SAVE

SAFETY VOICE FOR ERGONOMICS



Training for Masonry Apprentices 2nd Edition

Apprentice Workbook

ACKNOWLEDGMENTS

Safety Voice for Ergonomics (SAVE) was developed by occupational safety and health researchers Drs. Dan Anton (Eastern Washington University), Jennifer Hess (University of Oregon), Laurel Kincl (Oregon State University), and Douglas Weeks (Saint Luke's Rehabilitation Institute), in collaboration with the Masonry r2p Partnership.

SAVE Collaboration

The SAVE project is funded by CPWR
(CDC/NIOSH Cooperative Agreement U60 OH009762-06)

The Masonry r2p Partnership worked together to ensure that all stakeholders provided substantial input into development of these materials. This ensures that the final materials are appropriate and practical.

This project was funded by **CPWR – The Center for Construction Research and Training.** CPWR is the research and training arm of the North America's Building Trades Unions and serves the construction industry and its workers (www.cpwr.com). CPWR is supported by NIOSH cooperative agreement OH009762. The contents are solely the responsibility of the authors and do not necessarily represent the official views of NIOSH. Funding for the expansion of SAVE materials to include allied crafts (tilers and PCC masons) was provided by an Oregon OSHA training grant DCBS-1199-19.

TABLE OF CONTENTS

GENERAL INSTRUCTIONS

SAVE materials were initially developed to address ergonomic hazards and solutions specific to brick and block masons. These materials have been expanded to address job duties and hazards unique to PCC and tile/terrazzo/marble masons. While no changes were made to video content, as you follow along in your apprentice workbook you will find additional pictures, quiz questions and discussions that pertain to PCC and Tilers. Your instructor should direct you to the workbook sections most relevant to your primary craft.

General Instructions

1) Each unit in this workbook will have a video that your instructor will play.

2) Follow along in the workbook as you watch the video.

3) At certain points in the video, the instructor will pause the video for a discussion, quiz or activity.

4) Use the space in the workbook to complete the quiz or activity.

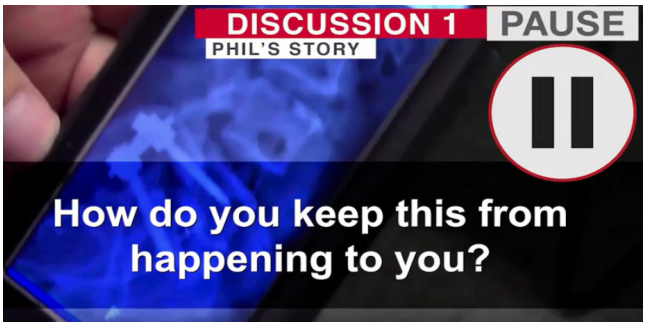
SAVE UNIT 1
INTRODUCTION, ANATOMY & CUMULATIVE TRAUMA

LEARNING OBJECTIVES

1. Define ergonomics and know why it is important.
2. Understand risk factors for cumulative trauma.
3. Identify the causes of work-related musculoskeletal injuries.
4. Know how good ergonomic practices can be used to reduce injuries.

Discussion 1: Phil's Story

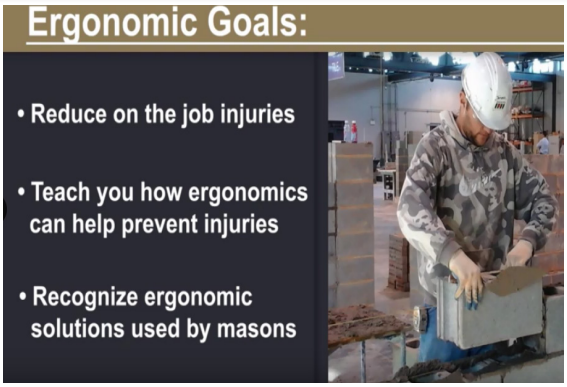
The video provides Phil's testimonial about how he injured his low back at work, resulting in surgery.

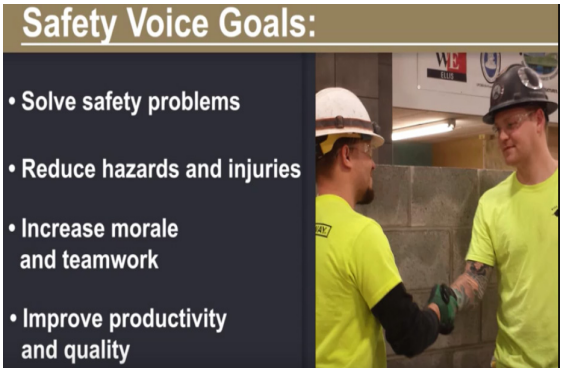


How do you keep this from happening to you?

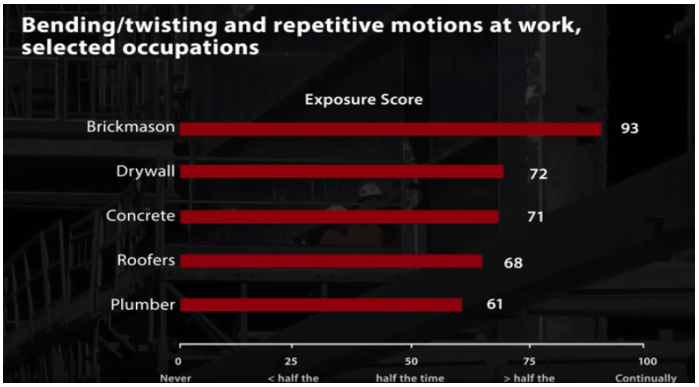
Introduction

These SAVE units will introduce you to ergonomics and safety voice topics. Using this combined knowledge is the best way to become a safety leader in ergonomics and prevent injuries at work.





Ergonomics Overview



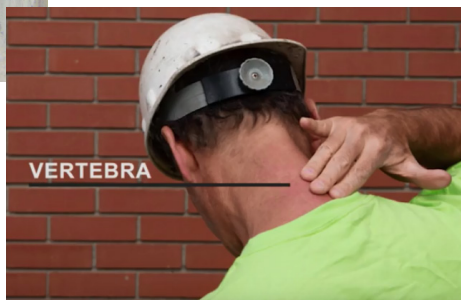
Ergonomics is important because injuries to muscles, ligaments, joints and discs are common among construction workers and can end your career.

Anatomy

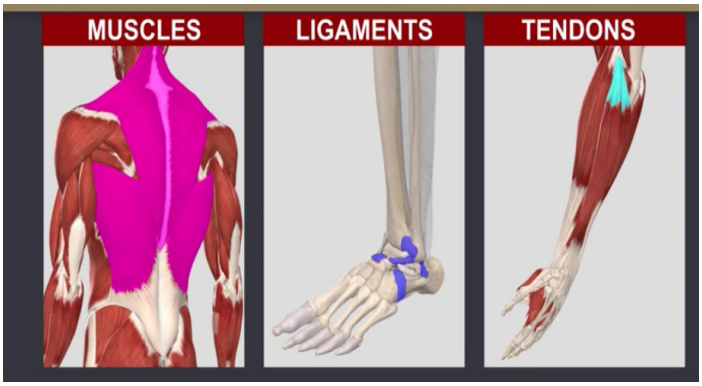
To understand how to prevent injuries to soft tissues like your ligaments, muscles, and discs, it's important to know the structural characteristics of your body. This is anatomy.

Your back bone is called the spine. The bones of the spine are called vertebra.

Feel the bones behind your neck. You're pressing on part of a vertebra.



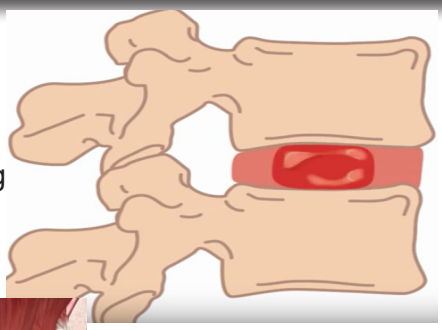
Quiz 1: Type of Injury



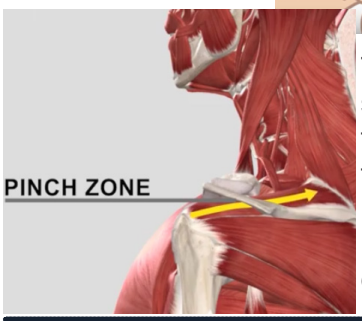
What do you call injuries to your muscles, ligaments, and tendons?

Anatomy of Discs, Shoulders and Wrists

Between every two vertebrae there are discs. The disc has jelly like material on the inside and strong fibrous bands on the outside.



There are important nerves that allow the hand to function. One of these nerves runs through a tunnel created by the carpal bones and into the hand.

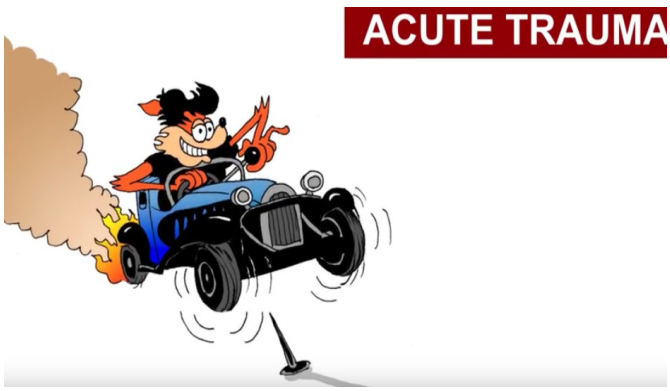


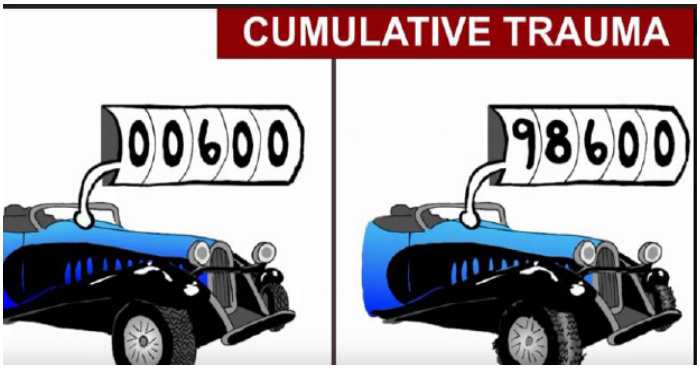
There is a tunnel in the shoulder. A rotator cuff tendon goes through this tunnel and can be pinched. This is why this part of the shoulder is called the 'pinch zone.'

Discussion 2: Cumulative Trauma

Have you heard the term 'cumulative trauma'? What do you think it means?

Just like there are different ways to get a flat tire, there are different ways you can injure yourself.





