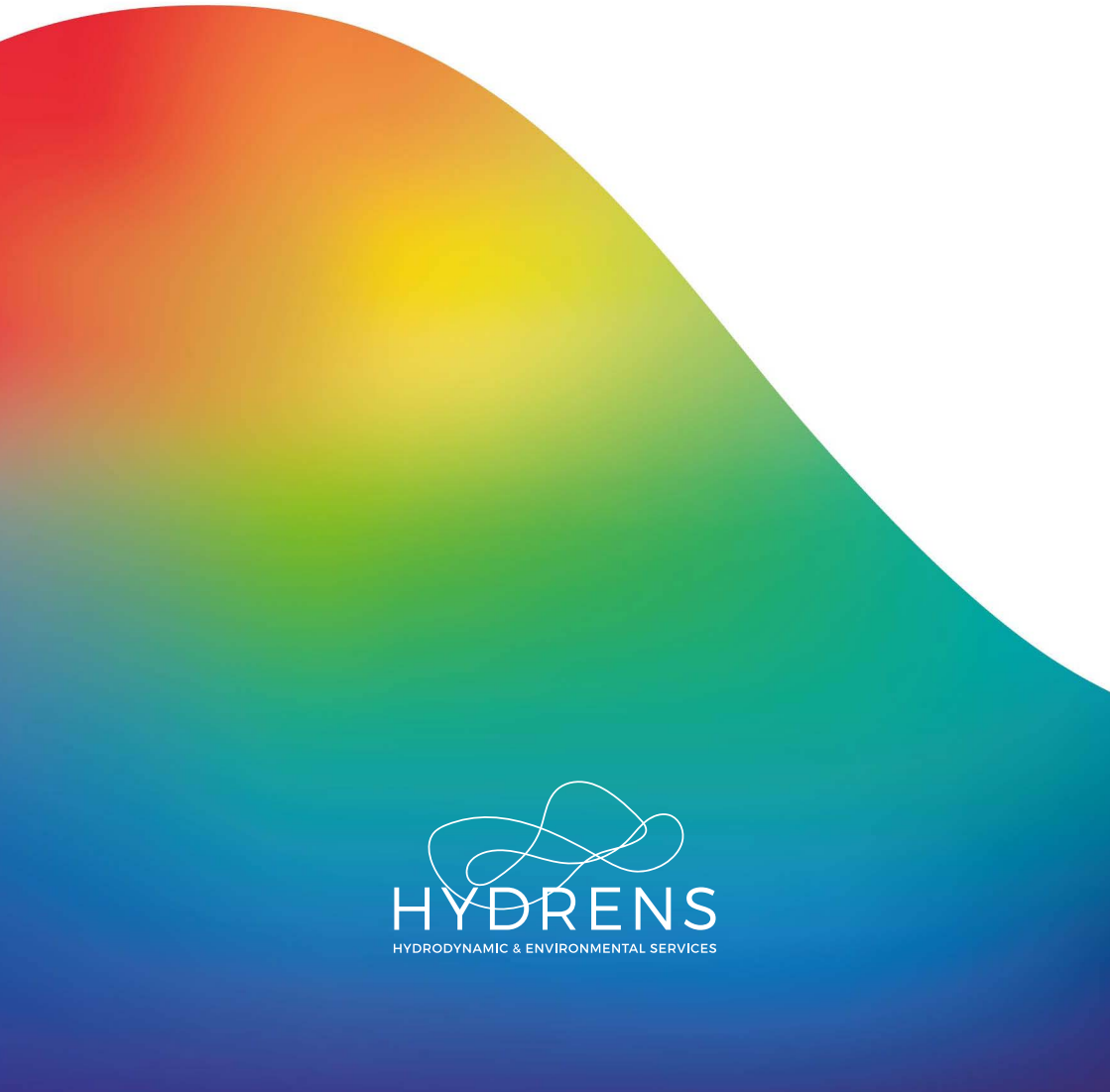
HYDRODYNAMIC AND ENVIRONMENTAL SERVICES



HYDRENS

HYDRODYNAMIC & ENVIRONMENTAL SERVICES

HYDRENS

HYDRODYNAMIC & ENVIRONMENTAL SERVICES

Hydrens aims to offer innovative technological solutions based on the hydrodinamic performance improvement to increase the efficiency of the processes.

Hydrens develops its activity throughout three main lines of work:

Computational Fluid Dynamics (CFD)

Experimental measurements (Instrumentation)

Process modelling (Simulation)

CFD is a tool with amazing flexibility, accuracy and breadth of application. Experimental validation and other simulation tools supports decision making.

Modern fluid mechanical problems would be impossible to solve without the use of CFD which has evolved into a robust and precise technique for design and optimization of the systems.

MISSION

*To offer diagnostic-solution **services in any type of process** from the most advanced simulation and instrumentation tools.*

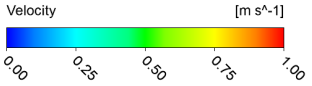
VISION

*To be a technological reference in the **optimization of hydrodynamic systems and processes.***

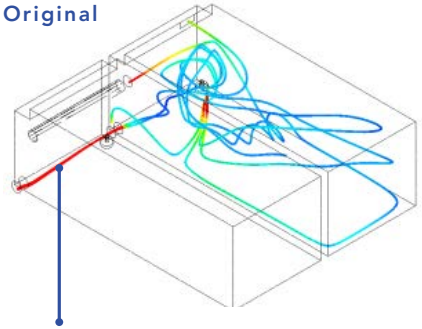
Hydrens collaborates with the Multiphase Flow Group (MFG) of the Universitat Jaume I (UJI), which is expert in CFD modelling with broad experience in the water sector applications.

HYDRODYNAMIC OPTIMIZATION AND REDESIGN OF BIOLOGICAL REACTORS

Diagnosis of the **hydrodynamics performance** of biological reactors, optimization (relocation of internal elements) and retrofitting (process & redesign).

