



Ergonomics Case Study

Washington State Department of Corrections

Shelton Correction Center

Background

The Department of Corrections uses heated food tray carts to transport meals from the kitchen to the cellblocks. The correctional facility wanted to find out what they could do to improve the food delivery system. The employees had complained about the effort needed to get the carts moving and keep them moving over a variety of surfaces.

Issues Found



The food carts were designed to be used indoors on a linoleum surface. At the correctional facility they were being maneuvered on asphalt, up an incline, over a door threshold, over floor mats, outdoors in inclement weather, and as far as 50 feet. The initial forces required to start the cart moving was measured by a force gauge at up to 165 pounds, depending on whether the wheels were straight when the push started. The force necessary to sustain the push was up to 50 pounds. Both the initial and sustained forces were significantly above recommended limits. You can use this on-line calculator to determine allowable push/pull/carry forces:

<http://ergonomics.healthandsafetycentre.org/calculator/ergo/ppcc/intro.htm>

Recommendations and Implementation

The L&I Consultation Ergonomist suggested several battery-powered assists to move the food carts. However, the cost of these devices was prohibitive (more than \$5,000). The consultant also advised maintaining the casters on the food carts. The Department of Corrections has a mechanical shop which was asked to evaluate the casters. The shop had replaced the original casters once already, as they had failed. They replaced the casters with a new type designed to roll more easily.



This is the original caster.
The wheels were plastic and had failed.



This was the second caster tried. The tires would sink and grab at the ground or floor covering. This resulted in push and pull forces that exceeded recommended limits.



This is the third caster. These casters have a cast iron spoke and a solid rubber tire. The L&I consultant again measured the force required to move the food carts. The initial push force was now 46 lbs. This means that 89% of women could push the cart once every 30 minutes without risk of serious injury. Under the same conditions, greater than 90% of men could push the cart without risk of serious injury. The cost to retrofit the casters on two carts was only \$500.00.

Follow-Up

The employees immediately recognized that it took a lot less force to move the food carts and were very happy with the results.