



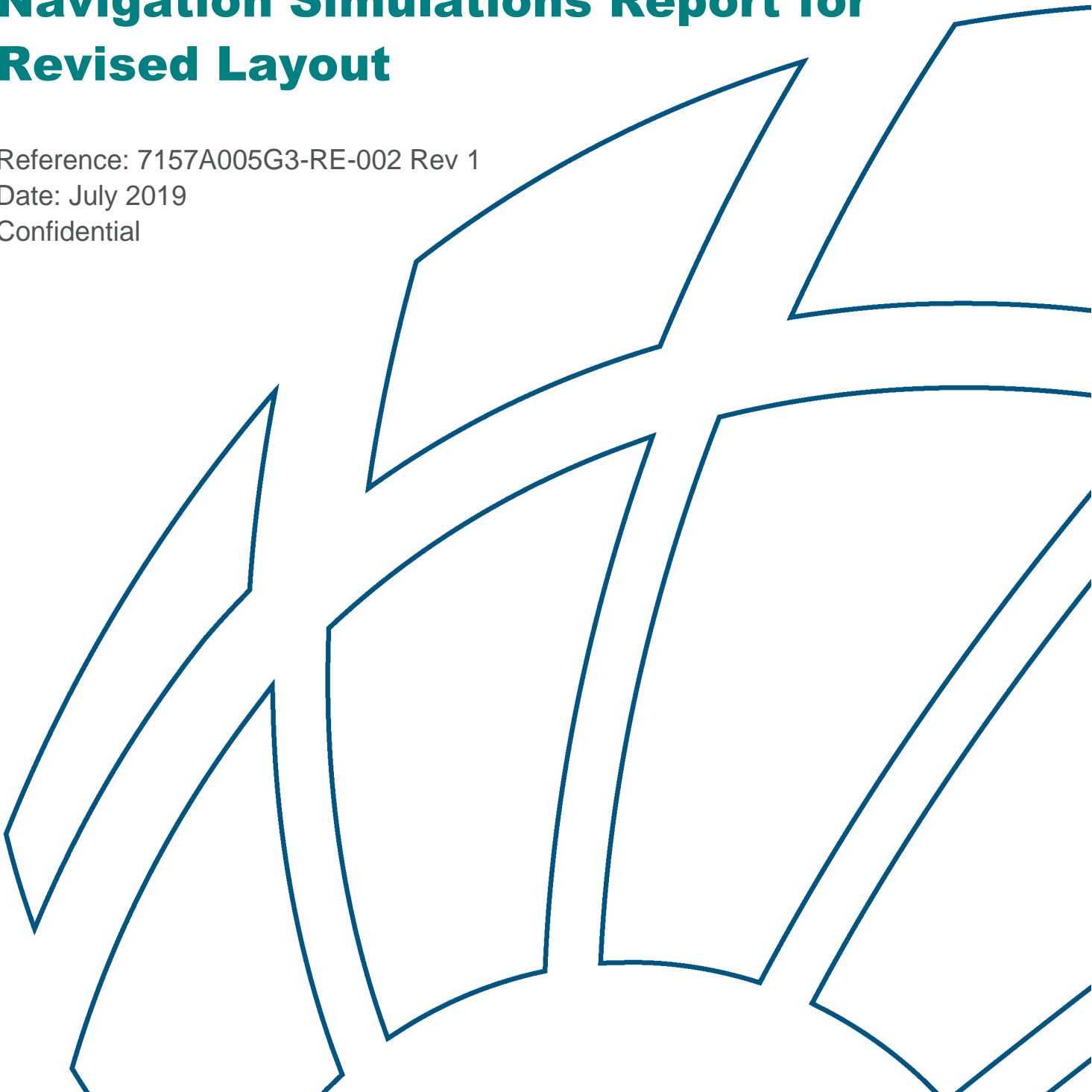
Port Planning Consultancy for the Conceptual Master Plan of the Proposed Westports Expansion

Navigation Simulations Report for Revised Layout

Reference: 7157A005G3-RE-002 Rev 1

Date: July 2019

Confidential





Port Planning Consultancy for the Conceptual Master Plan of the Proposed Westports Expansion

Navigation Simulations Report for Revised Layout

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Executive Summary

BMT has been commissioned to develop a Master Plan for Westports Expansion.

One of planning elements is to identify and evaluate any navigation constraints and risk that potentially brought by the presence of new landform and additional ship calls.

A series of navigation simulation runs were performed with a 3,000 & 22,000 TEU container ships. When the report was presented to the Port Authority, there was concern about the impact of vessels swinging off the proposed berths to through traffic movement. This was taken into consideration and an alternative expansion layout was studied. The expansion was modified to increase the channel width and to create more space for navigation; taking into consideration the findings of the earlier simulation report. A second set of simulation runs was then conducted, this time with 8,100 TEUs and 22,000 TEUs vessels. This set of simulation runs conducted for the alternative layout is the subject of this report.

The simulations were conducted in adverse environmental conditions, that is, in peak currents and in 20 knots winds. The criteria selected for the simulation runs helped establish the upper limits of conditions for movement and appreciation of the potential difficulties expected to be encountered.

Access and departures of the 8,100 TEUs and 22,000 TEUs vessels were conducted satisfactorily under all conditions.

Engagement with the authorities is necessary to take forward a review of the Expansion, which should examine the phasing of the development within Full Mission Ship Simulations (FMSS) for more comprehensive testing and verification by the local authorities and pilots.

1

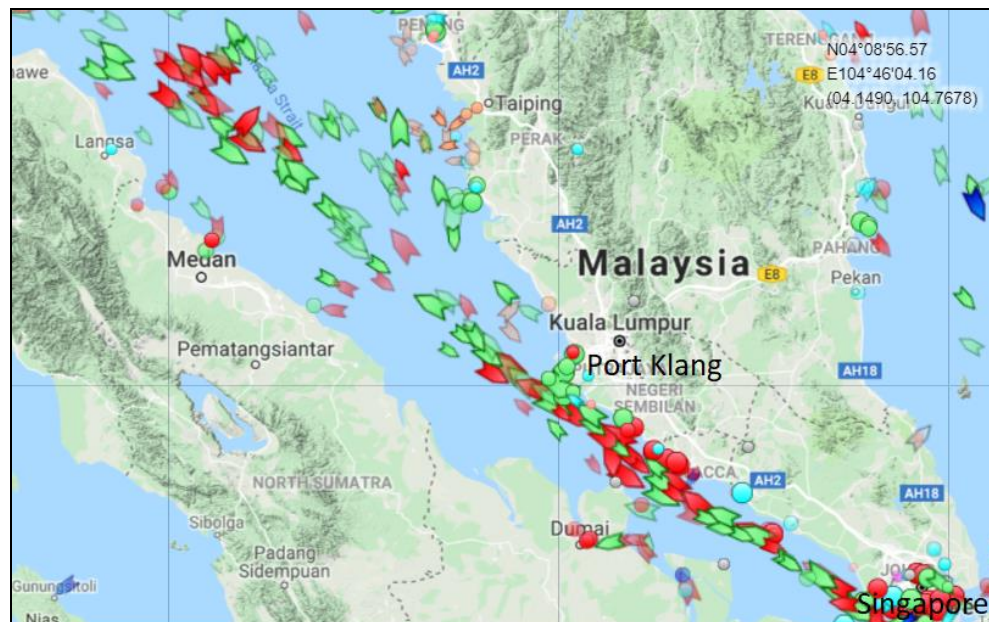
Introduction

1.1

Background

Port Klang is one of Malaysia's prominent ports. Its position off the Strait of Malacca, a major shipping route, has historically made it an important port of call for traders. In addition to its maritime importance, it is centrally located in West Malaysia, close to the economic hub of Kuala Lumpur and connected to the rest of the peninsula by well-developed land and rail links.

Figure 1-1 Port Klang on a Busy Shipping Route



Source: marinetraffic.com

Westports Malaysia Sdn Bhd ("hereinafter Westports") is a major container terminal operator at Port Klang. BMT is supporting Westports to carry out studies for an extension of their container terminal southward.

The extension is designed to accommodate the largest containerships being built today. These vessels have a length of up to 400m and a laden draft as deep as 16.5 metres. As part of the study, desktop navigation simulations were initially conducted using two types of containerships; a 3,000 TEU vessel with a length of 210 metres and a 22,000 TEU vessel with a length of 400 metres. This study takes into account the findings and recommendations of the initial study and was conducted using 8,100 TEUs and 22,000 TEUs vessels.

1.2

Scope of Work

The scope of work for this desktop simulation study is to conduct a preliminary assessment of the proposed layout of the extension and approaches based on the movement of the design vessels to and from the extended area under adverse environmental conditions. The simulation runs will help provide feedback on the adequacy of the existing Aids to Navigation (AtoN), the adequacy of the approach channel and the tugs used when operating in peak environmental conditions.

The scope breakdown is as follows:

- (i) provide feedback on the adequacy of the existing Aids to Navigation (AtoN) for the approach to and from the berths;
- (ii) provide feedback on the manoeuvring of the design vessels in 20 knots wind and peak current conditions based on findings of the desktop simulations; and
- (iii) evaluate some emergency situations that may occur during manoeuvring.

1.2.1

Methodology

The methodology used in conducting the desktop navigation simulations considers reasonable worst-case scenarios that a vessel may be exposed to during transit to and from the proposed extension of the Westports Container Terminal. The assessment considers factors such as vessel manoeuvrability and the support required, site conditions such as sea room and the adverse met-ocean conditions prevalent at the site.

The desktop navigation simulations will help to identify the site constraints, if any, and to provide information for further consideration and decision-making. An experienced Master Mariner with pilotage experience was deployed for the study in order to provide a greater degree of depth in conducting the navigation simulations and evaluation of the simulated situations.