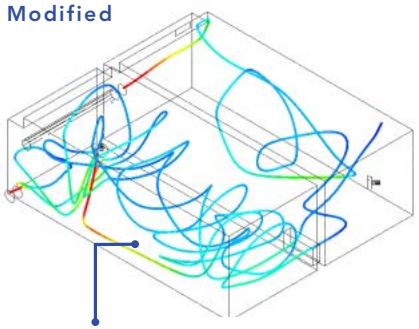


Original



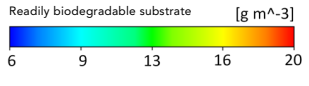
Short-circuiting detected

Modified



Mixing and fluid behaviour improved

Implementation of Biochemical Models | Experimental Validation



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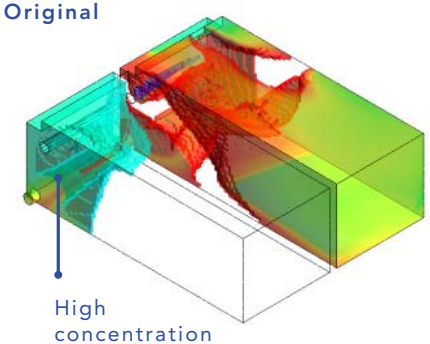
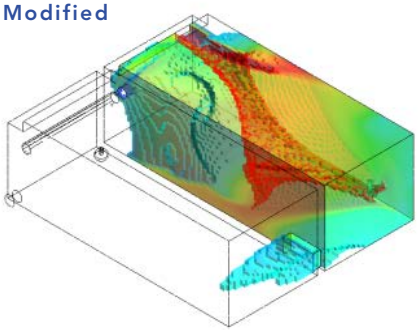


High concentration exiting the tank

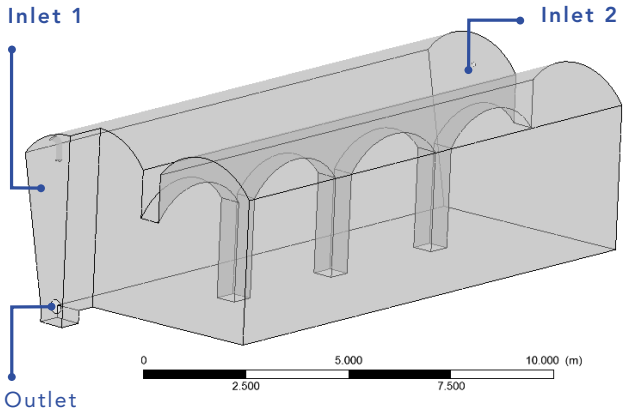
Modified

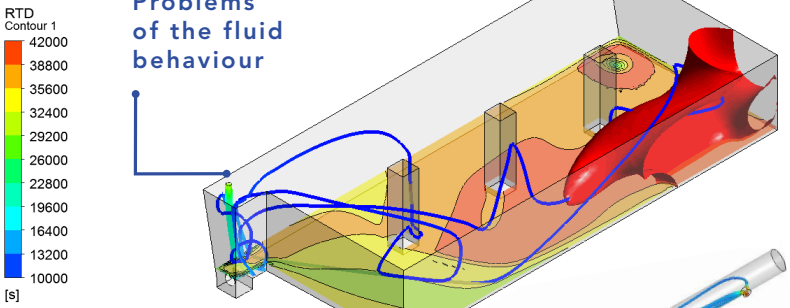


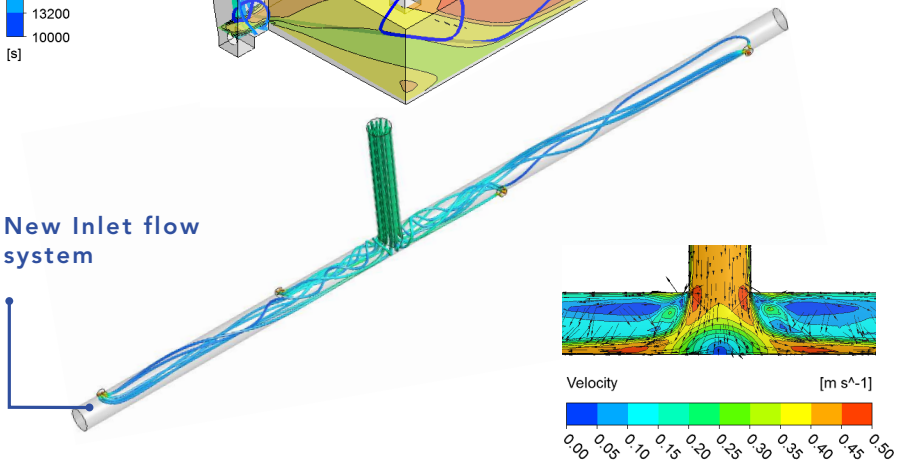
· Mean Residence Time increased by 38%
· Denitrification efficiency improved by 17%

RETROFITTING OF WATER TREATMENT TANKS FOR DRINKING WATER

Mixing improvement inside the tank to **ensure low amount of ions** at the outlet. Improvement of inlet/outlet locations. Reduction of unmixed zones and dead volumes.



