3rd PRIZE

N. project: L1-94 **category:** Waterborne

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RA3 **Advanced Propulsion Systems**

Key Characteristics: Motivated from rail and car fuel saving by coasting mechanism • Modified Cruising speed profile - Fuel saving employing "Eco-driving" coasting phenomena • Utilization of ship's free inertial run at deceleration to reduce energy expenditure •

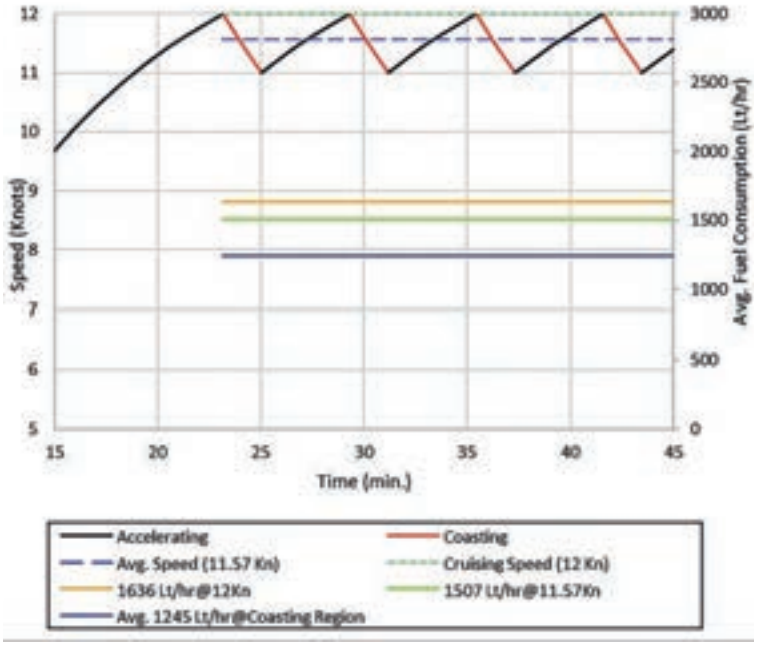
A Method for Optimizing Cruising Speed Profile using Coasting Phenomena for an Eco-Friendly Ship

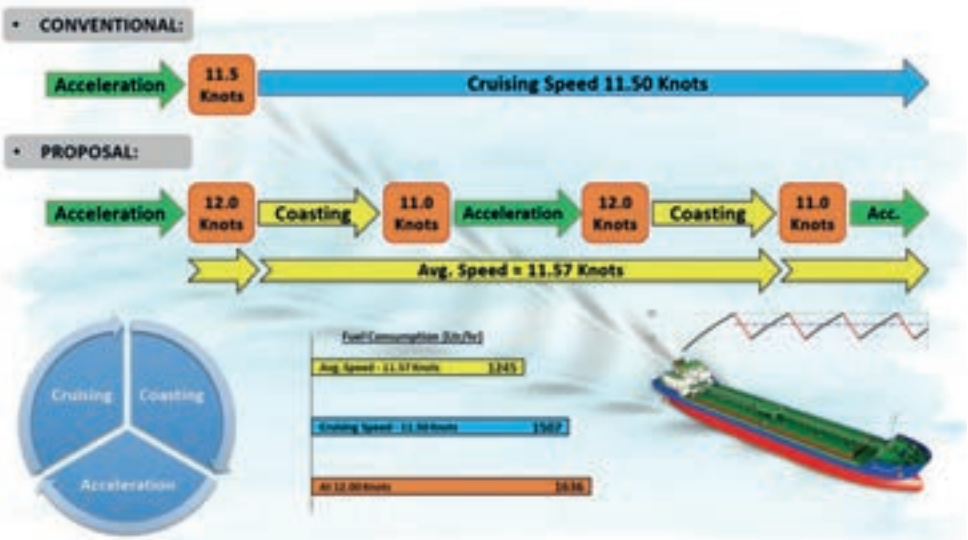
A ship does not stop immediately when its engines have been switched off. Due to inertia, the ship moves quite a large distance forward before stopping to a complete halt.

The stopping time is often 15 to 20 minutes, while the distance covered is many kilometres. The concept for the present project comes from the inertial running or coasting of ships. The term is generally used while describing the stopping capability of a ship.

The motivation behind the project is to see whether this free travel can be used to our advantage towards obtaining a better energy efficiency. That is, while the ship can use its own power to reach a certain speed, its inertia can be used to move some distance forward without the expenditure of any extra energy. The idea digs deeper into this radical new concept to periodically use and then stop using the propulsive power of the ships to save fuel, while maintaining the minimum desired speed. Having various challenges, advantages and disadvantages of its own, this project discusses the related issues and how to overcome them to fine-tune the process.

The project also discusses how to optimise the ships cruising speed profile, maximise the incorporated coasting phase and help reduce fuel consumption. As a preliminary approach, it is assumed that the test case is considered for a ship moving forward through still water with no ambient wind, current or sea waves. The only force propelling the ship forward is its engine rpm and propeller thrust and the only force opposing the motion is the resistance from hull friction and wave making •


Speed (Knots)
Avg. Fuel Consumption (Lt/hr)
Time (min.)
Accelerating
Coasting
Avg. Speed (11.57 Kn)
Cruising Speed (12 Kn)
1636 Lt/hr@12Kn
1507 Lt/hr@11.57Kn
Avg. 1245 Lt/hr@Coasting Region


CONVENTIONAL:
Acceleration
11.5 Knots
Cruising Speed 11.50 Knots
PROPOSAL:
Acceleration
12.0 Knots
Coasting
11.0 Knots
Acceleration
12.0 Knots
Coasting
11.0 Knots
Acc.
Avg. Speed = 11.57 Knots
Cruising
Coasting
Acceleration