



## **Developing a Safety Training on Warehouse Worker Hazards for Structural Steel Fabricating and Supply Companies**

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## **Developing Safety Training on Warehouse Worker Hazards for Structural Steel Fabricating and Supply Companies**

The paper presents the results of a collaborative effort between two US universities, The American Institute of Steel Construction (AISC) and a steel fabricating corporation to develop and implement a bilingual (English and Spanish) safety training program on warehouse worker hazards for structural steel fabricating and supply companies. Structural steel fabricators receive structural steel material, fabricate structural elements for steel framed buildings and bridges and then ship fabricated material to projects. Steel service centers purchase material from steel mills and distribute steel to structural steel fabricators.

Workers in structural steel fabricating and supply companies are at risk of fatal and non-fatal injuries. In addition to exposure to common warehouse worker hazards in other industries, structural steel warehouse workers are exposed to risks related to the large, heavy and variable nature of the steel material they handle. Furthermore, some warehouse workers employed in structural steel fabricating and supply companies speak Spanish as their native language and have limited English fluency that puts them and their co-workers at an increased risk of fatal and non-fatal injuries.

Structural steel warehouse workers face many barriers to receiving adequate safety training that is in a language and manner that workers can understand. The structural steel fabricating and supply industry includes many small companies that are geographically distributed among the United States and may lack the resources to develop and implement adequate training programs for their workers. When training is available, it is often offered in English which limits the Spanish-only worker's ability to understand the training and may increase the risk of injuries due to employers mistakenly believing that workers are trained to safely perform their duties.

In order to address the barriers to adequate training, the research team successfully obtained a training grant from the Occupational Safety and Health Administration (OSHA) to develop an English and Spanish Warehouse Worker training curricula for use with worker training. The training consists of peer to peer activity based learning. The training covers potential hazard exposures that flow from warehousing and processing tasks such as off-loading and loading materials, movement of material by overhead crane, forklift, loaders or by hand, falls from equipment or loads, struck by or caught between accidents, musculoskeletal injuries due to lifting, bending or working overhead, electrical equipment operation and maintenance requiring safe practices and lock-out/tag-out, and chemical processes. Educational materials consist of a six contact hour worker training which includes activity based learning, PowerPoint presentations, demonstration materials, trainee workbooks and a learning outcomes assessment.

This paper contributes to the body of knowledge by highlighting the results of a partnership between academia, a professional society and a company to develop and implement a safety training program with the common goal of decreasing the number of fatal and non-fatal injuries among structural steel warehouse workers. The paper concludes with recommendations for those interested in forming partnerships to develop and implement training programs.

## **Introduction – Susan Harwood Grant/ Safety**

Workers in structural steel fabricating and supply companies are at risk of fatal and non-fatal injuries. In addition to exposure to common warehouse worker hazards in other industries, structural steel warehouse workers are exposed to risks related to the large, heavy and variable nature of the steel material they handle. The structural steel and supply companies' workforce is diverse. Some workers are older and very experienced while others are young or new. Furthermore, a large portion of warehouse workers employed in structural steel fabricating and supply companies speak Spanish as their native language and have limited English fluency that puts them and their co-workers at an increased risk of fatal and non-fatal injuries. Hispanic migrant workers are, twice as likely, to be injured on the job than non-Hispanic workers (AFLCIO, 2014). Language barriers make communication among Spanish and English speaking workers about the importance of safety training nearly impossible since most training is only available in English (Olbina, Hinze, & Ruben, 2011). Occupational Safety and Health Administration (OSHA) has allocated a large amount of funding to increase the availability of training materials and offer trainings in Spanish.

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In order to address the training needs of workers in the United States, OSHA created the Susan Harwood Training grant program. The Susan Harwood training program provides training and education for target audiences. Through a competitive process it awards grants to non-profit organizations such as non-government organizations (NGOs) and universities to develop materials and train workers (OSHA Susan Harwood, n.d.).

This paper presents the results of a Susan Harwood training grant from OSHA to develop an English and Spanish Warehouse Worker training curricula to educate structural steel warehouse workers on how to avoid hazards with the goal of reducing the number of injuries and fatalities in the industry.

## **Partnership**

The team for this project was composed of a partnership which included faculty and students from Michigan State University, faculty and students from The University of Puerto Rico at Mayaguez, The American Institute of Steel Construction and Douglas Steel Fabricating Corporation. All team members worked with the common goal of developing and offering a training program that is dynamic, relevant and can assist small structural steel companies in satisfying their training needs for their employees.

