

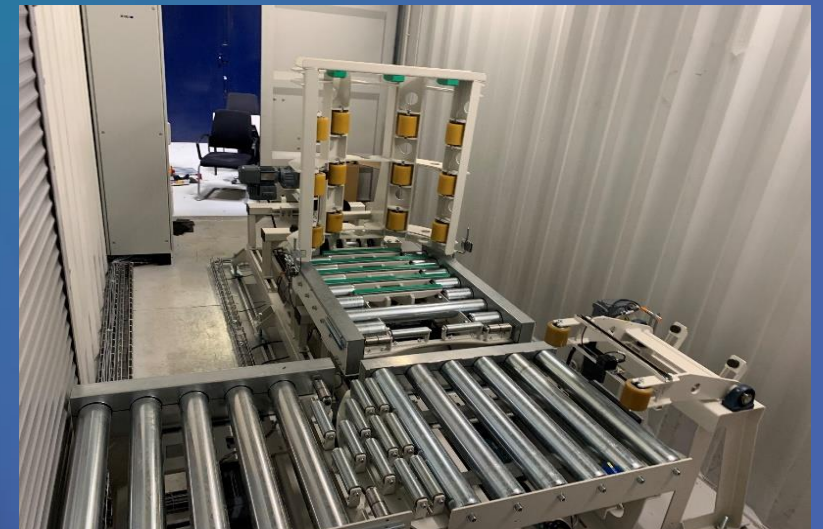
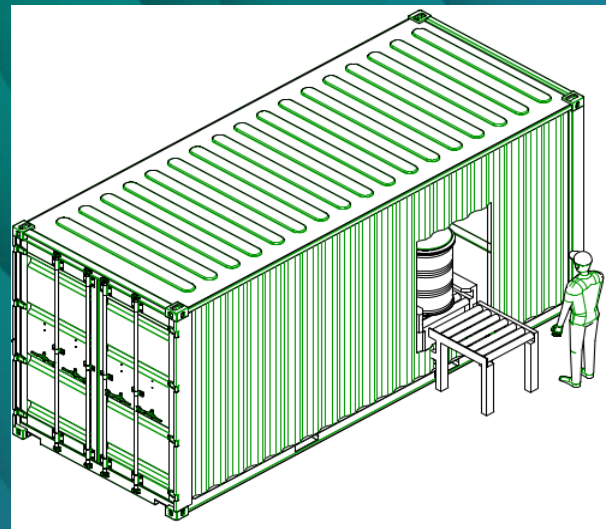
# EMOS: Development of a mobile, automated, optical inspection system for radioactive drums

Tania Barretto, Eric Rentschler, Melanie Müßle

Institute of Technology and Management in Construction (TMB) – Deconstruction and Decommissioning of Conventional and Nuclear Buildings

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# Agenda

- The research project - **EMOS**
  - Field of application
  - Goals
- Concept
  - Requirements and boundary conditions
  - Setting of Inspection unit and components
  - Inspection process
- Outlook
  - Time line

# The research project - EMOS

- **EMOS** - Development of a mobile, automated, optical inspection system for radioactive drums
- Sponsored by:  Federal Ministry of Education and Research
  - BMBF Sponsoring Programme „Research for the dismantling of nuclear facilities “ (FORKA)
  - Sponsoring number BMBF: FKZ 15S9420
- Research cooperation within the KIT
  - Institute of Technology and Management in Construction (**TMB**)
  - Institute of Photogrammetry and Remote Sensing (**IPF**)

# Field of application

## ■ Problem:

- Detection of geometry and corrosion damage to the drum



## ■ Approach:

- Automatical detection of damage to new and stored drums
- categorization
- If necessary, initiate consequences to minimize damage

# Goals of the research project

- Increase in **Safety** during interim storage of nuclear waste
  - All-round, objective (reproducible), optical inspection with parallel documentation and archiving
  - Backtracking of damage development by continuous monitoring
  - Prevent the drums from loss of integrity
- Increase in **occupational safety**: staff is less exposed to radiation
  - Automation
- **Time Gain** in the inspection of the drums
  - Automatic handling; evaluation of entire drum surface
  - electronic storage and documentation of the results
  - Output of inspection report

