

Summary of the first test of the NautilusLog app

At the end of January 2017, the NautilusLog app was successfully tested on board a container ship (more than 50,000 gross tons) on a voyage from Hamburg to Rotterdam. The test voyage was primarily intended to demonstrate the usefulness of the NautilusLog app and to prove the following:

- The sensors used by smartphones are capable of receiving and utilising the signals transmitted by the global positioning system on the bridge of ships.
- Smartphones are able to record distances travelled by ships with sufficient accuracy and automatically detect their nautical conditions, such as “berthed”, “underway”, “at anchor”, etc.
- The usability of smartphones for the automatic determination of CO₂ emissions and the Energy Efficiency Operational Index (EEOI).

The following parameters applicable to the voyage were given by the ship's master as follows and communicated with the NautilusLog app via standardised input masks:

- The cargo carried during the journey was 28,329.55 tons.
- The ship consumed Marine Diesel Oil (MDO) during the trip.
- The conversion factor (in tons of CO₂/per ton of fuel) was 3,206.
- Consumption of MDO during the stay in Hamburg: 14.3 tons.
- Consumption of MDO during the voyage from Hamburg to Rotterdam: 75.1 tons.

For the test, a total of nine smartphones from different manufacturers were used, all with the operating system Android. Seven were placed in different places on the bridge and one was placed two decks deeper. One smartphone was carried in the pocket of one of the people who conducted the test.

The following table compares the values automatically calculated by the nine smartphones for the CO₂ emissions per nautical mile, or the EEOI, with those that the captain calculated from the parameters recorded in NOT DISCLOSED's logbook.

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Smartphone	CO2 Berthed	CO2 Underway	CO2 / NM Underway	EEOI Underway
Units	Tons of CO2	Tons of CO2	Tons of CO2 per NM	Grams of CO2 per ton of cargo and per NM
NOT DISCLOSED	45.85	240.77	0.731	25.809
Samsung G1	45.85	240.77	0.735	25.951
Motorola G3	45.85	240.77	0.740	26.126
Motorola G4 (Wifi)	45.85	240.77	0.735	25.959
Samsung S3	45.85	240.77	0.744	26.247
LG G4	45.85	240.77	0.732	25.825
Samsung S6	45.85	240.77	0.730	25.778
Samsung XC	45.85	240.77	0.729	25.723
Motorola G4	45.85	240.77	0.737	26.014
HTC	45.85	240.77	0.732	25.833

The following table shows the maximum and the minimum deviation (in%) of the values for the CO2 emissions per nautical mile or the EEOI calculated automatically by the nine smartphones compared with those that the captain calculated from the parameters recorded as NOT DISCLOSED in the logbook.

Deviation	CO2 Berthed	CO2 Underway	CO2 / NM	EEOI
Maximum	n.a.	n.a.	+1.78 % (S3)	+1.70 % (S3)
Minimum	n.a.	n.a.	-0.14 % (S6)	-0.12 % (S6)

The test was successful because it could be shown that the NautilusLog app was able to determine all the parameters prescribed by Regulation (EU) 2015/757 with sufficient accuracy. The tests mentioned above were concluded with good results.

A much more detailed version of the test report is available on request.