



Evaluating alternatives to lifting concrete blocks over rebar

Alternatives to lifting concrete masonry blocks onto rebar: biomechanical and perceptual evaluations

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Overview

Conventional wall construction using concrete block (concrete masonry units or CMUs) requires workers to repeatedly lift CMUs above their heads and thread them over rebar for placement. Two available technologies might reduce such strenuous lifting and consequent strains and sprains: H-block and high-lift grouting. H-block CMUs are open on the ends (from above, they look like an H instead of an 8) and can be laid without lifting over the rebar. High-lift grouting uses standard CMUs, but rather than pouring grout to embed the rebar as the wall is constructed, workers build the wall first, then place the rebar and pour the grout. In this study researchers first evaluated shoulder motions of bricklayers while building a wall of CMUs using each method, establishing that the alternative methods reduced strenuous shoulder movements. The researchers also interviewed a sample of construction estimators and plan specification writers selected randomly from professional association lists and the Blue Book to discover what barriers might exist to wider industry adoption of the safer alternative methods.

Key Findings

- On average, workers building a block wall using conventional methods had a “peak shoulder flexion” of more than 130° – that is, the workers lifting block had to raise their arms 130° to place it when building the higher rows of the wall. Construction using H-block or high-lift grouting significantly reduced this strenuous peak shoulder flexion.
- A construction estimator – using local material prices, labor productivity estimates from RS Means, and an estimate developed for a retail store – estimated that construction using H-Block would have added only 2% to the masonry construction costs.
- Although the American Society for Testing and Materials (ASTM) indicates that H-block meets the same weight-bearing standards as medium weight CMUs, one-fifth of construction specification writers interviewed believed that H-block did not meet necessary strength and structural stability standards. Only one-third had ever specified use of H-block in a construction project.
- Although more than three-fourths of the specification writers indicated that use of high-lift grouting was permitted at the contractor’s discretion, nearly half of the masonry contractors surveyed believed that the method was not approved by specification writers.

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See full report:

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