AshMelT project

bioenergy2020+

Practical relevance of the AshMelT methods – survey of real slag formation in small scale heating applications

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13. industrieforum PELLETS

Background & Objectives

Fuels

Wood fuels

- Pine, Spruce, Willow, Beech, Ash tree
- Stemwood & bark rich fuels from thinning and pruning

Stalk fuels

- Agricultural residues (Wheat straw, corn cobs)
- Energy crops (Miccanthus)

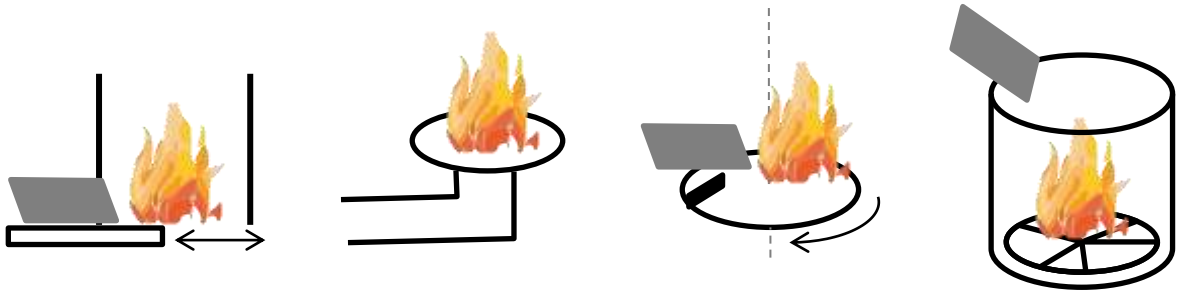
Other Fuels

- Residues from food production (DDGS, rape seed extract)
- Waste wood
- Peat

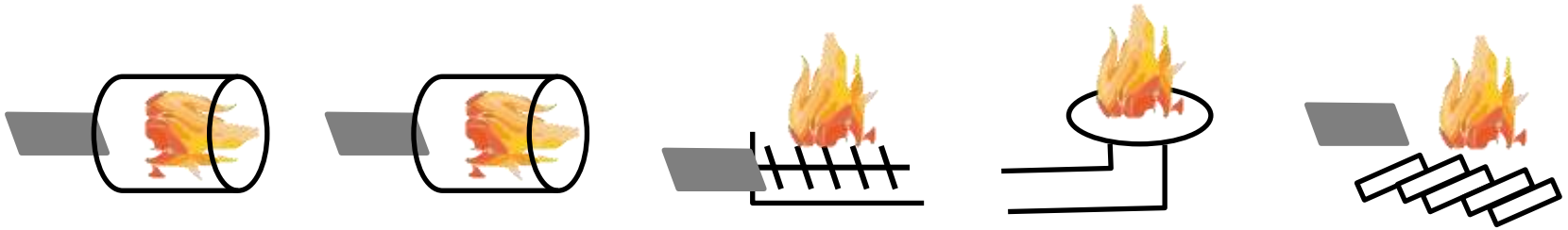
Overall 18 different fuels

Objective: Broad range of slag formation mechanisms

Combustion technologies



B01	B02	B03	B04
16,8 kW	15 kW	140 kW	6 kW



B05	B06	B07	B08	B09
29 kW	80 kW	30 kW	20 kW	40 kW

Severity - How sever is the challenge of the ash residues in a combustion system?

Challenges for combustion system	Assessment of residues	Severity
Amount of ash Amount of slag Grain size of slag Hardness of slag	Ash content • Amount of ash Visual Classification • Classifying the hardness and structure of the residues Particle size distribution: d80 • Amount of slag formed • Characterising the grain size	Severity • Weighted average • Factor between 0-1

