Safety Focus - Ergonomics in the Manufacturing Environment

cbia
Workers' Comp

Submitted in Partnership with

FutureComp®

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CBIA Workers' Comp Program Overview

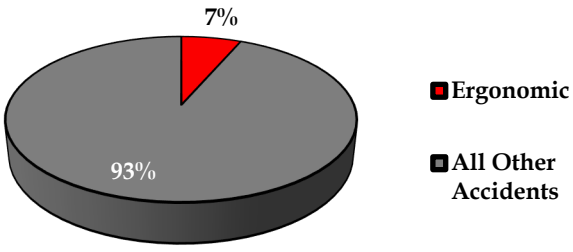
The Connecticut Business & Industry Association (CBIA) Workers' Comp Program consists of over 100 organizations with a collective goal to prevent accidents and incidents from occurring as a benefit to you the employer, the Program as a whole and most importantly, the employees whom are our most valued partners.

As Members or organizations are similar in nature of operations, safety related exposures could be common, thus we within the FutureComp Loss Control Department will attempt to send out periodic communications related to trending within the Program, more serious incidents that could have the potential of happening at your organization and hot topics in the industry, to include but not limited to any regulatory updates.

This is a focus on **ergonomics or repetitive motions**, as historically these types of injuries have been one of the most common accident types and we have seen some increases in costs related over most recent years (additional data below). It is important to note, that in this focus we are concentrating on those injuries that we can accurately identify the root cause of injury as being directly related to repetitive or developing over time. Strain related injuries can include ergonomic factors, however we will concentrate on strain specifics as part of a future safety focus. We will discuss in more detail some of the CBIA common risk factors related to ergonomic and repetitive motions, however the majority of the injuries we see within the Program typically occur in secondary and assembly operations, along with repetitive operator motions.

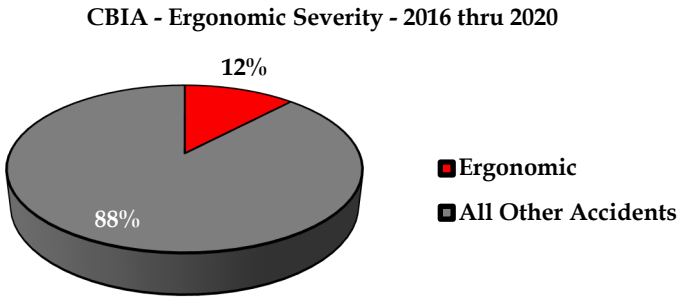
Finally, it is **important to note**, that ergonomics is one of those workplace hazards that are difficult to "manage". We often hesitate in providing employees too much information on the subject matter as there are so many variables that could increase potential of injury. This safety focus should primarily be used by management to evaluate their current approach, consider common control methods, educate those responsible for supervising employees and know that additional actions can be taken if and when specific concerns are identified.

CBIA - Ergonomic Frequency - 2016 thru 2020



Looking at the last five completed calendar years, although not the most common accident type in the Program, ergonomic specific injuries have been one of the more frequent accident types with either consistent trending or trends that are increasing over most recent years. In risk management, we always consider frequency has the tendency to breed severity (costs). This is very much the case with ergonomic injuries since surgery is often a necessity, which ultimately equates to lost workdays. We want to reduce the potential of an incident in the hopes of minimizing end financial impacts.

Ergonomic specific incidents have actually been the fourth most costly incident in the program since 2016 behind lifting, strain and caught between (typically machine guarding related). As mentioned previously, there could be ergonomic factors related to strain type injuries, but those also involving lifting. However, this focus is on repetitive exposures, workstation design and possible solutions to control. Since 2016, just ergonomic specific incidents have cost the Members of CBIA just over $740,000.



Focus on CBIA Ergonomics

Potential Areas of Concentration Based on Historical Trends

https://ergonomictrends.com/

To help illustrate potential areas of focus, it is important to look at what body parts within the CBIA Program are most commonly effected as it could shed light on what operations are potentially leading to the repetitive motion exposures.

Looking back at five years of ergonomic claims, the vast majority involved wrists and elbows, followed by fingers, shoulders and neck. These are the common body parts involved in ergonomic cases, however, could highlight the fact that repetitive fine hand manipulation is one of the primary causes of cases within CBIA.

