CFD simulation

Ø32x10m, TS 15%

9x Varibull paddle agitator

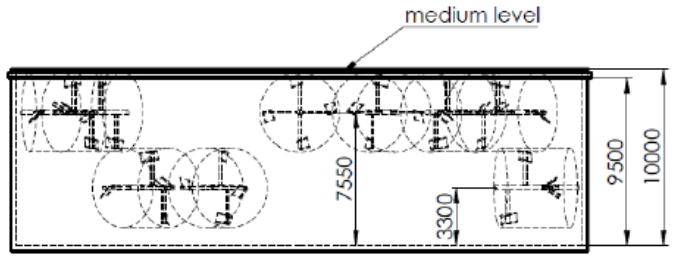
SÜD BIOGASTECHNIK

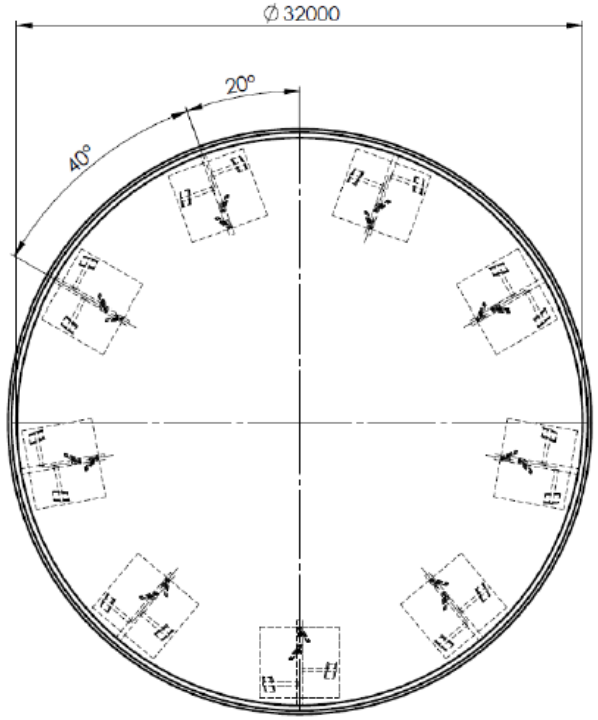
Container geometry

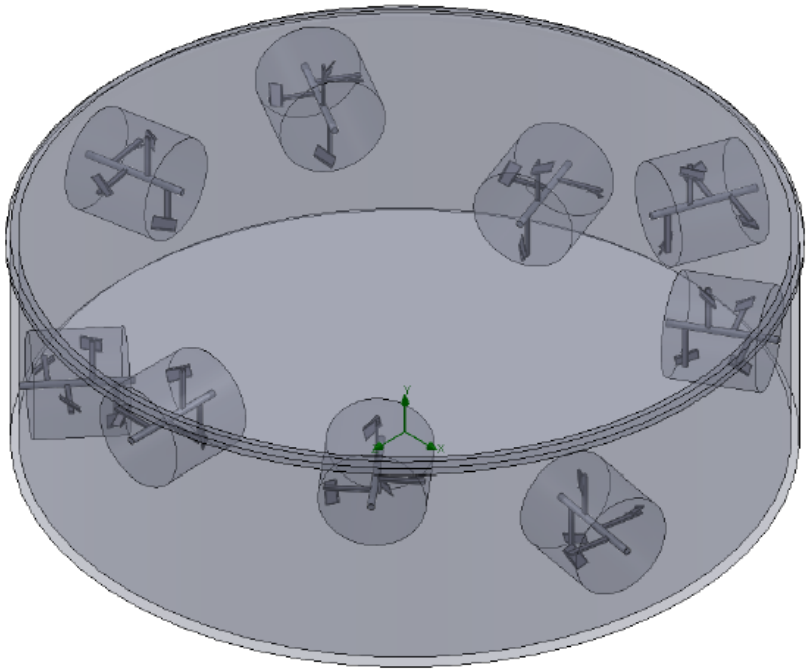
- Container diameter: 32m
- Filling level: 9,5m
- Substrate: TS 15%
- Agitator: 9x Varibull paddle agitator (10 rpm)
- Circulation capacity - without turbulence and entrainment: 15624 m^3/h
- Circulation capacity - with turbulence and entrainment: 52800 m^3/h