## ■ Requirements

- Mobile inspection unit
- Optical and geometrical recording of the whole drum surface, including top (lid) and bottom, to detect damage like:
  - Corrosion
  - Bumps / wells
  - Scratches / cracks
- Collected data will be automatically analyzed by a software, digitally saved and an inspection report will be generated

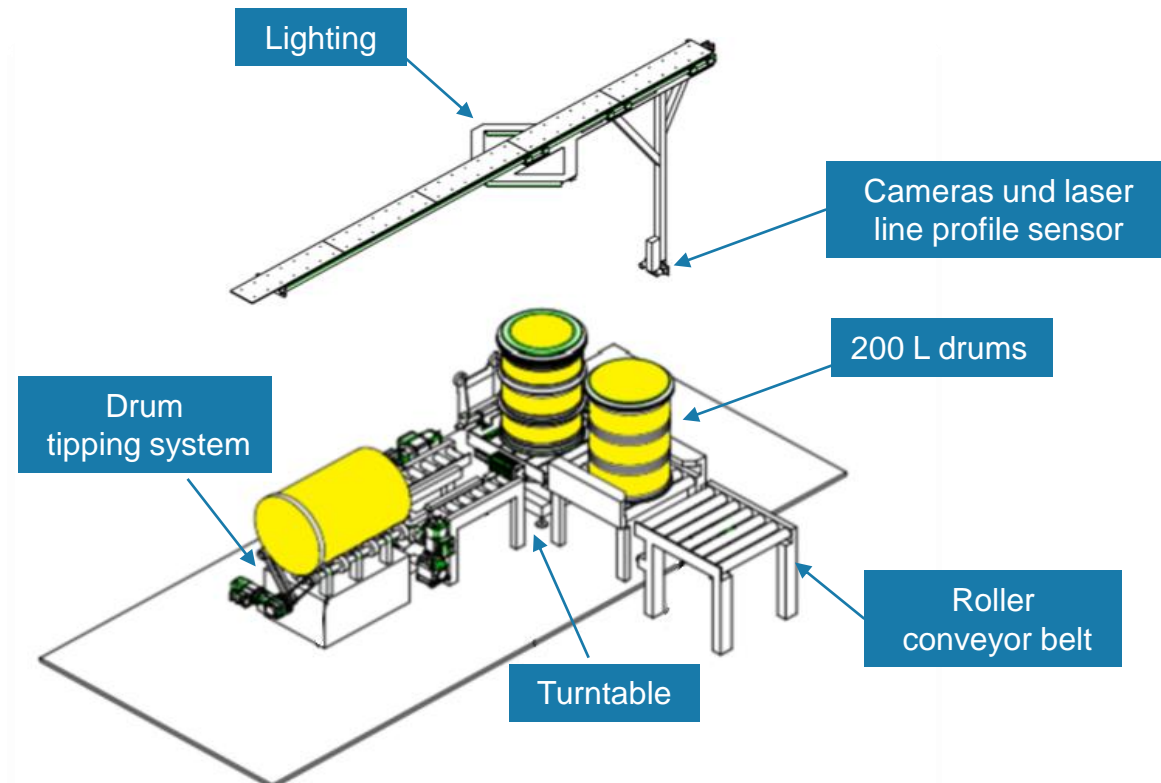
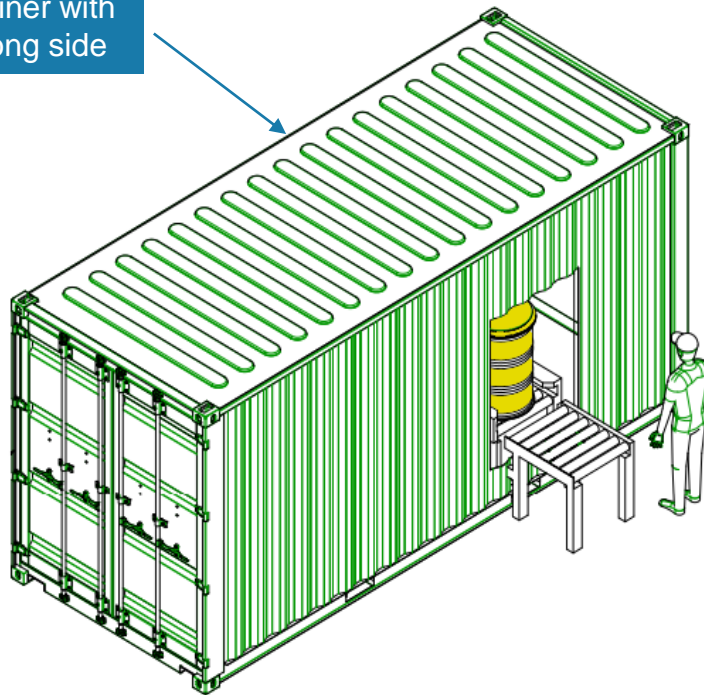
## ■ Boundary conditions of the research project

