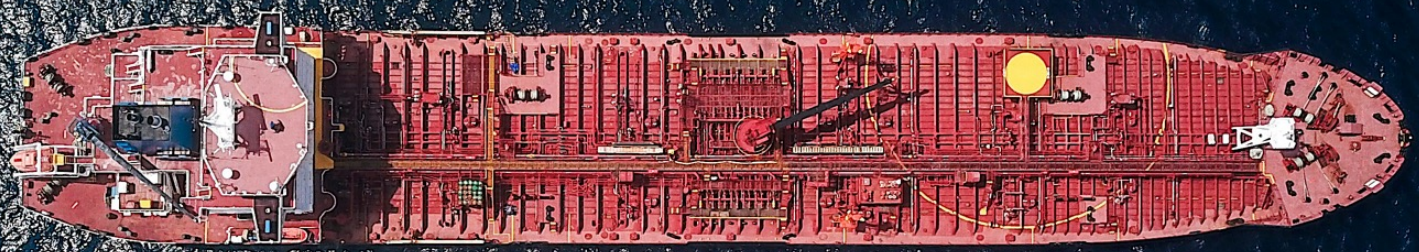
NeuralShipper



Generative AI for Modern Ship Design and Engineering

Compute Maritime

Understanding Shipping

- Shipping is the single greatest driver of global trade.
- At any moment, **~100K** ships are transporting 90% of the goods we use daily.
- Yet it accounts for 3% of global greenhouse gas (GHG) emissions.
- If shipping were a country, it would be the world's sixth-largest GHG emitter.
- Its biggest hurdle? An industry built on outdated design processes, making rapid change difficult.

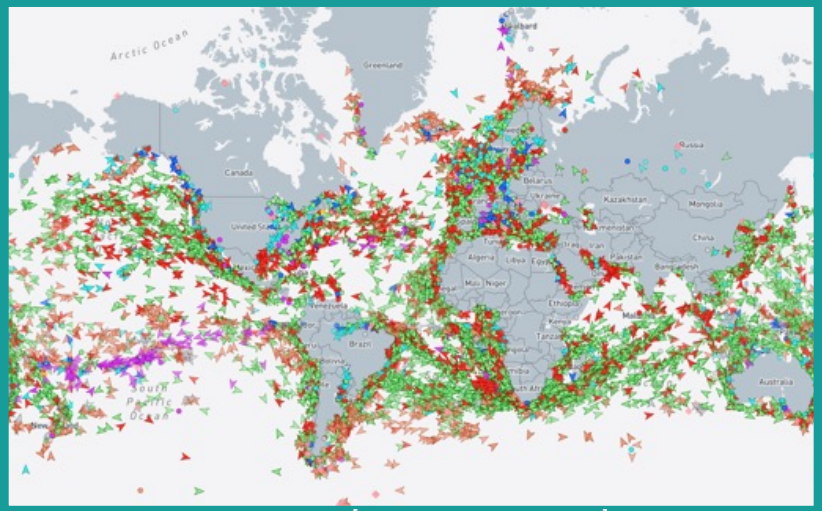
IMO International Maritime Organisation

European Commission

Target to achieve		
Year	CO2 intensity	GHG emissions
2030	≥ 40% cut	≥ 30% cut
2050	≥ 70% cut	Net Zero

this has created an urgent multibillion-dollar market for new solutions

Ships Voyaging Right Now!



