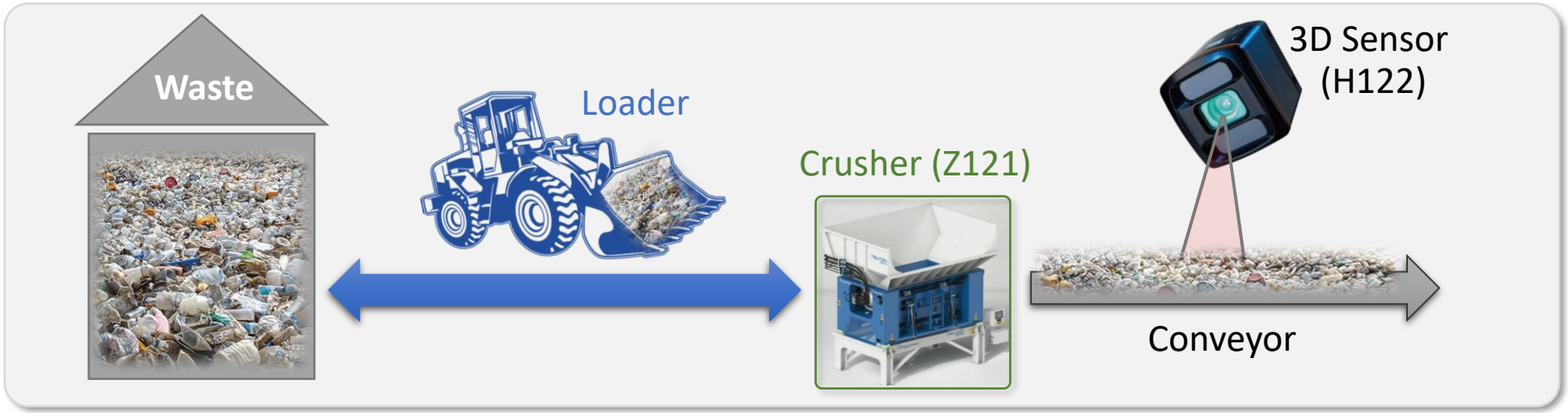
Eggersmann
Recycling Technology

Case Study: Data Science in recycling plants

Process description



For this case study, only the very first steps of a typical recycling process are considered:

1. A human driven loader repeatedly transports shovels of waste from a warehouse to a crusher (Z121).
2. The crusher breaks the waste into smaller particles and transfers it fully automatically to a conveyor belt, from where it is transported to the subsequent sorting steps, which will not be discussed further. After the crusher, a 3D Sensor (H122) is measuring the volumetric flow rate of the waste (m^3/h) on the conveyor.

Under standard operating conditions, the crusher is typically operated at an **oscillating rotating speed** (given in percentage), where a maximum and minimum value is specified by the current operator. Noteworthy, in the case of breaks (during shift changes) or unplanned breakdowns of the entire plant, due to malfunctions, the rotating speed is typically constant (e.g. 0 %). Occasionally, the crusher is operated without any waste input for maintenance purposes .

The rotating speed data of the crusher and the measured volumetric flow rate data by the 3D sensor are provided for a specific time interval.

Tasks

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With the data at hand, try to provide insights into the process. For example, is it possible to:

- Estimate the shift changes and average break time?
- Estimate the number of unplanned breakdowns and the corresponding average shutdown times?
- Estimate the average time it takes for waste to travel from the crusher to the 3D sensor?
- Estimate the average time intervals between individual shovel loads ?
- Estimate the average volume of waste per shovel?

Can you deduce any further insights or correlations or even propose changes in the operating conditions?

Please prepare **max. 4 PowerPoint slides** (please send them by mail beforehand) and **present your results in max. 10 min**.

Noteworthy, we are especially interested to learn about the way you approached the task.

In particular:

- How did you screen and try to understand the data?
- Which questions did arise and how did you deal with uncertainties?
- What problems did you face? How did you solve them?

Pay particular attention to presenting and communicating your thoughts and findings clearly.