- Velocity of the medium after the simulation has reached a steady state: 0.222m /s

CFD-Geometry



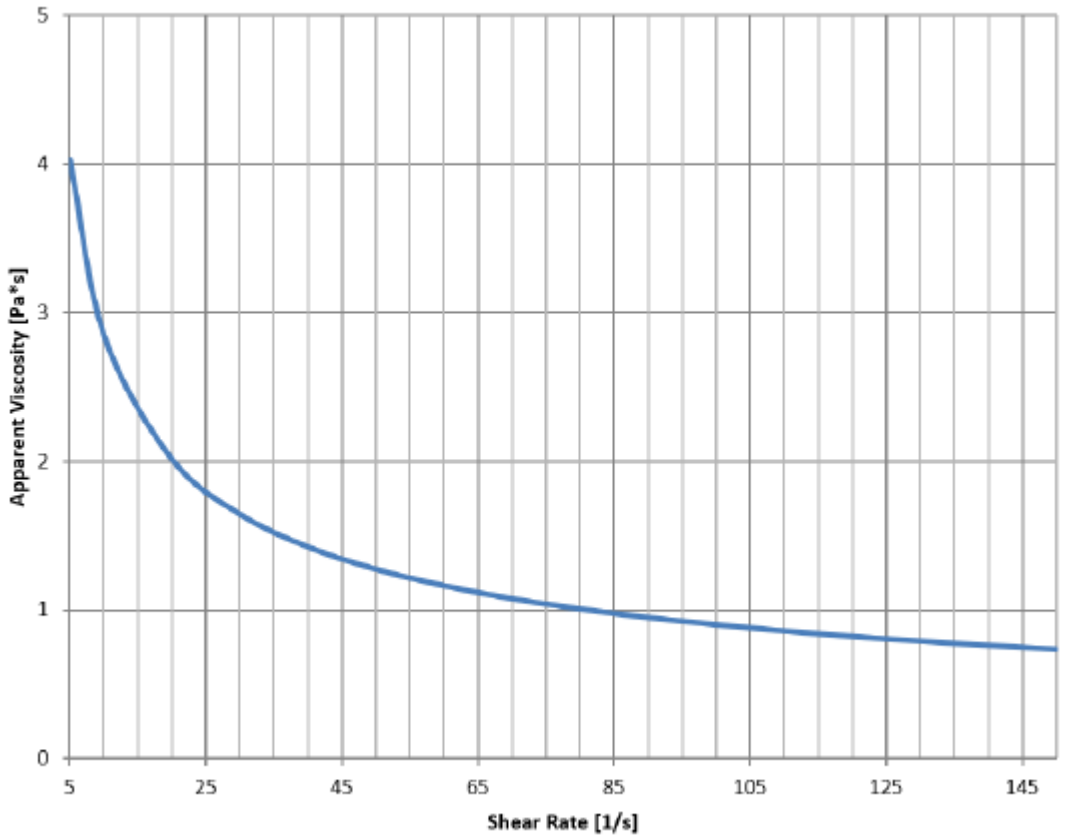




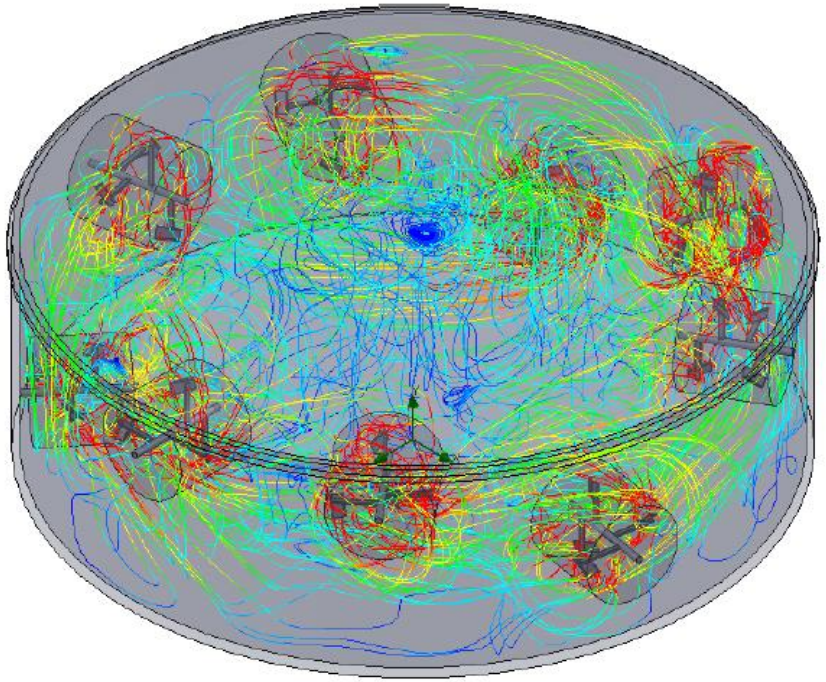
CFD Medium Definition

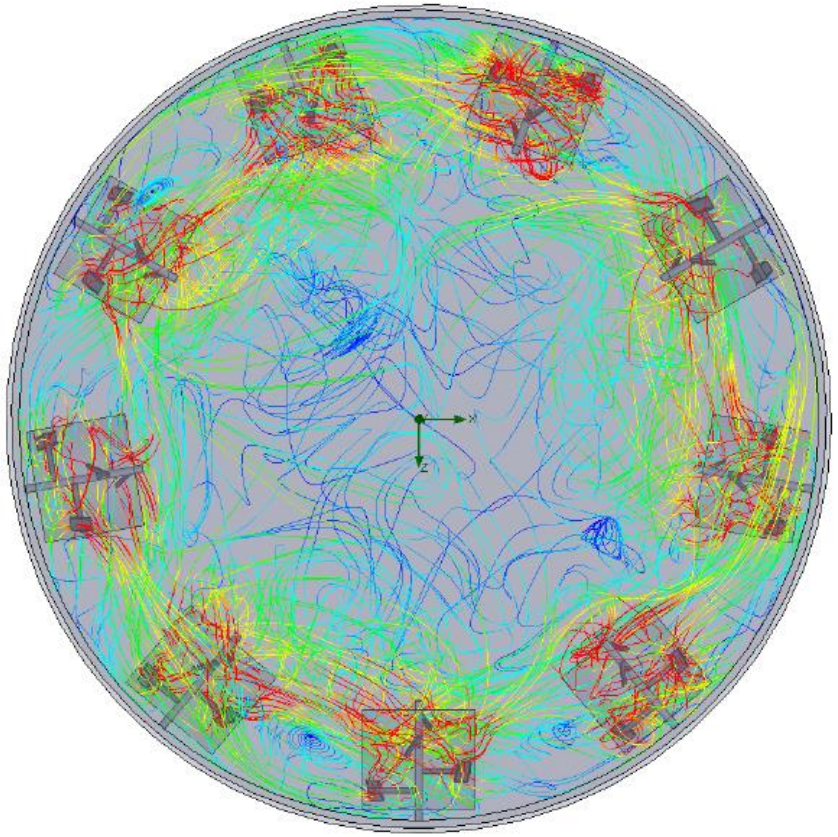
- A non-Newtonian behavior of the fluid was assumed in the simulation.
- **Definition of "non-Newtonian fluid":**

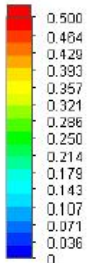
A non-Newtonian fluid differs from "normal" fluids in that it has a variable viscosity. A non-Newtonian fluid changes its viscosity depending on the shear rate that occurs. For example, for the fluid (see diagram below), the viscosity at a shear rate of 85/s is about 1.0 Pas. Consequently, the same fluid may have different viscosities at different locations in a tank, depending on the shear rates present at a particular location. This non-Newtonian behavior was included in the simulation. The shape of the curve is based on experience and measurements.



