

# Assessing the value of kite traction

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During simulations an individual voyage is made in small, hourly, time steps. The ship's behaviour, added resistance and involuntary speed loss is accounted for, as well as the crew's reaction to the circumstances.

A 100 m vessel operated on a fixed north-south route across the North Sea at constant target speed was used for the simulation.

It is worth noting that because of the decreasing relative wind velocities in aft ward wind directions, relatively high traction forces are obtained in transverse wind directions. The efficiency of the hull to cope with the related transverse forces depends on the hull form and the longitudinal position of the traction system.

**A meaningful contribution** Results of 1,450 crossings, covering eight years, showed that the contribution of the kite in total thrust is highly dependent on the target ship speed in relation to the typical wind speed. At 10 knots the kite contributes 16%

on average but at 13 knots this reduces to 12%. Fuel savings depend on propeller design and operation, as well as engine fuel consumption at reduced loading.

Analysis of the time periods in which the kite contributes significantly, show that the pull of the kite is not very constant over time; two-thirds of benefits are realised on one-third of trips.

Although MARIN had to make quite crude assumptions, it seems justified to conclude that a powerful kite can provide a meaningful contribution to the thrust requirements. But wind climate, the economic target speed and propulsive and engine efficiency at reduced propeller loading are important factors. And the efficiency of the hull form in coping with the transverse component has to be considered in the ship's design.

Ref: Naaijen, P, Koster, V. and Dallinga, R.P.: On the power savings by an auxiliary kite propulsion system, ISP, 53(4), p.255-270

Rising interest in wind propulsion has been boosted by the apparent advent of kite traction. The development raises many questions, from the practical problems of launch and recovery in adverse weather, to how best to quantify the economics. MARIN expects increasing interest in kite traction and therefore, decided to carry out pilot simulations.