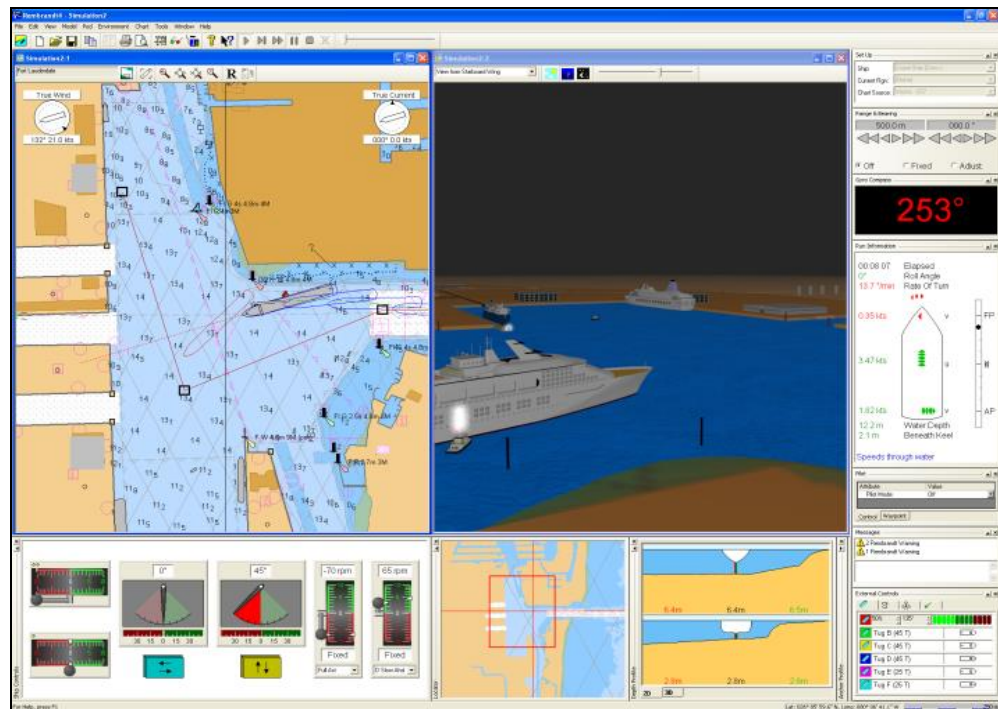
The following sections provide details on the conduct of the desktop navigation simulations.

1.2.2

PC Rembrandt and Vessels

Accurate information on the performance of ships undertaking approach and departure manoeuvres for the purpose of assessing ship handling during transits and berthing is normally provided by ship manoeuvring simulation. BMT has a number of such tools that have been developed in-house over many decades based on a detailed understanding of ship hull hydrodynamics and manoeuvring dynamics. BMT's DNV-approved desktop ship navigation simulator *PC Rembrandt* was the simulator used (Figure 1.2). More details on *PC Rembrandt* are provided in **Appendix A**.

Figure 1-2 Screenshot from Desktop Navigation Simulator PC Rembrandt



Source: BMT

Based on the information provided by the Client, two ship models were used to simulate the 8,100 TEU and 22,000 TEU containerships. The main particulars the vessels used in the simulations are presented in Table 1.1.

Table 1.1: Vessel Particulars

Containership	Length Overall	Beam	Draft	Displacement
8,100 TEUs (Laden condition)	347m	42.8m	14.5m	142,778 tons
22000 TEUs (Laden condition)	400m	61.3m	16.5m	281,919 tons

Source: BMT

Details of the vessels and their manoeuvring characteristics are provided in the Pilot Cards attached as **Appendix B** and **Appendix C**.

1.2.3

Chart

In conducting the navigation simulations, charted information is required for the simulator set-up. The charted information of the area and latest bathymetric information were imported into PC Rembrandt and the proposed terminal extension was then defined to provide a realistic depiction of the site.

1.2.4

Currents and Wind

Currents can be defined in PC Rembrandt as:

- (A) spatial currents, where the current speeds and directions over the study area do not vary; or
- (B) time varying currents in which the current speed and direction changes with time.

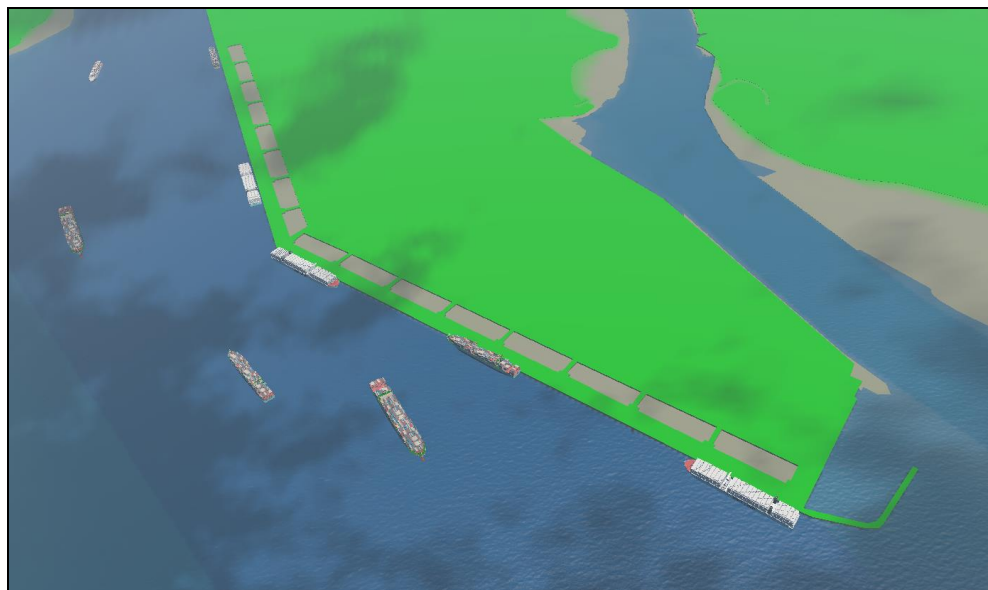
In this study, BMT used the predicted time-varying currents for the post extension scenario modelled by DHI.

In the simulation runs the wind speed was set at 20 knots (gusting) from the Northeast, 20 knots (gusting) from the Northwest and 20 knots (gusting) from the Southwest. Both these wind directions blow across the approach channel.

The simulations provided an insight into:

1. the ability of the design vessel to berth and unberth from their designated berths at the terminal;
2. the “workload” of the manoeuvres and tug actions; and
3. the closeness of approach of the vessel to the edge of the navigable channel, if any, at the approaches to and at the terminal area.

Figure 1-3 Depiction of Proposed Extension at Westports



Source: BMT

1.2.5

Conduct of Simulation Runs

In conducting the simulations using PC Rembrandt, the following data was collected for assessment:

- Control movements required;
- Velocity history of the manoeuvres;
- Heading and rate of heading change assessment;
- Power and RPM history for manoeuvres;
- Tug use assessment; and
- Track Plot

These parameters provided an indication of:

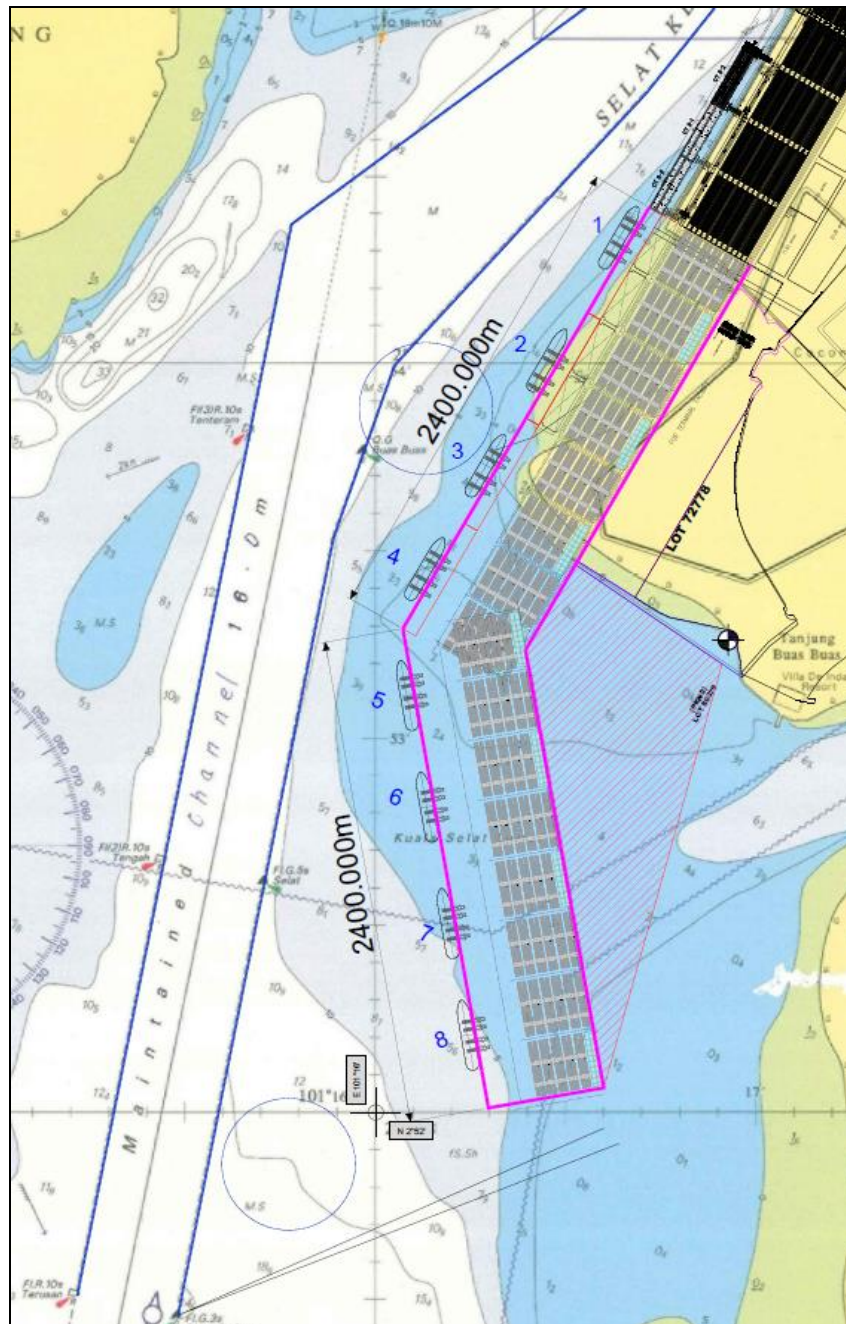
- The ability of the vessel to approach and depart from the terminal under the tested environmental conditions.
- The size and number of tugs required to safely assist the vessel during transit.
- Any constraints to the manoeuvres.

