

Rapid Ballast Water Testing with the
Ballast-Check™ 2
Handheld PAM Fluorometer
(Turner Designs, California, USA)

Introduction

Within the frame of a larger research and development project Triton Marine Science&Consult was asked to execute a series of tests with an ultrasound treatment system for water. For this project Triton MSC is closely cooperating with the Flensburg University of Applied Sciences. The tests were executed at the Institute for Nautics and Maritime Technologies (INMT), the harbour testing site of Flensburg University of Applied Sciences.

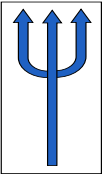
The INMT provides two large seawater pipe systems (DN250) equipped with adequate ballast water filters. Both systems provide multiple options to test ballast water treatment reactors, several isokinetic sampling ports and the maximum pump capacity for each of the pipe systems is 320m³/h.



Ultrasound treatment system (blue box) tested at the Institute for Nautics and Maritime Technologies, Flensburg University of Applied Sciences, Germany

Test Program

In total the program was designed for 65 different test cycles with variations of the three major target parameters. With a triplicate analysis of the ballast water samples the program comprised a maximum of 195 single analyses.



Sample Analysis with the *Ballast-Check*TM 2

Within the frame of the program the *Ballast-Check*TM 2 handheld fluorometer, produced by Turner Designs California, USA, was used to rapidly assess the algal activity and abundance of viable microalgae, i.e. the IMO target organism class plankton $>10\mu\text{m}<50\mu\text{m}$, in the ballast water samples from the different test cycles.

During the entire program the Turner Designs handheld PAM fluorometer *Ballast-Check*TM 2 performed the analyses without any failures. The values from the analysis of control and blank samples, which have been analyzed in parallel to the ballast water samples, demonstrate the persisting accuracy of the *Ballast-Check*TM 2 fluorometer with intensive use.

The rapid analysis procedures of pipetting the sample into the cuvette, placing the cuvette into the slot, pressing the button and reading the value takes less than a minute and enables for a rapid execution of replicate analysis of ballast water samples in order to generate a sound data base for the further statistical elaboration of the resulting values.

The option to export the generated information and data from the analysis of ballast water samples to MSEXCEL, run statistical tests and produce the relevant graphs adds to rapid elaboration of detailed, comprehensive and reliable statements requested in ballast water quality testing onboard ships.

Continuation of the test program with the Turner Designs *Ballast-Check*TM 2 handheld PAM fluorometer

Since the preliminary test program at the Institute for Nautics and Maritime Technologies of the Flensburg University of Applied Sciences described here was successfully terminated, a larger, 2 years follow-up test program is about to be implemented and start in autumn 2015.

Integral and obligatory part of this larger research and development program is the analysis of the IMO target organism class plankton $>10\mu\text{m}<50\mu\text{m}$ in the ballast water samples.

For this larger 2-years research and development program and based on the very positive experiences with the Turner Designs *Ballast-Check*TM 2 handheld PAM fluorometer during the preceding, preliminary test program, the project management intends to use two *Ballast-Check*TM 2 handheld PAM fluorometers in parallel for the analysis of the ballast water samples to further optimize the time from sample to result. This would allow the executing scientists to almost immediately respond to the results from the analysis and repeat a test cycle with a modification and thus optimization of the relevant target test parameter.

In the end the entire test program will largely benefit from the use of the rapid, reliable and accurate Turner Designs *Ballast-Check*TM 2 handheld PAM fluorometer.