Supplement of Saf. Nucl. Waste Disposal, 1, 3–4, 2021
https://doi.org/10.5194/sand-1-3-2021-supplement

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Development of a mobile, automated, optical inspection system for radioactive barrels

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Federal Ministry of Education and Research

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

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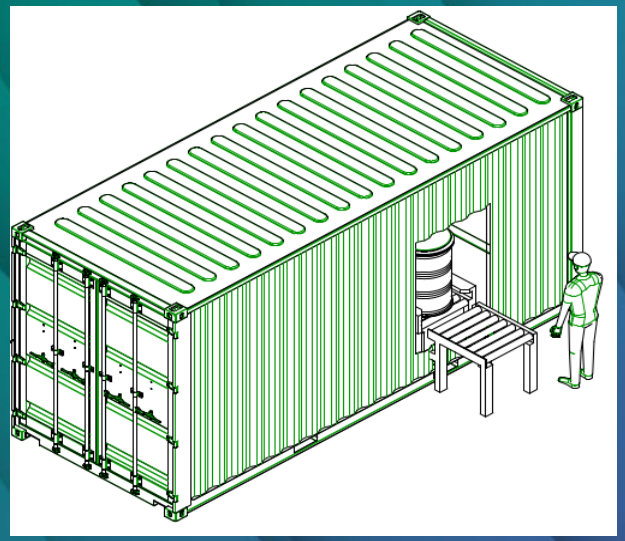
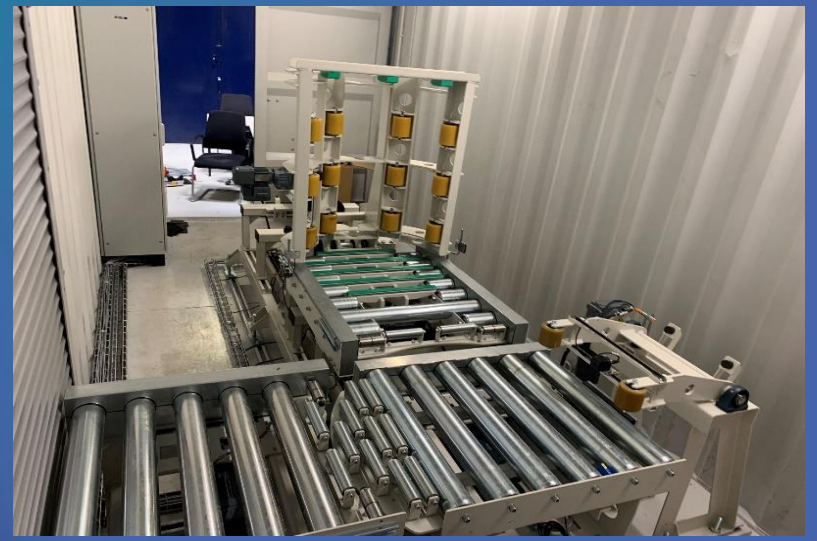
SafeND – Interdisziplinäres Forschungssymposium für die Sicherheit der nuklearen Entsorgung *November 11th, 2021 Berlin*





