

**Instructor's Notes –**  
**Ergonomic Improvement**  
**The Next Level**  
**(The Prevention of Pain and Discomfort)**

**Timber Products Safety**

- There is a high incidence of ergonomic related injuries in our industry.
- The Timber Products Manufacturers Association along with your employer recognizes the need for ergonomic improvement and the prevention of pain and discomfort.
- With a grant from OSHA, TPMA has developed the following training module to help you recognize ergonomic hazards and provide a process for reducing the potential for future pain and discomfort.

**This Training Module Uses**

- Adult learning techniques
- Photos of actual practices at a sawmill
- Illustrations and short interactive demonstrations
- New techniques for recognizing ergonomic hazards

## Training Module Worksheet

### Hand out the worksheet

- Since adults learn the most by doing, a worksheet has been prepared to help you retain the most important information.
- You will complete the worksheet as we move through the material. This means that you will fill in the blanks or complete lists.
- You will keep the worksheet as a reference to the key points presented in this module.

### Instructor – this is Part I –

### The Foundation for Ergonomic Improvement

Everything begins with a foundation.

### MSDs Are Ergonomic Related Injuries

*(Whenever you see the words highlighted in red like these, it means it is time to fill in the worksheet)*

Musculoskeletal Disorders is the proper scientific term but we will use MSDs instead. MSDs are injuries or pain and discomfort in the body's **joints**, ligaments, **muscles**, nerves, **tendons** and structures that support the **limbs, neck and back**.

Our mission is to make ergonomic improvements in our work environment that will prevent MSDs.

## **Ergonomic Improvement**

Let's get started with a definition of ergonomic improvement.

“Ergonomic improvement is a process for reducing risk and preventing MSD's that cause pain and discomfort by effectively managing the **movement** of **people, equipment, material and energy**”.

There are some key words in this definition. The first one is **movement**. No MSD has ever occurred without movement.

The other key words are **people, equipment, material and energy**. They are key because they are the only four things that can move. Think about it, if we were able to effectively control the movement of people, equipment, material and energy in our process, we would have no MSDs.

Ergonomics The Next Level will focus on the movement of people and material as they are key to the prevention of MSDs which is our mission. Equipment and energy are also important but not at the same level as people and material.

## Process

What is a process? A **process** is a series of steps designed and developed to achieve a specific result. It is **never** ending. It is **continuous**. It has **inputs and outputs**. Every time the process receives a good input a **better output** should follow.

You have a major role in the ergonomic process by providing inputs. You know the work better than anyone so you are best equipped to identify the physical movements most likely to produce pain and discomfort.

## Hazards

A hazard may be defined as – **any source of danger**. There are two major types of hazard. The first type is an unsafe **condition**. The second type is an unsafe **behavior**. It should be pointed out that the term behavior is used in the scientific sense. That is, behavior is defined as an observable action. Therefore, by itself behavior is neither good nor bad – it is merely an observable action. On the other hand, an unsafe behavior, by definition, is an observable action that is a source of danger.

Here are several examples of unsafe conditions:

- Noise
- Non-adjustable chairs at a console
- Console monitors located too high or too low

There can be a direct relationship between unsafe conditions and unsafe behaviors. For Instance-

While Noise is an unsafe condition - Failing to wear hearing protection in noisy areas is an unsafe behavior.

A non-adjustable console chair may be an unsafe condition but failing to adjust an adjustable chair to the needs of an operator is an unsafe behavior.

A console monitor located too high or too low is an unsafe condition but viewing a console monitor that is placed too high or too low is an unsafe behavior.

(Please keep in mind, at this point we are not talking about responsibility. We are still focusing on an observable action.)

## **How Do MSDs Occur**

An **MSD** is an injury or pain and discomfort that happens **over time** because of unsafe behaviors and unsafe conditions. The most important thing to remember is that before every MSD is recognized or diagnosed there are unsafe behaviors or unsafe conditions in the work environment that contribute to or allow the condition to develop. Knowing this, doing nothing is an option but not a very good one.

## **The Sequence of Events That Lead to MSDs**

The sequence starts with hazards that are in the work place. If specific unsafe conditions or specific unsafe behaviors which are

known to contribute to the development of MSD's are in the work place and remain uncontrolled, the combination of those hazards along with time and movement will produce MSD's.

