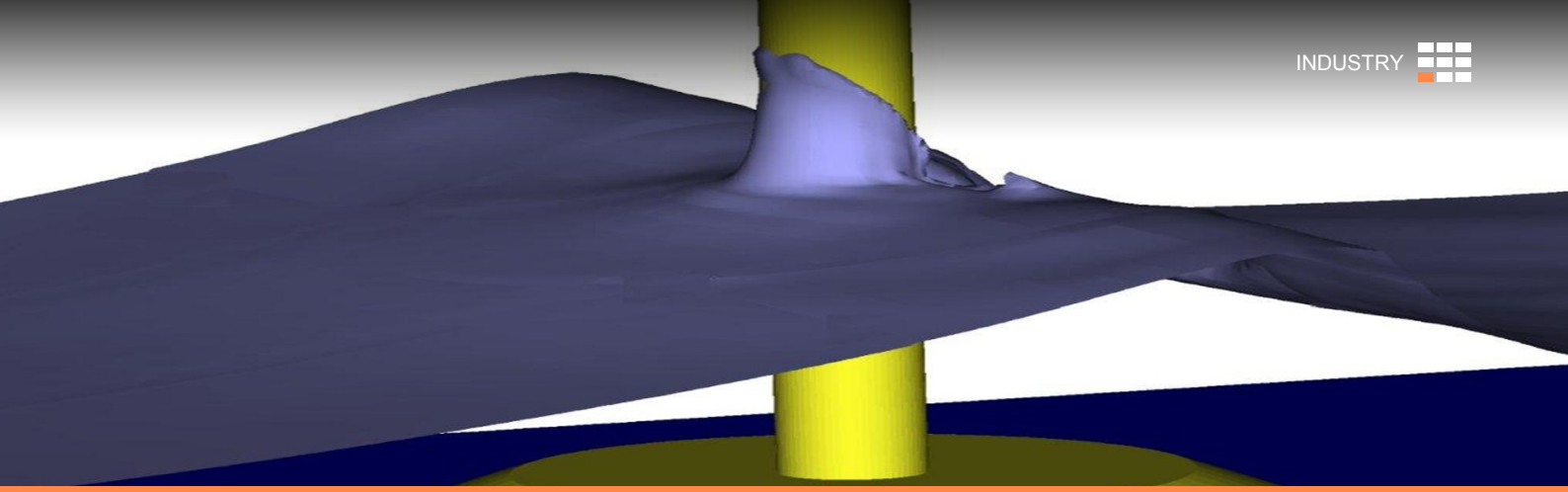


DHI SOLUTION

COMPUTATIONAL FLUID DYNAMICS

An effective tool for engineering design and analysis of fluid design

MEETING THE GROWING NEED FOR CFD MODELLING

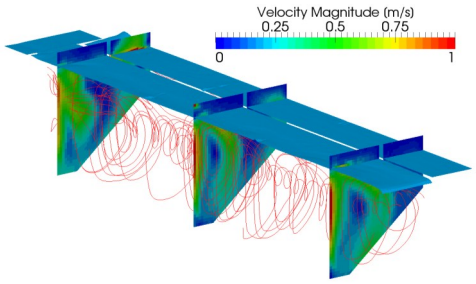
The capability of understanding and investigating the motions of liquids and gases in detail is of great importance in a wide range of engineering disciplines and applications. Computational Fluid Dynamics (CFD) has become a powerful method to fulfill such demands and is now widely being used to investigate the behavior of liquids, gases and floating objects. They can be computed in 3D, irrespective of their different sizes, combinations, or even their environments — man made or natural.

DHI HAS THE SOLUTION

With more than 30 years of experience in detailed 3D flow modelling, DHI offers not just state of the art services. Our solutions are drawn from our global pool of knowledge and capture the value of our highly qualified staff's expertise. We work in close dialogue with our clients and tailor-make our solutions to always meet their specific needs.

OUR CFD PROJECTS: FROM DESALINATION TO TSUNAMIS

- Biomimetic membranes for desalination
- Simulation of mixing processes
- Integration of biological process models
- Acoustic flow-meters
- Sediments in waves and currents
- Design loads
- Tidal turbines
- Ship traffic effects on nature/man-made structures
- Dam breaks and tsunamis



Simulations of streamline in an aerated grease and sand trap

OUR EXAMPLES SPEAK FOR US

Our projects showcase the wide scope of area, we have successfully dealt within CFD modelling:

SUMMARY

CLIENT

Any corporate body dealing with liquids and gases, such as

- Oil and gas industry
- Water and energy suppliers
- Wastewater and desalination plant operators
- Environmental and port authorities
- Mining companies
- Aquaculture industry

CHALLENGE

In depth hydrodynamic knowledge is often required to optimise hydraulic solutions

SOLUTION

Assessment of designs based on detailed calculations of flow velocities, pressures, temperatures and concentrations improves performance of new constructions and leads to efficent solutions