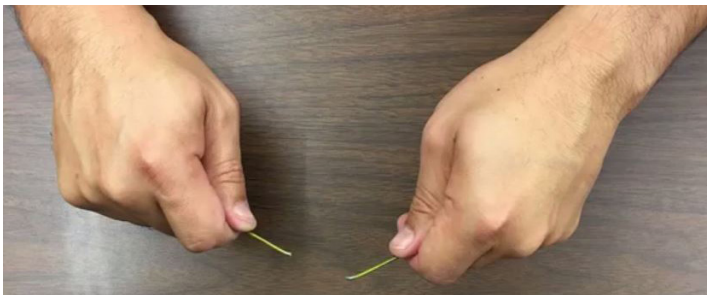
Activity 1: Wire Bending

Acute trauma happens immediately, like spraining an ankle while hiking. Or getting hurt during a workplace accident, such as a fall.

Cumulative trauma seems invisible because the damage builds up over time and occurs from repetitively doing the same thing over and over.

Now, let's simulate cumulative trauma.

Just like the wire eventually breaks with enough bending, all materials, whether concrete block or human muscles, ligaments or discs have structural limits and can eventually break.



The Cycle of Cumulative Trauma

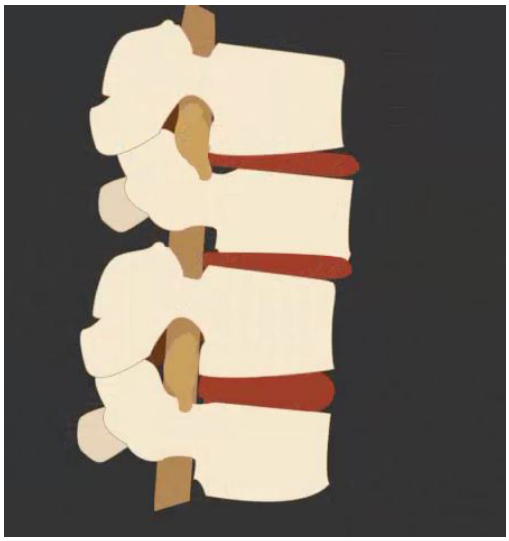
1. Damage to tissues, such as muscles and tendons causes microscopic tears.
2. The tear heals with small scars.
3. Scars make tissues lose elasticity.
4. Loss of elasticity makes the tissue weaker.
5. These steps lead to fatigue and pain.
6. A cumulative trauma injury results.

Mild vs. Severe Injury

Acute and cumulative trauma back strains and sprains can be mild and heal on their own in a few days or weeks.

However, it's common with cumulative trauma that these injuries become frequent and chronic, lasting months or more. That makes them difficult to heal.

Disc Injuries

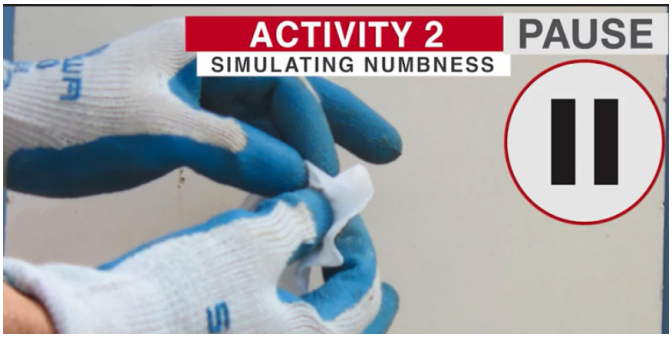


- Slipped Disc/Disc Protrusion is when the disc is pushed backwards enough to cause pain
- Disc Herniation is more severe and occurs when when the center is released from the disc
- Sciatic Nerve Injury occurs when a disc presses against a nerve that runs down the back of the spine.

Disc injuries can occur in the neck as well as the upper and lower back.

Activity 2: Simulating Numbness

With overuse, such as frequent bending of the wrist or work in awkward wrist postures, the carpal tunnel becomes inflamed and the nerve becomes irritated. This can cause pain and numbness in the hand, called Carpal Tunnel Syndrome.



Have you ever had numbness in your fingers or hands? Try this activity to simulate numbness in your fingers.

Rotator Cuff Injuries

There are four key shoulder muscles that form the 'rotator cuff'. They are frequently injured from cumulative overuse and working in awkward postures.

Quiz 2: Low Back Injuries

How are discs in the low back frequently injured?

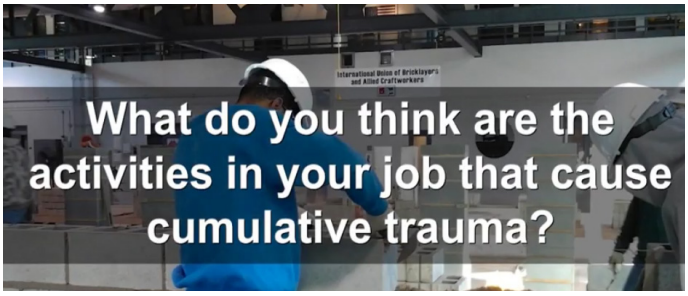
A. Sitting all day

B. Heavy lifting

C. Using stooped postures

D. All of the above

Discussion 3: Work Postures



Cumulative tramua is caused by wear and tear over time. It is sneaky and can take months or even years before the damage leads to an actual injury.

Like a tire wearing, the repeated wear and tear to your muscles, ligaments, tendons and discs, creates damage making them less stretchy and more prone to eventual injury.

What do you think are the activities in your job that could cause cumulative trauma?

Wrap-up

Your knowledge about ergonomics, anatomy and cumulative trauma will help you spot job tasks that are risky. Later units will explore risk factors that lead to injury and solutions to help reduce your chances of developing a serious work injury.

SAVE UNIT 2
AWKWARD & NEUTRAL POSTURES

LEARNING OBJECTIVES

1. List the four ergonomics risk factors (H.A.R.P.). Have a more in-depth understanding of the risk factors for cumulative trauma.
2. Describe or demonstrate at least one awkward posture used at work related to the back, shoulders and wrists.
3. Describe or demonstrate neutral posture solutions for awkward back, shoulder and wrist postures.
4. Understand why it is important to avoid awkward postures whenever possible, and the importance of using neutral posture.

Introduction and Musculoskeletal Injury Risk Factors

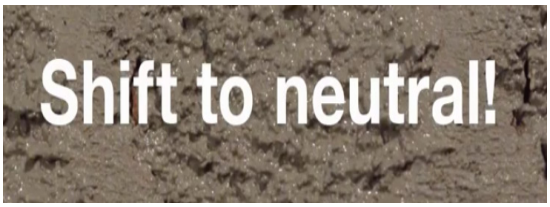
There are four main risk factors that can result in work-related musculoskeletal disorders.

In this unit we'll focus on awkward postures and show you how to minimize them by using neutral postures.

Neutral Postures

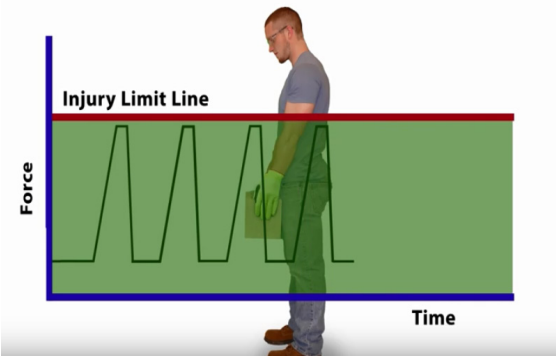
The spine has three natural curves that make it strong and sturdy.

Neutral postures are postures that put the least amount of stress on the muscles and joints.



Safety Margins

For every part of your body, there's a safe functional limit for postures. As long your body stays below this threshold, you minimize your risk of being injured. In other words, you are working within the margin of safety also called the green zone.



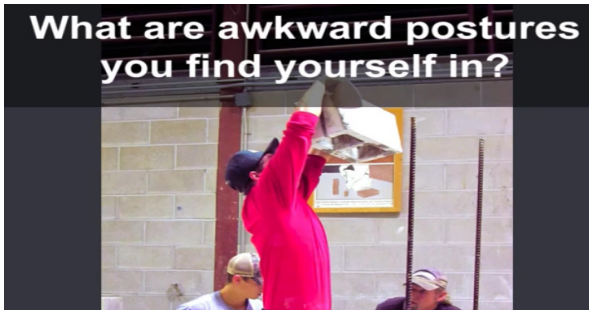
Caution Zones

We'll talk about risky postures as ***caution zones*** since that's a good way to know when your posture might be harmful.

For the rest of the unit, green means the posture is safe while yellow means use caution.

Discussion 1: Awkward Postures

Non-neutral postures are called awkward postures.

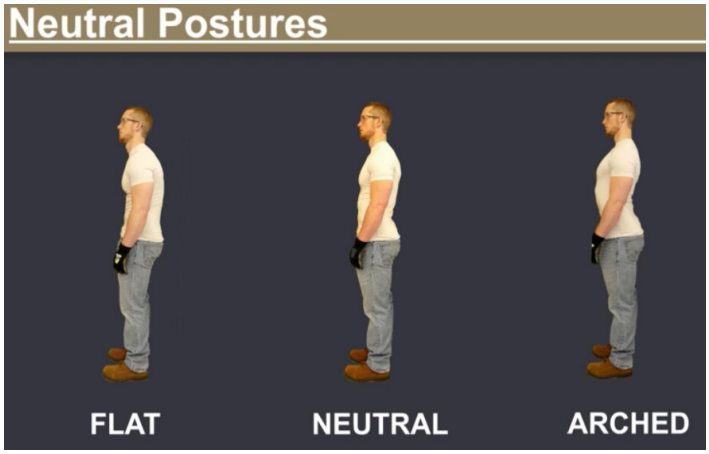


What are awkward postures you find yourself in? Are there awkward postures specific to your craft?

Low Back Posture

There's a 'sweet spot' about halfway between rounding your back and flattening your back.

Activity 1: Neutral Spine Posture



When you are in the 'Sweet Spot' your back is in a neutral, safe posture. It's also where your back should feel the most comfortable to work.

So let's practice it. Everyone should stand up to practice.

Awkward Back Postures

So, what are other examples of awkward back postures?

These include bending your neck or low back too much, twisting, or combining bending and twisting.

Forward bending more than 30° degrees is a position that over stretches back muscles and can lead to fatigue and damage.

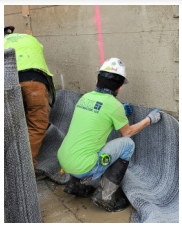
Activity 2: The Green Zone

Bending forward less than 30° is safer for your low back and is in the Green Zone.

Look at the pictures and practice bending about the same amount.

Squatting

Another way to work without bending forward too far is to squat.



When possible use alternatives to bending such as squatting or half kneeling. The important point is to 'Change it up'!