- 200 L– drums (A200, R200, RRF200)
- Low active waste

# Concept

## ■ Setting of inspection unit and components

20ft High Cube Container with a rolling gate at the long side





# Inspection process

- **Step 1** – Drum is carried to the **turntable** and gets centered



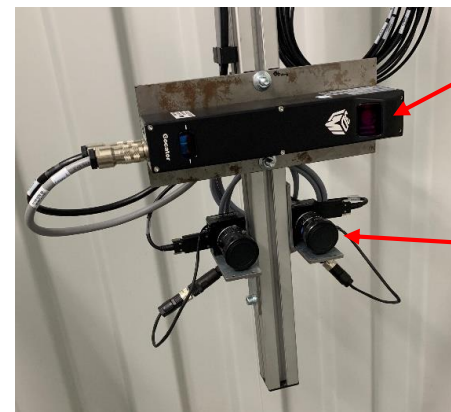
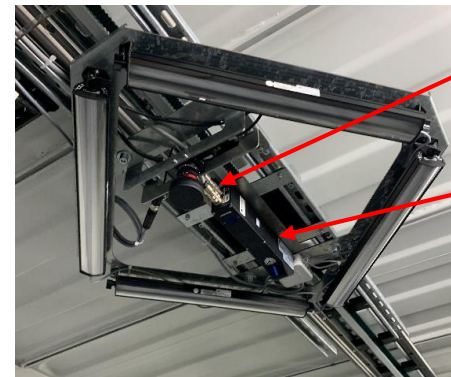
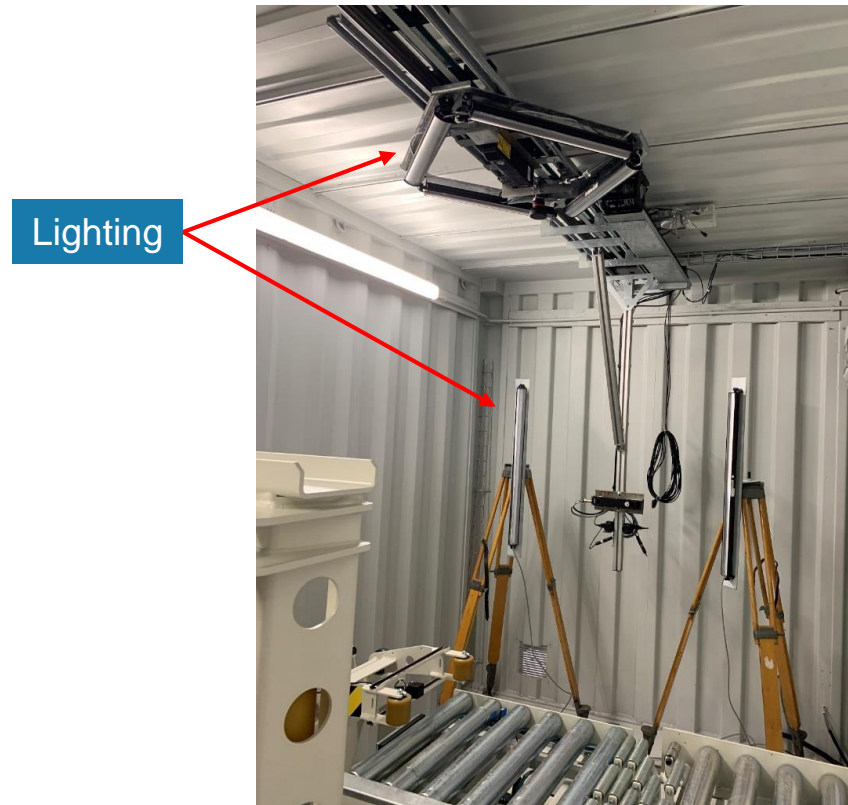
Turntable



