

Introduction

The fast-time simulation program SHIPMA 7.0 was developed by MARIN and Deltares to simulate the manoeuvring behaviour of ships (SHIPMA is an acronym of **Ship** Manoeuvring). SHIPMA 7.0 is an upgrade of the earlier Shipma 6.2. SHIPMA 7.0 is currently in its end phase of beta testing and will be released before end Q3 2013.

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For what user?

For a proper use of the features of SHIPMA , the user must have ample knowledge of:

- ship handling in restricted water;
- the specific problems related to slow-speed sailing;
- tug assistance procedures;
- the consequences of (changing) external forces due to currents, waves, wind and bank suction;
- ship's hydrodynamics.

and a basic knowledge of:

- the operating system of a personal computer (Windows) and;
- an ASCII text editor.

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Applicability

SHIPMA is used in port design and inland waterway studies so as to give the designer an insight into the inherent possibilities and restrictions of vessels in relation to the infrastructure and environmental conditions. It is particularly applicable in comparative studies to evaluate several designs [KOEMAN, a.o., 1983].

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Capabilities

SHIPMA is a program for simulating the manoeuvring behaviour of ships, taking into account the influences of:

- the ship's manoeuvring characteristics,
- the kind of manoeuvre and desired track,
- rudder and engine actions,
- tug assistance,
- wind, waves and currents,
- shallow water and
- bank suction.

Rudder, engine and tug(s) are controlled by a combination of:

- a track keeping autopilot and tug controller,
- input data as defined by the user.

The autopilot responds to deviations from the desired track and course angle. In the case of curved tracks and changes in the current-pattern, the autopilot will anticipate on these changes, while taking into account a user-defined "anticipation distance".

SHIPMA computes the track and course angles of the ship, the required actions for the rudder, the engine and the tugs, on time-step basis during the manoeuvre. All forces acting on the ship and the speeds, rotations and accelerations of the ship will be determined as well, and stored in output files. In addition, the actual water depths, current velocities, wind speeds, wave heights, tug orders, tug forces and so on, are calculated.

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Limitations

SHIPMA is **not** suitable for:

- detailed design;
- complicated mooring manoeuvres;
- training purposes;
- ship/ship interactions and;
- complex human interference.

For these purposes a study with a real-time manoeuvring simulator, possibly in combination with a SHIPMA study, is required. One important reason is that, because of the predictable character of the autopilot, SHIPMA runs can be reproduced exactly. This is of course in contrast with human control and the variability of wind, waves and current. Thus, it would not make sense to analyse SHIPMA results statistically.

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Verification

SHIPMA has been verified at MARIN's Nautical Centre MSCN using the results of small-scale as well as full-scale manoeuvring tests [VRIES, de, 1989 and 1982].

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System requirements

To use SHIPMA 7.0 you need:

- Computer with a 2GHz or faster processor.
- Microsoft Windows XP with service pack 2, 32 bit operating system.
- Microsoft Windows 7 Professional with service pack 1, 32 and 64 bit operating system.
- 2 GByte of installed memory (RAM) or more.
- 2 GByte of available hard-disk space.
- DVD-Rom drive.
- 1024x768 or higher resolution display with 256 colors.
- Keyboard and Microsoft Mouse or compatible pointing device.
- Microsoft Internet Explorer 8 or later.

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FAQ

General

1. Q: What is SHIPMA in general used for?

A: The application of SHIPMA is primarily in port and fairway design, referring to both approach channels and inland waterways. According to PIANC a first estimate of the required channel width based on general guidelines has to be followed by ship manoeuvring simulations. In this we distinguish between fast-time simulation with Shipma (steered by an autopilot) and real-time simulations on a Ship Manoeuvring Simulator. The simulations with SHIPMA give insight into the inherent possibilities and/or restrictions of:

- Vessels including the effect of additional manoeuvring devices like bow and stern thrusters;
- Infrastructure;
- Environmental conditions;
- The role of tugs.

Based on the insights gained, mitigations, if needed, of the infrastructure design (channel layout, manoeuvring basin and terminal layout) and/or the admittance policy can be proposed. The fast-time simulations with SHIPMA do not include the human factors in ship handling. In the final stage of the design the SHIPMA study can be followed by a study on a real-time simulator to include human factors and fine-tune the SHIPMA results.