2 Location of Berths

2.1 Location

Figure 2.1 shows the orientation and layout of the proposed additional containership berths at Westports, Port Klang.

Figure 2-1 Port Klang Westports Proposed Extension



Source: BA Chart 2153 superimposed with proposed layout

2.2

Environmental conditions

2.2.1

Climate

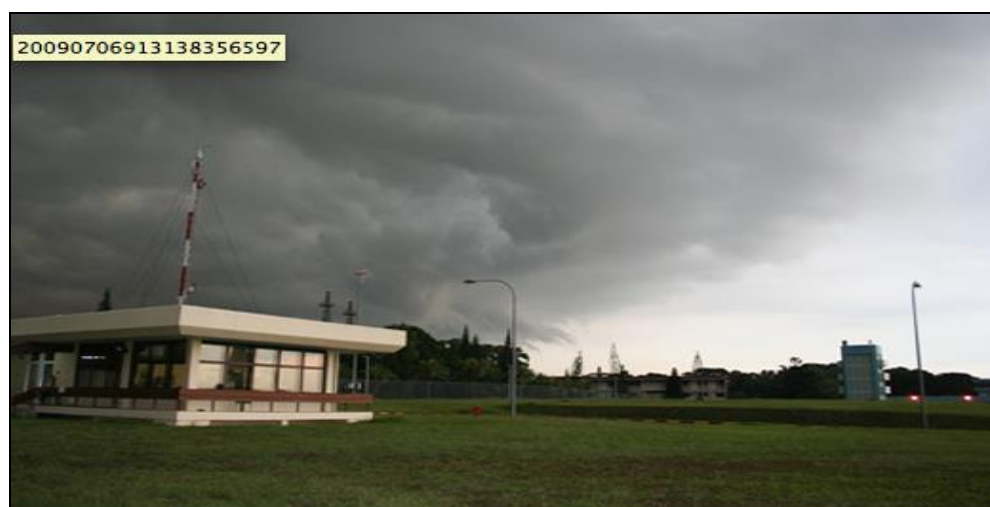
Although Malaysia has an equatorial climate, the narrowness and topographic configuration of each portion—central mountainous cores with flat, flanking coastal plains—facilitate the inland penetration of maritime climatic influences. The climate at Port Klang is characterised by uniform temperature and pressure, high humidity and abundant rainfall. The climate can be divided into two main seasons, the Northeast Monsoon and the Southwest Monsoon season, separated by two relatively short inter-monsoon periods.

During the Northeast Monsoon, from December to early March, Northeast winds prevail, sometimes reaching 20 km/h. Cloudy conditions are common in December and January with frequent afternoon showers. Spells of widespread moderate to heavy rain sometimes last from 1 to 3 days at a stretch. It is relatively drier in February till early March. This is also a generally windy period with wind speeds sometimes reaching 30 to 40 km/h in the months of January and February.

From late March to May is the transition period before the Southwest Monsoon. Light and variable winds are experienced during this period with afternoon and early evening showers often with thunder.

The Southwest Monsoon season is from June to September. Winds are generally from the Southeast to Southwest quadrant. Rainfall is from isolated to scattered late morning and early afternoon showers. Early morning 'Sumatra' line squalls are common. Wind gusts of up to 50 knots have been recorded during the passage of a 'Sumatra'. Haze is sometimes experienced during this period.

Figure 2-2 Approach of a Line Squall



Source: nea.gov.sg

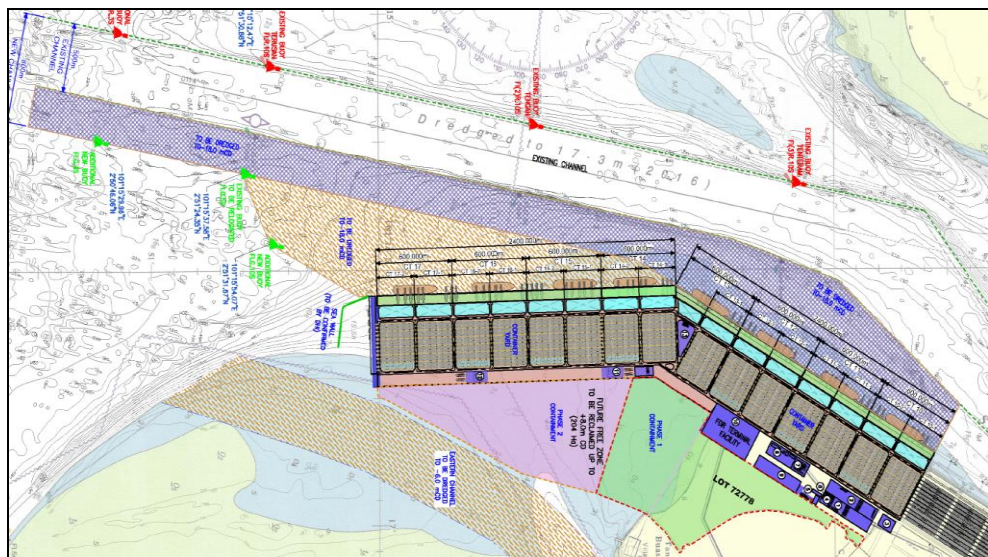
October to November is again a transition period, this time before the Northeast Monsoon. It is a period of light and variable winds and afternoon sea breezes. There are scattered showers with thunder in the late afternoon and early evening.

2.2.2

Bathymetry

The proposed terminal is located over reclaimed land to the south of Pulau Indah. The planned approaches to the berths are designed to be dredged to -18 metres CD for Berths CT10 to CT17. The main approach channel is at -18 metres CD and it will be widened from 500m to 800m at the entrance.

Figure 2-3 Bathymetry at Proposed Extension of Terminal



2.2.3

Tidal levels

The tidal water levels in the area of interest are presented in Table 2.1.

Table 2-1 Tidal Levels at Port Klang

Tide Descriptor	PORT KLANG
HAT	5.82m
MHWS	5.09m
MHWN	3.72m
MLWN	2.35m
MLWS	0.98m
LAT	Zero

Source: Port Klang Malaysia Marine Information Handbook Fourth Revision 01 Feb 2018

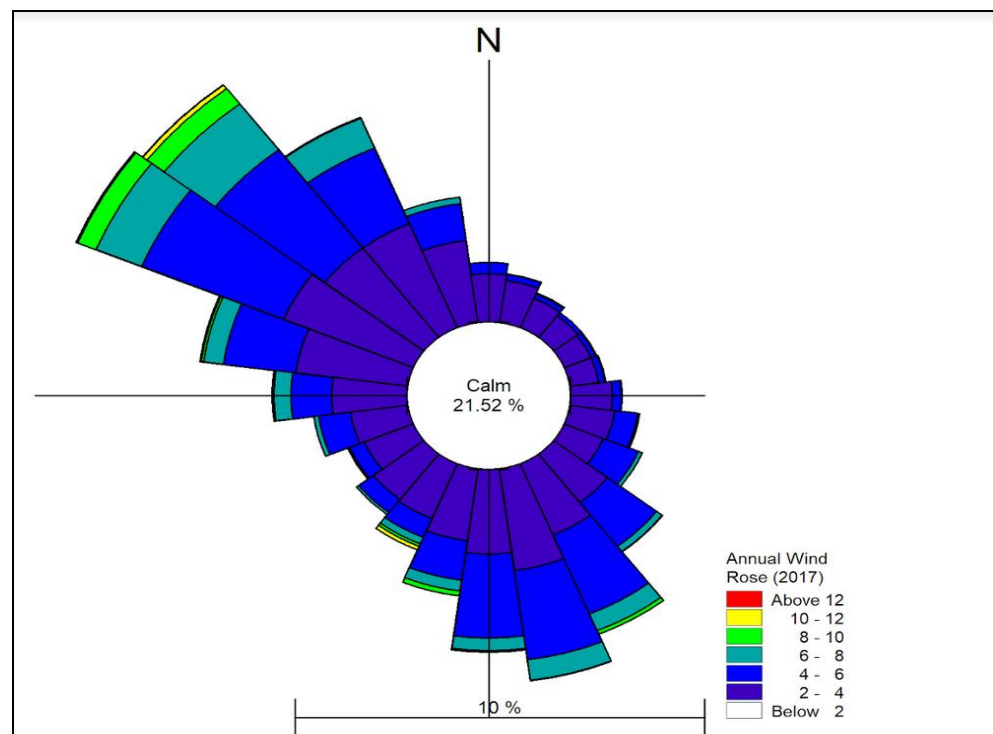
2.2.4

Winds

The wind speeds and direction for Port Klang are presented in Figure 2.4.

During the short squall periods, when wind speeds are high, vessels can avoid approaching or departing from the site by holding off until conditions improve with the passing of the squall.

Figure 2-4 Annual Wind Rose at Port Klang



Source: DHI

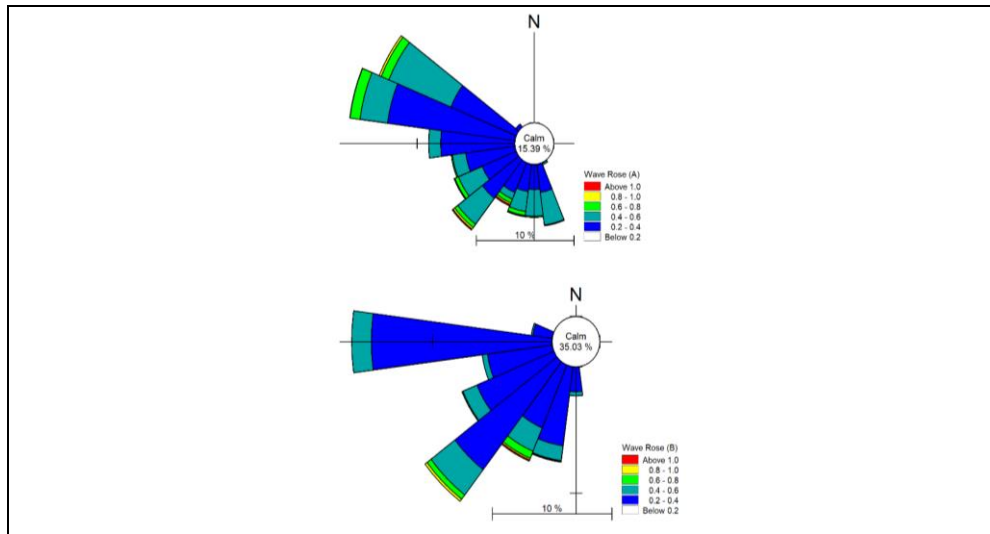
2.2.5

Waves

Based on information provided by DHI, the significant waves in the Strait of Malacca off Port Klang are from the southwest and northwest. Wave heights are predicted to be less than 1 metre of the berths, allowing for normal harbour tug operations.