Drum centering



# Inspection process



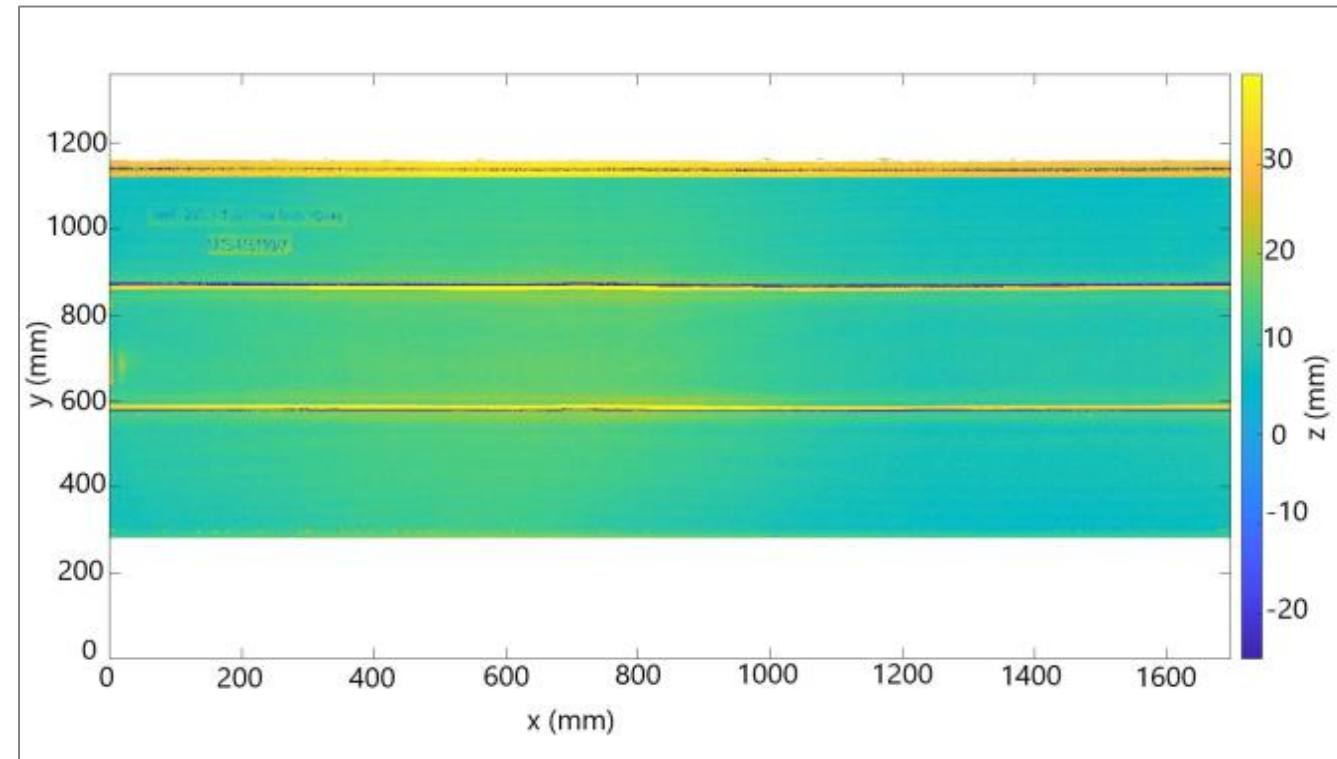
# Inspection process

## ■ Step 1.1 – Drum coat und drum top scan



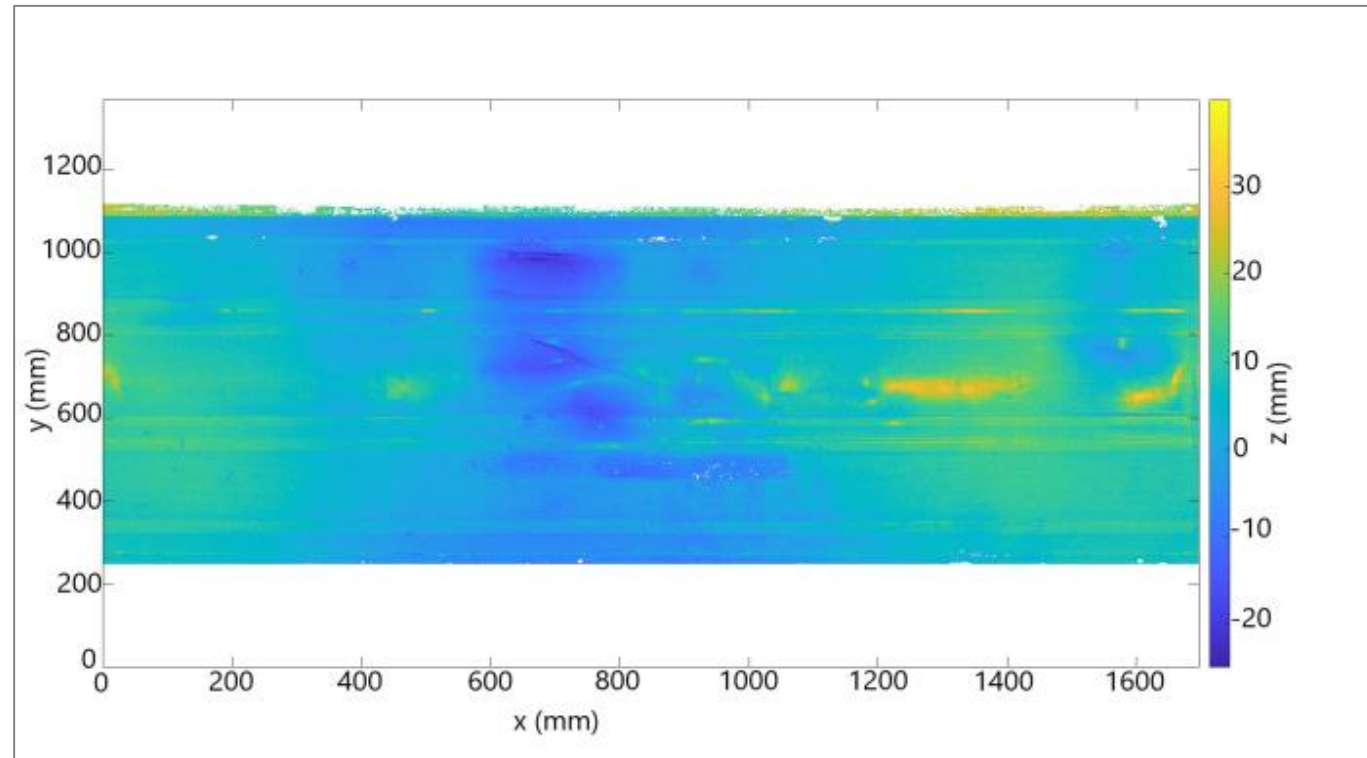
