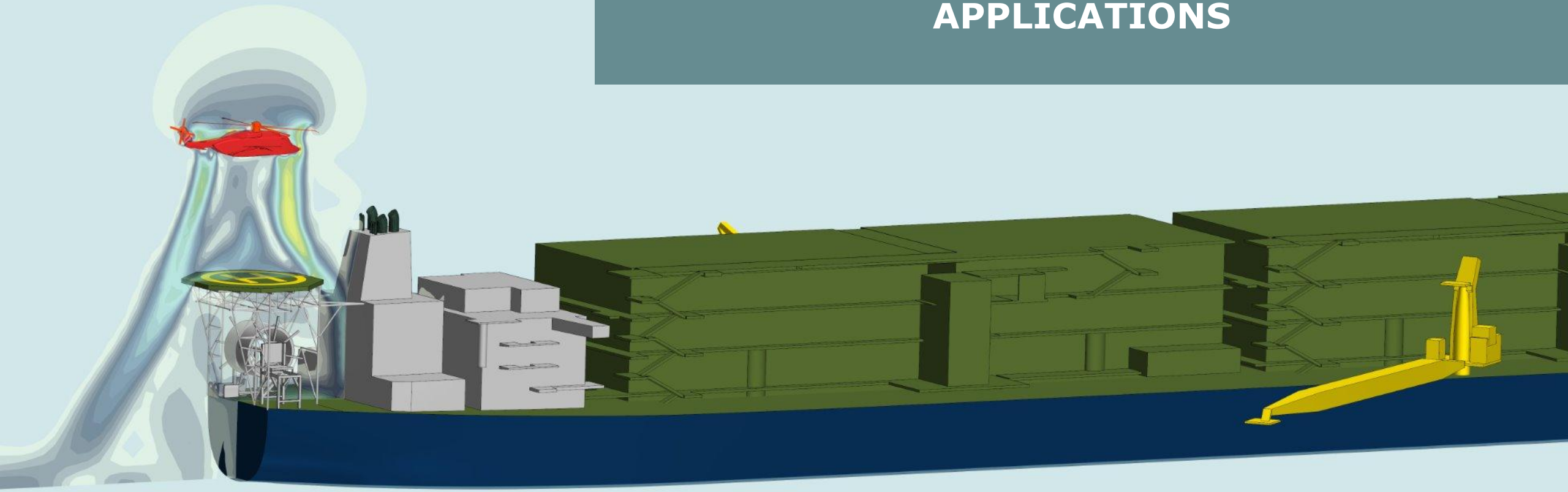
VICUSdt

grupo emenasa

CFD AERODYNAMIC SIMULATION FOR NAVAL APPLICATIONS



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2) AERODYNAMIC RESISTANCE
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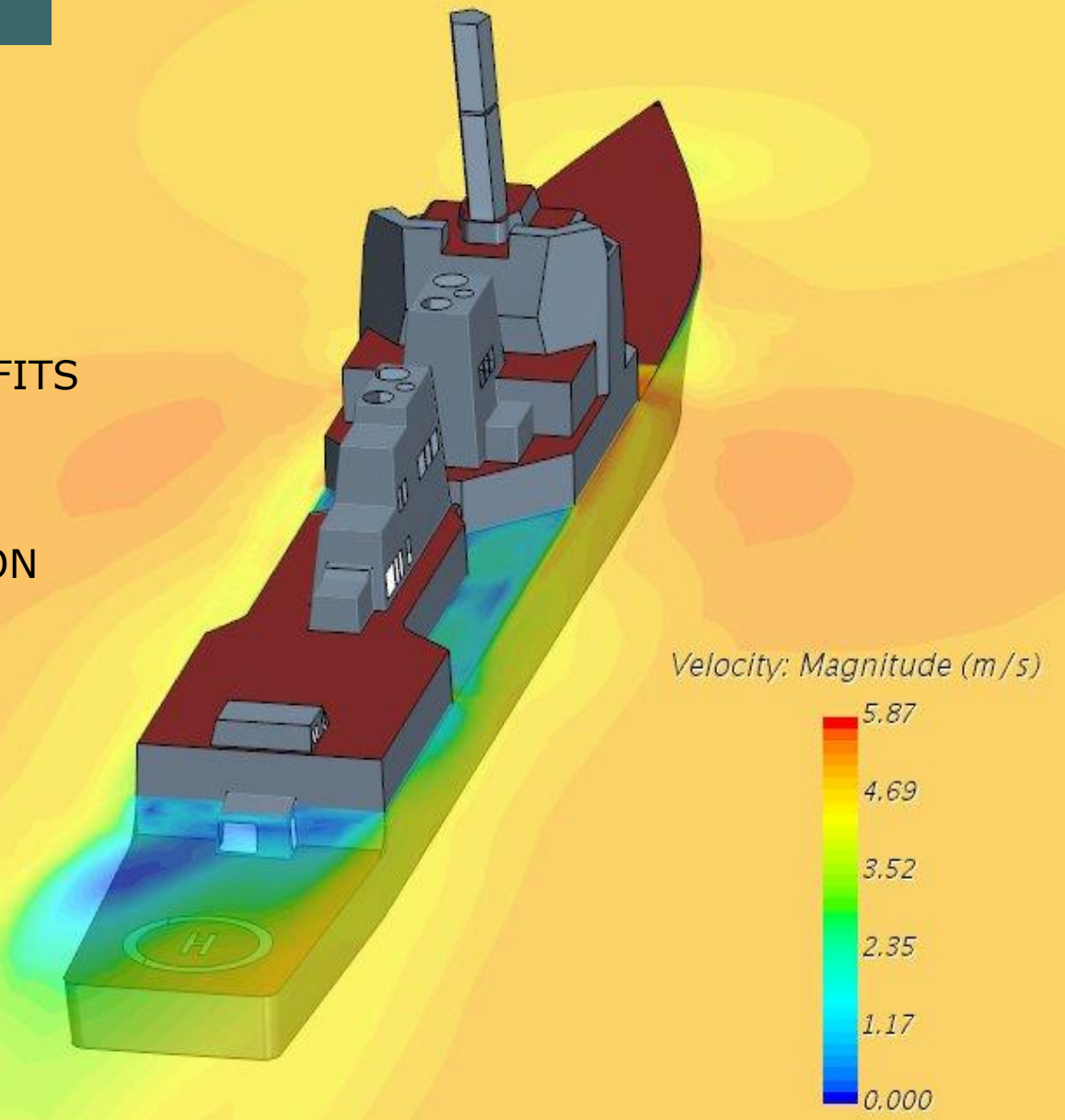
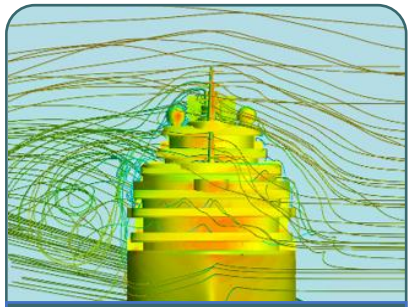
4) HELIDECK ANALYSIS