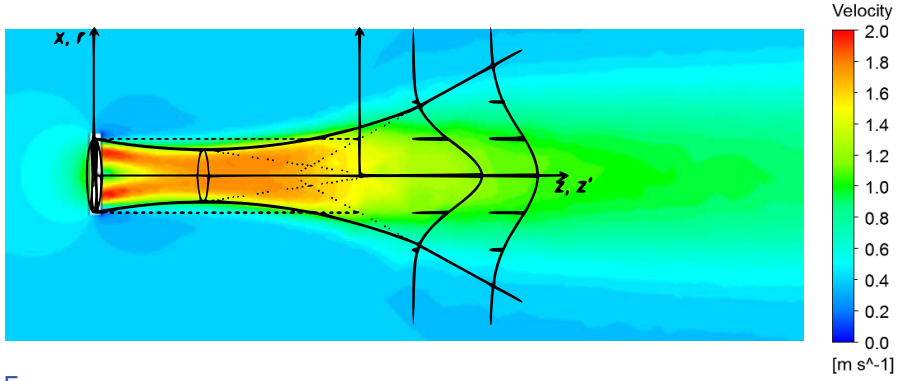




CHARACTERIZATION OF THE PROPELLERS FOR MIXING OPTIMIZATION

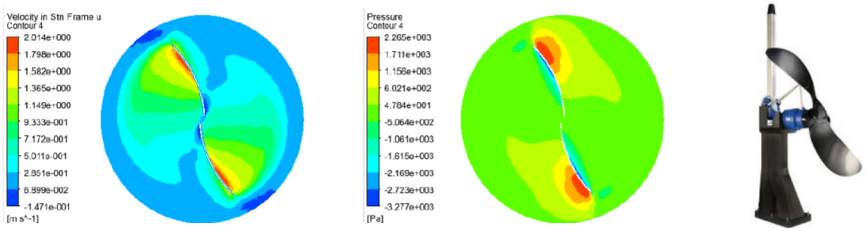
Characterization of the mixers to choose the best option for a specific configuration.

Velocity profile | Mixing | Sedimentation of suspended solids
Energy consumption| Thrust efficiency | Suction / Drag Effect



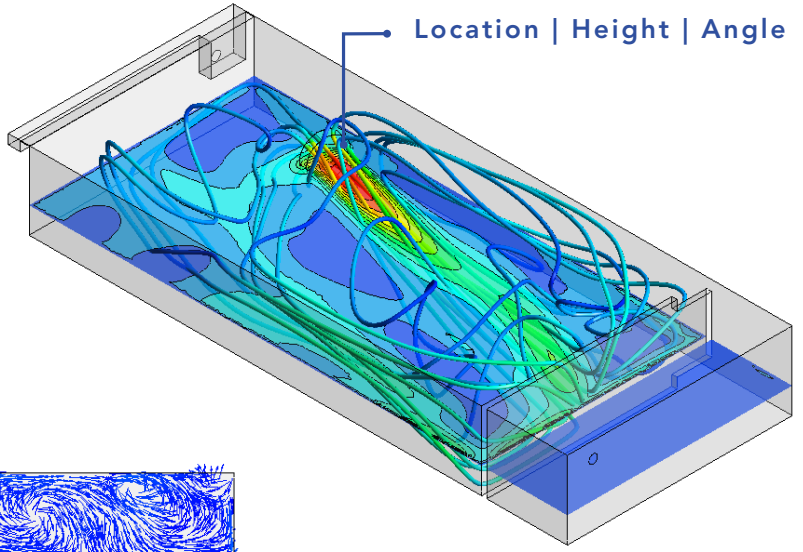
Frequency:

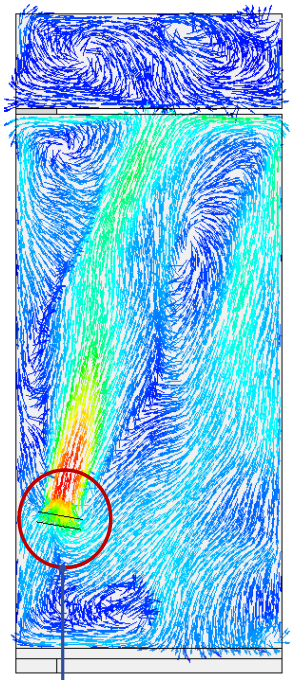
LOW MEDIUM HIGH

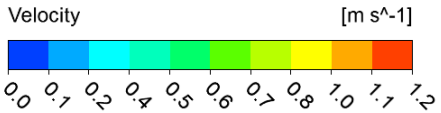


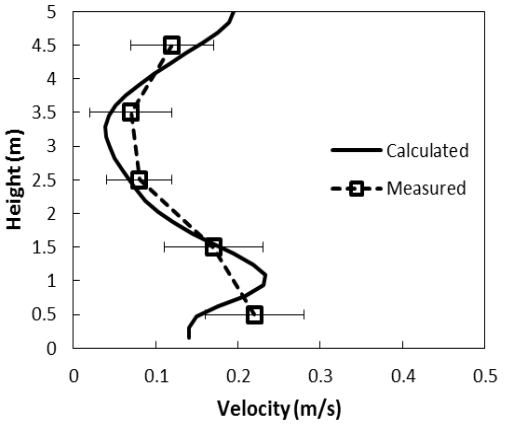
SELECTION AND POSITIONING OF THE PROPELLERS/STIRRERS

Mixing optimization of a bioreactor. Equipment selection and positioning.







