Mazzei Computational Fluid Dynamics

World Leader in Mixing and Contacting Technologies

CFD...
Design Optimization for New and Retrofitted Water & Wastewater Systems

WHY CFD?

Predicting the mass transfer and mixing performance of gas-liquid systems is fraught with complexity. Traditional modeling approaches depend on broad assumptions and simplifications which may misrepresent actual flow conditions—this is especially crucial for multiphase flows in retrofit applications in the water/wastewater industry.
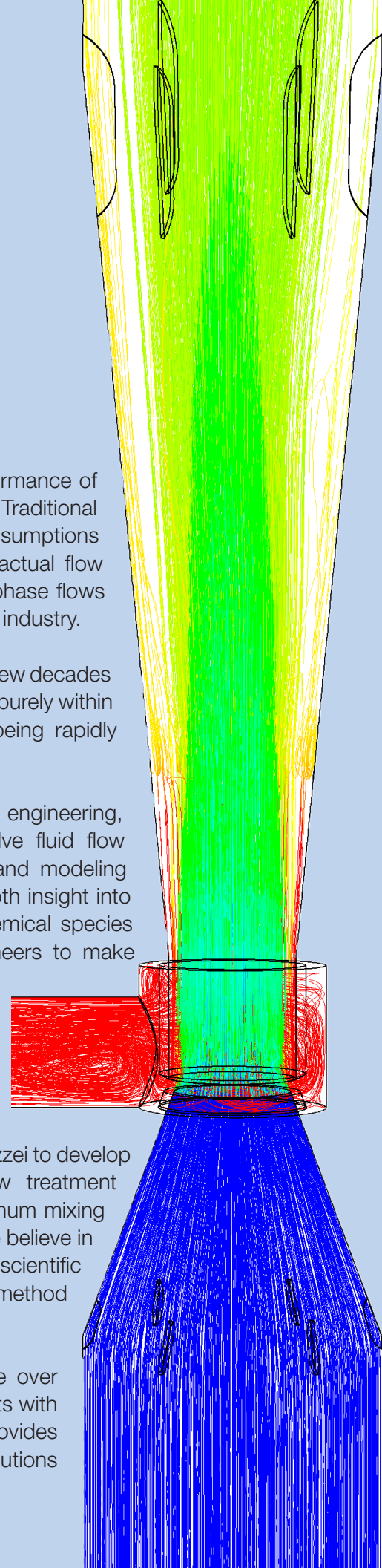
Flow modeling has taken giant leaps in the last few decades and computational fluid dynamics (CFD), once purely within the reach of aerospace engineers, is now being rapidly adopted in water and wastewater engineering.

CFD combines computational methods with engineering, physics, chemistry, and mathematics to solve fluid flow challenges. A CFD approach to examining and modeling multiphase hydrodynamics provides an in-depth insight into flow patterns, mixing, mass transfer and chemical species transport, which in turn allows design engineers to make informed decisions and offer innovative solutions to lower cost and improve performance.

THE MAZZEI ADVANTAGE

Computational fluid dynamics has enabled Mazzei to develop a thorough scientific understanding of how treatment systems operate, in order to provide the optimum mixing and mass transfer performance. At Mazzei, we believe in embracing new technologies. Today we use a scientific approach instead of a traditional 'black-box' method of design and analysis.

The combination of our extensive experience over three decades in the water/wastewater markets with the use of new technologies such as CFD, provides Mazzei the edge in designing and supplying solutions to meet your unique system needs.

MAZZEI CFD

A critical component of Mazzei's water/wastewater treatment expertise is its in-house computational fluid dynamics team with over a decade of industry and academic experience. Mazzei utilizes state-of-the-art CFD simulation software and hardware for a comprehensive modeling process including geometry generation, meshing, simulation and flow visualization. Mazzei uses advanced meshing methods, as well as problem-specific turbulence models, numerical algorithms and subroutines. Baseline models are validated with experimental data from both academic publications and actual field measurements.

CFD projects at Mazzei range from short-term studies aimed at identifying and mitigating flow and mixing anomalies to long-term studies for design optimization of each component of the treatment train. This expertise allows Mazzei to provide custom designs that adapt to existing constraints within plants that are examining alternatives to retrofit their water/wastewater treatment systems.

BENEFITS OF MAZZEI CFD

▶ Designing for realistic flows is crucial to performance prediction in retrofitted mixing systems, in particular, for optimal placement and configuration of nozzles

▶ Rapid prototyping for new component design and overall system optimization

▶ Modeling transport and transfer of gas in gas-liquid systems to determine uniformity of mixing for:
- Predicting stratification
- Predicting coefficient of variance (CoV)
- Identifying appropriate location of measurement probes

▶ Identifying and mitigating flow and mixing anomalies

▶ Calculating multiphase pressure losses in piping systems for unique applications as a function of bubble diameter, gas density and gas to liquid ratios

Channel mixing
with Mazzei
nozzles
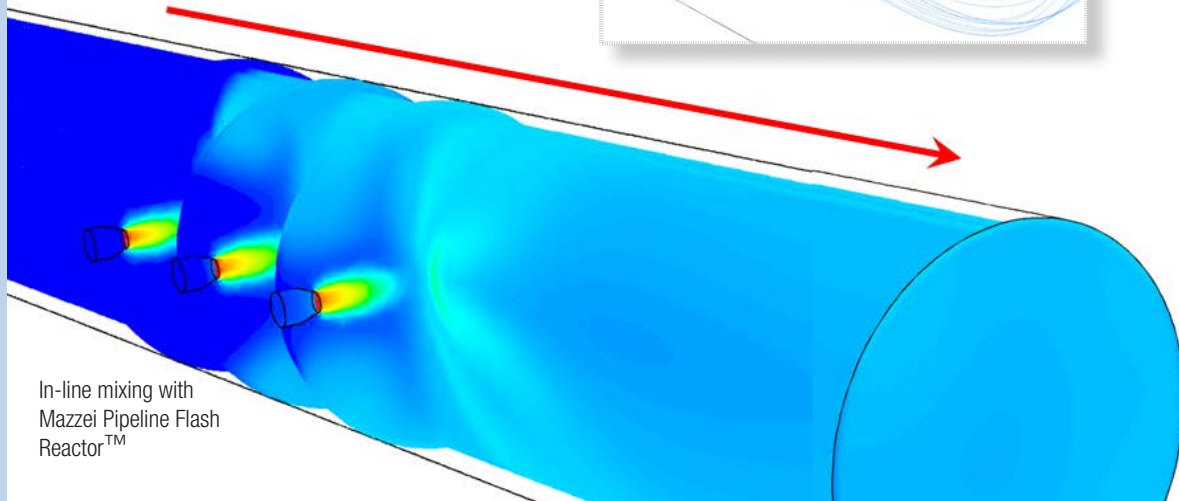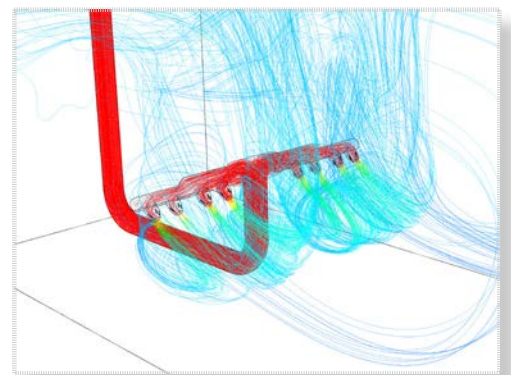
In-line mixing with
Mazzei Pipeline Flash
Reactor™