

Title: Ergonomic Interventions to Reduce Back Injuries in the Home Building Industry

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500 word Abstract:

**BACKGROUND.** Workers in the home building industry are exposed to most of the recognized occupational risk factors for back disorders including heavy work, materials handling, pushing, twisting, frequent lifting over 25 pounds, requirements for sudden unexpected maximal effort, awkward postures. Engineering controls for the reduction of low back injuries in this population was the focus of this study.

**METHODS.** The biomechanical demands placed on low back of workers from three trades within the home building industry (masons, drywall hangers and framers) were quantified using the CABS method (Mirka et al, 1998a, 1998b) From this data, the activities that placed the workers at risk of low back injury were identified and 15 different interventions were developed and evaluated in the lab and field. Described below are a small subset of these tasks along with a description of the interventions developed and their lab and field assessments.

**WALL CYLINDER.** When framers complete the construction of a wall, typically it is lying on the floor. The workers then get together and manually lift the wall the vertical position. This exposes the workers to high loads on the spine while in extreme flexed postures. A wall lifting device was created that utilizes an air cylinder capable of producing a lifting force of 1200 lbs. An attachment harness is secured to the header of the wall and then the cylinder lifts the wall to slightly above head height. At this point the framers can easily push the wall the rest of the way to the vertical position. Laboratory analysis of this device documented tremendous reduction in loads on the spine and field assessment indicates great enthusiasm for the design, particularly for the increased productivity in developing wall for the second story where application of sheathing after the walls were erected was an annoyance with the existing methods.

**DRYWALL LIFT.** The installation of drywall often requires excessive spine

extension and high loads. We identified a commercially available product called PANEL LIFT that is able to lift the sheetrock into place in both the horizontal and vertical orientations and then the worker can use a screwgun with an extension to secure the panel. Laboratory and field evaluations of the intervention showed decreased low back stress while using the device, but construction workers expressed concerns related to productivity.

NAIL GUN ATTACHMENT. When framers are securing the sub-flooring material to the floor joists or floor trusses they most often use a nail gun. This requires that they spend a great deal of time with their trunk in a fully flexed posture, often for hours at a time. The static loading of the ligaments and muscle of the back along with the extreme posture of the lumbar spine make this a job with potential risk for cumulative trauma. A handle was designed and fabricated that allows the worker to stand in and upright posture as they are using the nailgun. Laboratory analysis of the use of this tool documented tremendous improvement in lumbar posture and field assessment indicates great enthusiasm for the design.

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