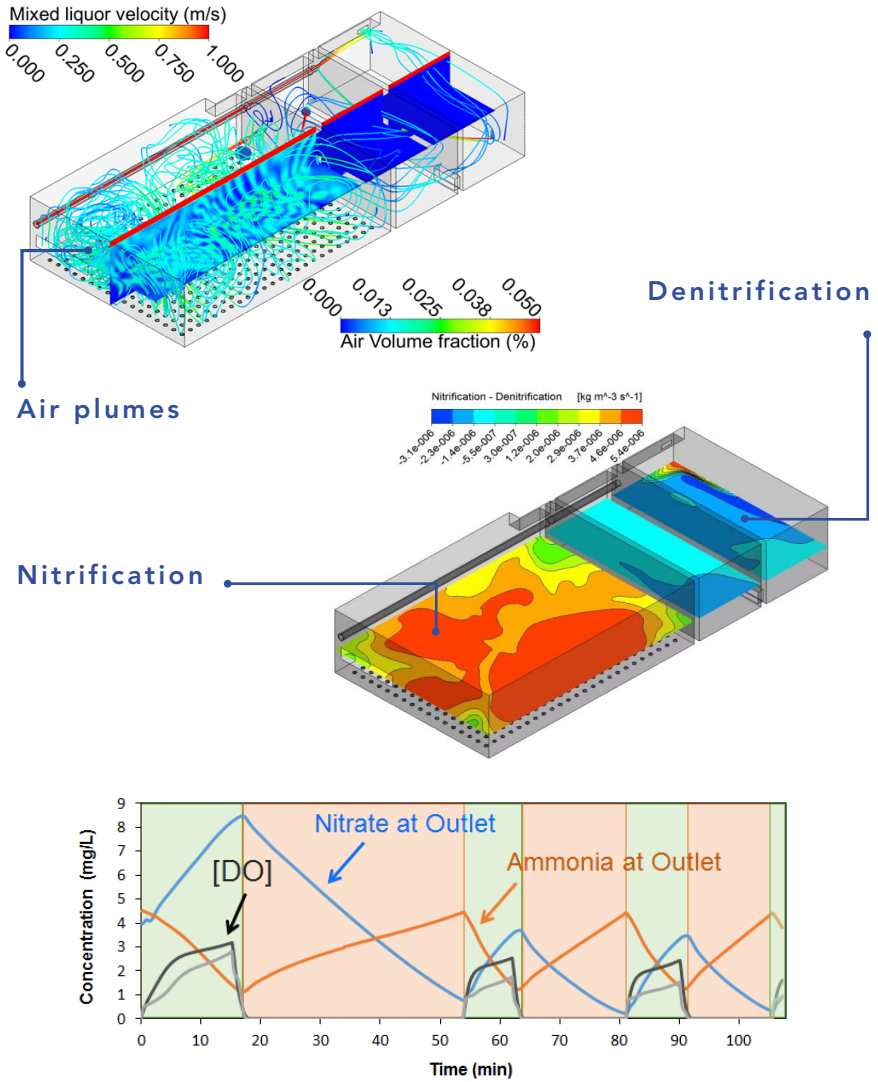


Stirrer positioning

OPTIMIZATION OF AERATION CYCLES IN A BIOREACTOR (TWO-PHASE FLOW)

Simulation of the **aeration process** reproducing the **ON-OFF cycles** of the blowers.

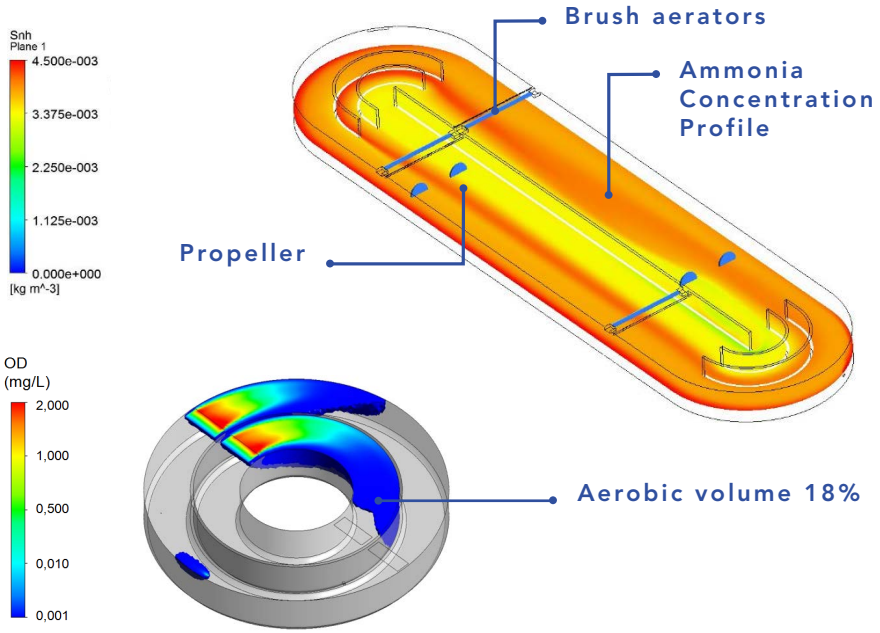
Study of the distribution of **nitrogen compounds** inside the reactor.



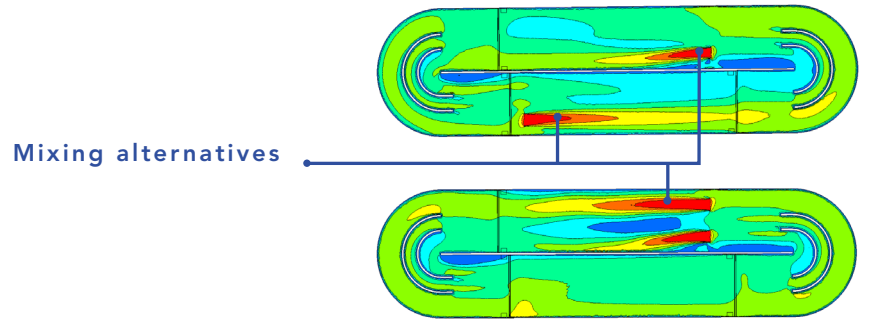
HYDRODYNAMIC AND BIOCHEMICAL MODELLING IN BIOREACTORS

Superficial aeration system configurations.

Oxic-Anoxic zones | Nutrient removal performance



Aeration supply performance | energy optimization



DYNAMIC SIMULATION OF CIRCULAR CLARIFIERS

Performance of a full-scale clarifiers through dynamic simulation.