Common CBIA Operations Where Ergonomic Injuries Occur

- Assembly
- Deburring
- Electroplate Tanks
- Secondary Operations
- Coil Assembly
- Computer Workstation
- Plastic Injection Molding
- Masking for Coating
- Microscope/Inspection

Common CBIA Tasks Where Ergonomic Injuries Occur

- Winding
- Crimping
- Deburring with knife
- Opening/Closing Clamps
- Twisting
- Cutting
- Hand deburring
- Pulling/placing tape
- Soldering
- Reaching
- Trimming
- Deburring with file
- Activating Machine
- Pushing/Placing Part
- Inspecting/Gauging Parts

If you have any of the above operations or tasks within your operations, you may want to consider the following controls especially if any of the above are considered repetitive in nature.

What Defines a Repetitive Job?

According to OSHA Ergonomic Guides, a highly repetitive job can be characterized by one of the following: A cycle time less than 30 seconds. Over 1,000 parts per shift, or more than 50% of the cycle time involving the same kind of fundamental cycle.

Control Considerations Specific to Ergonomics

The following will be broken down further, but we feel it is important that when investigating and improving ergonomics exposures within the workplace there is a common flow of control implementation that can be considered based on your overall exposure;

- Workstation Design to Include Fitting the Employee to Station
- Eliminating Non-Value Adding Operations & Motions
- Implementing Engineering Control(s) to Reduce Manual Repetitive Motion
- Creating a Formalized Work Rotation
- Develop In-House Stretch & Flex Program
- Supervisors Roles in Controlling Ergonomics

Workstation Design

https://technologystudent.com/


https://www.valin.com//

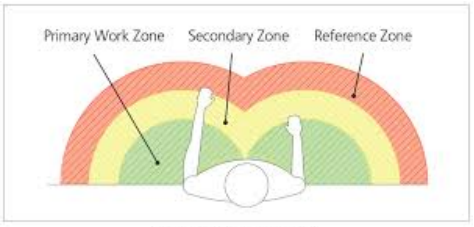


Figure 1: Workzones

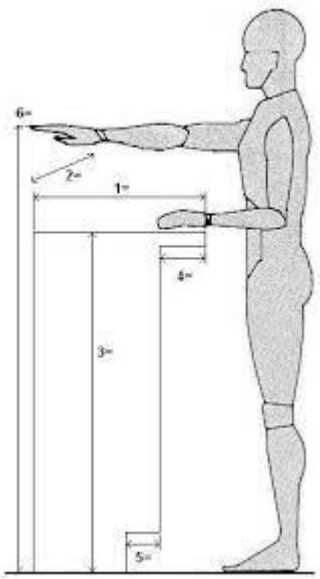
https://workplacenh.com/

- Although not identical, the concepts related to computer workstation design can be somewhat similar to manufacturing in that body positioning is all about attempting to maintain as neutral posture as possible.

- **Ergonomic Arrangement for the Individual**
  - Feet flat on the ground or when necessary on a footrest/stool, never on casters or wheels of chair.
  - Knees bent at 90-120 degrees, anything less can restrict blood flow, anything more creates pressure on back.
  - Bottom flat in chair, 90-120 degrees from bottom to back with back being fully supported by chair support.
  - Shoulders should be relaxed, work surface at a height that allows elbows to be bent 90-120 degrees. Note that arm rests of chair should be just lower than neutral position. They are called a rest for a reason and constant use causes unwanted static pressure.

- The greatest challenge in the manufacturing environment compared to computer workstations is eliminating or reducing the need to bend neck to see work. A monitor can be placed at a neutral height, however it may not always be possible to adjust position of work that is required. Note that minor adjustments could help reduce possibility of injury.

- **Standing Workstation(s):** Concepts surrounding a standing workstation is very similar to that of sitting, you want to ensure that the work to be performed is set up a height that will allow the employee to stay in as neutral posture as possible, with the primary focus of having the work itself being completed at a height to allow employee to bend at the elbows between 90-120 degrees while standing straight.

