

eBook

Learn. Do. Manage.

Applying Proven Strategies for MSD Risk
Reduction & Ergonomics Process Improvement

velocityEHS®





Contents

Introduction	3
The “Learn. Do. Manage.” Strategy	4
Learn: Empowering Workers to Recognize & Prevent MSD Risks	4
Do: Identifying, Assessing & Controlling MSD Risks	6
Manage: Monitoring Control Performance & Refining Workplace Improvements	9
Applying the “Learn. Do. Manage.” Strategy with VelocityEHS Industrial Ergonomics	10
Additional VelocityEHS Resources	11
Let VelocityEHS Help!	12



Introduction

Ergonomics is an essential pillar of a strong environmental, health, and safety (EHS) management program, and it is also a major driver of corporate environmental, social, and corporate governance (ESG). An effective ergonomics process that minimizes the risk of musculoskeletal disorders (MSDs) not only reduces worker injuries and injury costs, but it makes a significant contribution to employees' health, well-being, job satisfaction and workplace culture—key aspects of social sustainability that promote overall ESG performance.

Yet, many organizations struggle to build and maintain an effective ergonomics process, and MSD risks continue to be a leading cause of work-related injuries. In fact, recent data from the [National Safety Council \(NSC\)](#) showed that overexertion and other MSDs contributed to 255,490 workplace injuries in 2020. That's 21.7%, or more than one fifth, of all lost-time worker injuries across all industries that year.

These significant rates of MSD injuries are even more pronounced in the manufacturing industry where it can be especially challenging to address MSD risks effectively and systematically. In [FIGURE 1](#) we can see that overexertion and other bodily reactions (a.k.a. MSDs), along with repetitive motion injuries that frequently occur due to poor ergonomic design, were responsible for **38%** of all manufacturing injuries recorded in 2017.

The numerous complex processes, repetitive job tasks, shifting operational activities and rigorous production demands that characterize manufacturing environments

introduce a wide variety of MSD risks, and identifying and controlling all those risks can leave even experienced EHS professionals feeling overwhelmed and wondering where to get started. Compound that with all the other crucial functions of EHS and ESG programs that EHS managers need to address, and you can understand how MSD risks can easily slip through the cracks.

In this eBook, we'll introduce you to the VelocityEHS "Learn. Do. Manage." strategy that has been developed by our team of Certified Professional Ergonomists (CPEs) to help you simplify the way you look at your ergonomics process, and systematically address the full spectrum of MSD risks in your workplace. We'll look at each step in this strategy and discuss how they align with the various functions of your ergonomics process, common challenges encountered at each stage, and current best practices and technologies that can make a world-class ergonomics process achievable for EHS professionals at all levels.