# Pre-tests result

- Elevation map of the unwound drum coat – New drum



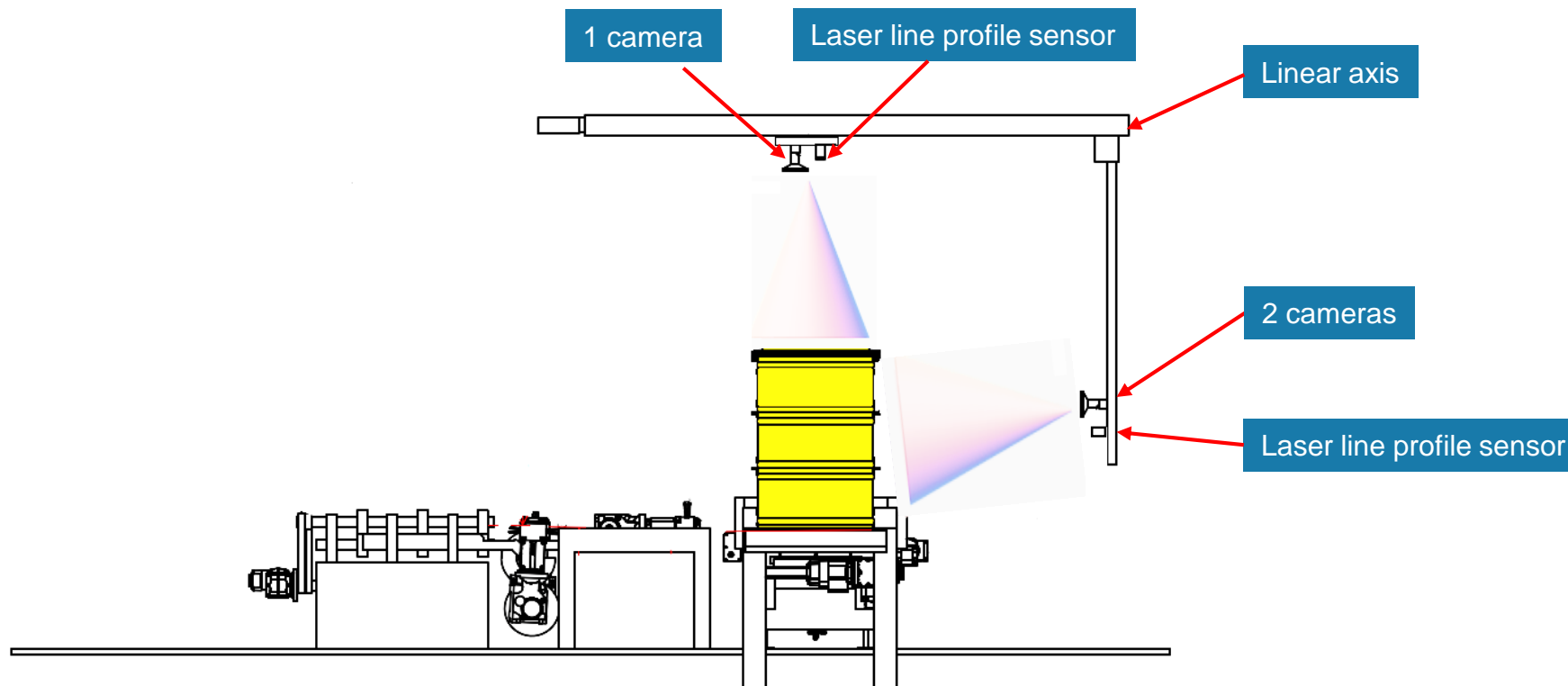
# Pre-tests result

- Elevation map of the unwound drum coat – Used drum