Global fleet [www.marinetraffic.com]

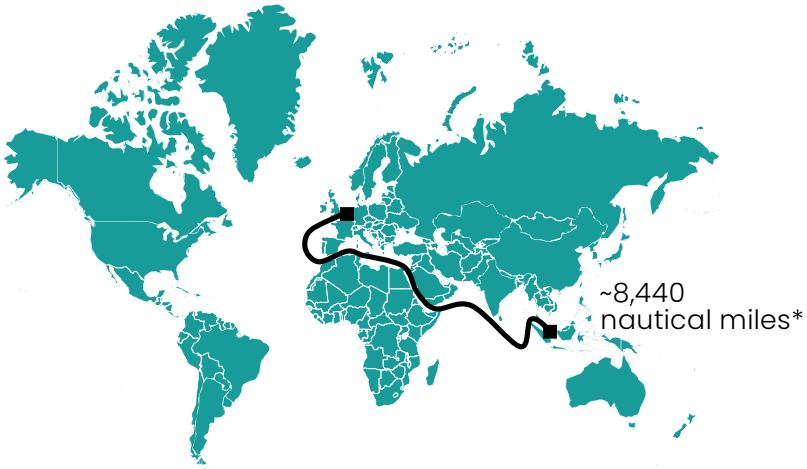
For stakeholders, Non-Compliance is Not an Option

A typical cargo ship sailing from Singapore to Rotterdam can emit **~3,364 tonnes of CO_2**.

That's the same as the annual **emissions of 730 cars**.

Starting now, non-compliance with IMO & EU regulations on this single voyage could cost the owner

$336K - $1.27M in penalties.



*this is the shortest route via the Suez Canal. The route via Cape of Good Hope (~11,720 NM) would mean even higher penalties.

Challenge: Legacy in the shipbuilding industry

Ship Design Has Barely Changed...

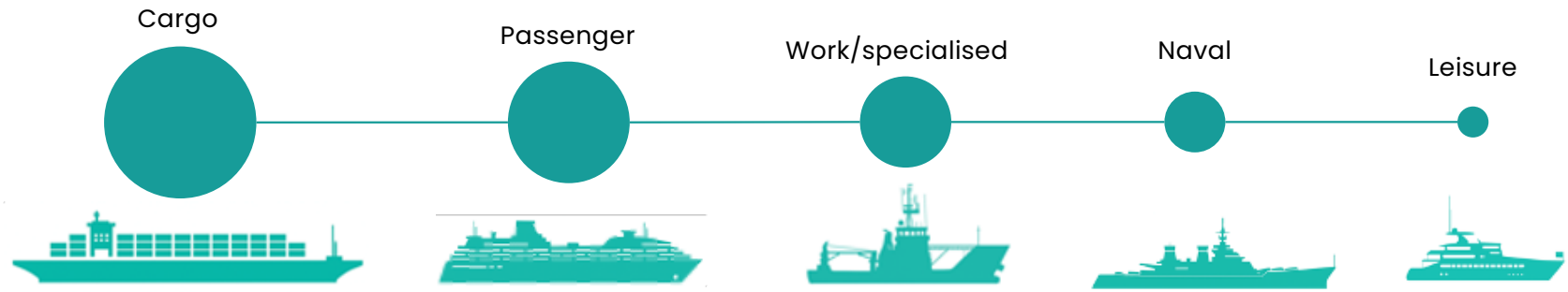
1970

2022

design-wise, both ships have similar performance!

...And They Scale Across the Entire Industry...

from Cargo to Naval Vessels



...Integration of New Technologies Also Hinges Critically on Vessels' Design.

Hybrid & Electric Propulsion

Battery and hybrid drive systems enabling zero-emission operations

Alternative Fuels

LNG, hydrogen, ammonia, and biofuels offering cleaner alternatives

Renewable Energy

Solar and wind power integrations for supplementary energy

Smart Ships

Advanced automation and data-driven operations

Autonomous Vessels

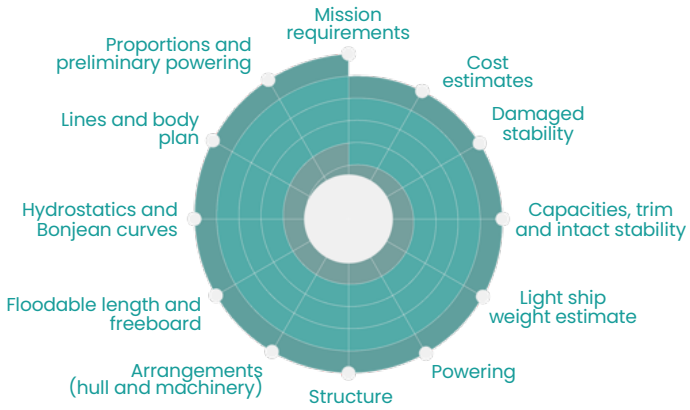
Self-navigating ships with enhanced efficiency