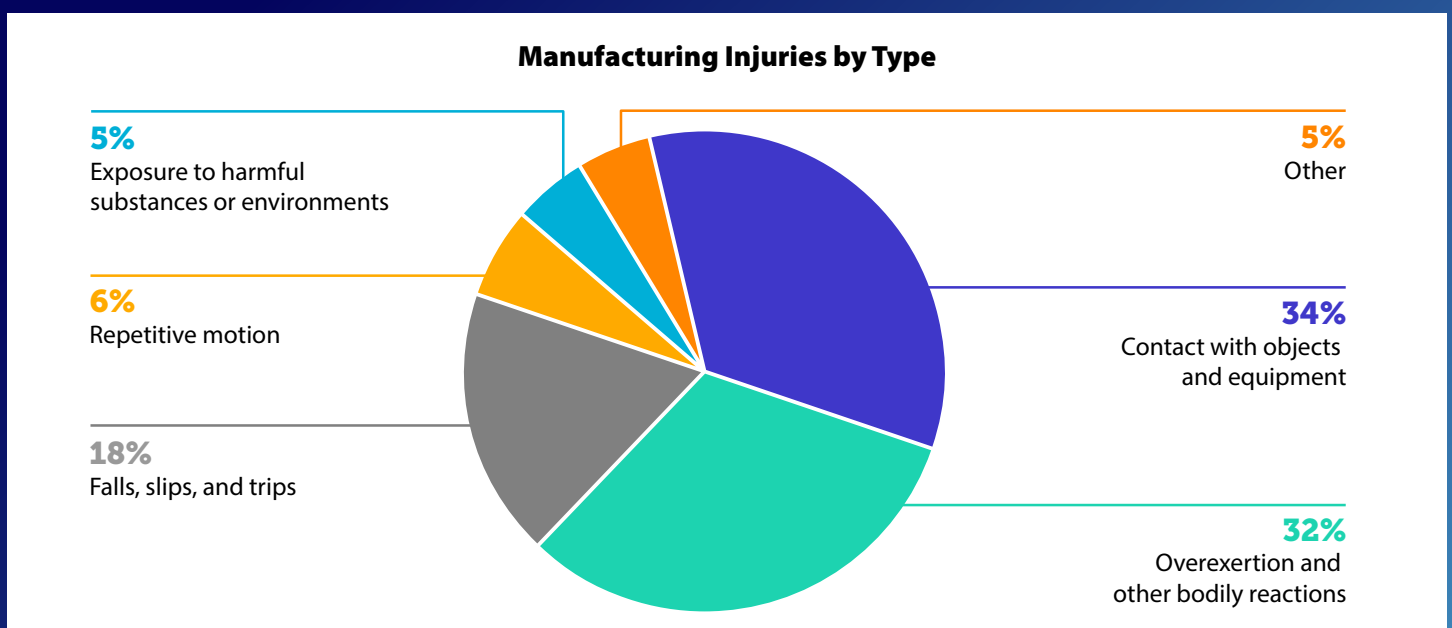


Figure 1: National Safety Council Injury Facts, 2017



The “Learn. Do. Manage.” Strategy

Like any other EHS system or program, ergonomics is all about managing risk. Your ergonomics process should function to achieve three fundamental objectives:

- Educating workers on the risks encountered in the workplace (in this case, MSDs and other related injuries)
- Systematically identifying, evaluating and prioritizing workplace risks, and implementing the controls and improvements necessary to minimize them
- Monitoring and refining the effectiveness of those controls and workplace improvements over time to ensure maximum MSD risk reduction and continuous process improvement.

Our “Learn. Do. Manage.” strategy directly aligns with these fundamental EHS management objectives. Here’s how.

Learn: Empowering Workers to Recognize & Prevent MSD Risks

Many CPEs and EHS professionals would argue that awareness of workplace risks and the knowledge of how to avoid or control them is the most important and fundamental factor in workplace health and safety. Walter Dill Scott, former President of Northwestern University (1920-1939) and Pioneer in Applied Industrial & Organizational Psychology may have put it best, saying:



"The future of the safety movement is not so much dependent upon the invention of safety devices as on the improvement of methods of educating people to the ideal of caution and safety."

- Walter Dill Scott

One thing to note here is that Scott made this statement nearly a century ago, when there were few if any governmental workplace health and safety regulations in place, and the EHS profession was in its infancy. Even then, leading minds like Scott recognized the essential value of training in keeping workers safe and minimizing workplace injury and illness.

Ergonomics training should equip your ergonomics team and workers with the knowledge and best practices they need to identify and ultimately control MSD risks in the workplace. At a minimum, ergonomics training should address the following topics:

For Workers

- MSD risk awareness
- Recognizing MSD symptoms
- Use of ergonomic devices and equipment
- Safe material handling
- Proper postures and techniques to prevent or minimize injuries
- How to report MSD injuries

For Ergonomics Team Members

All of the above topics for workers, plus:

- Performing MSD risk assessments
- Evaluating and prioritizing MSD risks
- Identifying MSD risk causes
- Selecting appropriate MSD risk controls
- Documenting and communicating MSD risk reductions

The Challenges of Ergonomics Training

The fundamental goal of ergonomics training is, of course, to help achieve reductions in MSD risks and prevent ergonomics-related injuries. To achieve this goal, training must be effective. One of the most common measures of training effectiveness is **training retention**, which is typically defined as the long-term ability of workers to recall and apply the knowledge and skills they have received. Numerous studies have shown how training retention is heavily affected by the methods and modes we use to communicate training information. Not all training is equally effective, and the Learning Pyramid (**FIGURE 2**) gives us a helpful way of visualizing the varying levels of training retention that different types of training have been shown to achieve.



