Second Symposium of Urban Mining

Pre-conditioning of old-landfilled material for further upscale processes

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Outline

- The landfill mining project 'TönsLM'
- Why pre-conditioning?
- The pre-conditioning setup
- Processing results
- Challenges
- Summary & Outlook
The Landfill Mining project: 'TönsLM'

- Duration: 8/2012-7/2015

- **Aims:**
  - Holistic view on the topic of ‘landfill remediation’
  - Development of processes for recovery of valuable materials
  - Ecological & economical balancing
  - Development of guideline for Landfill Mining

- **Project partner:**
  - 3 Companies
  - 3 Universities: 6 research institutes
  - 1 Authority
Landfill ‘Pohlsche Heide‘

Area 3: 1992-1995
Pre-conditioning of old-landfilled material for upscale processes

**Project overview**

- Excavated material
  - 50% MBT plant
  - 50% Pre-conditioning

MBT plant

- Light fraction
- Products & residues

Pre-conditioning

- Coarse/heavy fraction
- Products & residues

LWP-sorting plant

- Products & residues

IW-sorting plant

Additional treatment steps (e.g. product valorization, thermal processes,...)
Pre-conditioning of old-landfilled material for upscale processes

**Project overview**

- **Excavated material**
  - 50% to **MBT plant**
  - 50% to **Pre-conditioning**

- **MBT plant**
  - Light fraction to **LWP-sorting plant**
  - Coarse/heavy fraction to **IW-sorting plant**

- **Pre-conditioning**
  - Light fraction
  - Coarse/heavy fraction

- **LWP-sorting plant**
  - Products & Residues

- **IW-sorting plant**
  - Products & Residues

**Additional treatment steps**
(e.g. product valorization, thermal processes,...)

**Separation of fines → further treatment**
Pre-conditioning of old-landfilled material for upscale processes

**Project overview**

Excavated material

- 50% to MBT plant
- 50% to Pre-conditioning

**MBT plant**

- Light fraction
  - Products & residues

**Pre-conditioning**

- Coarse/heavy fraction
  - Products & residues

**LWP-sorting plant**

**IW-sorting plant**

**Additional treatment steps**
(e.g. product valorization, thermal processes,...)
Material after excavation
Why pre-conditioning?

- Preparation of material for further sorting processes
  - Sorting at LWP sorting plant = sorting of standard plastics
  - Concentration of valuable materials (‘light fraction‘)

- Reducing amount of fines fraction (< 60mm)
  - Transport costs
  - Processing costs
  - Subsequent processes ≠ fines processing

- Protection of subsequent machinery and processes
  - Removal of large objects (with wheel loader)
Large objects

Iron barrel
Large objects

Technical fabric  Railway sleeper
Large objects

Truck tyre
The pre-conditioning setup

- Crushing
- Sieving
- Ballistic separation

Fe output

Light fraction

Fines (<60 mm)

Heavy fraction
The pre-conditioning setup

- Crushing
- Sieving
- Ballistic separation

- Fe output
- Light fraction
- Fines (<60 mm)
- Heavy fraction
Achieved mass balance*

- Light fraction: 32%
- Fines: 65%
- Heavy fraction: 2%
- Fe: 1%

*average for all 3 sampled areas
Material composition: Light fraction

- Foils: 9%
- Plastics 3D: 11%
- Wood: 15%
- Textiles: 6%
- Paper/cardboard: 4%
- FE: 4%
- NF: 1%
- Fines: 32%
- Residue: 11%
- Stones: 7%
- Others: 50%
Material composition: Light fraction

- **Plastics 3D**: 11%
- **Foils**: 9%
- **Wood**: 15%
- **Textiles**: 6%
- **Paper/cardboard**: 4%
- **FE**: 4%
- **NF**: 1%
- **Other**: 50%
- **Fines**: 32%
- **Stones**: 7%
- **Residue**: 11%

= 6 % of Input
Processing challenges

- High amount of fines (< 60 mm): >> 60%
- Low process efficiencies of pre-conditioning
  - Wet material (moisture content up to 50%)
  - Plugging of paddles (ballistic separator)
    → layer of clay
- Mobile aggregates
  - Limitations in process dimension
The pre-conditioning setup

- Crushing
- Sieving
- Ballistic separation

Fe output

Light fraction

Fines (<60 mm)

Heavy fraction
Summary & Outlook

• Need for improvement of fines separation

• Cost efficiency of landfill mining projects
  – Increase of separated amount of fines
  – Transport costs
  – Treatment costs

• *Pre-conditioning is a important part of the landfill mining process chain!*

• Next steps:
  – Analysing of product quality
    → Plastics for material recycling?
  – Starting of 2nd project part:
    → slag landfill
  – Input to guideline (technical feasibility)
Thanks for your attention!

Special thanks to all partners for the cooperation and support in the 'TönsLM‘ project!

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