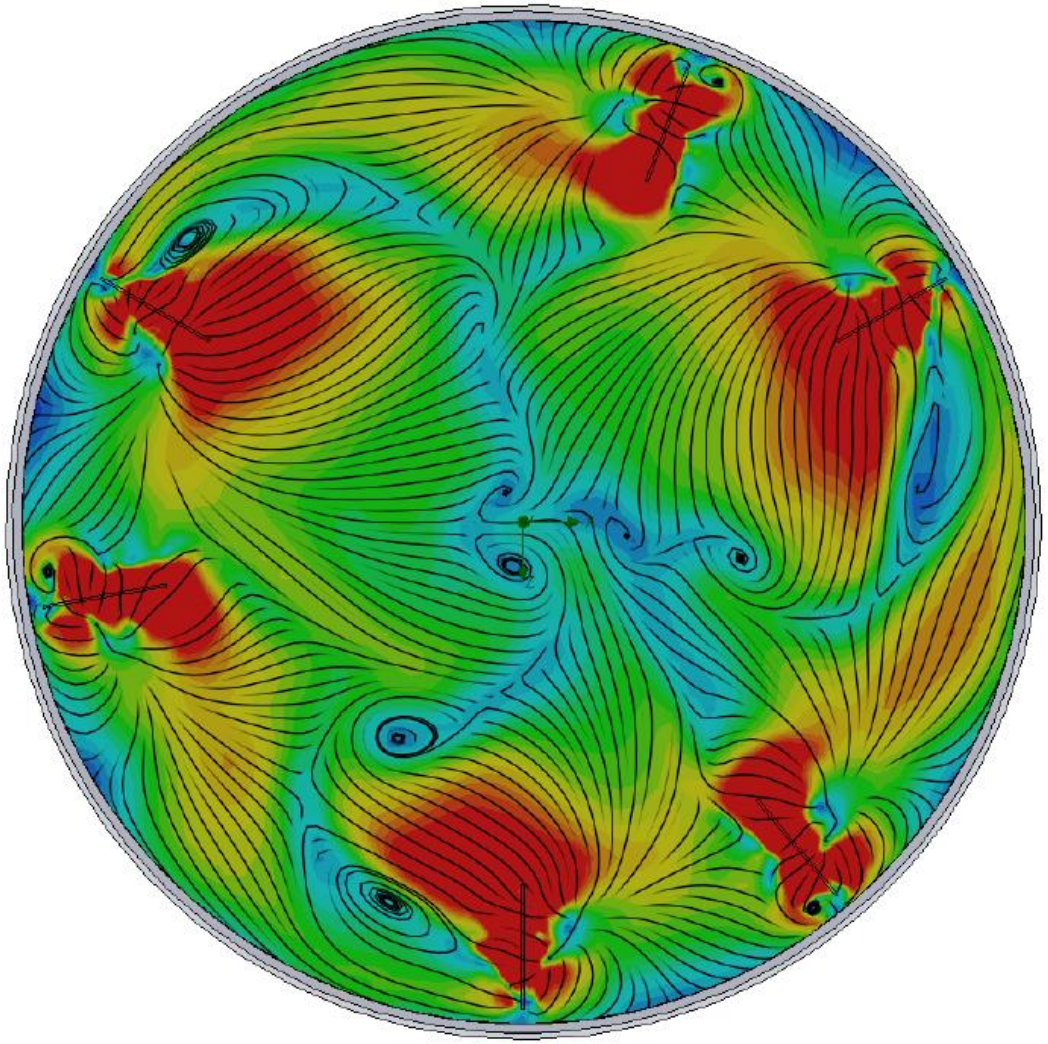
Streamlines



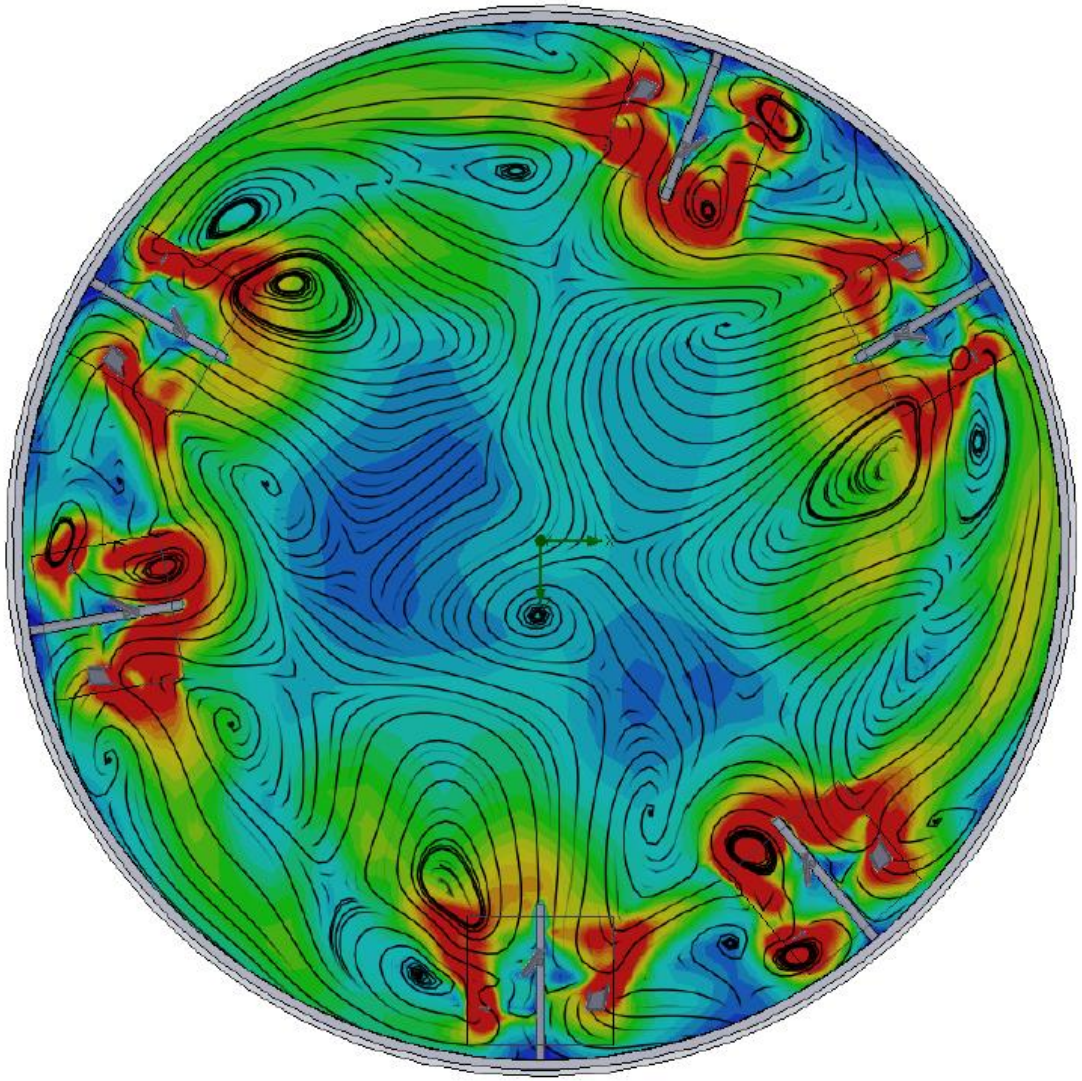


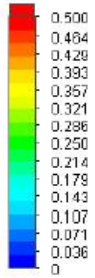


Floating layer (9,5m)