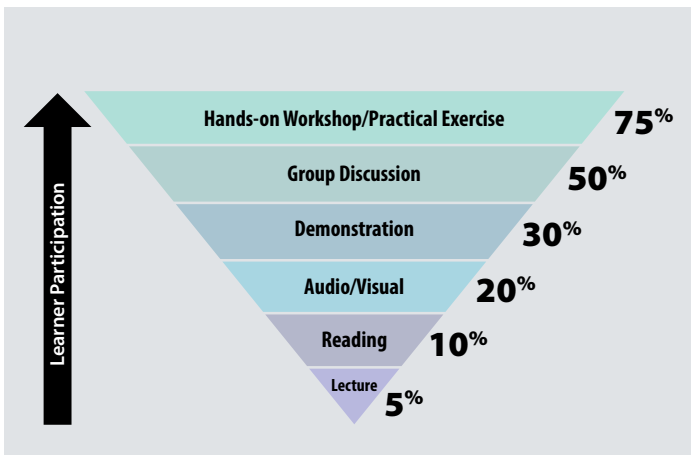


Figure 2: Average % of information retained by training mode

Note that there is a direct and positive correlation between learner participation in training (i.e., engagement) and training retention rates, with more participatory training modes helping to achieve higher levels of training retention.

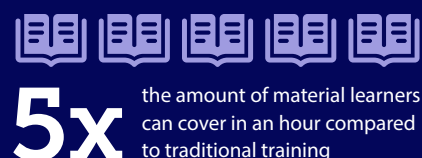
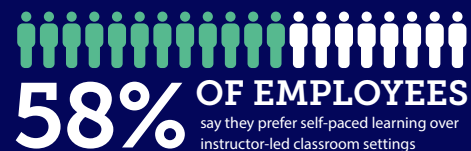
Engaging Workers in Your Ergonomics Training

Businesses have long recognized the real-world benefits of worker engagement and should take advantage of any opportunities available to engage workers with their ergonomics training. *eLearning* provides workers with a more interactive and participatory training environment compared to in-person classroom lectures and is shown to improve training retention and effectiveness in a variety of ways (**FIGURE 3**).

Though *eLearning* provides a powerful tool to further engage workers in your ergonomics training, hands-on, *in-person discussion groups and workshops* will always be an important part of a balanced and effective ergonomics training program. Gathering your workers on-site to review job processes and workstation designs with the goal of identifying and assessing risks, then discussing MSD risk reduction techniques and controls in a group setting is another highly effective way of engaging workers in your ergonomics training. These workshops should be led by an ergonomics expert who can facilitate and guide the discussion, but should be focused on securing the participation and input of the workers who will be performing the jobs in question. These workshops help foster a creative and collaborative environment where workers' shared expertise and skill is integrated into the training process to develop a fuller understanding of both MSD risks and the workstation improvements needed to control them.

VelocityEHS Industrial Ergonomics gives you access to our extensive library of interactive *eLearning* courses so you can deliver effective, engaging ergonomics training content to your workers whenever and wherever, with tools to help you plan, coordinate and monitor your training program all from one intuitive centralized learning management system (LMS). In addition, our team of CPEs will work with you on-site, face-to-face, to conduct expert-led ergonomics workshops that bring your workers together to develop a shared understanding of the unique MSD risks present in your workplace, necessary process and workstation design improvements, and how to establish and maintain a highly effective ergonomics process that successfully minimizes MSD risk.

Figure 3: The Benefits of *eLearning*



Do: Identifying, Assessing & Controlling MSD Risks

Once your workers possess an ideal level of MSD risk awareness, the next step is to pinpoint and quantify those risks so you can eventually control and prevent them. It's at this "Do" step in the ergonomics process where we perform *MSD risk assessments* and begin to identify the corresponding risk causes and controls.

When conducting an ergonomics assessment, collecting accurate and reliable data is critical. This data is the ultimate source for any conclusions we make about the root causes of MSD risks, and it will also define the controls or improvements we implement to manage those risks. Along with ample training, assessment data should help assessors to accurately characterize the MSD risks of the job tasks being performed. Assessment data should include:

- surface heights
- hand working height
- horizontal reaches
- forces
- employee input & feedback.

For more information on ergonomics assessment data collection, [check out our blog on key ergonomics measurements](#).

The Challenge with MSD Risk Assessment

Certified professional ergonomists (CPEs) often rely on observational MSD risk assessment methods to assess MSD risks. There are numerous techniques that assessors apply during an observational-based assessment, and differing levels of familiarity and expertise in performing these assessment techniques can introduce significant variability in measurements and other assessment data. As a result, assessment scores are often inaccurate and unreliable.