2. Q: Are there papers of case studies in which SHIPMA is used?

A: The following papers are available:

- a. [OPERATIONAL FRAME WORK AND SAFETY STUDIES \(paper\).pdf](#)
- b. [Nautical Safety Study for Marsaxlokk and Valletta \(paper\).pdf](#)

Vessels and tugs

- Q: Why do I need two ship models for one ship with two drafts?
A: Ship models are specific for each ship. Even the same vessel at a different loading condition (loaded or ballasted) is a separate ship model. Reason is that the models consist of a set of hydrodynamic coefficients that are specific for that particular vessel at that loading condition. Coefficients are derived from tank tests and/or large scale measurements.
- Q: Is there the option of inputting the ship main particulars, instead of purchasing ship models?
A: There's no option for this in SHIPMA as each model has it's own coefficients. This makes SHIPMA less general, but more accurate.
- Q: What are the tug capabilities
A: Tugs can be used in push and pull mode and can change from one bollard position to another bollard position during simulation. See [Tug capability diagram.pdf](#)
- Q: Is there a list of standard SHIPMA vessels?
A: The following SHIPMA models are available form our [SHIPMA_Shiplist.pdf](#)
- Q: What if my design vessel is not in the MARIN library?
A: On request vessels can be modelled by MARIN to the specifications of the required design vessel. To be able to model the required design vessel accurately, we require the following [info](#)

Databases

- Q: Is it possible to create databases myself or do I need MARIN for this?
A: It is possible to create databases yourself, starting with editing the provided example files. For complex databases it is advised to involve MARIN

Environment

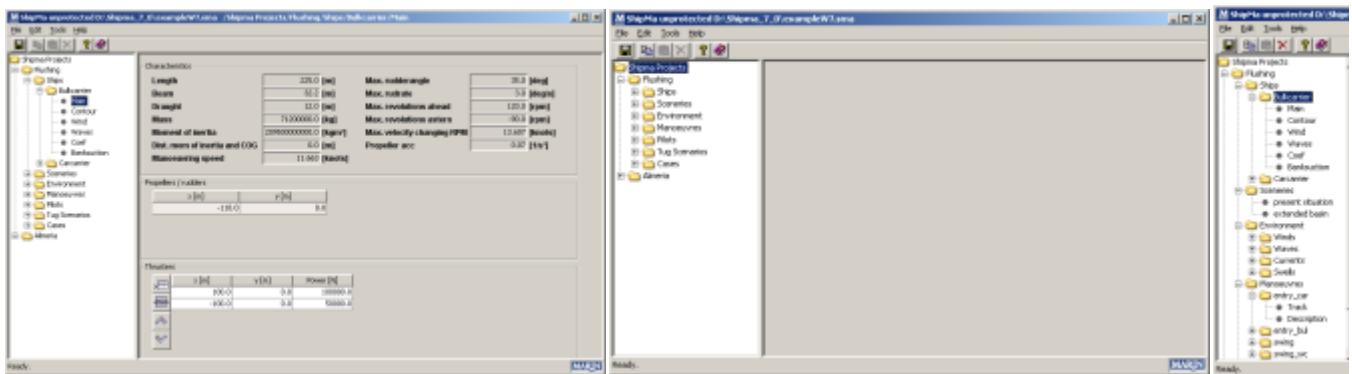
- Q: Do I need to take wind gusts into account with regard to the wind coefficients?
A: The wind-coefficients are based on a average wind speed of 1 hour. So you need not take in account the wind gust in your calculations
- Q: To what wave period in SHIP input is referred?
A: It refers to the wave peak period. By default we include sets for $T_p = 8, 10$ and 12 sec
- Q: How is wave data imported?
A: Wave data is imported as an ASCII file consisting of a line specifying the wave peak period and consecutive lines with:
x, y , significant wave height, wave direction
You can give in any number of points you need

