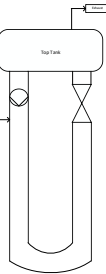


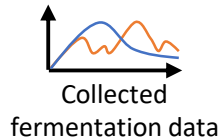
Introduction

→ Sustainable protein production at Unibio is achieved through fermentation in a U-loop reactor using biogas as C source.

→ Increased protein demand can be met through production of high amounts, and this implies an efficient fermentation process.

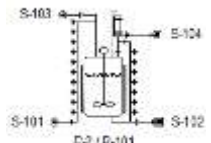


→ Goal: Fermentation optimization by increasing process productivity and stability.



train

Machine Learning (ML) model



Process simulation

→

Validation and integration with ML model

Methods

▼ SuperPro Simulation

→ Inlet stream and component definitions.

→ Identification and initialization of suitable unit operations for U-loop modeling.

→ Sizing of operation units.

→ Process modelling: analysis of conversion of reactants across U-loop, gas-liquid mass transfer of reactants, process heat.

► Model validation

► Sensitivity analysis

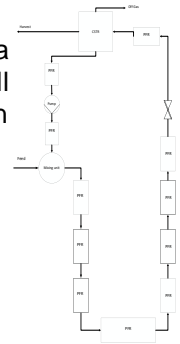
► Integration with ML

Current progress

U-loop model in SuperPro

→ U-loop follows behaviour of a plug flow reactor (PFR), and will be modelled as several PFRs in series, thus allowing for pressure along the loop to be discretized.

→ Top tank may be modelled as either a continuous stirred tank or degassing unit.



Challenges:

→ Discretizing the loop based on pressure raised questions about how conversion of reactants and mass transfer from gas to liquid phase varies across the loop.

→ Simplified algorithm can be established to estimate these values.

Perspectives

→ Integration of SuperPro simulation with the machine learning algorithm would enable the possibility to gain a better understanding and control over the fermentation at Unibio. Both models could be useful in the context of fermentation up-scaling.

→ As a Helix Lab fellow I have been presented with the amazing opportunity of working on a project within a biotechnology company, outside of the classic setting of a classroom. For the future I am hoping to successfully complete my Thesis project and find a job in the biotechnology industry.