

# High Impact

*A Project from the First 10 Years of NORA*



## Biomechanical Stress Control in Drywall Installation

### The Challenge:

Based on analysis of the Supplementary Data System (BLS), the compensable injury/incidence rate (27.5 cases per 100 workers for this group) for drywall installers was nearly three times the injury rate of 9.5 for all other construction occupations combined, in 1987. In 1994, falls (29.9%), overexertion (25.9%), and contact with objects (25.1%) were the leading events of injury and illness involving days away from work. As a result, sprains and strains (43.3%) constituted the most frequent nature of injuries and illnesses category in 1994. 📌

## Approach:

The project examined different approaches to estimating the population of at-risk drywall installers, using occupational injury classification data from the BLS. In addition, three parallel efforts were undertaken to identify high-risk activities associated with the traumatic injuries and overexertion hazards of drywall installation work: 1) analysis of videotaped data; 2) analysis of biomechanical stresses associated with drywall lifting; and 3) completion of a drywall installation survey identifying high-risk tasks and activities. In the laboratory component, simulations were conducted to evaluate the biomechanical stresses associated with drywall handling techniques identified from the field investigation. Force platform and motion analysis techniques were used to determine forces, moments, postural instability, and postures during simulated drywall handling tasks. A simulated drywall lifting workstation was built and all subjects performed one of the four randomly assigned lifting methods. Both center of pressure (COP) and center of mass (COM) data were analyzed to assess postural stability of workers.

## Results:

All the ratings of fall potential, perceived physical stress, and risk of being struck by or against objects while hanging drywall on the ceiling were greater than while performing the other two tasks. Activities involving lifting/carrying/holding drywall sheets were rated as most physically stressful. Workers perceived greater physical stress for the two drywall sanding tasks than the four taping tasks. Sanding skimmed drywall without the use of pole sanders, in particular sanding ceiling joints, nails, and corners was rated most stressful. Wrists/hands and shoulders were identified as the most affected body part subject to physical stress during drywall taping and sanding. Tasks performed with the use of stilts were rated as having greater fall potential than those without using stilts. Statistically significant results from the univariate analyses and PCA indicated that the three horizontal lifting methods created less perturbation than the vertical lifting method.

## Impact:

The field study component has not only collected useful data from these worksites, but also established excellent collaborative opportunities and research partnerships for NIOSH. This study also represented the first large-scale, worker-based, and construction-related laboratory study, which was conducted to evaluate the biomechanical stresses associated with the lifting of large-sized manual materials. Drywall installers, carpenters, painters and construction laborers are responsible for almost 50% of fall-related injuries in the construction industry. All of these four construction workforces handle drywall at worksites. The recommendations of this project can be extrapolated to apply and benefit the previously-mentioned four construction workforces, which represent 3.3 million construction workers. The study results were also referenced and used for wallboard-related legislative actions in Washington State in June, 2000. The study findings provided strategies for controlling physical stresses and fall hazards in drywall-installation work, thereby promoting the safety of this sector of the construction population. ■

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For complete description of this project and others see the CD Rom "A Compendium of NORA Research Projects and Impacts, 1996-2005" located at [www.cdc.gov/niosh](http://www.cdc.gov/niosh).

The findings and conclusions in this report have not been formally disseminated by the Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health should not be construed to represent any agency determination or policy.