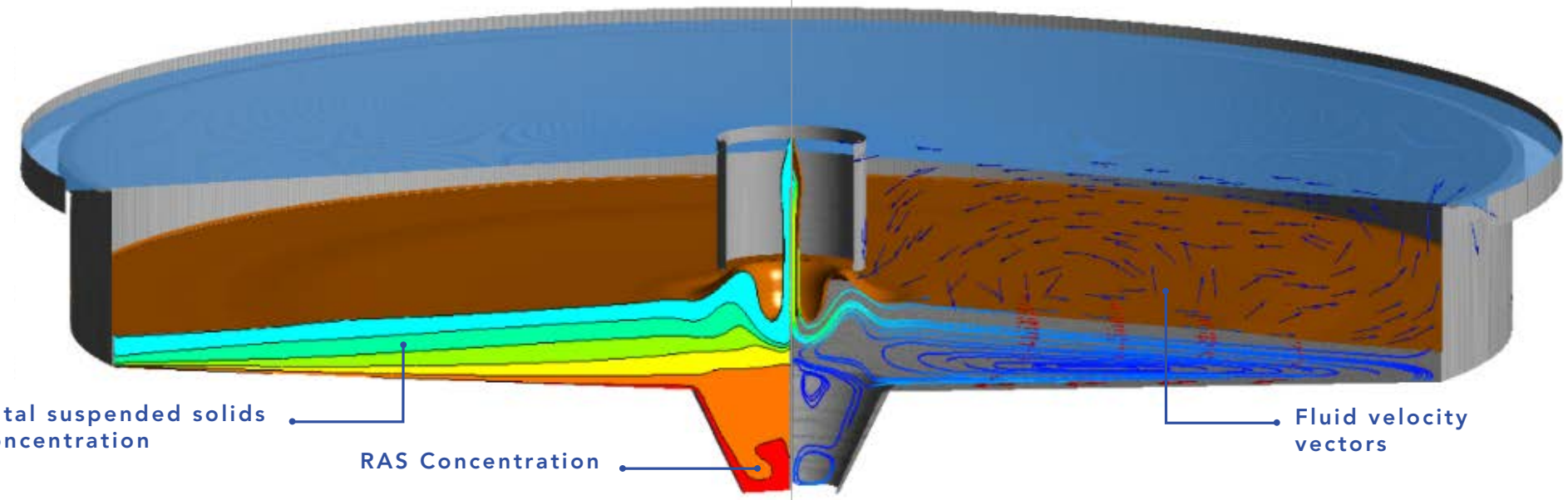
Settling velocity | Experimental Validation | On-line measurements

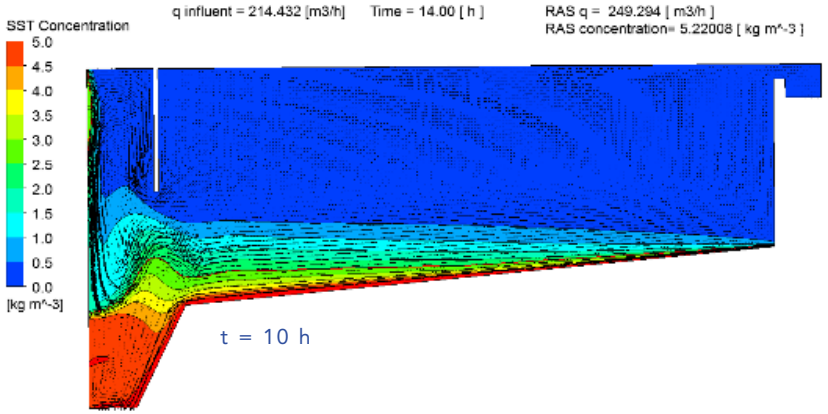
RAS concentration and SST gradient inside the sludge blanket in transient state.

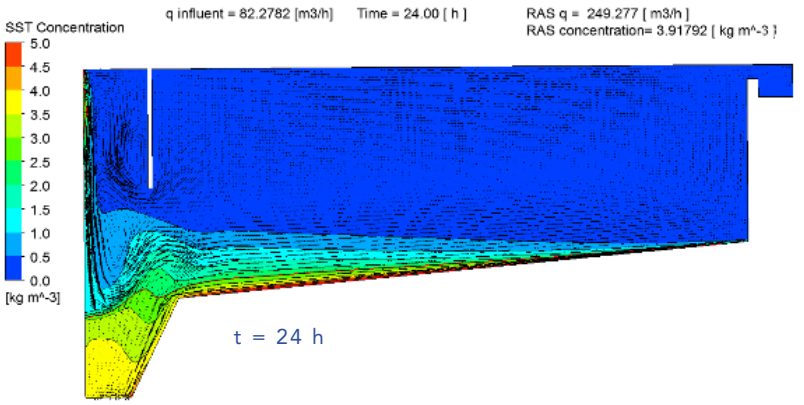
q influent = 265.226 [m^3/h]

time = 12.6333 [h]

X ras = 7.16793 [kg m^-3]