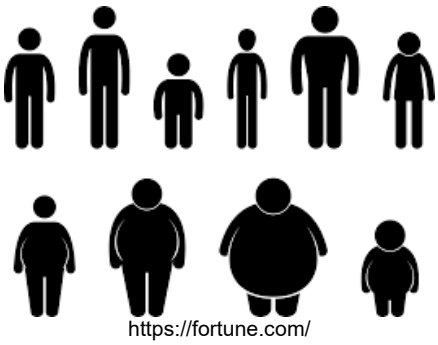


https://escuelaing.s3.amazonaws.com/

- Note, that by offering the option between sitting and standing in the same cell or station, it acts as a form of rotation. A key contributor to ergonomic related injuries is sitting or standing in a single position for prolonged periods of time and or restricting blood flow. By changing even the slightest posture, ergonomic related injuries could be reduced significantly.

- If offering standing options, you may want to provide anti-fatigue mats, especially on concrete floors and specialized stools can be purchased, which can be used to provide periodic support, especially if standing is the only option.

- **Fitting the Employee to the Station**


https://fortune.com/


http://clipart-library.com/


https://www.iqsdirectory.com/

- We all know that people don't come in the same shape or size, thus we cannot believe that a workstation is going to be a one size fits all. Taking into consideration the above when trying to promote neutral positioning, a workstation has to have some sort of adjustability in order to accommodate the varying shapes and sizes of your employees.

- Note that not all ergonomic solutions have to be costly. Most if not all CBIA Members should have some sort of engineering and or obviously fabrication department. Consider what alternatives can be made throughout the work process internally before investigating potentially costly outside solutions.
- With that said, the most common ways to allow some adjustability for the individual is to offer a chair/stool with at least the ability to adjust up and down. Ideally, having a workstation that can also be adjusted will allow for the best work conditions, however one or the other should at least improve the situation.
- You want to set up chair and or workstation in a zone to promote 90-120 degrees for all areas described above. Note that when increasing the height of a chair it may be necessary to provide some sort of footrest so employee can support their feet and ultimately the rest of their body.


https://www.verywellhealth.com/


https://www.verywellhealth.com/

- Ensure that when at appropriate heights and with 90-120 degree zones, that employee can utilize the lumbar support of chair/stool. If the majority of your employees are using pillows, sweatshirts…etc to provide a more comfortable work environment, their chairs may not be adequate or lumbar inserts should be investigated.

IMPORTANT – When making ergonomic improvements the expectation isn't for the employee to sit like a robot 8 hours a day, what we want to promote is proper ergonomics for the majority of the day until it becomes habit and educate when poor habits are observed

- **Eliminating Non-Value Adding Operations & Motions**
  - Evaluating and eliminating non-value adding operations is not only a benefit from an ergonomic standpoint as it could reduce some unnecessary strain on the body, but it should also have direct impact on production as per the definition, it does not add value to the operation.
  - Definition: "Non-value added is any action that does not add value to a product or service, value being defined by the customer. It is the waste within a process. An action is either value-added or non-value-added *(https://www.isixsigma.com/)*.
  - The best way to evaluate whether a work process or task is value adding is to conduct a Job Hazard Analysis (JHA). These are commonly used to identify hazardous conditions and appropriate controls, however since they are a step by step breakdown of individual jobs, they can be used to evaluate value versus non-value adding work processes.
  - If you question why something is done in a manner it is currently being done, this could often be viewed as non-value adding and the exact purpose of conducting this type of study. A very "generic" example could be an operator having to walk across the production floor to get raw materials in order to complete a single run, if product was at the station, it would be more efficient and eliminate non-value adding exposures.

- Lean Manufacturing and Six Sigma concepts are centered around these concept as again, has an effect on many operational aspects to include but not limited to: safety, production, quality, timeliness…etc.

https://www.mfgnewsweb.com/

- Probably the most commonly overlooked asset we have when investigating safety improvements are the employees that are performing the job on a day to day basis. No one knows better than them what could be improved and even at times what could be eliminated (non-value adding).

Get the employees involved in safety improvements, it will lead to the most beneficial improvement and assist in developing a safety culture!

- **Implementing Engineering Control(s) to Reduce Manual Repetitive Motion**
  - Ergonomics has become such a hot topic over recent years, that the number of products that are manufactured as "ergonomically" designed are simply too many to list in one safety focus.
  - Remember, when considering any ergonomic improvements, get the feedback of the employees of what they believe could work best and first see if solutions could be created in-house.
  - Test any control investment in small samples before implementing company wide.
  - Ensure that new control or process does not introduce other potentially more harmful hazards, if they do, ensure you train and offer appropriate means (controls) to protect the employee.
  - Budget, engineering controls can be costly and they do not have to occur overnight. Even improving a portion of production helps reduce overall exposure and could increase potentials related to rotation (more below).