Quiz 1: Worst Back Posture

Which mason is in the worst posture for their back?

Awkward Neck Postures

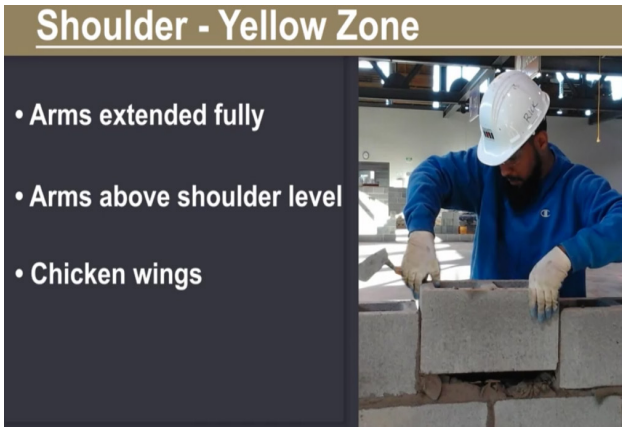
Your head weighs about 12 pounds, which is about the same as a bowling ball.

When you work with your head bent forward, it isn't balanced over your trunk and gravity is more able to push it towards the ground.

Just as bending forward with the low back, having your neck bent forward can over-stretch and fatigue the muscles in your neck.
Working for extended time with the head bent forward is a ***yellow zone posture***.

Awkward Shoulder Postures

The shoulder is in a neutral posture when the arms hang at the side of your body.



Activity 3: Awkward Shoulder Postures

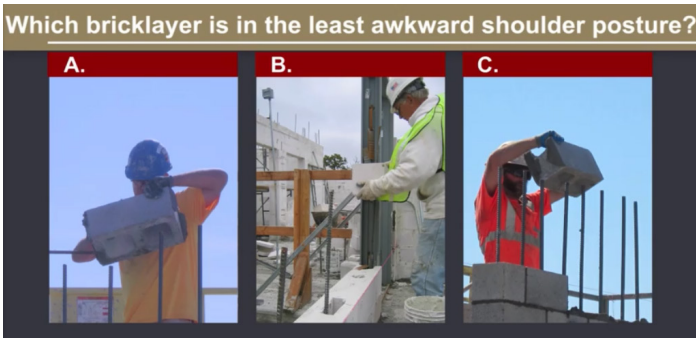
Most of your tasks require you to have your arms between 60° and 120°. This region is called the "pinch zone" because it can pinch your rotator cuff muscles. Working with your arms close to your body is the safest.

Now lets try an activity to illustrate the effect of awkward shoulder postures.

Quiz 2: Awkward Shoulder Postures - Brick and Block

Working with your arms overhead is also hard on your shoulders and is a yellow zone posture.

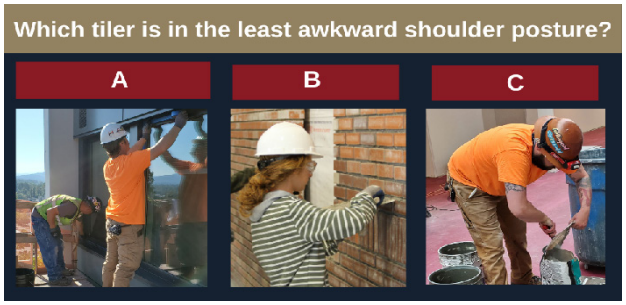
The final awkward shoulder posture is called the "chicken wing" posture.



Which bricklayer is in the least awkward shoulder posture?

Quiz 2: Awkward Shoulder Postures - Allied Crafts

Working with your arms overhead is also hard on your shoulders and is a yellow zone posture. The final awkward shoulder posture is called the “chicken wing” posture.



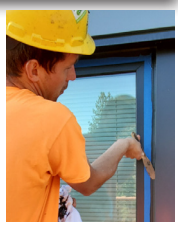
Which tiler is in the least awkward shoulder posture?

Chicken wing posture

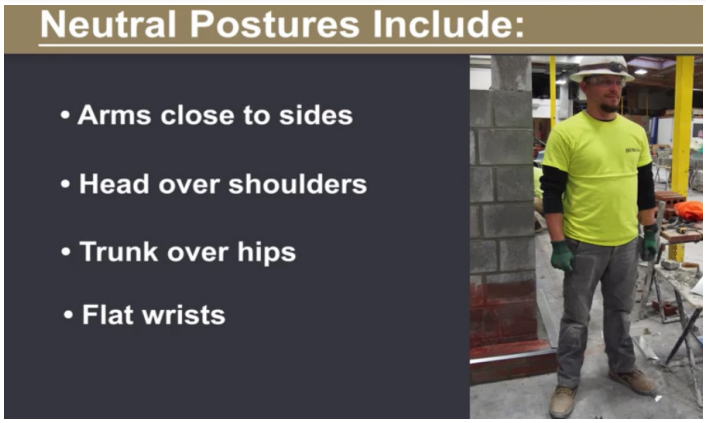
Awkward Wrist Postures

“Awkward” wrist postures include bending your wrists excessively forward, backward, or to either side.

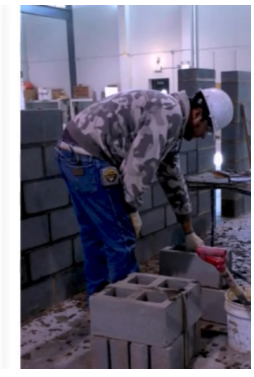
Whenever possible, keep your wrists in a straight line with your forearm.



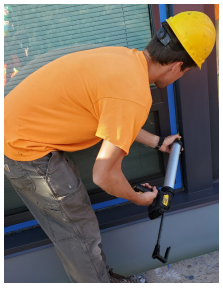
Neutral Posture Summary



Quiz 3: Worst Body Position



What part of the mason’s body is in the worst position?



Quiz 4: Worst Body Position

What part of the mason's body is in the worst position?

A. Back

B. Shoulders

C. Wrists or hands

D. Nothing's wrong, it all looks good to me!

What part of the mason's body is in the worst position?

Quiz 5: Worst Body Position

What part of the mason's body is in the worst position?

A. Back

B. Shoulders

C. Wrists or hands

D. Nothing's wrong, it all looks good to me!

What part of the mason's body is in the worst position?

Wrap up

As a mason, your work will always require you to use awkward postures. Try your best to minimize these postures and frequently shift into neutral. Especially try to avoid combinations of awkward postures like bending and twisting.

While changing your posture is one solution, ergonomically designed tools, equipment and work practices are even better, and should always be your first choice. We'll discuss these options in later units.

SAVE UNIT 3
HEAVY LIFTING, REPETITIVE ACTIVITIES & PROLONGED POSTURES

LEARNING OBJECTIVES

1. List the four ergonomics risk factors (H.A.R.P.).
2. Describe repetitive activities and prolonged postures.
3. Understand the risks associated with heavy lifting, prolonged postures and repetition over the course of their career and how to minimize each risk factor.
4. Explain strategies for reducing the effects of heavy lifting, repetition and prolonged postures.

Review

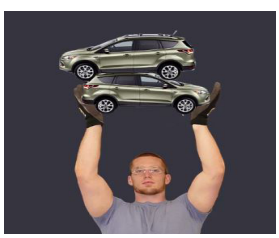
In the previous unit, we talked about the risk factor awkward postures. Now we'll talk about a few more.

Steve's Story

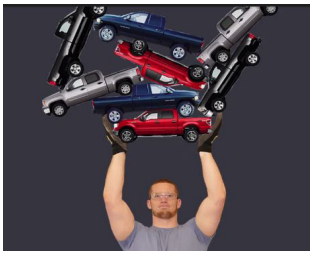
Let's listen to Steve's story about his shoulder injury which was caused by frequent repetitive work in postures above his shoulder.

How much do you lift?

In one day, you lift almost 4 tons of CMU. This is the same as lifting 2 SUVs.



This adds up to 19 tons in a week, or about 8 full size pickup trucks!

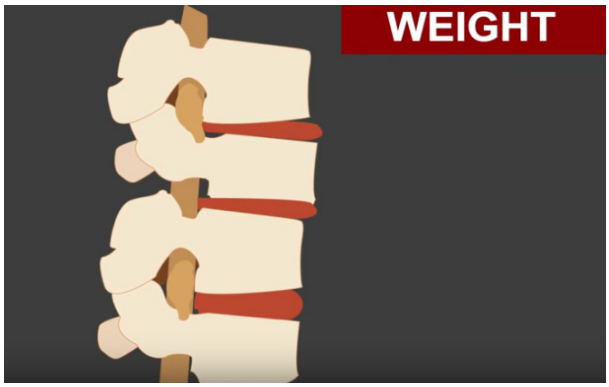


After one year, the average mason has lifted about 950 tons. Imagine lifting 2 1/2 fully loaded Boeing 747s!

What Makes a Lift Unsafe

When we think of lifting or manual material handling, we usually think of how much the object weighs, and this is really important. However, there are other factors that make lifting and carrying materials safe or unsafe.

Weight



In general, the heavier the material you lift, the more pressure there is on your back.

Discussion 1: Staying Strong

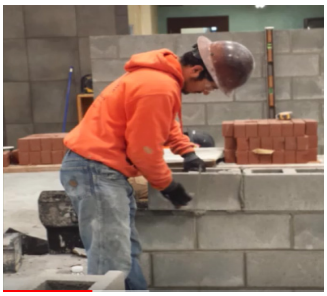
If you stay strong, would you be less likely to be hurt lifting?

Have you heard stories like Steve's from journeymen masons or other instructors?

Frequency, Awkward Posture, Twisting, Distance

Frequency, or how often you lift is the next risk factor. It might seem crazy, but even lifting brick or tile can injure your back, shoulders or arms because you lift so many of them each day.

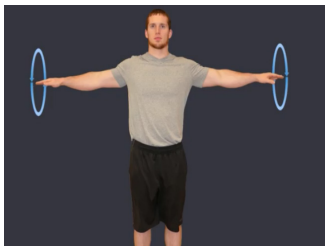
While you can't control lifting frequency, you can control how frequently you use awkward postures while lifting.

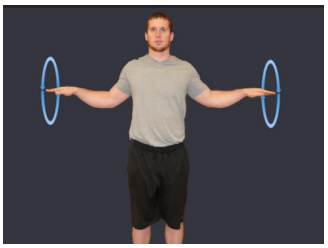


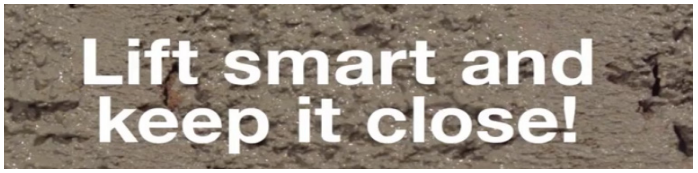
Another risk factor you have some control over is twisting while lifting. Remember, bending combined with twisting is the worst posture for your back.

