

Master's Thesis

Process Modeling for the Design of Plasma-Arc Gasifiers

Motivation

Ambitious climate targets require improved recycling technologies to close the carbon cycle. Entrained flow gasification is an efficient technology for converting low-grade, carbon-containing feedstocks (e.g. biomass, plastic waste) into high-quality synthesis gas. Plasma-assisted gasification offers opportunities for process intensification and the reduction of emissions. This Master's thesis aims to further develop an existing Aspen Plus model for the analysis of plasma-assisted entrained flow gasification. Detailed sensitivity studies using a Design of Simulated Experiments (DoSE) approach provide the opportunity to assess the potential for electrifying entrained flow gasification.

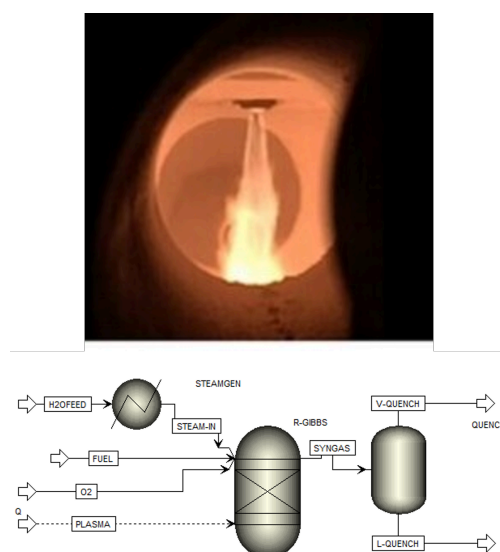


Figure 1: Simplified Process Scheme.

Work packages

- Literatur research on modelling of plasma-assisted entrained flow gasifiers
- Further development of an Aspen Plus model for the mass balance analysis of plasma-assisted entrained flow gasification
- Automation of existing modelling workflows
- Design studies using the Design of Simulated Experiments (DoSE) approach
- Bonus: Opportunity to participate in the REGA campaign

Applicant's profile

- Enrolled student in the master's program in Chemical or Bio-Engineering or comparable
- Interest in simulation work in the field of process development and optimization
- Basic knowledge in process simulation, preferably with AspenPlus
- Independent and structured work style

Upon interest, please contact us at any time (lars.kufferath-sieberin@kit.edu).

Thesis start: November 2026

Duration of the work: 6 months

Work approach: simulativ

Contact:

Lars Kufferath-Sieberin

lars.kufferath-sieberin@kit.edu