

Ergonomic Evaluation of Scaffold Caddy

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A caddy to carry scaffold components, designed by partners, Cathy R. Holloway and James R. Henderson, alleviates the much of the physical demands of scaffold transport. Use of the scaffold caddy (Figure 1) significantly reduces the manual handling aspects of carrying scaffold components. It also improves productivity since less time is spent in manually carrying the scaffold pieces. Since workers are less fatigued when they use the scaffold caddy, they can work more quickly, efficiently, and safely.

Ergonomic Benefits

The ergonomic benefits of the scaffold caddy are:

- Reduction of the amount of weight carried
- Reduction of the distance walked while carrying the scaffold pieces
- Reduction in awkward postures such as bending and twisting

Conventional Method

Scaffold components are both heavy and bulky. Sample weights are given in Table 1. Scaffold components are sometimes carried long distances, as they must be moved from the delivery location to the location where the scaffold is assembled. In some cases, this distance may be hundreds of feet. The combination of the weights and distance that those weights are carried presents a serious risk for musculoskeletal disorders.

When lifting and carrying a large, bulky component such as a scaffold buck, workers are often in awkward postures, as seen in Figure 2.



Figure 1. Scaffold Caddy

Scaffold Component	Weight
Scaffold buck	60 lbs.
8' Board	40 lbs.
Jack	13 lbs.
Outrigger	11 lbs.

Table 1. Weights of scaffold components.



Figure 2. Awkward posture when carrying scaffold buck.

Workers may pass through interior doorways when carrying the scaffold pieces. To avoid damaging the doorways, they must move slowly and carefully. This imposes additional awkward postures such as sideways bending and twisting while carrying as much as 60 lbs.



Figure 3. Sideways bending when passing through interior doorway.

The tread and large diameter of the tires allow the caddy to move easily across the uneven ground that is typical of a construction site.

Each component of the scaffold has its assigned spot on the caddy, with the rods and hangars customized for their respective components, as demonstrated in Figures 5-9.



Figure 5. Loading scaffold bucks.

Revised Method Using Scaffold Caddy

The caddy is designed to carry all of the components to build a scaffold. The heavy duty frame and tires are capable of supporting the weight of both the caddy and its load (Figure 4).



Figure 4. Heavy duty frame and tires.



Figure 6. Loading outriggers.



Figure 7. Loading jacks.



Figure 8. Loading braces.



Figure 9. Loading boards.

Push Forces

The amount of force needed to move the caddy was measured using a force gauge. With the caddy empty, 33-38 pounds of force was needed to start moving the caddy. Once the caddy was in motion, only 13-17 pounds was needed to sustain the movement (on smooth floor).

With the caddy loaded (with 9 bucks, 9 outriggers, 10 braces, 13 jacks, and 6 planks), the starting force was 68 pounds, and the sustaining force was 30-40 pounds.

Ergonomic Comparison between Conventional and Revised Methods

An ergonomic evaluation was conducted to compare the two methods for moving scaffold components. The evaluation was based on a modified version of OSHA's CTD Risk Factor Checklist.¹

¹ Steve Schneider, 1995, "OSHA's Draft Standard for Prevention of Work-Related Musculoskeletal Disorders", *Ergonomics* 10(8):665- 674.

Using the conventional method and assuming that one person takes 5 hours to carrying all of the scaffold components, the CTD Risk Factor Score is 25.

Using the scaffold caddy and assuming that one person can accomplish the same work in 1 hour, the CTD Risk Factor Score is 18.

Thus, the scaffold caddy reduces the risk of a CTD by approximately 28%. The main difference between the conventional and revised methods is the time factor. The caddy greatly reduces the carrying times as compared to the conventional method.

Productivity gains are also impressive. Carrying scaffold pieces manually was timed at 70 minutes. Using the scaffold caddy to transport the same number of scaffold pieces took about 8 minutes. This represents a time savings of ~ 88%.

Conclusion

The scaffold caddy improves productivity and reduces the risk of ergonomic injuries when moving scaffold components on a jobsite.