Your back muscles have to work much harder if you extend your arms while placing CMU or brick, rather than if you keep the work close to your body.

The distance you reach from your body is as important as the weight of what you will lift.







The "Right" Way to Lift

One way to keep materials close is to do a squat lift, like a weight lifter. Lifting like this can save your back but might increase the stress on your knees.

Coupling

Here again, change it up, sometimes lifting with both hands instead of just one.

Be sure you have good fitting gloves that protect your hands and provide a good grip.

Quiz 1: Awkward Postures When Lifting

What's the best way to control awkward postures while lifting?

A. Use adjustable height scaffolding

B. Squat to lift like a weightlifter

C. There is no way to control awkward postures at work

What's the best way to control awkward postures while lifting?

Quiz 2: Factors You Control - Brick and Block

What factor do you have the most control over when lifting?

A. The weight of the CMU you handle

B. How far you reach when laying CMU

C. How often you lift CMU

What factors do you have the most control over when lifting?

Quiz 2: Factors You Control - Allied Crafts

What factor do you have the most control over when lifting?

A. Weight of the materials you handle, such as tiles

B. How far you reach when tuckpointing

C. How often you have to lift tiles

What factors do you have the most control over when lifting?

Repetition

Another activity that increases your risk of injury is repetitive motion, where you use the same muscles and joints over and over.

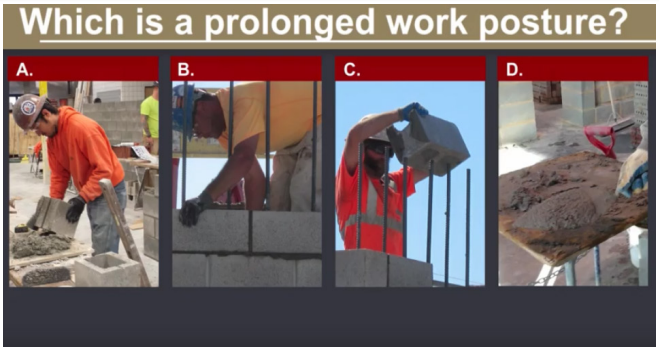
Activity 1: Repetition

Let's practice an activity that demonstrates the effect of repetition on our bodies.

Prolonged Postures

Prolonged postures are a risk factor because our muscles and joints like movement. When muscles are in a position for too long, especially a stretched posture, they tend to get tighter and tired.

Quiz 3: Prolonged Postures - Brick and Block



Which is a prolonged work posture?

Quiz 3: Prolonged Postures - Allied Crafts

Which is a prolonged work posture?

Combined Risk Factors

Masons spend 93% of their work time bending, twisting, and performing repetitive motions at work.

These are called 'Combined Risk Factors.' When risk factors are combined it is more likely that they will lead to pain or an eventual injury.

Discussion 2: Minimize Risk Factors

When possible, limit your exposure to only 1 risk factor at a time.

One way you can do this is to get in the habit of turning your whole body while lifting instead of planting your feet. Or, instead of always stooping by bending at your waist, try to squat sometimes.

Using equipment when possible reduces combined risk factors.

What are some ways to minimize risk factors for injury?

Quiz 4: Most Injured Area

Which part of the body is most injured in masons?

A. Shoulder

B. Low back

C. Hands

D. Hips and knees

Which part of the body is most injured in masons?

Quiz 5: Second Most Injured Area

What region is injured second most?

A. Shoulder

B. Low Back

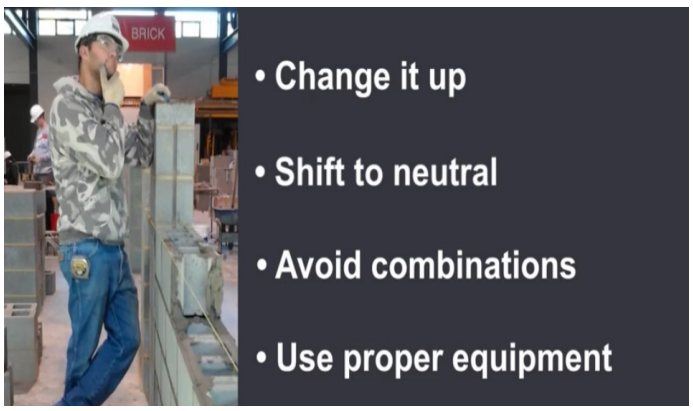
C. Hands

D. Hips and knees

What region is injured second most?

Wrap-up

HARP risk factors are a regular part of your job. So, think about how to minimize these risk factors whenever possible.



SAVE UNIT 4
SAFETYVOICE,RESPONSIBILITIES&INFORMATION

LEARNING OBJECTIVES

1. Define safety voice and know when to use it.
2. Understand the rights and responsibilities of employers and masons.
3. Identify the hierarchy and chain of command for your local.
4. Know who to go to for safety advice.
5. Know where to look up relevant safety information.

Review

Don't HARP about back pain!

Discussion 1: Jessie's Story

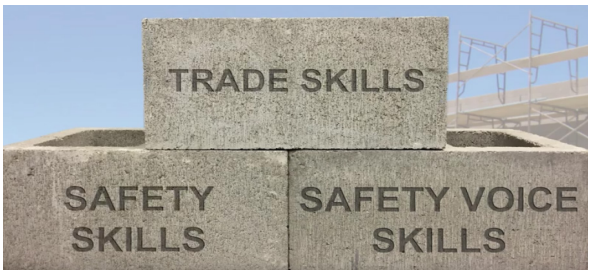
"In training, I was told that acid washing brick needs specific PPE. On a jobsite, I was not provided the necessary PPE and when I asked for it, the foreman downplayed my concerns for safety.

After I called my union about this, a business agent and my apprentice coordinator became involved to help resolve the issue. I was then provided the PPE I needed to do my job safely.

I was trained to work safely. Because of my union, I had backing when I stood up for my right to have proper PPE."

Would you have spoken up?

Has anything like this ever happened to you?

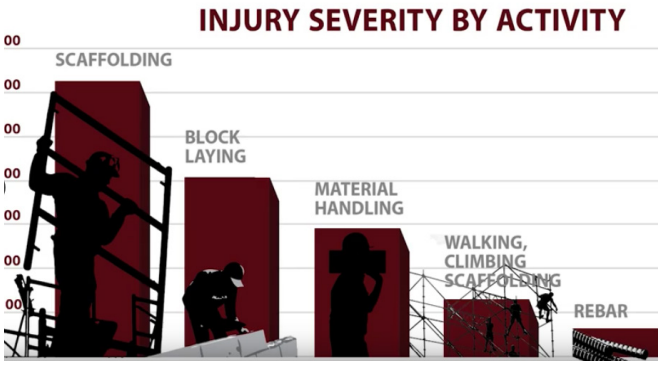


It is just as important to be skilled at using a safety voice as it is to learn a trade and safety skills.

What is Safety Voice?

The images shown on the left of unsafe and safe scaffolding are shown as an example of seeing an obvious safety issue.

Speaking up to fix hazards = using your **Safety Voice**



The bar chart shows the results of a study published in 2013.Three masonry activities were responsible for the majority of <u>severe</u> injuries:

- Scaffold erection and dismantling
- Laying block
- Material handling

Knowing how to complete masonry activities as safely as possible is important. Knowing how to speak up if you are not in a safe situation is just as important.

Activity 1: Rights and Responsibilities

There are certain responsibilities that both you, your employer and your union have:

Your employer is responsible for providing:

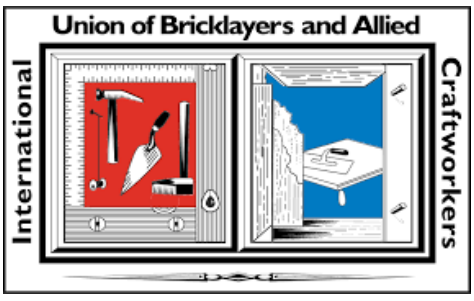
- a safe and healthy workplace
- information on hazards at the worksite
- training about health and safety on the job

You must:

- report any hazards
- know hazards and solutions
- follow all safety procedures

Your union:

- provides training
- helps solve health and safety issues



SAVE Unit 4
Activity 1: R & R Worksheet

For each statement, decide if each statement is a “Right” or a “Responsibility” for the **employer**, the **worker**, or the **union** and write down the answer in the space provided. Some statements might be a responsibility for more than one person.

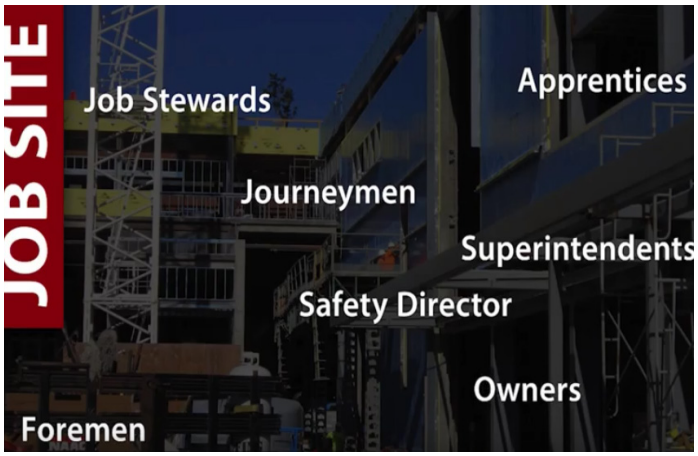
Statement	Right	Responsibility
“Look out for co-workers”	_____	_____
“Provide training you understand”	_____	_____
“Represent you regarding workplace issues”	_____	_____
“Ask for safety training”	_____	_____
“Get medical care paid if you’re injured on the job”	_____	_____
“Use and maintain PPE”	_____	_____
“Provide a safe and healthy workplace”	_____	_____
“Work together to improve conditions on the job”	_____	_____
“Provide safety gear and PPE”	_____	_____
“Know what to do if there’s an accident on the job”	_____	_____
“Work without being harassed”	_____	_____
“Speak up if you know there’s a hazard”	_____	_____
“Stand up to bullying”	_____	_____

Why Build a Safety Voice?

Discussion 2: Your Situation

It's important to recognize the bigger picture and how important you are in this picture.

Let's talk about how you fit into the bigger picture with your local and your jobsites.



How do you fit into the bigger picture?

How does our local hierarchy work?

What is the chain of command?

Getting Advice

Let's talk about the best way to get advice or information.

It's best to talk with someone on the job for worksite problems.

Discussion 3: Line of Communication

It depends on your region, but this person could be a trusted coworker, your union steward or agent, or your apprenticeship training coordinator or instructor.

What is the best line of communication for your local?

