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World-Leading Maritime Research

Opportunities to partner for FP7

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Why partner with the University of Southampton

- Strong track record of engagement with Framework programmes, and currently 10% of our funding comes from Europe
- Over 200 researchers from 20 different subject areas are active in maritime research
- World leading expertise in the following areas:
  - **Transport efficiency and competitiveness**
  - **Naval architecture and propulsion**
  - **Environmental impact and climate change**

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Work packages that we could contribute for Greening of Surface Transport calls, specifcally:

- Green retrofitting through optimisation of hull-propulsion interactions
- Retrofitting of ships with green technologies
- Towards zero emission marine engines

Benefits of traction kites for auxiliary ship propulsion

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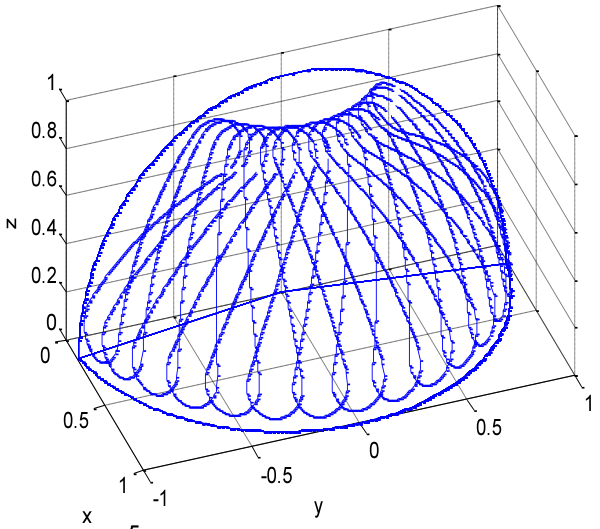
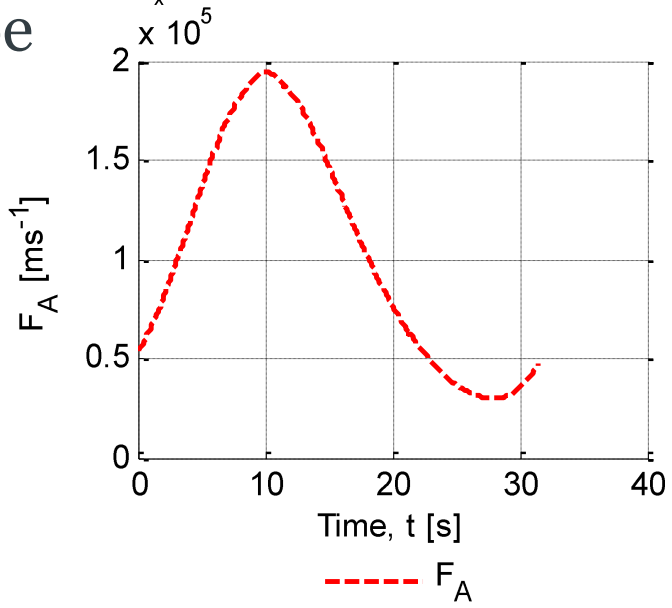
- Retro-fit solution using University kite dynamics model enabling assessment of emissions reduction potential to merchant shipping
- Could be further developed to allow benefits of kite-assisted propulsion to be assessed across a wider range of ship types with extrapolation to global emissions reductions
- Also leading to development of optimal kite trajectories with control strategies





Propulsive efficiency gains through combined hull-propeller-rudder design

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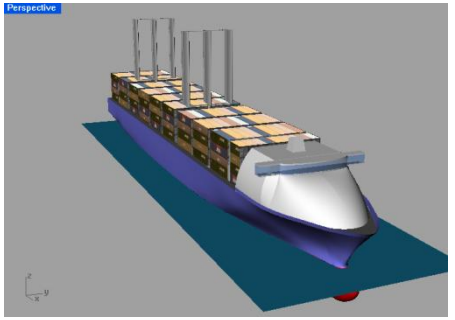
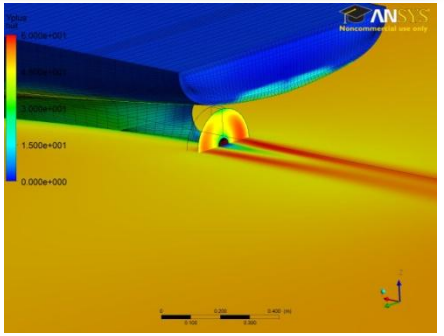
- Reductions in resistance, require ‘smaller’ propeller, less shaft, gearbox and engine losses and hence less fuel.

