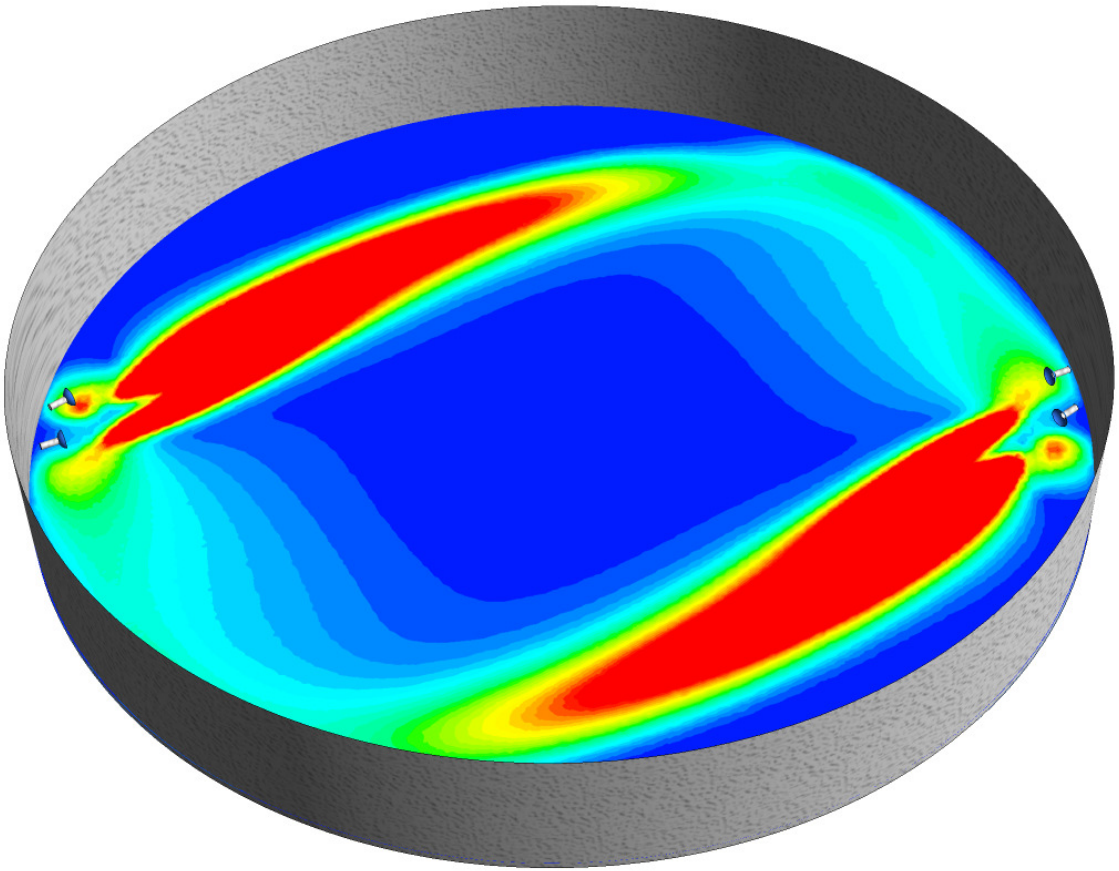
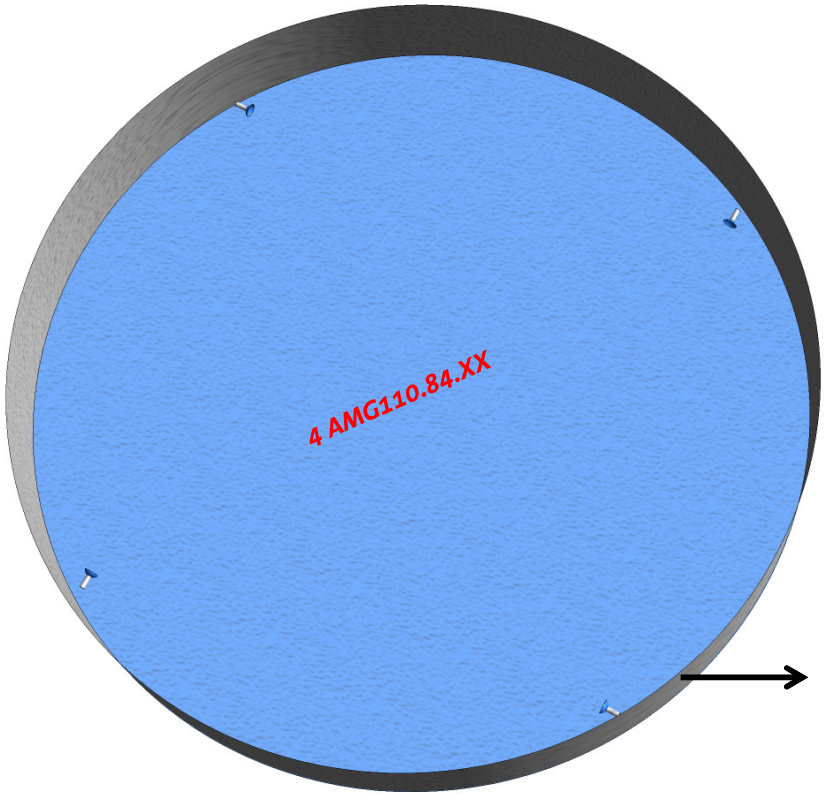
CFD analysis no. 2 for **WWTP Stargard Szczecinski**



