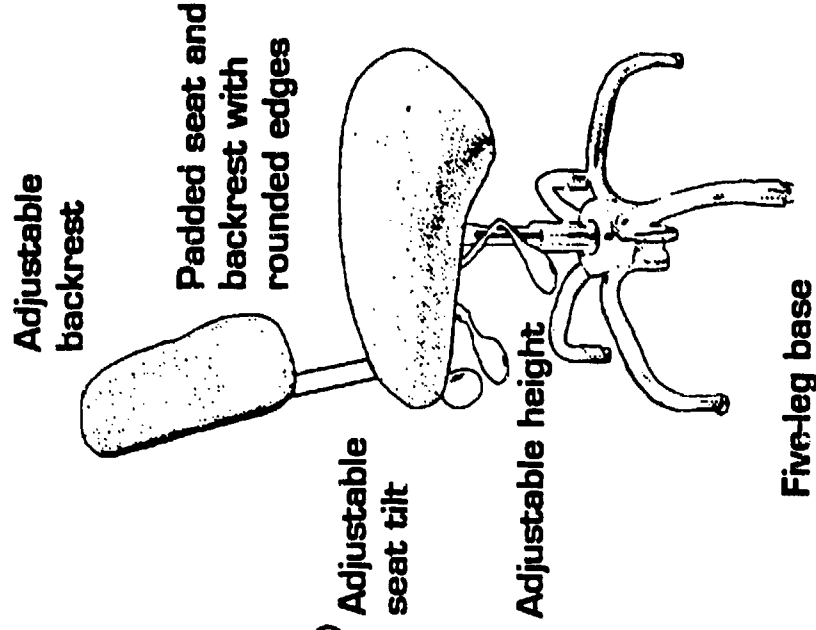
The proper height for chairs is one to two inches lower than the distance from the crease at the back of the worker's knee to the floor. The seat may be slightly lower when the worker uses a treadle or pedal.

If your workers are having chair-related problems, there are two ways to help.

The first is to adjust the chairs you already have, if you can. Make sure the height is right for the worker who is using it. If workers rotate jobs, each chair should be adjusted every time a new worker uses it.

Second, your company's management may decide to buy new chairs. You can help by knowing the important chair features to look for:

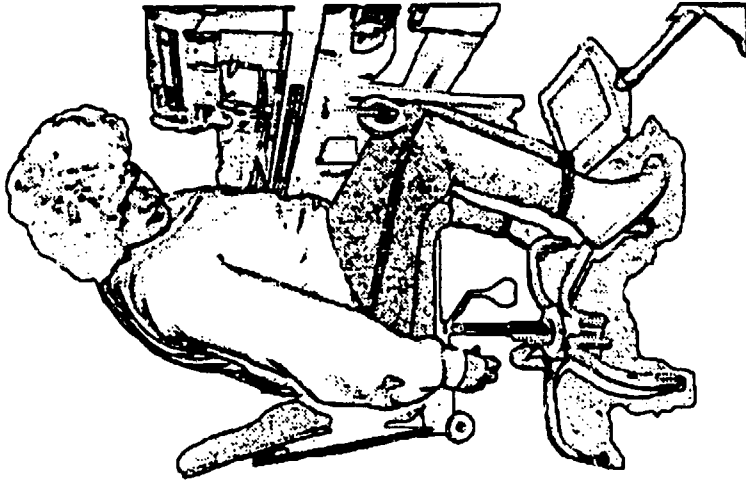
- adjustable height, seat tilt, and backrest position
- padded seat and backrest with rounded edges.
- easily adjusted (if it's hard to adjust, workers won't adjust it!)
- five-leg base for stability.



Some other chair features to look for are:

- Ability to swivel. Seats that turn while the base of the chair stays in place are good, because they allow workers to turn to get bundles and pieces, rather than twisting to reach to the side or behind. Swiveling can also make it easier for workers to sit down and get up from the work station.
- Seat shape. Very curved seats are bad, because these kinds of seats may not fit everyone.
- Texture of seat material. Rough texture is good, because this can help keep workers from accidentally sliding in the chair.

-
- **Wheels.** Having wheels on the chair is good, because they can help the worker reach different parts of the work station more easily. But unless wheels can be locked, they should not be used at work stations with treadles or pedals.
 - **Arm rests.** Arm rests are good, because workers can use them to rest their elbows while doing close work that is above elbow height. But arm rests should not be used if they are going to get in the worker's way.
- If a worker is very small, the chair may be too high even after you've made all the adjustments you can. The worker's feet may not be able to rest firmly on the floor. If that's the case, give that worker needed leg support by adding a footrest to the work station.



GOOD: This worker is adjusting her chair down to the right height.

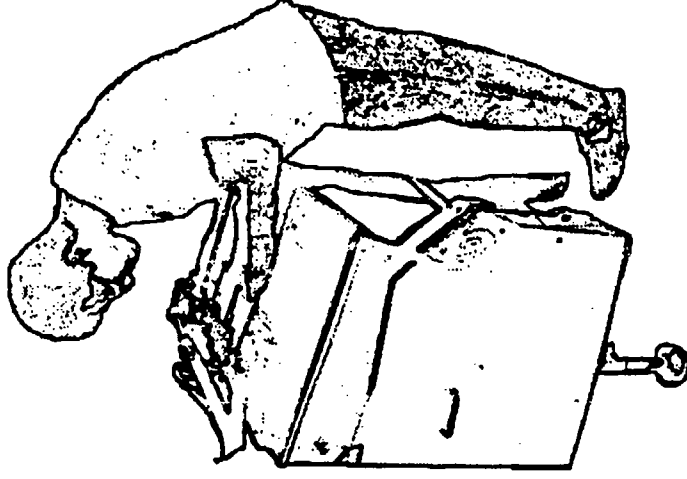
When workers get new chairs, they must learn how to use them properly. They need to be trained on how to adjust their chairs to fit their bodies. As the supervisor, you should be sure that workers know how to use all the adjustments.

Workers may need a few days to get used to sitting on well-designed chairs. The chairs will probably feel strange at first.

Once in a while, a worker will be unable to get used to a new chair, even when it is properly adjusted. After trying a new chair for two weeks, a worker who wants to go back to using the old chair should be allowed to do it.

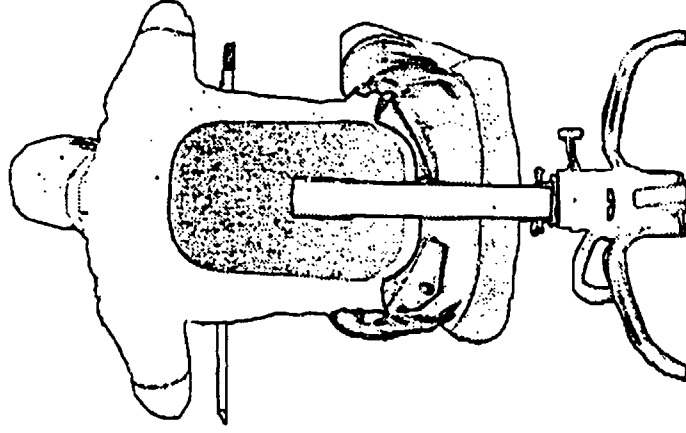
Tables should be adjusted so that workers can work at or near elbow height.

If the table is too low, workers will have to hunch forward, both to reach the work and to see it more clearly. This position puts strain on backs, necks, and shoulders.

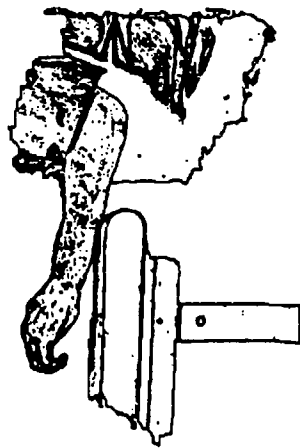


BAD: Worker must hunch over to see work

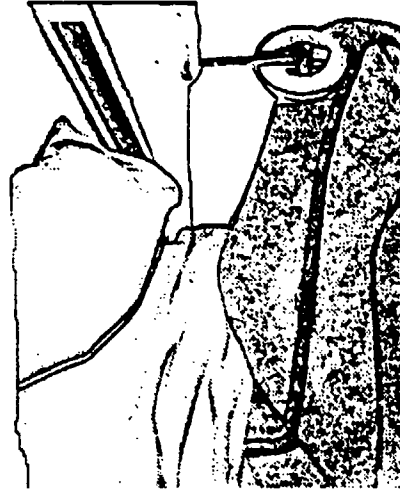
If a table is too high, workers will have to raise their shoulders to get their arms high enough to work. This posture tires the neck, shoulder, and upper back muscles and results in muscle pain.