The wave rose of the study area is presented in Figure 2.5.

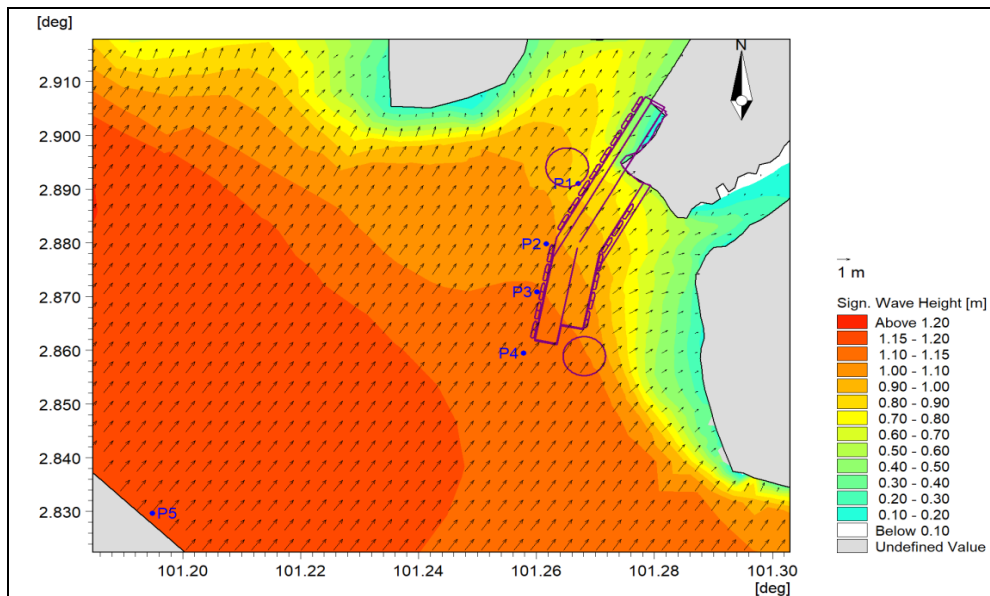
Figure 2-5 Wave Rose for the study



Source: DHI

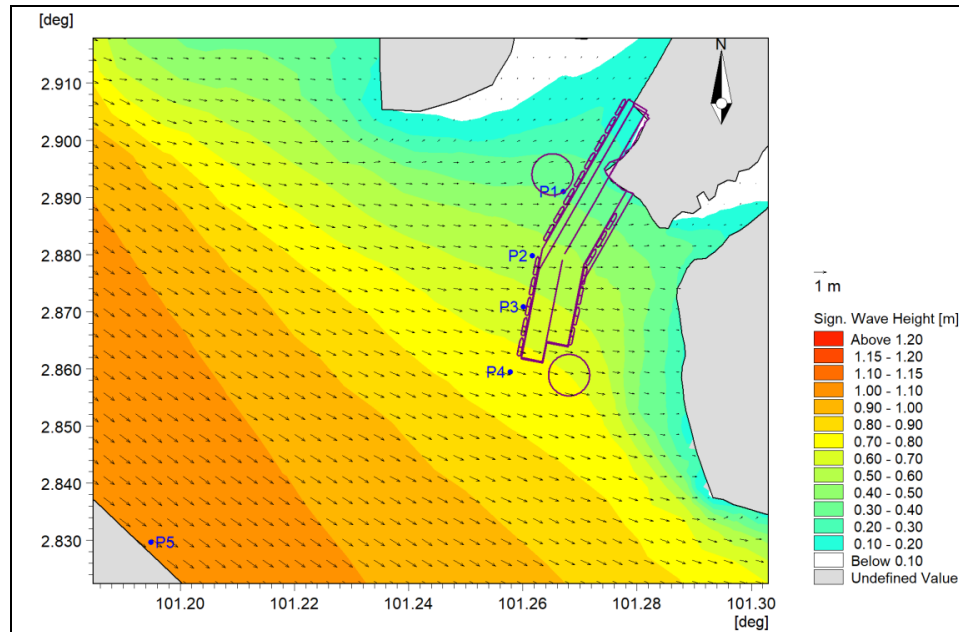
Snapshots of the simulated wave conditions used for the navigation simulations are presented in Figure 2.6 and 2.7.

Figure 2-6 Southwest Wave Field (initial layout illustrated, since s/s)



Source: DHI

Figure 2-7 Northeast Wave Field (initial layout illustrated, since s/s)



Source: DHI

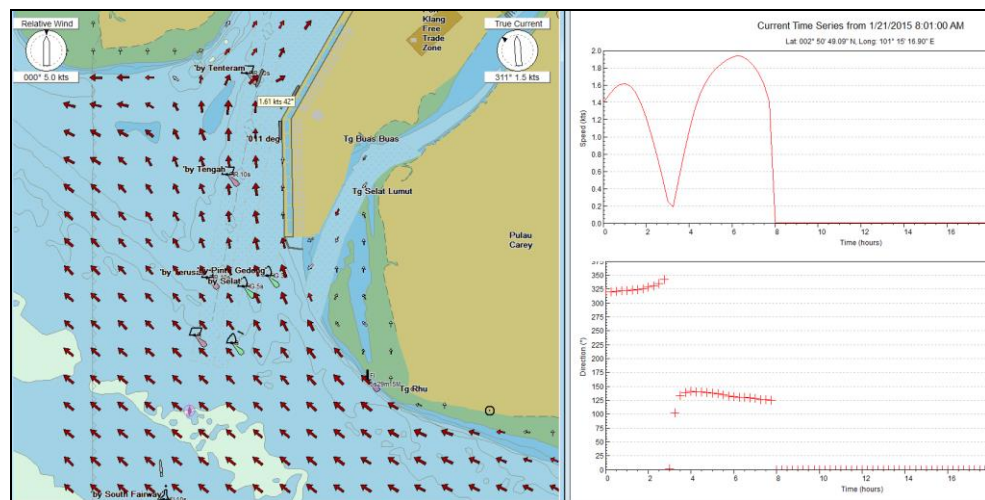
2.2.6

Currents

Tides at the project site are semi-diurnal. The flood current in the region flows from north to south and the ebb from south to north.

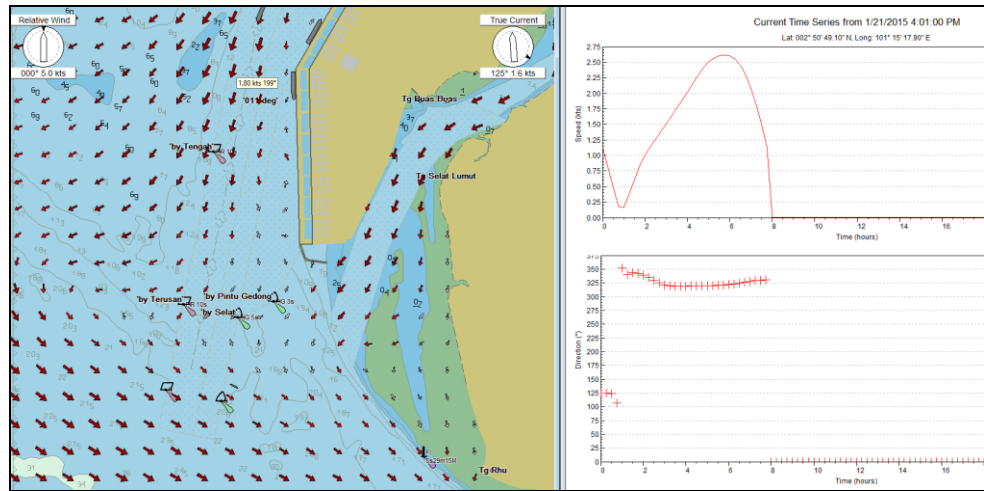
Extract of the 24 hours current profile used for the navigation simulations are presented in 8 hours interval (Figure 2.8, Figure 2.9 and Figure 2.10). The current profile is measured between the channel entrance buoys.

Figure 2-8 Current Profile 1



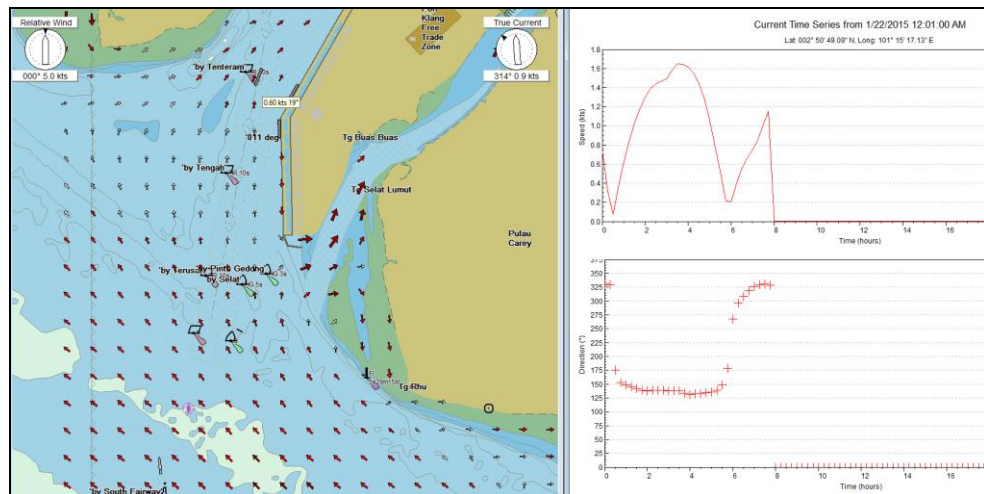
Source: BMT

Figure 2-9 Current Profile 2



Source: BMT

Figure 2-10 Current Profile 3



Source: BMT

2.3

Simulation Approach

PC Rembrandt simulator (**Appendix A**) was used to simulate the manoeuvring of the two containerships in laden conditions. A total of 66 simulations runs were conducted to berth and unberth the vessel at the proposed berths. The tugs deployed in the simulation runs had a maximum of 60 tons bollard pull. In the berthing scenarios, two 45 tons and four 60 tons bollard pull tugs were used for berthing and unberthing of the 8,100TEU and 22,000TEU containerships, respectively. More tug power could be deployed if necessary.