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

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

Goals of the research project

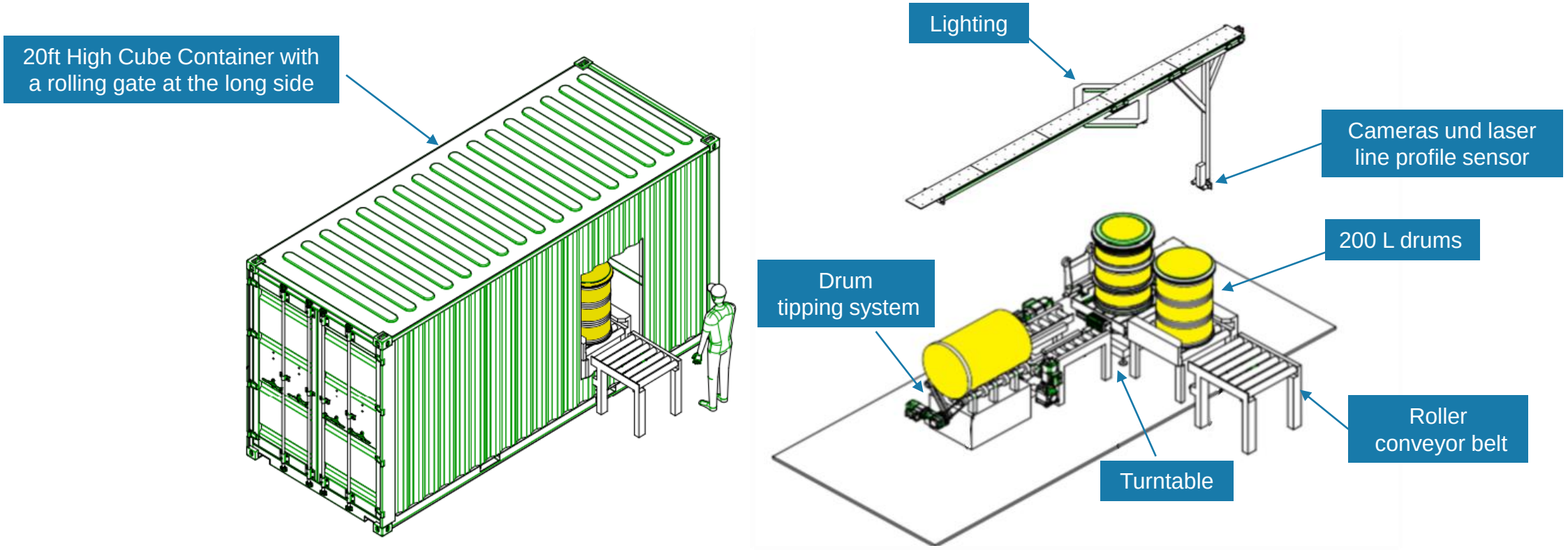
- Increase in **Safety** during interim storage of nuclear waste
  - All-round, objective (reproducible), optical inspection with parallel documentation and archiving
  - Backtracking of damage development by continuous monitoring
  - Prevent the drums from loss of integrity
- Increase in **occupational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

Concept

- **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

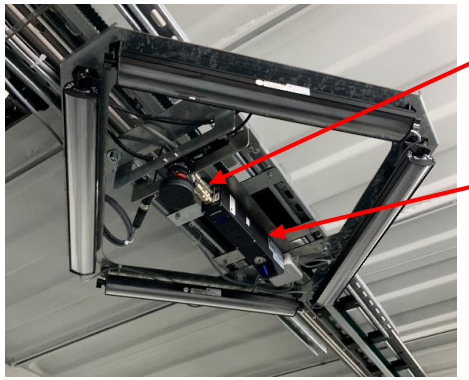
- **Setting of inspection unit and components**