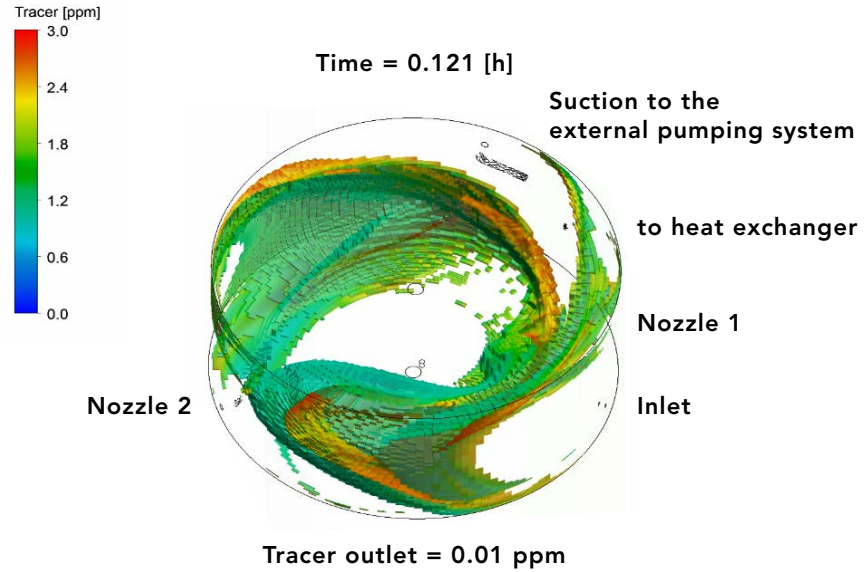




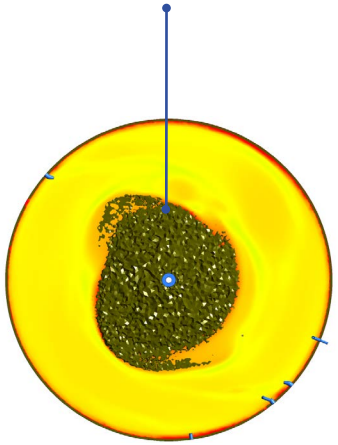


MIXING IN ANAEROBIC DIGESTION TANKS

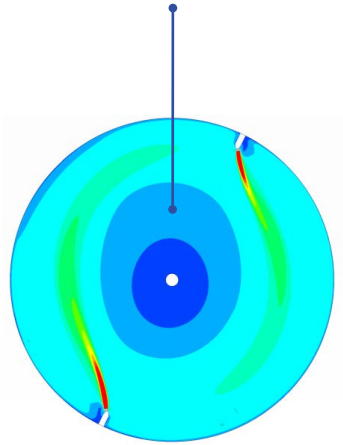
Optimization of **Mixing performance** of **full-scale** anaerobic digester tanks. Determination of **dead volumes** and **low mixed regions.**



Dead Volume Validated

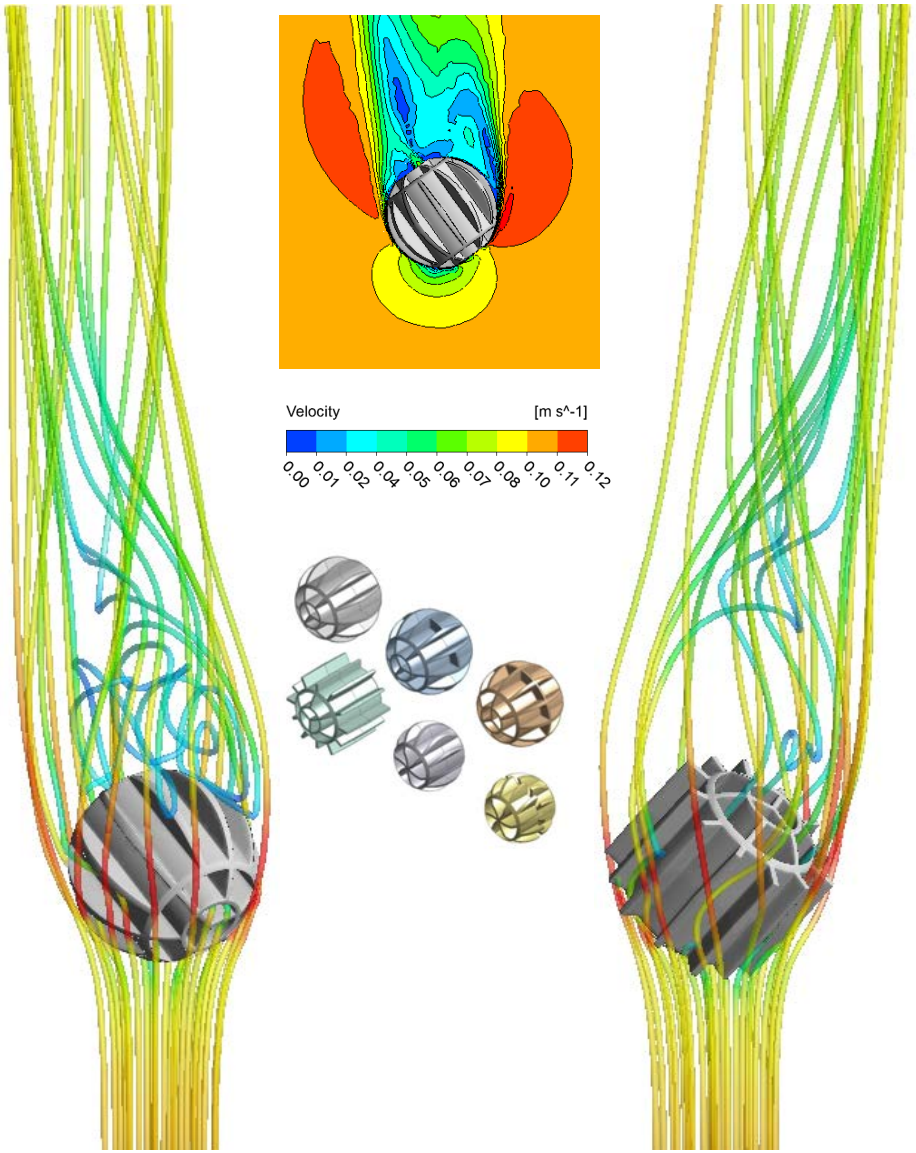


Sludge Velocity Distribution



BIOCARRIERS ANALYSIS AND OPTIMIZATION

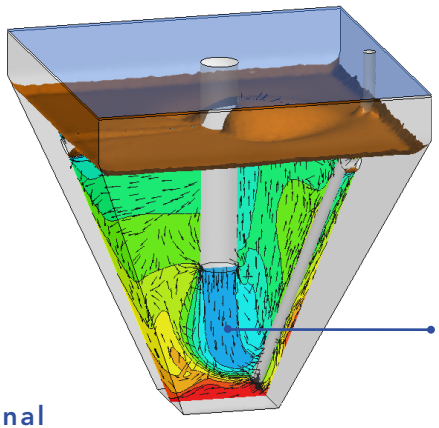
Hydrodynamic analysis of **biocarriers** to obtain the best hydrodynamic performance inside the mixing tanks.