VALUE

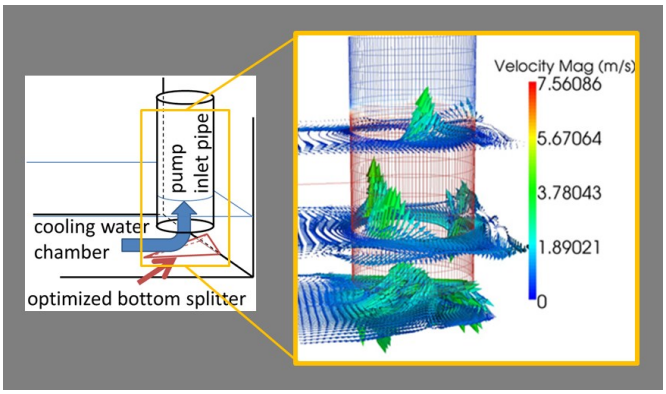
- Reduces costs—optimised designs save resources and energy
- Saves time—prior modelling eliminates on-site trial and error
- Detailed insight—CFD analysis leads to understanding of bio-physico-chemical flows

WASTEWATER TREATMENT PLANT-GREASE TRAP

DHI provides simulations of biological/chemical processes by integrating them in CFD modelling, thus ensuring, optimised treatment plants and tanks. These detailed analyses also help reduce energy consumption and save resources.

POWER PLANT INTAKE

The design of intake structure is a typical CFD application as transportation of cooling water is essential in power plants. In the figure below, the bottom shape below the pipe (arrow), transporting water to a heated generator has been optimised. This minimises vortices and the consequent mixing of air-water, thereby reducing energy consumption by the pump and increasing the efficiency of the power plant.

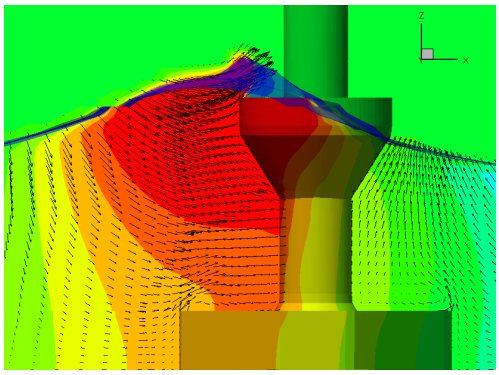


Velocities around a power plant intake pump

NEXT GENERATION WIND TURBINE

Offshore wind turbines help to meet the increasing demand for renewable energy. At DHI, we calculate forces caused by currents and waves acting on the foundation of the wind turbines. Through our phased approach, the wave climate of the entire area around the wind turbine can be calculated using MIKE by DHI software, while the forces can be determined using CFD techniques.

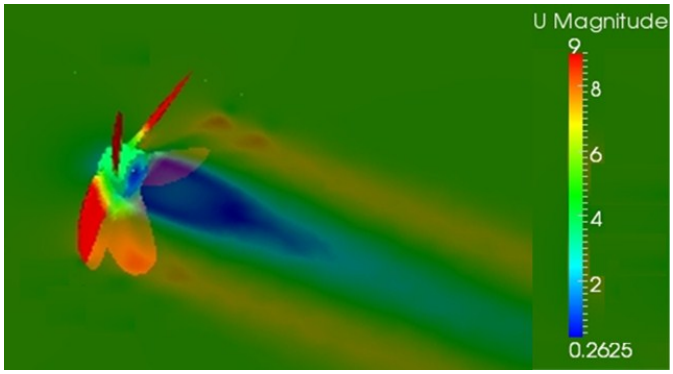
We can also simulate breaking waves that usually cause significant slamming impact on the pile as well as assess the scouring at turbine foundations.



Wind turbine gravity based foundation

PROPELLER WASH

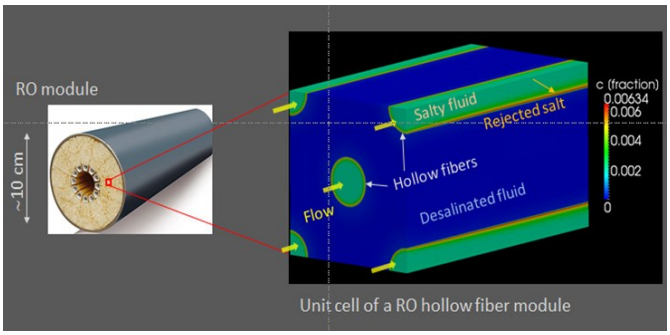
To meet the growing demand of the global maritime industry, larger ships are being opted for. Higher manoeuvrability and navigational speed are attained with their increased engine capacity and stronger side thrusters, but at the cost of sediment remobilisation. This not only erodes the seabed but also damages port structures along breakwaters and in navigation channels globally. DHI helps investigate sediment transport induced by ship propellers to optimise maintenance of navigational channels such as dredging processes.



Propeller wash wake velocity

REVERSE OSMOSIS DESALINATION

Reclamation of fresh water from sea by reverse osmosis (RO) is one of the key technologies of the 21st century. We use CFD to optimize geometry of RO modules to increase their overall performance and energy savings, e.g., by finding optimal distance between hollow fibers or determining fibers' optimal lengths and diameters. Furthermore, we use CFD simulations to gain insight into detailed flow and concentration fields, in particular concentration polarization extent and its induced limiting flux.



A 3D simulation of RO hollow fiber module of conventional design - unit cell - is shown in the figure above

Contact: GMAC - marketing@dhigroup.com
For more information visit: www.dhigroup.com