



SENIOR DESIGN ORGANIZATION PROJECT DESCRIPTIONS

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OPTIMIZATION OF BULK PACKAGING SYSTEM FOR TITAN AMERICA

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Bulk Packaging Systems utilize Flexible Intermediate Bulk Containers, or otherwise known as FIBC's, to handle the products being produced. These FIBC's can hold up to 1.5 metric tons of material in certain cases. The company Titan America LLC produces different varieties of cement and construction products in bulk for their customers. Their Super Bag Division utilizes a Bag Filling Station that is manually operated using six workers. Titan America reported that they have been having issues in this department in terms of operating time and efficiency rates. As of right now, Titan America is producing 12,000 bags a month using their current design, but they want to increase this by 30% and produce 18,000 bags a month.

Our proposed senior design project is to optimize the grappling hooks that the FIBC's attach to while filling, and to add an additional hopper to the top of the Bag Filling Station so that the workers can work on two Bag Filling Stations at the same time.

The current design of the grappling hooks is stationary and ineffective and the FIBC's need to be manually placed on and off. This design is inefficient and wastes time for the forklift operator who has to wait for the bags to slide on and off.

Our team developed three alternate grappling hook designs that allow easy insertion and extraction of the fork lift handle bars. One will be selected as the optimum design relative to the specified design goals.

The Bag Filling Station Titan America uses also do not have an overhead hopper reservoir. This decreases efficiency because it does not allow the company to use the second Bag Filling Machines they have in storage at the same time. A hopper will be designed to hold 0.75 metric tons of material, roughly half of a full FIBC bag, and will open and close using a rotating pressure valve.

The hopper and rotating pressure valve will also have three alternate designs and one will be selected as the optimum choice. One last issue with the Bag Filling Station for Titan America is the aeration process. It is far too slow, and can be improved to increase the amount of material that can be filled into the FIBC's.

One option would be to develop a vacuum system in the overhead hopper than will pre-aerate the material before it is filled. This portion will also have three design alternatives, with one of them being the most desired for specific purposes.

The global impact of this project will affect the growth of developing and hard stricken countries to rebuild. If these bulk bags of cement can be produced at a faster rate, then more products can be distributed. The ongoing rebuilding efforts in Haiti and Japan since the recent tragedies cannot be done without the importation of cement and cement products. All of these new advancements in the Bag Filling Station for the Bulk Material Division for Titan America will allot the workers the time needed to begin filling a separate FIBC bag the same time and increase efficiency rates to increase their supply.