The challenge is clear

- Designers must innovate to deliver efficient vessels—or risk costing stakeholders millions, if not billions.
- But given their complexity, designing new efficient vessels presents a tremendous challenge.
- Current design tools and workflows are ill-equipped to meet the urgency and scale of innovation required for decarbonisation.

Existing design tools are

Slow & Inefficient	Unintuitive	Restrictive for Innovation
Not Built for New Tech	Creativity Drain	Costly



contemporary ship design still largely depends on the traditional design spiral

- Articulated by MIT's J. Harvey Evans in 1959

The Path Forward

NeuralShipper

the world's first generative tool for vessel design and optimisation, enabling the rapid generation of low-emission vessel concepts, supporting alternative fuels and propulsion technologies

while enabling naval architects to significantly

NeuralShipper is powered by a suite of foundation models

NeuralShipper reimagines how vessels are designed, simulated, and optimised

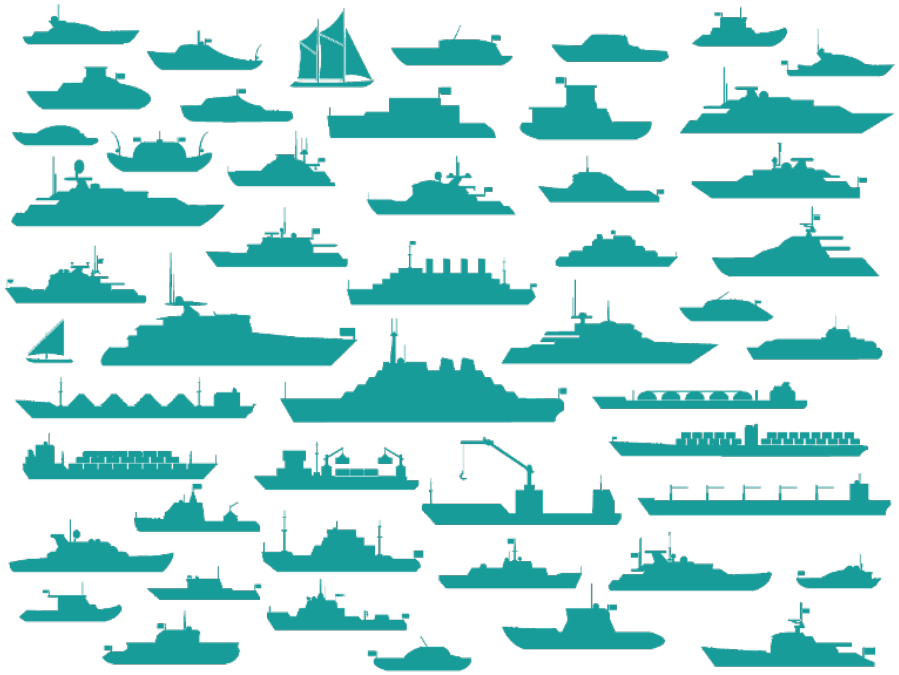
NeuralShipper acts as an AI designer, collaborating with humans to design anything from fuel-efficient cargo ships and specialised workboats to sleek yachts and complex naval vessels

NeuralShipper explore thousands of tailored concepts within minutes, each meeting specific requirements, constraints, or performance goals

Technology Behind NeuralShipper

At the heart of NeuralShipper lies our **Large Geometric & Physics Foundation Model**, trained on over 100,000 3D ship designs covering nearly every type, shape, and category.

including container ships, tankers, bulk carriers, tugboats, yachts, crew supply vessels, ferries, fishing vessels, icebreakers, naval warships, and offshore support vessels.