The programme of simulations is described later in this section and the results are summarised in Section 4 of this report. The full details of the simulation runs are presented in **Appendix D**.

As the simulation exercises cannot comprehensively emulate operational situations in the real world, such as fatigue, tug master error, deficiencies in tug power, condition of the ship's engine, etc., limits are normally introduced in the simulations conducted whenever possible. These limits are:

- (a) ship's engines to be used at a maximum of Half Power;
- (b) rudder angle to be used set at a maximum of 20 degrees;
- (c) tugs to be used at a maximum of ½ Power, if possible, for a safe manoeuvre.

If the wind and/or current conditions in the simulations made control of the vessels difficult, the above limits were relaxed in order to determine the forces required to control the vessel under the adverse environmental conditions.

2.4

Simulation programme

The planned desktop navigation simulation run matrix is presented in Table 3.1.

Table 2-2 Navigation Simulations Run Matrix

Westports Phase 2	Berthing		Unberthing	
	20 knots NE Wind	20 knots SW Wind	20 knots NE Wind	20 knots SW Wind
CT 13 – 8,100 TEU Container Vessel with LOA of 347m				
Peak Flood Currents	2	2	2	2
Peak Ebb Currents	2	2	2	2
CT 14 – 8,100 TEU Container Vessel with LOA of 347m				
Peak Flood Currents	2	2	2	2
Peak Ebb Currents	2	2	2	2
CT 10 – 22,100 TEU Container Vessel with LOA of 400m				
Peak Flood Currents	2	2	2	2
Peak Ebb Currents	2	2	2	2
CT 17 – 22,000 TEU Container Vessel with LOA of 400m				
Peak Flood Currents	2	2	2	2
Peak Ebb Currents	2	2	2	2
Total	16	16	16	16
64 Runs				

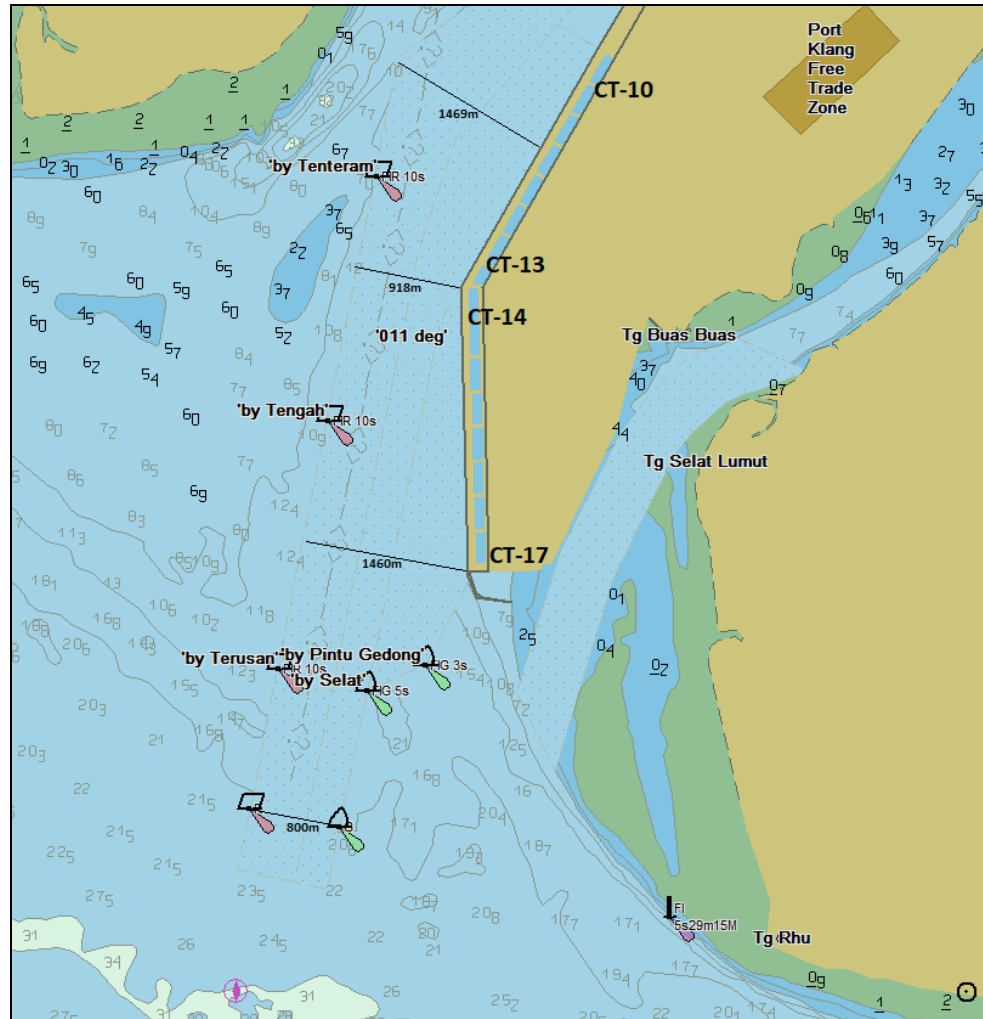
The simulation programme was designed to evaluate the feasibility of the proposed port expansion design taking into consideration the manoeuvrability of the ship (assisted by tugs) and the ability to maintain control in the wind and current conditions simulated. It is envisaged that more comprehensive simulations will be undertaken to optimise the manoeuvres and develop best practices using the finalised port design and operating conditions.

Note: No emergency runs were conducted as similar situations were evaluated in the previous set of simulations.

3 Simulation Results

Depending on the vessel size, the berths used for conducting navigation simulations are presented in Figure 4.1.

Figure 3-1 Berths and Channel Widths in Alternative 2 Layout



The degree of difficulty is assessed qualitatively. The following table presents guidance used to assess the degree of difficulty in the simulation runs.

Table 3-1 Degree of Difficulty in Simulation Runs

Degree of Difficulty	General description	Scale
No Danger	Could be executed by shipmaster with little or no experience, e.g. anchoring in an open anchorage without any vessels around.	0/6
Very Safe	Could be executed by a shipmaster exercising due diligence.	1/6
Safe	Could be executed by shipmaster assisted by qualified pilot.	2/6
Challenging	Could be executed by shipmaster and qualified pilot, with adequate tug assistance.	3/6
Difficult	Could be executed by shipmaster and experienced pilot, with adequate tug support.	4/6
Very Difficult	Challenging physical or environmental conditions. Small margin of error. Could be executed by shipmaster and experienced pilot with adequate tug support and possibly, with external guidance, e.g. dockmaster.	5/6
Not Feasible	Manoeuvre not feasible. Physical or environmental conditions too overwhelming for vessel even with assistance of experienced pilot and adequate support, e.g. tidal height insufficient for vessel to transit.	6/6