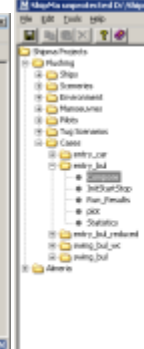
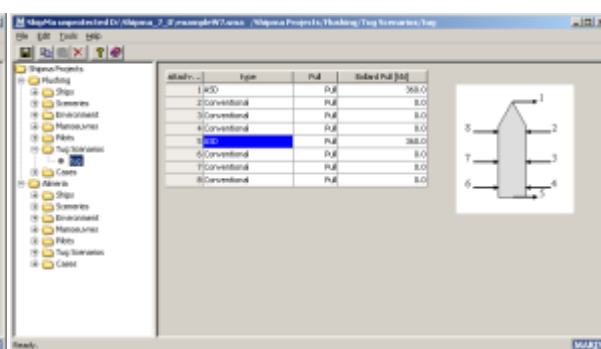
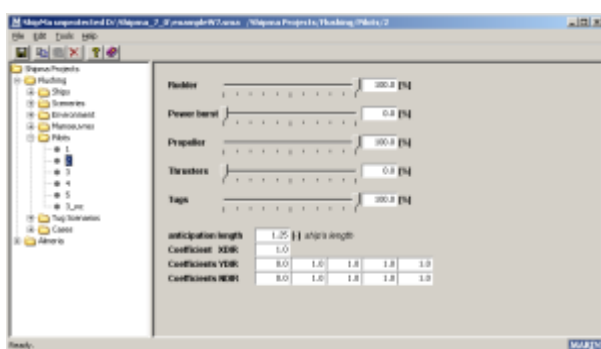
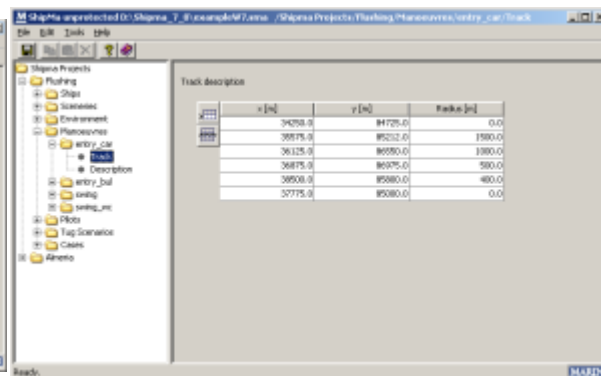
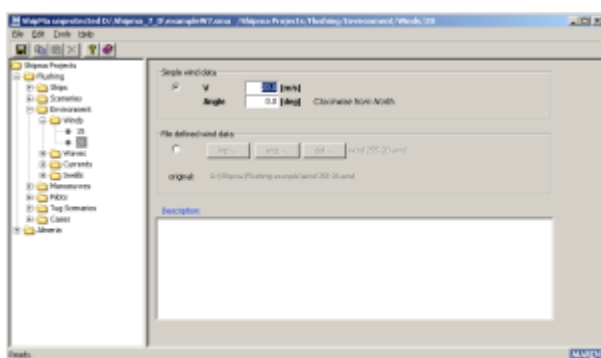
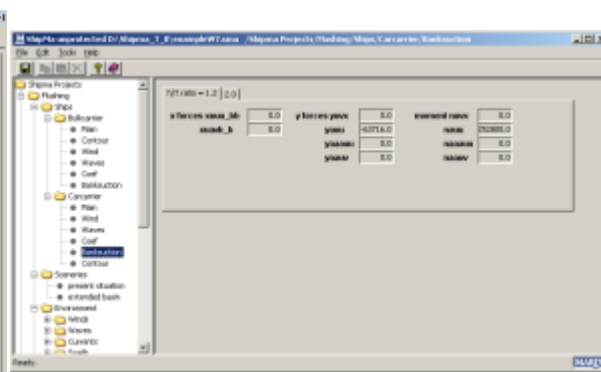
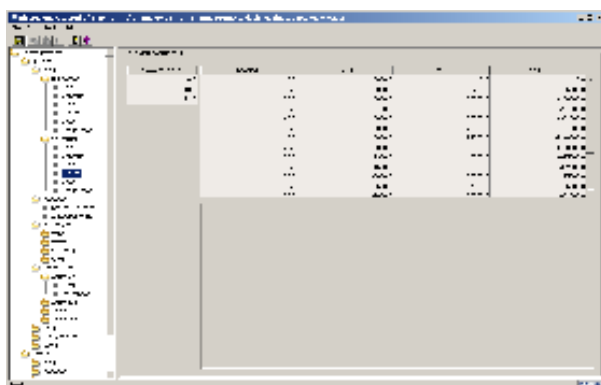
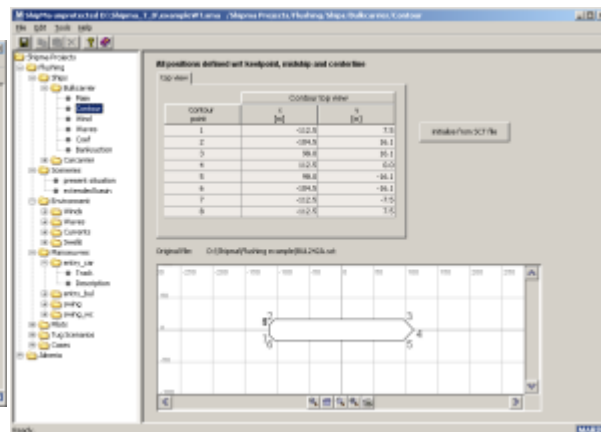
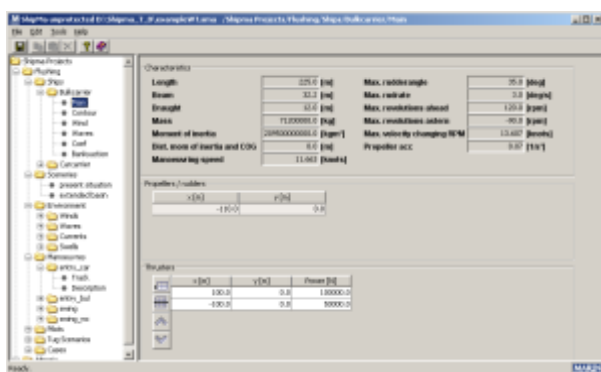
Training