- Cost-effective techniques for energy savings, identifying components where improvements can be made at low cost

- Tailored/adaptable components that can be matched to instantaneous marine environment will ensure optimal fuel efficiency

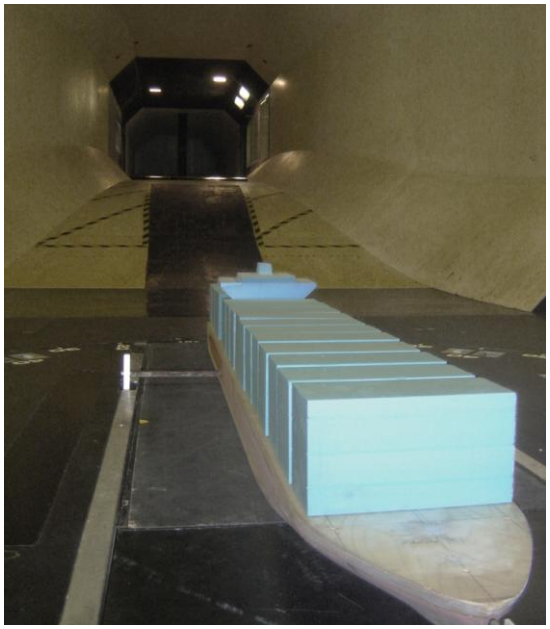
- A 25% reduction in rudder drag alone can equate to a 1% saving in fuel

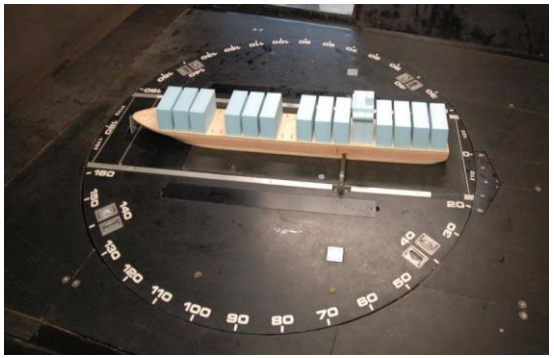




Air resistance of container ships

- Use wind tunnel facilities to study:
  - Superstructure design
  - Stacking arrangements
  - Novel coverings
  - Bow fairings
- Parallel investigation of alternatives using CFD (large computing facility at UoS)
- Translate reductions in drag to fuel-savings and emissions reductions using vessel operations simulation



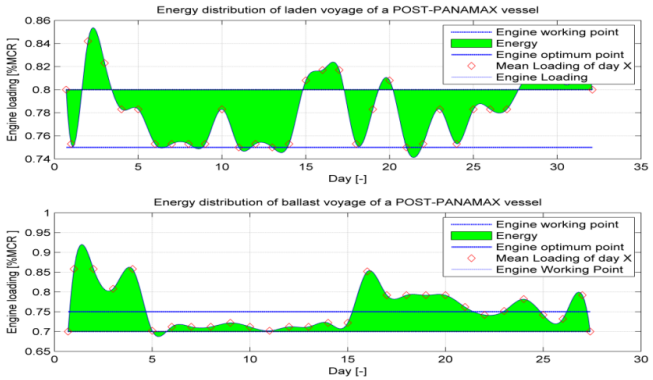


Hybrid ship propulsion

- Replace direct drive engine with sets of diesel-electric generators and energy storage to reduce installed power
- Net Displacement remains about the same
- Analysis based on actual fleet operations indicating fuel savings of up to 28%

Table 1: Potential fuel Savings due to Hybrid system installation per vessel and per year

Type of Vessel:	Fuel Savings [tonnes/Day]:	Fuel Savings Percentage:	Fuel Savings/year (480$/tonne)	Voyage Type:
Handysize	1.6	7 %	up to 460,000 $	Laden
	4.7	29%		Ballast
HandyMax	0.2	0.7%	up to 525,000 $	Laden
	7.4	28%		Ballast
Panamax	3.3	11%	up to 605,000 $	Laden
	4.8	16%		Ballast
Post – Panamax	7.9	19%	up to 1,175,000 $	Laden
	6	16%		Ballast
Capesize	3.7	7%	up to 440,000 $	Laden
	2.5	5%		Ballast



Dedes, E., Hudson, D.A., Turnock, S.R., Assessing the potential of hybrid energy technology to reduce exhaust emissions from global shipping, submitted to Energy Policy

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