How significant is this variability? A 2017 study published in *Human Factors*, The Journal of the Human Factors and Ergonomics Society (HFES) analyzed 442 risk assessments of actual jobs carried out by 290 professionals from 20 countries to determine the reliability and accuracy of assessment data. The results showed that approximately 30% of the assessments performed using observational methods had errors. In 13% of the assessments, the errors were significant enough to invalidate the results of the assessment altogether. In total, nearly 1 out of 3 observational assessments performed in actual work situations did not adequately evaluate the level of potential MSD risks.

30% of the MSD risk assessments performed using observational methods had errors

13% of assessments had errors significant enough to invalidate the results of the assessment

The study concluded that greater effort is needed to ensure that assessors possess better knowledge of the techniques used to assess MSD risks. Our first reaction to this conclusion might be that assessors require additional training and higher levels of expertise to ensure assessment accuracy, but this is another challenge which may not be easy to overcome. CPEs spend years of their careers developing that level of expertise, and most organizations may not have the budget or access to bring on one or more CPEs to perform those assessments.

However, ergonomics expertise can be supplemented with technology to enable non-experts to assess MSD risks more accurately. Technology can help achieve this by automating and standardizing assessment data collection, and guiding assessors toward better decisions.

Motion Capture Assessment Technology

The goal of ergonomics assessments outside of the research laboratory is typically to prioritize intervention efforts (i.e., MSD risk controls) and quantify improvement effectiveness. As a matter of cost, observational-based assessments have traditionally been favored in industrial environments, at the unfortunate sacrifice of data accuracy.

Artificial intelligence (AI) and machine learning technologies are introducing new and exciting possibilities for improving the accuracy and simplicity of assessing MSD risks. Motion capture technology has been the state-of-the-art for evaluating whole body movements in research settings for over 20 years. However, it has only recently become feasible to apply this technology to MSD risk assessments in manufacturing and other industrial environments.

Originally, motion capture required the subject of the assessment to [wear a large array of body sensors](#) while the data was collected from multiple cameras to precisely record



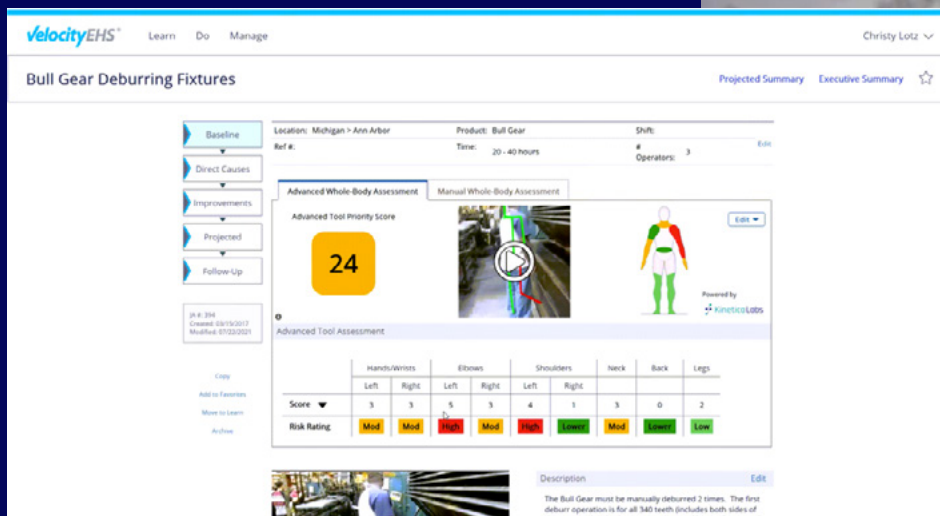


Figure 4: AI-generated baseline MSD risk assessment

body movements. Today, the use of machine learning and artificial intelligence has eliminated the need for multiple cameras and sensors.

Sensorless motion capture provides a high level of accuracy in classifying posture ranges that is nearly the same as that obtained with body sensors, while requiring less time and cost to complete, less training for users to perform assessments, less interruption to operations, and the only special equipment needed is a cell phone or tablet to record a video of the job task.

Motion Capture vs. Observational Assessment

Motion capture, whether using sensors or sensorless technology, provides considerably more accurate data than observational assessments. Sensorless motion capture is even more accurate at identifying postures than observational assessments performed by experienced ergonomists, and substantially more accurate than those from non-experienced assessors. Practically—and most importantly—this means that an inexperienced ergonomics team member using sensorless motion capture can assess a job with similar accuracy as an ergonomics specialist.