BAD: Because his work surface is too high, this worker has to raise his elbows and shoulders.

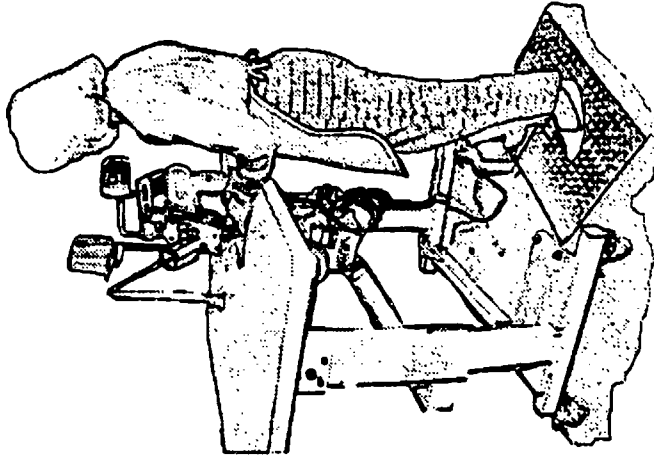


Edges of work surfaces should be rounded or padded, so that workers can rest their arms against them without cutting off blood circulation and possibly hurting arms or hands.



For sit-down work, the table should also be high enough to allow room underneath for the worker's legs. The table top should never press on a worker's thighs. Workers who use a treadle need more room than those who don't, so they can move their legs easily.

If a table is designed so that it can be tilted, tilting the machine toward the worker may help the worker see the garment better, may improve the worker's neck and back posture, and may reduce how far the worker has to reach to the needle.

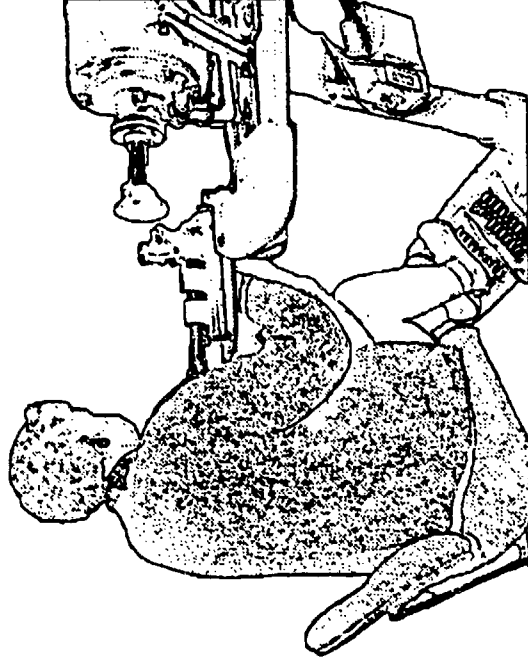


GOOD: This table tilts to put the machine in a better position for the worker.

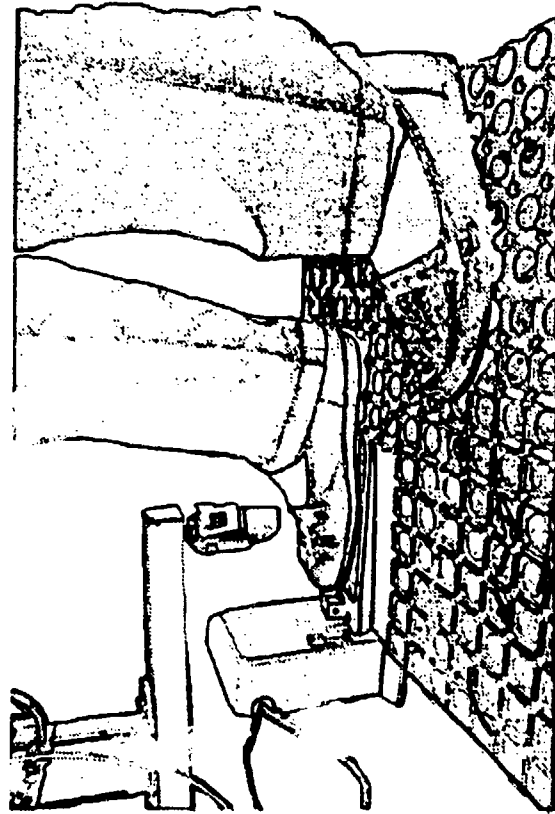
Treadle placement may be another reason for poor sitting posture.

When the treadle is too close to the front edge of the table, the worker has to sit back and away from the table. This puts the worker farther away from the needle and makes the worker slump or hunch forward to reach the work area.

The treadle should be placed so that the worker can get as close to the table as possible. A mechanical treadle that stays in one place can often be moved with the aid of tools. However, if different workers use one work station, or if a worker at this kind of work station is having a hard time reaching the needle, you might suggest to your manager to change the foot control from a fixed treadle to a moveable, electronic pedal.



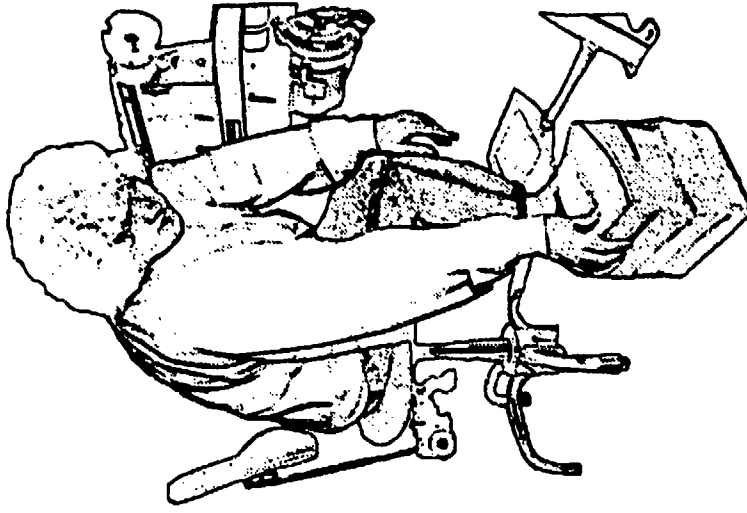
BAD: Because this worker's treadle is too close to the front of the table, so she has to hunch forward to reach her work.



For standing work, it's best not to use foot controls. But if foot controls are used at a standing work station, they should be level with the floor and should work with little force. Foot controls should also be fitted with guards, so that the equipment they run can't be started up accidentally.

GOOD: This foot control is level with the floor and has a guard.

Picking up heavy loads and twisting, turning, and bending to reach can cause muscle strains and sprains. For example, reaching at arm's length to pick up a bundle can stress the back and shoulder muscles, especially if the worker has to reach down often. This kind of stress might also irritate nerves in the shoulder.



BAD: Twisting and bending can hurt a worker's back and shoulders

Handling materials

Work Station Guidelines

- Workers should be able to work with the elbows down, close to the body.
- Workers should have to reach no farther than 16 inches to the front.
- Workers should be able to rest their arms, but not against sharp edges.
- Workers should not have to twist or bend to pick up and put down objects such as garment bundles.
- Workers should not have to reach behind themselves.
- Where possible, the work should be designed so that workers change between sitting and standing throughout the work day.

To keep workers from having to do stressful reaching, place trucks and horses so that the bundles are at table height and are within 14 to 16 inches of the worker. The material a seated worker picks up at one time should be as light weight as possible.

Here are some things your company can do to avoid material handling problems.

- Keep objects at the same level as the work surface, so that they don't have to be lifted.
- Use carts or trucks to move materials.
- Keep bundles as light weight as possible.
- Check wheels and casters regularly to make sure they are not damaged. If they are damaged, have the maintenance department repair or replace them.

Chapter 3: What are CTDs?

In the apparel manufacturing industry, repetitive motion is a fact of life. Many jobs require workers to do the same hand and arm movements over and over. But sometimes repetitive motion can hurt workers. This is especially true when

- the motion includes using too much force with hands, such as pinching, holding, or pulling
- the worker is working in a cramped or unnatural position, such as holding elbows too high or reaching back
- the worker must constantly press arms or hands against a sharp-edged work surface
- the machine or tool vibrates.

Cumulative means building up over time.

Trauma means pain or injury.

Disorder means sickness.

