Icing a cake requires skilled manual labor, which is difficult to remove through engineering measures. This task requires repetitive wrist movement with a variety of tools including combs, scrapers and smoothers. Current tools are made of metal or plastic with varying handle sizes. Over the last ten years two cases of Carpal Tunnel Syndrome (CTS) have been reported by employees. Regardless of the cause, each case of CTS costs Kroger approximately $40,000. This includes surgical costs, time away from work, training of replacements and other future liability issues. Jobs with high force and high repetitiveness have a predicted risk for tendonitis 32 times greater than that of jobs with low frequency and low repetitiveness.

Analysis of the specific physical tasks in the cake icing workstation found three tasks of concern for upper extremity musculoskeletal injury. Particularly, the repetitive tasks of combing the sides of the cake and wiping icing off the cardboard involved the greatest risk due to ulnar deviation and other repetitive wrist motions. The top frosting task utilized the lighter smoothing tool, but required a pinching grip which is not recommended ergonomically.

Ergonomic analysis tools were used to analyze postures, motion, and force. Tools used were RULA, ACGIH TLV HAL, and Strain Index. They resulted in pre-abatement scores of 4, 0.5, and 13.5 and post-abatement scores of N/A, 0.25, and 9.0, respectively. Recommended abatements are: 1) allowing workers to choose from an assortment of ergonomically correct, light, large handled tools (optimum grip diameter of 1.5-2.0 inches) which reduce pinch grip and wrist strain; 2) redesign the boarding tool to eliminate ulnar deviation in that task; 3) If the previous two abatements are not sufficient consider cake rotation to 45 degrees on the conveyor belt to improve access and limit poor wrist positions. The post-abatement results will reduce workers risk to UEMD’s.

Repetitive hand and wrist motion bring the highest injury risk to workers. This is most accurately reflected by the Strain Index, which incorporates repetition and task duration. There were no significant changes in the task to provide meaningful impact to the RULA analysis. The revised task resulted in minimal improvement in the already low ACGIH TLV HAL result. Regardless of abatements, this task requires skilled manual labor which cannot be eliminated by engineering measures. Recommendations have been made to reduce specific high risk elements, such as increased pinch grip forces and ulnar deviation, but the frequency keeps the overall task at elevated risk.

Currently the bakery is in the process of manufacturing innovative ergonomic icing tools based on the recommendations resulting from the icing line analysis. These industry unique tools are designed to reduce UEMD’s by limiting extreme wrist postures and decreasing pinch force. Once manufactured these tools will be tested by line workers for effectiveness and comfort.