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EZ SCOOP: AN ERGONOMIC REVIEW

A TricorBraun White Paper | September 28, 2017

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BENCHMARKING IMPACT ON OPERATIONS

Consumers hate to dig their hand into the powder to retrieve the scoop – not only does this compromise hygiene but it leaves a mess! The EZ Scoop eliminates this problem and helps to create brand loyalty. From an operational standpoint, we wondered – how does it compare to the traditional drop scoop at the filler in terms of efficiency?

Today, scoops of all sizes are dropped into bottles containing all types of powdered products one at a time by the assembly line worker. This type of repetitive motion is known to result in neck and wrist strain due to container placement and posture. It can also cause potential contamination due to verification of scoop insertion. The EZ Scoop can be inserted into the neck ring of a bottle at any radius within 360 degrees and when tested, assembly line speeds were not compromised.

A recent ergonomic study was conducted to benchmark dropping the scoop into the bottle against the "light lip pinch" and the "cup-grasp and placement" technique with an error rate measured at zero. With reasonable work station setup, minimal training and practice, the EZ Scoop can be manually placed with limited stressors to workers and no impact on operational efficiency.

TricorBraun contracted with Blankenheim Services, LLC, an international ergonomics company based in Appleton Wisconsin, to evaluate the EZ Scoop product as it relates to packaging. Blankenheim Services' niche is ergonomics, safety and industrial therapy. The team includes Certified Professional Ergonomists (CPEs), a Certified Safety Professional (CSP), and a team of ergonomic consultants and therapists who specialize in ergonomic risk in the manufacturing setting. These safety, engineering and therapy professionals have drawn on their work experience in the manufacturing setting to provide clients with value-added and proven services for over twenty years.

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Researchers

Eric Blankenheim OTR MSIE CSP CPE. Eric holds degrees in both Occupational Therapy and Industrial Engineering. He owns a patent on a hand tool design and consults internationally on the quantification of ergonomic risk factors.

Oguz Akkas. Oguz has both undergraduate and graduate degrees in engineering and is currently a PhD candidate at UW Madison in the area of ergonomic models of the upper extremity.

Evaluation Tools

After an initial trial to explore various techniques, a formal evaluation of the old method of manually dropping the scoops compared with the optimal technique of placing the EZ Scoop was done using the following evaluation tools:

The Upper Extremity Strain Index[1]: This is a very well-researched tool to evaluate ergonomic risks at the wrist and hand and considers factors including force, posture, repetition, time of contraction and speed of work.

ACGIH Threshold Limit Value[2]: This tool, developed by the American Conference of Governmental Industrial Hygienists considers both force and speed and is a tool which is very sensitive to small changes.

RULA[3]: This tool, while possibly less sensitive, considers the entire upper body, not just the forearm, wrist and hand.

Traditional time study using MTM data[4]: While an ergonomic assessment tool, this is a well-researched method to assess the total amount of work.

Worker report of difficulty level using the Borg Scale[5]: While the sample size was small, actual subjective worker perception was deemed important.

[1]J. Steven Moore and Arun, Garg, The Strain Index: A proposed method to analyze jobs for risk of distal upper extremity disorders; American Industrial Hygiene Association, 56: 443-458, 1995.

[2]Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment, Cincinnati, OH: American Conference of Governmental Industrial Hygienists, 1985.

[3]McAtamney, L. and Corlett, E.N. (1993) RULA: a survey method for the investigation of work-related upper limb disorders, Applied Ergonomics, 24, 91-99.

[4]Niebel, Benjamin W., and Andris Freivalds. Niebels methods, standards, and work design. New York, NY, McGraw-Hill, 2003

[5]Borg, G. (1998), Borg's Perceived Exertion and Pain Scales, Human Kinetics, Champaign, IL. Gunnar Borg, 1970, 1985, 1998

0 ADDITIONAL **STRESSORS**

OPERATIONAL **COMPROMISE**

Testing occurred at a packaging location with multiple trials of 70 seconds per trial. Run speed was controlled at 20.5 bottles per minute based on the contract filler's report of a maximal run speed. Each trial was recorded by two video cameras and included representatives from Blankenheim Services, as well as engineers from TricorBraun and the contract filler.

Trial Results

- Blankenheim Services did extensive evaluation of the process at two sites using the ergonomic evaluation tools. The evaluation found that placing the EZ Scoop did not slow the production rate in the packaging process. In addition, Blankenheim Services found that with a minimal amount of worker training (1-2 minutes) the EZ Scoop created no additional stressors to the worker at the wrist or hand. The study showed that there were less unnecessary neck and shoulder motions with the EZ Scoop which incrementally decreased the total upper extremity ergonomic exposure.

- The study showed that by having the EZ scoop placed in the neck of the bottle and clearly within the line of site of the worker, the likelihood of a worker missing placement of a scoop in a bottle decreased and the worker did not have to waste motions looking into the bottle to verify placement. This appeared to have the further safety benefit of not requiring the worker's head and mouth to be directly over the food product. It should be noted that the contractor may find a missing placement with down-line evaluation, however, decreasing the likelihood of a miss should improve overall productivity.

- In the evaluation process using an interdisciplinary approach including Blankenheim Services engineers, TricorBraun engineers, and experienced TricorBraun workers, it was determined that with the correct technique of pinching the lip and placing the scoop, the ergonomic stressors at the wrist were comparable or slightly improved and the other stressors

Recommended Placement
Light Lip-Pinch Technique

were decreased. Follow up testing clearly demonstrated that with minimal training (1-2 minutes) workers could easily understand the technique and felt that the process was very easy to do. Training should include how to set up the workstation to minimize unnecessary motions, and the correct technique to grasp and place the EZ Scoop.

- The EZ Scoop fits into the neck of the bottle well, allowing worker ease in the packaging process. At a line speed of 20.5 bottles per minute, for a two-hour rotation, the pace of work and calculated ergonomic stressors were all under 60% of the recommended maximum levels. This includes a Strain Index score of 3 which is well below the maximal recommended safe level of 6.1. The time study indicates that 1.57 seconds per placement or 38.2 placements per minute would be considered "100% Standard Time", however it should be noted that the 38.2/minute calculation is without any allowances and testing was not conducted at this rate, secondary to the fact that other non-related factors would limit the line speed.
- The calculations using RULA, the ACGIH TLV and the worker subjective reporting showed incremental improvements in the ergonomic scores of the EZ Scoop placement compared to the old placement method.
- No design improvement recommendations were identified.

SUMMARY

Blankenheim Services has found that the EZ Scoop, developed by TricorBraun, appears to be a practical idea that not only addresses consumer pain points in terms of hygiene, convenience and mess but it can easily be incorporated into production lines without a negative impact on productivity levels or added risk to workers in terms of stress or efficiency. While Blankenheim Services did not specifically review consumer satisfaction, it is more than apparent that consumers would rather have a scoop that is easy to access. For manufacturers and brand owners, the results of this study support the implementation of this solution.

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With the average direct and indirect costs of a musculoskeletal disorder being $69,594.00 plus the individual worker's pain and suffering, all stakeholders including TricorBraun, the brand owner and the filler contractor should benefit from an understanding that the EZ Scoop placement does not increase the line worker's ergonomic stressors.

While many factors contribute to quality, productivity and safety, having the EZ scoop placed within line of site of the worker appears to potentially contribute positively to all three.

If you have any questions about this white paper or our services, please call 800-325-7782 or email marketing@tricorbraun.com.

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