# Inspection process

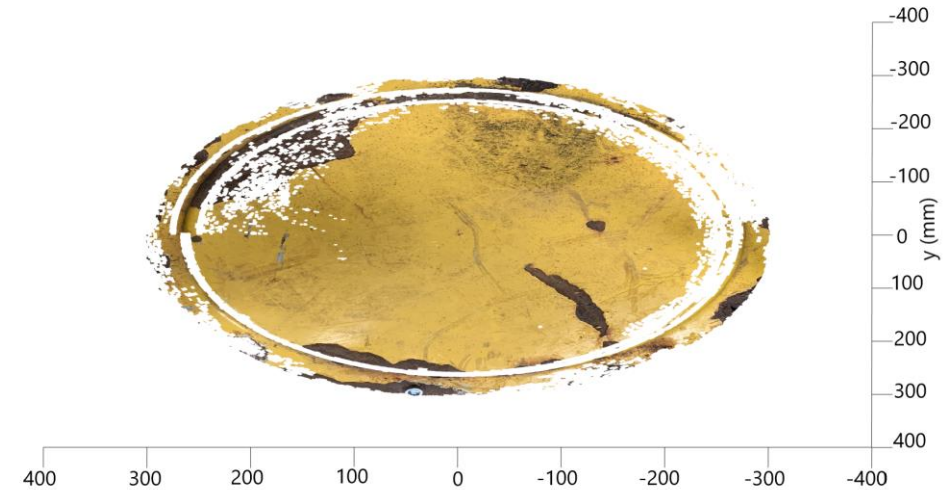
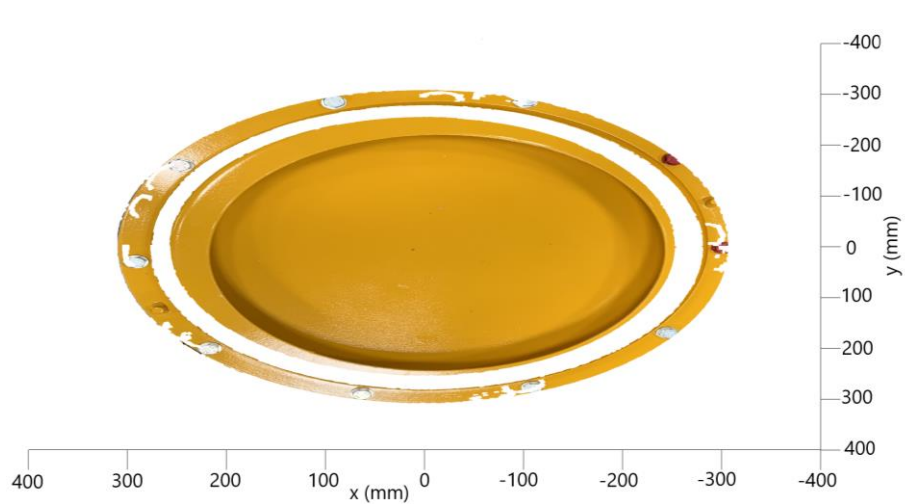
## ■ Step 1.2 – Drum coat und drum top photograph