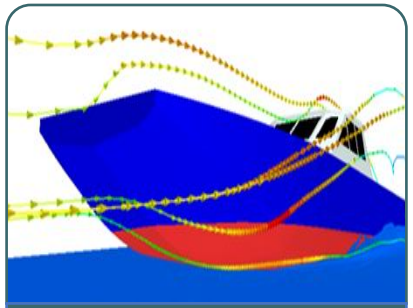


1) CFD AERODYNAMICS: BENEFITS

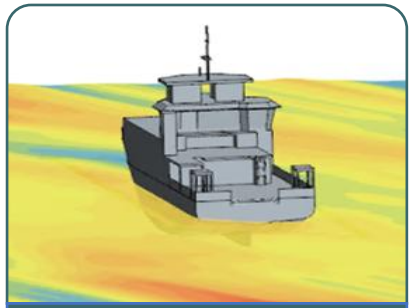
IMPORTANCE OF CFD SIMULATIONS IN NAVAL AERODYNAMICS



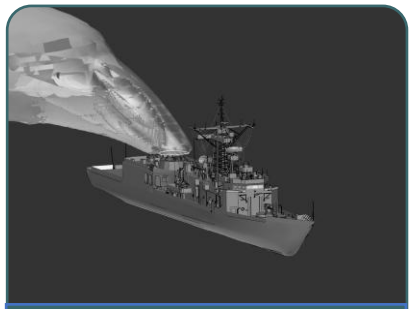
Drag resistance



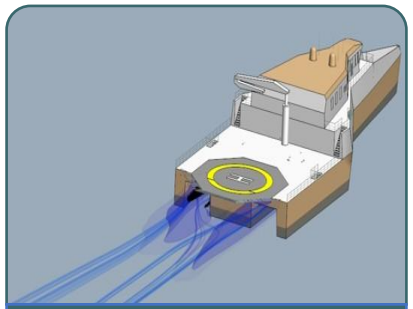
Stability



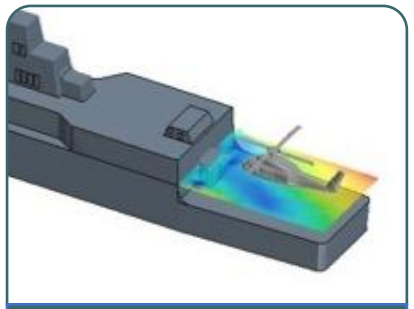
Maneuverability



Operational capability of the combat system



Comfort



Flight operations safety

2) AERODYNAMIC RESISTANCE

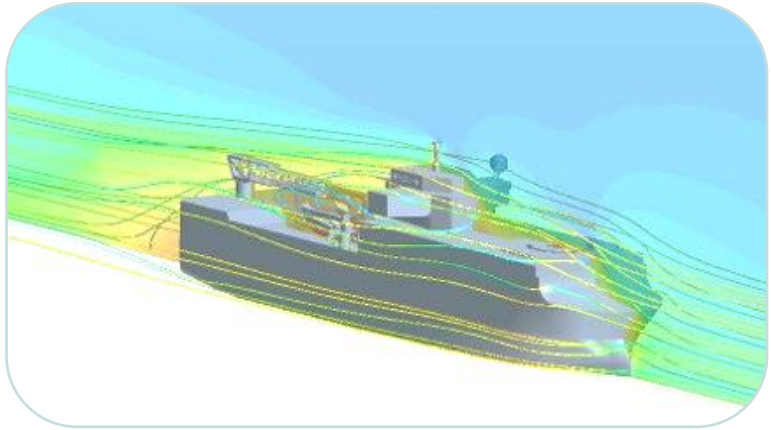
AERODYNAMIC RESISTANCE

PROBLEM → CFD MODEL → SOLUTION

Reduce aerodynamic drag

Energy efficiency

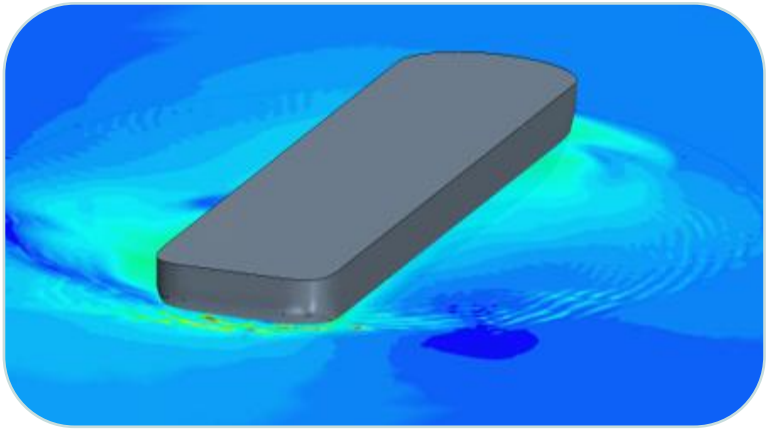
Reduce fuel consumption



Maneuver

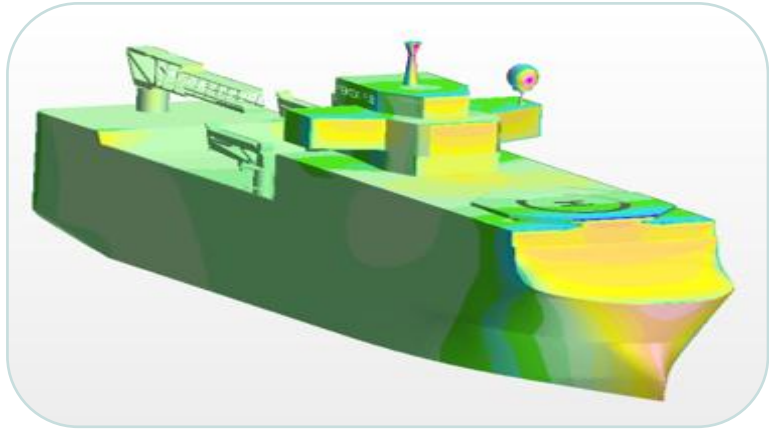
Transversal propulsion

sizing & position



Dynamic Positioning (DP)