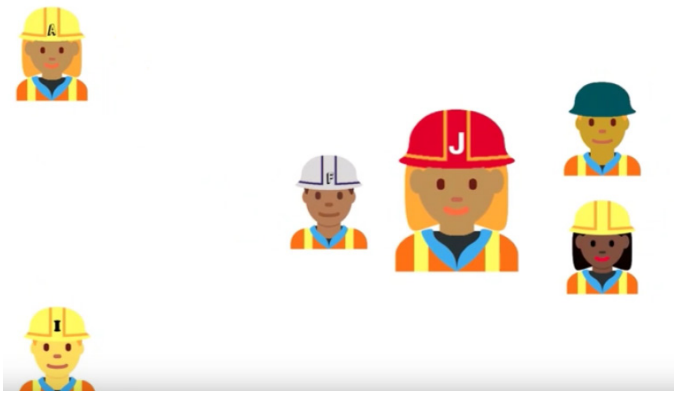
Who should you talk with about safety issues?

Do you know how to get in touch with them?

Review of Jessie's Story

She knew the person who would be able to provide her with proper PPE would be her foreman. Before she spoke up to the foreman, she double checked with her co-workers what the PPE requirements were. Then when she spoke with the foreman, she knew the exact PPE she needed to work safely.

Once her foreman downplayed her concerns, she knew she needed to get help so she called her local and spoke with her instructor. Her instructor spoke with the union business agent to determine the best action. They knew Jesse was right and needed the proper PPE to do the job.



Safety Information

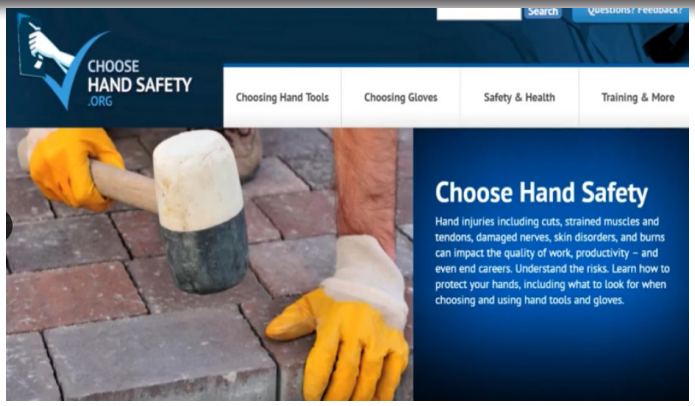
Let's talk about available information that may help you problem solve safety issues.

Your local can tell you about specific resources.

You can consider taking additional safety training, for example OSHA training and Foundations for Safety Leadership training.

Your workbook has a list of online resources at the end of this unit.

Activity 2: Grip Size - Choose Hand Safety



Let's try one activity that is found on the "Choose Hand Safety" website. This will help you learn about your grip size and how that determines the appropriate handle size for your handtools.

Turn to the worksheet now.

Wrap-up

We covered a lot in this unit!

Building your safety voice is about the right way to speak up when you run into a safety issue.

Remember, knowing your rights and responsibilities at work are important. Check and use available safety information to help you become a safety leader and problem solver.

Choose Hand Safety Worksheet
SAVE Unit 4: Safety Voice, Responsibilities & Information

Activity 2: Grip Size

1) What is my Hand Size? _____ inches.

Everyone is different, but there are some key measurements that will help you select hand tools that are the right size for you. Some people may be able to gauge these measurements by just looking at their hand in relation to a tool. Others may prefer to use precise measurements.

The following is a detailed explanation of how to measure your hand. These measurements are used to answer the questions: "How do I use my hand size when buying hand tools?" and "What should I look for in a hand tool?"

Hand Length

A person's hand size is measured by the length of their hand. To figure out the length of your hand, measure the distance from the fold in your wrist below the palm to the tip of your middle finger when your hand is flat. In this photo, for example, the hand length is about 7.25" (or 7-1/4").

2) What is my Grip Size? _____ inches.

Use your hand size. 20% of your hand length equals your grip diameter or size.

EXAMPLE: 20% of a 7-1/4" (or 7.25") hand length equals about 1-1/2" grip size.
(*calculated as follows:* 7.25" x 0.20 = 1.45" --rounds up to 1.5")

3) Use your grip size to determine the appropriate handle size (grip).

Look for hand tools that have a grip size that matches or is close to your grip size.

To figure out a hand tool's grip size you can, **measure the widest point of the handle** or the area that you will be gripping most of the time during your work. In the photo to the right, for example, the grip size is about 4-1/2".

Handle Grip Measurement

If a tool's handle is too big or too small, there are options for modifying it to fit your grip:

- Use a replacement handle, if available.
- If the handle is ***too small***, add a sleeve or cushion (or duct tape) to the handle to increase its size.
- If a handle is ***too large***, you might be able to sand it down to a smaller diameter if it is made out of wood. But be careful, sanding too much could affect the strength of the handle and increase the chance of the handle breaking.

Don't assume tool handles with indentations or finger ridges are better. If your fingers do not align with the indentations, you will end up putting excess pressure on your hand that could cause discomfort and increase the risk for injury.

Also consider that there are two main types of grips:

- A **power grip**, used to hold a mallet or trowel, uses the muscles in the forearm and your hand is wrapped around the handle (photo to right).

- A **precision grip** (or a pinch grip), often used to hold jointers or plaster cutting and shaping tools, relies more on smaller and weaker finger muscles (photo to right).

Learn more about what you should consider for hand safety:

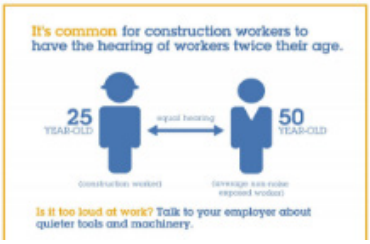
- Handle length
- Hand tool weight
- Gloves
- Anti-slip materials
- Shock and vibration
- Handle angles

Safety and Ergonomics Resources

+ Choose Hand Safety
https://choosehandsafety/com

+ Mast Climbers
www.cpwr.com/research/mast-climbers

+ Noise Infographics
www.cpwr.com/research/
preventing-hearing-loss-noise-infographics



CPWR THE CENTER FOR CONSTRUCTION RESEARCH AND TRAINING TOOLBOX TALK

+ Toolbox Talks
www.cpwr.com/publications/toolbox-talks

+ Hazard Alerts
www.cpwr.com/publications/hazard-alert-cards

+ Ergonomic Guides & Checklists
www.cpwr.com/research/ergonomics-guides-checklists

+ Foundations of Safety Leadership
www.cpwr.com/foundations-safety-leadership-fsl

SAVE UNIT 5
COMMUNICATION & CONFLICT RESOLUTION

LEARNING OBJECTIVES

1. Identify appropriate verbal and non-verbal communication strategies.
2. Understand that conflict is normal and can be positive.
3. Use the ABC model to resolve conflicts.

Review

Communicating Well

A big part of having a safety voice is communicating well.

Good communication is especially important at work, like these guys working together on this two person lift.

If they did not communicate well, do you think the work would go smoothly?

Discussion 1: Communication Skills

Think about situations or conversations you have had at work or anywhere.

What is a good communication skill?

What is a bad communication skill?

Different Ways of Communicating

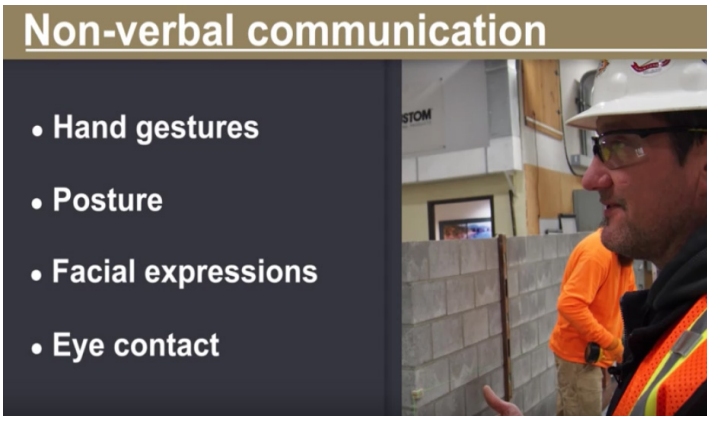
People communicate in a wide range of ways: non-verbal and verbal.

Non-verbal communication is what your body and facial expressions say.

Verbal is how you speak and how you phrase what you say.

Discussion 2: Hand Signals

Over half of all communication is non-verbal, so let's talk about that first.



Hand signals can express a lot.

You can probably think of other hand signals that help you communicate on worksites.

Hand signals are a form of non-verbal communication.

What does this mean?

And this?

You can probably think of other hand signals that help you communicate on worksites. What are they?

Open vs. Closed Postures

An open posture expresses interest in talking and listening.

A closed posture expresses discomfort, disinterest or disagreement.

Which group looks like they are having a good conversation?

Facial Expressions

Facial expressions can show your emotions pretty quickly.

Eye Contact

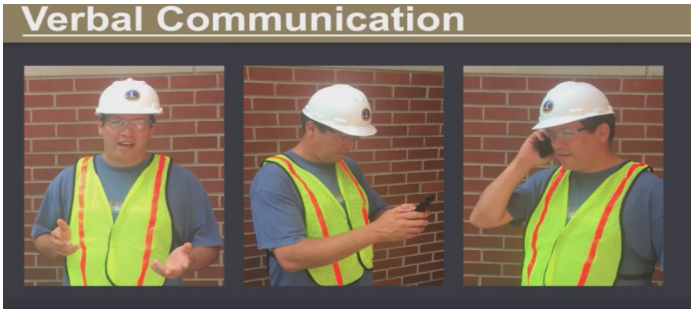
Eye contact is important. Looking directly in the eye of someone lets them know that you're listening.

Maintaining eye contact represents honesty.

Eye contact helps to signal when to speak.

Eye contact means you are actively listening.

Discussion 3: First Impressions



Verbal communication is what you say.

The first few minutes of a conversation can be really important.

What is the appropriate start to a conversation at worksites you've been on?

What is your friendly start?

Conversation Tips

The following tips are covered:

- Active Listening
- Reflect & Clarify
- Offer a solution

Active Listening: be prepared to listen, keep an open mind, and try not to jump to conclusions before you have heard everything.

Repeat & Understand: Sometimes you need to repeat what your co-worker said to check that you understand.

Offer a Solution: It's important to not just complain, but also offer up a reasonable solution.

Discussions 4-6: Joe's Story

Joe was working on an equipment storage building. A brick needed to be cut out and replaced on a wall about 15 feet above the ground. The foreman directed Joe to climb into the bucket of a skid-steer loader to be lifted to the repair site.

The bucket of a skid-steer loader is not designed to be a work platform and no fall protection was available!