## **Manage the Movement**

Remember that all MSDs begin to develop with some form of movement. Unfortunately, most of the time the movement involves the way our jobs are performed. Sometimes it is personal choice of movement and other times it is the design of the job that causes us to move in certain ways. In either case, the movement must be managed.

## **Personal Choice May Have Consequences**

Read and discuss

Changes

The author of this training material worked with a garage mechanic in Louisiana named Eddy who chose to get the grease and grime off his hands by dipping them in solvent and then washing them in soap and water. He knew that he should avoid direct contact with solvent but he chose to have direct contact because it worked and nothing happened to him when he did. He did this for over twenty years. He performed his ritual before every break period, lunch period and at the end of the shift. He dipped his hands in solvent four times a day for more than twenty years without having a problem. However, one day, at the first break he performed his ritual and by the end of

the break both of Eddy's hands were so swollen that they looked like little footballs. He was off work for weeks and was never able to return to his job as a garage mechanic. So what happened? Over time he developed a sensitivity to the solvent. The solvent not only removed all the grease and grime from his hands but it also removed all the oil and fatty deposits in his hands. His sensitivity was so strong from long term exposure that if he even got close to where solvent was being used, his hands would begin to swell.

So what does all of this have to do with ergonomics and MSDs? Actually, this incident has a lot to do with ergonomics and MSDs. Repetitive motion injuries and even over exertion injuries generally happen over time and the victim, like Eddy, has very little warning of the impending consequences.

Eddy knew that he should not have direct contact with the solvent but he made a personal choice that had consequences. This training has been designed to provide you with the knowledge necessary to protect yourself from MSDs and the pain and discomfort that results. Armed with that knowledge, you will be able to make informed choices both on and off the job.

### **Learning to Recognize Danger**

We all know that, if we are able to recognize a danger, we can take action to protect ourselves. Our life experiences teach us

to see and sense danger and learn how to deal with it. Anyone who has ever been rear-ended by another vehicle and is injured develops a special awareness of what is behind them and how close they are. Therefore, sometimes it is **actual life events** that cause us to develop skills that keep us safe.

### **In Addition**

We also develop skills to keep safe by **listening** and **watching** our elders or observing how others handle potential dangers. Most of what we learn by listening and watching is pretty obvious. Observing someone stick a finger into a hot empty light socket and survive provides serious skill development for both the victim and observer. Watching someone touch a hot burner on a stove provides a life-long lesson. Gaining knowledge through listening and watching is not always as dramatic as our examples. Sometimes it just quietly happens.

### **Ultimate Proof - We Learn by Watching our Elders**

Case closed! It happens everywhere with everyone and begins at a young age.

The next part of this training is going to provide you with some skills and knowledge for recognizing ergonomic hazards that cannot be learned by listening to elders or watching others deal with danger.

### **Part II – Ergonomic Awareness (Click to next slide)**



## **Ergonomic Skills and Knowledge**

For too many people ergonomic skills and knowledge are acquired through bad experiences over a period of time. This is learning the hard way. By the time these skills and knowledge are learned, damage has already occurred. Sometimes the damage can be reversed and sometimes it can't. Gambling on being able to reverse the damage doesn't seem to be a good option. Learning ergonomic skills and obtaining knowledge appear to be the superior option.

## **What is the Best Way to Prevent MSDs?**

- Recognize and manage the **Postures** that Cause Them
- Manage the **Repetitive Movements** that Cause them

## **Movement and Posture**

For the next several slides, you are going to learn how to recognize potential dangers that are not obvious. These non-obvious dangers involve the posture and movement of your wrist, elbow, shoulder and arm. We will start with the wrist.

## **Wrist Postures and Movement**

Each slide will have neutral postures on the left and awkward postures on the right. It is very important that all of us fully understand what is neutral and what is awkward. I am going to demonstrate each neutral and awkward posture and I would like each of you to do the same. **Demonstrate each posture to the class.** Notice that my upper arm is parallel to the floor and my right hand is straight up. **Maintain that basic posture for all of the wrist demonstrations.**

**Describe what you are doing with each posture.**

First do neutral posture #1.

Next do awkward posture #2.

Now do awkward posture #3.

Let's do neutral posture #4.

Next do awkward posture #5.

Now do awkward posture #6.

Did you feel any differences between the neutral and awkward postures?

The bottom line is this - you should not feel any stress with neutral postures. Some people will feel stress with the awkward postures. Awkward wrist postures not only put stress

on the wrist but also impact the forearm, elbow, upper arm and shoulder. Some of you may have felt the stress and others may not have felt the stress. The extent of the stress varies by individual and several other factors which will be discussed later.