Common CBIA Engineering Controls

https://www.cisco-eagle.com/

https://www.cisco-eagle.com/

https://www.assemblymag.com/

- Pneumatic Tools
- Conveyers
- Jigs to Hold Parts
- Automated Processes
- Tilted Workstation
- Lift tables
- Automatic Feeds
- Ramps
- Robotics
- Chairs
- Barrel Carts
- Electronic Dispensers
- Overhead Hoists
- Microscope Extenders
- Adjustable Workbench

Remember, an ergonomic improvement doesn't have to break the bank…..

- **CBIA - Simple Ergonomic Improvement(s)**

Case Study #1

Before…

…After

A member was having issues with repetitively having to lift parts or products from the end of the machine. Although not as fancy as a self-adjusting lift table, a four-dollar five gallon bucket investment could prevent a costly back injury due to repetitive lifting.

Case Study #2

https://www.webstaurantstore.com/

Before…

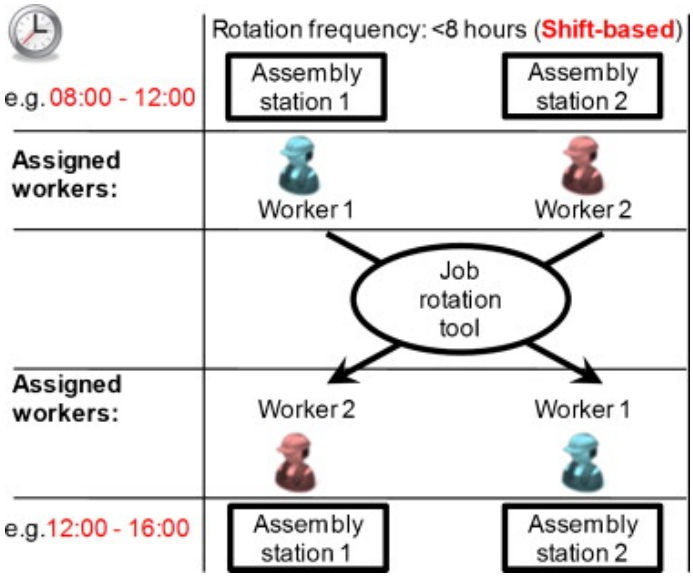
https://www.aliexpress.com/

…After

For years, one of our Members was having serious issues with ergonomic injuries, even though not the only cause, their employees had to pull and tear multiple (hundreds per hour) pieces of masking tape as part of their process. After a simple observation and suggestion, the Member researched electronic tape dispensers which not only helped reduce ergonomic risks, but also potential lacerations.

- **Creating a Formalized Work Rotation**

  - Sometimes, even with the best work practice and even engineering controls (short of 100% automation), progressive ergonomic risk prevention approaches may need to be considered (will discuss stretch & flex further).
  - Most work or job rotation programs fail because organizations leave it up to the individual employees to decide when rotation is necessary. Employees will tend to stick on the job they are most comfortable with, especially in roles that are considered piece-rate even though they may be physically hurting themselves.

