

Increasing Participation and Safety for the Loading of the Initial Material Lot for a Fastener  
Packaging Assembly Line at Goodwill Industries of the Springfield/Hartford Area, Inc.

School of Engineering  
Western New England College  
Springfield, MA

## **Objective**

OMG, Inc. of Agawam, MA, a manufacturer of roofing products and fasteners, utilizes Goodwill Industries of the Springfield/Hartford Area, Inc. to perform some of their final packaging operations. One of the operations involves the removal of metal decking screws from a large bin into a smaller bin for delivery to a work area. This task currently involves a person lifting a bin weighing 40 – 60 pounds from the floor, carrying the bin several feet and then reaching (while standing) 3 feet from the body and dumping the contents onto the work surface . This primary objective of this device design and fabrication is to enable workers having a variety of disabilities, including those who have limited strength and reach as well as those with visual impairments, to accomplish this task. The secondary objective is to eliminate several ergonomic concerns that were observed with respect to lifting and reaching of heavy objects.

## **Work Scope of Design Project**

This project is an interdisciplinary project involving senior undergraduate students in biomedical engineering and industrial engineering. These students are completing the design project as a requirement in their respective laboratory courses offered in Fall 2007. Students began the project by touring the Goodwill facility in Springfield and observed the screw packaging process. A standard design process is followed throughout the project. The team first brainstormed design ideas, then chose the best three to present to the laboratory instructors. Based on feedback from instructors, students made modifications to their designs which were then presented to the Supervisor of Rehabilitation and the Program Director of Employment Support Services at Goodwill Industries in Springfield; these individuals chose the design they thought would best serve the largest number of workers. Incorporating feedback from the nonprofit agency, the team is currently developing prototypes of their device. Once the prototype is manufactured, it will be tested by workers at Goodwill. Based on the results of the testing with disabled workers, the team will modify its design and validate its success with further testing by workers at Goodwill. The deliverables at the conclusion of the semester are a working device and a report meeting the standards of the NISH National Scholar Award guidelines. Modifications to the design, along with testing at Goodwill, will continue into the Spring 2008 semester to ensure that the device meets the needs of workers. A final report will be submitted to NISH by April 11, 2008. Testing of the devices by the workers at Goodwill has been approved by the Western New England College Institutional Review Board.

## **Schedule**

9/4/07

Introduction to the Projects and Tour of Goodwill Industries in Springfield, MA

9/11/07

Project Brainstorming and Initial Design Concepts

9/25/07

Basic Designs and Present Proof of Concepts at Goodwill Industries

10/9/07

Detailed Drawing and Analysis of Designs

10/10/07 – 10/30/07

Evaluation of Initial Prototype Completed (including basic prototype testing at Goodwill Industries)

11/1/07-11/26/07

Design Implementation, Fabrication and Testing

11/27/07

Project Evaluation / Redesign Completed / Final Presentation

12/4/07

Semester Project Report

12/5/07 – 2/01/07

Final Design Fabrication, Delivery to Goodwill and Validation of Design

4/11/08

Submission of Final Report to NISH

### **Design Team**

- Biomedical Engineering Students: Karen Joyce and Jeremiah Beers
- Industrial Engineering Students: Colin Stone and Jenna Opsitnick
- Faculty Advisors: Judy Cezeaux and Thomas Keyser

### **Budget**

Request: \$350

Co-funding (Department of Industrial Engineering): \$400

Justification: Initial designs require a substantial amount of fabrication that will likely include a linear actuator (or equivalent), battery, re-charger, mobile base, platform, pivoting bins and platform supports. This project is aimed to increase the number of disabled workers who can perform this task and improve ergonomics with respect to lifting and repetitive motion disorders.

Estimated Material Costs:

Aluminum and polycarbonate for final design: \$200

Linear Actuator: \$250

Wood for prototype design: \$50

Miscellaneous (screws, locking pins, battery, re-charger, etc): \$250

Machining required for this project will be performed by a machinist/model maker in the Western New England College machine shop

### **External Collaboration**

Throughout the project planning and implementation phases, students and faculty are in contact with Anne Kaboray, Supervisor of Rehabilitation and Carol Hasenjager, Program Director of Employment Support Service at Goodwill Industries of the Springfield/Hartford Area, Inc. Anne Kaboray is responsible for choosing the workers to participate in the testing and validation of the design.

### **Contact Information**

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