

Design of a lifting and rotating unit for the automated testing of radioactive drums

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Bachelor programme of Electromechanical Engineering Technology

SITUATION

Vansichen Linear Technology

This integrated project was commissioned by Vansichen Linear Technology. Vansichen Linear Technology is a company with around 25 employees. They are located in Hasselt and are responsible for the distribution and design of **standard linear components and custom-made systems**.



Figure 1: Logo Vansichen Linear Technology [1]

A client of Vansichen Linear Technology approached the company to find a solution for a specific challenge. The client is involved in **measuring radioactivity in waste drums**. These drums weigh 1.5 tons and are intended for the long-term storage of radioactive waste.

PROBLEM DEFINITION

Current situation

The inspection of the radioactivity levels in waste barrels is currently **too slow and inefficient**, resulting in significant time loss for the company. There is a need for a faster measurement method to speed up the inspection process.

Radioactive Barrel Measurement Inefficiency



Figure 2: Radioactive barrel measurement inefficiency

FINAL DESIGN & CHOICES

The transport system

- The conveyor rollers are **chain-driven**.
- **Lane diverter** transfer barrels from the infeed to the outfeed side.
- **Vertical stoppers** ensure proper spacing and stop the drums.

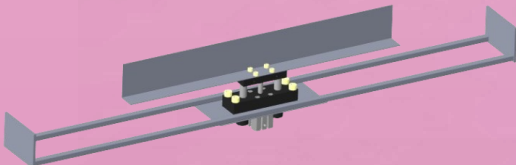


Figure 5: Vertical stopper

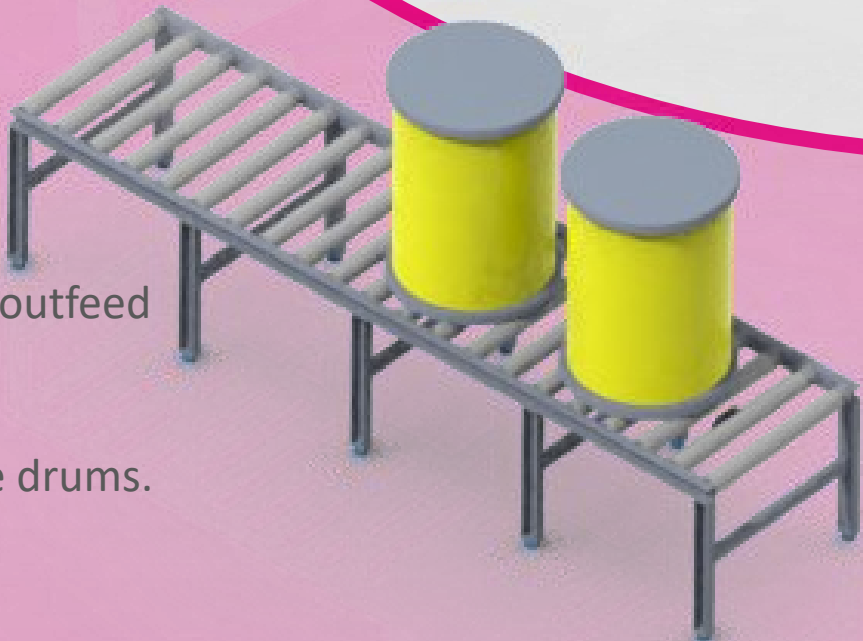


Figure 4: Design of the transport system

The unit

The **unit** itself makes use of a combination of mechanisms and components:

- **Linear guides** combined with a **spindle** for the lifting movement.
- A **slewing bearing** with mounted **rollers** for the rotation
- **four pneumatic cylinders**: two for clamping the drum and two for ejecting it.

The translation and rotation movements are powered by appropriately dimensioned **motors**.