At first, workers may need only to rest for a few minutes to make the pain or tiredness caused by harmful repetitive motion go away. But eventually, they may develop more serious problems.

In this book, these kinds of problems are called CTDs (short for Cumulative Trauma Disorders).

Another common name for them is Repetitive Motion Disorders (RMDs), because they are the kinds of sicknesses some workers can get

from doing repetitive movements in a harmful way.

You can help your workers avoid getting CTDs by knowing what positions and movements are likely to put them at risk of getting CTDs. You also need to know what positions or movements workers should use to avoid getting CTDs.

On the next few pages are some positions that can put a worker at risk of getting CTDs. Remember, these positions are most likely to cause problems if the worker does them often and for long periods of time. Next to each risky position is the ideal position. Workers may not be able to use the ideal positions all the time, but workers should know what they are and try to use them.

Not all workers get CTDs, even when their jobs expose them to CTD risk factors. And some workers get CTDs because of things that are not related to their jobs:

- hobbies, such as tennis, knitting, or gardening
- some medicines, such as birth control pills
- some diseases, such as thyroid disorders, diabetes, high blood pressure, and arthritis.

A movement or position that can put a worker at risk of getting a CTD is called a **risk factor**.

Risky position

Ideal position

- Bending the wrist up



- Bending the wrist down



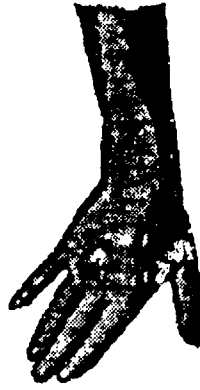
- Holding the wrist straight



Risky position

Ideal position

- Bending the wrist away from the thumb



- Bending the wrist toward the thumb



- Holding the wrist straight



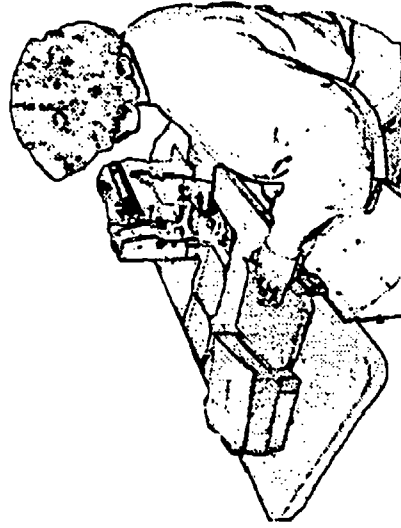
Risky position

- Reaching forward with one or both arms stretched out



Ideal position

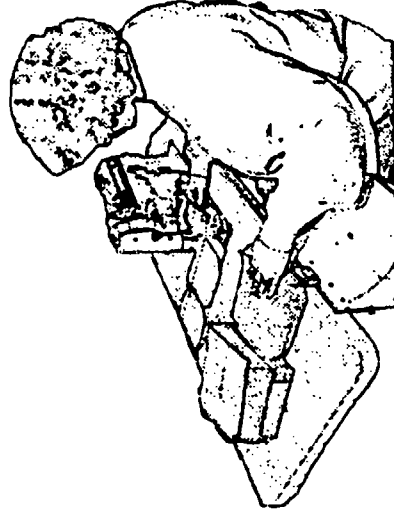
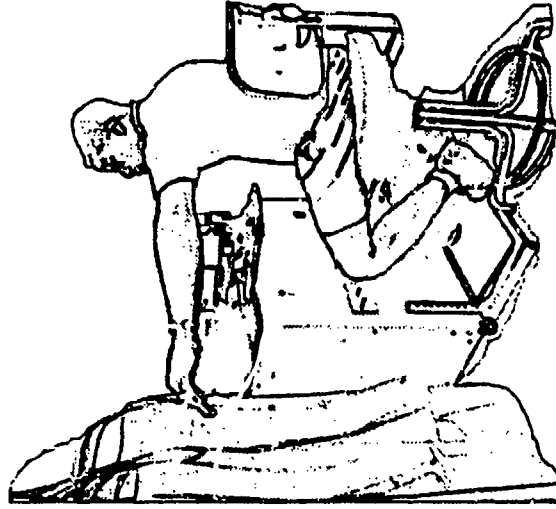
- Putting work closer



Risky position

Ideal position

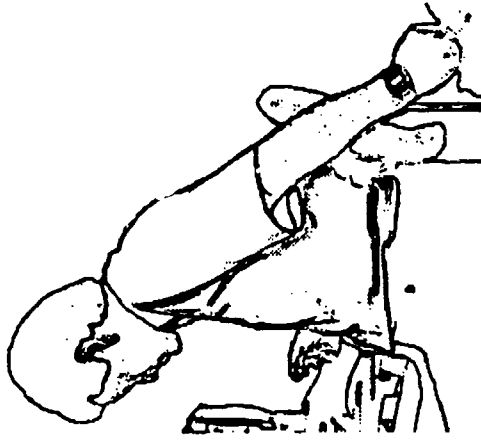
- Reaching to the side with one or both arms stretched out



- Putting work closer

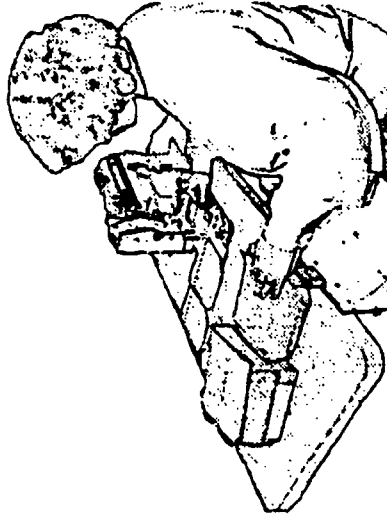
Risky position

- Reaching behind



Ideal position

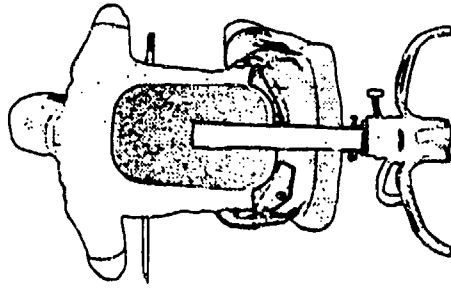
- Putting work to the side or in front



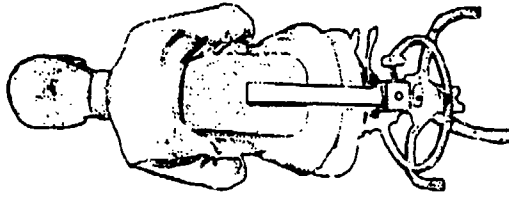
Risk, position

Ideal position

- Raising the elbows away from the body

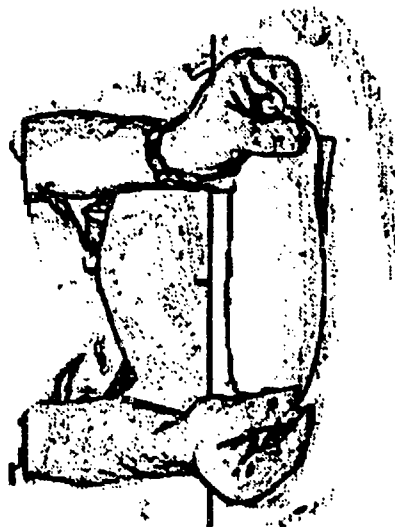


- Holding the elbows close to the body



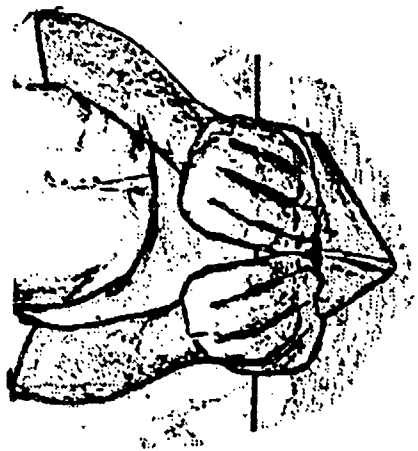
Risky position

- Turning the lower arm between palm up and palm down



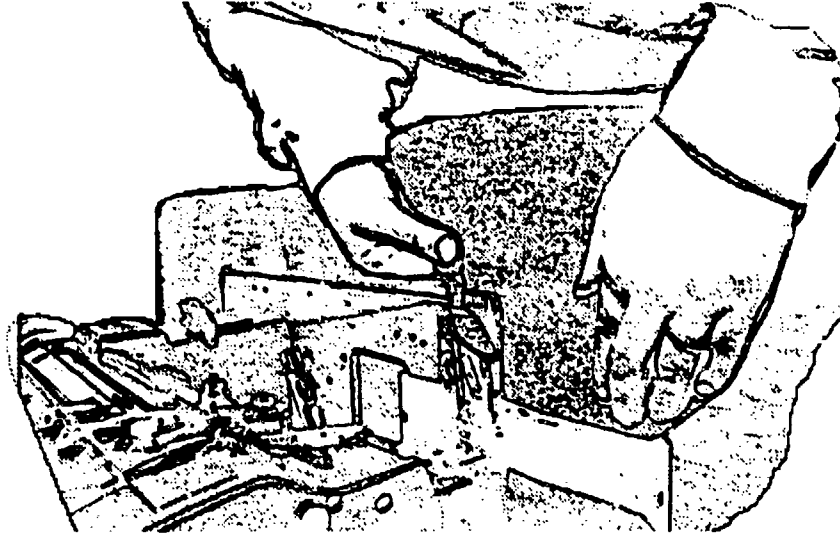
Ideal position

- Using as much arm movement as possible
- Using a clamp, guide, or machine instead of arms and hands