3.1

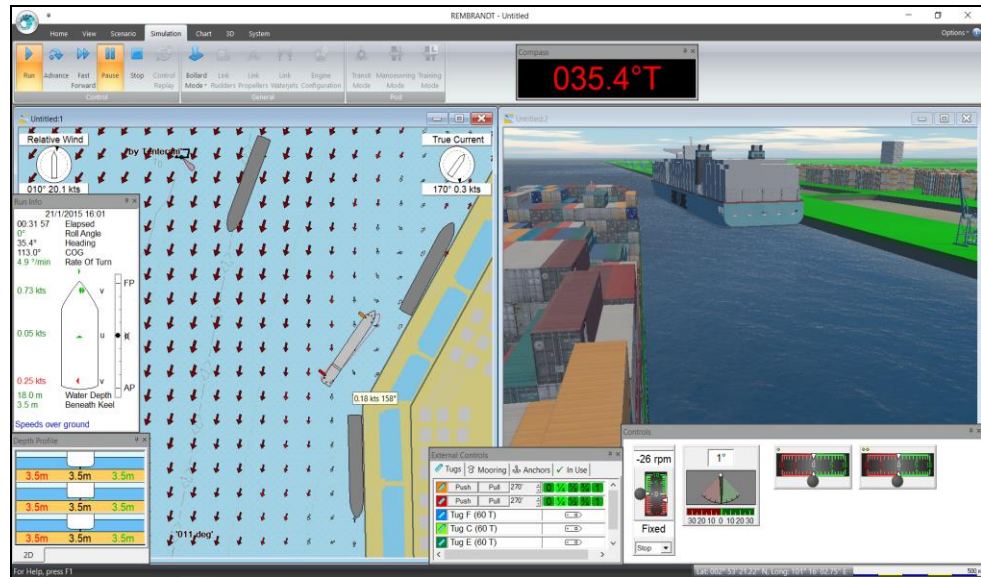
Summary of Runs

3.1.1

CT 13 - 8,100 TEU Containership Simulation Runs

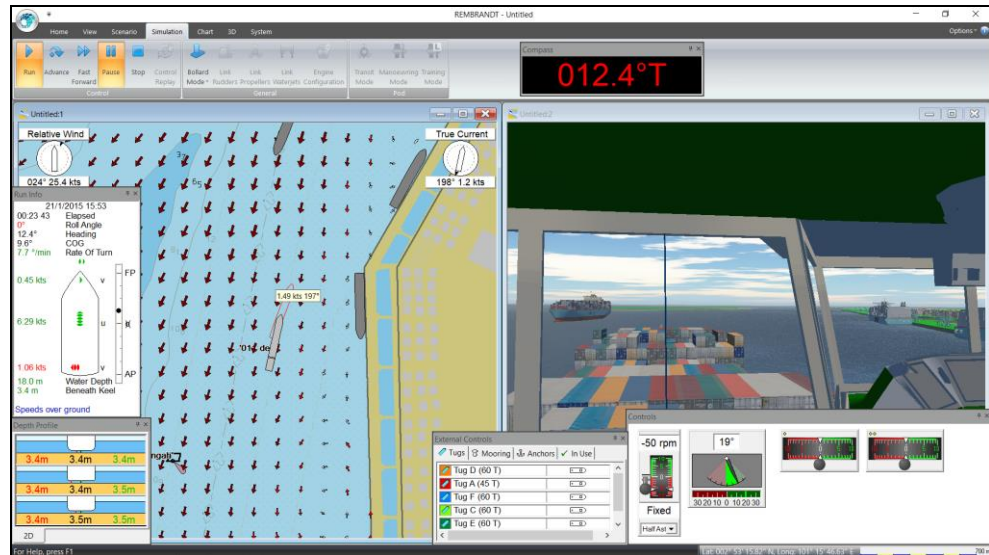
Run 1

R1WPCT13NE20kFld1530hT60tx2StbdArr.rmb

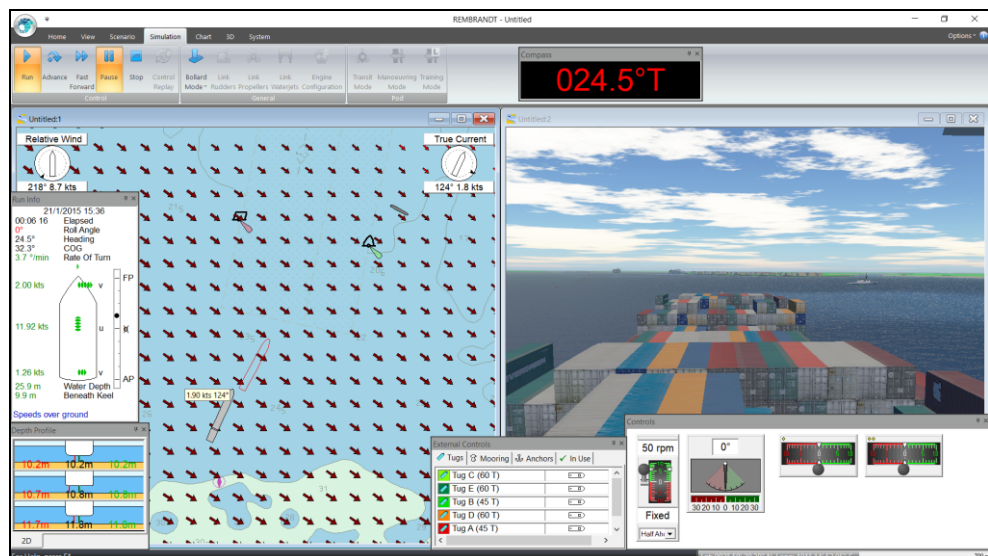


The vessel experienced a strong set to starboard when approaching the entrance to the South Channel. She entered the channel at a speed of about 11 knots and kept the engine at Half Ahead until she passed the Selat Buoy. After the Selat Buoy, the south-easterly current flow shifted to a more southerly direction. The vessel was therefore stemming the current in the latter part of her approach to the berth. Off the berth, a weak counter current was experienced. Two 60 tons bollard pull tugs were made fast and they worked at Slow Power to push the vessel to the berth.

Degree of difficulty: 3/6

Run 2**R2WPCT13NE20kFId1530hT45tx2StbdArr.rmb**

The vessel experienced a strong set to starboard when approaching the entrance to the South Channel. She entered the channel at a speed of over 11 knots and kept the engine at Half Ahead until she passed the Selat Buoy. After the Selat Buoy, the vessel was generally stemming the current. She remained in the channel until close to the berth. Two 45 tons bollard pull tugs were then made fast and assisted in pushing her alongside operating at a maximum of Half Power.

Degree of difficulty: 3/6**Run 3****R3WPCT13SW20kFId1530hT45tx2StbdArr.rmb**

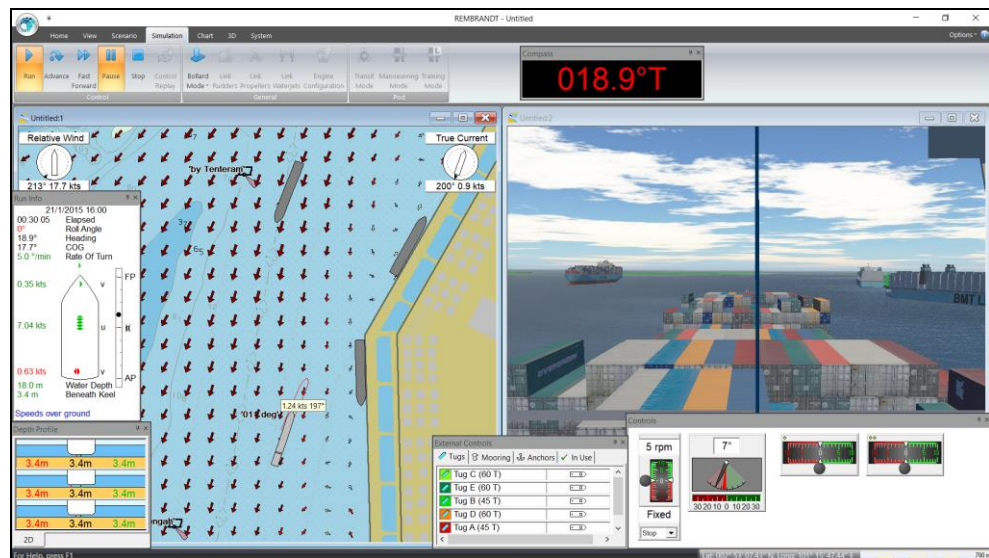
The vessel experienced a strong set to starboard when approaching the entrance to the South Channel. She entered the channel at a speed of over 11 knots and

kept the engine at Half Ahead until she passed the Selat Buoy. After the Selat Buoy, the vessel was generally stemming the current. She remained in the channel until close to the berth. Two 45 tons bollard pull tugs were then made fast and assisted in pushing her alongside operating at a maximum of Half Power.

Degree of difficulty: 3/6

Run 4

R4WPCT13SW20kFId1530hT45tx2StbdArr.rmb



The vessel experienced a strong set to starboard when approaching the entrance to the South Channel. She entered the channel at a speed of about 7.5 knots and kept the engine at Slow Ahead until CT-14. The engine was stopped and Half Astern was ordered. As the speed dropped, two 45 tons bollard pull tugs were made fast. After the vessel 'pulled up', the tugs assisted in pushing her alongside operating at a maximum of Half Power.

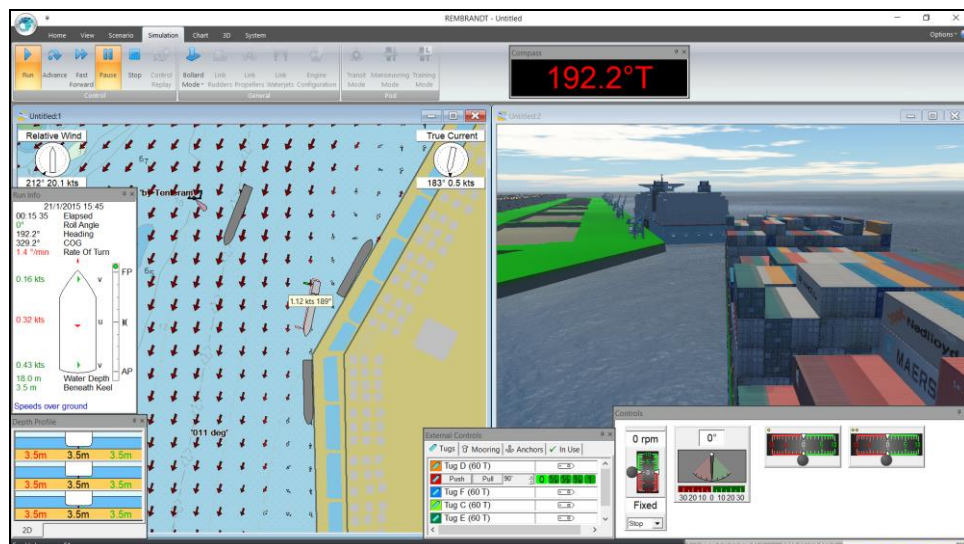
Degree of difficulty: 3/6

Run 5**R5WPCT13NE20kFId1530hT45tx2StbdDep.rmb**

The vessel was pulled off the berth using two 45 tons bollard pull tugs and swung to port. The tugs operated at a maximum of Half Power. After swinging around the vessel proceeded to sea at Slow Ahead, transiting the channel at over 9 knots.

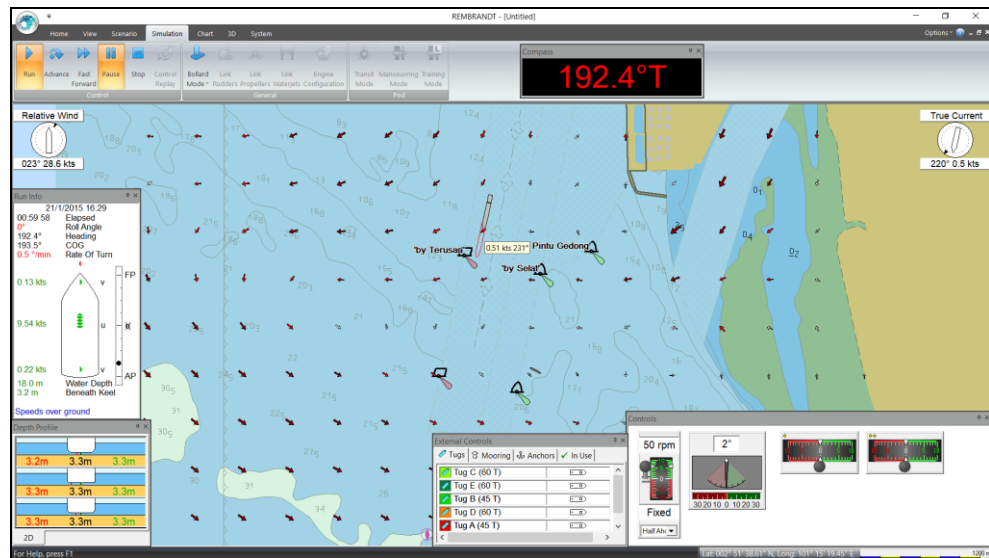
Minimum available channel clearance for through traffic: 495 metres.

