

Impactor measurements in Tar laden hot raw gas for Biomass Gasifiers

Mohit Pushp^{1,2}, Kent Davidsson¹,
¹ SP Technical & Research Institute of Sweden, Boras
² Gothenburg University

Objectives

- Development of existing low pressure cascade impactor for particle measurements in hot conditions thereby minimizing the condensation of tar and particle bounce off.
- Aim of the project is to develop commercially feasible technique that can be applied to the Tar laden gas from gasification systems.

Background

Operational conditions of the gasification affect the particle content, size distribution and chemical composition which lead to particulate emission, corrosion and fouling. Detailed analysis of particles can be used to optimize the gasifier operation and design of downstream cleaning equipment.

Ash-related problems during thermal conversion of biomass



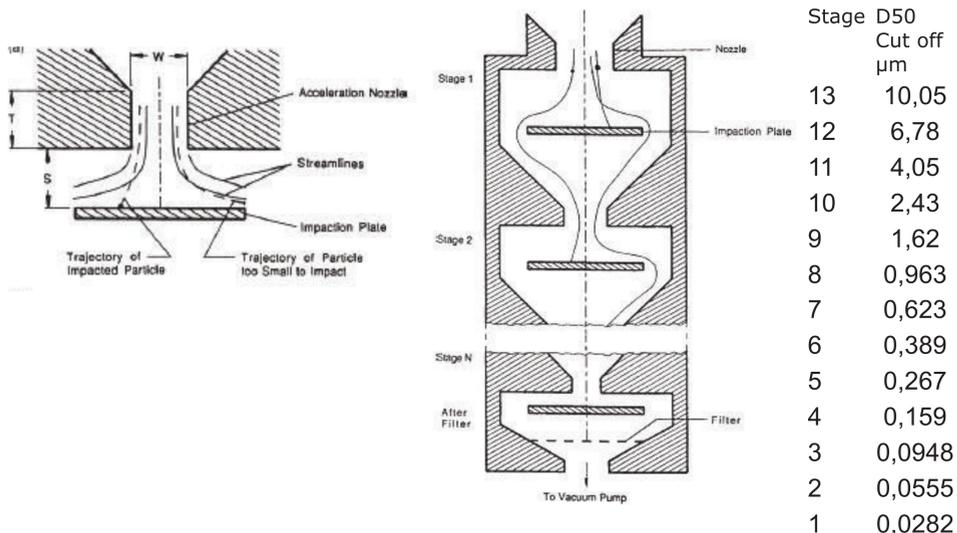
Corrosion



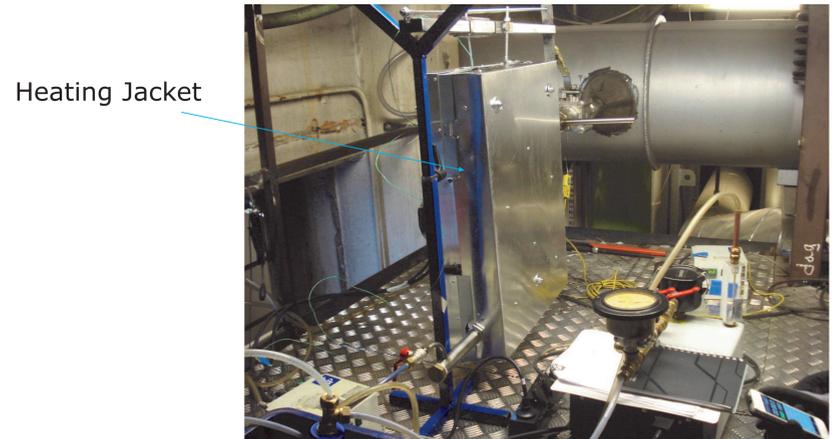
Fouling

Working principle of Cascade Impactor

Because of inertia particles larger than stage cut diameter cannot follow the flow stream lines but are impacted on the collection plate



Experiments at Chalmers Gasifier



A new sampling and particle measurement technique was tested in a 2 – 4 MWth indirect gasification facility at Chalmers. Sampling was conducted in the hot raw gas in the gasifier

Results

Experimental results

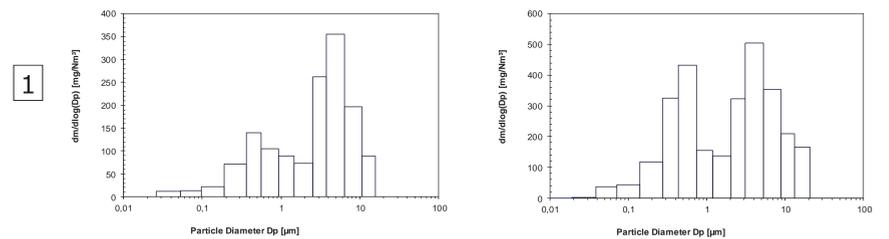


Fig 1 & 2: Dual mode distribution is observed during different operating conditions

NOTE : Values are not corrected for dilution

Conclusion

- Bounce off has been reduced to great extent
- Particles have been captured without condensation of tar
- Results looks promising and deeper analysis is ongoing for more clarity and confidence

Contacts

mohit.pushp@sp.se
kent.davidsson@sp.se