Virtual Ship - smart navigation that saves fuel!

MARIN has developed a prototype, navigational aid system, called Virtual Ship. It advises inland skippers on the optimal track and speed during their voyages in order to obtain the lowest fuel consumption possible.

As restrictions in water depth have a negative effect on the fuel consumption, continuously changing water levels and the riverbed morphology make it difficult for skippers to determine the most energy efficient ship operation. Virtual Ship performs calculations based on real time and predicted water depths provided by CoVadem (www.covadem.com). CoVadem is an initiative started by MARIN, Deltares, Autena Marine and Bureau Telematica Binnenvaart. CoVadem makes water depth information available by aggregating, processing and distributing cooperative depth measurements from a growing ‘sailing network’ of about 80 inland vessels.

Better insight into up-to-date and future river conditions, enables Virtual Ship to show the optimal track for a given route. Power and resistance calculations are performed by our ‘Gulliver’ trip simulation software program. It includes environmental data such as currents and water depth. The software also accounts for the calculation of hydrodynamic influences like squat. Virtual Ship will look for the deepest parts of a river for a given route to determine the optimal track, taking the manoeuvring capability of the ship into account.

Furthermore, Virtual Ship optimises the power and fuel consumption on the optimal track in such a way that the given ETA is achieved. From our previous research (RISING) it was found that the minimum fuel consumption is achieved on a waterway by operating in constant power mode, as long as there are no limits with regards to current velocities and power setting. Therefore, inland skippers will be advised to slow down on the track when water depths are limited.

The development of Virtual Ship was commissioned by the European project NOVIMAR[1]. This project investigates the vessel train, a waterborne platooning concept featuring a manned leading ship and a number of followers, which are digitally connected and follow at a feasible distance by means of automatic control. This vessel train concept is a new approach for inland waterway and shortsea transport. To safely guide a vessel train, smart navigational information, as provided by the Virtual Ship, is essential.

[1] The project NOVIMAR has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 723009.