GWUC solution engineering
Oct.11th,2013.

Introduction

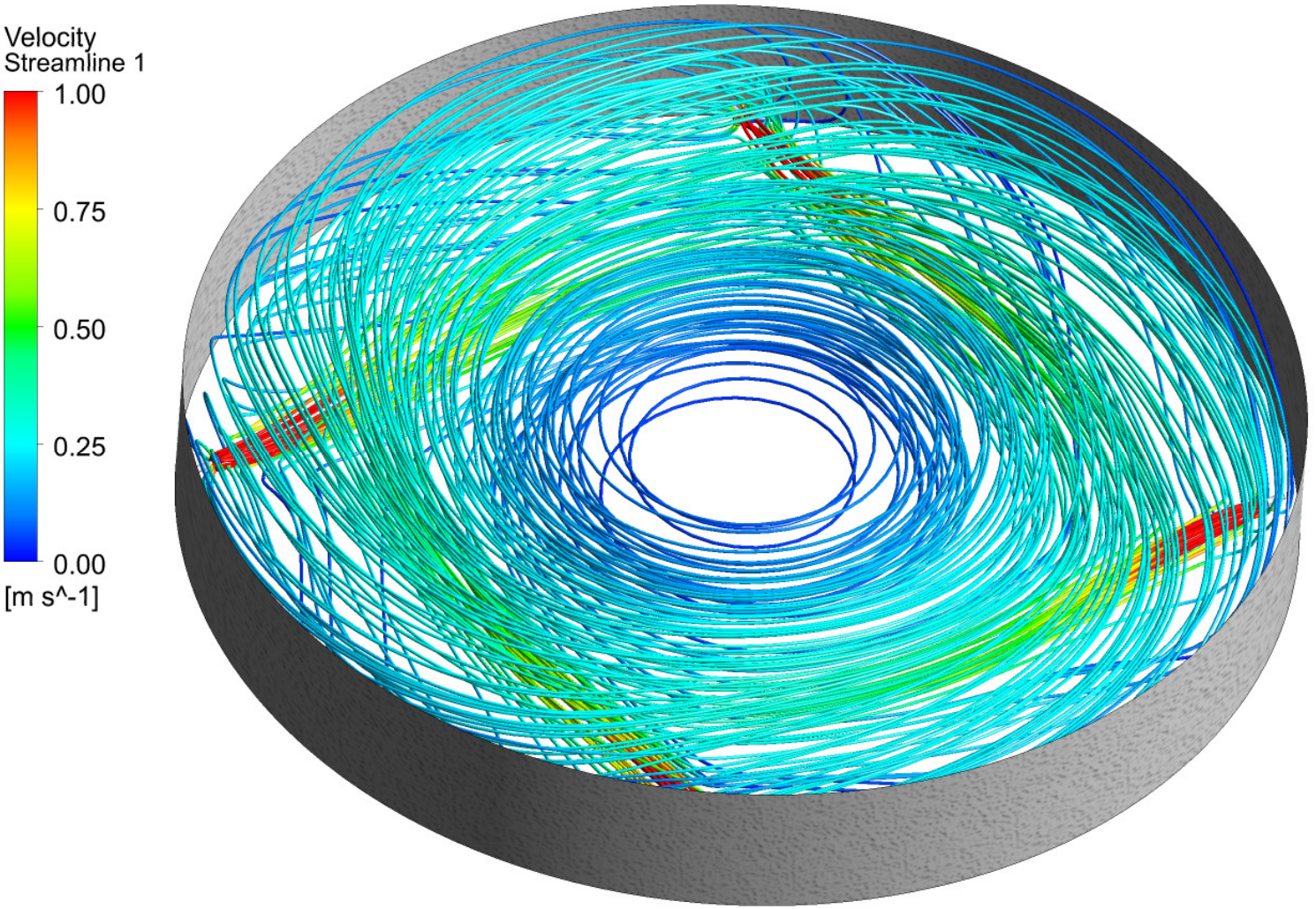
- A CFD Model was used to reinvestigate flow paths of Poland WWTP. The aim of CFD study is to simulate the flow patterns of new positioned mixer and identifying and evaluating the mixing performance of digester tank.