It's world's only foundation model capable of generating high-fidelity CAD designs

NeuralShipper - for design

Start exploring thousands of novel designs within minutes using only preliminary design requirements and constraints.

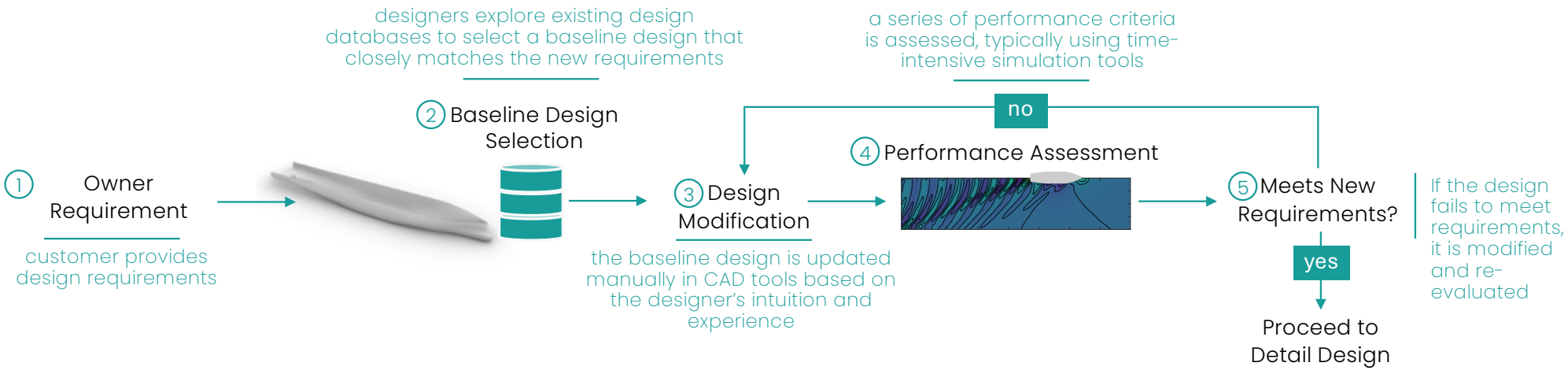
Inputs

- Vessel Type
- Capacity
- Length
- Beam
- Draft
- Hydrostatic Constraints

Output

- Generate: Conventional, Unconventional and Multipurpose vessel designs
- All satisfying given design requirement & constraints
- Performance assessment

Before NeuralShipper | **Design Cycle: 2-5 months**



After NeuralShipper | **Design Cycle: 1-2 days**

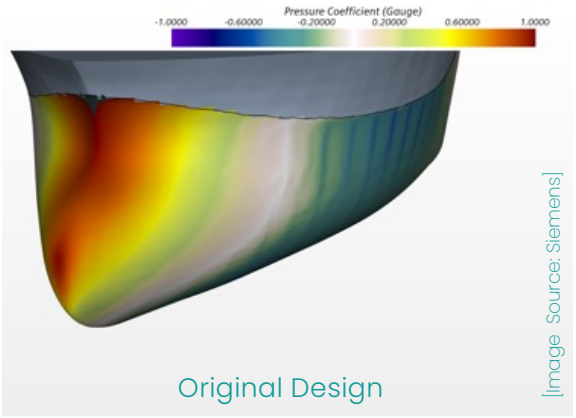
Independent case study from SIEMENS on NeuralShipper

Baseline Design

Bulk Carrier

Optimisation with existing tools

Time taken:
~1 month

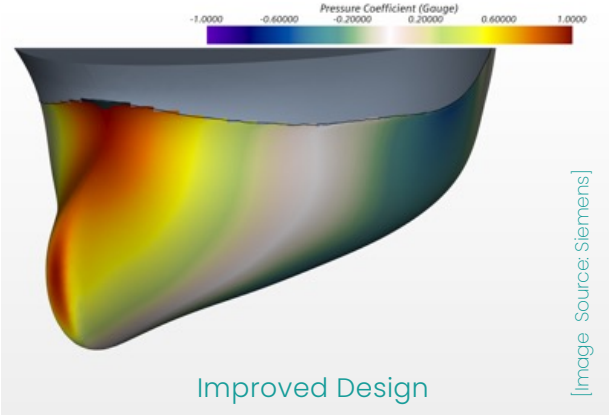


Original Design

[Image Source: Siemens]

