Concept study of a new drive system for industrial folding doors

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One of many advantages of industrial folding doors is their flexibility. Folding doors come in many different sizes and can be installed in narrow spaces. In order for any supplier of folding doors to stay competitive, minimizing the installation dimensions is key. Development of a new and compact drive system requires thinking outside the box.

Electrically operated folding doors is a popular door choice for many industries today. When compared to other industrial doors they have less moving parts, are virtually maintenance-free, have shorter opening times and a reduced risk of collision due to their horizontal opening direction. With shorter opening times, the door decreases heat loss and increases logistics efficiency.

ASSA ABLOY is one of the world's largest suppliers of industrial folding doors. The company today uses a transmission rail to transfer the motor's rotational motion to the movement of the door sections. Although the solution is elegant, it might be hard to fit where space is very limited, for instance in parking garages.

Figure 1: The company's current design.

Our master thesis focuses on developing a more compact drive system with a good reliability, robustness and cost efficiency.

To achieve this goal the thesis follows a custom-made product development plan, based on the Ulrich & Eppinger methodology. This includes concept generation, development, prototyping and testing. The concept generation incorporates a full evaluation of competitors products in order to acknowledge and evaluate existing drive systems.

The concept generation resulted in a unique concept consisting of a rack-pinion inspired solution, where the rack is bent to stay within the door's opening space. The developed drive system neither requires extra headroom nor side space and has the same installation dimensions as a manually operated folding door.

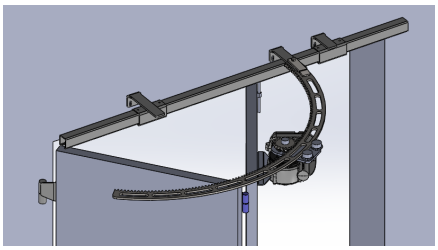

Figure 2: The concept design.

After testing, the concept turned out to be cheaper, faster, more energy efficient and more serviceable in comparison to the company's current solution. We believe that the new drive system has a huge market incentive, especially in places where installation dimensions are limited.

References

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