There's also the variable of *time*. No matter how experienced an assessor may be, it is hard to collect accurate information about body motions and postures over time throughout performance of complex job tasks. Although this is an

important factor, most observational tools don't include more than two data points of exposure. Motion capture provides the ability to accurately capture this data and apply multiple levels of exposure. In fact, time spent performing multiple movements and in multiple postures is continuously recorded, resulting in high resolution data that helps refine quantification of risks and better prioritize risk controls.

Additional benefits of motion capture assessments include:

- less time to learn how to perform an ergonomics assessment
- less practice to complete an ergonomics assessment accurately
- allows non-experts to accurately complete assessments, further reducing the cost per assessment.

This last point is perhaps the most valuable. The cost savings per assessment is substantially higher, as a much wider range of people in the organization can accurately complete an assessment. In some cases, VelocityEHS CPEs have found the cost savings for an assessment can exceed 50%.

By simply recording a video of a worker performing the job and collecting a few pieces of additional information, EHS team members can provide everything the artificial intelligence requires to identify postures and motions that may be contributing to MSD risk (**FIGURE 4**).

For more information on VelocityEHS Motion Capture AI assessment technologies, read this blog on [The Benefits of Sensorless Motion Capture for Ergonomics Assessments](#).



Implementing Effective MSD Risk Controls & Workplace Improvements

Once a baseline analysis of MSD risk is complete, then comes the task of identifying the causes for those risks and selecting the most effective controls to manage them. The challenge here is that with potentially numerous job types involving a wide range of equipment and materials, not to mention all the other conceivable variables that figure into how jobs are performed, it can be incredibly difficult to determine true causes of MSD risks, let alone select the most appropriate or effective controls. Unless you're a trained ergonomist, it can be difficult to know where to start.

For example, consider the following MSD risk assessment scenario:



A manufacturer has a process for painting parts. The parts are large and have complex shapes, requiring a wide range of motions for the workers moving, prepping, and painting them. Parts are mounted on fixed brackets while they are painted, and the painters need to reach, twist, kneel, stoop and move around the parts to paint them. While this might not seem so bad when painting one part, the paint department completes hundreds of parts daily. The repeated motions required to paint the parts have resulted in multiple workers reporting back pain, hand/wrist strains, neck pain and general soreness. It's a multi-task job with potentially several MSD risks, but let's assume for a moment that you have already used VelocityEHS Industrial Ergonomics to perform the assessment and quantify the baseline for MSD risks to workers. Then what?

MSD Risk Causes

Well, you first need to define the causes of these MSD risks. In your parts painting scenario, one potential cause is the positioning of the parts while being painted. Are workers required to lift, move and fix the parts to the bracket? Excessive or repeated lifting forces and handling of the parts can also contribute to these risks. Is repeated motion with the paint sprayer causing hand and wrist strains? These are just a few potential causes for the overall job MSD risk, but clearly identifying the true root causes is fundamental to the effectiveness of your MSD risk controls and workstation improvements.

MSD Risk Controls

What are some potential controls for these MSD risk causes? One possible alternative would be to mount the parts to a moveable mount/bracket that can be raised, lowered, or rotated so that the painter can maintain a comfortable posture while painting the part. For potential strains from moving the parts onto or off of the painting mount/bracket, consider using some type of cart, conveyor or lift system to minimize/eliminate the need to manually lift and transport the parts. To address hand and wrist strain from using the paint sprayer, consider replacing it with a sprayer with a more ergonomically suitable handle/grip frame and balanced design, or perhaps some type of mechanical assist that minimizes forces required to hold and move the sprayer. There are many possibilities for alternative controls, but one thing to remember—EVERY individual MSD risk identified during your assessment should have a root cause (potentially multiple causes) attributed to it, and you must address each of those causes with a corresponding control or improvement.

The Challenge

Identifying the true causes of MSD risks is not always straightforward, not to mention selecting the most appropriate and effective controls for each cause. For example, one thing that you might not immediately think of in our parts painting scenario would be to automate the painting process altogether—using robotics to move, mount, and paint the parts rather than exposing workers to the MSD risks (not to mention the chemical exposure and other safety risks) inherent to the painting process. When it comes controlling MSD risks in industrial settings, engineering and ergonomic design principles will factor heavily into both identification of root causes and selection of MSD risk controls, and this can make non-ergonomics experts feel a little lost.



