

Design for mechanical machine to unload steel profiles from bending machine

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Situation

Frisomat, a leading company based in Wijnegem and founded in 1978, is globally recognized for its innovative steel constructions. Their recent investment in an advanced bending machine promises to produce accurate steel profiles with unparalleled efficiency. This machine serves as the backbone of their production process and represents a significant step forward in technological advancement.

Problem Statement:

Frisomat's new bending machine, depicted in Figure 1, operates fully automatically and unmanned, but faces a crucial limitation: the temporary buffer belt reaches its maximum capacity within 1.5 hours, resulting in production downtime.

This obstacle not only jeopardizes Frisomat's investment but also their ambition to guarantee 24/7 production.

Finding a solution to this bottleneck is essential for ensuring uninterrupted production.

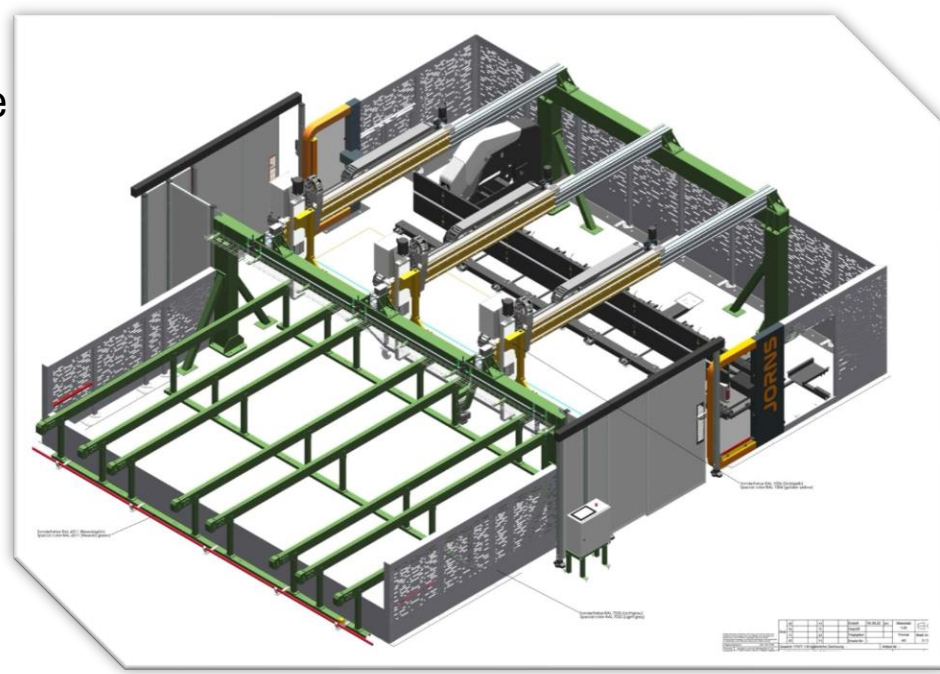


Figure 1: Bending machine

Objectives

The primary objective of this project is to develop an advanced machine capable of overcoming the capacity limitations of the temporary buffer belt, thus ensuring a continuous production process.

This solution must not only be highly efficient but also meet strict standards in sustainability, safety, and user-friendliness.

It is imperative that the machine can handle a wide range of steel profile shapes, as illustrated in Figure 2, while also striving for scalability and adaptability to anticipate future requirements and minimize operational costs.