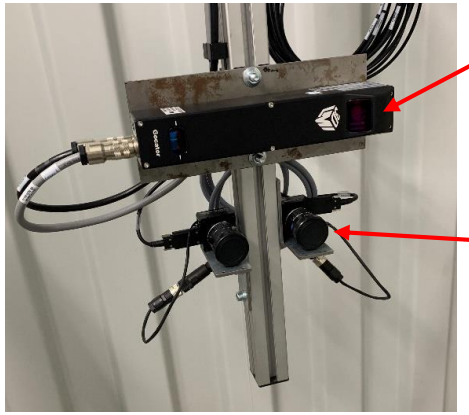


Inspection process

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

Inspection process



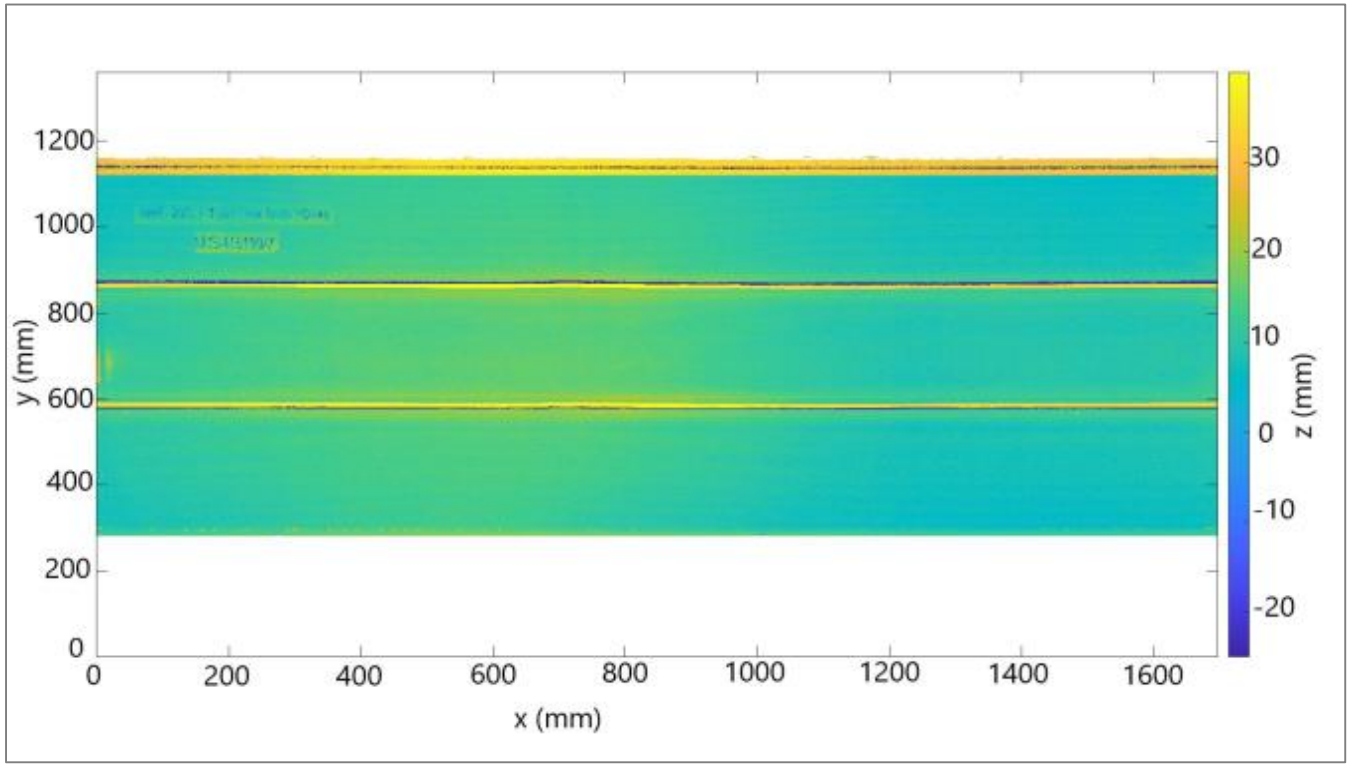


Inspection process