3D Geometry model for flow simulation

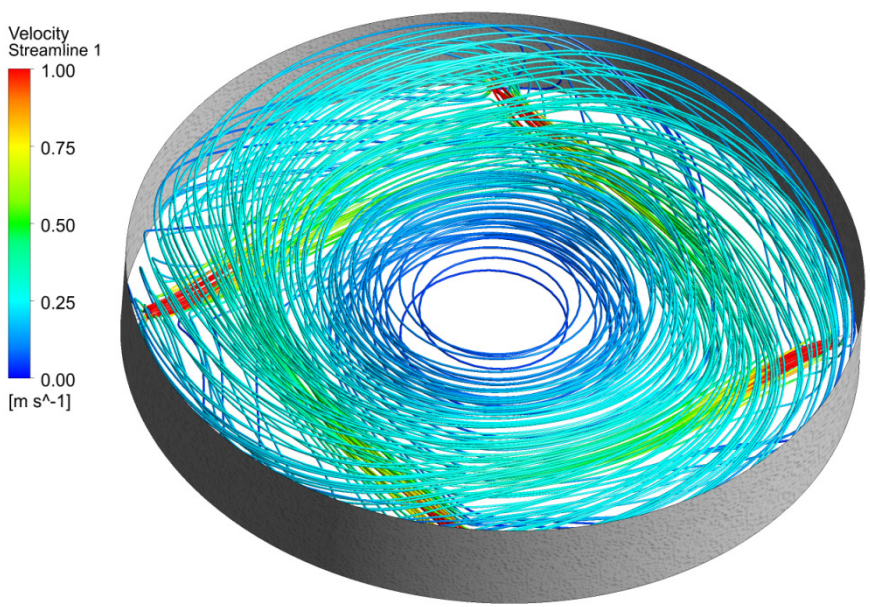
Simulation Scenarios	Total solid (%)	Installed products
A	4.6	4 AMG.110.84XX