Optimisation with **NeuralShipper**

Time taken:
3.47 minutes



Improved Design

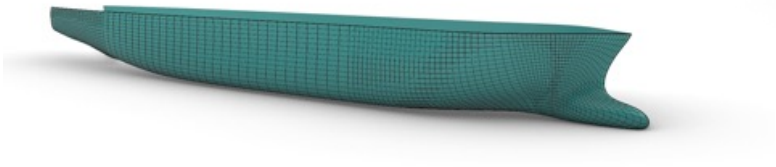
[Image Source: Siemens]

Fuel saved: ~2,030 tonnes/year
Cost saved: ~USD 1.32 million/year

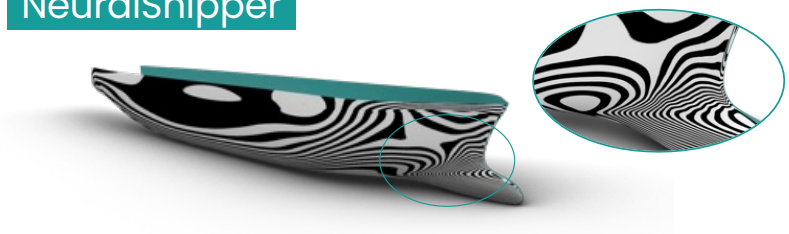
"Our collaboration with Compute Maritime represents a paradigm shift in maritime design. The combination of NeuralShipper and Simcenter STAR-CCM+ aims to redefine how multidisciplinary design optimisation is performed..."