- **Step 1.1** – Drum coat und drum top scan

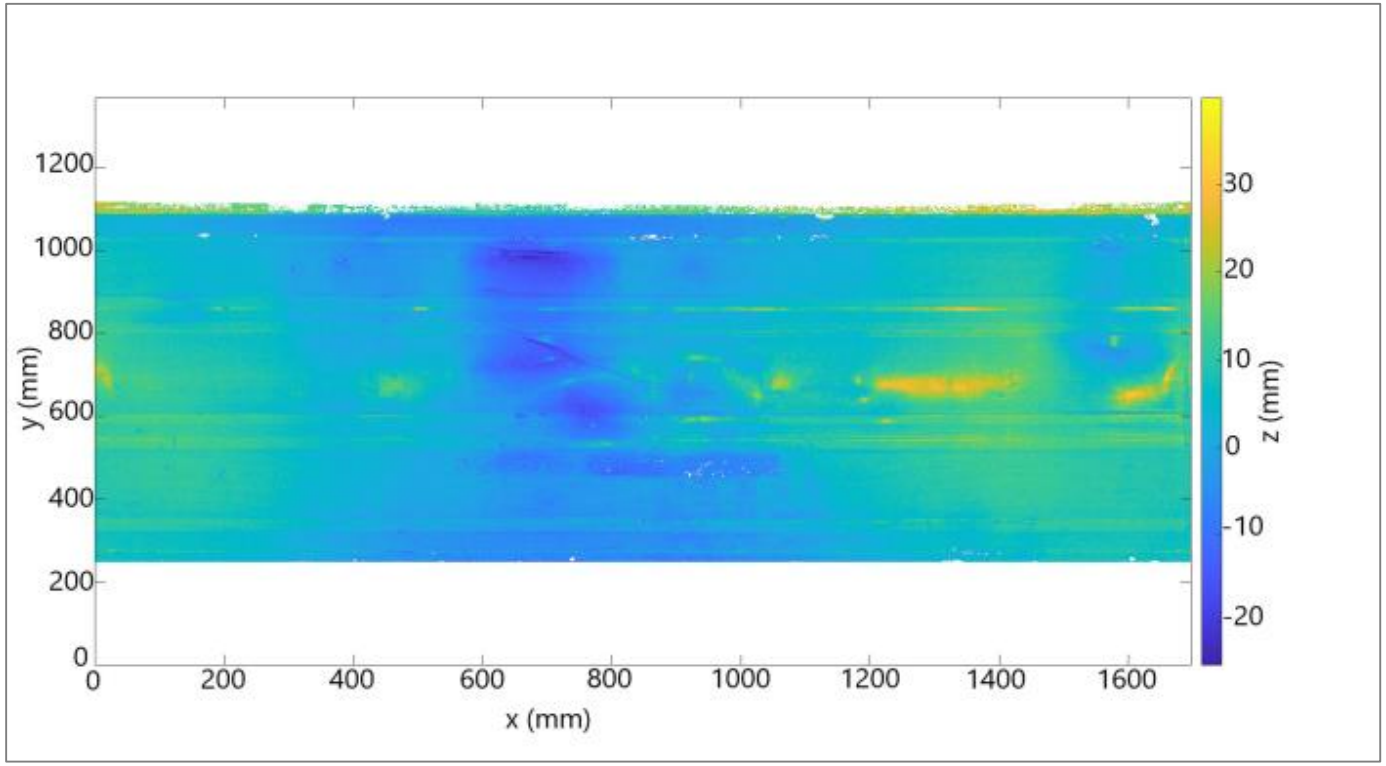
Pre-tests result

- Elevation map of the unwound drum coat – New drum



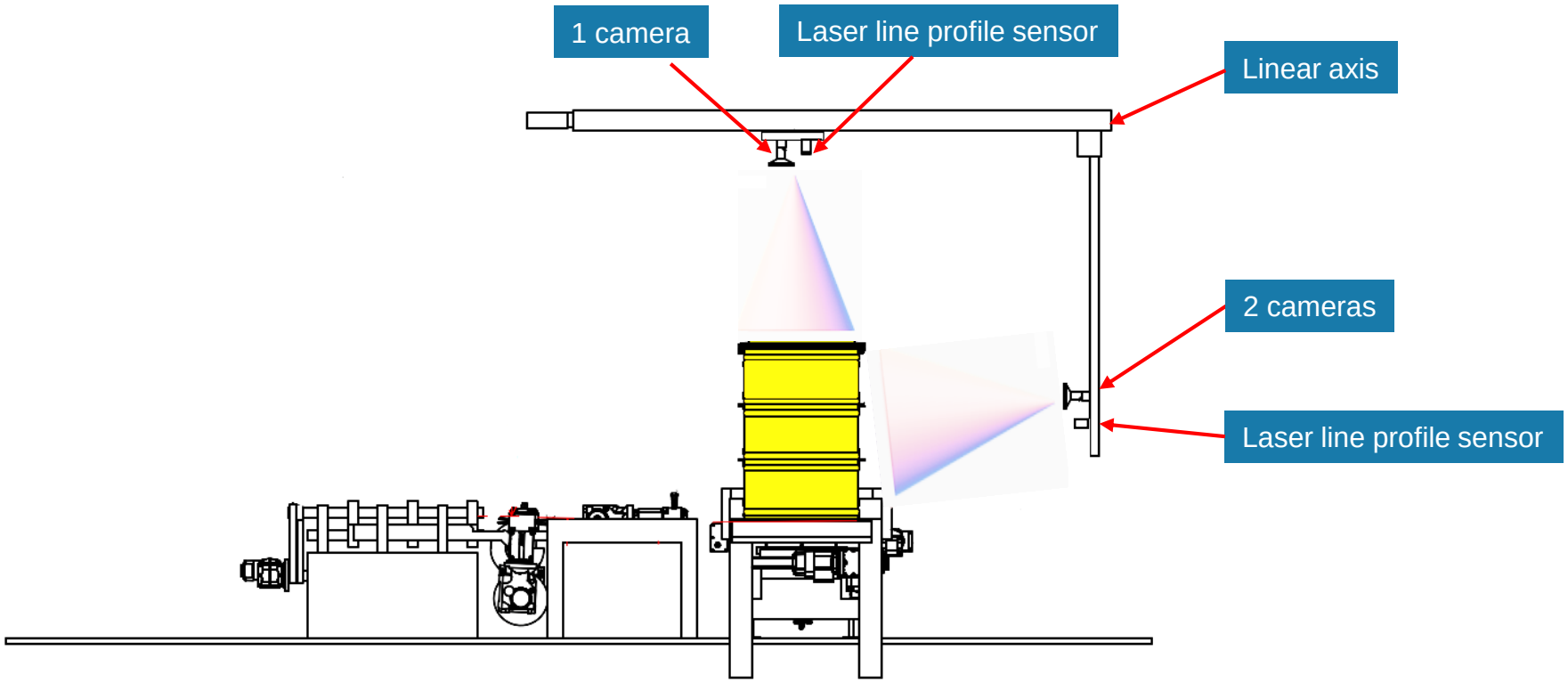
Pre-tests result