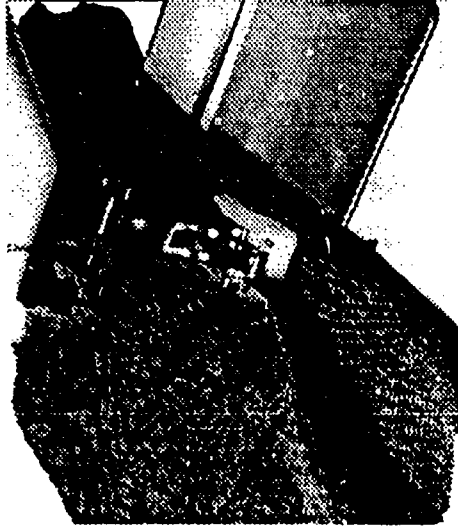
Risky position

- Pinching and using force



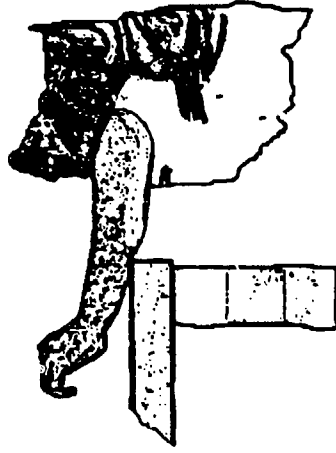
Ideal position

- Using as little force as possible
- Using a clamp, guide, or fixture instead of hands



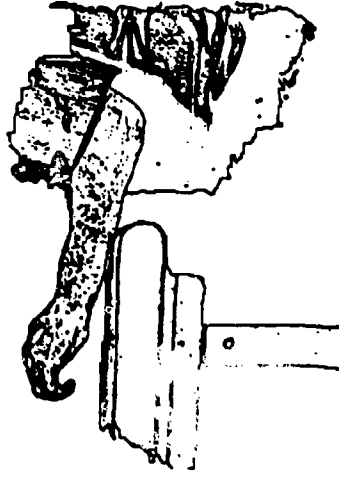
Risky position

- Leaning against sharp edges



Ideal position

- Rounding the edges of work surfaces



What gets hurt when a worker gets a CTD?

Tendons connect muscles to bones.

A tendon or the cover that protects it can get hurt when a worker works in a position that cramps body parts, especially hands or arms.

A worker who has hurt a tendon or its cover might have one or more of the following symptoms:

- sharp or dull pain
- burning feeling
- swelling
- crackling or popping sounds when the part that's hurt moves
- loss of some or all use of the part that's hurt

A common tendon disorder is **tendinitis** (ten-dun-ITE-us).

One kind of disorder of the tendon cover is called **tenosynovitis** (TEN-o-sin-uh-VITE-us).

Tendinitis in the elbow is called **epicondylitis** (ep-i-con-duh-LITE-us) or tennis elbow.

Tendinitis in the thumb is called **De Quervain's** (de-ker-VANZ) disease.

When the index finger tendon is hurt from being used too much, the injury is called **trigger finger**.

When the tendons inside the wrist swell and press a nerve, carpal tunnel syndrome can result.

Workers can also hurt nerves. There are two kinds of nerves: sensory and motor. Sensory nerves are the messengers from all parts of your body that tell your brain to see, hear, taste, smell, and touch. Motor nerves send messages from the brain to the muscles that make your muscles work.

One of the most common nerve disorders is called carpal tunnel syndrome.

As the nerves of the hand pass through the wrist, they must share the small amount of space with the tendons and blood vessels. If the tendons swell, they can press on the nerves and can, in time, damage them.

A worker who is starting to get carpal tunnel syndrome might feel these hand problems:

- pain
- numbness
- burning feeling

Because the first signs happen at night, workers might not link the pain with their work. As the disease gets worse, the signs start to happen during the day, too. After a while, if left untreated, the thumb might stop working and the hand might not be able to sweat.

You need to help your workers tell you about problems that might be signs of CTDs. Watch your workers to see if they give you any clues, like rubbing their hands or the other signs listed in Chapter 2.

- Do they rub or stretch their hands or wrists?
- Do they stretch and rub their necks or shoulders?
- Do they shake their hands?

Even if you don't see signs of pain or discomfort, ask your workers if they're having any pain. Be open to listening to them if they complain.

- Do they seem to be taking more breaks than usual?
- Do they put elastic bandages around their wrists?
- Have they made any changes to their tools or work stations, such as using pillows or pads?

A bump in the cover that protects a tendon is called a ganglion cyst (GAN-gee-on SIST). It often forms on the top or bottom of the hand or wrist.

Pressure on nerves in the shoulder is sometimes called thoracic outlet syndrome (thor-ASS-ick OUT-let SIN-drome). This disorder causes the fingers to get numb. The arm may feel like it's "going to sleep."

If workers are having any problems that might be signs of CTDs, it's your job to make sure they go to your company's medical or personnel department so that they can get prompt treatment if necessary. A doctor, or a nurse working with a doctor, must diagnose and treat CTDs.

Usually a doctor will prescribe medicine and rest or temporary change of duties. Your company may move a worker into a job that doesn't require as much strength or use of the hands until the worker is completely well. This is called light or restricted duty.

Sometimes workers don't get completely well with this kind of treatment, especially if they didn't get treatment early enough. Then the doctor may recommend surgery.

When workers are having pain in their hands, arms, or other body parts, it's important for them to be treated early, so that they're less likely to need surgery. That is why you should check with workers regularly to see if they are having any problems that might be related to CTDs.

Solutions to CTD problems

In order to reduce the risk of CTDs or find ways to help workers who have CTDs, you and your manager will need to make a plan. If your company has an ergonomics team, the whole team should work on the plan.

Your role in helping protect workers is a key one. You're the person who sees your workers working every day. You know what jobs they are doing and how they do them. So you're the right person to spot the problems.

First, you might find it helpful to answer these questions:

- Which jobs do people who get CTDs do? Your company's human resources department and medical department keep these records and may be able to give you this information.
- In which jobs do workers complain the most, miss work, and make excuses to get away from the work?
- Does the job include any of the risk factors of CTDs? You could use a check-list like the one at the end of this chapter to help you decide.

Remember, some of the risk factors for CTDs are

- doing a movement repeatedly
- using too much force to do a movement
- working in an awkward position
- pressing arms and hands on sharp edges
- using a tool that vibrates

Controlling CTD risk factors

Once you've identified a job that is causing problems, talk to your manager and the ergonomics team. It might be possible to change the equipment or the way the task is done to get rid of the risky position.

You have an important role in preventing and controlling CTDs. Your role is to help your company's management and engineering department as much as possible. You'll help them make the changes they decide are needed. You'll help make sure the changes are used and work properly.

Because of your important role, you need to know what methods are commonly used in the apparel industry to control CTDs.

To control or get rid of CTD risk factors, your company will need to use three methods:

- job design
- medical monitoring
- training

The best method is to redesign the job or the tools so that the worker doesn't have to do a risky job or so that the worker can use a better posture and less force and repetition.

Watching and checking workers to catch medical problems early, before they get too serious, can do a lot to control CTD problems.

Training is also a key part of any program to control and prevent CTDs.

