SHOVELING GETS THE SHOVE

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ABSTRACT

Purpose: To review a case study undertaken in a poultry processing facility, which involved manually shoveling meat. The project represented a collaborative effort between a consulting ergonomist, safety manager, ergonomics student, and various site management and engineering resources. **Methods:** The Facility Safety Manager launched an ergonomics project in response to an employee concern regarding manually shoveling meat from a buggy into a smaller tote stationed next to a de-boning machine. Two methods were available for the task: shoveling into a tote and then manually transferring the tote contents to the de-boning machine workstation, or shoveling the meat directly from the buggy to the smaller tote stationed next to the de-boning machine. Two to three shovel loads were transferred every three to four minutes. **Solution:** The design group sketched a design for a cart that could be used to eliminate the need to shovel meat from a buggy. Through further collaboration, the project team decided to pursue a powered buggy dumper, with a conveyor, which is used to transfer meat directly to the de-boning machine workstation. Ergonomics design principles and safety guidelines were applied in order to ensure that the new equipment and workstation design optimized human performance, safety and efficiency. Twenty months after the initial project was started, a "success story" was published (in house) to highlight the project's positive outcome. **Benefits:** The new workstation design eliminates all shoveling, thereby minimizing the risk of back and shoulder injury. Feedback from employees has been very positive, and the injury records for this job reflect an improvement. This presentation will review the process used to implement the change, including the actual results, as well as the lessons learned.

LA PELLE AU RANCART

RÉSUMÉ

Objectif : Examiner une étude de cas axée sur la manipulation de la viande avec une pelle qui a été réalisée dans une usine de transformation de la volaille. Le projet représente une initiative rassemblant le consultant en ergonomie, le gestionnaire de la sécurité, l'étudiant en ergonomie et diverses ressources en gestion et en ingénierie au sein de l'entreprise. **Méthodologie :** Le gestionnaire de la sécurité de l'usine avait décidé d'entreprendre un projet d'ergonomie à la suite de préoccupations soulevées par un employé concernant le transfert manuel de la viande avec une pelle à partir d'un chariot à un bac placé à côté de la machine de désossage. La tâche pouvait se faire de deux façons : en utilisant une pelle pour mettre la viande dans un bac puis transférer manuellement le contenu du bac au poste de désossage ou en pelletant la viande directement du chariot pour la mettre dans le plus petit bac à côté de la machine de désossage. Les travailleurs pouvaient transférer de deux à trois pelletées chaque trois à quatre minutes. **Solution :** L'équipe de conception a conçu une esquisse d'un chariot qui pourrait éliminer le besoin d'utiliser une pelle pour transférer la viande à partir du chariot. Dans le cadre d'une collaboration ultérieure, l'équipe de projet a décidé de mettre au point un chariot transbordeur électrique sur tapis roulant afin que la viande soit transférée directement dans la machine de désossage. Les principes de conception ergonomique et les recommandations en matière de sécurité ont été appliqués afin de s'assurer que le nouvel équipement et la nouvelle conception du poste de travail optimisaient le rendement des travailleurs, la sécurité et l'efficacité. Vingt mois après le début du projet, cette « histoire de réussite » a été publiée à l'interne afin de souligner les résultats positifs du projet. **Avantages :** Le nouveau poste de travail élimine toute tâche de pelletage, ce qui minimise les risques de blessure au dos et à l'épaule. Les commentaires reçus de la part des employés ont été très positifs et les rapports de blessure liés à cette tâche se sont améliorés. La communication orale permettra de passer en revue le processus utilisé pour mettre en œuvre les changements et décrira les résultats réels et les leçons tirées.

Mots clés : pelletage, ergonomie, viande, transformation de la volaille, conception

DESCRIPTION OF THE PROBLEM

This case study takes place at a poultry processing plant. In the Boning department, birds are de-boned, using a combination of manual and automated processes. At the job described in this paper, thighs were received at the "shoveling" workstation in a buggy, and transferred, using a shovel, from the buggy to a tote. Full totes of thighs, were staged at a stationary stand where another operator, the "loader", would manually load individual thighs into a de-boning machine.

"Shovelers" tended to alternate between two different techniques for transferring thighs. The first method required the "shoveler", to transfer 2-3 loads of meat (11.3 kg full shovel weight) to a tote, at a rate of one shovel every 2.5 minutes, and then lift the tote (weighing approximately 22 kg) onto a stationary stand, at a rate of once every 5 minutes. This method exposed the "shoveler" to high forces and awkward back postures. The Liberty Mutual Tables recommend a Maximum Acceptable Load (MAL) of 10.7 kg for this task [1].

Alternatively, the "shoveler" would transfer meat directly from the buggy (69 cm high) to the stationary stand (125 cm high). This second method exposed the "shoveler" to high forces and awkward shoulder postures, requiring 88% of maximum voluntary capacity (MVC) shoulder strength for an average female [2]. This is 38% higher than ergonomics guidelines suggest for occasional exertions [3]. Shoveling directly from the buggy to the stationary stand tote also resulted in more waste, from product sliding off the shovel and onto the floor, due to the height of the stand.

In 2010, there were 5 reported injuries on this job (back (2), right shoulder (2), and right elbow). This job was shared between two full-time operators who rotated every 30 minutes between shoveling and loading, and one lead hand, who provided relief for 5-10 minutes every 30 minutes. These jobs are performed on two shifts.