Results-Streamline

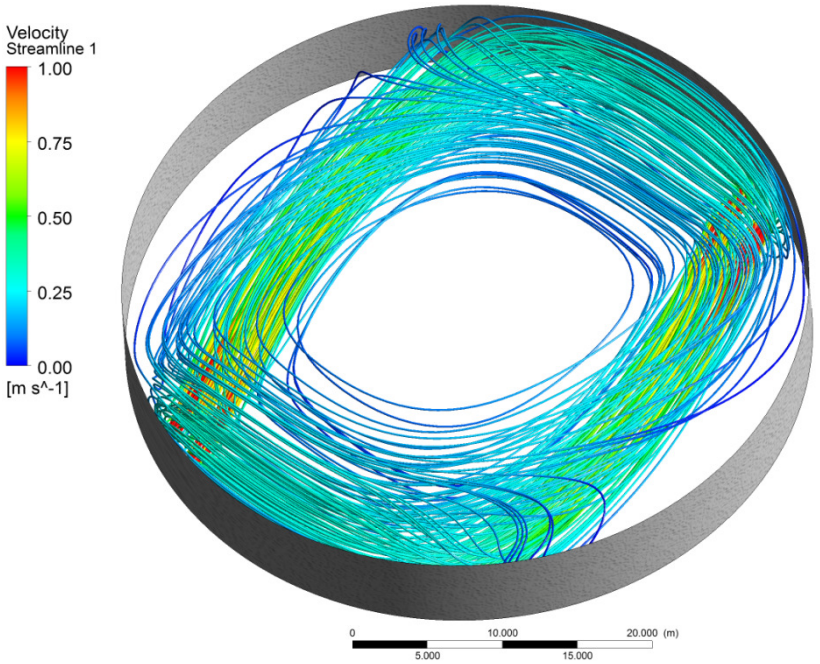


Results-Streamline

Comparison with original design

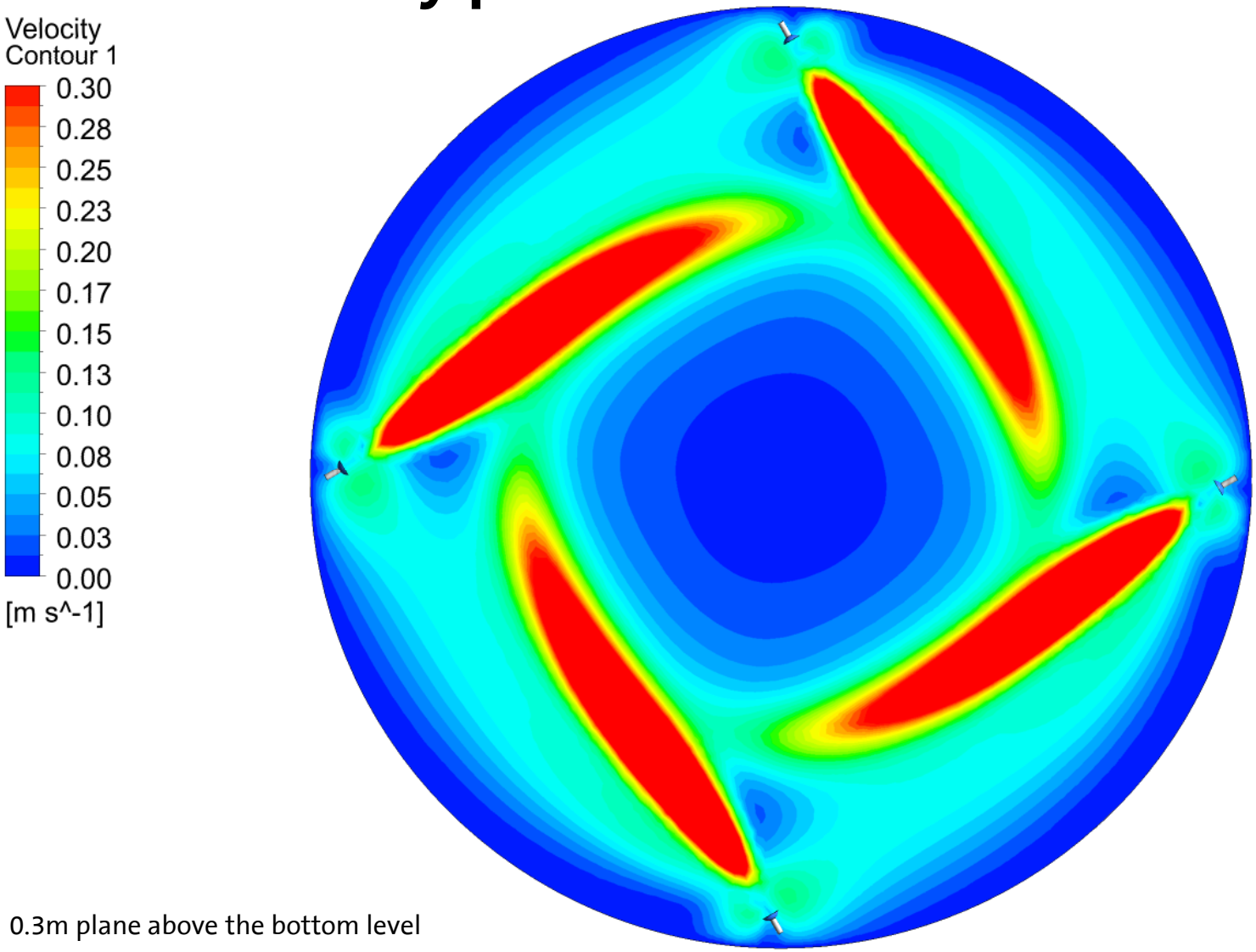


Sim. no.2 result



Sim. no.1 result
(previous analysis)

