Bachelor's Thesis Engineering Technology

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Steel coil transporting machine

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Specialization Electromechanical Engineering Technology

Background

Aperam Services & Solutions, situated in Genk, is a company that slits steel coils into thinner coils and makes them ready for transport (figure 1).
The coils hang at rotatable crosses (figure 2).
A C-hook on an overhead crane transports the coils between those crosses.

Figure 1: Slitted coil

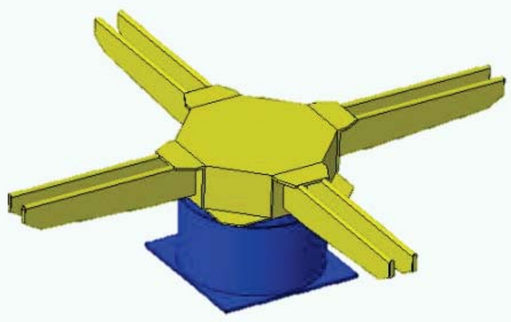


Figure 2: Rotatable cross

Problem and objectives

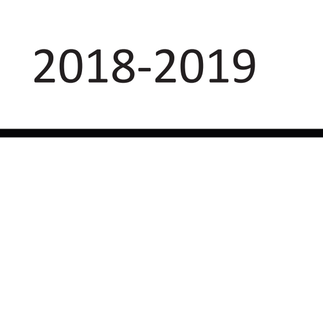


Figure 3: C-hook with coil

Problem

The C-hook (figure 3) can move freely. Therefore automation of this process is not possible.
Moreover the overhead crane is not always ready for use and this method is labour-intensive.

Objectives

Coils with a maximum weight of 25 tons have to be transported from two inputs to one output. These inputs and output are rotatable crosses and have their own specific heights. It's important for the coils not to be damaged during transportation and the whole system has to fit in a foundation pit (figure 4).

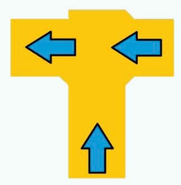
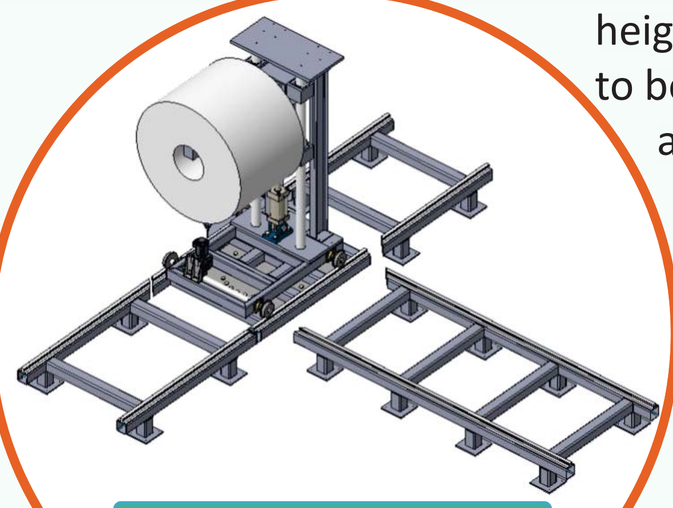


Figure 4: Foundation pit

Final result



Method

Before the coils can be transported they have to be lifted from the rotatable crosses. The lifting mechanism is based on two hydraulic cylinders so that the lift can reach 3 different heights (figure 5). When the coil is lifted it can be moved by a cart on rails and can be rotated by a turning rail (figure 6 & 7). When the cart arrives at the supply lane it rolls underneath the cross till the end stop. At this point the lift lowers and the coil is placed.

Results

The hydraulic cylinders are attached to each other by inner and outer thread. There will be torsion on the rod because of the weight of the coil. That is why the hydraulic cylinders are hinged.

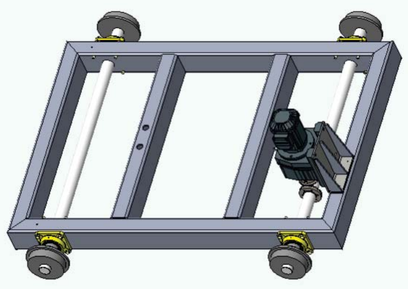


Figure 6: The cart

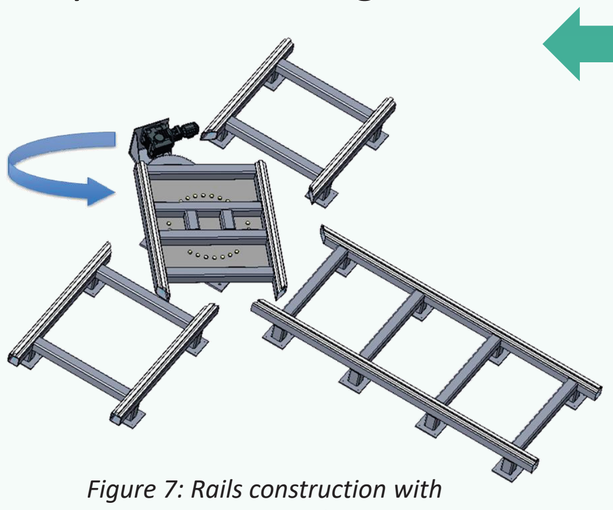


Figure 7: Rails construction with turning rail

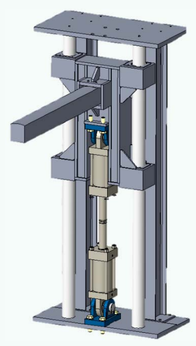


Figure 5: Lifting mechanism

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