Teaching and training should never be the *only* ways you deal with CTD risk factors. They should be used to support changes to the work and tools.

Sometimes the work can be redesigned to stop workers from using force, doing movements over and over, or using awkward positions.

more natural positions.

- The handles of scissors, clippers, irons, trimmers, and cutters should be shaped so that the worker can use a straight wrist.

Here are some ways that have been tried.

- A tool's handle should be long enough so that its end doesn't cut into the worker's palm.

- Clamps and guides might help take the place of a worker's hands to hold, guide, or stretch the garment a worker is sewing.

- Cutting tools such as scissors need to be sharp. Dull tools can make a worker use too much force to make a cut.

- Machines can sometimes help workers by doing parts of a job that can cause pain.

- Tools and equipment should be kept from vibrating. By following the manufacturer's

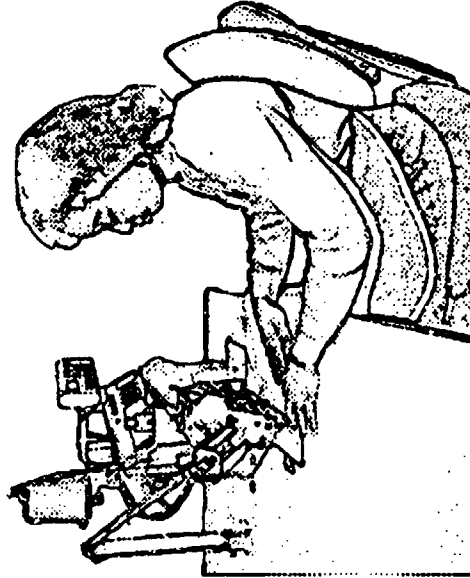
- Tilting the table might help cut down on the amount a worker uses a bent wrist.

- maintenance recommendations, you may be able to prevent or reduce vibration. If not, your company will have to ask the manufacturer for advice.

- Sitting in properly designed chairs allows workers to use

Helping workers avoid CTDs

Your role in teaching and training your workers is an important part of controlling CTDs. Having a properly designed work station and tools is not enough. Workers must learn how to use them properly. For example, it doesn't help workers to have chairs with proper back rests if the workers don't sit with their backs against the rests.



BAD: This worker is not using her well-designed chair properly. She's using a pillow instead of adjusting the backrest.

Workers need to know the risk factors for CTDs. Remember, they are

- doing a harmful movement over and over
- using force
- working in an awkward position
- pressing on sharp edges
- working with a tool that vibrates.

If workers know the risk factors, they can avoid movements and actions that can hurt them.

Learning to spot signs and symptoms of CTDs

Part of your job is to teach your workers to use smooth movements and to use as little force and repetition as they can. And you need to keep an eye on them every day so that you can spot bad work practices early and correct them before the workers get hurt.

Training is particularly important for workers who don't know a job well yet. These workers often use more force and motion than is needed to

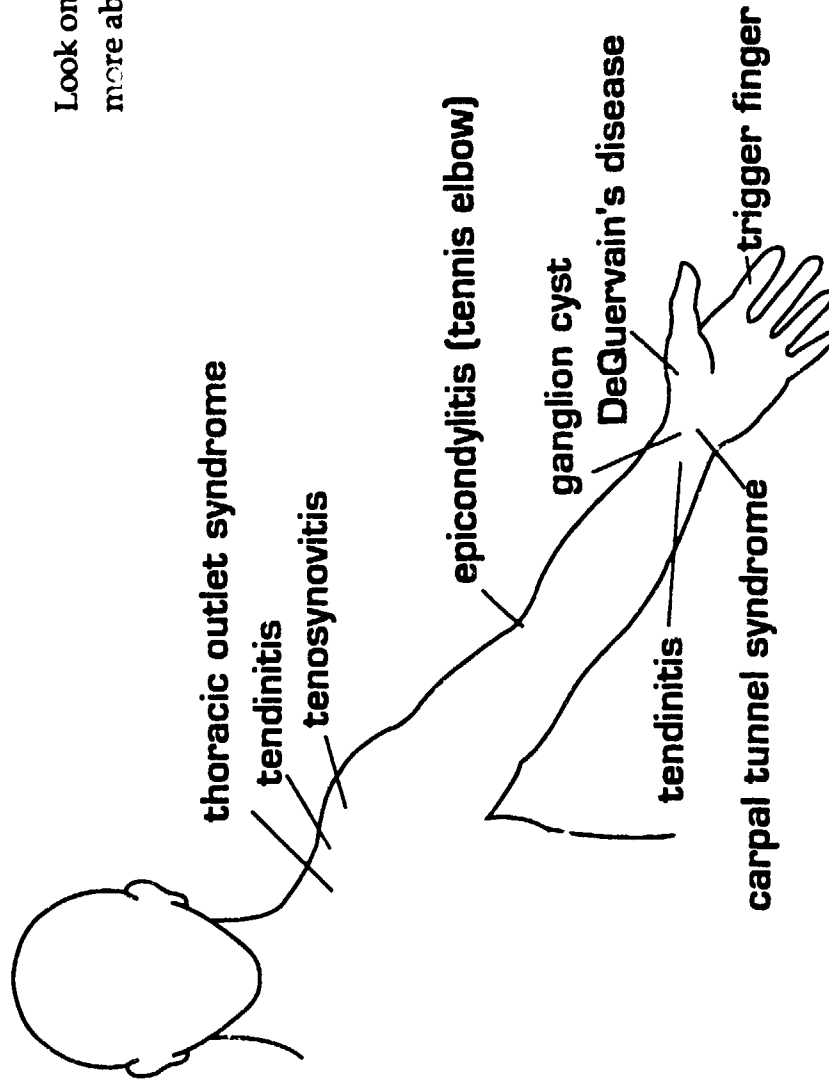
do a task. They need to be trained to do the work properly before they are put under the pressure of doing piece work.

Workers need to know the signs and symptoms of CTDs. That way, if they have a problem, they can report it right away. Then, they can be treated quickly, so that the CTD doesn't get any worse.

CTDs and where they hurt

This upper-body map shows which CTDs hurt which parts of the body.

Look on pages 59, 60, and 61 to learn more about these disorders.



Some supervisors worry that telling workers about CTDs will "give them ideas." They fear that some workers will pretend to have a CTD.

Of course, that could happen. But a much bigger danger is that you may not find out about a CTD until it's too late to help the worker easily.

If you talk frankly to your workers about CTDs, you can be sure they learn the facts. They're probably hearing about CTDs anyhow, in the news and from co-workers. You can help keep them from being scared by half-truths and wrong information.

Besides making ergonomic changes and training workers, some companies use job rotation to help reduce CTDs.

Cutting back the amount of time a worker spends at a risky job lets workers use different muscles and gives their bodies a short rest while they change tasks. For job rotation to work, the worker must be able to switch between jobs that require the worker to use very different strengths and body parts.

With or without job rotation, you should encourage workers to take brief breaks now and then to relax their arms and hands.

RISK CHECKLIST

Department _____

Your Name _____

Job _____

Date _____

Worker's Name _____

Time _____

Check the box if you see the worker doing any of these movements or positions. Check as many as you see.

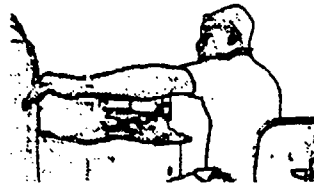
- ☐ Bending or turning the wrist in any direction



- ☐ Reaching forward with one or both arms stretched out



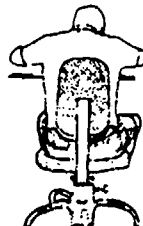
- ☐ Reaching to the side with one or both arms stretched out



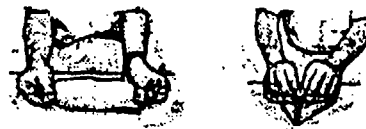
- ☐ Reaching behind



- ☐ Raising elbows away from the body



- ☐ Turning the lower arm between palm up and palm down



(see other side)

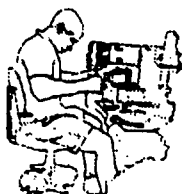
- ☐ Pinching, pulling, or using force



- ☐ Hunching the back



- ☐ Bending the neck



- ☐ Pressing hands or arms on sharp edges



- ☐ Twisting and bending



If you checked any of the boxes, the worker may be at risk, especially if the movement or position happens often or for long periods.