Active Causes & Controls

VelocityEHS Industrial Ergonomics includes [ActiveEHS®-driven MSD risk controls](#) that are designed to guide users of any experience level through a standardized workflow that automatically prioritizes the highest-risk areas and allows the user to select which ones they want to address. From there, you can select from a pre-built list of potential causes and controls for the MSD risks. These pre-built cause and control lists have been assembled with the collective expertise of our in-house team of CPEs who possess hundreds of combined years of experience in assessing and designing controls for MSD risks in a wide range of industrial environments. This built-in expertise empowers your entire team to more quickly and accurately identify risks, root causes and controls—helping save time and improve risk reduction.

Manage: Monitoring Control Performance & Refining Workplace Improvements

Like any other EHS management program, sustaining your ergonomics process over time means taking a continuous improvement approach. Even a well-designed MSD risk control or improvement may not initially be the most effective, and controls should ideally be reassessed and refined on a continuous basis. That means having ways to track control effectiveness. In other words, it means having the ability to quantify MSD risk metrics and indicators.

MSD Risk Metrics

Many large employers measure and report on MSDs as a part of their EHS and ESG programs to quantify how they are maintaining safe workplaces. At a very basic level, you only need a couple of key metrics (key performance indicators, or KPIs) to drive your ergonomics improvement process:

1. Percentage of job tasks with a high level of exposure to MSD risk factors
2. Percentage reduction of MSD risk priority score achieved through ergonomics improvements

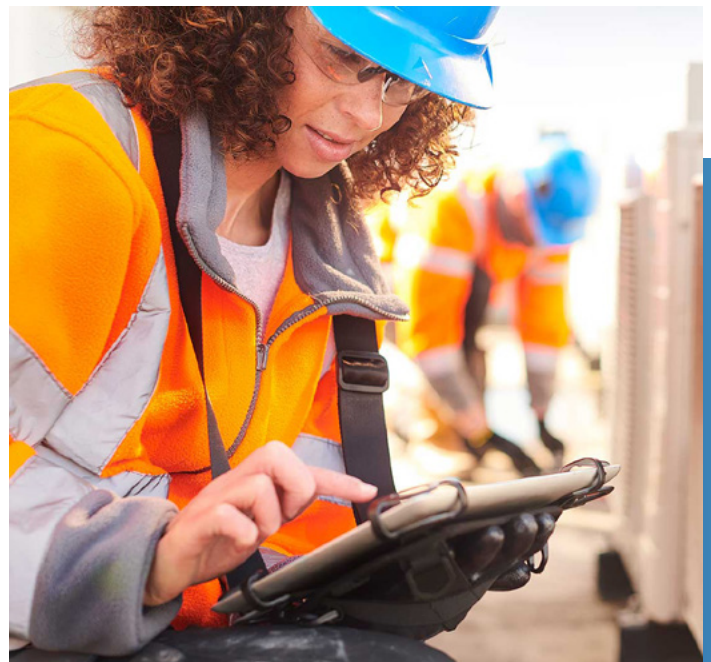
These two simple metrics can tell you a lot about the effectiveness of your ergonomics process improvements, but merely collecting the data is not enough. All of the time,

effort, and resources you devote to your ergonomics process will go unrecognized unless you can effectively communicate successful reductions in MSD risks and demonstrate the value of your ergonomics process to the business.

Program Transparency & Visibility

To make these metrics meaningful and add value to your organization, you should add them to your organization's performance dashboard and communicate them to management and your teams on a regular and periodic basis. Adding the measures to an organization's data dashboard and performance scorecard not only promotes transparency of performance, but it also sends the message that MSD risk reduction (i.e., employee safety and well-being) is equally as important as productivity, quality, and financial performance metrics and goals. In addition, regular review and discussion of these metrics at the management level reinforces the priority that leadership places on reducing MSD risks, providing a safe workplace, and holding the right people accountable for risk reductions.

[VelocityEHS Industrial Ergonomics](#) packages our cutting-edge [Motion Capture AI](#) assessment tools and [ActiveEHS®-driven MSD risk controls](#) within a comprehensive program management solution that ensures organizations can easily



coordinate, track and manage MSD risk assessment, analysis and controls across jobs and locations from one centralized system. With standardized, reliable, and repeatable assessment processes and automation of time-consuming manual assessment tasks, our software allows ergonomics experts and non-experts alike to accurately measure and prioritize MSD risks at scale, saving valuable time that can be better spent implementing improvements that positively impact worker health. At the same time, an intuitive user interface and centralized access to program data helps ensure continuity of best practices for controlling MSDs, even with turnover of ergonomics management personnel.