Oh by the way, you don't have to remember if it is an ulnar or radial deviation or a flexion or extension. Knowing what is neutral and what is awkward is all you have to know.

## **Elbow Postures and Movement**

Now we are going to look at neutral and awkward postures of the elbow.

I am going to demonstrate each neutral and awkward posture with my right elbow and I would like each of you to do the same. **Demonstrate each posture to the class.**

**Describe what you are doing with each posture.**

Let's do neutral posture #1.

Next awkward posture #2.

Now awkward posture #3.

So we have done one neutral and two awkward postures with the elbow. Did you notice that with these postures the elbow remains stationary and the position of the lower arm determines if the posture is neutral or awkward? Again the

bottom line is this - you should not feel any stress with neutral postures. Most people will not feel stress with the basic awkward elbow postures unless they have previous damage to the elbow. For instance, if you were a baseball pitcher and threw thousands of curve balls or sliders, you may have experienced some stress with the awkward postures. The important thing to know is what is neutral and what is awkward.

If awkward doesn't hurt, then why are we even talking about it? Unlike the wrist, to stress the elbow requires the introduction of up to three other factors that will be introduced later.

## **Shoulder Postures and Movement**

Next we are going to look at neutral and awkward postures of the shoulder.

Again I am going to demonstrate each neutral and awkward posture with my right shoulder and I would like each of you to do the same. **Demonstrate each posture to the class.**

**Describe what you are doing with each posture.**

Let's do neutral posture #1.

Next do awkward posture #2.

Most of you didn't feel anything. It was pretty easy. Now do the same thing with the fingertips of your left hand on the outside of your right shoulder. You should feel the muscles of the right shoulder tighten up. Every physical movement produces some sort of musculoskeletal response.

Do awkward posture #3.

Now let's do neutral posture #4.

Next do awkward posture #5. Return to neutral and repeat #5 with your left hand finger tips on the outside of the right shoulder. Did you feel your shoulder muscles tighten up? What else happens to your body when you move from neutral to awkward? (bones and joints move)

Now do awkward posture #6.

Obviously, the neutral postures should not cause stress. If you did not feel any stress in the awkward postures, you should feel good about yourself because there is hope that future ergonomic improvements can keep you that way for the rest of your career. If you felt any stress with the awkward postures, you may have done some shoulder damage in the past. Future ergonomic improvements may prevent any additional damage to your shoulder. It should be noted that the three other factors that will be discussed later will also influence stress on the shoulder.

## **Back Postures and Movement**

Read and discuss the slide. Demonstrate each posture to the class.

Describe what you are doing with each posture.

Let's do neutral posture #1.

Next do awkward posture #2.

Did you feel anything with awkward posture #2? Hopefully not, but what if you had to be in that position for six hours a day. Do you think that would make a difference?

Do awkward posture #3.

Do neutral posture #4.

Let's do awkward posture #5.

Now do awkward posture #6.

### **Neutral vs. Awkward Postures**

We now know that there are neutral postures and there are awkward postures. **Neutral** postures will produce the **least** stress on the body. On the other hand, **awkward** postures will produce the **most** stress on the body. Some of us will feel the stress of awkward postures and some will not. It varies by individual and is influenced by time and three other factors.

## **The Four Factors That Influence MSDs**

Previously, we learned that all MSDs begin with some sort of movement. In these instances, we are talking about your personal movement and not necessarily the movement of material. We already learned that **Posture** is a factor which can produce physical stress. The remaining three factors are – **Duration, Force and Frequency**. A task that does not take very much time; requires little effort; is infrequent and posture is not severe will not produce high physical stress.

On the other hand, a task that takes a long time; requires significant physical force; happens frequently and involves awkward posture may very well produce high physical stress. Posture, Force, Duration and Frequency all influence the development of MSDs.

### **A Real Life Example**

In the 50's, 60's and 70's, many Major League Baseball pitchers had short careers. Their arms would be shot by their thirties. Why- Duration – they would try to pitch the whole game. Force – they gave whatever they had to every pitch. Frequency – they threw a lot of pitches going the distance. Posture – each pitch involved several awkward postures.

But we learned to make improvements because the process used by Major League Baseball was destroying very valuable

assets. **Duration** – today there are closers who come into the game to finish it and no one has to go the distance. **Force** – a lot less force is expended in five innings than nine or more innings. **Frequency** – fewer pitches in five innings. **Posture** – fewer pitches involving awkward postures.