Joe knew that this was a violation of OSHA safety regulations and was unsafe. He knew he could erect a scaffold in a short time and take care of this task safely.

Joe thought about what to say and how to say it.

- He wanted to be calm and communicate openly.
- He pointed out that on the busy street it would look bad for him to be seen working unsafley.
- He said that he couldn't work safely from the bucket of the skid-steer loader.
- Lastly, he offered to erect the scaffold right away and get the job done.

The next day the foreman pulled Joe aside and told him that he respected him for speaking up about a safety issue and offering a solution.

What's wrong with this situation?

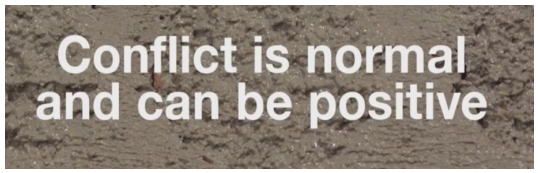
How can Joe best communicate this to his foreman? Think about what you might say or do in this situation.

Can you think of other examples of successfully speaking up for safety?

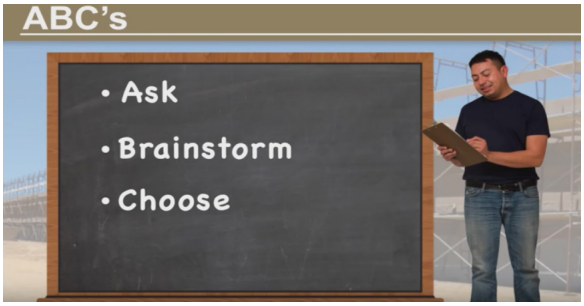
Introduction to Conflict Resolution

Sometimes we don't see eye to eye with those we work with. It's important to know how to prevent and resolve conflicts in a professional and respectful manner.

Conflict is perfectly normal.The way we handle these disagreements determines if the outcome will be positive. Conflicting views can even bring about new ideas, which promote positive results.



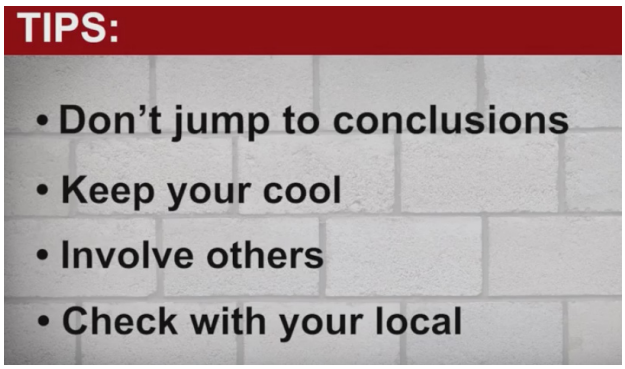
ABC's of Conflict Resolution

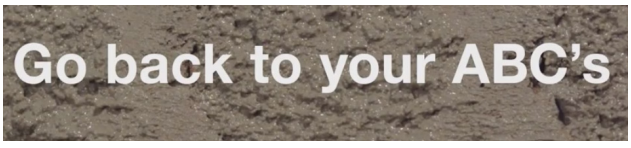


"A" stands for ask. Take a step back and ask questions. You'll establish trust by treating others with respect and asking their opinion.

"B" means to brainstorm. Usually, there's more than one solution. Brainstorming solutions together can result in better solutions.

"C" stands for choosing the best solution. Try to get everyone to agree to the solution.





Discussion 7: Scaffolding Safety

Pete was working with a large crew on a jobsite. There were multiple scaffolds being used but the contractor only had one extension ladder. This meant only one scaffold had a ladder for access. This is an OSHA violation and extremely unsafe.

Pete shared his concern about this with his co-worker, Bob. Bob told him to be quiet and work. They disagreed that this was an important issue that needed to be resolved.

During a break, Pete called his union agent to ask for guidance on how to deal with the problem.

The agent came immediately. He met with the foreman and walked around the job site making general comments, staying very positive. After a few minutes the agent commented about the fact that there were not enough ladders for the masons to access the scaffolding.The foreman said he instructed the laborers to move the ladder when needed.The agent pointed out that this violated OSHA standards and the local union contract. In a polite but firm manner, he told the foreman that there would have to be a ladder for every scaffold.

The foreman immediately requested more ladders for the job site.

How would a conversation go between two masons in this situation?

Discussion 8: Example Resolution

The agent did not escalate the situation, even though he was speaking up for safety. Here's some things he did right:

Did you notice what actions and strategies were good in this example?

Have you had an experience like this that you can share? Perhaps when things went well when done appropriately?

Wrap-up

In this unit, you learned about good communication skills and how to resolve conflicts.

You will need these skills to build your safety voice and become a leader. In the next unit, you'll learn about ergonomic solutions for masonry work.

SAVE UNIT 6
ERGONOMIC SOLUTIONS

LEARNING OBJECTIVES

1. List the three categories of ergonomic solutions for masonry.
2. Describe several engineering solutions.
3. Describe several administrative solutions.
4. Describe several work practice solutions.
5. Understand the hierarchy of controls (solutions).

Review

In the previous units we talked about safety voice. We learned about risk factors for sprains and strains. Also, we discussed safety responsibility and using good communication skills.

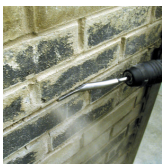
Ergonomic Solutions

Using ergonomic solutions whenever possible reduces your chance of injuries and can help you stay healthy and active for your entire career.

Solutions generally fall into three categories: engineering, administrative and work practice solutions, but they are not all equally effective.

Engineering Solutions

What are engineering solution?

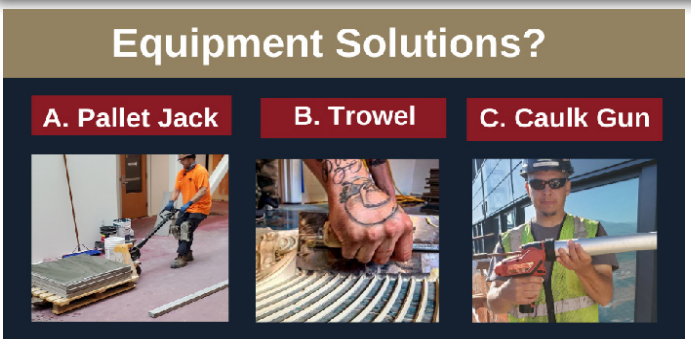


Engineering solutions are the most effective way to prevent injuries. Administrative solutions are moderately effective, while work practice solutions, because they are difficult to always use, are important but less effective solutions.

Quiz 1: Equipment Solutions - Brick and Block

Which do you think is an example of an equipment solution?

Quiz 1: Equipment Solutions - Allied Crafts



Which do you think is an example of an equipment solution?

Examples of Engineering Solutions

The following section highlights platforms and lifts, material handling equipment, tools, and materials that can all help reduce exposure to injury and cumulative trauma.

Tools

Material handling equipment reduces heavy lifting and awkward postures.

Well designed tools help reduce forceful hand exertion and awkward wrist postures.

Administrative Solutions

Now let's talk about administrative solutions. These have to do with work procedures.

They tend to help manage rather than eliminate hazards.

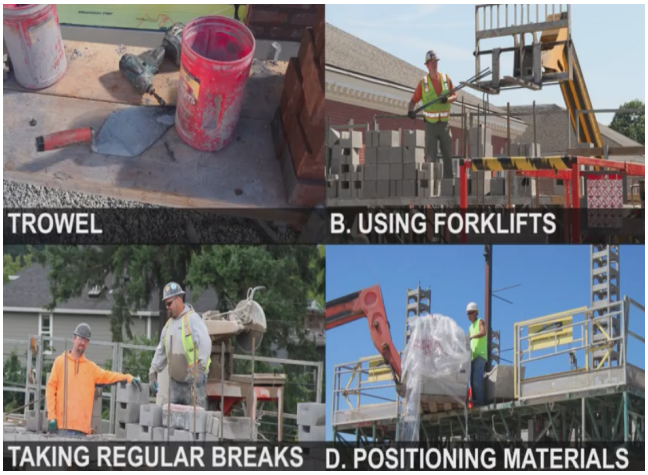
You may not have much control over administrative solutions that reduce your risk of injury.

Scheduled Breaks

Pre-Stocking Materials

Exercise Programs

Quiz 2: Administrative Solutions



Which is an administrative solution?

Work Practice Solutions

You have the most control over work practice solutions.

Work practices fall in to 6 categories:

- Transporting materials
- Cutting brick and block
- Laying brick and block
- Housekeeping and maintenance
- Good body postures
- Personal Protective Equipment (PPE)

Support Weight

Elevate Work

Modify Tools

Quiz 3: Work Practice Solutions - Brick and Block

Which is a work practice solution?

A) Adjusting the height of scaffolding

B) Have mortar mixers on site

C) Ergonomic Training

D) Lifts available

Which is an example of a work practice solution?

Quiz 3: Work Practice Solutions - Allied Crafts

Which is a work practice solution?

A) Grasping a grout float to support body weight

B) Having a power caulking gun

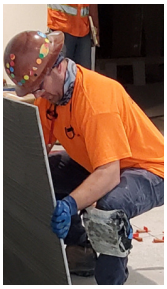
C) Ergonomic Training

D) Lifts available

Which is an example of a work practice solution?

Work Practice: Good Body Postures

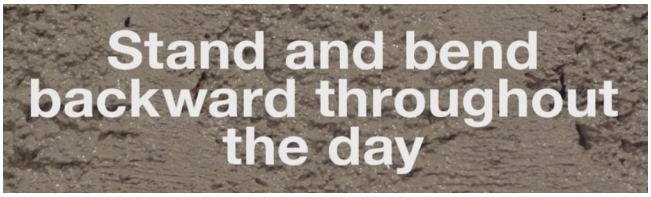
Body postures are a work practice solution that refer to using your body in the safest, most efficient way possible. Neutral postures are safe body postures.



Activity 1: Back Extension

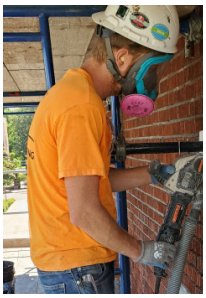
Since you spend a lot of time bending forward, whenever possible you should put your hands on your hips and bend backwards a few times.

Bending backward relieves the constant stretch on your low back muscles and repositions your low back discs.



More About Work Practices

PPE is worn on the body to protect you from all types of injuries, as well as protection from dust, scrapes and burns.



Discussion 1: What is wrong?

Now let's see if you've been paying attention. In an earlier video the masons were not using the correct PPE. Whats wrong with this picture?

Wrap-up

To summarize, there are many ergonomic solutions that will help keep you safe and minimize the chances of an injury at work. These include…

- Engineering
- Administrative
- Work practice solutions

Engineering solutions are most effective but administrative and work practice solutions are important and should always be included.