INTERVENTION AND METHODS

Following the initial analysis, "shovelers" were encouraged to perform 2-person lifts to transfer totes of meat from the buggy to the loading stand, or to transfer half-full totes individually, but twice as often. While these interim solutions were within ergonomics guidelines, they were inefficient, and not consistently performed. The "shoveler" required assistance from the lead hand or the machine loader, and this technique took these employees away from their jobs.

Due to space constraints at this workstation, we were we unable to optimize working heights by allowing the "shoveler" to stand on a platform and transfer meat directly from the buggy to the stand.

Following discussions with area operators, supervisors, food safety representatives, health & safety, the area manager, the ergonomics co-op student, and ergonomist, we initially proposed using a cart, scissor lift, and smaller totes. Designs were created and quotes were obtained. However, during the second project meeting, the group decided that the cost to produce this change was simply not feasible for a job that, in the end, would still require some manual handling. Instead, a second idea for the intervention, and final design, was found.

SOLUTION

The final design was for a "dumper-conveyor-carousel system", which eliminated shoveling and tote handling demands. A powered buggy dumper was installed to dump the contents into a hopper, where it was then conveyed from the hopper to the loading carousel. The Boning manager collaborated with engineering and ergonomics to write a proposal to obtain capital funding for this design on the basis of safety and production improvements. When funding was approved, a Consequence-Driven Manufacturing team was appointed to work through the design. The final design went through a Management of Change process (reviewed by all departments in the facility) to ensure that the new equipment wouldn't negatively impact any other processes, and to look for further opportunities for improvement. Not only did we want to eliminate the shoveling & tote handling demands, but we wanted to ensure that the new "D40 operator" position (formerly "shoveler") and "loader", would be operating within ergonomics guidelines when interacting with the new machinery. Items considered were: dumper design, foot pedal location and forces, working heights and reaches to operate the dumper and carousel, conveyor height with regards to carousel height (to limit the need to lift/lower meat during the transfer), a height-adjustable platform for "the loader" to accommodate "loaders" of various statures, and forces to operate the dumper. The powered dumper–conveyor-carousel system was implemented within 6 months of the second meeting.

LEARNING EXPERIENCES

There were several "learning experiences" and benefits noted following implementation. For example:

A dumper, which tilts more than 90 degrees to ensure that thighs would easily slide out of the buggy and into the hopper, without raking, required a safety bar to prevent the buggy from falling into the hopper! The operator now pushes the bar into place before the buggy is dumped to prevent the buggy from falling into the hopper. The safety bar is then pulled away to disengage the buggy from the dumper. Push/pull forces to move the safety bar in and out of place were designed within ergonomics guidelines, and specifications were provided to Maintenance to add to their preventive maintenance checks.

A cold water "sprinkler" system was installed to continuously spray a small amount of cold water onto the inside of the hopper to limit thighs from sticking. The cold water also assists in maintaining low meat temperatures.

The jobs of the "shoveler" and "lead hand" changed drastically following the dumper-conveyor installation. The operator who formerly did the shoveling now controls the dumper and is more efficiently utilized to perform other cleaning and cooling duties in the department previously performed by the "lead hand". This frees up the "lead hand" to focus his attention on assisting with inspection, providing operator relief, completing paperwork, and other duties.

FOLLOW-UP

Operators who do the job were involved in the design to provide feedback on proposed improvements, as well as stakeholders from other departments who interact with the equipment (e.g. Maintenance, Sanitation, Quality Assurance). Involvement from all key stakeholders limited the amount of "re-work" to be completed afterward. The dumper-conveyor-carousel system was installed in February, 2011. Since installation, no injuries have been reported. Feedback from operators has been overwhelmingly positive: "I love it", "I no longer dread coming to work", "I am not hurting at the end of the day", "I'm not sore", and "It's fantastic". Operators were asked to rate the "shoveler" job on a scale of 1-10, where 1=awful and 10=fantastic: "before" scored an average of 1.3, and "after" scored an average of 10!

The production rate at this workstation has increased by 33% (from six to eight buggies emptied per shift). A more consistent flow of product is processed in this department, and an additional inspector was added to compliment this increase. Thighs which fell on the floor during the transfer from shoveling resulted in approximately 10 kg of inedible waste per shift. Now that the contents of the buggy are dumped directly into a hopper, no waste is collected at this position.

Thigh bones break when lateral force is applied, both during the processes of dumping and shoveling. The original shoveling method damaged approximately 88 kg (4 totes) of thighs per shift. The de-boning machine cannot push "broken" thigh bones out of the meat, so those thighs have to be "re-worked" (manually de-boned). The addition of the dumper-conveyor system has reduced the amount of re-work to approximately 49.5 kg (2.25 totes) per shift.

While the physical demands for the "shoveler" and lead hand jobs have significantly decreased, the opportunities for job rotation have not been expanded. This is an opportunity to investigate in future projects.

As a final benefit, it should be noted that prior to this intervention, it would have been unheard of, for someone on "modified duties" to perform these jobs. The addition of the dumper-conveyor-carousel system at this workstation eliminated manual handling demands, so the risk of injury at this job is now very low. The potential to offer modified work is now available (depending on an operator's restrictions). Therefore, the installation of this dumper-conveyor-carousel system has also provided return-to-work opportunities, where there previously were none available in this work area. Overall, this project proved to be a successful example of a collaborative ergonomics workstation redesign. The primary objective of reducing injury was accomplished, as well as several secondary benefits.

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