

# Participatory Ergonomics Spotlight

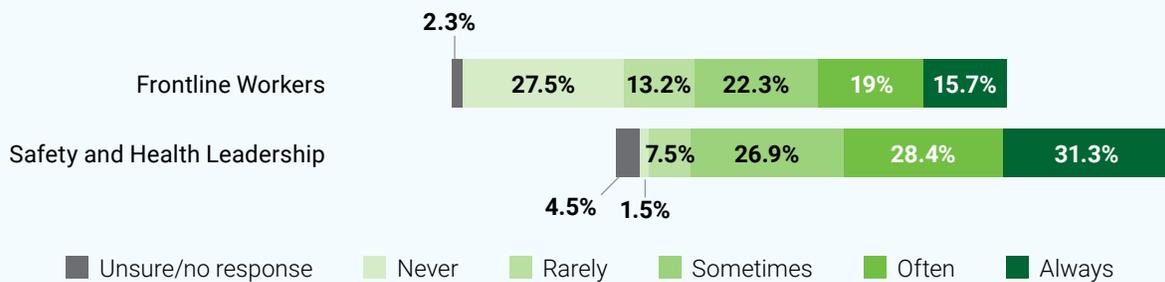
Participatory ergonomics (PE) is a collaborative approach to workplace safety and design that actively involves frontline workers, supervisors and other stakeholders in identifying ergonomic risks and developing solutions. Unlike top-down safety programs, where decisions are made by management with little input from those performing the work, PE acknowledges and takes advantage of the experience and insight of those who interact daily with equipment and work environments. Employees often have firsthand knowledge of their risk exposures, in some cases based on years of experience performing the job. Through PE, employees can be involved in planning and controlling their work-related risks and are given power to influence both processes and outcomes to achieve desirable goals (Burgess-Limerick, 2018; Wilson, 1995). PE assumes that workers are the experts of their work, and including them in solution development and implementation is vital to successful risk mitigation (Brown, 2004).

## Data Insights

The MSD Solutions Lab surveyed 1,000 full-time, nonmanagerial workers to understand perceptions of their organization’s MSD prevention efforts. Results highlight barriers to participatory ergonomics and opportunities for improvement:

- **Trust declines as hierarchal distance increases:** workers trust peers most, supervisors less, and senior leaders least.
- **Nearly 20% of frontline workers had little to no understanding of MSDs.**
- **Older workers may be missed by MSD prevention efforts:** increasing age was linked to lower awareness, confidence, and involvement, and less favorable views of safety culture.
- A notable perception gap exists: **frontline workers reported lower involvement in ergonomics decisions, about their physical environment for example, compared to leaders’ assessments** on the [MSD Solutions Index](#). (See more examples in Figure 16 of the [original results report](#).)

Perceived frequency of frontline worker involvement in determining where improvements can be made to the physical work environment



- **Higher worker involvement** was significantly correlated with 1) **more favorable perceptions of culture, trust and MSD prevention effectiveness;** 2) **more prompt reporting of pain;** and 3) **greater comfort using safety technology.**

A follow up survey of 400 nonmanagerial workers who have used MSD prevention technology reinforced the value of collaboration. **Greater involvement in technology related decisions** and **comfort raising concerns** to leadership correlated with a higher likelihood of reporting that the technology 1) **increased awareness of ergonomic risk factors;** 2) **improved posture;** and 3) **reduced concerns about injury risk.**

## Jump-start your Participatory Ergonomics Journey

Even if starting a PE program doesn't feel feasible at the moment, a formal program is not necessary to collect worker feedback and consider their perspectives in decision making. Start by having casual [conversations with employees](#) to get a better understanding of pain points and daily challenges. Set up or optimize systems for employees to submit feedback and suggestions. Having a strong safety culture where worker perspectives are valued can help lay the groundwork and build enthusiasm for more formal participatory ergonomics efforts. Organizations ready to build or improve a PE program should start with these core components:



**Secure organizational commitment and material support.** Establish support from senior leaders, managers, and union or worker representatives through communication of benefits of a PE program. Align program goals with organizational priorities and ensure adequate time, staffing and funding.



**Involve the right people for the right combination of skills and expertise.** Form cross-functional ergonomics teams of frontline workers, supervisors, engineers, maintenance staff, ergonomists, safety and injury prevention specialists, and other relevant advisors. Identify a champion to advocate for resources and a facilitator or technical/ergonomics expert to guide the process, connect ideas and keep momentum.



**Provide training and build capacity.** Leverage the technical expertise on your team to [train](#) employees, supervisors, engineers and managers in ergonomic principles and how their tasks contribute to MSDs. Tailor training to specific job demands, tasks and risks.



**Use systematic methods to identify risks.** Agree on consistent tools and processes, such as task analysis, observation, worker input, surveys or technology, to identify hazards and understand work constraints. Workers' knowledge should be central to this process.



