

Design of an industrial washing line for mechanical components as part of an automated milling process

Mertens Michiel, Vanonckelen Roel

Specialization Electromechanical Engineering Technology

Introduction

As part of the automation of a milling process including the milling, the cleaning and the measuring of high accuracy mechanical components, an automatic washing line has to be designed for the company E.S. Tooling. The machine has to clean the parts, placed on pallets, of chips and oil after milling and before being measured. This line has to be incorporated in a linear cell with a robotic arm on rails that transports the pallets between the milling, washing and measuring machines. The following, most prominent demands must be met:

- ▶ The machine must be capable of cleaning a part in under 10 minutes.
- ▶ The motor for the transportation of pallets has to run continuous.
- ▶ The machine must be capable of cleaning parts with a maximum dimension of 400x300x200 mm.
- ▶ The machine must be capable of cleaning parts attached to a pallet.
- ▶ The machine must be compatible with all three pallet types.

Conclusion

The industrial washing line is capable of cleaning milled mechanical components (with various sizes) of oil and chips in under 10 minutes thanks to the continuous rotation of a conveyor chain. This, while being compatible with the three pallet types already in use in the factory.

Features



Continuous process

- ▶ Conveyor runs continuously
- ▶ Transport plates cycle trough conveyor



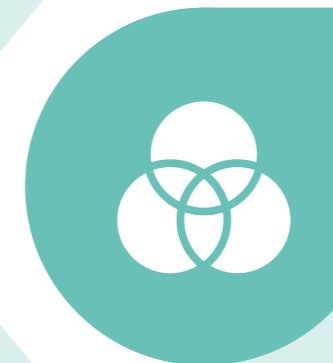
Transport plate buffer

- ▶ Unused transport plates remain in buffer
- ▶ Placed in/taken from buffer with pneumatic cylinders



Automated supply and unload

- ▶ Moving robotic arm
- ▶ Transport plates elevated by pneumatic cylinders



Compatible with 3 pallet types

- ▶ Pallets placed on transport plates
- ▶ Correct positioning ensured by aligning pins



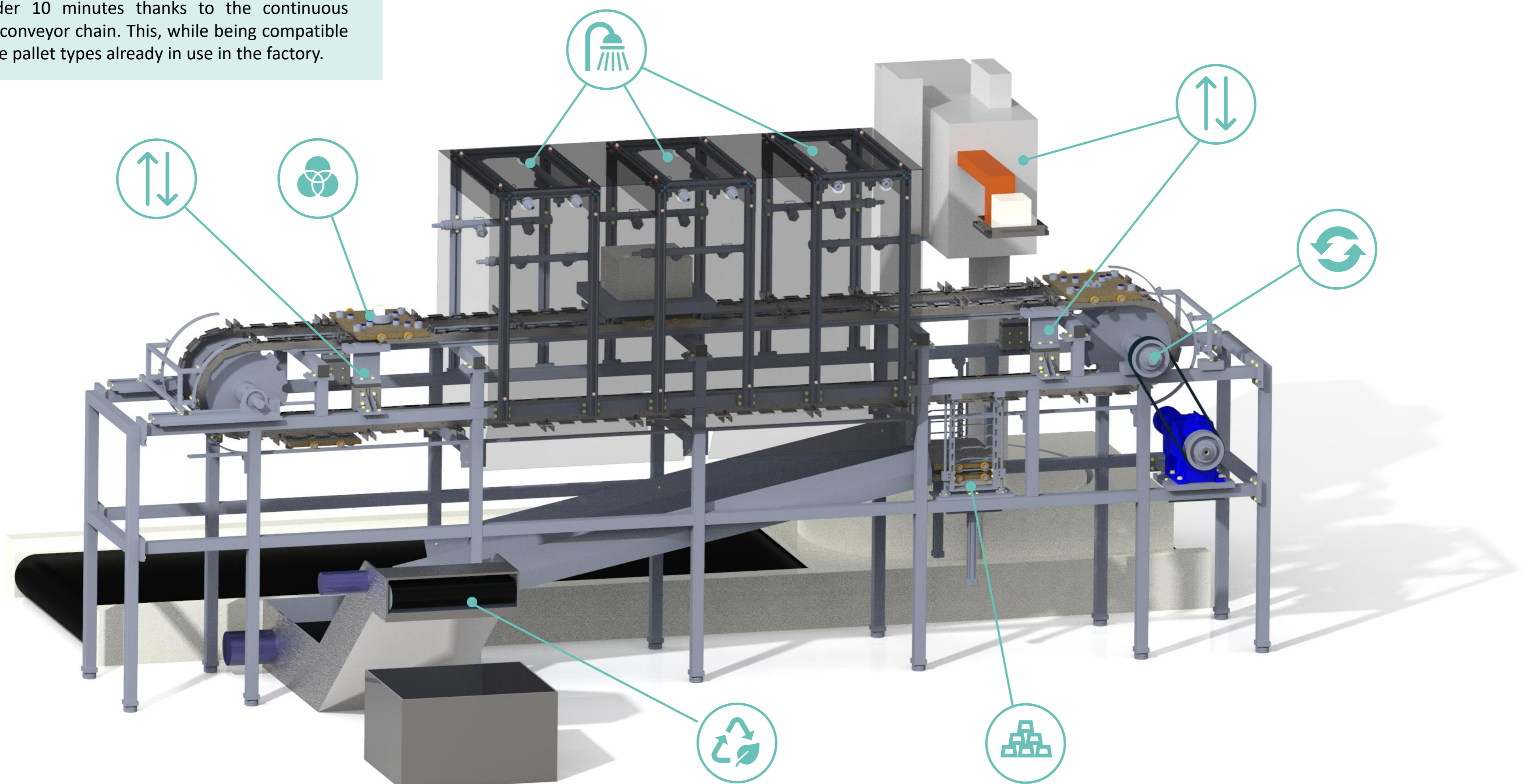
Waste water treatment

- ▶ Chip filtration system
- ▶ No use of detergents



3 step cleaning

- ▶ Water jet spray → chip removal
- ▶ Steam jet spray → oil removal
- ▶ Air jet spray → drying



Supervisors / cosupervisors: Prof. Dr. Ing. Karel Kellens
ing. John Bijmens
Prof. dr. ir. Michael Daenen