The Ergonomics Job Improvement Process:
Four Steps to a Better Workplace

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About Humantech

Humantech was founded with the single focus of improving the lives of the working population. For nearly 40 years, our approach has changed how organizations use the science of ergonomics to improve workplace performance.

We’re experts in workplace improvement. Big project or small, we bring tangible benefits to you and your company at every step. Whether you need to deploy a global ergonomics initiative or a single risk assessment, we partner with you to achieve your goals. We listen well, work hard, and evaluate ourselves based upon your success.

We are the largest consulting team of Board Certified Professional Ergonomists in North America. Humantech consultants combine expertise in ergonomics with practical industry experience and the skills of professional services delivery.

Our software solutions help you take control of your ergonomics process. Humantech’s proprietary assessment and solution tools, e-learning, and central online system give you a faster, more effective and efficient way to manage ergonomics corporate-wide.

A team of highly qualified professionals with skills in e-learning and software development, industrial and graphic design, sustainability, and information technology supports our consulting staff.
Find and fix your high-risk jobs quickly with our experts at your side.

The Humantech System® is an all-in-one solution for managing workplace ergonomics in industrial environments.

Learn
Online Training
Build knowledge quickly. Access 7 interactive online training modules covering everything from principles of ergonomics to design guidelines. You choose which modules are appropriate for your teams.

Do
The Job Improvement Process
Gain skills to assess and fix jobs. Once the online training is finished, your teams will work alongside our Certified Professional Ergonomists to assess and improve problem jobs.

Manage
Data and Reporting
Verify and track progress. With The Humantech System, ergonomics process owners can easily monitor the activities of the ergonomics team, track the status of improvement plans, and generate reports.

Learn more at www.humantech.com/thesystem
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Introduction

This e-book describes a simple process for improving the workplace to fit the people at work. That is what occupational ergonomics is: designing the workplace so that the reaches, forces, movements, and information required to perform a job are within the capabilities of what healthy people can do. The goal of workplace ergonomics is to remove barriers so that employees can perform at their best. Ideally, this is done when planning and designing new workstations and tasks, but sometimes it’s necessary to retrofit and improve the existing workplace. This process works in both situations.

Following a simple four-step job improvement process for ergonomics, you, engineers, supervisors, and even employee teams (safety committees, quality teams, lean teams) can make tactical changes that continuously improve the workplace. For most employers, the primary reason to improve the ergonomics of their workplace is to improve employee well-being, specifically to prevent employees from developing musculoskeletal disorders (MSDs). MSDs are “wear-and-tear” injuries that can occur over time when people are working in awkward postures and/or applying high forces.

The job improvement process is one part of a comprehensive ergonomics program—and a very important part. It’s all about making the right changes to the workplace. Changing the setup and organization of workstation layout, tooling, material handling, and information flow can help better fit the job to the employee. These changes are not an option; they are essential.

MSD Risk Factors

Before you take action to prevent MSDs, you should understand what causes these injuries, since the process focuses on controlling the risk factors. We know from research studies that there are three primary risk factors that contribute to MSD injuries:

- **Awkward postures**: non-neutral joint postures
- **Forceful exertions**: excessive force
- **Long duration or high frequency**: extreme frequency and/or duration of awkward postures and forceful exertions

Any combination of these risk factors increases the chance that the capabilities of a joint structure are exceeded and that an MSD injury will develop.

In addition to these primary risk factors, there are secondary risk factors that can have some influence: compression of soft tissue on a hard edge, low temperatures, vibration, impact stress, and wearing ill-fitting gloves. The proactive management and prevention of MSDs focuses mainly on reducing exposures to primary risk factors to an acceptable level.
Fortunately, today there are several valid, quantitative assessment tools that allow us to measure the amount of exposure to risk factors and compare it with what is an acceptable level, or threshold, for humans. This practice of exposure sampling has been used by industrial hygienists for years to measure and determine exposure to other occupational hazards, like high noise, chemical vapors, metal fumes, airborne dust, and radiation.

For MSD risk, there are whole-body assessment tools, such as the BRIEF™ Survey, RULA, and REBA. In addition, there are assessment tools specific to a body part (the NIOSH Lifting Equation, ACGIH Hand Activity Level) and some that are specific to a task (Snook and Ciriello Push, Pull, and Carry Tables). Think of the risk assessment as a crystal ball. It is a way to predict which jobs have the greatest potential for causing an injury. When managers and supervisors have access to this information, they can take action to reduce the level of risk and prevent injuries from occurring in the jobs for which they are responsible.

**The Job Improvement Process**

Through benchmarking studies, we’ve learned that companies who are successful in managing and controlling MSD injuries are those who manage ergonomics improvements as a process. The process is a simple and familiar one: Plan, Do, Check, Act. This is the Shewhart Cycle, which is the foundation of quality and safety management systems. This process can be systematically applied to identify, control, and verify the reduction of exposure to MSD risk factors. Studies have shown that aligning the job improvement process with a system, model, or process already familiar to the organization improves uptake, understanding, and support.