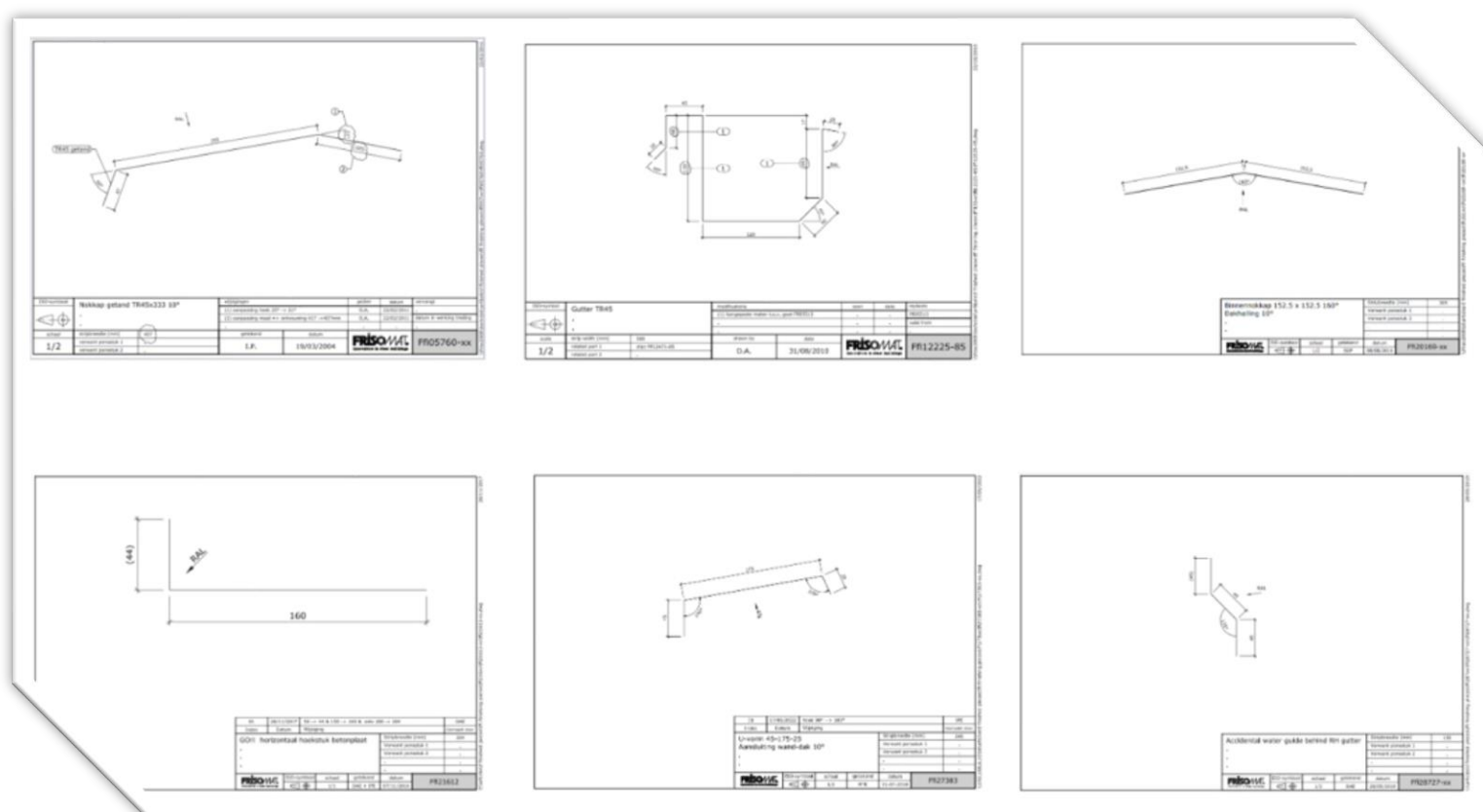


Figure 2: Different profile cross-sections

Method

The development of the machine is an iterative process, evaluating various designs and technologies within budgetary and time constraints. Sustainability and environmental protection are integrated into the design, alongside stringent safety measures. The use of standard commercial components will minimize costs and increase availability.

The operation process of the machine works as follows:

1. Supplying buffer containers:

A table lift, illustrated in Figure 3, with integrated driven rollers as illustrated in Figure 6 collaborates seamlessly with the driven rollers within the rack, illustrated in Figure 4. This helps the facilitation of the movement of buffer containers into and out of storage.