— Dimitri Ponkratov
Marine Director, Siemens Digital Industries Software

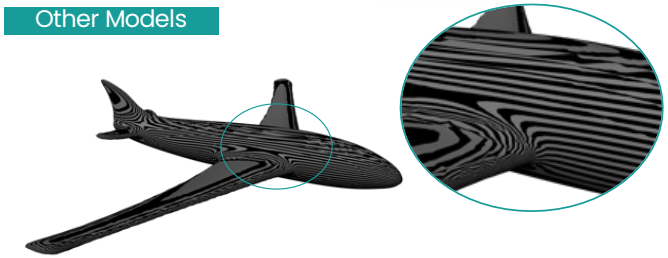
CAD-Ready Output: An Industry First



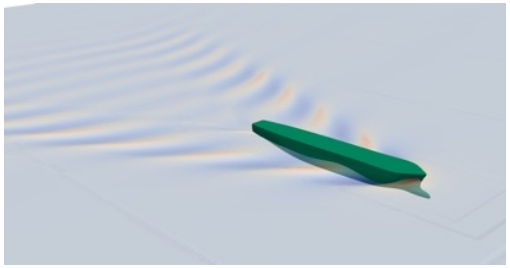
NeuralShipper

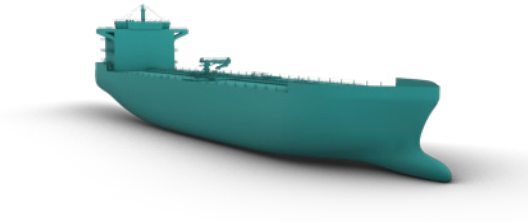


Other Models

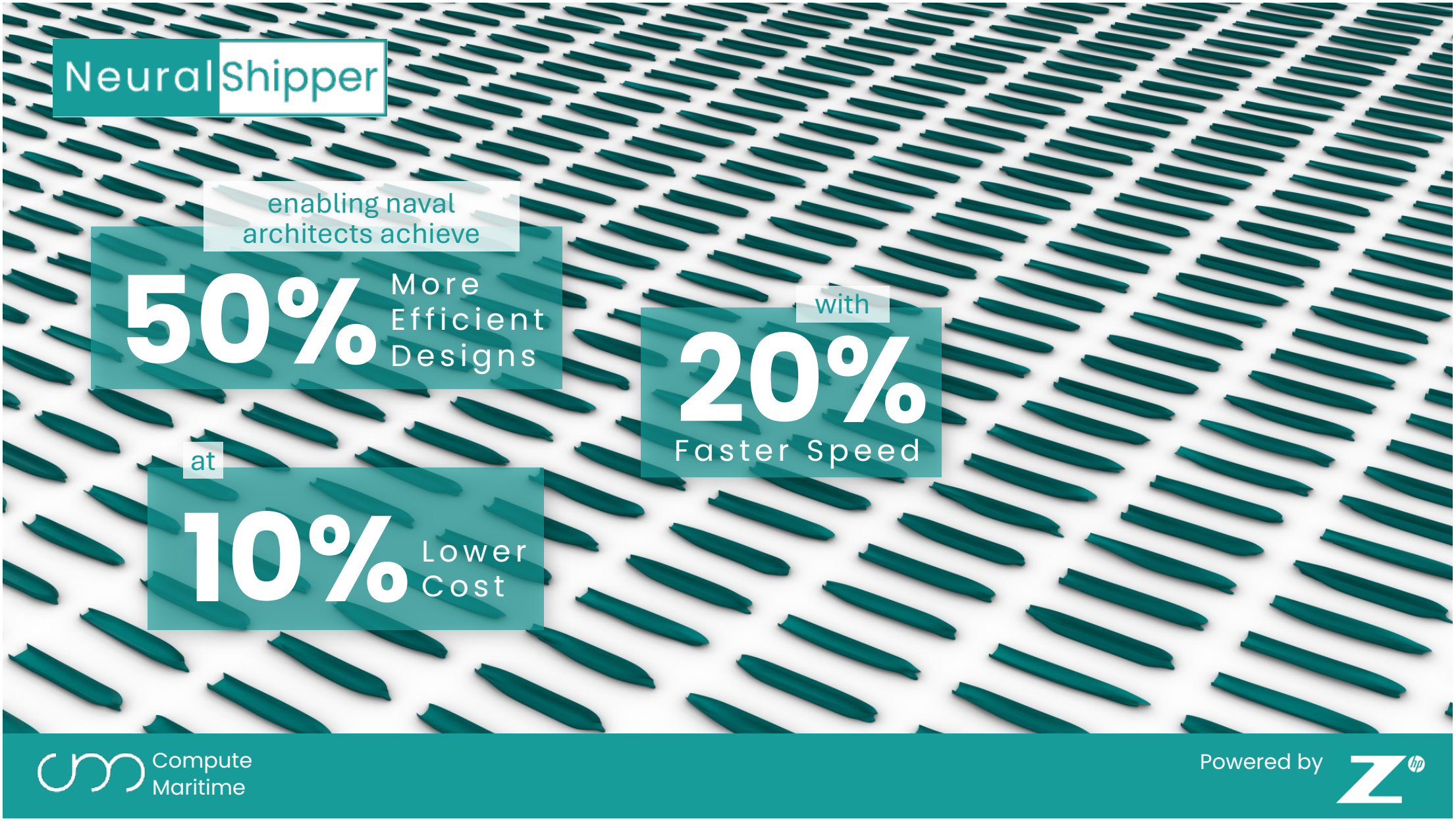


Simulation & Detailed Design





The first large geometric foundation model capable of generating high-fidelity NURBS geometries for direct CAD workflows, delivering industry-ready, mathematically precise, CAD-native outputs.