Force & Moments calculation



AERODYNAMIC RESISTANCE

PROBLEMS → **CFD MODEL** → SOLUTION

Aerodynamic resistance analysis

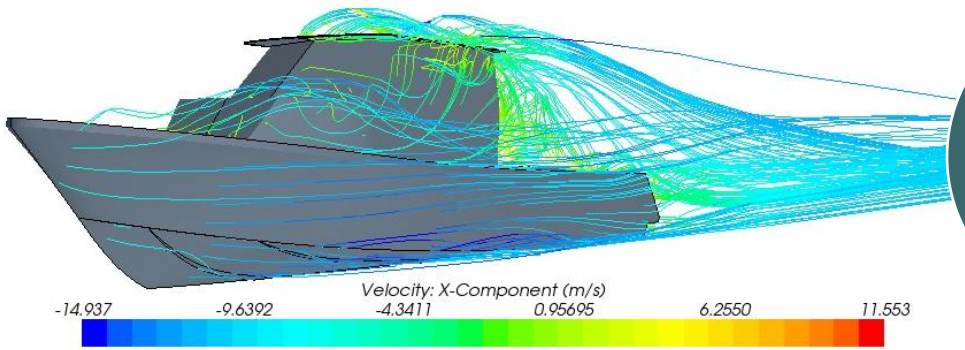
Ship 3D geometry

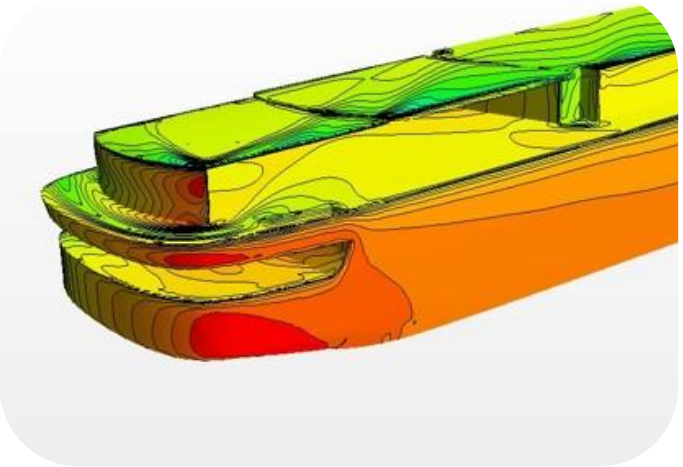
Ambient conditions

Operational conditions

Pressure surface

Identify high-resistance zones





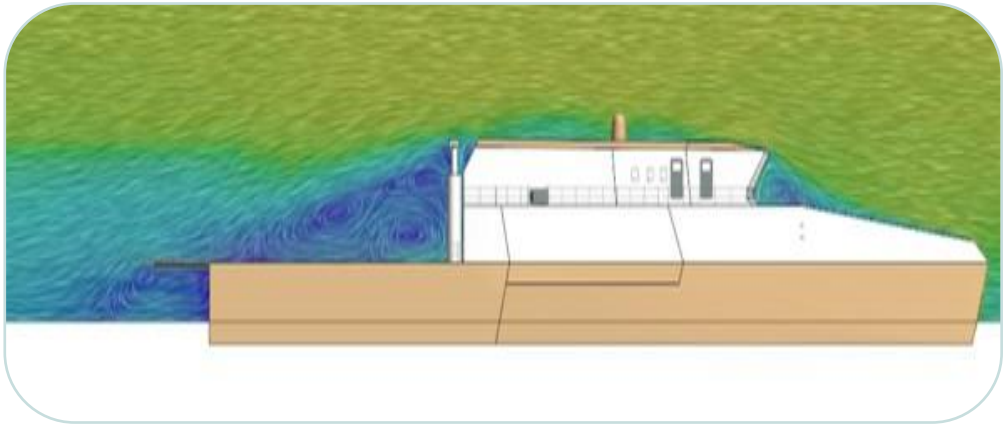
AERODYNAMIC RESISTANCE

PROBLEMS → CFD MODEL → **SOLUTION**

Reduce aerodynamic drag

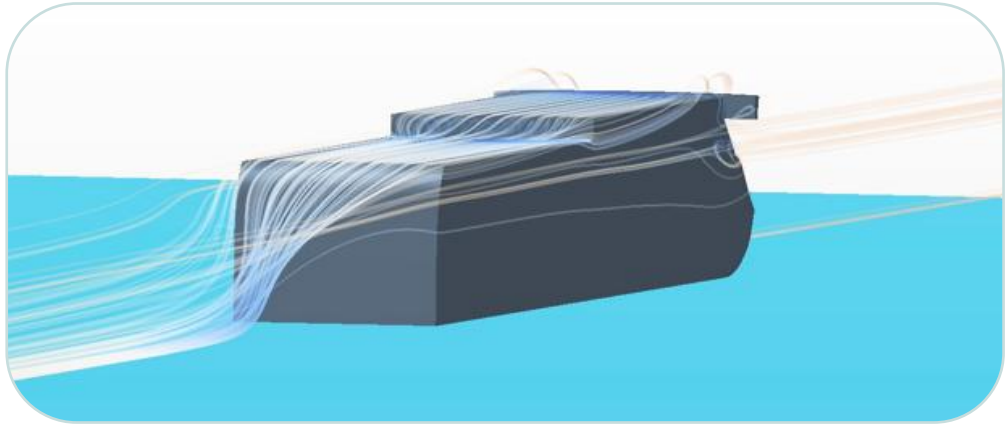
Rounded shapes

Avoiding edges, flat or angular surfaces



Aerodynamic fairings

Reducing vortices & flow separation



3) EXHAUST GASES DISPERSION

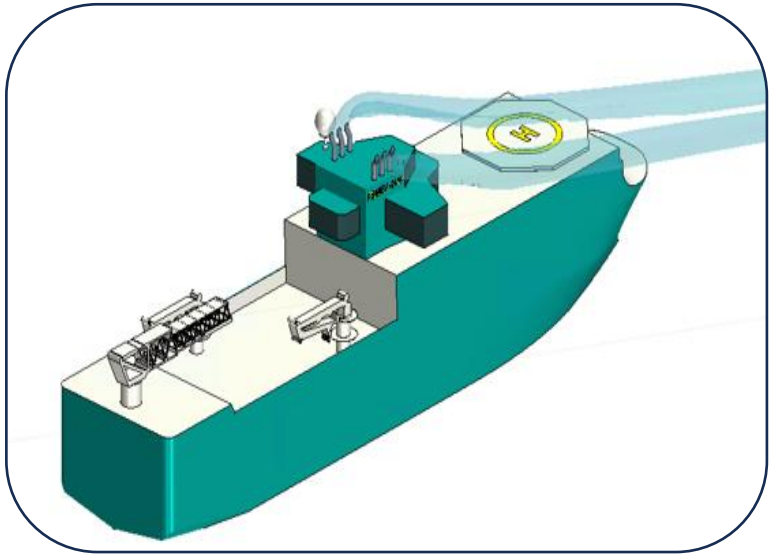
GASES DISPERSION