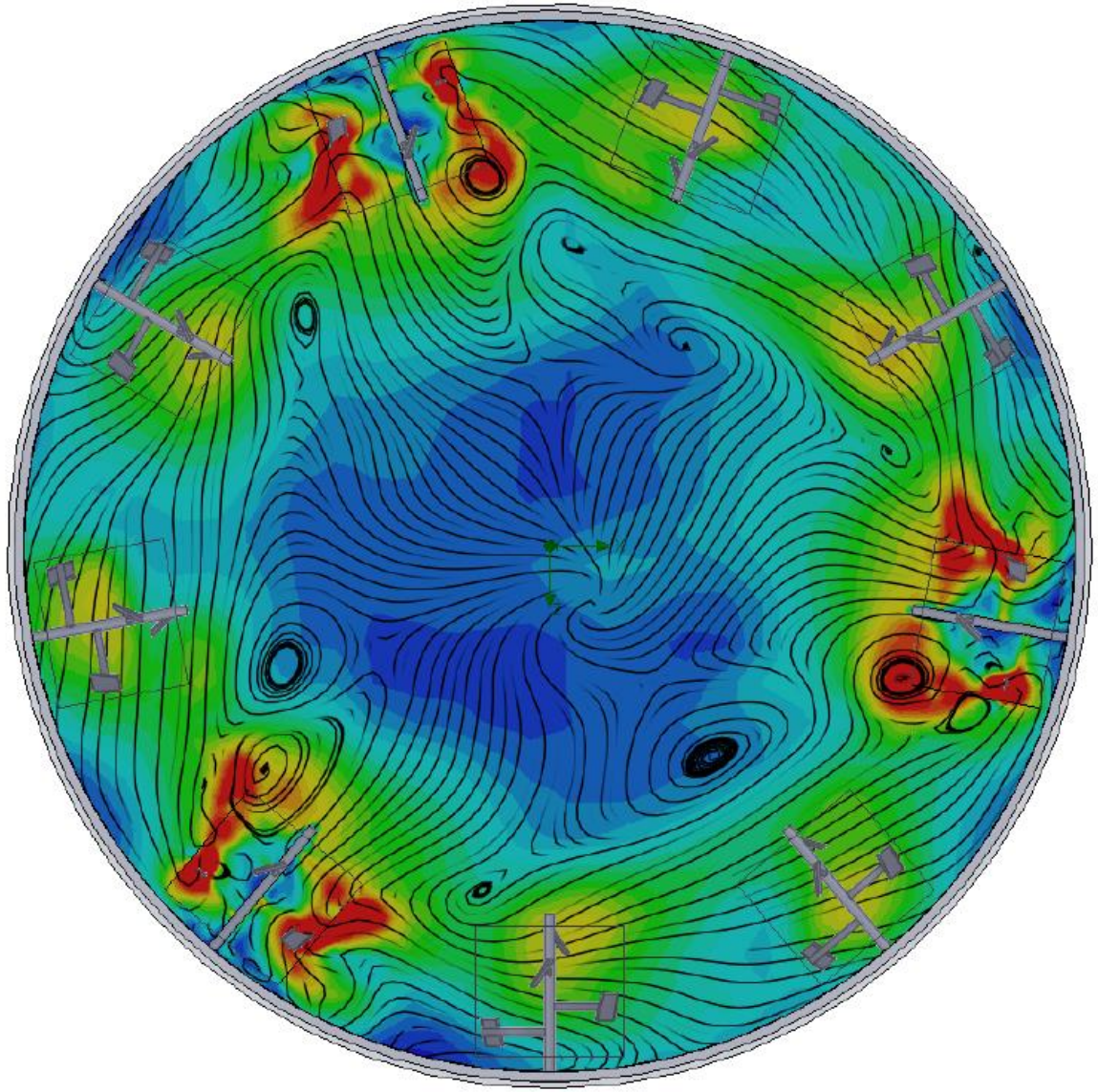
Level 7.55m center agitator shaft