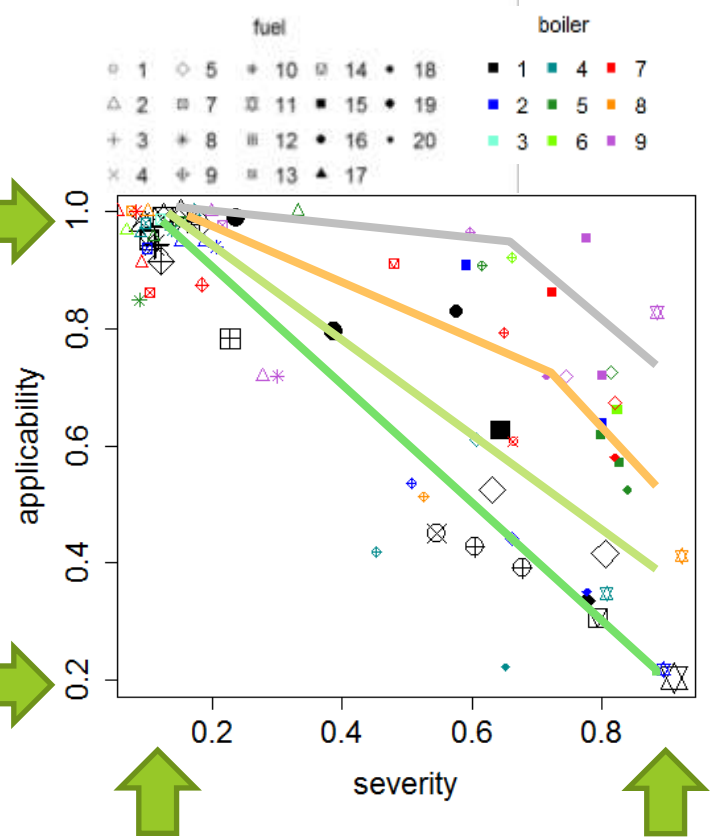
Applicability – How severe is the impact of the slag formation on the combustion appliance?

Parameters to be fulfilled for applicability	Assessment of applicability	Applicability
Continuous operation Supply the demanded energy Maintenance efforts	Temperature variance on grate • Stability of operation Emission release • Comparison with reference fuel • Assessing the influence on combustion Power output Adaptions of control parameters Time to boiler shutdown	Applicability • Weighted average • Factor between 0-1