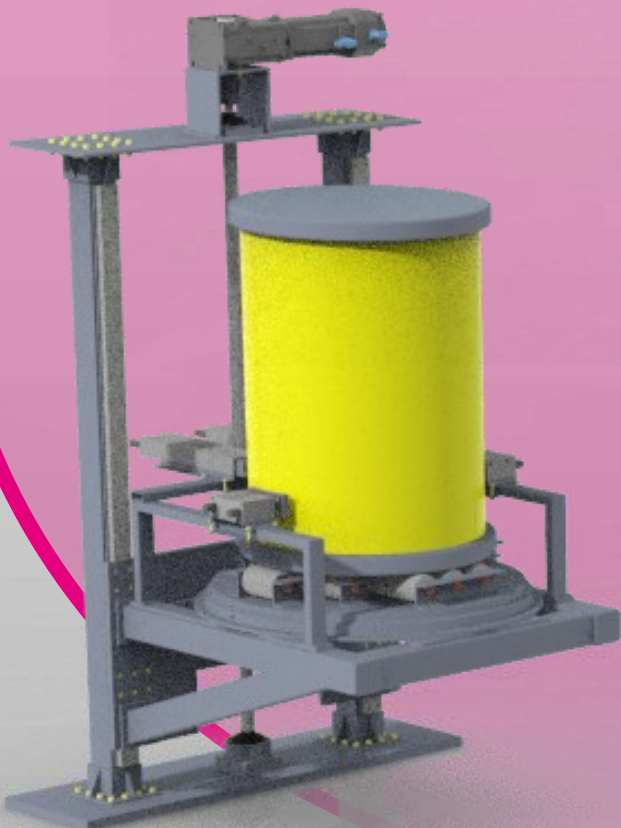


Figure 6: Design of the lifting & rotating unit

OBJECTIVES

Inspection process requirements

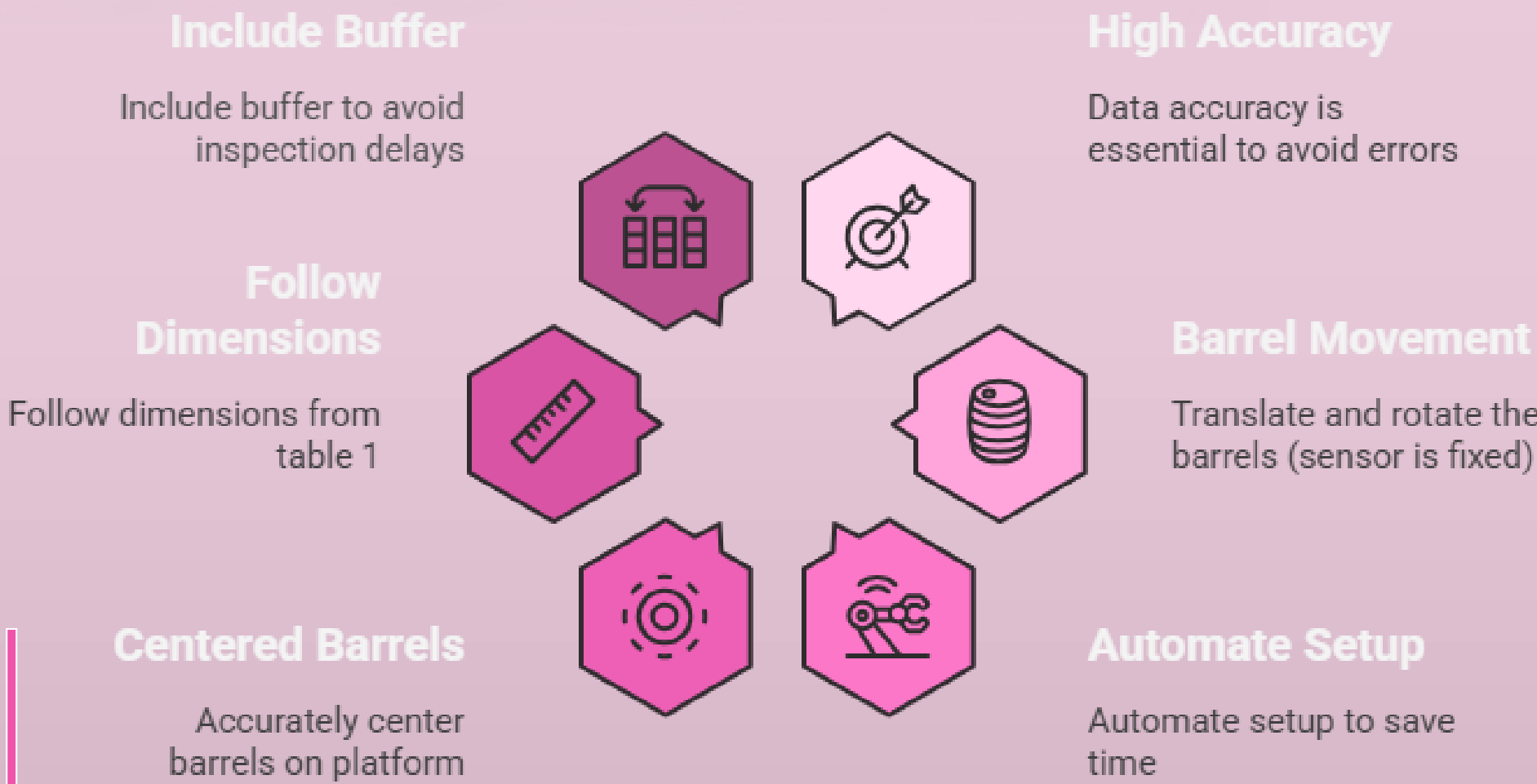


Figure 3: Inspection process requirements

Table 1: Barrel Dimensions and Unit Stroke Data

load capacity of unit	2 ton
stroke length of unit	1100 mm
Diameter barrels	772 mm
Height barrels	1068 mm

Supervisors / Co-supervisors / Advisors:

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Prof. Dr. Ir. Daenen Michael
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Prof. Dr. Lievens Jeroen

[1] Vansichen Linear Technology, [Online]. Available: <https://vansichen.be/vansichen-linear-technology>. [Geopend 1 mei 2025].