- Elevation map of the unwound drum coat – Used drum



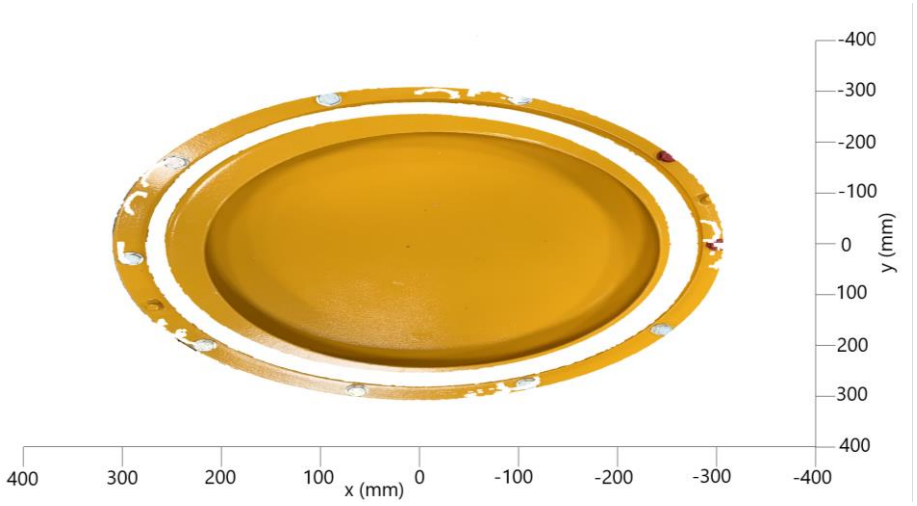
Inspection process

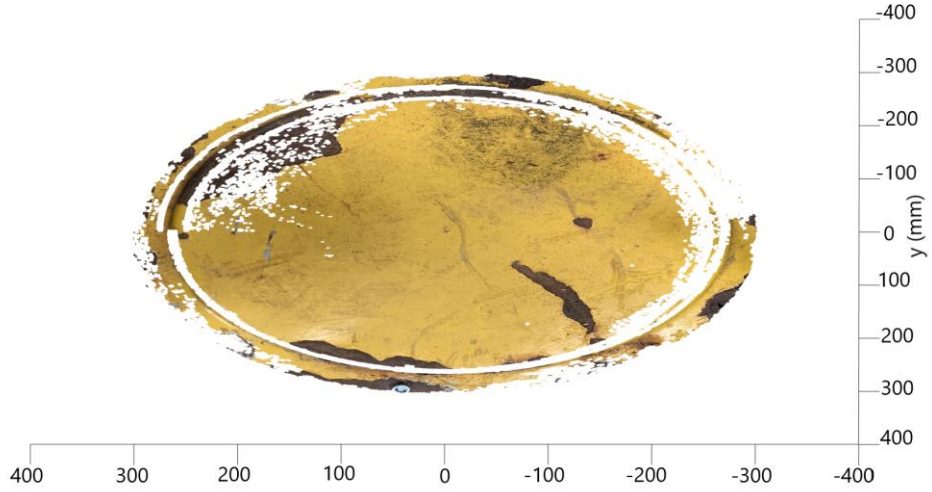
- **Step 1.2** – Drum coat und drum top photograph