**Facilitate collaborative solution development.** Support teams in generating, testing and refining ergonomic improvements. Outline who identifies problems, who develops and implements solutions, and who approves resources. Workers should play a central role in identifying issues and shaping solutions, while leadership, program champions and subject matter experts provide resources and oversight.



**Build a business case.** Develop a financial justification to senior leadership for the suggested improvements once an improvement has been piloted and proven. This effort should be collaborative, with the program champion or facilitator responsible for building and presenting the case to senior leadership, and input from the cross-functional team on the value of the solution and costs such as labor, materials and time.



**Evaluate progress and promote continuous improvement.** Establish feedback loops to monitor outcomes, track key metrics and refine efforts over time. Leverage existing systems, such as maintenance or corrective action processes, to implement and track improvements. Communicate successes and lessons learned to leadership and employees.



## Considerations and Evidence for Participatory Ergonomics

Workplaces are unique, and the strategies that succeed in one setting may not work in another. Consider the context of your organization and these factors that can be potential barriers or facilitators to a PE program:

**Leadership buy-in and participation:** Sustained support from leadership and management is necessary for time and resource allocation. Without visible, genuine commitment from leadership and implementation of team ideas, motivation and engagement will likely fizzle out.

**Time and resources:** Allocating time and materials for workers to participate in PE teams while balancing production goals can be a challenge and should be considered ahead of time for an increased chance of success and sustained engagement. Access to technical expertise—such as an ergonomist for accurate risk assessment and solution evaluation, or an engineer for designing solutions and process changes—can serve as a key facilitator for PE teams.

**Workplace culture:** An existing culture of trust, collaboration, open communication and inclusivity fosters participation. Adversarial or hierarchical environments can undermine or hinder employee involvement.

**Existing improvement processes:** Organizations with established systems for collecting and following up on employee feedback, concerns or suggestions may find it easier to implement participatory ergonomics, especially if those processes are widely accessible, transparent, efficient and trusted.

### Efforts involving PE principles have seen positive impacts on organizations, including:

- Decreased musculoskeletal disorder (MSD) risk
- Improved organization and safety culture
- Increased employee ownership
- Reduced injuries and workers' compensation claims
- Improved communication
- Quicker and more positive responses to technology or other interventions
- Increased identification of ergonomic risks
- Improved job performance and productivity
- A culture of continuous improvement
- Improved employee commitment

(Burgess-Limerick, 2018; Hansen et al., 2024; Nobrega et al., 2017; Rivilis et al., 2008; ; Van Eerd et al., 2008; Van Eerd et al., 2010)

Organizations have used various strategies and frameworks to implement participatory ergonomics. For example, a roofing company integrated participatory ergonomics into its safety activities by engaging workers through field studies and focus groups to develop guidance for safe material-cart handling. Supported by trained foremen who used these materials in toolbox talks, the initiative resulted in zero cart-related injuries over 4.5 years, a 13% increase in shared ergonomic knowledge, and \$65,323 in cost savings (Zhang & Lin, 2024).

Similarly, programs using the Participative Ergonomics Blueprint (Wells et al., 2003), which involves cross-functional teams identifying MSD risks and working together to build, implement and evaluate solutions, have shown benefits. At a car parts manufacturer, low-cost solutions like anti-fatigue mats and tool modifications reduced disability time by nearly 52% (IWH, 2009), while a textile plant achieved a benefit-to-cost ratio of 5.5, saving \$295,000, improving productivity and reducing neck fatigue (Tomba et al., 2013).

The Healthy Workplace Participatory Program Toolkit (CPH-NEW, n.d.), which combines ergonomics and health promotion to implement Total Worker Health® programs through worker-led design teams and manager-led steering committees, has improved planning, communication and teamwork skills when supported by trained facilitators and consistent retraining (Nobrega et al., 2017; Nobrega, 2020).

## Participatory Ergonomics in Action

Organizations across a wide range of industries are embracing participatory ergonomics as a core component of their safety and health strategies. By actively involving employees in identifying hazards, evaluating tasks, and designing practical improvements, organizations are seeing improvements in workplace safety and employee wellbeing. The following case studies illustrate how organizations are engaging workers in identifying risks, shaping solutions, and ultimately improving ergonomic design and workplace safety outcomes.



Pacific Gas & Electric Company (PG&E) implements participatory ergonomics through close collaboration with grassroots safety teams, which are made up of peer-elected frontline employees. These teams raise concerns and are involved in rolling out safety initiatives, with some teams even forming formal ergo committees. Grassroots teams work alongside ergonomic specialists, tool committees and staff who design work methods and procedures to share perspectives and jointly develop solutions.