INTERNAL ELEMENTS REDESIGN OF A HOPPER SETTLING TANK

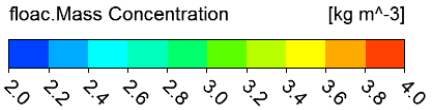
Retrofit of a tank to improve the sludge settling operation.

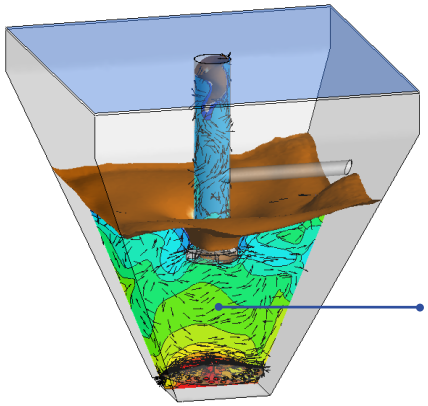
Diagnosis of alternatives | Dynamic performance | Ad-hoc solution



High turbulence

Original



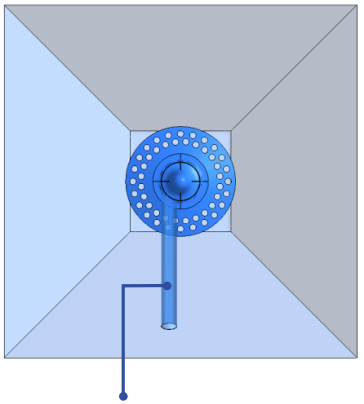


Low turbulence

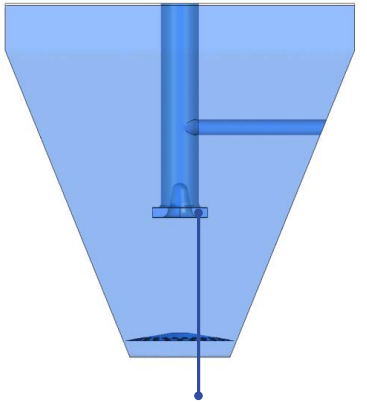
Modified

The incorporation of CFD techniques in the water sector involves a substantial improvement since they allow the detailed study of the processes to increase the knowledge of the operation, design, retrofitting and optimization of process units.

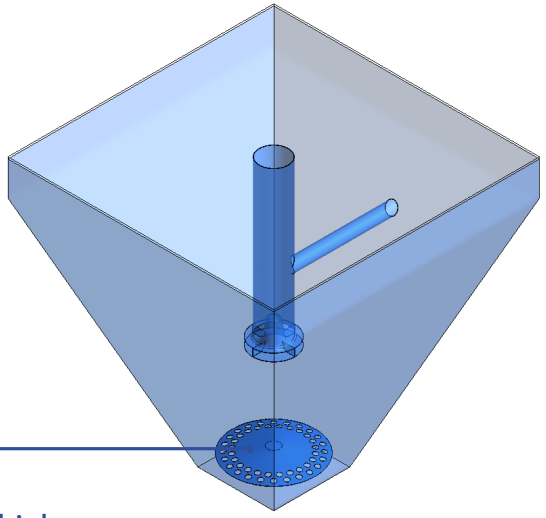
Energy dissipation



Tangencial influent flow



Dispersion feedwell

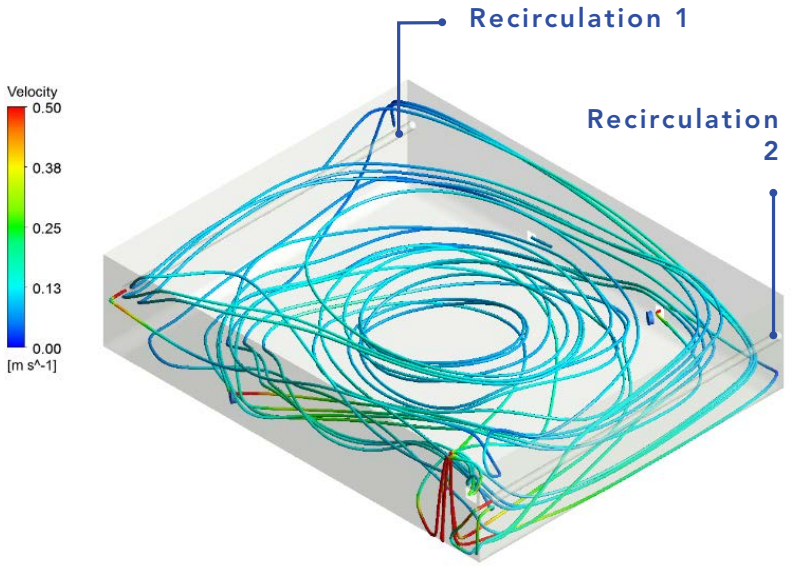


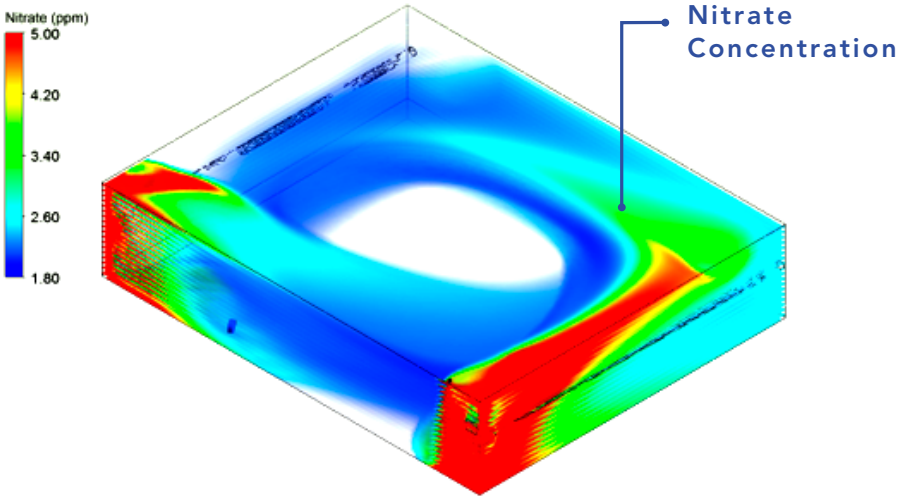
Thickener baffle

DETERMINATION OF REAGENT DOSAGE

Optimization of the organic matter dosage in an anoxic tank.