PROBLEM → CFD MODEL → SOLUTION

Exhaust gases interaction with ship decks

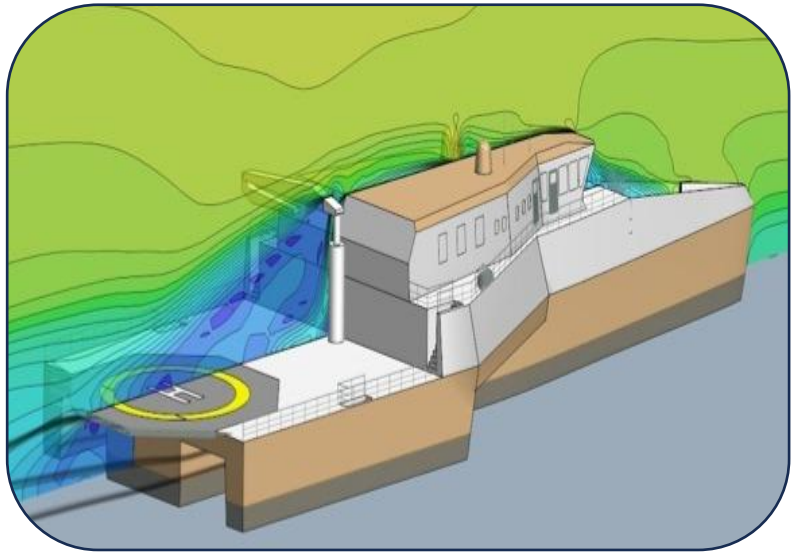
High-tech vessels

Sensor temperature increment



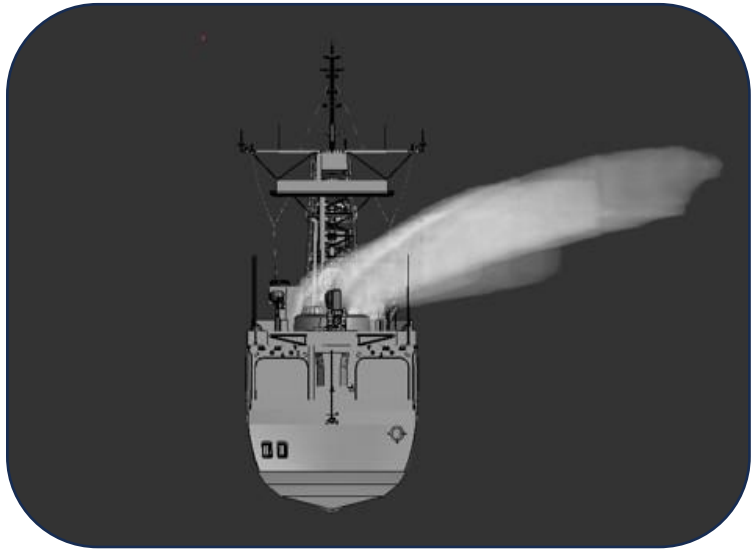
Yachts / Cruises

Passengers air quality



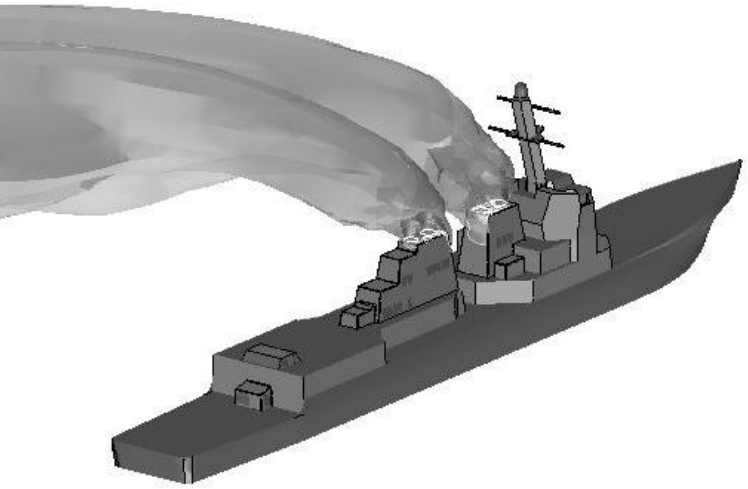
Warships

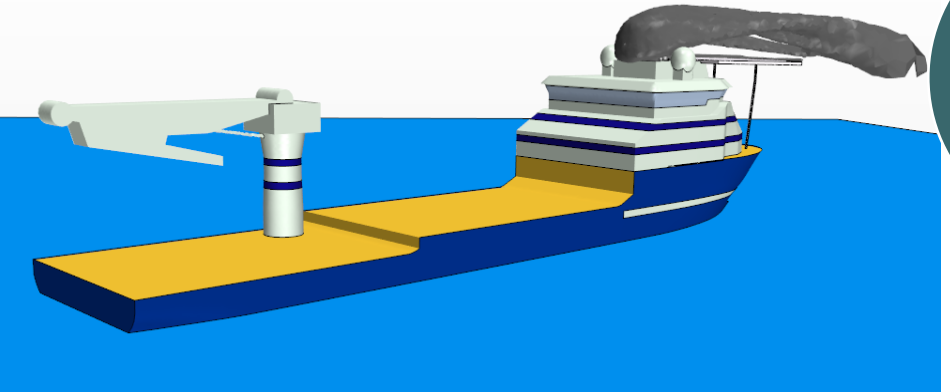
Radar signature



GASES DISPERSION

PROBLEMS → **CFD MODEL** → SOLUTION

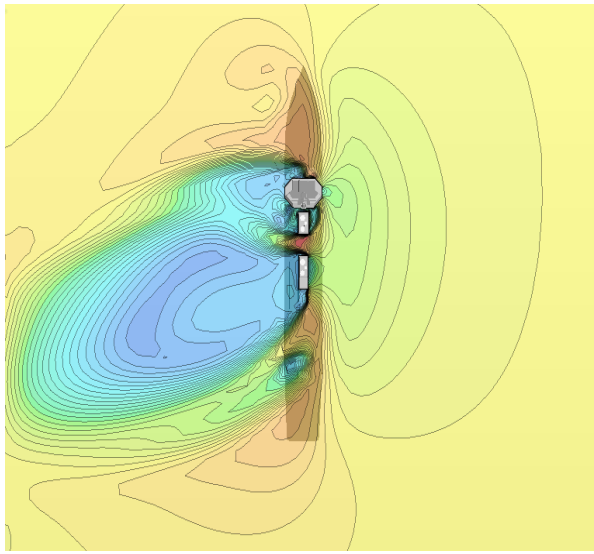




Exhaust gases dispersion

- Ship 3D geometry
- Ambient conditions
- Operational conditions

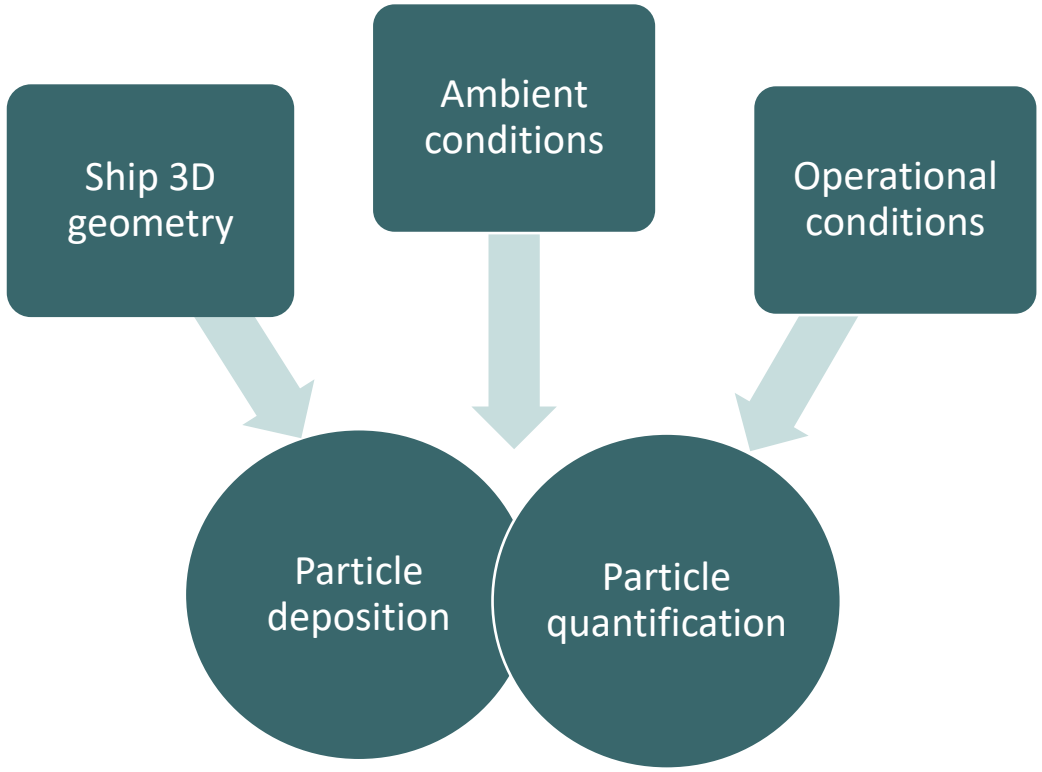
- Gases trajectory visualization
- Temperature & Concentration measures
- HVAC inlets



