

**Riemersma, J.P.S. (Jean)**

## **Redesign of the Polaroid 600 film cartridge**

*Reduction of the idle time in the assembly machine caused by the placement of the endcap*

This thesis aims to redesign the current Polaroid 600 film cartridge so that machine faults during assembly caused by (mis)placement of the endcap are reduced. Currently, the endcap is ultrasonically welded to the rest of the cartridge, closing it completely. The assembly machine needs to be situated in a self-contained darkroom because the instant photos are light sensitive.

The attachment of the endcap currently causes a lot of failures, which are undesired since the assembly process takes place in a darkroom. The failures cause a lot of downtime, in where the machine is not able to operate, almost 200 hours per year per machine and there are 6 machines. Polaroid would like to eliminate the ultrasonically welding process to prevent downtime.

The redesign process for the endcap included the following steps; analysis of the to-date and outdated Polaroid film cartridges, analysis of alternative cartridges that are currently on the market, evaluation of current production and assembly techniques at Polaroid and a discussion of alternative production and assembly techniques. In the end, a set of product requirements were composed. Expert meetings, observational and literature studies were used in the process.

The ideation followed, where the best ideas have been drawn in a digital drawing program. These sketches have been discussed and evaluated with several employees of Polaroid. The best ideas were conceptualized and tested. The concepts use different joining techniques that were analysed in the research phase. Additive manufacturing was used to test the concepts of usability and fragility. Moreover, the costs have been estimated for the three concepts. The tests and estimations resulted in a concept choice. The concept choice was based on the requirements that were a result of the research conducted. The concept have been assed on the manufacturability and functionality.

The final design used an integrated endcap in the box-flap of the film cartridge. The front of the pack has ribs and gussets that add strength to the front of the cartridge. Besides that the redesign uses another box finger that should add more strength to the design and ensure better spreading of the instant photo. The joining techniques that have been used are force-fits and snap-fits, which are assembly techniques that can be incorporated in the injection moulded design of the film cartridge, external joining features are not needed. The snap fit and force fits ensure good vertical and horizontal placement of the box flap. The final design is a recommendation for a redesign of the Polaroid 600 film cartridge. The design has been 3D modelled in SolidWorks, where concise simulations have been conducted.

To implement the redesign, several simulations and tests must be conducted to reinsure the success of the redesign, for instance: mould flow simulation, strength analysis and a more precise/extensive cost estimation. The results are proof of concepts and suggest the further implementation of the redesigns within the Polaroid 600 film cartridge and other cartridge types Polaroid manufactures. More information about the design can be found in the report.

