

Case Studies of High Impact Ergonomic Improvements

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Introduction

The Walt Disney Parks and Resorts ergonomics program (Safety In Motion or SIM) has developed and evolved into an integral part of resort operations over the last 12 years. This paper outlines a selected set of ergonomic improvements that exemplify the challenges, along with the key factors for the success, of a sustainable and high-impact ergonomic safety process. In a complex service-business environment 'high impact' means beneficial to health, safety, business operations, and employee relations.

Selected Case Studies

Transportation of Outdoor Vending Carts

From 1998 to 2007, Safety In Motion worked with the goal of reducing manual pushing and pulling forces required to move large vending carts and smaller supply carts. A few key challenges to ergonomic improvement included: food safety regulations required carts be cleaned daily in a central facility, which necessitated moving large, heavy carts over long distances, up and down paved inclines, to the facility and then back to widely dispersed locations throughout each park; and resort visual theme guidelines did not allow the use of industrial-looking tractors or pushers during park operating hours. Three solutions were combined to meet the ergonomic goal. First, low-boy trailers and tuggers (tractor-like vehicles for pulling) were used to transport large carts before and after park operating hours. Specific variances from the County Health Department were obtained that allowed some of the largest carts to be cleaned by a mobile cleaning unit, which eliminated the need to move the largest carts. The fleet of re-supply, beverage, and ice carts were motorized. The impact of these solutions included: reduction of recordable injuries and claims associated with moving carts, and labor efficiency increases, which offset the cost of the ergonomic investments.

From this case, a few lessons in the creation and installation of ergonomic programs can be learned. First, Safety in Motion's education of operations managers, employees, and technical staff was

essential to stressor and hazard recognition, solution development, and implementation with employees. Second, do not limit the team to single-solution thinking; sometimes it is best to use an array of solutions that combine to meet the ergonomic goal in a sustainable way. Third, do not be daunted by initial resistance to proposed changes. The first proposed cart pusher met with initial resistance from engineering; however, the initial work paved the way for motorizing ice, beverage, and resupply carts in the following years. Finally, the initial involvement of food service managers in the SIM training and ergonomics project caused them to become long-term advocates for both ergonomics and safety, which led to increased strategic and financial support for continued development of the current array of ergonomic solutions, including trailers, motorized carts, and mobile cleaning devices.

Storage of Character Costumes

From 1999-2000, Safety in Motion worked to provide an ergonomic solution that would reduce forces on shoulders and backs when reaching for costumes. The challenges to ergonomic improvement included: All entertainment cast members had to retrieve and store their costumes daily in two different types of locations, overnight large scale warehouses and break-area storage, and finding a way to create a program that achieves immediate results and generates support for long-term ergonomic improvement. By training cast members to reorganize their small storage areas based on red, yellow, and green zone principles for smart setup, which required no budget, we quickly engaged all employees and saw results in a matter of weeks. (An example of storage and smart setup: Mickey and Minnie are shorter, so their costumes heads should be stored on the lowest head stumps, whereas Goofy is taller and his costume head should be on a higher stump.) This solution trained employees to solve their own “low-hanging fruit” ergonomic problems, both at work and at home, and set the stage for larger scale projects that required budget and management support. In addition, by training cast members, the solution generated testimonials promoting the benefits of ergonomic changes and set the stage for larger scale improvements and investments in following years. Ultimately, this case study helps us learn that low-hanging fruit projects (low budget, low tech, with obvious logical solutions) are an excellent way to instigate larger, more technical projects. In addition, this type of project motivates employees and managers to understand the value of ergonomic improvements and often results in identification of talented, supportive employees and managers who will sustain ergonomic improvements. Finally, low-hanging fruit projects motivate executives and managers to support new, more challenging ergonomic improvements in the work environment.

Redesign of Custodial Pan and Broom

From 1998 through 2005, SIM worked to reduce repetitive strain on hands, wrists, and elbows by redesigning the Disney custodial pan and broom. However, SIM faced significant challenges in convincing leaders of East and West Coast operations (essentially independent of each other) to buy into, and take ownership of, the project due to perception of the “traditional Disney pan and broom” as an important part of the Disney Show heritage. The outcome of the project is a new, lighter pan and broom that adjusts to fit the individual and reduces cumulative stress on the wrist, hand, and elbow by enabling the use of mid-range wrist alignment and a power grip. In addition, the use of this new pan and broom reduced recordable incidents and claims related to musculoskeletal pain in hands, arms, and shoulders.