As an apprentice, you have the most control over your personal tools and equipment, using good body postures and some work practices, such as raising and lowering scaffolding to keep the work between your knees and shoulders.

SAVE UNIT 7
SOLVING SAFETY PROBLEMS WITH SOLUTIONS

LEARNING OBJECTIVES

1. Understand the concept of PASS: Problem, Advice, Safety, Solution.
2. Analyze a potential hazard to identify root causes.
3. Understand the factors to consider for making a choice about a solution.
4. Develop a plan for selecting safety solutions.

History of Ergonomics and Masonry

Unit 7 opens with a video about Frank Gilbreth, considered the father of ergonomics. Mr. Gilbreth's goal was to make work more efficient and productive. He especially helped make mason's work less stressful.

Discussion 1: Block Cutting

This may look like a typical day on a worksite.

But what if you notice that something doesn't seem right. Something is not safe.

Learning to spot safety hazards is the first step to finding solutions.

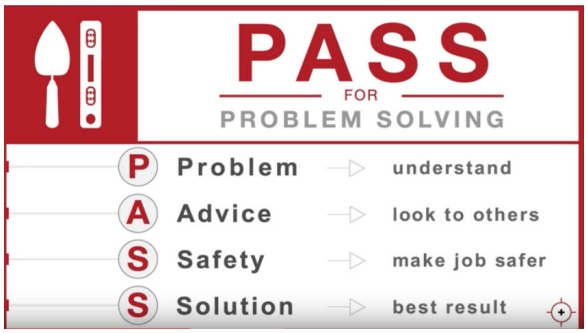
What is going on here?

If you saw this happening at a jobsite, what would you do?

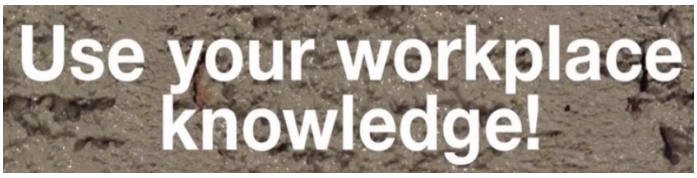
Problem Solving

Now we are going to get into how to problem solve safety issues.

Rather than complaining, you will be raising concerns. and solutions. Problem solving is your PASS to speak up.

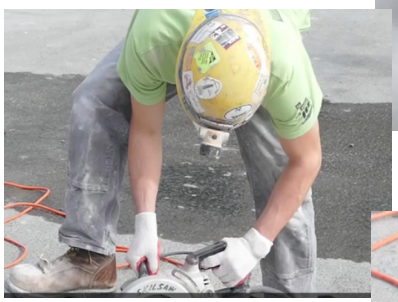


Problem – fully understand what you want to raise concerns about
Advice – looking to others for information may help.
Safety and **S**olution –find your safety solution. What is the best result to make the job safer?



Discussion 2: Issues

To practice identifying safety problems with this task, we need to get to what we call “the root cause” of the hazard.



Sometimes, a solution is not so apparent and you may need to get more information or advice.

Let’s break this down and dig a little deeper to get to the root. There is more than one problem here so we’re going to discuss each problem.

For each issue, let’s brainstorm why the problem is happening.

Why is he breathing in dust?

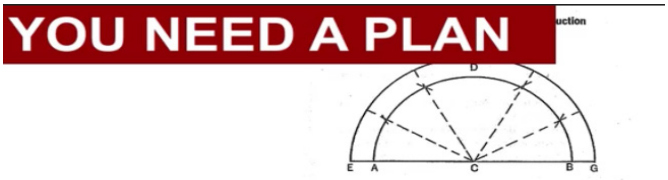
Why is he in an awkward, stooped posture?

Why is his foot in danger?

Plan to choose a solution

Let's learn some strategies to help us decide what would improve safety and what's the most viable solution.

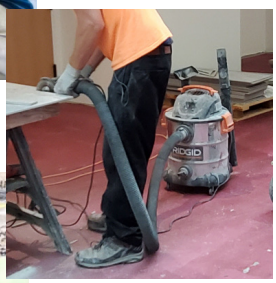
If you have several options, you need a strategy or plan to choose the best one.



All work takes planning. Just as masons use plans for building walls and arches, apprentices can plan to make safety decisions and use problem solving skills.

Discussion 3: Decisions

Let's quickly look back at our cutting block example. There are several solutions that could control dust.



How would you decide what is best?

What factors do you need to consider to make the best choice?

Problem Solved

The mason knows he can request a wet saw table for the project since he has to cut many blocks and knows the contractor has one. After asking his supervisor, he learned that the water prevents the dust from going everywhere.

He learned that a saw with dust collection would be harder to get and that respirators are uncomfortable and hot, so those two options are not always the best.

Also, respirators are part of a respiratory protection program which requires fit testing, training, and medical evaluations.

Knowing all this, he decides that his goal is to use a wet saw table.

Tips: Short term vs Long term

Just because a solution would be an immediate fix, doesn't mean it's necessarily the best.

Sometimes a short term solution is OK when you have to wait to put a long term solution into effect.

If you can't fix something right away, make it a goal to reach for in the future. Plan ahead.

Activity 1: Sphere of Control

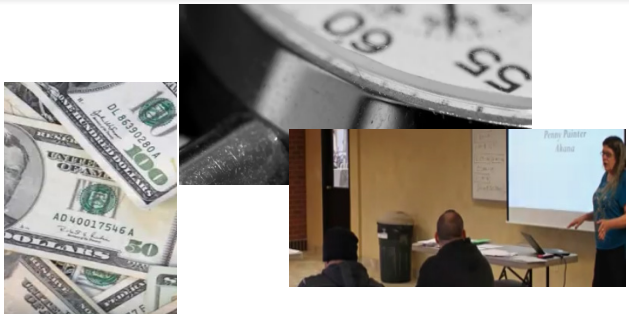
Now let's talk about who has control. Some solutions you have more control over, such as work practices, while other solutions you can't do much about – yet.

Turn to the Sphere of Control Worksheet now. Place the number for each activity where it belongs on the Sphere of Control diagram, to reflect your level of control.

Tips: Effectiveness of Solution

Engineering solutions are the most effective way to prevent injuries. Work practice solutions are the least effective and should complement engineering and administrative solutions.

Tips: Barriers



Barriers include cost, time and training.

Activity 2: Solution Plan

Turn to the Solution Plan worksheet for your craft.

Activity 1: Sphere of Control Worksheet - Brick and Block

1. Using 2 hands to place CMU instead of 1
2. Taking 'bending backwards' breaks
3. Lifting with a slight arch in your back
4. Staying fit
5. Adjusting scaffolding height
6. Adjusting how fast you lay brick/block to pace yourself
7. Good fitting gloves
8. Stepping rather than twisting when lifting
9. Laying light weight block
10. Holding materials close to your body
11. Lifting CMU less frequently during the day
12. Using mortar silos
13. Stretching before work
14. Using a squat lift
15. Taking rest breaks regularly
16. Having carts and lifts available
17. Changing up your tasks

Activity 1: Sphere of Control Worksheet - Allied Crafts

1. Supporting body weight with one hand gripping trowel or float
2. Taking 'bending backwards' breaks
3. Lifting with a slight arch in your back (neutral spine)
4. Staying fit
5. Cutting down tuckpointing tools to reduce wrist stress
6. Practicing switching hands when caulking, tuckpointing or 'demoing'
7. Good fitting gloves
8. Keeping the work in front of you
9. Using anti-vibration tools
10. Keeping work close to your body
11. Letting tools 'float' in your hand with a loose grip
12. Craning counter weights to roof
13. Stretching before work
14. Alternating kneeling with squatting postures
15. Taking rest breaks regularly
16. Having carts and lifts available
17. Changing up work tasks

Activity 2: Brick and Block Masons Solution Plan

Instructions: You are going to develop a plan to consider ergonomic solutions. Read the scenario, then write down your assessment of the solutions presented for: timing, control, effectiveness, barriers. Taking all of these considerations into account, write your overall recommendation for the best ergonomic solution.

SCENARIO 1 Brick and Block Masons

You are starting work on a new US Post Office. Due to security concerns you are required to lay 10" block with rebar 8" on center, with a 4' lap. This requires you to lift 60 lb block over tall rebar with each block placed.

1. What are the **ergonomic risk factors** you face in this situation?

2. Describe **2-3 solutions** you can consider in the spaces provided.

	Solution 1:	**Solution 2:**	**Solution 3:**

3. Fill in the table for each solution considering the following:

Timing

short term or long term solution?

Control

do you have control or who does?

Effectiveness

What type of solution is it?

How effective is it?

Barriers

time, money, training, what else?

What is your 'best solution' recommendation?

Activity 2: PCC Masons Solution Plan (1 of 2)

Instructions: You are going to develop a plan to consider ergonomic solutions. Read the scenario, then write down your assessment of the solutions presented for: timing, control, effectiveness, barriers. Taking all of these considerations into account, write your overall recommendation for the best ergonomic solution.

SCENARIO 2 PCC Masons

You are starting restoration of exterior brick on an 8 story building. You'll be setting up several outriggers. You'll need to carry dozens of 50-lb counter weights to the building roof. The last set of stairs leading to the roof is very narrow and steep. The usual practice is to carry weights manually, 2 weights at a time, one in each hand.

1. What are the **ergonomic risk factors** you face in this situation?

2. Describe **2-3 solutions** you can consider in the spaces provided.

	Solution 1:	Solution 2:	Solution 3:

3. Fill in the table for each solution considering the following:

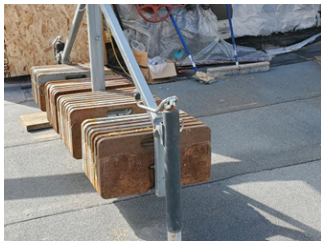
Timing
short term or long term solution?

Control
do you have control or who does?

Effectiveness
What type of solution is it?
How effective is it?

Barriers
time, money, training, what else?

What is your 'best solution' recommendation?



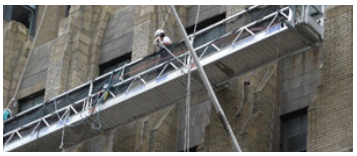
Activity 2: PCC Masons Solution Plan (2 of 2)

Instructions: You are going to develop a plan to consider ergonomic solutions. Read the scenario, then write down your assessment of the solutions presented for: timing, control, effectiveness, barriers. Taking all of these considerations into account, write your overall recommendation for the best ergonomic solution.

Cross beam swing stage scaffolding

SCENARIO 3 PCC Masons

You are preparing to work on a PCC site with swing stage scaffolding suspended from the roof. You have been told there will be a "crossbeam stirrup assembly" with an 'A' type stirrup mounted several feet from the ends of the platform. You know with this set-up the hoist blocks your ability to easily access work on both sides of the stirrup.



