

Design and Development of a Convertible Stair-Ramp System

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Abstract

This design project aimed to provide a solution that addresses material handling and safety issues. Ladders are structures used for going up or down that consist of series of bars or steps between two upright lengths made of metal. Rigid ladders, which are self-supporting or leaned in a vertical surface and flexible ladders are hung from the top, are some types of ladders that are commonly used. The design concept of this industrial ladder is that the stairs can be converted into ramp and vice versa, and combined in a single system. The materials used for the design were aluminum, and a jalousie mechanism, which is known to be lightweight yet sturdy and corrosive. The primary function of this ladder is mainly to be a staircase for going up or down, but it can also be converted to a ramp for industrial use. This design project matched with the need for stairs or inclined plane. Results of the study suggested that the advantage of the new design over the traditional ladders are: First, it is portable and can be easily transported or carry alone within the trip; second, the material handling, particularly loading and unloading of goods will be more comfortable and safer. Since it is convertible to a ramp, the porters can use strollers or forklift that would aid them in carrying the loads to or from the truck, instead of using stairs alone. To create a better and final design, the proponents evaluate different constraints such as environmental, safety, usability, economic and manufacturability, and use Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) to assess the nine design options.

Keywords

Convertible Ladder, Design Project, Design and Development, Slide and Ladder, Technique for Order of Preference by Similarity to Ideal Solution