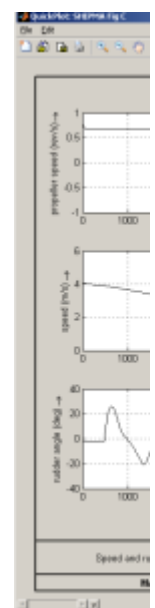
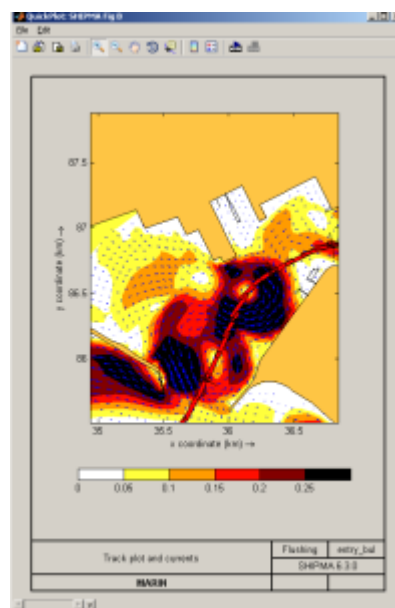
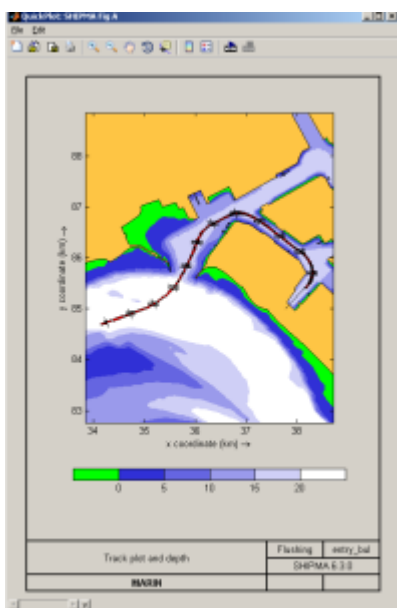
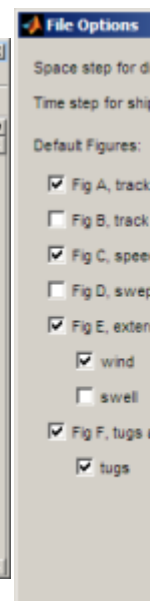
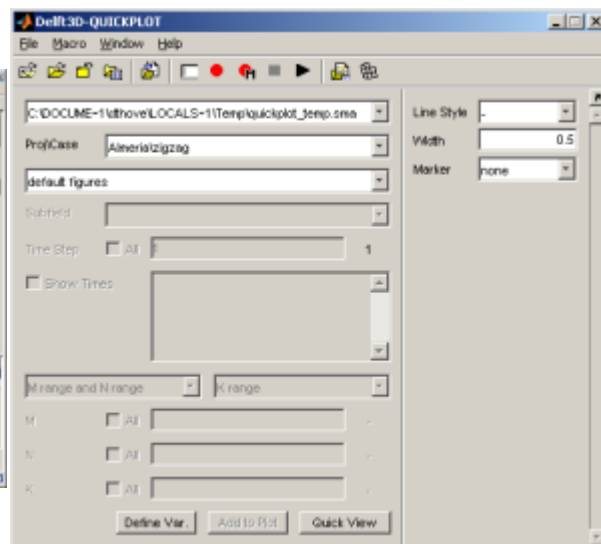
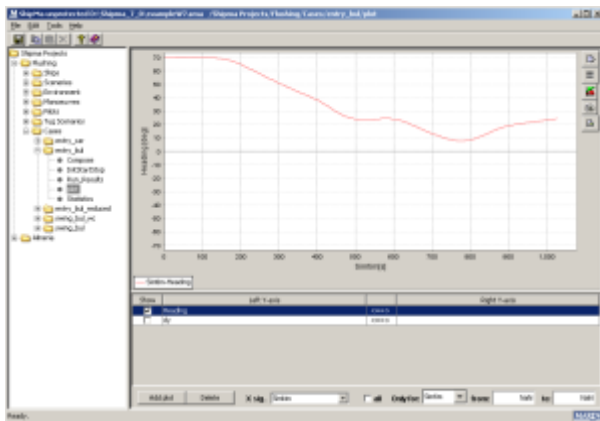
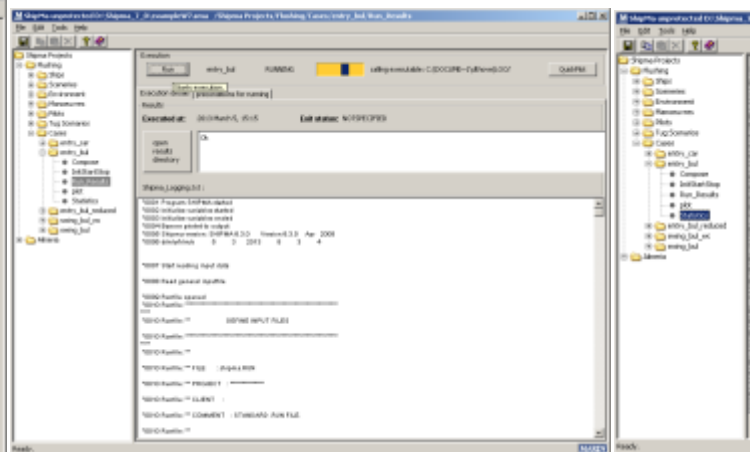
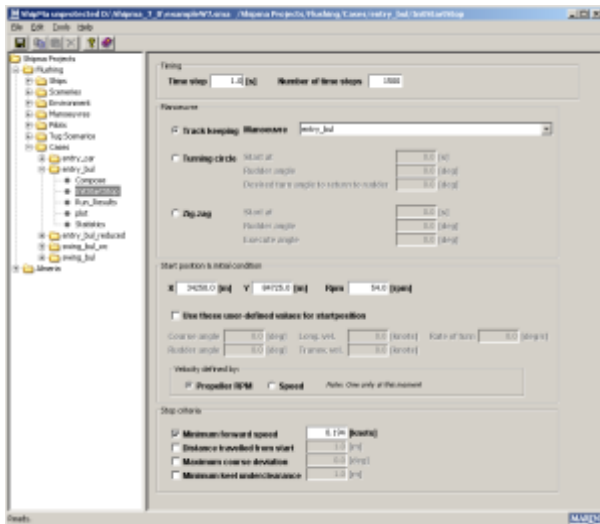
- Q: In what locations are training provided?
A: A training is given in our office in Wageningen, The Netherlands or on request in the clients office. The last option will result in cost for travelling and hotel for one person in addition to the regular training costs
- Q: Is online training provided?
A: Yes, the training can be done online too.

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Screenshots







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