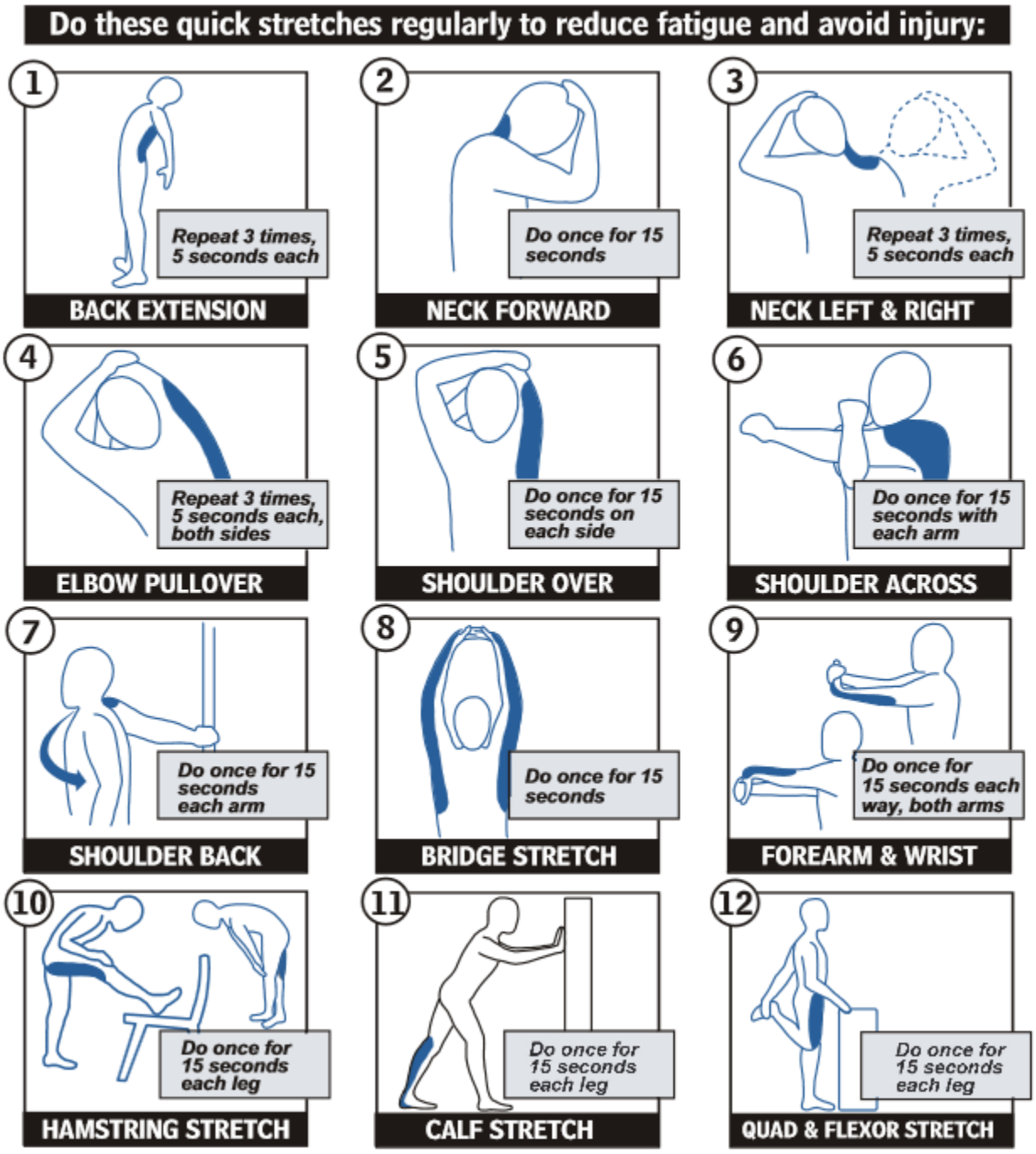


https://www.sciencedirect.com/

  - There is no set standard on how often a rotation should occur, this needs to be determined based on physical demands of repetitive jobs and production requirements. Rotation could be every week, every other day, multiple times throughout a single shift and adjusted based on production needs.
  - Another challenge in manufacturing environments is that most jobs that are assembly related could be considered repetitive in nature and often involve the same common body parts. Note that even slight variations in job demands could reduce stress on specific body parts and most importantly, physiologically effect the employee in that they mentally feel better doing a different job or task.
  - This is why even offering a standing option versus sitting performing the same exact task may be beneficial in that different pressures are being put on a single individual even performing the exact same function. This also occurs in lean or cell manufacturing in that more options for rotation can be made available.
  - At the end of the day, if your organization wants the most value out of rotation in an effort to reduce ergonomic exposures, it should be a formalized process, maybe centered around production data. These approaches can also be value adding when challenging the validity of a claim as it can illustrate efforts were made to reduce exposure with supporting documentation.

- **Develop In-House Stretch & Flex Program**
  - The misconception with stretching or exercise programs is that is must be some sort of extravagant workout routine where employees break out their exercise mats and sweatbands. The below "routine" takes approximately five minutes for just the stretches and could be a good starting point for manufacturing related operations and can be done on the production floor.
  - The example we use to promote the value of stretching programs is the routine developed by professional athletes, individuals that take great care of their bodies, but still stretch before each game, at half-time and although we don't see it, even after the game is done. They do this to prepare their well-kept bodies for the demands that they are about to face knowing that by not doing so they increase their chances of injury. Why wouldn't we want an employee to do the same thing as they prepare for what could be viewed as a strenuous work activities.