Walk-thru 'C' stirrup on swing stage scaffolding

1. What are the **ergonomic risk factors** you face in this situation?

2. Describe **2 solutions** you can consider in the spaces provided.

	Solution 1:	**Solution 2:**

3. Fill in the table for each solution considering the following:

Timing

Short term or long term solution?

Control

Do you have control or who does?

Effectiveness

What type of solution is it?
How effective is it?

Barriers

Time, money, training, what else?

What is your 'best solution' recommendation?

End 'A' type stirrup assembly

Activity 2: Tile Masons Solution Plan

Instructions: You are going to develop a plan to consider ergonomic solutions. Read the scenario, then write down your assessment of the solutions presented for: timing, control, effectiveness, barriers. Taking all of these considerations into account, write your overall recommendation for the best ergonomic solution.

SCENARIO 4 Tile Masons
Masons are to tile a new hotel lobby using 36' x 36' marble tiles. This is a large project and each tile weighs over 50 pounds. Some younger apprentices want to muscle through it and lift the tiles by themselves without equipment.

1. What are the **ergonomic risk factors** you face in this situation?

2. Describe **2 solutions** you can consider in the spaces provided.

Solution 1: **Solution 2:**

3. Fill in the table for each solution considering the following:

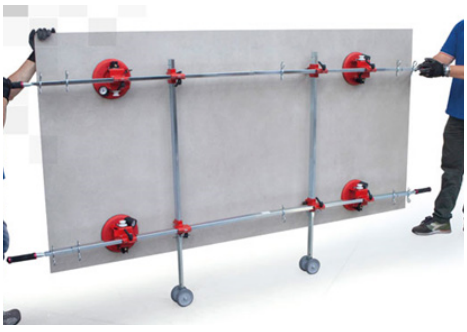
Timing
short term or long term solution?

Control
do you have control or who does?

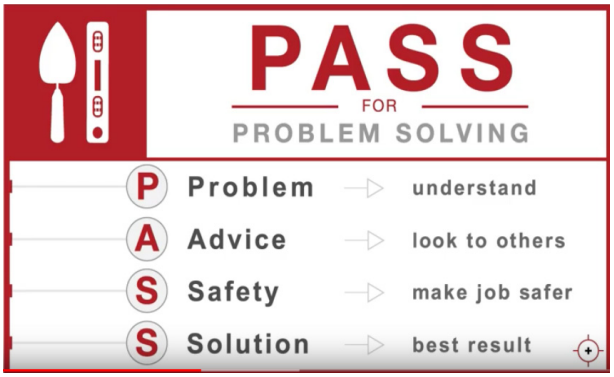
Effectiveness
What type of solution is it?
How effective is it?

Barriers
time, money, training, what else?

What is your 'best solution' recommendation?



Recap of PASS and HARP



Remember there are 4 main risk factors to keep aware of at work: HARP. And, when you notice safety hazards at work use your PASS skills for solving problems.

The End

Be proactive and be a safety leader!

SAVE GLOSSARY

ABC MODEL – Ask questions, Brainstorm solutions, Choose the best solution is the ABC model for conflict resolution.

ACUTE TRAUMA – Damage to your body's tissue that happens immediately after a trauma.

ACTIVE LISTENING – Listening takes a concious effort to hear and understand what a person is saying to you. To actively listen you must be prepared to pay attention, keep an open mind and not jump to any conclusions before you have heard everything.

ADMINISTRATIVE SOLUTION – Eliminating or minimizing the risk of injury in the workplace by changing work procedures. Examples include job site layout and materials staging, work sequencing and scheduling, and ergonomics programs and training.

ANATOMY – The science concerned with the structure of the body.

ANSI (AMERICAN NATIONAL STANDARDS INSTITUTE) – A private, non-profit membership organization that coordinates voluntary standards activities. ANSI standards are used by engineers and specifiers to choose masonry materials. For example, light weight block meets the same ANSI standard as regular weight CMU.

AWKWARD POSTURE – Awkward posture is the position of the joint and its connecting limbs that deviates from neutral posture. Awkward posture of the body is associated with an increased risk for injury.

BACK INJURIES HAZARD ALERT – A Hazard Alert is a short, image-driven material that delivers a simple and direct message for protections against health and safety hazards. CPWR provides a hazard alert to prevent back injuries.

CARPAL BONES – Eight small bones that make up the wrist.

CARPAL TUNNEL SYNDROME – A condition in which the nerves that pass through the wrist becomes irritated and inflamed causing pain and numbness in the hands.

CHOOSE HAND SAFETY – Hand injuries can impact the quality of work, productivity and even end careers. Understand the risks. Learn how to protect your hands, including what to look for when choosing and using hand tools & gloves. Visit choosehandsafety.org for more information.

CONFLICT RESOLUTION – A process for preventing and resolving conflicts in a professional and respectful manner.

CONTROL – The power to direct the tools, equipment or work practice. You have control to select and use some solutions, but some things you may not have any control over but can still use your safety voice to advocate for a solution.

CPWR - Is an acronym for the Center for Construction Research and Training.

CUMULATIVE TRAUMA – Damage to your body tissues leading to injury that occurs slowly over time. The duration can be a few days, weeks or even years. Examples include carpal tunnel syndrome, tendonitis and muscle strains and ligament sprains.

DISC – Fibrous spacer that rests between two vertebrae in the spine, made up of an outside ring of strong fibrous bands and a center filled with a jelly-like material.

DISC HERNIATION – A more severe form of disc protrusion in which the injury to the intervertebral fibers are se-

verely torn and some of the jelly-like center contacts and irritates the nerves. Also known as a “slipped disk”.

DISC PROTRUSION – An injury to the intervertebral disc in which the fibers are torn and some of the jelly-like center is pushed backward onto the spinal nerves.

ENGINEERING SOLUTION – A way of eliminating or minimizing the risk of injury in the workplace by using equipment, tools, and work materials that are most ergonomic. Engineering solutions are the most effective way to reduce chances of injury.

ERGONOMICS – The study of people’s efficiency in their working environment. Interaction between the worker, the work & the work environment.

FORCE – The amount of muscle effort applied to move an object. Sometimes referred to as the ‘weight’ of the object. The higher the force, the greater the risk of injury.

FUNCTIONAL LIMIT – The range of motion within the body in which you will not likely be injured and which minimizes the cumulative trauma to your body.

HARP – Reminder of the 4 risk factors for strain/sprain injuries: Heavy Lifting, Awkward Postures, Repetitive Activities, & Prolonged Postures.

HIERARCHY – Every local has their own communication line and directions on who you should talk to about safety concerns once you are on a jobsite. Know this hierarchy and your line of communication.

HIERARCHY OF CONTROL – A method to rank ergonomic solutions by effectiveness. At the top of the hierarchy for most effective are engineering solutions, at the bottom of the hierarchy of control are work practice solutions.

LIGAMENT – Fibrous tissue that connects one body to another bone. Ligaments allow proper movement of the joints

LONG TERM SOLUTION – A solution that might take days or weeks to implement rather than hours or a day. Such a solution might be something that the contractor or owner has to take care of or something that needs to be delivered to a site or ordered.

MUSCLE ASYMMETRIES – A condition in which some muscles become stronger and others weaker so that a group of muscles does not work together as a unit. For example, weak buttock muscles can cause back muscles to work too hard which increases the chance of injury.

MUSCULOSKELETAL DISORDERS (MSD) – Injuries and disorders of the muscles, nerves, tendons, ligaments, joints, cartilage & spinal disc.

NEUTRAL POSTURE – Postures that put the least amount of stress on the muscles and joints. Neutral posture is standing erect, head facing forward, with the arms at the sides.

NON-VERBAL COMMUNICATION – Hand signals, postures, facial expressions and eye contact can communicate a lot.

PASS – A mnemonic that outlines the steps for problem solving in the workplace. Problem (you must fuly understand the problem you are raising concerns about), Advice (look to others and information for help), Safety & Solution (find your best safety solution).

PELVIS – The large bony ring structure at the base of the spine to which the hips attach.

PINCH ZONE – A tunnel-like region of the shoulder in which the rotator cuff muscles can be pinched when the arm is raised to the side 90°

PPE – Personal protective equipment.

PROBLEM SOLVING – Using an orderly method to find solutions to a problem. Like solving a puzzle, there are steps to problem solving that include identifying your problem, getting advice, and determining the best solution.

PROLONGED POSTURES – Body positions that a person stays in for more than a few seconds at a time; also called static postures. Prolonged postures increase the changes of an injury.

REFLECT AND CLARIFY – Reflecting is repeating back what you heard to ensure you understand. It can help clarify if you misunderstood.

REPETITION – The number of similar exertions performed during a task. Can be associated with injury and worker discomfort.

RISK FACTOR – Actions or conditions in the workplace that can cause a work related injury or MSD; examples include heavy lifting, awkward postures, repetitive activities, and prolonged postures.

ROTATOR CUFF – A collection of four shoulder muscles that provide movement and keep the shoulder joint sturdy and stable. These muscles can be injured from reaching overhead and when the arms are used repeatedly in the pinch zone.

SAFETY VOICE – Speaking up to fix safety hazards. Knowing how to speak up appropriately and effectively is a skill that can be learned.

SAFETY HAZARD – Unsafe conditions that can cause injury, illness or death.

SAFETY TOOLBOX – ICE BAC has a website site resource called safety toolbox with links to information on hand safety, silica, mast climbers, gloves, hand tools, cutting masonry, reducing back injuries and noise and hearing loss

SCIATIC NERVE – A large nerve that runs down the back of your leg. This nerve can be injured by disk problems in the low back.

SHORT TERM SOLUTION – Immediate fix for a worksite problem.

SLIPPED DISC – The same as a disc herniation.

SPRAIN – An injury to a ligament in which the fibers are stretched or damaged.

STRAIN – An injury to a muscle or tendon in which fibers are stretched or damaged.

TENDONITIS – An injury to a tendon in which the fibers are stretched, damaged, or irritated.

TENDON – Fibrous tissue that attaches muscles to bone.

TRUNK – The body minus the head, arms and legs.

VERTEBRA – An individual bone out of the series of bones that make up the spine.

VERBAL COMMUNICATION – Talking in person or over the phone, emailing, texting or messaging are all forms of verbal communication.communication.

WORK PRACTICE SOLUTIONS – A way of eliminating or minimizing the risk of injury in the workplace by improving work tasks using ergonomic principles.

CPWR is the research and training arm of the North America's Building Trades Unions and serves the construction industry and its workers (www.cpwr.com). CPWR is supported by NIOSH Cooperative Agreement OH009762. The contents are solely the responsibility of the authors and do not necessarily represent the official views of NIOSH.