In addition, data dashboards and reporting features provide ergonomics teams with heightened visibility of the data they need to understand key trends, while also enabling them to drill down into the data for a more granular analysis when needed. The system also makes it simple to generate an easy-to-understand executive summary report that includes essential details of MSD risks, controls and improvements, trends and other KPIs to help ergonomics teams easily communicate the value of your program to management.

Applying the “Learn. Do. Manage.” Strategy with VelocityEHS Industrial Ergonomics

The VelocityEHS® Industrial Ergonomics solution is purpose-built to support an ergonomics process based around our proven “Learn. Do. Manage.” strategy. Our solution gives you the tools to administer your ergonomics process from beginning to end and support a continuous improvement approach to MSD risk reduction and worker health and safety.

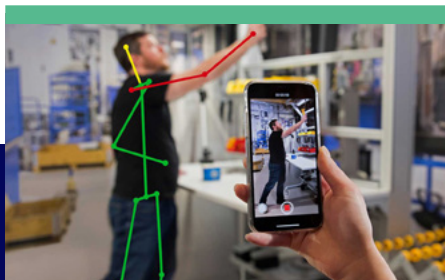
VelocityEHS Industrial Ergonomics combines expert-built eLearning and learning management system (LMS) capabilities, pioneering sensorless motion-capture AI technology, [ActiveEHS®-driven MSD risk controls](#), and comprehensive program management capabilities so you can spend less time and effort identifying and assessing MSD risks, and more time making improvements to the workplace.



Learn.

Build knowledge quickly with interactive online training modules and expert-led workshops that cover everything from principles of ergonomics to design guidelines:

- Courses based on the latest research
- Available in 20+ languages
- Includes learning verification



Do.

Leverage innovative AI & ML technologies to assess MSD risks of jobs and improve process and workstation design with expert results. The software captures:

- Risk analysis
- Root cause analysis
- Action plans
- Risk reduction results



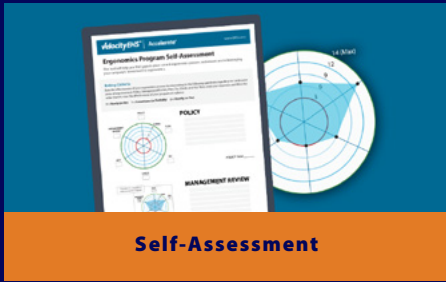
Manage.

Ergonomics process owners can easily monitor the activities of their team, track the status of improvement plans, and generate reports, such as:

- Risk maps
- Improvement reports
- Training status
- ROI and more



Additional VelocityEHS Resources



Self-Assessment

Ergonomics Program Self-Assessment

Easily [evaluate your current ergonomics progress](#) across six areas of continuous improvement (**Policy, Management Review, Plan, Do, Check, and Act**) and plot your performance to see where your process is strong, and where it might need more work.



Webinar

Planning and Deploying A Large Scale Ergonomics Process: Year by Year

Watch our [on-demand webinar](#) to learn critical elements for establishing, deploying, and—most importantly—sustaining a large-scale workplace ergonomics process to identify risk factors and prevent musculoskeletal disorders.



eBook

Successful Ergonomics Teams

[Download this eBook](#) to learn how to make more informed decisions about establishing an ergonomics team for your organization, and how to improve the management and operation of your existing team.



Webinar

Calculating an ROI for Ergonomics

[Watch our on-demand webinar](#) to learn about the common types of data and information that are used to help evaluate and justify ergonomic improvements in your workplace and build a better business case for ergonomics process improvements.



Infographic

Why Should You Care? Infographic Series

[Download this series of four infographics](#) and find out why your C-Suite, Health & Safety, Human Resources, and Operations teams should care about industrial ergonomics.



Let VelocityEHS Help!

Learn how VelocityEHS can help you implement and maintain a world-class ergonomics process for your business.

Give Us a Call

Request a Demo

Contact Us Today!



Toll Free:
1.866.919.7922

Visit us online:
www.EHS.com

VelocityEHS®

www.EHS.com