Some other things to look for:

- ☐ Using home-made aids or tools
- ☐ Using wrist or finger wraps
- ☐ Using pillows
- ☐ Signs of fatigue, such as slumping, rubbing neck or hands, sighing, shifting positions
- ☐ Tool or equipment that vibrates too much
- ☐ Anything else you notice (write here or attach another page)

Chapter 4:

The work environment

Sometimes, conditions that are part of the workplace can affect how workers do their jobs.

Two such conditions are sound levels and lighting.

Used correctly, sound and lighting help workers do their jobs better. Used incorrectly, they can get in the way of workers' doing a good job or can even hurt workers.

Sound

Workplaces contain both meaningful sounds and noise. You don't want to get rid of meaningful sounds, because workers use them to gather many kinds of information. For example, by listening to a machine, workers can tell how fast it is running and if it is running properly.

Other sounds are not meaningful or useful to those hearing them. These unwanted sounds are often called noise.

Loud or sudden noises can distract workers, making it hard for them to concentrate on their work. A noisy workplace can make workers get tired more easily. Very loud noises can even damage workers' hearing.

The loudness of sound is measured in units called decibels.

You can guess at the loudness of noise in the workplace by doing a simple experiment to see how easily you can talk with your co-workers.

These guidelines can help you tell generally how high the noise level is. But measuring noise levels exactly can be very complicated and must be done by a trained professional.

OSHA has specific rules and programs to protect workers who are exposed to noise levels greater than 85 decibels for a full shift or for eight hours.

If you suspect your work place is too noisy or if you think a machine is making too much noise, report the problem to your manager.

If the noise level is:	You can hear people:
45 decibels	20 feet away talking in normal voices
55 decibels	10 feet away talking in normal voices
65 decibels	5 feet away talking in normal voices
75 decibels	5 feet away talking in loud voices
85 decibels	5 feet away if they shout
95 decibels	3 feet away if they shout
105 decibels	1 to 2 feet away if they shout
115 decibels	not at all.

There are several ways to reduce the noise level.

Often it is possible to enclose a noisy motor or piece of equipment in a sound-absorbing box.

Sometimes the noise level can be reduced if the noise-producing equipment is put into a separate room or if special noise-absorbing panels are hung from the ceiling.



GOOD: Ear muffs can protect a worker's hearing when work place noise can't be reduced to safe levels.

Keeping equipment in good running condition can help, too. Sometimes machines are noisy because they need oil or a part is wearing out.

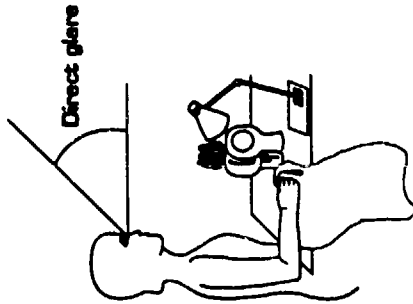
It's best to use methods like these to solve noise problems. But if neither of these is possible, workers' hearing must still be protected by noise-reducing ear muffs and ear plugs. If that's the case, it will be your job to be sure that your workers are wearing them and using them properly.

Sewing workers often complain that there is not enough light on their work stations or that they must look into bright spots caused by misplaced lighting or reflections off shiny surfaces. People who sew need to be able to see very clearly what they are doing.

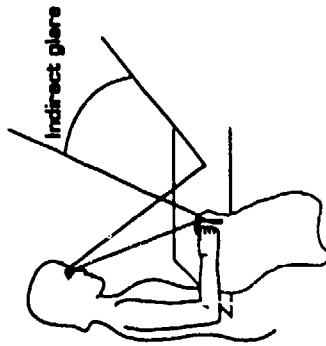
Two kinds of lighting should be used in the sewing room: area lighting and task lighting.

Area lighting should be used to light the room evenly. Fluorescent lights are usually used to provide a soft light that is relatively free of shadows.

Glare comes from bright spots of direct light or light reflecting off shiny surfaces. Glare in workers' eyes can keep them from doing their best work. So lights and work stations should be placed so that workers aren't bothered by glare.



Direct glare gets into a worker's eyes from lights or windows.



Indirect glare reflects into a worker's eyes off shiny surfaces

Most sewing work stations have small task lights mounted on or near the machine. These are meant to be pointed at the area that the worker needs to see most clearly, generally the area at and just in front of the needle. Often, these lamps are not aimed correctly. The light they provide is often not bright enough.

As most people get older, they don't see as well as they once did. Around age forty, their eyes may start to have a harder time focusing on close objects. Older workers may need stronger lighting to see more clearly. They also should have their vision tested regularly.

As a supervisor, you should check work stations to be sure that:

- both the area lighting and the task lighting are strong enough that the worker can see clearly without leaning forward
- the task light is aimed just in front of the work
- enough area lighting is falling on the work station so that there's not much contrast between light and dark areas
- if possible, there is more light when dark fabrics are used than when light-colored fabrics are used
- work stations are arranged so that there's no glare from windows and lights.

If people complain about not having enough light or about being unable to see what they are doing, simple adjustments can sometimes help.

Adjusting where the task lights are pointing or changing bulb sizes might solve lighting problems. If not, your manager may ask an expert to take more precise measures and suggest what needs to be done.

Chapter 5: Training and retraining workers

Productive workers are a company's most valuable resource. But resources cost money. A company must invest in its workers at the start so that they will become productive. A company must keep on investing in its workers for as long as they are on the job so that they will stay productive.

Good training programs are one of the most important investments a company can make in its workers. When training programs are well designed, the money spent on them gets paid back because

- workers learn in less time
- workers get more productive
- workers feel better about their jobs
- the work place is safer.

Training programs that are poorly designed or badly presented may do little or no good.

Apparel manufacturing workers need several different kinds of training.

- New workers need training to learn how to do their new jobs.
- Workers who have been on the job for a while need on-going training to correct bad habits they might have picked up.
- When workers are ready to take on new tasks, they need training to learn new skills.
- Workers need training to learn how to use new equipment.
- All workers need training to learn how to do their jobs safely.

Learning a skilled job like sewing isn't easy. For training to work well, several conditions must be met.

- A worker must want to learn.
- A worker needs to practice the task.

- A worker needs information about how to do the task better.
- A worker needs a reward related to doing the task well.
- A worker needs to learn at a pace that fits the task and the worker's skill level.

Wanting to learn:

For training to work well, the worker who is being trained must really want to learn. Different goals can make a person want to learn. The goal may be higher pay, a better job, recognition, or anything else that is important to the person.

Practice:

A worker who is in training can learn some basics by watching an expert do the job. But to really learn a job, a worker needs a lot of hands-on practice. This is especially true for any job that requires precise muscle control and body movements.

The goal of practice is for the worker who's being trained to

- learn all the correct movements
- be able to repeat the correct movements time after time
- be able to complete the movements without having to think about each step.

Information:

As you are training your workers, you need to tell them constantly whether they are doing a task right and how they might do it better. This is called feedback.

Feedback should do at least three things.

- It should tell trainees whether they are doing what the trainer expects.
- It should tell trainees what they are doing right.
- It should tell trainees specifically what they are doing wrong and how they should change what they are doing.

While learning a job, people quickly forget the muscle movements that they used. For that reason, you should give feedback to trainees right after they finish a practice session, before they have a chance to forget their hand and finger positions and movements. The shorter the delay in giving feedback, the more value it has.

Reward:

People learn correct muscle movements much more quickly when they receive some reward for the correct action. Usually, in a training program, a sincere "well done" from the trainer is enough of a reward.

During the early hours of training, frequent rewards are needed to help the trainee learn. Later, rewards can be given less often.

Learning schedule

When trainees are first learning a new job, they learn best when training is presented in bite-sized pieces rather than all at once. Ideally, practice sessions should be short, and trainees should have some time between sessions to absorb what they have learned.

When experienced workers are being cross-trained on a new job, they'll learn fastest if they switch back and forth between the old job and the new job every hour or two during the day.

Three methods of training

At least three methods can be used to train new sewing workers or those who are being cross-trained on a new machine:

- trial and error
- instruction
- modeling

Trial and error is probably the most common way that people learn new skills. They keep trying the skill again and again. From their

successes and mistakes, they gradually learn how to do the job successfully. Some trial and error is needed to become expert at any job that requires physical skills.

However, learning by trial and error has two drawbacks. First, figuring out the skill by yourself usually takes much longer than if someone can tell you what you're doing right and wrong. Second, the way you teach yourself to do a job may not be the best way to do that job.