A few important lessons came out of the design and implementation of this project. First, educating and recruiting management and employee leaders to participate in the development of the new pan and broom was essential. Second, always test proposed solutions on a small scale, include individuals with a broad array of opinions and viewpoints in the test group, take all feedback and use it to improve the proposed solution, and make sure the test group can see how their feedback impacted development of the solution. While this process can be time consuming, it assists in overcoming

resistance. Third, carefully plan communications and training to support large-scale implementation of the ergonomic improvement, let employees know what's in it for them, who supports the change, and how/when the change will reach them. Finally, employees need training on how to best use the new tools, and this training must be designed to help them change long established work habits.

Computer-based Management of Merchandise Tote Box Weight

From 2000 through 2002, SIM worked to design a solution with a number of ergonomic objectives. The first objective was to keep load weight of tote boxes (plastic boxes used to transport merchandise to park stores) within a safe and predicatable range to reduce acute injury from lifting and handling. The second objective was to warn employees when totes were heavier than the preferred weight limit and provide a reminder for safer handling. And the last objective was to set up a procedure where heavy tote boxes was stacked only on the floor (green zone level) of wagons used to deliver tote boxes to merchandies locations. The challenge this solution faced was warehouse pick lists (lists of items to be delivered to specific merchandise locations), which were organized based on warehouse rack and shelf locations to maximize time efficiency. One unintended consequence of pick lists was wide variations in the weight (5 to 90 lbs.) of tote boxes. Asking warehouse employees to limit the weight of totes was an unreliable solution and negatively impacted time and volume delivery efficiencies. The impact of the solution¹ allowed the frequency of heavy tote boxes (over 30 lbs.) to be reduced to less than 10%, labels to be automatically generated to mark heavy totes, which cued warehouse staff to load the heavy totes on the floor of the tug wagons, warning receiving staff to use appropriate equipment and technique, and reducing recordable strains and sprains significantly. The business nature of the ergonomic solution for managing tote box weight stresses the importance of inclusion of upper management in ergonomic education, as well as the use of planned business system changes as opportunities to develop or incorporate ergonomic improvements.

Grips and Harness Support for Guest Research Electronic Survey Devices

From 2000 through 2009, SIM worked to reduce cumulative strain on hands, shoulders, necks and spines through the creation of grips and harness support for electronic guest research survey devices. The challenge faced in this ergonomic endeavor was devices, which quickly and continuously evolved over the last nine years, that caused such ergonomic stressors as: end-range wrist postures when holding the tablet screen, shoulder strain caused by the coiled cord connecting the tablet to the belt-mounted battery pack and wireless transmitter device, and contact stress caused by uneven weight distribution and belt design. Through SIM's ergonomic improvement, there have been employee testimonials on the reduction of strain and pain, as well as reduction of pain-related visits to employee health services. From this case study, SIM learned the value of building ergonomic stressor analysis into the sourcing and procurement process.²

Inventing the Bed Wedge

From 2006 through 2008, SIM worked to reduce lifting forces involved in putting the corners of sheets on (or cornering) hotel mattresses. An unintended consequence of hotels' emphasis, especially in the last 10 years, on plush mattresses and pillows as part of marketing and guest satisfaction has been a steady increase of the lifting force required when housekeepers are tucking and cornering sheets. The invention of the bed wedge has reduced the force required to lift the corner of a mattress from 50 to 5 lbs. While creating the bed wedge, some important lessons became apparent. First, teamwork makes a big difference. The core of the bed wedge team was a creative safety manager, with a strong mechanical shop background, and a housekeeping supervisor, who rose through the ranks and was well respected by both workers and management. Supporting this team was the hotel executive manager, the safety department

ergonomist, and several engineering and shop staff. Next, the problem was recognized by staff and management. Third, the team was not deterred when they found no commercially available solution, but instead went into a creative brainstorming mode. Finally, the safety culture at Disney had reached a point where ergonomics was viewed as part of a continuous operational improvement, which meant all executives, operational staff, safety staff, and engineers were familiar with the injury prevention principles and language of SIM, and all were committed to protecting the health and safety of staff as part of operational excellence.

Selection of Child Stroller to Be Used Property-wide

The final case study took place from 2007-2008, in which SIM worked to reduce physical strain of storing and deploying thousands of strollers each day. The challenge faced in this ergonomic improvement was twofold. First, each park had unique stroller storage, deployment, and recovery issues, which meant finding one product to meet varying needs would be difficult. Second, historically, the primary specification and evaluation criteria for purchasing strollers included guest safety, durability, and cost, but did not include employee ergonomics. Adding this primary set of criteria was the result of a resort-wide roll-out of SIM in 2006. Through the ergonomic improvements, the reach envelope (leverage zone) for stacking strollers was improved (reduced) and a device to stand up and lay over stacks of strollers was developed. From this work, two lessons were learned. First, be opportunistic; incorporate ergonomics criteria into equipment purchasing and decision-making. Second, make the ergonomic criteria simple and easy to compare/measure. For example: weight reduction, reach envelope reduction, and less manual lifting.

