

## **ERGONOMIC IMPROVEMENT**

### **Panel Mover at Access Ability, Inc.**

Access Ability, Inc. is a metal fabrication business founded in 1996 for the purpose of manufacturing modular access ramps. At the beginning of the OSHA Worksite Redesign project Access Ability had one full time employee and limited part time employee help. The company has since expanded into divisions of metal fabrication including mild steel railings, custom fabrication products and aluminum specialties. Access Ability has done work for a number of notable clients including Tri-Met, Tom Walsh Company, R & H Construction, Housing Authority of Portland, and the State of Oregon's Disability Services Offices. The products now include ramps, railings, architectural and ornamental metals and, the newest product, aluminum workstations for hospital environments.

When the company was founded, owner, Gale Schmidt, was recovering from a disability that had curtailed her mobility. Discovering that wheelchair access was a major deficiency in many public places, Gale wanted to find a way to make ramp installations easier and more affordable. She designed a modular system that consists of a small number of interchangeable components that can be configured in a multitude of ways. By using standard components, ramps can be made in varying lengths and shapes such as straight, "L" shaped, switchbacked, or in combinations of these shapes. The modular ramp design has all the Americans with Disabilities Act (ADA) features built into it. The proper slope, handrail height, bumpers, etc. are part of the features. The design has been awarded a Master permit for the State of Oregon, which is essentially the seal of approval from the State for code compliance.

The ramps are made of steel frame components that are powder-coated for an attractive, durable finish. The decking of the ramps consists of plywood panels that are specially treated and coated with an abrasive slip resistant topping. This design is doubly attractive to the owner because they are virtually maintenance-free, (unlike wood ramps that need sealing and sanding every few years), and they are more attractive than bulky lumber ramps.

Because the ramps are produced in our shop in production fashion, they can be made affordably. The component nature of the design means that they can fit almost any landscape setting and be easily assembled in the field. For comparison, a straight, 30' Modular Access Ramp can be installed in 1 hour on level ground (two hours on uneven ground). It would take approximately 8 hours to build the same ramp out of lumber after receiving approval of the engineering design through the state permitting process.

The Modular Ramp system is fast becoming the ramp system of choice in the Portland area and the company is looking to expand sales to the national market.

As a small, non-automated company there are some production challenges. One of the tasks that was particularly difficult was manual panel moving and manipulation. The actual walking surface of the ramp is made of plywood that is cut and notched to specific

sizes and patterns and then finished with sealers and paint. The ramp panels are cut from typical 4' x 8' sheets of MDO plywood. Each panel weighs up to 80 lbs. and had to be manually carried from the storage rack, to the panel saw, to the cutting table and to the paint rack and also was manipulated during the painting process to access all sides and edges of the panels. This meant that a worker was manually lifting, twisting and balancing these panels, weighing up to 80 pounds, throughout the process.

Oregon OSHA was contacted to request suggestions to reduce the ergonomic impact of the panel movement. After review of the situation, a viable solution could not be identified or located. A grant application was completed and an Oregon OSHA Worksite Redesign Grant was awarded to evaluate the tasks involved in the panel manipulation and to design a system that reduced the ergonomic stresses involved in moving and manipulating the plywood panels.

The Oregon Manufacturing Extension Partnership (OMEP) was contracted to manage the project. OMEP had worked with Access Ability in 1998 to help secure a Master Permit from the State of Oregon for the ramp design and to develop tooling for injection molding of ramp parts. Patrick Kraft, a Manufacturing Consultant with OMEP, served as Project Manager.

Concept Designer, Alan Walters, was hired to assess the processes and design a transport and manipulation system for the shop. After review of the baseline ergonomic report, which defined the initial ergonomic concerns, Alan outlined a concept to use an overhead trolley system with suspended panel carrier frame, to move the panels through the shop. Alan also integrated into the plan a tilt-table lever system for getting panels from a vertical traveling orientation, to a horizontal working orientation.

To carry the panels via the trolley, Alan designed an aluminum panel carrier that is hung from the trolley and raised and lowered by means of a chain binder lever. The plywood panels, in their full dimension, are stored horizontally on a skid that allows the panel carrier to slip under an individual plywood sheet. The chain binder lever is pulled, raising the carrier and picking up a plywood sheet a mere 3 inches off the ground. Then the sheet is manually pushed via the trolley to the panel saw where it is cut to height and width. The plywood then rides in the carrier to the cutting table.

Getting the panels on and off the cutting table was the most risky process for the panel handler. The awkward size of the panel combined with the weight and twisting motion required, was a strain on the panel handler's back. Alan eliminated the strain by designing a simple armature that the panel could be lowered into by means of the chain binder system. The armature is hinged onto the edge of the cutting table. Once the panel is set in the armature, the operator merely pulls a lever and the panel is swung horizontally onto the tabletop. It requires only a single handed pull on the lever. There is no lifting, twisting or awkward balancing of the panel involved anymore.

While on the cutting table, the panel is notched, trimmed and surface painted. The panel is then lowered via the armature back into a drying carrier, of which there are five, to

allow processing of small batches of panels at any given time. These additional trolleys and carriers do not require the binder system for lifting, as the armature system swings the panels onto and off of the fixed height carriers. The back face of each plywood panel is painted and then the panel is moved via the drying trolley, to the end of the line, where it stays to dry. Once dry the panels are trolleyed back to the storage rack. The process has eliminated the strain formerly experienced by the human panel handler.

Prior to the new process, the panel handler reported feeling strain throughout the back, torso, and hips, when moving the panels. With the new panel system the handler reports no strain.

Oregon OSHA's (OR-OSHA) Worksite Redesign Grant program provided \$27,000 in grant monies for this project. This covered some of the costs to design, prototype, and install the system to its final configuration. It also included the pre and post ergonomic evaluation reports and documentation of the workstation so that others could benefit from the research. Access Ability Inc. contributed the required 10% match, in the form of manufactured subparts and assisting in the installation, testing, and reporting on the outcomes of the panel mover system. While the system was designed for their special needs, Gale believes it may be of interest to many companies with similar applications and issues.

All product designs developed through this program are public property. The design is complete, and will be available to anyone wishing to duplicate or further develop the panel mover system. A web based project archive is in the process of being constructed, that will provide details on this and many of the 35 to 40 grants being completed. It will be linked from the main Oregon OSHA website and will provide information such as project overviews, ergonomic reports on the projects, as well as design and vendor information so that anyone may research the results and adopt the technologies.

Information about developments and the status of this program can be obtained from Oregon OSHA ([www.orosha.org](http://www.orosha.org)).  
Phone: 1-800-922-2689  
<http://www.cbs.state.or.us/osha/grants/worksitere design.htm>

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