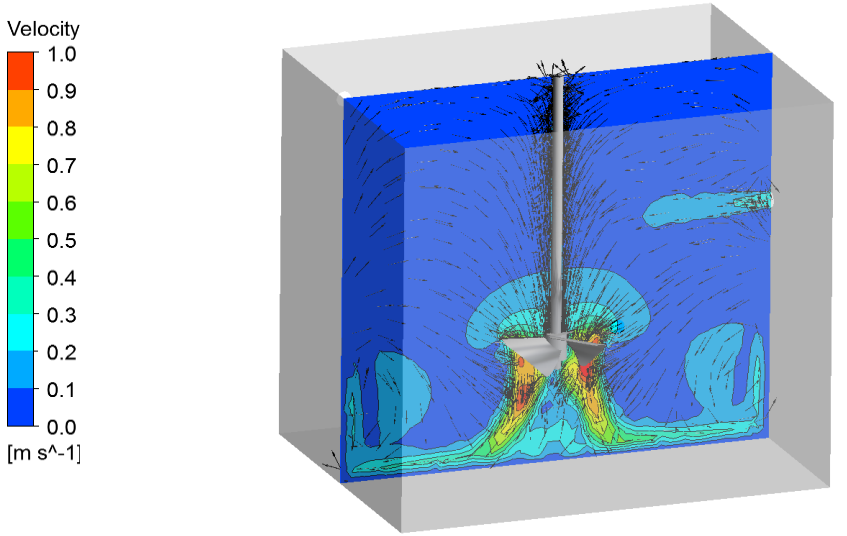
Hydrodynamic performance | RTD | mixing efficiency | Reagent Dosage Optimization | Internal recirculation rates setting



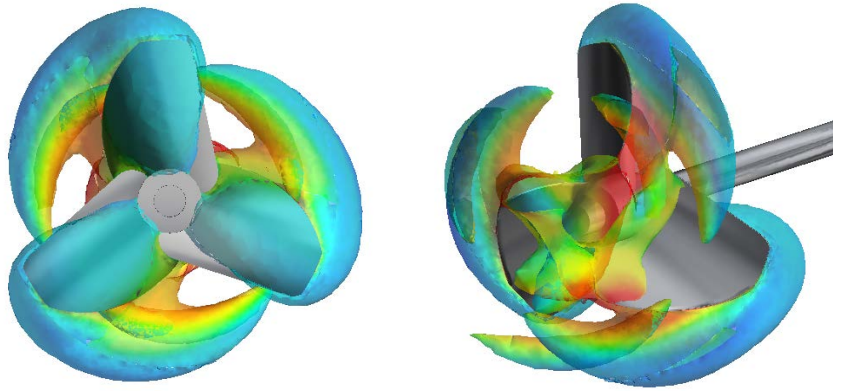


DESIGN OF INDUSTRIAL AGITATORS

Agitators improvement design to achieve **a more efficient mixing** and a **better quality product.**



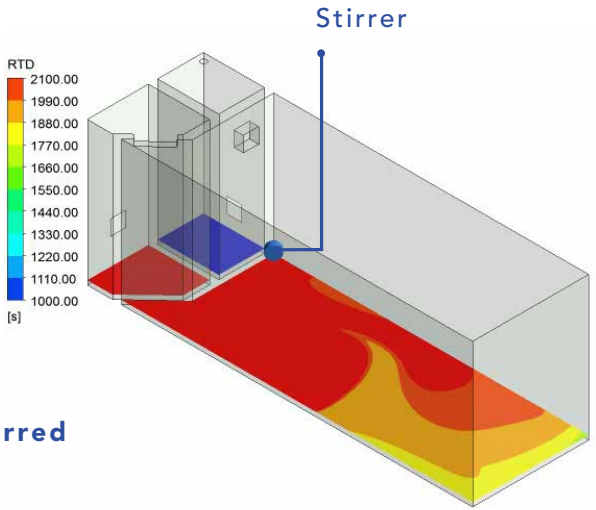
Coagulation - Floculation process | High - Low Mixing Intensity



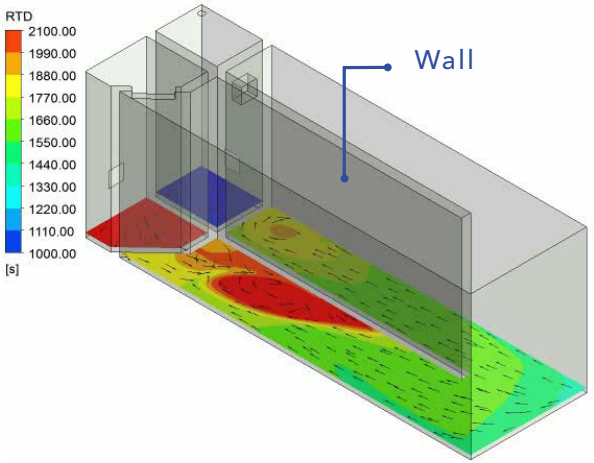
DESIGN OF NEW REACTORS

Design a new constructed bioreactor according to the hydrodynamic configuration.

Hydrodynamic configuration:
Plug - Flow vs CSTR | Biokinetic performance | Energy consumption



Continuous stirred tank reactor configuration



Plug - flow configuration

HYDRENS
HYDRODYNAMIC & ENVIRONMENTAL SERVICES

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