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SMART WASTE INCINERATION: ENVIRONMENTALLY FRIENDLY HEAT AND POWER FROM WASTE

INTELLIGENT DIGITALIZATION SOLUTIONS SUPPORT THE EFFICIENT OPERATION OF WASTE INCINERATION PLANTS AND REDUCE POLLUTANT EMISSIONS.

The incineration of household waste is a fundamental part of Austria's waste management system. Every year, more than 700,000 tons of waste are incinerated in Vienna alone, generating environmentally friendly heat and electricity for hundreds of thousands of households. Efficient and clean waste incineration is a major challenge from a process engineering point of view. The inhomogeneous composition of the waste to be incinerated is largely responsible for this. This inhomogeneity manifests itself in varying fuel properties, resulting in strong fluctuations in calorific value as well as potential pollutant emissions, such as sulfur dioxide (SO2), nitrogen oxides (NOx) and chlorine compounds (e.g. HCl). This can result in the need to add a higher-grade fuel, such as heating oil, or create unwanted pollutant emission peaks.

In this project, methods were developed to determine the properties of the delivered waste by using measured values of the combustion process and the delivery system. Based on this, an optimal premixing of the remaining, not yet incinerated waste is to be carried out. Due to this systematic premixing of the waste, a more homogeneous composition, a more constant calorific value and thus a more stable combustion process can be achieved. Furthermore, possible pollutant emission peaks can be smoothed.

Federal Ministry
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Climate Action, Environment, Energy, Mobility, Innovation and Technology

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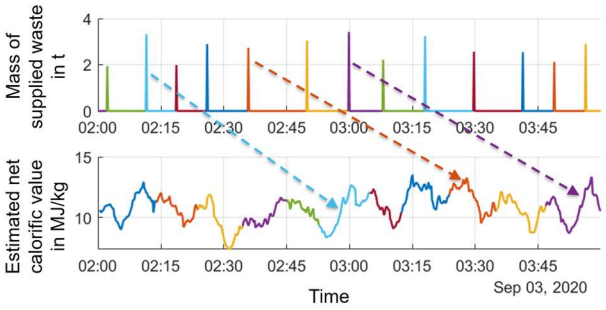
Methodological approach

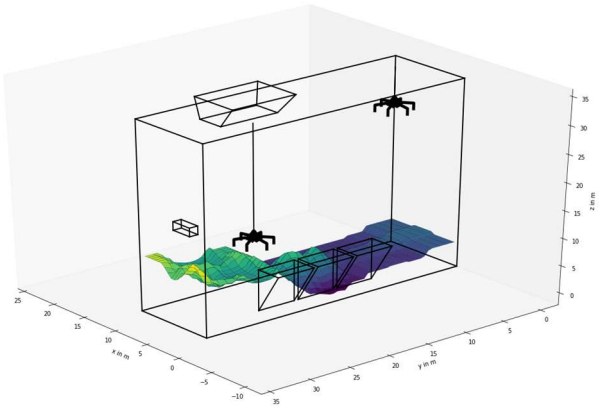
The basic functionality of the developed methods can be divided into two main parts.

First, a so-called fuel estimator calculates relevant waste properties, such as calorific value, water content or pollutant emission tendency, from measurements of the combustion process and assigns them to crane loads of supplied waste. The following graphic shows an example of this for the calorific value.



© BEST, Assignment of crane loads to determined calorific value

In the second step, a 3D model of the bunker, in which the delivered waste is temporarily stored, is used to trace the origin of the waste. In the case of problematic waste, the fraction still remaining in the bunker can then be optimally premixed.



© BEST, Tracking of the waste by using a bunker model

Outlook

The developed methods (fuel estimator & bunker model) provide the basis for an optimal automated mixing of the different waste fractions. These cost-effective digitalization methods from the field of "Industry 4.0" allow for increasing the efficiency of waste incineration plants without requiring any mechanical modification of the plant. By homogenization of the waste, the addition of higher-grade fuels, such as heating oil, can be reduced and pollution emission peaks avoided.

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