

ABSTRACT

Irizarry, Javier. Ph.D., Purdue University, May, 2005. Safety Issues in Steel Erection: Impact on Task Durations and Risk Perception of Ironworkers. Major Professor: Dulcy M. Abraham.

In spite of the efforts by government agencies, labor organizations, and researchers in the field of health and safety, injuries and fatalities continue to plague the construction industry. In 2002, the construction industry had the undesirable distinction of having two of the most dangerous occupations in the United States. The fatality rates among structural steel workers climbed to 58.2 fatalities per 100,000 workers (fourth highest rate), and the fatality rates among construction laborers reached 27.7 fatalities per 100,000 workers (ninth highest rate). These high fatality rates are often associated with unsafe working conditions and behaviors due to the high demand for worker performance. However, research has not clearly shown the relationship between unsafe working conditions and worker performance nor quantified the impact of unsafe work practices on worker performance.

This research presents a methodology that determines the impact of safety and environmental variables on tasks durations in steel erection and evaluates factors that may influence the perception of risk of ironworkers. This methodology included direct observation of steel erection activities, ANOVA analysis of task duration data, methods analysis of the steel erection process, and survey analysis of ironworkers.

The analysis of task durations revealed that the use of personal protective equipment (PPE), the time of day during which the operation was performed, the elevation at which the work was performed, and the presence of decking below the work area had significant effects ($p < .05$) on the durations of steel erection

tasks. Results of the methods analysis explained the significant effects of these variables with the following causes: the additional steps required for the installation of steel beams when fall protection is used; the interaction between workers on the decking below the installation location; and the additional time required to install poorly fitting elements as the specific activities. Accident and injury experience, experience in steel erection and construction work, safety incentive programs, and type of tasks performed were found to significantly influence ($p < .05$) the risk perception of ironworkers. Based on these findings, the study concludes with general guidelines and recommendations for safety training programs and improvements to the steel erection process.