GASES DISPERSION

PROBLEMS → **CFD MODEL** → SOLUTION

Solid particle dispersion

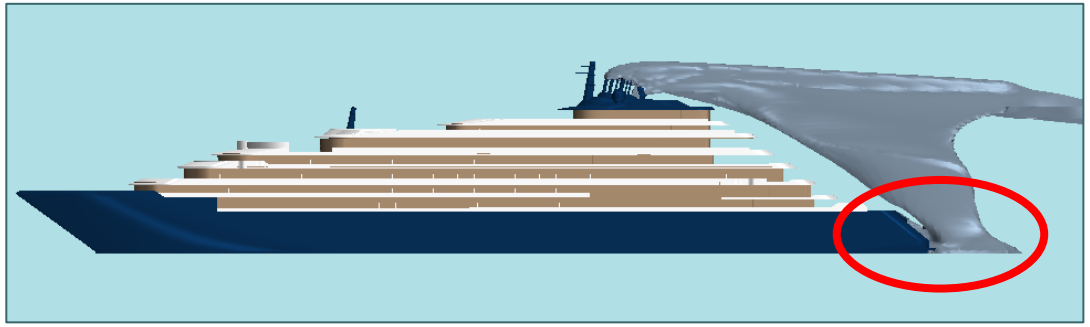


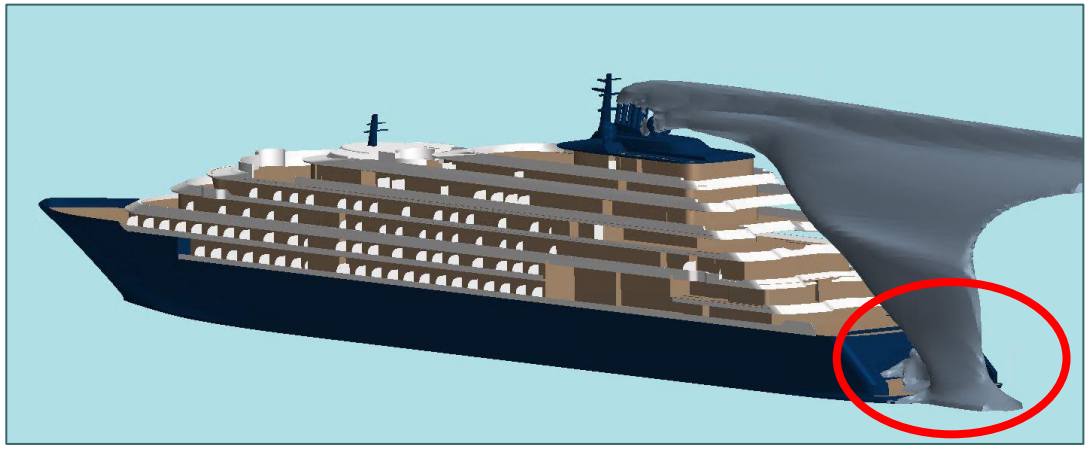
GASES DISPERSION

PROBLEMS → CFD MODEL → **SOLUTION**

Deflectors design

BEFORE





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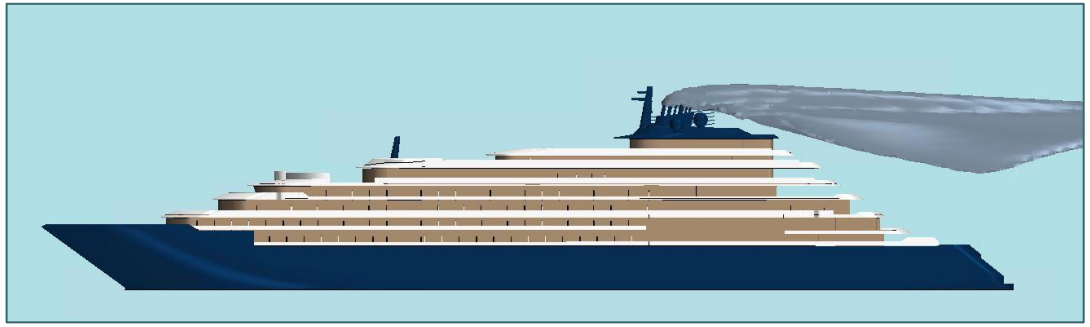
