Development of Parking Brake Component

Bachelor thesis work
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Product Development and Mechanical Design Process
Innovation and Product Design Engineering Program

Julia Rintamäki

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Tutor (company): Therese Zachrisson and Lina Andersson
Tutor (university): Bengt Gustafsson
Examiner: Marcus Bengtsson
Abstract

This report represents the bachelor thesis examination by Julia Kastehelmi Rintamäki. The examination has been performed during spring semester 2013 at Volvo Construction Equipment in Eskilstuna. This report, Development of parking brake component, describes the product development process of the parking brake component for articulated hauler, wheel loader and grader.

Volvo CE has problems with the parking brake switch that exist today on articulated hauler, wheel loader and grader. The purpose of this project is to develop one common solution for the parking brake component for articulated hauler, wheel loader and grader. The secondary purpose is to find final concept proposal for each machine.

Employees at the Volvo CE were interviewed; they were contacted via e-mail, phone calls and via meetings to get the information about the machines and the information around the parking brake component. Volvo CE databases were also used for gathering information about standards and pictures.

Lots of different ideas were sketched and concept proposals were created with the aid of material from marketing analysis, competitor analysis, target group analysis, requirement specification, function analysis, standards and ergonomics.

Eight concept proposals were chosen to be evaluated with QFD, Pugh’s matrix and FMEA. Two concepts were most suitable and developed further to three dimensional models with the aid of Solid Works.

The different aspects were taken into account when designing and dimensioning the final concepts. Two models were created with the aid of plasticine for figuring out the ergonomics and dimensions of the product. DFM, DFA, DFE, D4S were used for taking into account costs, assembly, dimensions and environmental impacts of this product.

One of the concepts could replace the existing parking brake switch and suit in different cabins because of its size and design. This concept can be located on vertical or on horizontal plane. The other final concept solution functions better for the articulated hauler on account of the double function with exhausting brake system activating before parking brake system.

Suggestion for next steps for the project could be to make prototypes of the two concepts and test these components in real machines. Also interviewing users for further development of the final concepts and redesign if needed.

(Keywords: parking brake, parking brake component, switch, operator, articulated hauler, wheel loader, grader, Volvo Construction Equipment)