Pre-tests result

- Profile of the drum top with texture





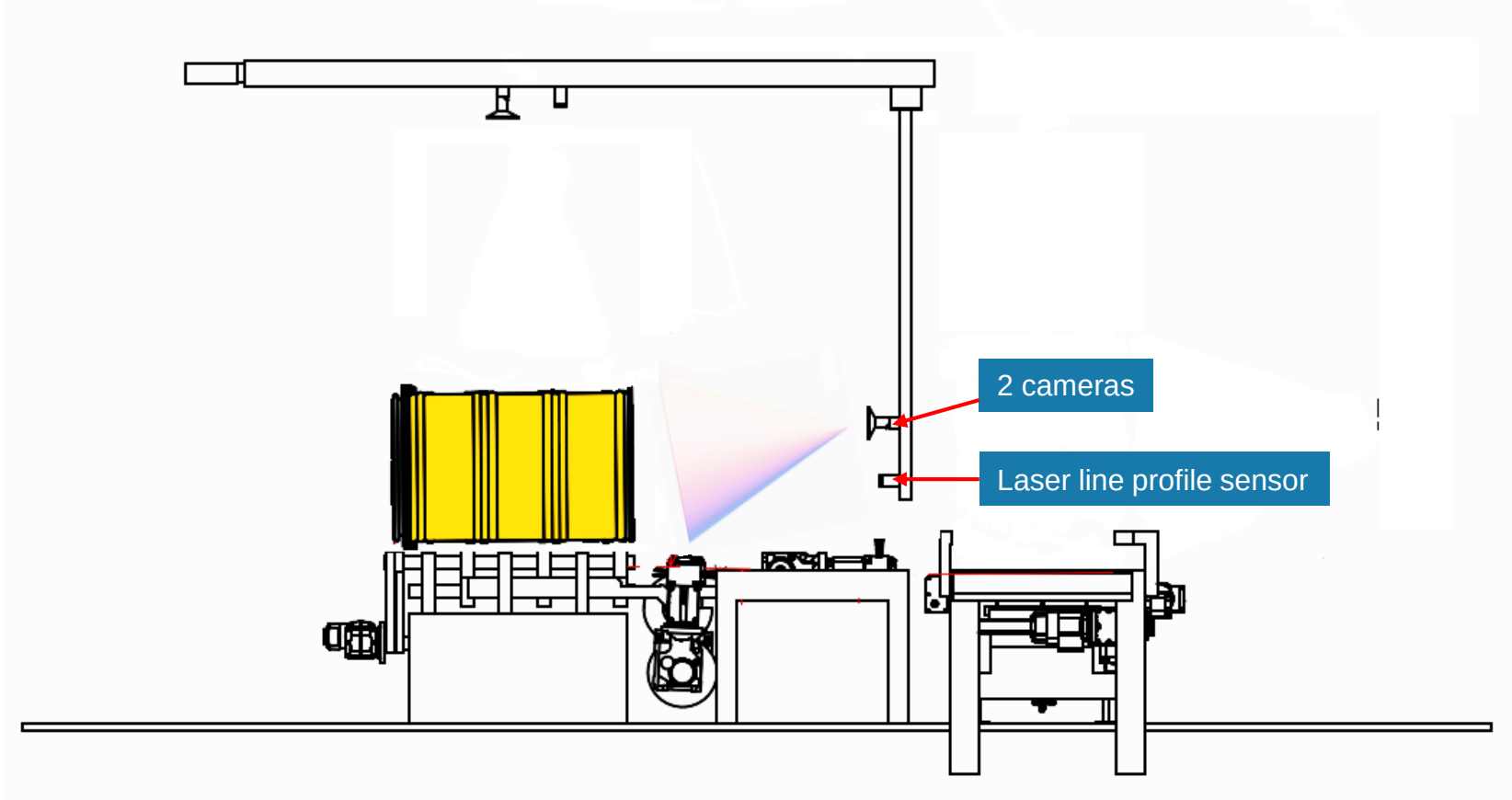
Inspection process

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