Degree of difficulty: 3/6

Run 6**R6WPCT13NE20kFId1530hT45tx2PortDep.rmb**

The vessel was pulled off the berth using two 45 tons bollard pull tugs. The tugs operated at a maximum of Half Power. When clear of the berth, the vessel proceeded to sea, transiting the channel at Half Ahead (speed over 12 knots).

Degree of difficulty: 3/6

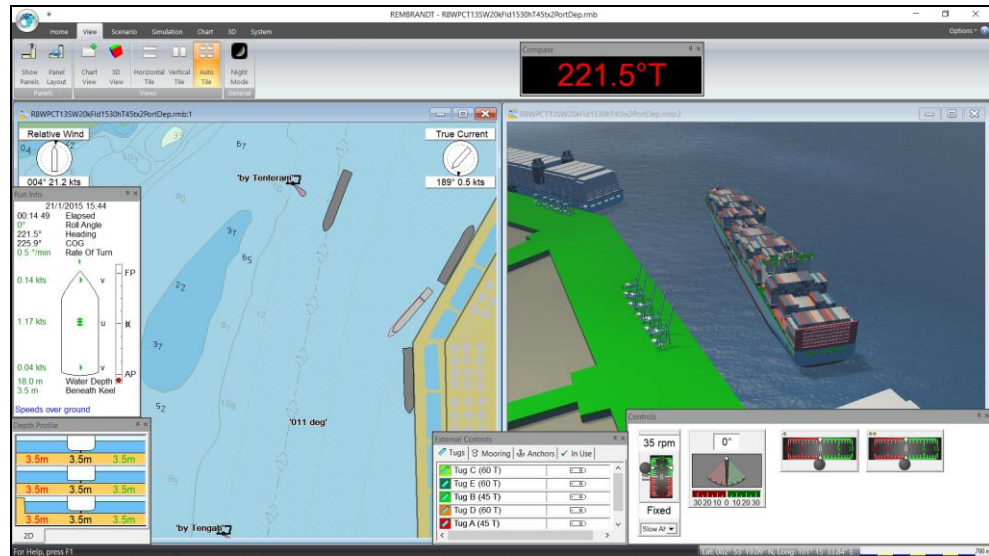
Run 7**R7WPCT13SW20kFId1530hT45tx2StbdDep.rmb**

The vessel was pulled off the berth using two 45 tons bollard pull tugs. The stern opened up faster initially and this was used to advantage to get the SW wind on the starboard side in order to clear it off the berth as far as possible before commencing the swing to port. As it moved further away, the stronger flood current at mid-stream slowed the movement of the stern away from the berth. The aft tug was stopped, and the forward tug then pulled at Half Power to swing to port with the assistance of helm and engine. After completion of the swing, the vessel proceeded to sea, transiting the channel at Half Ahead (speed over 12 knots).

Note: during the flood current, a weak flow to the west was noticed near the Terusan Buoy.

Minimum available channel clearance for through traffic: 500 metres.

Degree of difficulty: 3/6

Run 8**R8WPCT13SW20kFId1530hT45tx2PortDep.rmb**

The vessel was pulled off the berth using two 45 tons bollard pull tugs. When the bow was heading into the wind, the true tugs were stopped and the vessel proceeded to sea. The tugs operated at a maximum of Half Power.

Degree of difficulty: 3/6

Run 9**R9WPCT13NE20kEbb2130hT45tx2PortArr.rmb**

The vessel experienced a strong set to port in the ebb current when approaching the entrance to the dredged channel. She was manoeuvred at Half Ahead, close to the starboard buoys in order to keep off the outbound channel. When approaching

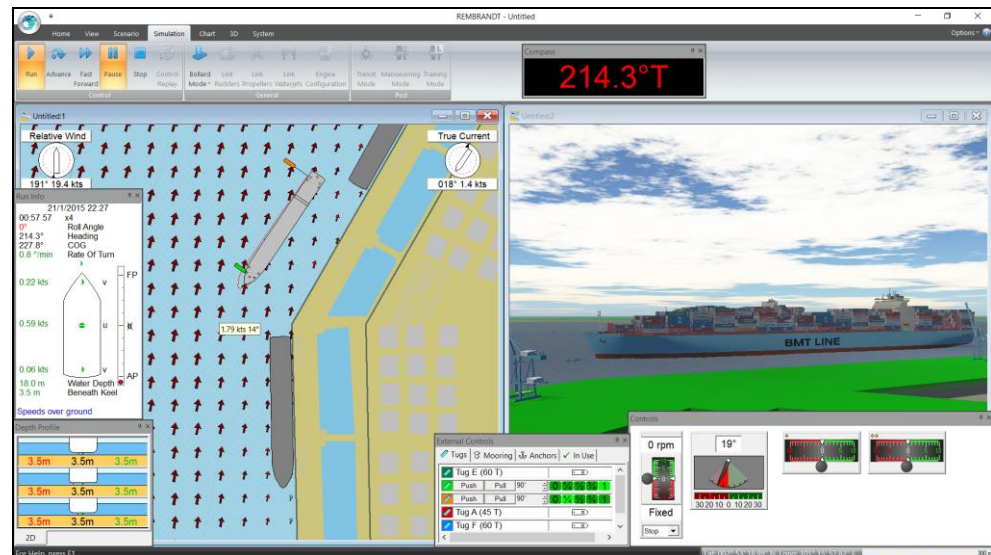
the berth, the speed was reduced and two 45 tons bollard pull tugs were made fast on the starboard bow and starboard quarter. The tugs assisted in swinging the vessel to starboard of the berth and pushing her alongside. Even after taking care to keep the bow north of the 'knuckle', close to the berth, the forward tug had to operate at Full Power to push the bow against the current. Taking this into consideration, it may be prudent to deploy a 60 tons bollard pull tug forward in peak current conditions.

Minimum available channel clearance for through traffic: 400m

Degree of difficulty: 4/6

Run 10

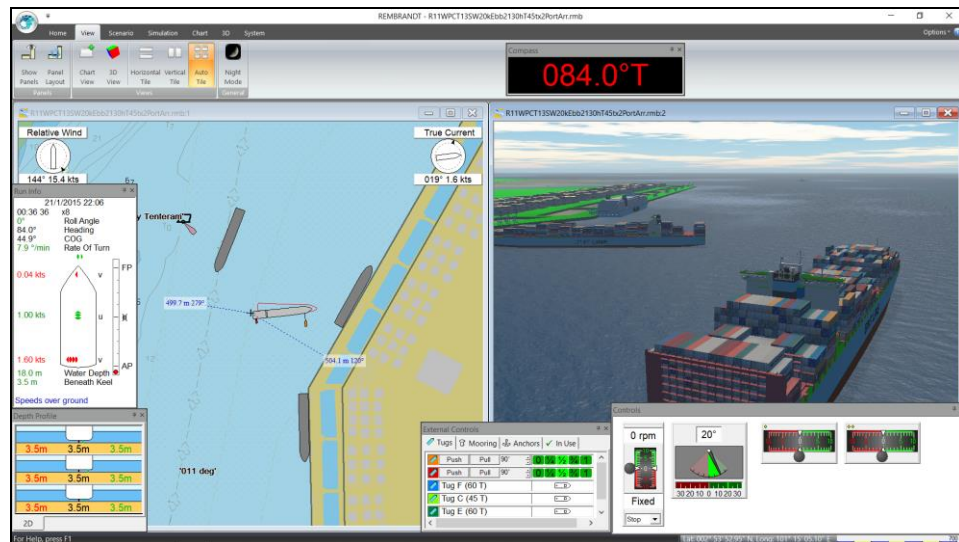
R10WPCT13NE20kEbb2130hT45tx2PortArr.rmb



The vessel experienced a strong set to port in the ebb current when approaching the entrance to the dredged channel. She was manoeuvred at Half Ahead, close to the starboard bouys in order to keep off the outbound channel. When approaching the berth, the speed was reduced and two 45 tons bollard pull tugs were made fast on the starboard bow and starboard quarter. The tugs assisted in swinging the vessel to starboard of the berth and pushing her alongside. The forward tug had to operate at Full Power to push the bow against the current. Taking this into consideration, it may be prudent to deploy a 60 tons bollard pull tug forward in peak current conditions. Alternatively, more clearance from the 'knuckle' will allow the vessel to avoid the 'push-off' at the 'knuckle'.

Minimum available channel clearance for through traffic: 530m

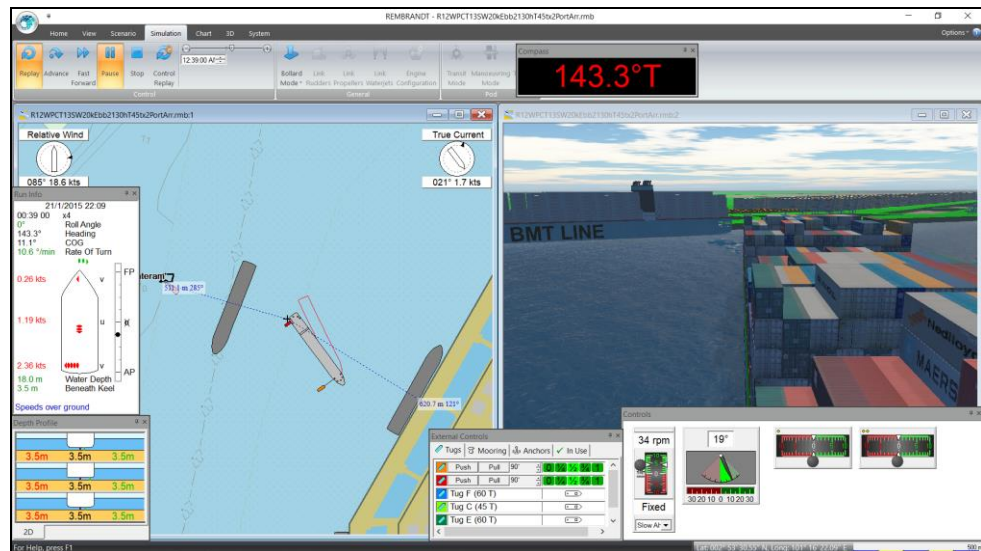
Degree of difficulty: 4/6

Run 11**R11WPCT13SW20kEbb2130hT45tx2PortArr.rmb**

Approaching the channel entrance, the vessel experienced a strong set to port in the ebb current. She was manoeuvred at Half Ahead, close to the starboard buoys in order to keep clear of the outbound channel. When approaching the berth, the speed was reduced and two 45 tons bollard pull tugs were made fast on the starboard bow and starboard quarter. The tugs assisted in swinging the vessel to starboard, off the berth, and pushing her alongside. When approaching 'knuckle', the forward tug had to operate at $\frac{3}{4}$ Power to push the bow against the current.

