



Ergonomics Case Study Library External Book Drops

Background

The Mount Vernon library asked L&I for ergonomics help after workers experienced strains and sprains while emptying the external book drop bins. As with most library systems, limits in the budget meant the book drops couldn't be replaced any time soon. Library staff hoped for a few quick fixes so everyone could manage the task and work comfortably. Fortunately, the City of Mount Vernon's maintenance department can modify equipment for the library.



Issues Found

Several issues added duration and force to the librarians' everyday exposures of lifting, bending, and pushing. This made the tasks more difficult and took a toll on the staff.

- The doors to the book drops had warped over time. To align the locks, workers had to lift the heavy doors while simultaneously closing and latching them. Shorter workers stood on tip-toes, while others squatted or knelt, or bent over.
- The library's entrance threshold caught the wheels of the library carts. Librarians had to lift while pulling heavily loaded carts over the lip.
- The ground sloped downhill from the book drops so librarians had to chase run-away carts. A wheel chock could solve the problem, but its location on the floor of the book drop made it hard to reach. Librarians were tempted to use their feet as chocks, instead.
- The plywood liner of the book drop floor caught the front wheel of the spring-loaded bin. Workers leaned on the bin to "tip" it up and move it over the lip. This took momentum and force, as well as some skill. In addition, it caused wear and tear on the plywood.

Recommendations and Implementation

Before		After
 <p>Awkward postures with forceful lifting and pushing to line up the latch and lock</p>	<ul style="list-style-type: none"> ✓ Install longer, lower handles: These make it easier to open and close the doors. Workers of varying heights can find a comfortable grip at the level that works best for them. ✓ Install better wheels: The new metal wheels roll more smoothly on the concrete. 	
  <p>Librarians lift carts over the old threshold</p>	<ul style="list-style-type: none"> ✓ Gradual threshold ramp at front entrance: Installing a lower threshold section in the doorway removed the barrier. Library carts and patrons with strollers, walkers, or wheelchairs can now roll right over. 	 <p>Arrow shows difference between old threshold and new, lower threshold</p>

Before		After
 <p>Awkward reach to chock while dealing with a roll-away cart</p>	<p>✓ Improve access for wheel chocks: Ropes on the chocks and hooks inside the book drops eliminate bending. Librarians can quickly find and access chocks before bins and carts start to roll away.</p>	
 <p>Left side of front door; Perpendicular to the entrance; Book drops situated back to back</p>	<p>✓ Relocate book drops: The new location has multiple benefits –</p> <ul style="list-style-type: none"> - Doors open toward the back and uphill, so library carts don't roll away. - The straight shot to the front doors reduces the need to steer heavy carts around corners. - With no wall nearby, there's more room to open and close the doors. - Improved worker safety: Librarians can now face any patrons that loiter near the door. 	 <p>**Library staff idea!**</p> <p>Right side of front door; Parallel to the entrance; Book drops situated side by side</p> 

Before		After
 <p>The plywood lip created a barrier for the central wheel of the spring-loaded bin; the wheel wore out the plywood.</p>	<ul style="list-style-type: none"> <li>✓ Install a metal threshold ramp on each book drop: A metal stabilizer, welded to the book drop framework, keeps the frame square. <li>- Doors open and close easily, and the latches align correctly. <li>- Spring-loaded bins roll smoothly over the metal stabilizer with no need to tip or forcefully push or lift them. 	

Follow up

The participation of the library staff contributed greatly to the success of this project. Workers generated excellent ideas during the ergonomics consult, and continued to brainstorm afterwards. They willingly tried out proposed solutions, and keep refining them.

The library staff appreciate the ergonomics changes that have been implemented so far. Comments include: “It’s much easier to open and close the drop box doors using the long handle.” “The lower profile door sill is great; it’s just fine coming in now with a full cart”. An added bonus for the employer, as well as the staff, is a greater awareness of injury prevention. The staff now divide and conquer—they make sure to rotate the task of emptying the book drops among the scheduled staff each day.

Mount Vernon Library’s long term plan will increase worker safety and eliminate the problems caused by heavy doors, finicky locks, and roll-away carts. They plan to create a through-wall access for book drops in the exterior wall of the building. The spring-loaded bins that came with the book drops will still be used, but indoors, out of the rain, and on a level surface.