

Mixed Methods Ergonomics Job Analysis for Construction Glass and Glazing Work

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Construction workers regularly experience heavy workloads and various physical stressors that can result in debilitating Work-Related Musculoskeletal Disorders (WRMSDs) of the upper extremities as well as lower back discomfort, pain, and injury. Construction glass and glazing workers have a higher rate of injuries and illnesses than the national average for all occupations (BLS, 2015). In 2010, glass and glazing contractors reported the highest rate of back injuries, 97.8 per 10,000 full-time employees, followed next by masonry contractors with 45.3 per 10,000 full-time employees (CPWR, 2010). However, there is limited research on back injuries, back injury prevention, or ergonomic stressors present in glass and glazing work. The purpose of this exploratory, sequential, mixed methods study was to conduct a systematic evaluation of glass and glazing construction work to help identify and rank ergonomic risk factors that could contribute to the higher incidence rate of work-related low back injury. Additional information gathered indicated a number of improvements that could help reduce ergonomic stressors in construction glass and glazing work.

Data were collected by observing and interviewing glass and glazing employees. Two observational methods called PATH (Posture, Activity, Tools, and Handling) (Buchholz et al., 1996) and REBA (Rapid Entire Body Assessment) (Hignett & McAtamney, 2000) were used to evaluate glass and glazing construction work. Structured interviews provided qualitative data and information related to the content and process of construction glass and glazing work. Two different groups of employees were interviewed, construction glass and glazing project managers and supervisors, and non-supervisory construction glass and glazing workers. Work sampling PATH data-coding sheets recorded the activities performed and tools used by the glass and glazing workers for various construction tasks. The PATH data collected provided an estimate of the proportion of time that glass and glazing workers spent in awkward postures, handled loads, and performed other physical activities in their work. Specific work tasks from the qualitative interviews were evaluated using the Rapid Entire Body Assessment (REBA) ergonomic injury risk estimator. REBA scores for these tasks classified each task as “medium”, “high”, or “very high” with regard to the level of ergonomic injury risk. REBA classifications identified job tasks or subtasks that could benefit from job changes that could eliminate or lower ergonomic injury risk. Finally, a mixed methods analysis combined the qualitative and quantitative data to provide a comprehensive integrated evaluation of the most important ergonomic injury risk factors associated with construction glass and glazing work.

The results of this study provided a more fully developed construction glass and glazing job description that suggests this type of work is not equivalent to the “construction laborer” job description found in government publications. In addition, substantial on-site daily observation of construction glass and glazing work facilitated detailed ergonomic job task analyses that identified the most physically stressful work postures, work tasks, tooling, equipment, and material handling activities in glass and glazing construction. This research could help direct and facilitate the design and testing of ergonomic interventions that could eliminate or reduce the risk of back injuries in construction glass and glazing work.

Keywords: Construction Glass and Glazing, Back Injury, Mixed Methods, PATH Method, and REBA Method