Faculty from Michigan State University and The University of Puerto Rico at Mayaguez who participate in this project have extensive experience in developing safety training curricula both in English and Spanish and providing OSHA training to workers.

The American Institute of Steel Construction (AISC) functions as a liaison to its fabricator and erector members on many issues including safety, and also works with federal agencies when appropriate. AISC provided comments and testified at OSHA hearings when the Steel Erection Negotiated Rulemaking Advisory Committee proposed revisions related to Subpart R of 29 CFR 1926. AISC has an active Safety Committee whose mission is to “help its members achieve zero injury goals” (AISC, n.d.). AISC maintains a safety channel at its website and provides links and safety resources for its members and offers a Safety Awards Program.

Douglas Steel Fabricating Corporation is regionally large steel fabricator and erector of structural steel primarily for buildings. Douglas Steel Fabricating Corporation has been very active in the AISC Safety committee in promoting safety of workers.

### Program Development

The first step of the project was to write a competitive proposal to OSHA to request the funds for the curriculum development and training program. In order to identify the hazards that workers in the structural steel industry and routinely exposed to, the team members implemented a multi-prong approach which included an extensive literature review, shop visits and input from experienced industry members who serve on the Safety Committee. The focus of the curriculum is the 26CFR 1910 General Industry Standards. OSHA has numerous guidance publications that address workhouse worker hazards in various industries but none that were specifically focused on the steel fabricators and steel supply companies. Existing OSHA materials were adapted and new material was developed to create an industry sector specific program.

Based on the multi-prong approach described, it was determined that potential hazard exposures flow from warehousing and processing tasks which include off-loading and loading materials, movement of material by overhead crane, forklift, loaders or by hand, falls from equipment or loads, struck by or caught between accidents, musculoskeletal injuries due to lifting, bending or working overhead, electrical equipment operation and maintenance requiring safe practices and lock-out/tag-out, and welding and chemical processes. These potential hazard exposures became the basis of the curricula outline and the expected learning outcomes for each module. As shown in Table 1, the curricula is divided in 10 modules. The first module (Module 0) provides an overview of the training program, the second module (Module 1) provides an overview of the hazards routinely encountered in the industry. Modules two through seven address specific hazards. Module eight addresses worker’s rights as defined by OSHA. Module 9 provides instructions for trainers who will go back to their companies after attending the training session and will provide secondary training to their co-workers.

Table 1: Training Modules and Learning Outcomes

Module	Learning Outcomes Participants shall be able to:
0) Program Overview	<ul style="list-style-type: none"> <li>• State program objectives</li> </ul>
1) Hazards Overview	<ul style="list-style-type: none"> <li>• Identify special characteristics of steel fabricating and supply companies which vary from other industries that involve warehousing activities</li> </ul>

	<ul style="list-style-type: none"> <li>• Identify key warehousing activities which take place in steel companies</li> <li>• Identify and recognize broad hazards which may exist in warehousing activities in steel companies</li> <li>• Develop a hazard map</li> </ul>
2) Material Handling and Storage	<ul style="list-style-type: none"> <li>• Identify key material handling hazards</li> <li>• Recognize hazards associated with material handling equipment</li> <li>• Identify methods to abate, avoid and prevent accidents when moving material</li> </ul>
3) Material Handling and Storage Equipment Continuation	<ul style="list-style-type: none"> <li>• Identify key material handling hazards</li> <li>• Recognize hazards associated with material handling equipment</li> <li>• Identify methods to abate, avoid and prevent accidents when moving material</li> </ul>
4) Hazard Communication	<ul style="list-style-type: none"> <li>• Demonstrate an understanding of what information is found in an SDS</li> <li>• Demonstrate an understanding of how to navigate an SDS to locate information</li> <li>• Demonstrate an understanding of “pictograms”</li> <li>• Demonstrate an understanding of requirements for secondary containers</li> </ul>
5) Preventing Musculoskeletal Injuries	<ul style="list-style-type: none"> <li>• Demonstrate understanding of the principles of ergonomics and their applications</li> <li>• Demonstrate understanding of proper equipment use, tools, and machine controls</li> <li>• Use good work practices, including proper lifting techniques</li> <li>• Demonstrate awareness of work tasks that may lead to pain or injury</li> <li>• Recognize early symptoms of MSDs</li> </ul>
6) Electrical Safety	<ul style="list-style-type: none"> <li>• Demonstrate understanding of the risks of working with electricity</li> <li>• Demonstrate ability to recognize electrical safety hazards</li> <li>• Demonstrate understanding of safe use of cords</li> <li>• Demonstrate understanding of the need for de-energizing for routine parts replacement such as changing drill bits</li> <li>• Demonstrate understanding of the need to Lock/Tagout equipment when servicing equipment</li> </ul>
7) Respiratory Safety and PPE	<ul style="list-style-type: none"> <li>• Demonstrate understanding of respiratory risks</li> <li>• Know when respiratory protection should be worn</li> </ul>