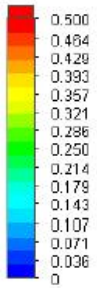




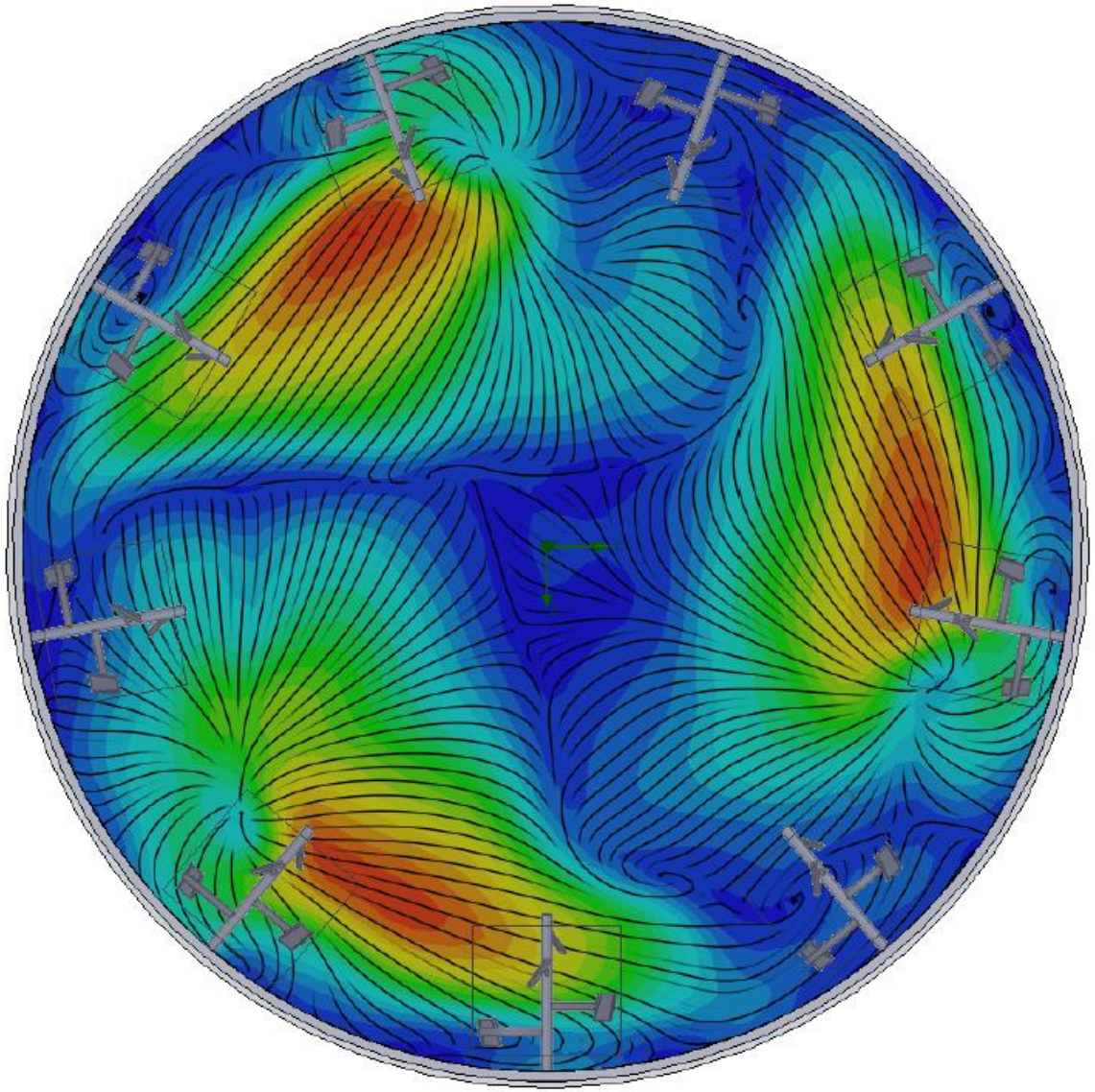
Speed (m/s)