Instruction is another common way to learn a skill. A person who is already an expert can explain the proper way to do the job. The expert can stay nearby and guide workers as they practice. Learning from an expert trainer can be a very efficient way to learn a skill.

As a trainer, you need to be an expert on how to do the job. And you also have to be an expert on using the methods of training discussed in this chapter.

Modeling is another way to learn a physical skill. In modeling, trainees watch an expert perform the task and then try to do it in exactly the same way.

Usually trainees watch the expert (probably you) in person, but they can also watch a movie or videotape of an expert. An advantage of using a videotape is that the trainees can view actions in slow motion or they

can freeze-frame the tape in order to get a better view of fast movements.

Also, if your company has modern videotape equipment, you can record the trainee performing the job. Then you and the trainee can compare the trainee's performance to the expert's. Together, you can examine and discuss the differences.

The most effective training program uses all three of these approaches—trial and error, instruction, and modeling, but in the opposite order.

In a well-designed training program, the trainee might first become familiar with the job by watching a videotape of an experienced worker doing it. During this time, you should be there to run the video

machine and answer any questions.

The trainee might then sit at a work station while you explain how the machine works and guide the trainee through the job.

Finally, the trainee should practice the job while you watch, praising and making suggestions.

The shape of learning

As trainees learn their jobs, most companies will want to keep track of how they're doing. One way to do this is to draw the person's learning curve. By following your workers' progress on the curve, you can see how well they're doing compared with what you expect. If you have some people who aren't doing as well as you think they should, you can give them extra training.

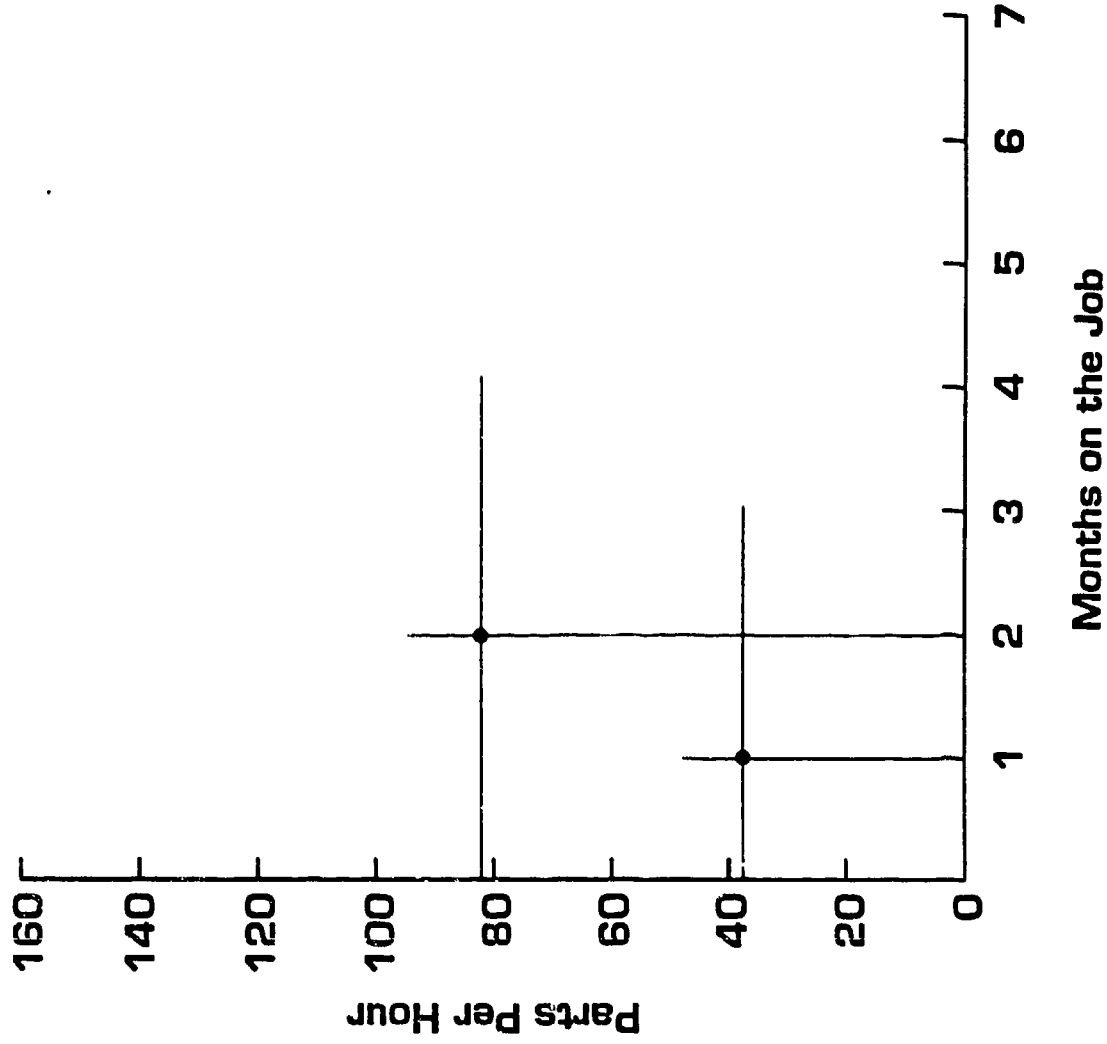
To draw a learning curve, first have your manager decide what performance goal will be best for measuring how well a worker is doing. Examples of a performance goal might be

- the number of pieces or parts the worker produces each day
- the percentage of standard production rate a worker achieves.

A sample learning curve chart

Draw a chart like the one in the picture. The numbers along the left side are the performance goal you're measuring. The numbers along the bottom are the length of time you're keeping track of.

Every day or every week or every month, you'll put a dot on the chart. To do that, very lightly draw two straight lines in pencil. One goes side to side through the number of pieces the worker produced that day. The other goes up and down through the current day, week, or month. Use a pen to put the dot where the two lines meet. (Then erase the pencil lines.)