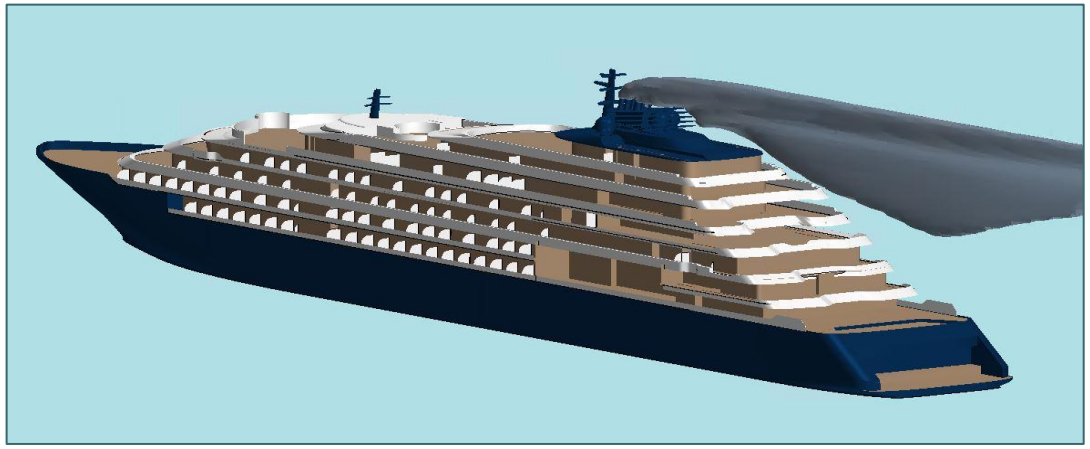


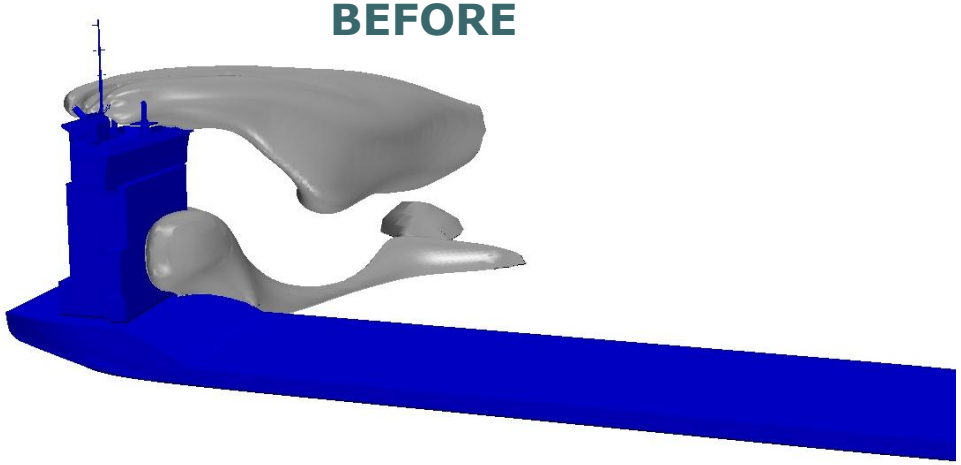


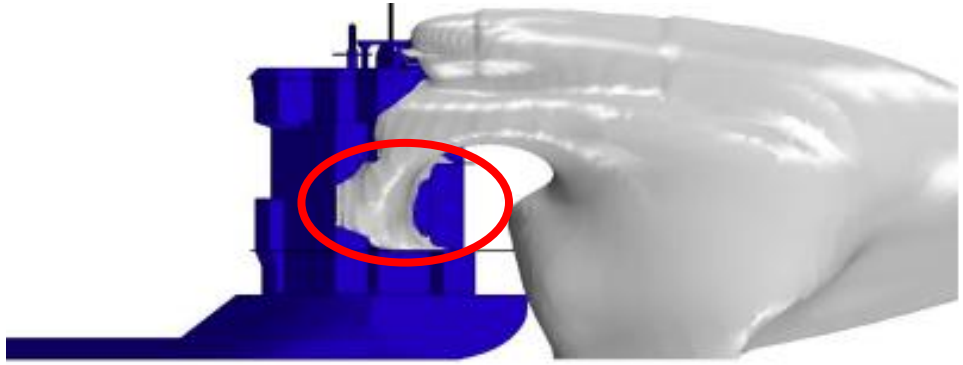
GASES DISPERSION

PROBLEMS → CFD MODEL → **SOLUTION**

Funnels design

BEFORE





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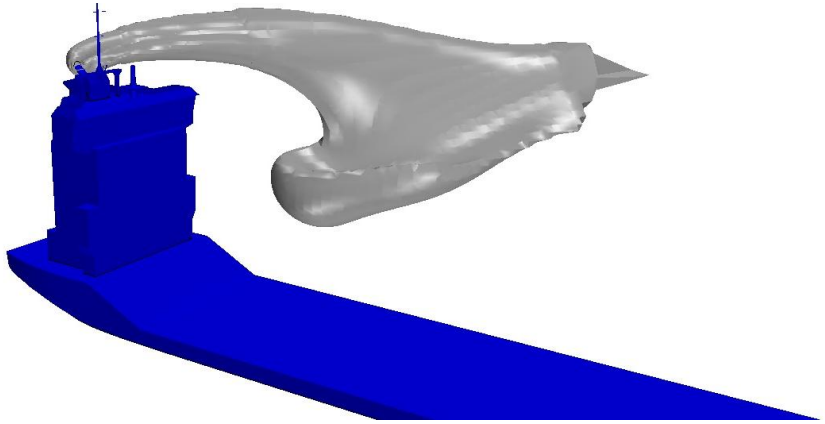
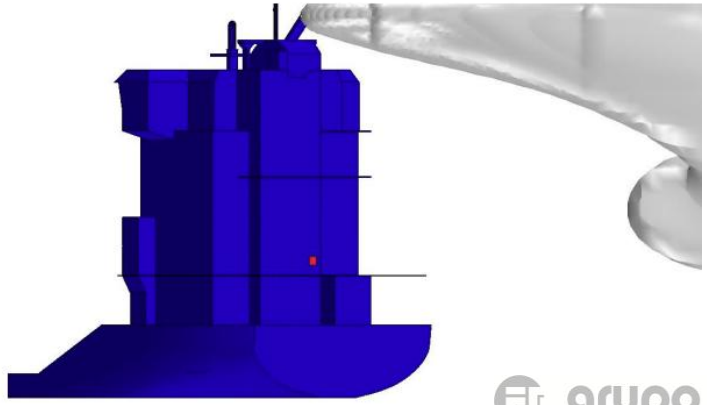