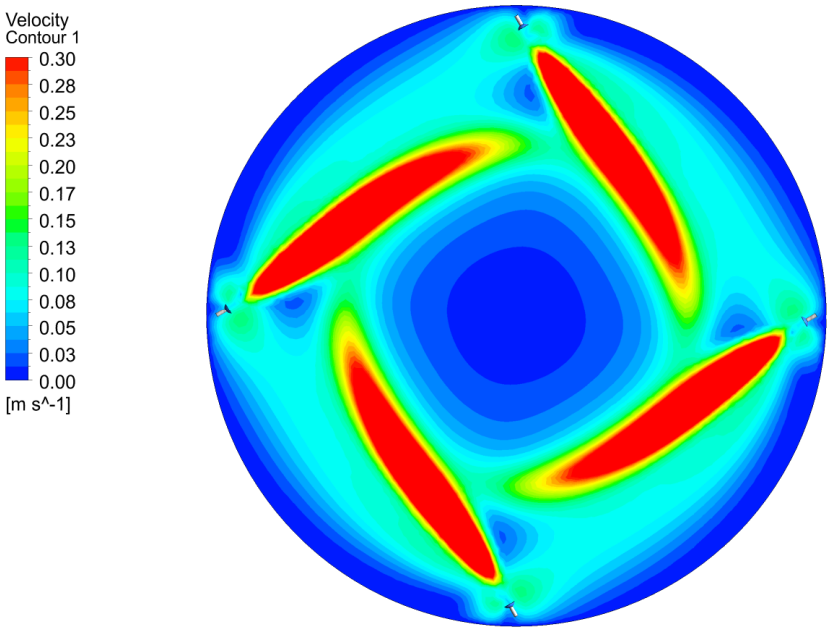
Results-Velocity plots



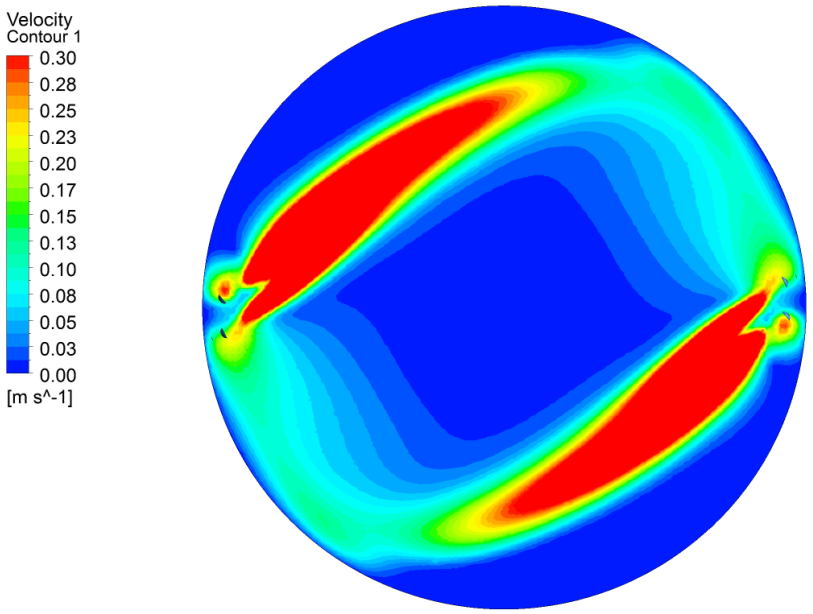
0.3m plane above the bottom level

Results-Velocity plots

Comparison with original design



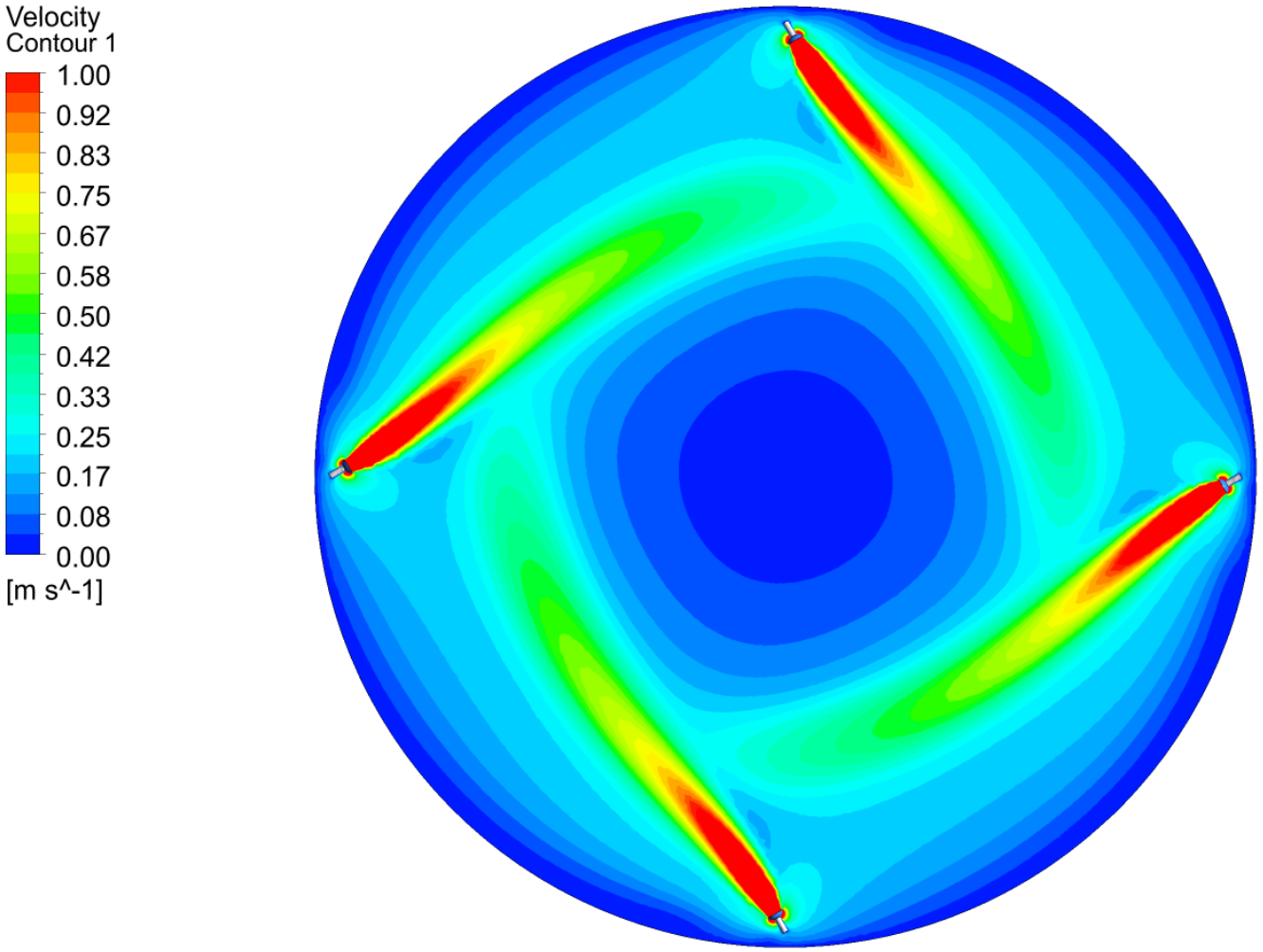
Sim. no.2 result



Sim. no.1 result
(previous analysis)