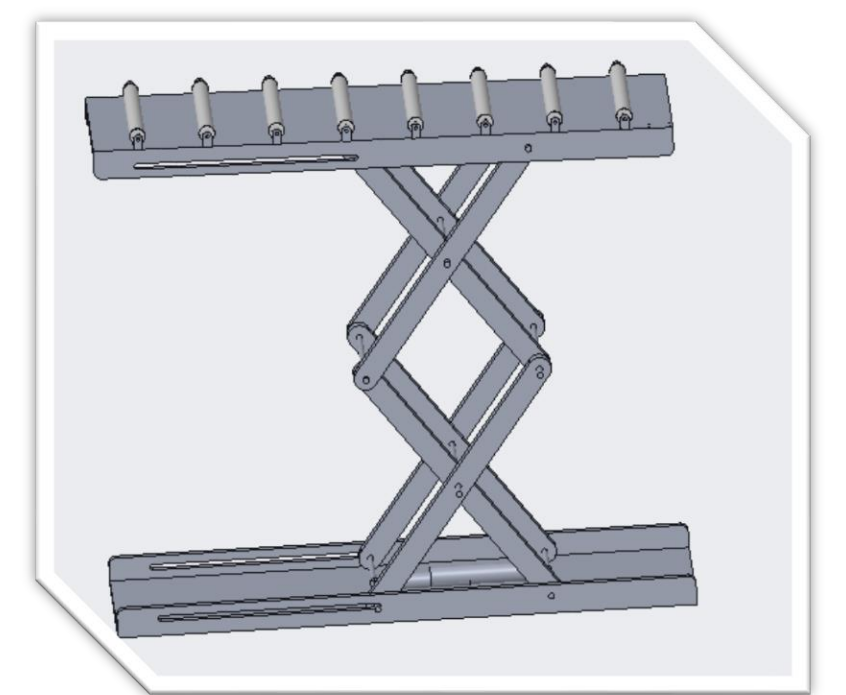


Figure 3: Table lift with driven rollers

2. Retrieving profiles and placing them in buffer containers:

An automated transport system retrieves the steel profiles from the buffer belt and accurately places them into the buffer containers, illustrated in Figure 5, ensuring efficient transfer without human intervention.

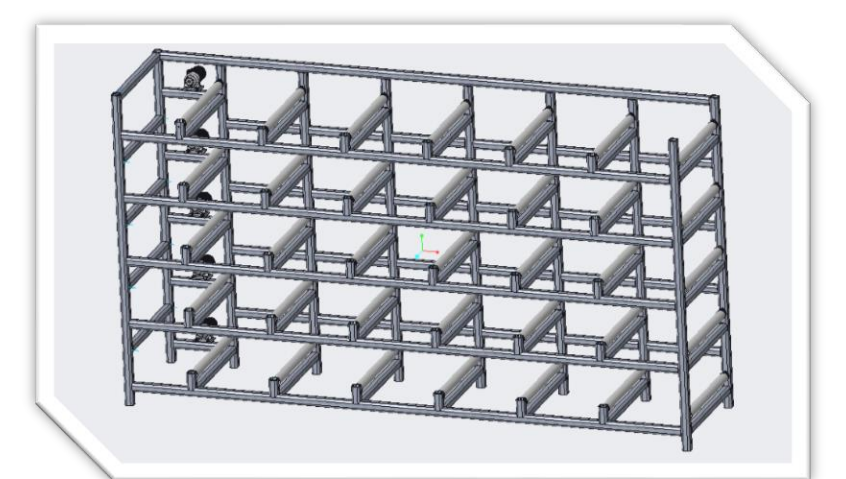


Figure 4: Rack with driven rollers

3. Returning full containers:

Once the buffer container is full, it is automatically returned to the buffer rack using the same table lift used to transport the container to the production line. This process occurs entirely automatically, ensuring uninterrupted production flow.