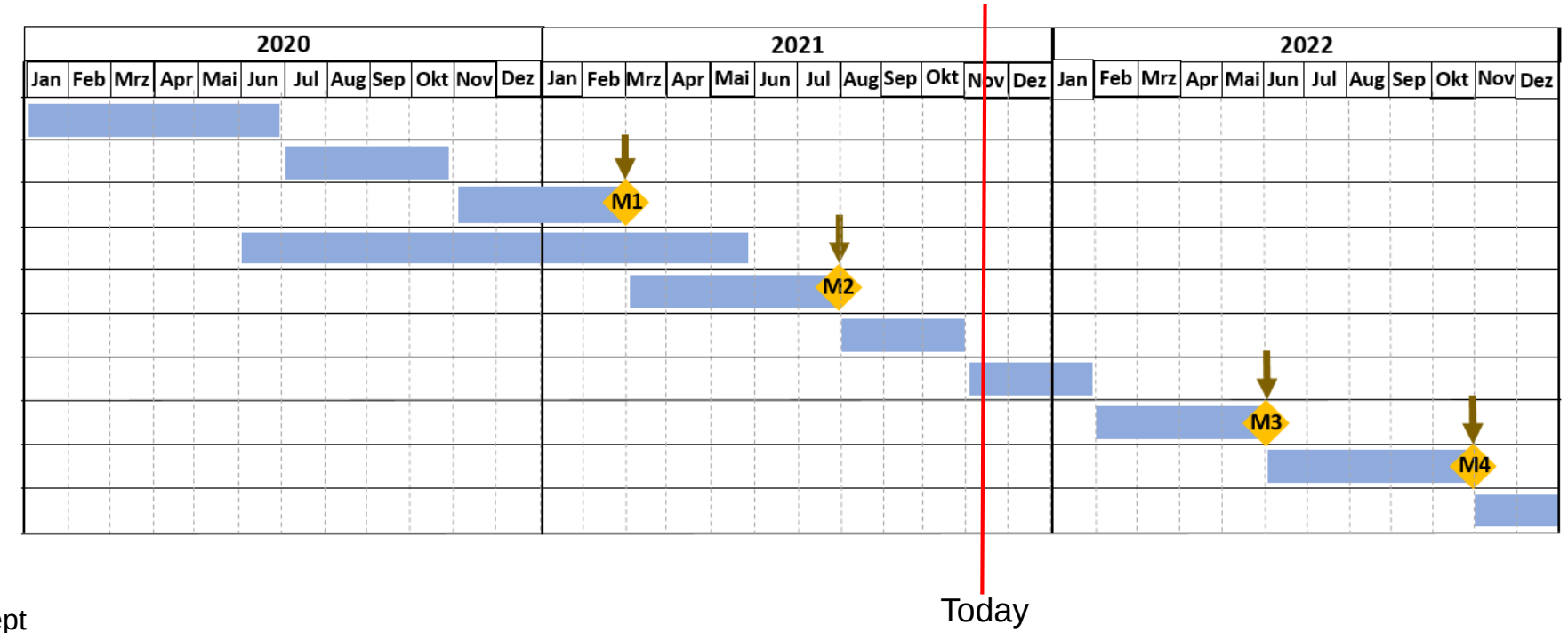
Inspection process

- **Step 2.1** – Drum botton scan und 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!