	<ul style="list-style-type: none"> <li>• Know the types of respiratory protection</li> <li>• Know how a respirator should fit</li> <li>• Know how to maintain, clean and store a respirator</li> <li>• Know inspection requirements</li> <li>• Demonstrate understanding of requirements for PPE</li> </ul>
8) Workers' Rights	<ul style="list-style-type: none"> <li>• Demonstrate understanding of workers' rights under the OSHA Act</li> <li>• Demonstrate understanding of procedures for filing a complaint</li> <li>• Demonstrate understanding of whistleblower protections</li> </ul>
9) Secondary Training	<ul style="list-style-type: none"> <li>• Demonstrate understanding of procedures for conducting secondary training</li> </ul>

**Spanish Version of the Materials Developed**

In order to address the training needs of Spanish-only speakers who work in the structural steel industry, the curricula was developed in English and Spanish. The authors followed the guidelines developed for educational materials targeted to Hispanic workers (Brunette, 2005). The translation process involved the use of the OSHA English-Spanish dictionary to ensure that the terms used were those that are approved by OSHA (OSHA Dictionaries, n.d.). It is important to note that Spanish is spoken in many countries in Latin American and many terms differ from one region to another, thus using the official OSHA dictionary was a requirement to maintain consistency between the terms used in this training curricula and the terms used in other OSHA training and publications. A faculty member whose area of expertise is Safety Management and who speaks Spanish as her first language led the translation effort. The curricula was translated from English to Spanish independently by two undergraduate students whose first language is Spanish. After the students had translated the material, they compared their versions and arrived at a consensus on which translation to use for each slide and bullet point. Having two versions of the translation minimized the potential of mistakes caused in the translation. After a consensus about the translation was reached, the material was translated back to English and it was compared to the original version to ensure that the message was not lost in translation.

**Trainings and Train the Trainers Program**

The overall program targets conducting ten “Train the Trainer” sessions geographically distributed across the continental US and Puerto Rico (five trainings in English and five in Spanish). The Target audience for the “Train the Trainer” session includes safety directors and supervisors from steel companies who have responsibility to train and oversee workers within steel companies. Trained trainers are asked to go back to their companies and conduct secondary trainings for their workers to extend the reach of the program to frontline workers. AISC promotes the “Train the Trainer” sessions through their regional engineers who will work local companies to host trainings.

## **Conclusions and Lessons Learned**

While there are many common warehouse worker hazards that workers in all industries face, handling structural steel is unique because of the bulk, weight and irregular nature of steel sections handling during receiving, movement into and around the shop (plant) at each work station and to storage, loading and shipping.

The following lessons learned from the development of the safety training for structural steel workers will assist universities and organization who are interested in developing training programs for targeted groups:

- There are many training materials developed for the construction industry and general industry, special care should be taken when adapting existing OSHA materials to a specialized industry to ensure that the message is communicated accurately and clearly.
- Forming a partnership between experts in different organizations (professional society, academia, and private company among others) is needed to secure external funding and develop quality training materials.
- To make sure that the training materials are relevant and current, multiple stake holders such as academics, professional organizations, companies, management and trade workers should be involved in the curriculum development process.
- Training materials developed in English that are translated to Spanish must be translated back to English and compared to the original files to ensure that the message is not lost in translation.
- Using the OSHA English-Spanish dictionary guarantees that the terms used in the training materials are consistent with those used by OSHA in all their materials.
- Ample time should be provided between the curriculum development phase and the beginning on the training to allow for the material to be reviewed and the feedback to be incorporated into the final curriculum.
- Creating a secondary training module benefits future trainers because it provides guidelines and improves recall of the material to be taught in the training.

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