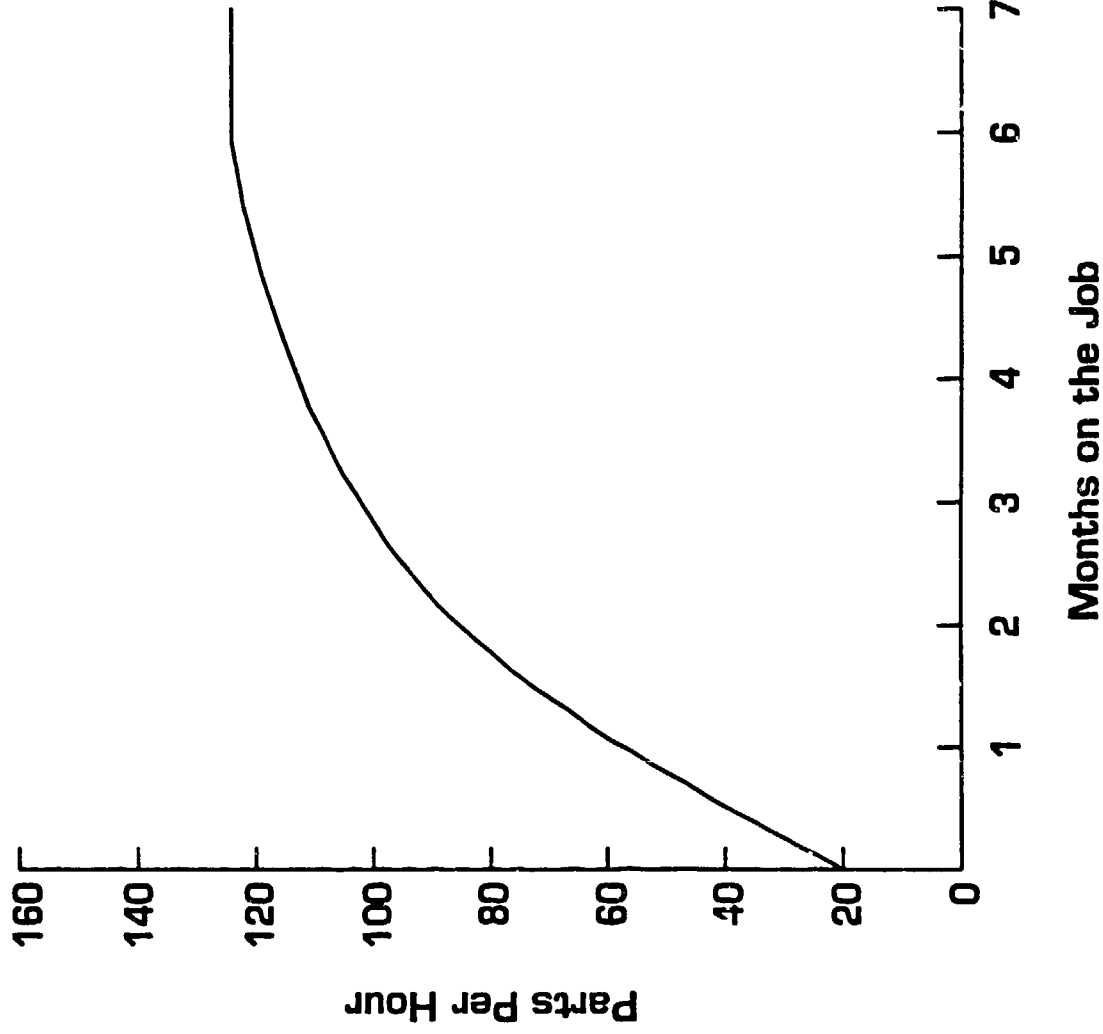


Ideal learning curve

The ideal learning curve looks like a smooth curve. The curve in the picture is for a trainee who learns very quickly at first. This trainee gradually shows less improvement day-to-day. At about six months, the trainee finally reaches her best level of performance.

The shape of the ideal learning curve will be different for different jobs. For easier jobs, the curve may rise more quickly. For harder jobs, it may rise more slowly.

For most sewing jobs, the ideal learning curve will reach the standard production rate between the third and fourth month.



Most learning curves are not this simple. For example, trainees often have times when their learning levels out. During times like this, you may see no improvement in the trainee's performance for several days.

Trainees may go through learning pauses for several reasons:

- their goals may have changed
- they may be having problems with machines

- they may not be feeling well
- they may need a little time to absorb what they've learned and get ready to learn more.

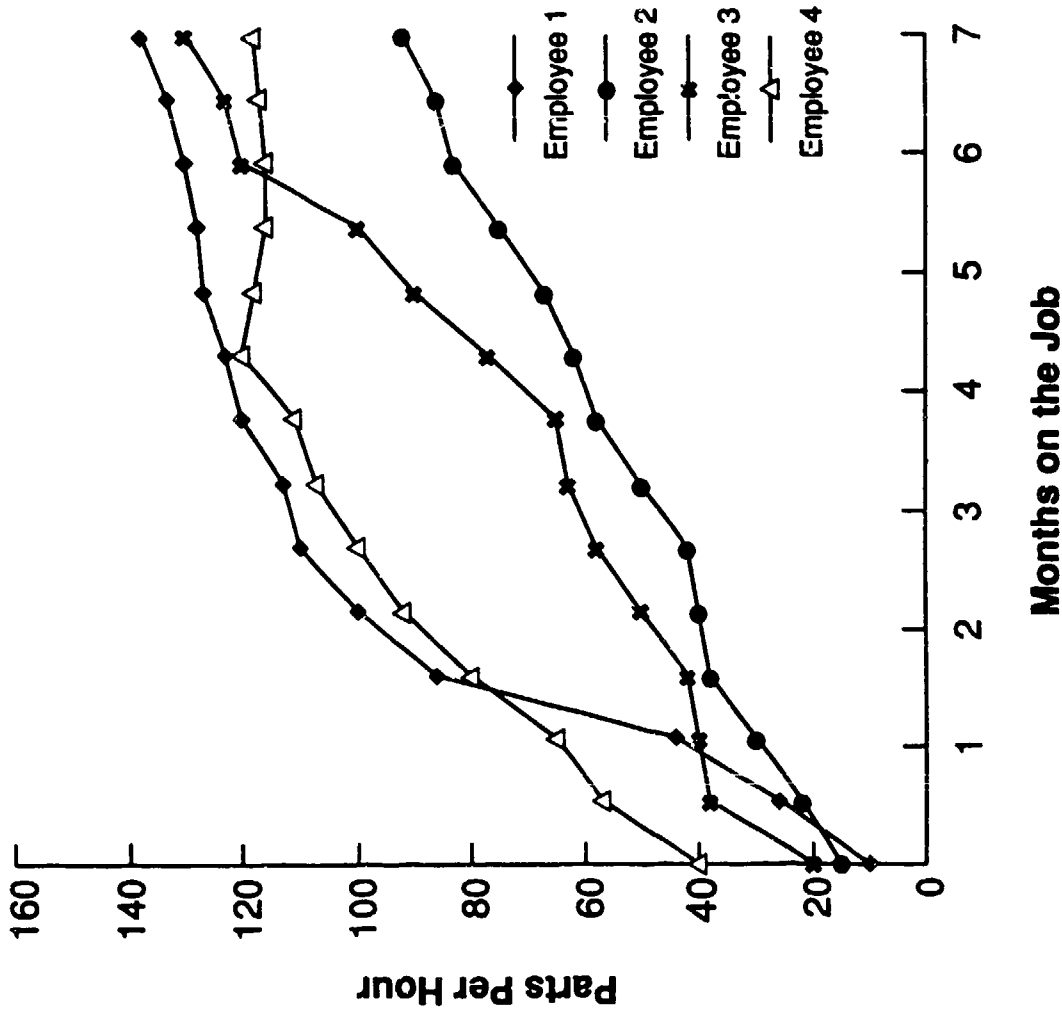
After a learning pause, a trainee may go back to the normal learning rate or may even have a spurt in learning.

When trainees reach a pause in their learning, you should try to find the cause but should not get too worried.

Learning curves for four different workers who are learning the same job

This picture shows learning curves for four different trainees on a particular job. As you can see, none of these curves is like the ideal curve.

Trainees start out at different levels of performance depending on their experience and skills. Some trainees will learn more quickly than others and some will continue to learn for much longer than others. Finally, after training, some will perform better than others.

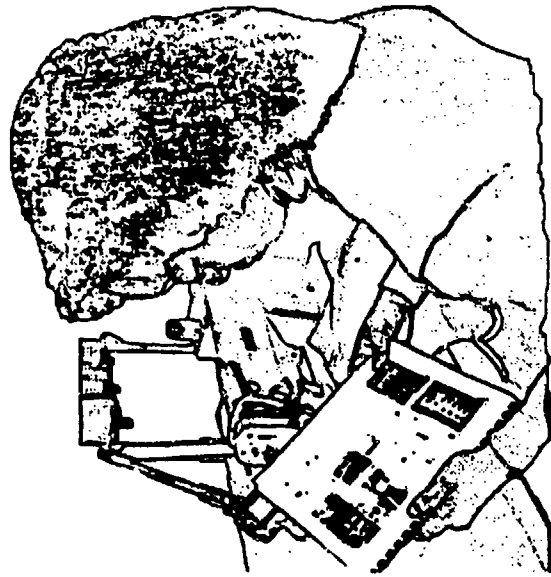


One reason workers learn at different rates is because of habits they may have developed on their old job. These habits may either help workers or get in the way when they learn a new job.

Sometimes the decisions and motions of the second job are like those used in the first job. Then, learning the second job will usually take less time than you might expect because the old habits will transfer to the second job.

However, sometimes the second job is very much like the first job but the worker must use different movements, especially hand movements. Then, the worker usually takes longer than expected to learn the second job because the old habits get in the way of learning.

Job aids can help workers learn



A job aid with clear pictures helps this worker learn a new task.

Besides videotape and video cameras, another way to help workers learn faster and better is to give them printed job aids. These are pictures and words that tell them how to do parts of their jobs.

People tend to learn much more quickly when they are shown something than when they are told about it. For example, drawings or photographs of proper hand positions and movements can help trainees understand how to do a task. Trainees should have job aids at their work stations during training so that they can look at them whenever they need to.

Some parts of the job, such as adjusting a machine, may be hard to remember, especially if the task is done only once in a while. You shouldn't try to teach a worker tasks like these during training. Instead, give workers printed aids that they can look at when the time comes to do the task.

For best results, the aids should be photographs and drawings that show the right way to do the task. They might also include easy-to-read instructions. Workers should be able to follow the instructions easily and to do the task with very little training.

Closing thoughts

You have a very important role in helping your company find and control ergonomic problems. Your cooperation is vital to the success of your company's ergonomic program and to the safety and morale of your workers.

By taking the attitude that "a stitch in time saves nine," you can help your workers stay healthy and performing at their best. At the same time, you'll be helping your company stay strong and competitive.