0.3m plane above the bottom level

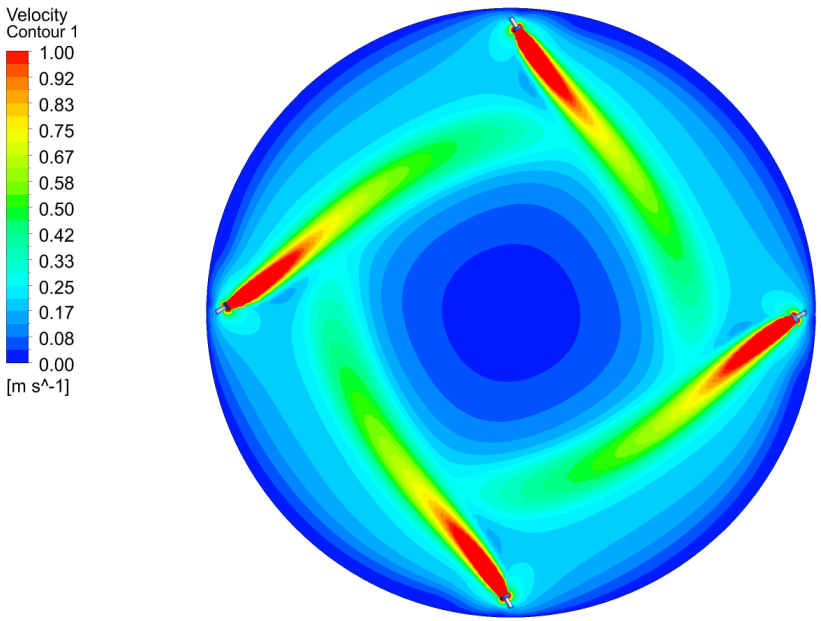
Results-Velocity plots



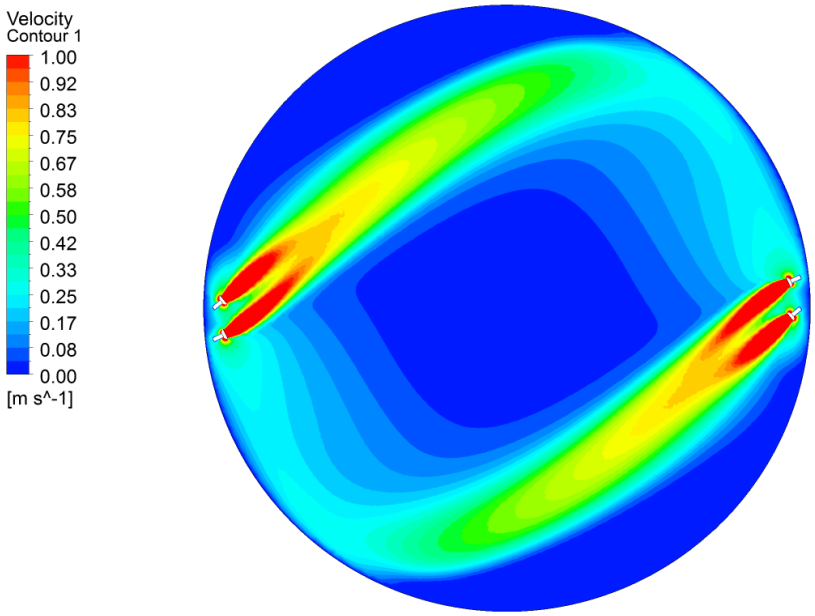
Through the AMG110 axis direction

Results-Velocity plots

Comparison with original design



Sim. no.2 result



Sim. no.1 result
(previous analysis)