All of this results in additional rest and recovery time for the starter. As a result, today pitching careers are much longer than in the past and this is good for pitchers, management and the fans.

This is exactly what we want to do in our mission – reduce the duration, force and frequency and improve the posture.

### **Wrist Postures + Duration**

Using the wrist as an example. Look at wrist posture #6 and factor in duration. There would be a noticeable difference between performing that posture and holding that posture for five minutes.

### **Wrist Postures + Force**

Have everyone do awkward wrist posture #6 and apply 6 pounds of force to their fingertips.

Factoring in force to an awkward posture makes a huge difference.

### **Wrist Postures + Force + Duration**



In this slide we are adding two factors, force and duration. Imagine the impact of six pounds of force for four minutes in awkward wrist posture #6.

### **Awkward Wrist Posture + Force + Duration + Frequency**

Now we are going to add the final factor, frequency. We still have the six pounds of force applied for four minutes each cycle but 50 cycles are performed each shift. Imagine the difference in physical stress between a simple awkward posture and that same awkward posture impacted by the factors of force, duration and frequency.

### **Part III – Actually Reducing Physical Stress**

Click to next slide

### **Ergonomic Improvements**

The purpose of previous ergonomic training and this session is to prepare you and management for reducing the duration, force, frequency and awkward postures involved in your physical stress.

Read and discuss the slide

### **Awkward Wrist Posture + Force + Duration + Frequency (2)**

Using the same slide from our example, what could reduce the physical stress involved in our example?

Get them to respond

The answers are –

Improve the posture

Reduce the force

Reduce the duration

Reduce the frequency

### **Why Ergonomic Programs Fail (1)**

Many ergonomic programs fail and there are two common reasons for their failure. The first reason is lack of management commitment to the process. Success requires management time, money and action. Management must drive the process.

### **Why Ergonomic Programs Fail (2)**

The second reason ergonomic programs fail is because those involved in the effort try to do too much too fast. In other words, their initial projects are too big and they strive for perfection. They want to eliminate 100% of the problem.

## **This Is What Works**

All of your improvement projects must address three words. They must be practical, feasible and realistic. Doing this will ensure success.

**Practical** = it can be done

**Feasible** = it makes sense to do it

**Realistic** = it is within the capability of the organization to get it done

## **Sage Advice**

I don't think that Mark Twain knew very much about ergonomics, but he was dead on when he said "**Continuous improvement** is better than delayed perfection."

Remember this also, "**Perfect** is the **enemy** of good".

Stick with practical, feasible and realistic and you can make a real difference.

## **Five Steps to Ergonomic Improvement**

1. **Identify** an awkward posture
2. **Determine** what can you do to -
  - Improve the posture
  - Reduce the force

- Reduce the duration
- Reduce the frequency

3. **Document** your improvement

4. Recognize, communicate and share your success

5. Repeat steps 1-4

### **For Instance**

What do you see? [Hold slide for 10 seconds](#) – Look at page 4 of your worksheet and look at the slide.

### **Example Step 1 -Three Awkward Postures**

The red lightning bolt identifies the three awkward postures in the photo.

### **For Instance (2)**

Just to make sure that we all see three awkward postures. Do you see all three awkward postures?

### **Example Step 2 – What can be done to –**

Now that the awkward postures have been identified, it is time to determine what improvements can be done. Just for the sake of an example let's say that posture can be improved and the frequency can be reduced.

### **Example Step 3 – Record the Improvement**

Read the slide

A 20 degree bend at the waist is much better than 45 degrees. As a matter of fact, it is 44% better. The frequency was reduced by 10%. Both of these improvements are excellent. Think about the impact of such improvements would have over time. (a week, a month, a year, 5 years, 20 years or a career)

**Example Step 4 –**

**Recognize, Communicate and Share Your Success**

Acknowledge the good work. Communicate the achievement and share your success with others.

**Example Step 5 – Repeat Steps 1-4**

[Wait two seconds and then click](#)

**Example Step 5 – Repeat Steps 1-4**

[Wait two seconds and then click](#)

**Example Step 5 – Repeat Steps 1-4**

[Wait two seconds and then click](#)

**Example Step 5 – Repeat Steps 1-4**

There are thousands of opportunities for ergonomic improvement that will prevent MSDs

QUIZ