

Automatic tilting table

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Specialization Preparation programme for Master of Electromechanical Engineering Technology



Situation

This project is being carried out in collaboration with Purmo Group Zonhoven. Purmo Group is an expert in heating and cooling techniques. In Zonhoven they specialize in the manufacturing of radiators. These are made from a bundle of stainless steel and are then transformed into a radiator using pressing and welding machines. This integrated project takes place at the end of the production cycle. After the manufacturing is completed, the radiators need to be stacked on wooden beams. For this last step, the radiators need to be rotated 90 degrees.

Problems

In a staff meeting it was made clear that this last step needed optimization. This is because the radiators each weigh 100 kg and must be placed per 6 on a set of wooden beams. In addition, there is the disadvantage that these radiators are produced at a slow rate. Therefore, it can't be a full-time job. This job is also dangerous due to the heavy weight of the radiators.

Solutions

Beam holder

Beams are loaded into the holder. This holder can hold up to 2 beams at once. The width of the beams can be quickly adjusted to the desired distance using the adjustment wheel. The holder can then be lifted which mounts the beams to the radiators. A tension belt can then be fastened which holds the radiators in place. The holders are mounted on gas struts which ensures the safety of the user. The linear guide makes it applicable for all dimensions of radiators.



Figure 1: Beam holder assembly

Frame

The frame is made from high strength steel beams. These are welded together which ensures rigidity and lightweight. The sharp edges of the frame have been removed to prevent injuries. The frame is directly bolted on to an existing conveyor belt. This ensures a short assembly time.

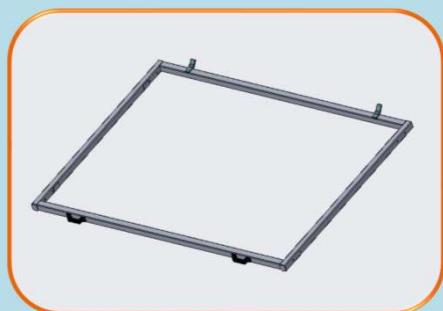


Figure 2: Frame beam holder

Design

This project is a two-part design:

- The beam holder
- The tilting table

These where both designed using Creo

Requirements

- Manual adjustment of beam width
- Works on all sizes of radiators (1800-2100 millimeters)
- Maximum width of 2500 millimeters
- Two separate units

Tilting table

The tilting table rotates the radiators 90 degrees. The radiators come in with the beams on the side and after rotation come out on top of the beams. The table revolves around its own axis which ensures a compact design. This design uses 2 conveyor belts that are mounted on bearings. These bearings allow it to freely spin on the tubes. The conveyor belts are driven by an electric motor.



Figure 3: Tilting table assembly

Parts

The tilting table consists of 2 different parts that can rotate around each other. The inner frame can freely rotate inside the outer frame. The tubes are 50 mm with a thickness of 3 mm which is welded to the frame to improve its stability. Due to the 600 kg weight of 6 radiators, the frame needs to be made from a 4 mm thick rectangular profile.



Figure 4: Outer frame

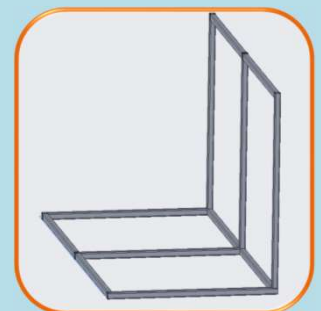


Figure 5: Inner frame

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