For this discussion, we’ve translated the steps of Plan, Do, Check, and Act into the more self-explanatory steps of Find It, Fix It, Check It, and Sustain It. These are the tactical steps—one half of a comprehensive ergonomics process. (A full process also includes strategic elements and activities by leadership to ensure ongoing support, resources, and accountability by the organization, which ensure the job improvement process is sustained and effective. We will focus on just the tactical elements in this e-book.)
Find It

The first step is to find where exposures to MSD risk factors exist. Ultimately, you’ll want to measure the exposure using a quantitative assessment tool, but it’s best to start by screening the workplace to identify where MSD risks may exist. This can be accomplished by three methods:

- **Review history of MSD injuries.** Check injury/illness records to identify which tasks, products, and operations have yielded MSD injuries in the past.
- **Ask the employees doing the work.** “What are the hardest parts of doing this task?” They may have already identified workstation layout, tooling, manual handling, and information flow issues.
- **Observe the work being done.** Use a simple observation-based checklist to look for and record awkward postures and/or the application of high forces.

Observation is a powerful tool for identifying potential MSD risks, but the real and valid measure is to quantify the exposure. This is where quantitative risk assessment tools (BRIEF Survey, etc.) are most valuable. Of all the MSD risk assessment tools available, a whole-body risk assessment is the most widely used and is a good place to start. Use this tool to determine the types of risk factors present, the amount of exposure, and the body regions exposed. In addition to providing a body map of exposure, some tools will also provide a single, whole-body exposure score which helps you prioritize the results.

By listing the results of risk assessments for many individual jobs, you can create a risk map of your operation. The risk map is a simple ranking of jobs by level of exposure, with the highest-risk job at the top. With these results, you can

- identify where your MSD exposures are and where they are not,
- determine how much, and where, you need to improve ergonomics,
- prioritize jobs for improvement (Fix It), and
- track and monitor risk reduction (Check It and Sustain It).

The Find It step is all about identifying and selecting those jobs that you need to address first because they pose a higher chance of causing an injury. It also ensures you aren’t spending time and effort fixing a low-risk job. This planning step helps you prepare for and focus on the next step, improving the workplace.
Fix It

While the Find It step is all about diagnosing the problem, the Fix It step focuses on putting the workplace improvements in place. The solution for reducing exposure to MSD risks is to change the work space to improve the ergonomics of the job so that the postures and forces are within the capabilities of people.

We know from the hierarchy of controls that engineering controls (physical changes) are more effective and efficient in protecting more people across time than administrative controls. So, the first question in the Fix It step should be “What changes will reduce risk?” To answer this question, you must first identify the direct causes.

Direct causes (or root causes) are the conditions that cause a person to work in an awkward posture or apply a high force, or to assume those awkward postures frequently or with long duration. Direct causes will vary with, and be unique to, each job. For example, the work may be located too high (resulting in raised shoulders and arms), parts may be located too far away (resulting in extended reach), or a tool may be too heavy (resulting in high forces on the shoulders and arms). Once identified, the direct causes will lead you to potential improvements, like lowering the work surface height, moving parts closer to the operator, and using a lighter-weight tool or providing a tool balancer to support the weight of the tool. Identifying direct causes and improvements is critical, but who is involved in identifying them is even more important.

The operators (people performing the job) should be involved in identifying and selecting improvements to their workplace. Engaging workers this way is called participatory ergonomics and is a proven practice for making effective changes. After all, the operators are the experts in those tasks. They know how a change (improvement) may affect the process or quality, or how it may introduce a constraint. In fact, operators often have the most creative and effective ideas about how to improve the task. More importantly, they need to be involved with changes to their workplace for the improvements to be accepted and sustained by all. This is true in production and distribution areas where work spaces are shared, and even more important in the office, where workstations are usually personal.

There are three key things you can do to ensure that the best improvements are implemented:

- Prioritize and select the best improvements
- Apply design guidelines for ergonomics
- Check to ensure that the improvements are effective (more on this later in the Check It step)
Prioritize and Select Improvements

A simple way to prioritize and select the best improvement is to evaluate each idea on the expected impact and cost. This means first modeling each idea to estimate its effect on improving employee well-being (reducing MSD risk), enhancing business performance (increased productivity, higher product quality, improved throughput), and the number of people benefitted. Next, estimate the cost, time, and money required to implement the improvement. Ultimately, you’ll narrow the list of brainstormed improvements to a few low-cost, high-impact ones to implement first. These are your “home-run” solutions and should be pursued before implementing the high-cost, high-impact ideas (capital projects). This prioritization exercise helps eliminate and deprioritize ineffective improvements (low-cost, low-impact) and those that are inefficient (high-cost, low impact).

Apply Design Guidelines

Design guidelines for ergonomics continue to be underused by many well-meaning engineers and professionals. The guidelines are the design criteria for humans—how to design the workplace to fit the capabilities of the healthy working population. They are based on information and research compiled over the years including anthropometry, force and weight capabilities, lighting requirements, and other measures of people and parameters of the workplace. Collectively they provide engineers with the best source of criteria from which to design for humans, and guidance for ergonomics teams to determine how high to raise work, the maximum reach for parts, the maximum weight of a tool, and many other factors for improvements.