4) HELIDECK ANALYSIS

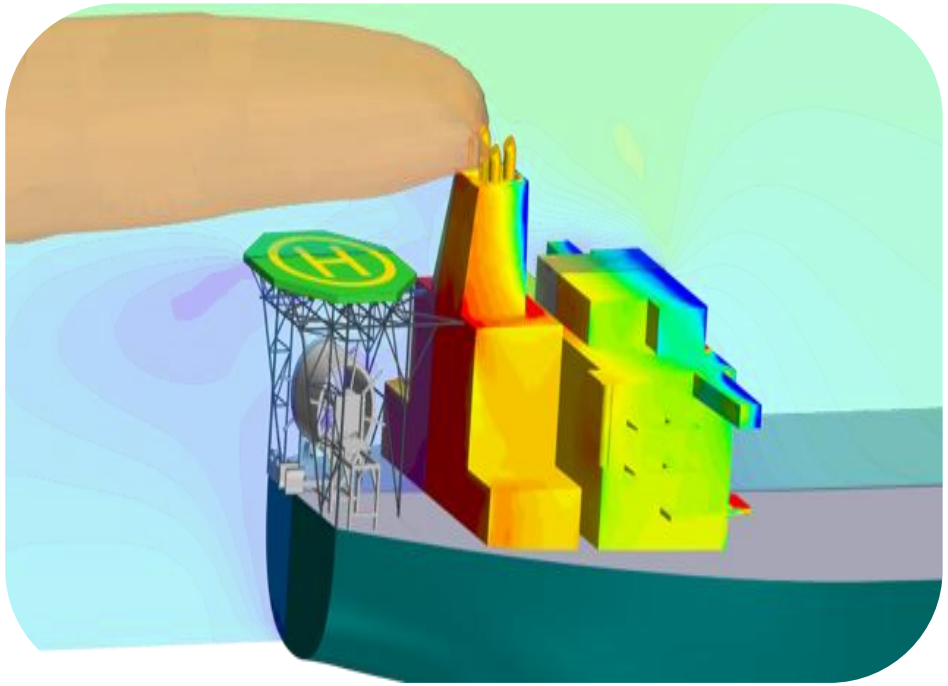
HELIDECKS ANALYSIS

PROBLEM → CFD MODEL → SOLUTION

Flow instability during flight maneuver approach

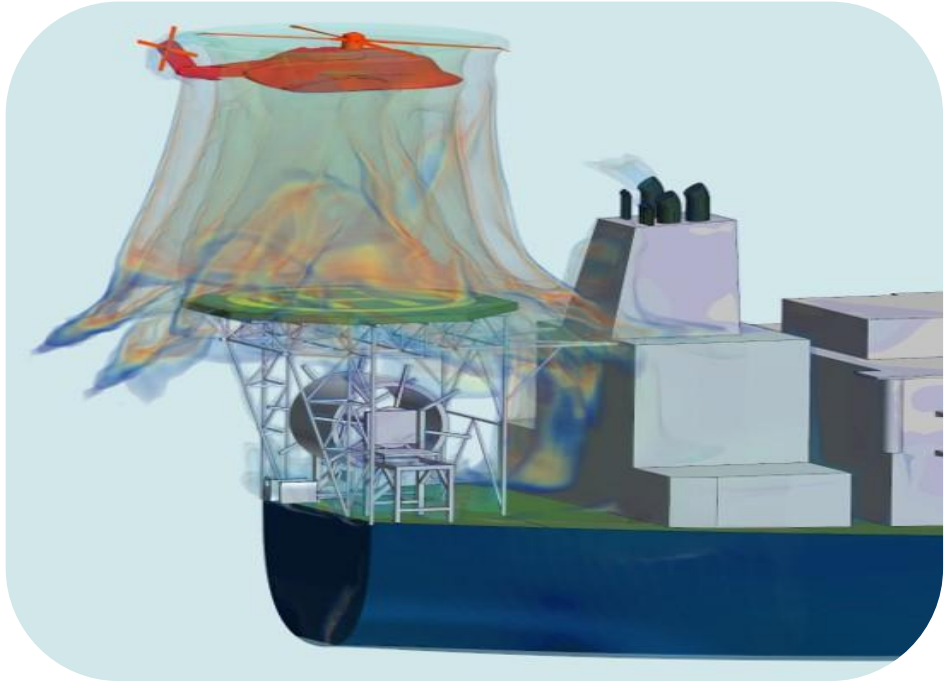
Thermal & Turbulence fluctuation

Helicopter instability



Rotor downwash

Extreme wind flows can cause harm to people/objects



HELIDECKS ANALYSIS

PROBLEMS → **CFD MODEL** → SOLUTION

Thermal & Turbulence fluctuation

Ship 3D geometry (focus on helideck)

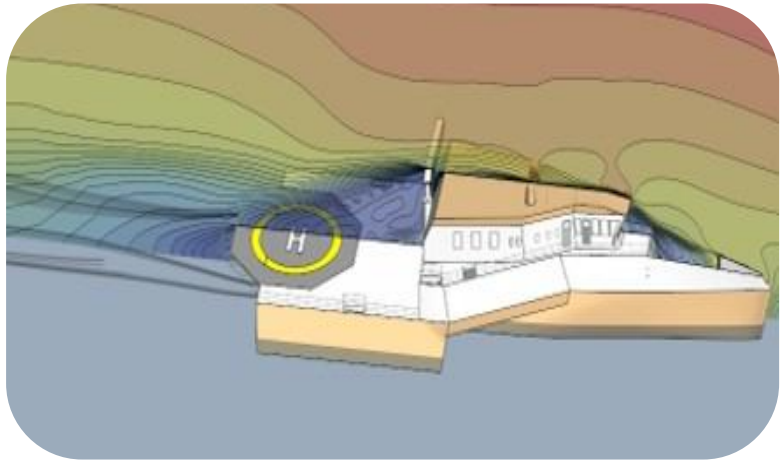
Ambient conditions

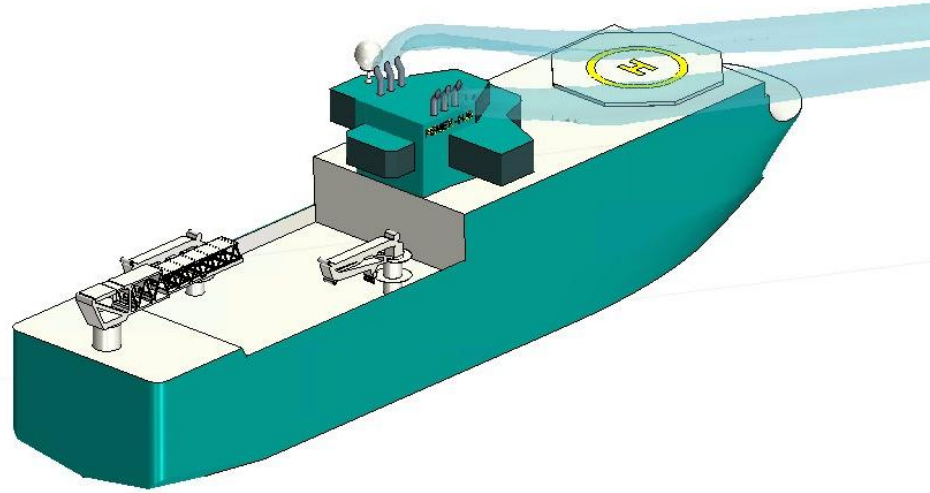
Operational conditions

Thermal & Turbulence fluctuation

(CAP437, NORSOK C-004, HSAC RP)