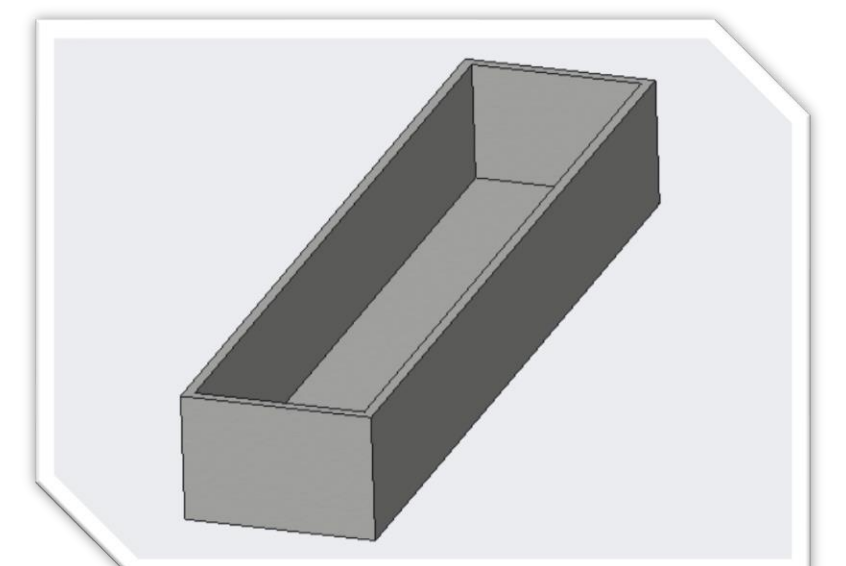


Figure 5: Buffer container

4. Staff retrieve full containers from the rack and return them empty:

Staff retrieve full containers from the rack with a forklift and empty them, facilitating the efficient removal of produced profiles from the buffer containers and preparing them for reuse in the production process.

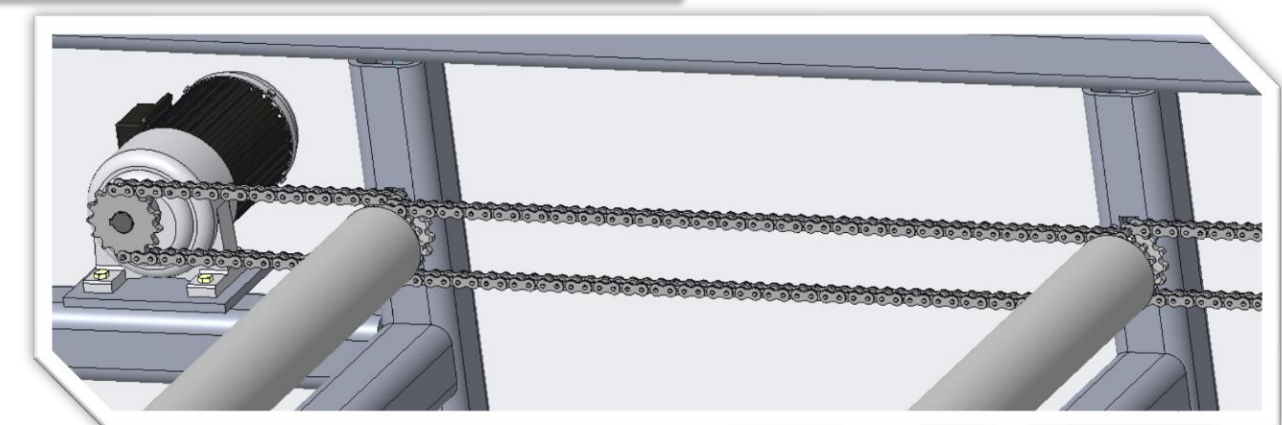


Figure 6: Close-up of driven rollers

Conclusion

This project plays a crucial role in Frisomat's efforts to improve production efficiency and maximize returns on their investment in the new bending machine. The development of an advanced machine capable of overcoming capacity limitations contributes to maintaining a seamless production flow. Additionally, this machine will meet strict standards in sustainability and safety, laying a solid foundation for future growth.

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