You can use design guidelines for ergonomics in today’s workplace when determining how to adjust or change existing jobs and equipment, and in tomorrow’s workplace to select tools and design new workstations that pose low MSD risk. They provide engineers and space planners with information they need to ensure that they design a job or equipment at low risk the first time, and do not introduce new MSD risk into the workplace. Many companies include design guidelines for ergonomics in their engineering or “gate” reviews, just as they would machine guarding. This is key for ongoing prevention.

<table>
<thead>
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<th>Criteria</th>
<th>Dimension</th>
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<tr>
<td>A. Working Height of Comfort Zone Bottom</td>
<td>Minimum 24”</td>
</tr>
<tr>
<td>B. Working Height of Comfort Zone Top</td>
<td>Maximum 62”</td>
</tr>
<tr>
<td>C. Hand Working Height Optimal Comfort Zone Bottom</td>
<td>Minimum 38”</td>
</tr>
<tr>
<td>D. Hand Working Height Optimal Comfort Zone Top</td>
<td>Maximum 49”</td>
</tr>
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Remember that you must change the workplace (improve the design) to reduce MSD risks and the incidence of the resulting injuries. Relying solely on employees to practice good body mechanics, use good lifting techniques, and “work safely” has been proven to be an ineffective and short-lived approach to controlling MSDs.

**Timing is Everything**

Timing and plans for changing the workplace should be guided by the risk map established in the Find It step. This prioritized list of jobs or issues helps keep everyone focused on addressing the highest exposures (greatest chance of resulting in an injury) first. But in the real world, we know that there are many factors that can affect timing. In addition to using the risk map, look for opportunities to make workplace changes when other changes are being made to equipment, layout, and tools, such as planned preventive maintenance when workstations and equipment will be shut down, planned moves, and equipment upgrades, adds, and changes.
Check It

It seems logical that one would always check before and after measures to ensure that an improvement solved a problem, and that the design change reduced the level of MSD risk to an acceptable level. This is a critical step for an effective job improvement process, but it is not a step practiced by many. Through benchmarking studies, we found that less than 25% of participants conducted follow-up MSD risk assessments to determine if improvements reduced the level of MSD risk.

This follow-up is quite simple: use the same risk assessment tools you used for the initial assessment (in the Find It step) to reevaluate the level of risk after improvements have been made. By using the same assessment method(s), you can compare the before and after exposure levels. The change in scores provides many key pieces of information: if risk decreased or increased, the amount of change in risk, and changes in exposure to different joints in the body. If the risk is reduced to an acceptable or low level, no other action is needed. If the risk remains at a moderate or high level, consider additional improvements.

These before and after scores in turn should be reported to management and the sponsor of your ergonomics program. Sponsors should track these changes on the risk map and use the results (or lack of results) to hold managers, engineers, and others accountable for reducing risk in the workplace. This is the third critical action mentioned earlier: check to ensure the improvement is effective.
Sustain It

The final step in the job improvement process is to Sustain It. This means taking ongoing action to ensure that improvements are maintained and used, that the level of risk remains low, and to look for opportunities to duplicate effective risk reduction controls at other similar workstations.

There are several things you, managers, supervisors, and team members can do to ensure and sustain the proper fit of the workplace:

- **Observe.** Check on ergonomics improvements and devices during start-up checks, inspections, and walkthroughs to ensure they are being used, are in proper operating condition, and are maintained.

- **Reassess.** Rerevaluate tasks when the equipment, process, or product changes or is moved. Ensure that improvements have been maintained and moved. Address new exposures created by changes in the workstation layout, tooling, manual handling, and information flow.

- **Communicate.** Share and discuss the findings of risk assessments and results of improvements with people working in the area. This will help them understand why the change was made, why new equipment or improvements should be used, and how the change affects their jobs, and it will encourage them to look for other opportunities for improvement.

- **Guide.** Provide engineers with design guidelines for ergonomics. Require that they use, and design to, the criteria for any new tools, workstations, or equipment; evaluate new equipment and projects against the design guidelines; and ensure that new MSD risks are not introduced.

- **Recognize.** Top leaders and the ergonomics program sponsor should present case studies of tasks improved by the changes. This includes showing before and after risk levels and the improvements made, and recognizing the individuals involved in the project. This “public recognition” demonstrates leaders’ commitments to, and endorsements of, the job improvement process and their commitment to safety, and provides recognition for those contributing to participatory ergonomics.
Final Thoughts

Improving the fit of the workplace is about change—change to the current workstation layout, tooling, manual handling, and information flow, or change to the design or specification of new tools and equipment. So, whether you are improving the current workplace or designing the future workplace, your goal is to ensure it best fits what people can do; your results will be improved employee well-being and reduced risk of MSD injuries.

Improvements are best managed and tracked following a continuous improvement process. Based on our experience, the model of Plan, Do, Check, Act is familiar to many, and is an effective model for managing the job improvement process for ergonomics at work.
Additional Resources