Example Stretch & Flex Routine



https://www.aitsys.com.au/

- Similar to the need to formalize rotation, if you are going to invest in stretch & flex programs, the process should also be formalized. In other words, do not simply leave it up to the employees to participate. Have a supervisor or lead direct the activities and to increase the culture, get safety committee members involved in the process and even see if any employees would like to volunteer, this may be an opportunity to identify someone interested in safety or at the minimum, may have knowledge related to health and wellness.

- Also similar to work or job rotation, there is no standard or guide on how often stretches should be done, however, they could be considered when there is the potential of static activity just prior to physical demand requirements, so most commonly, stretches are completed pre-shift, just after extended breaks and it is always wise to cool down after strenuous activity (post shift).
- Finally, a formalized routine or documented program can once again illustrate good faith efforts by your organization to reduce exposures related to repetitive work demands.

- ***IMPORTANT – If your organization has any highly repetitive jobs such as assembly or secondary operations, we strongly suggest investigating progressive ergonomic controls such as formalized rotation and or stretch & flex programs.***

Supervisors Role in Controlling Ergonomics

https://explore-work.com/

https://pmpaspeakingofprecision.com/

https://ehsdailyadvisor.blr.com/

- Several times throughout this focus we have discussed the role that supervisors can play in implementing strong ergonomic control programs, such as being involved in identification of workstation improvements, engineering controls, managing rotation and leading the stretch & flex program.
- We also mentioned that sometimes providing too much information can lead to unwarranted claims or the expectation that since employees are required to do repetitive work that injuries are bound to develop.
- Your organization with the assistance of direct **supervisors should:**
  - Orient or train employees when they first start on proper ergonomic positioning specific to all of their potential job duties.
  - Instruct them on work procedures to eliminate non-value adding motions.
  - Educate on engineering controls that are made available and any safety precautions.
  - Inform of progressive programs to reduce ergonomic risks such as rotation and stretch & flex.
  - Request that employees be open about any potential improvements they identify as they become familiar with job.
  - Promote early reporting by the employee of any discomfort while performing work duties.
- Simply put, it is your organization's supervisors or leads that will ultimately have the best success in implementing and managing your ergonomic control program. As they are routinely on the production floor, they should remind employees when they observe poor ergonomic behaviors (leaning, slouching, reaching, pillows jammed in the back of their seat…etc). Note that if your organization has a formal policy, if behaviors do not change then technically disciplinary action could be considered, but education and supervision should be the starting points.

- Supervisors should also routinely talk with employees, especially those that are working in what could be considered highly repetitive jobs and ask how the employees are doing. Early identification (and reporting to your workers' comp partner) could at least flag the need to conduct a more detailed ergonomic assessment for the specific individual and early treatment such as physical therapy is almost always less costly then surgical repairs which is common for ergonomic related injuries.

- Probably the most valuable tool we as safety professionals have when conducting ergonomic assessments of an individual is the ability to take pictures. Most often than not, an individual doesn't even realize they have developed poor ergonomic behaviors. The ability to take a snapshot of behaviors and discuss with the individual can go a long way in point out concerns and educating ways to correct. Take pictures the same way you would when conducting a Job Hazard Analysis, capture body positing during each work process or task being performed.

- **Ergonomic Conclusions**
  - In the safety and risk management world, ergonomics can often times be one of the most difficult workplace exposures to reduce, control and or eliminate. There is no exact science, every individual is different and there are always the factors of what is taking place outside the work environment which could be contributors in the potential development of repetitive motion related injuries.
  - As with any workplace hazard, it is your responsibility as the employer to investigate the potential hazard, implement controls that are feasible and possible to reduce risk and then explore progressive approaches that makes sense to protect your employees and organization from hazardous conditions within your workplace.

Important: This Safety Focus is to act as a guide in not only informing you of some of the most common and costly potential workers' compensation exposures within CBIA, but also provide some common approaches and control methods to address these exposures. It may be necessary to have more detailed and specific analysis to address your specific needs, in these situations please contact your CBIA safety partners at the FutureComp Loss Control Department.