How Severity influences the Applicability

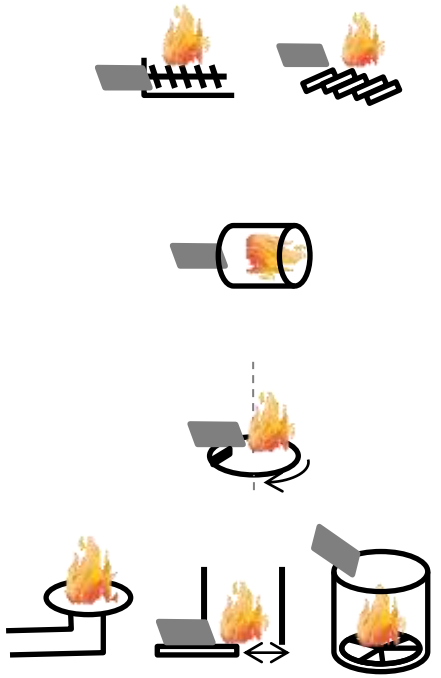
No influence of operation occured

High impact on combustion appliance

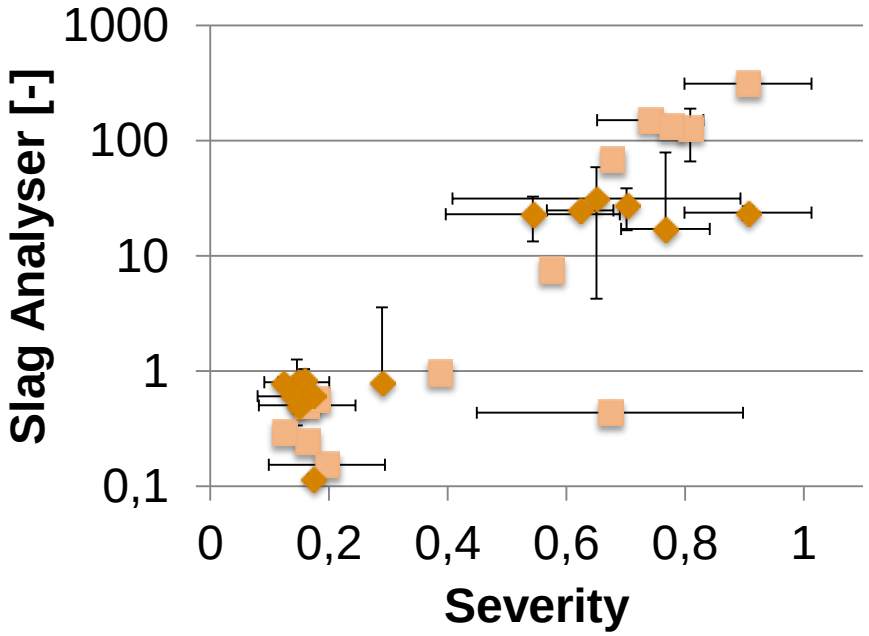


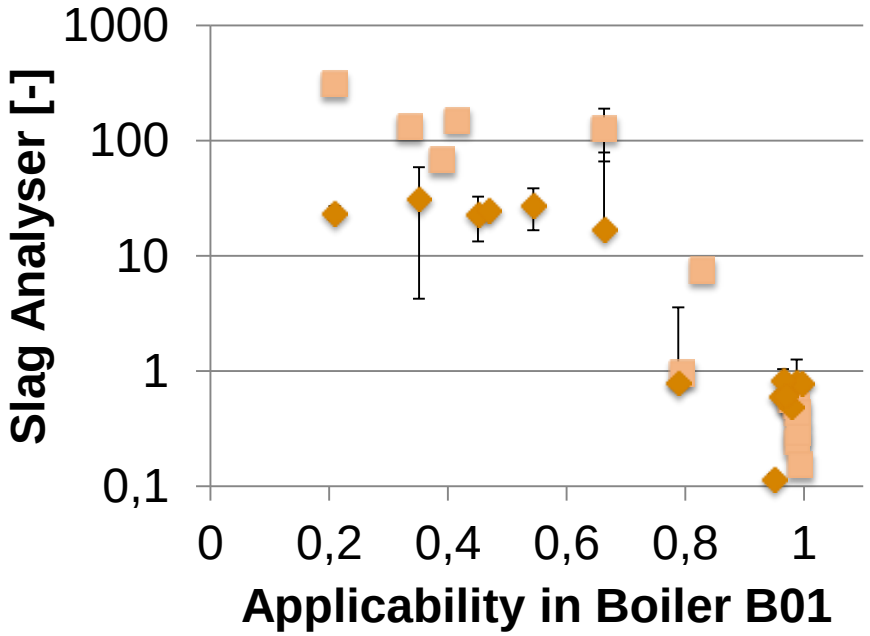
Loose and low amount of residues

Severe characteristics of residues

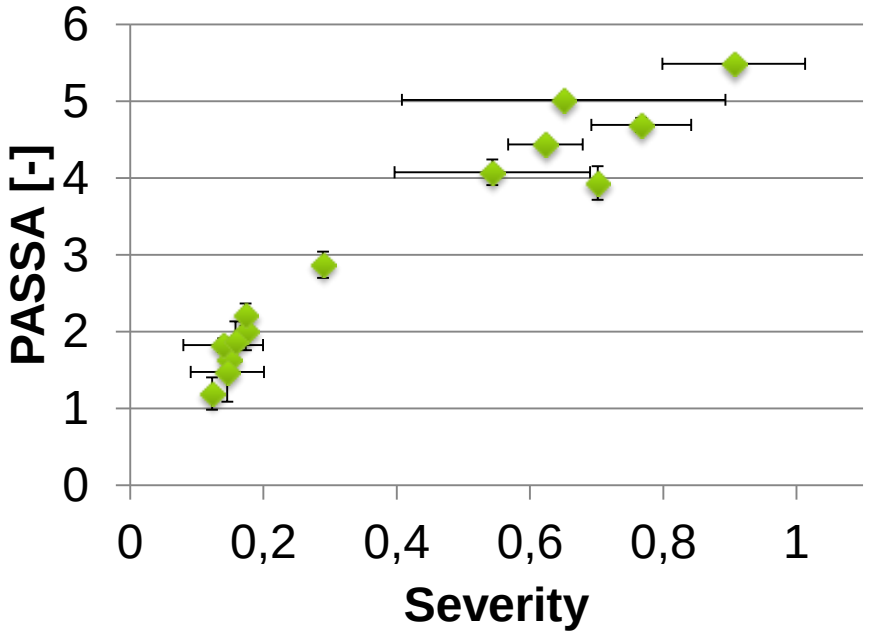


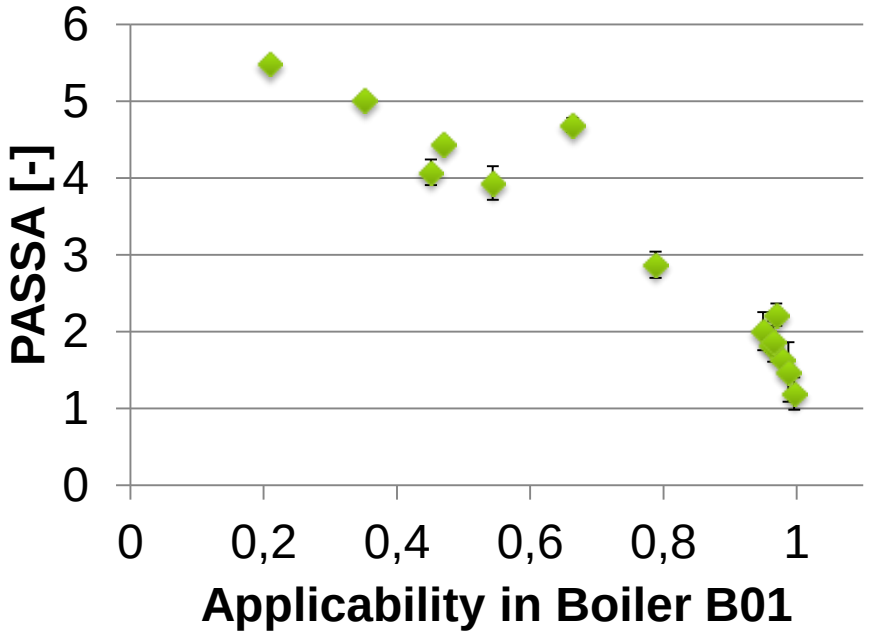
Prediction of Severity and Applicability
Slag Analyser results





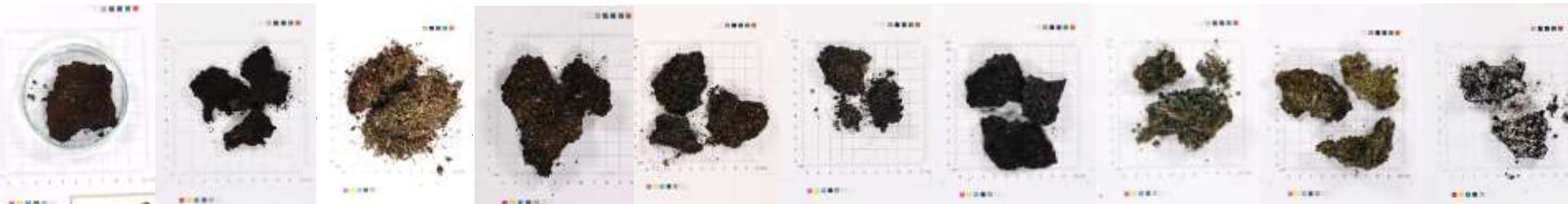
Prediction of Severity and Applicability
PASSA test results





Conclusions

- Survey of slag formation in various combustion technologies and of different biomass fuels. A method to assess the **severity** of fuels and **applicability** in combustion systems was developed and applied.
- A certain variance of slag formation in different combustion systems is visible. The impact of the slag formation is absolutely dependent on the combustion technology.
- Reasonable correlations of AshMelT methods (Slag Analyser and PASSA test) were found and will be further optimised. These correlations will be further optimised to allow certain predictability of **Severity** of the fuel and its **Applicability** in a combustion system.



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AshMelT project

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Thank you very much for your attention,

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