Summary of Key Lessons Learned

Education is a Key Precursor for Success

High-impact ergonomic improvements usually require a cross-functional team (technical professionals, managers, and operators) to plan, implement, sustain, and evaluate the improvement. In order to work together effectively, everyone on the team needs to understand basic ergonomic principles and have the following: shared terminology for basic principles (stressed) that is easy to remember and apply to everyday tasks, simple ways to observe and describe ergonomic stressors, and clear criteria for ergonomic improvement (better). For example, being able to observe elbows positioned in the red zone and recognizing the need to keep elbows working in the green or yellow zones. An additional recommendation regarding ergonomic education is to prepare all EH&S professionals on staff, regardless of their professional role or focus, to identify ergonomic hazards and contribute to the solution process. Why? Because experience has shown that food safety professionals often identify ergonomic issues in kitchen and food service areas, construction safety experts can help identify facility design ergonomic issues early, and health care professionals are often well positioned to identify ergonomic hot spots.

Success Breeds Success

In a service business environment, implementing and sustaining ergonomic improvement can appear daunting to both managers and employees. Why? Many service jobs involve a wide array of tasks and locations. For example, a custodian or distribution employee may work in several street locations, office areas, and vehicles during a single day. So how do you begin a project? And how will it be sustained? One key to successful implementation and sustainment in this kind of environment comes from demonstrating to individual employees how ergonomic improvements will benefit them personally. In this context, demonstration means providing a clear before-and-after comparison. For example, the demonstration can be a physical experience where utilizing an ergonomic principle immediately reduces

unnecessary physical stress and strain on a specific part of the body. Another key to developing support and confidence is to implement a few changes that are quick and inexpensive wins. This is a short-term strategy with long-term advantages. Even if the quick-win ergonomic improvements do not address the most severe stressors, early successes build positive expectations, project momentum, and provide meaningful examples that leaders can use to recruit support, both monetary and otherwise, for more challenging projects.

What Executive Leadership Wants to Know

Executives are motivated to invest in ergonomic improvements when they believe the proposed investment of time and money does a few things. First, it addresses a real problem. Make your case using data (incidents, claims, health care statistics, and absenteeism) and documentation (photos, videos, and testimony) that clearly and succinctly demonstrates the problem. Do not underestimate the power of short video clips. Next, the proposed investment should produce multiple business benefits. In addition to safety and health benefits, remember to define the potential financial return, operational improvements, and the value to employee relations, community relations, brand, and good will. The proposed investment should be likely to succeed. Provide a work plan that frames up who does what and by when. Executives often look carefully at who the key players will be. Sharp execs will often talk with key players to see if they are fully behind the project. Finally, make sure the investment is sustainable in the operating environment. Briefly define the communications, training, supervision, and maintenance that are required. Sustainment is a valid concern for executives and EHS leaders.³

Endnotes

- 1 This improvement was the result of the Warehouse Director, an executive level management position, attending Safety In Motion® training for his warehouse managers and safety committee. The Director was made aware of the ergonomic hazards posed by the variable tote box weight problem by his warehouse safety committee during a red zone hazard assessment. The Director happened to be in the initial phase of developing bid specifications for a new truck-to-shelf order delivery management software system and decided to add the requirement of tote box weight management. The software contractor found that the weight data for each item existed in the purchasing invoice data system and used that data to facilitate the automation of the tote box weight solution and labeling.
- 2 Initially, end-user ergonomics was not considered during the system specification and purchasing process. As a result, the guest research managers, tasked with training employees to use the devices, realized that the devices were causing significant cumulative fatigue and stress on employees' wrists, shoulders, necks and low backs. These managers took on the task of developing solutions to reduce the cumulative fatigue and contact stress. But recordable incidents occurred during the weeks and months needed to arrive at workable ergonomic solutions. Getting these managers involved in the purchasing and design process prevented repetition of this "retro-fitting" approach to injury prevention.
- 3 Ergonomic improvements do not sustain themselves. Failure to plan for sustainment almost guarantees that the best use and effectiveness of an ergonomic improvement will fade or degrade as management and employees change their work focus, forget why the improvement was made or move to other employment.