Level 3.3m center agitator shaft

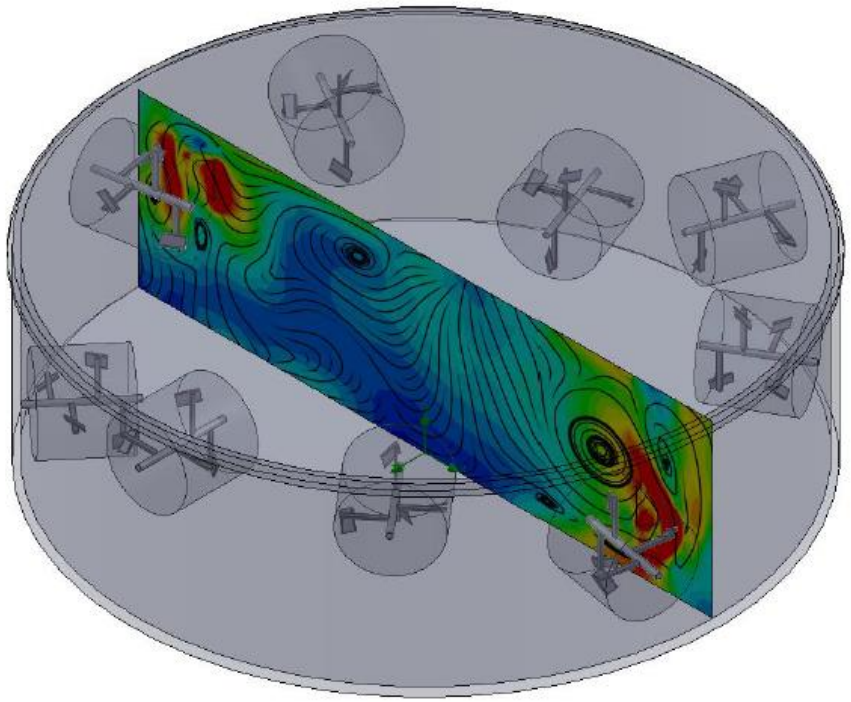


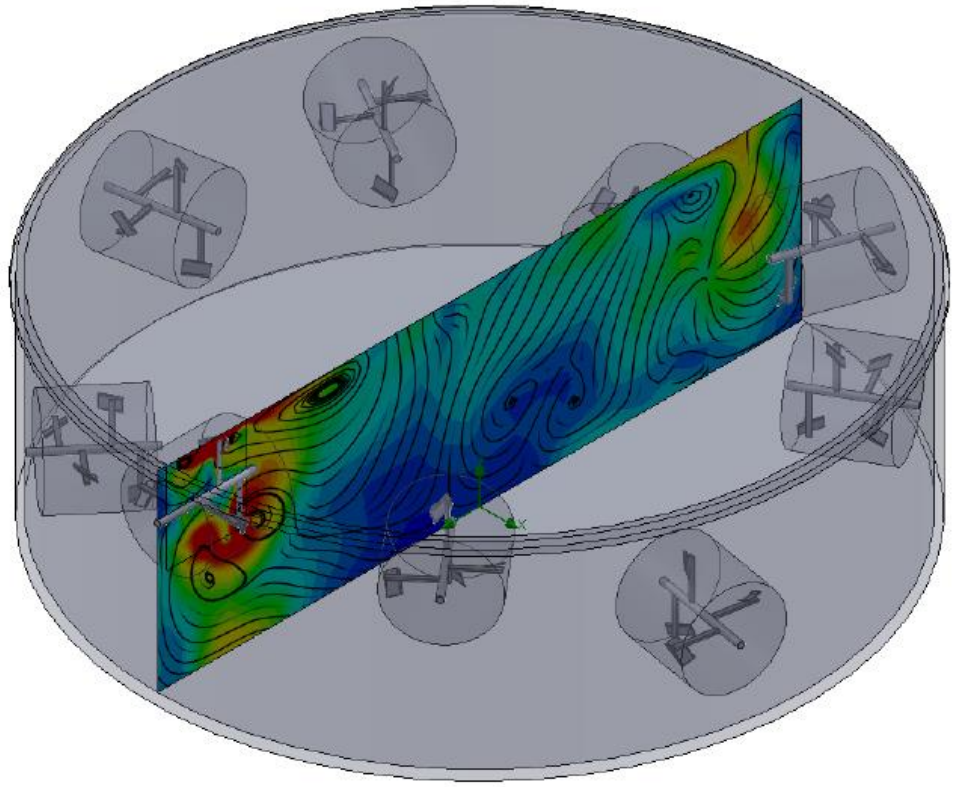


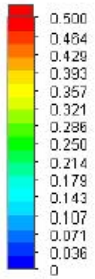
Container bottom (0m)



Cross section of the average speed







Speed (m/s)

Conclusion

- The velocity of the medium after the simulation reached a stable value of 0.222m/s
- Experience shows that the value is 0.18 m/s, thus complete mixing is achieved

The values are to be understood as samples. No project-specific design.

Thank you for your attention!

Biogastechnik Süd GmbH
Am Schäferhof 2
88316 Isny, Germany

Phone: +49 7562 97085 - 40
Fax: +49 7562 97085 - 50
vertrieb@biogastechnik-sued.de
www.biogastechnik-sued.de