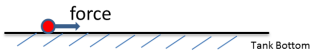
Through the AMG110 axis direction

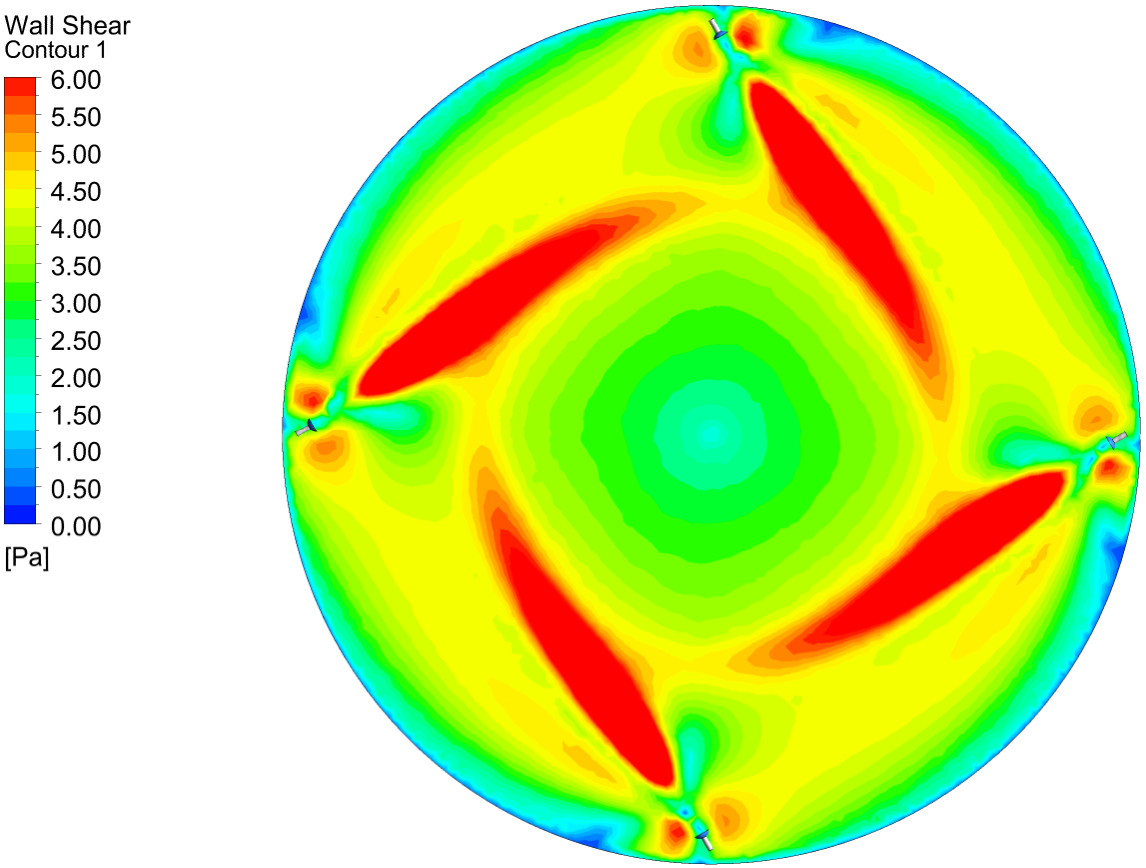
Results-Bottom shear stress

Bottom shear stress τ = force/acting area

Shear stress is the force applied by flowing liquid to its boundary. In this case, the liquid is waste water and the boundary is tank bottom. and it describes the force of water that is trying to drag the tank bottom downstream with it.

Different bottom shear stress depicts how well sediment is re-suspended at different zones of the tank bottom. Sedimentation can occur at the lower shear value zones.