A [case study](#) conducted by PG&E highlights their use of wearable sensors to conduct risk assessments. PG&E selected wearable sensors because they can be used in the field to provide real-time, easy-to-understand feedback during ergonomic assessments. This instant visibility fosters dialogue among workers, safety teams and leadership, enabling collaborative identification of risks and solutions while allowing baseline and post-intervention comparisons.

PG&E also unveiled how leveraging data from the wearable sensors can provide justification for employee ideas to leadership and teams who design work procedures. For example, an electric operations grassroots safety team identified an unnecessary installation step of a specific piece of equipment and asked the ergonomics team to use wearable sensors to validate their idea. The sensors provided immediate risk scores, showing a significant reduction in ergonomic risk and time when the installation step was removed.

In another example, the gas grassroots safety team approached the ergonomics team with a long-standing challenge of driving grounding rods under varying field conditions. Using wearable sensors, the team compared multiple tool options and accessories, providing real-time risk data and worker feedback to identify the safest and most efficient solutions. This collaborative process not only validated worker input but also guided tool selection and future improvements across diverse environments.





Superior Tube Products (STP), a small, 100% employee-owned manufacturing company, received a [grant from the MSD Solutions Lab](#) to pilot 3motionAI computer vision technology. Through utilizing this tool that analyzes video data using AI to assess risk, an unexpected issue was identified in the wash bay—operators were overreaching and straining their shoulders because the wash wand was too long. The operator team came up with a simple fix that cost about \$45 to implement and had a large, immediate impact—a shorter wash wand. Operators are now able to keep a more natural posture, with less strain, and the feedback has been that the job now feels easier and safer.



STP has a strong culture of collaboration, where new initiatives are rarely implemented in the work cell without employee input, and employees are empowered to come up with safety ideas that they can submit through continuous improvement programs. STP uses the 2 Second Lean philosophy, which encourages everyone to look for small ways to make their jobs safer, easier or more efficient every day. This has been incredibly successful at STP, with more than 200 safety-focused ideas submitted by employees, and nearly 80% having been implemented proactively over a three-year period. Those ideas have led to safer work cell designs, better ergonomics and new tools that help prevent injuries before they happen. For example, the wash bay team took their shorter wand improvement idea a step further by coming up with another simple idea to add an overhead hose to remove a trip hazard and take some of the lifting strain off of operators, leading to improvements in comfort and safety. By combining technology insights with everyday employee ideas, STP has built a culture where everyone's engaged, speaks up and helps to make STP a safer place to work, one small improvement at a time.



Boeing Defense, Space, and Security leverages a rapid prototyping lab to turn shop floor tool suggestions into standard work. This approach allows frontline employees to bring forward ideas for developing new tools or improving tools and processes, which are then quickly tested and refined in collaboration with engineers and ergonomists. By creating prototypes in real time and involving employees who perform the work in the evaluation, the company fosters a participatory environment where practical solutions are developed and implemented efficiently.

Through listening and collaboration, Boeing developed a tool to help shop floor operators safely and accurately complete work that requires them to scrape sealant from aircraft joints. This task often demands substantial force and time that can be hard on their hands and joints. The ergonomics team observed operators, listened to their concerns and suggestions, and then worked with engineering to develop multiple prototype 3D-printed scrapers, each of which is suitable for specific tasks. Operators offered redesign suggestions on a few of them, which were implemented, and now they have an assortment of scrapers to work safely and effectively while preventing awkward postures and high forces.

## More Tips to Foster a Collaborative Environment

- Host an internal “Ergonomics Cup” or solutions-driven competition where employees are encouraged to bring their ideas for job, tool or task improvements. Some organizations host these internal competitions, with the winners taking their entries to the Applied Ergonomics Conference to participate in the [National Ergo Cup](#).
- [Create a strong safety culture](#) that values [psychological safety](#) and ensures that all employees, especially those that may be underrepresented or more hesitant to speak up, have regular opportunities to bring ideas to leadership and safety/ergonomic teams.
- Ensure feedback loops so workers see their input leads to action, and share transparent updates on ergonomic initiatives and decisions.
- Recognize and celebrate frontline contributions, and share success stories internally and externally.
- Deliver safety and/or ergonomics feedback and coaching in a way that fosters open dialogue, not punitively.
- Co-create educational materials with frontline workers, and integrate those into existing trainings.
- Tailor communication to your workforce’s preference (e.g., digital, face-to-face, printed).
- Offer opportunities for experienced employees to mentor less-tenured employees. Consider a “train the trainer” model.
- Consider how technology can enhance communication and collaboration, and involve frontline workers in technology selection and pilot testing.

## Conclusion

Participatory ergonomics represents a significant shift in how organizations approach workplace health and safety. By actively involving employees in ergonomic planning and decisions, organizations can foster environments that are safer, more efficient, and aligned with holistic employee well being. Moving forward, research should aim to strengthen and refine implementation frameworks, measure long-term outcomes, and investigate the role of technology in supporting engagement.

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