NeuralShipper
enabling naval architects achieve
50% More Efficient Designs
with
20% Faster Speed
at
10% Lower Cost
Compute Maritime
Powered by

Compute Maritime leads a UK-funded project to

Leverage Generative AI for Next-Generation Vessel Design and Manufacturing

In partnership with

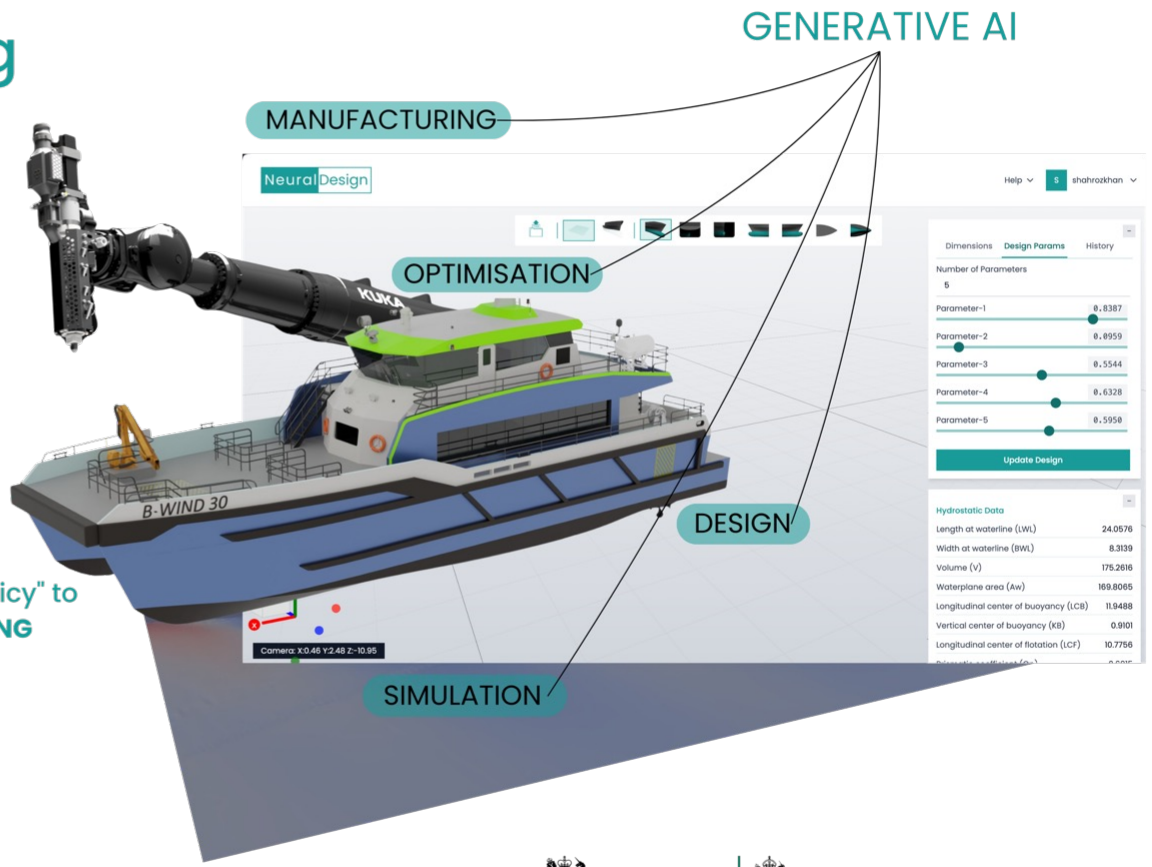
SIEMENS

Rapid Fusion

University of Southampton

BYD NAVAL ARCHITECTS

developing an intelligent design workflow that establishes a "one-roof policy" to tightly integrate the **DESIGN–SIMULATION–OPTIMISATION–MANUFACTURING** loop from the earliest stages of vessel design.



This project is funded by UK Government through theUK Shipping Office for Reducing Emissions (UK SHORE) programme in the Department for Transport. Innovate UK, part of UK Research and Innovation, is the main delivery partner for UK SHORE interventions.

Funded by UK Government

Department for Transport

UKRI Innovate UK