# Pre-tests result

- Profile of the drum top with texture





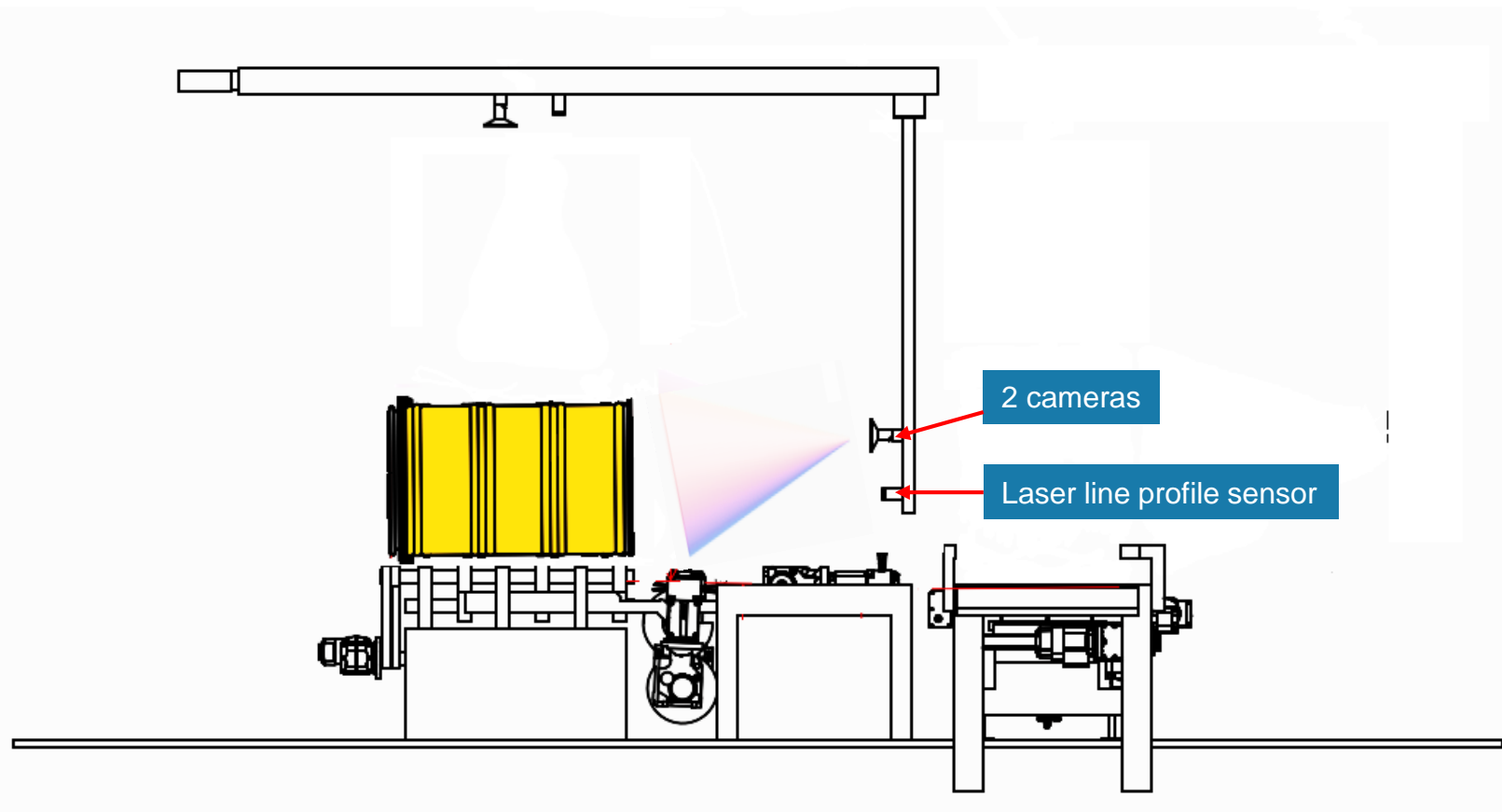
# Inspection process

- **Step 2:** Drum is carried to the **tipping system** and gets tipped



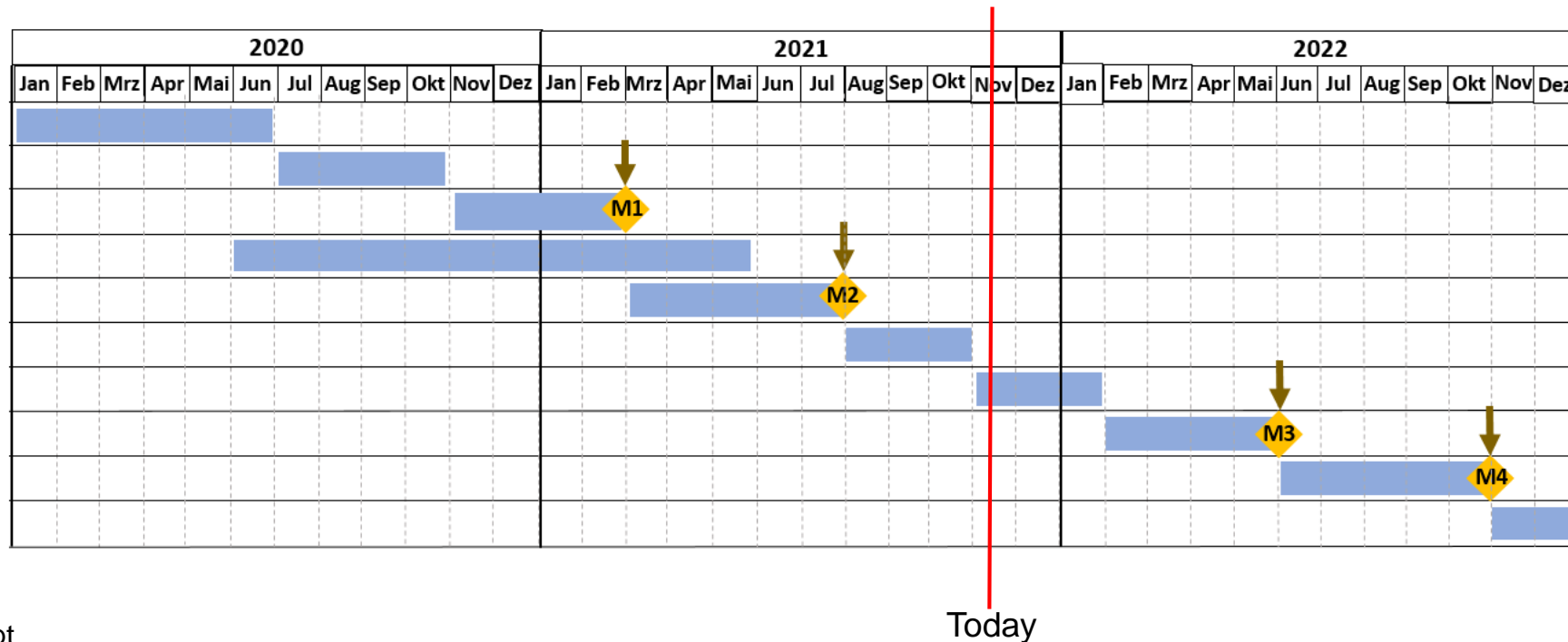
# Inspection process

## ■ Step 2.1 – Drum bottom scan and photograph



# Outlook

## ■ Time line



### Milestones

- M1** Finished Concept
- M2** Demonstrator 1.0
- M3** Final maturity Demonstrator 1.0
- M4** Final maturity Demonstrator 2.0

**Thank you very much for your attention!**