Results-Bottom shear stress

Comparison with original design

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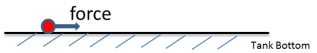
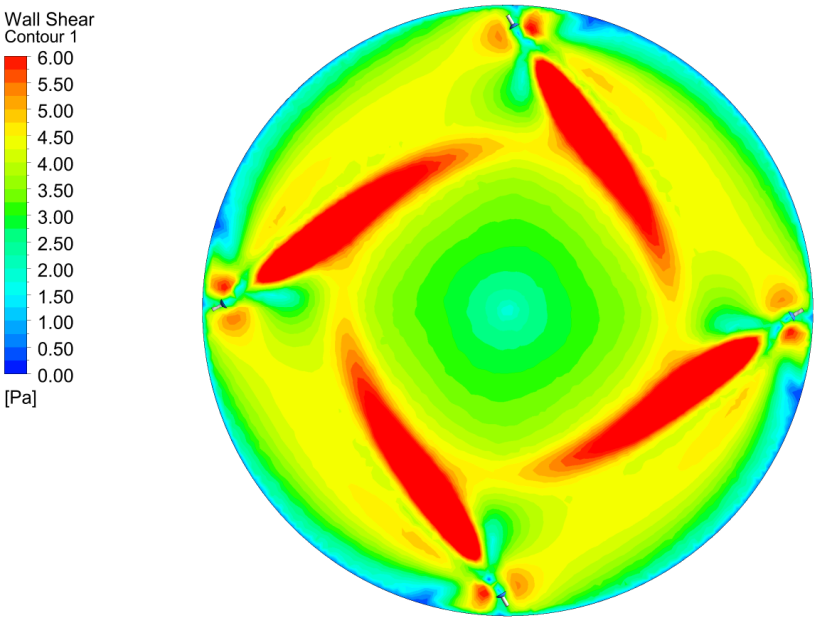
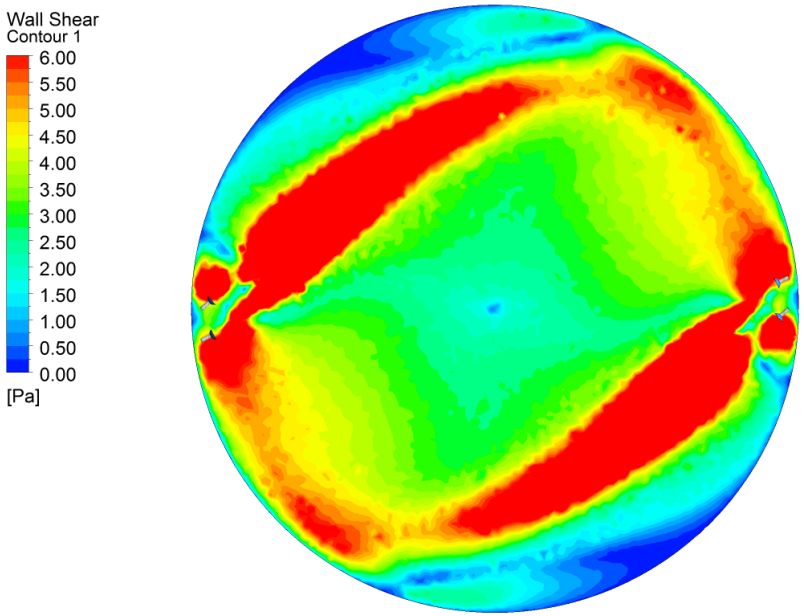




Sim. no.2 result



Sim. no.1 result
(previous analysis)

Results analysis&conclusions

CFD analysis of the digester tank has been investigated to find the optimum positioning of the mixers , taking into consideration that the only possible positioning area is at the periphery area of the tank.

By the CFD results it is clearly illustrated that the distribution and the utilization of the selected input power is possible by positioning the mixers at every quarter of the tank periphery. (Figure in Page 6)

To illustrate the performance we have chosen to visualize the bottom shear stress which is an effective factor to eliminate any possible solid build up.

The bottom shear stress and the average velocity can be increased by increasing input power but the selected mixer size seems sufficient for the required task.

Disclaimer

This test report shows a simulation of fluid flows inside a WWTP tank.

This report is provided on the basis of results and information retrieved from these simulations. All calculations, results and conclusions are based on averages and approximations, and these should be considered estimates only, which should not be relied upon as a demonstration of actual fluid flows inside the tank. The information and results in the report are provided for general information purposes only. Actual situations may vary, and Grundfos does not make any representations or warranties of any kind, expressly or implied, about the completeness, accuracy, reliability, suitability or availability with respect to that actual fluid flows are similar to the results shown in this report. Grundfos cannot guarantee that the calculation or the information is complete, error-free, accurate or fit for a particular purpose. Grundfos cannot be held responsible for any loss (including loss of profit, loss of savings or expected savings), damage or inconvenience caused as a result of any inaccuracy or error in the report, the conclusions, calculations or information.