Annual helideck availability





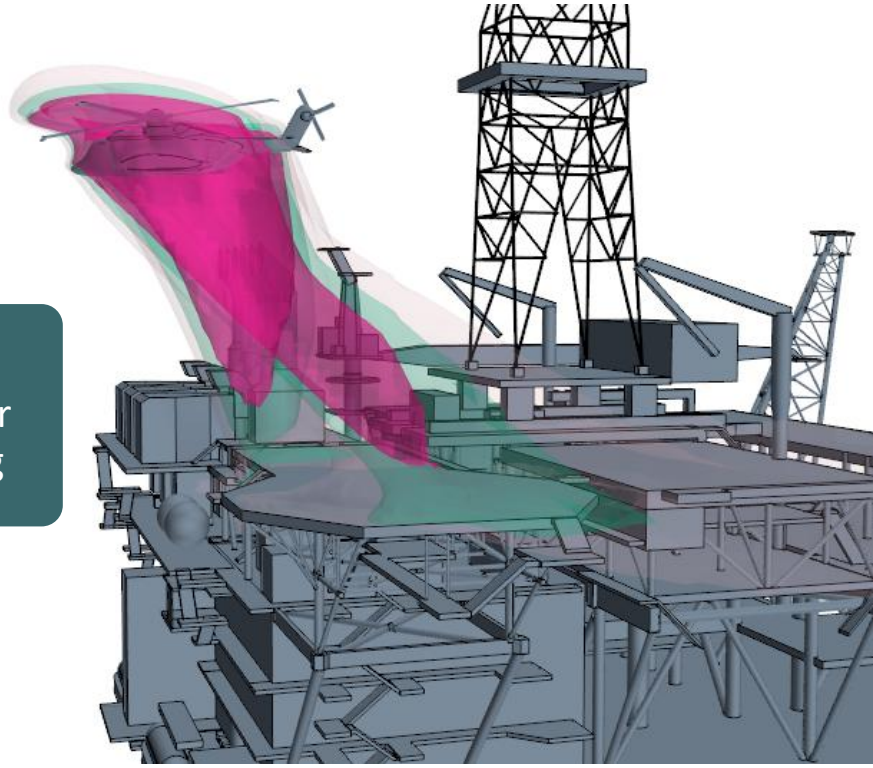
HELIDECKS ANALYSIS

PROBLEMS → **CFD MODEL** → SOLUTION

Rotor downwash

- Ambient conditions
- Operational conditions
- Ship 3D geometry (focus on helideck)
- Rotor helicopter modeling

→ Maximum velocities around helideck



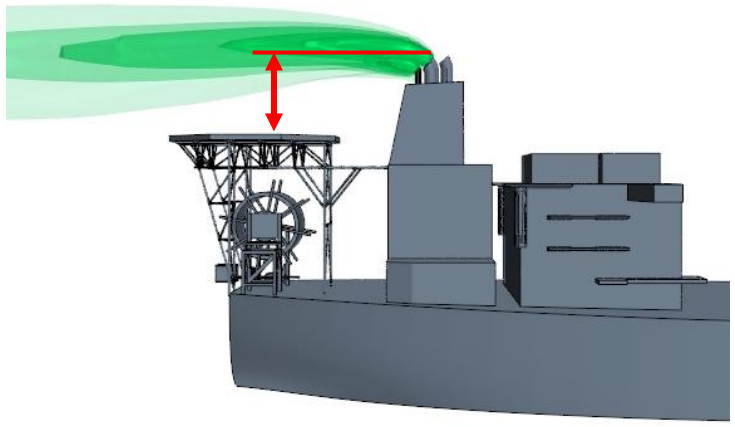
HELIDECKS ANALYSIS

PROBLEMS → CFD MODEL → **SOLUTION**

Layout optimization

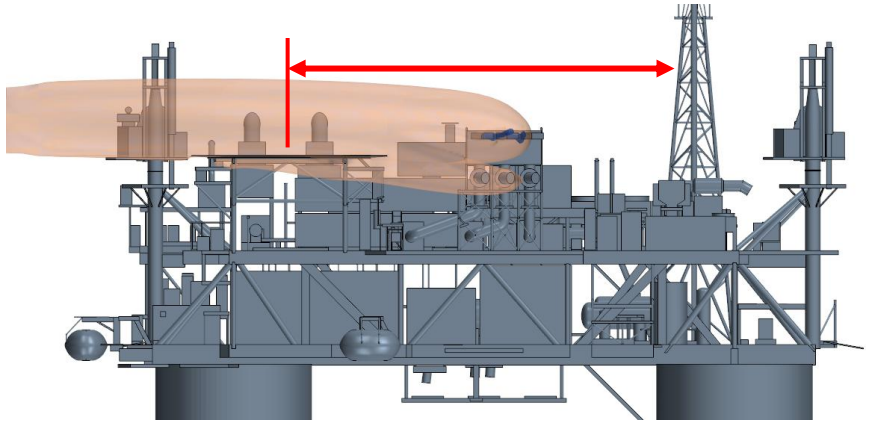
Height

between helideck - gases outlet



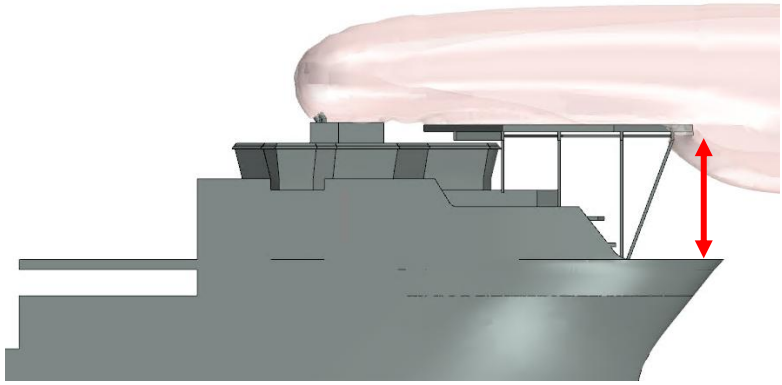
Horizontal distance

between helideck - superstructures



Air-gap

between helideck - deck



Funnel/Deflector design

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THANK YOU

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