Minimum available channel clearance for through traffic: 500m.

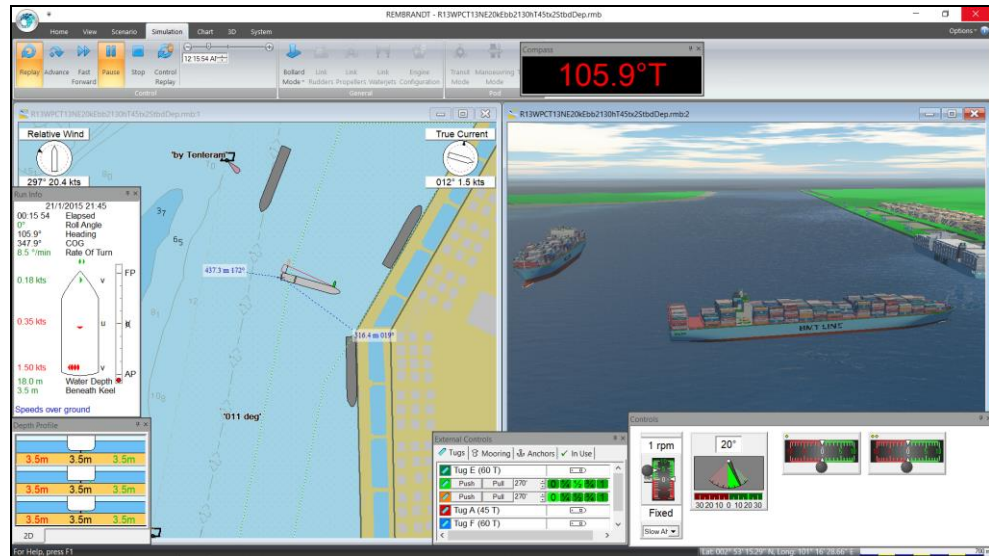
Degree of difficulty: 4/6

Run 12**R12WPCT13SW20kEbb2130hT45tx2PortArr.rmb**

Approaching the channel entrance, the vessel experienced a strong set to port in the ebb current. She was manoeuvred at Half Ahead, closer to the starboard buoys in order to keep clear of the outbound channel. When approaching the berth, the speed was reduced and two 45 tons bollard pull tugs were made fast on the starboard bow and starboard quarter. The tugs assisted in swinging the vessel to starboard. As she swung the vessel closed in on the ship at Berth CT 9. Astern engine was given to create more room for the swing. When the vessel was stemming the current, the approach was made to the berth. When approaching 'knuckle', the forward tug had to operate at Full Power to push the bow against the current.

Minimum available channel clearance for through traffic: 510m.

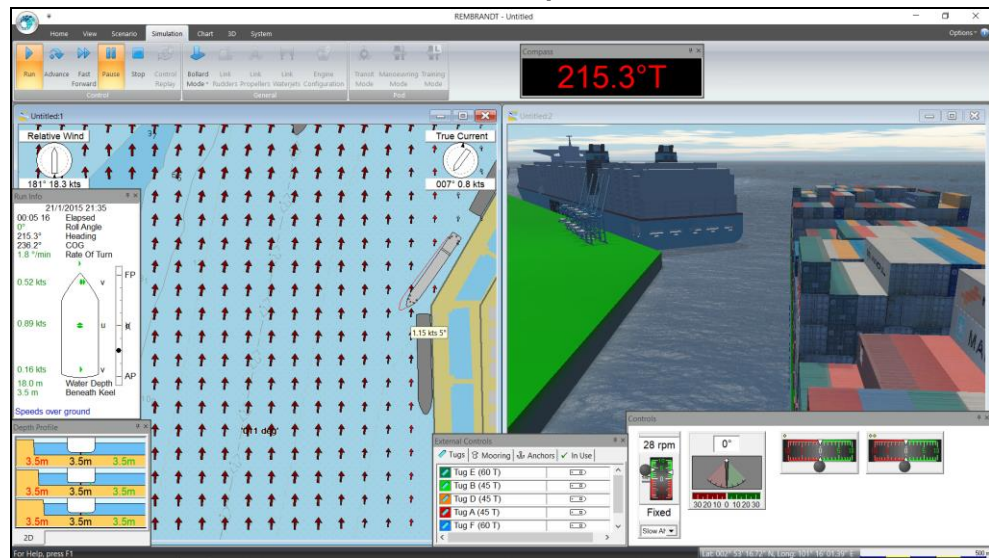
Degree of difficulty: 4/6

Run 13**R13WPCT13NE20kEbb2130hT45tx2StbdDep.rmb**

The vessel was pulled off the berth using two 45 tons bollard pull tugs and swung to starboard. The stronger midstream current helped to swing the stern around and the swing was completed after about 40 minutes and the vessel proceeded to sea at Slow Ahead after letting go the tugs. With a speed of about 7 knots a strong set to starboard was experienced after passing the Terusan Buoy. The heading was adjusted to between 175 and 180 degrees to counter the set and clear the channel safely. It is not recommended for two large deep drafted vessels to pass each other at the entrance of the channel under such environmental conditions.

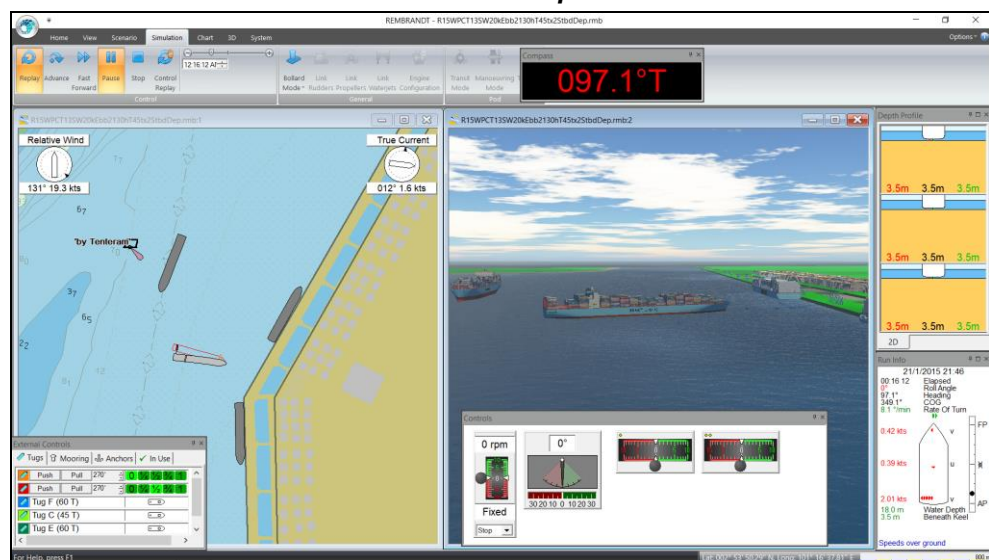
Minimum available channel clearance for through traffic: 435m

Degree of difficulty: 3/6

Run 14**R14WPCT13NE20kEbb2130hT45tx2PortDep.rmb**

The vessel was pulled off the berth using two 45 tons bollard pull tugs. The NE wind on the port side and the current off the 'knuckle' helped to push the vessel off the berth and bow to starboard. When off the berth, it was decided to merge into the South Channel at a small angle. This reduced the angle to the Ebb current and provided more control in the outbound passage. It also allows other vessels using the channel to move with less hinderance.

Degree of difficulty: 3/6

Run 15**R15WPCT13SW20kEbb2130hT45tx2StbdDep.rmb**

The vessel was pulled off the berth using two 45 tons bollard pull tugs and swung to starboard. The current and the wind helped to swing the stern around but also

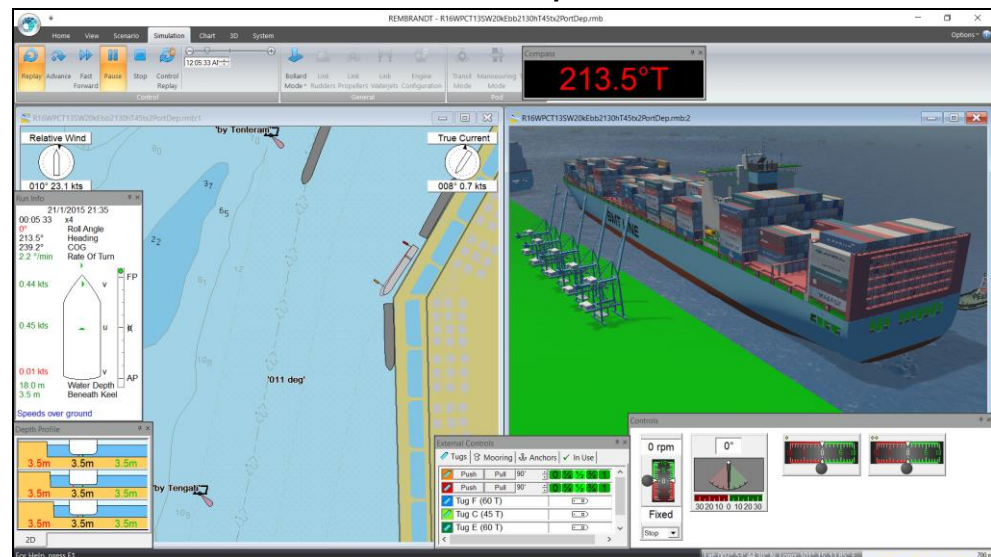
caused the vessel to set bodily to port. The tugs, together with helm and engine was then used to complete the swing before heading to sea. and the swing was completed in about 35 minutes and the vessel proceeded to sea at Slow Ahead after letting go the tugs. With a speed of about 7 knots a strong set to starboard was experienced after passing the Terusan Buoy. The heading was adjusted to between 175 and 180 degrees to counter the set and clear the channel safely. It is prudent to back astern after unberthing in order to allow more room for the set.

Minimum available channel clearance for through traffic: 410m

Degree of difficulty: 3/6

Run 16

R16WPCT13SW20kEbb2130hT45tx2PortDep.rmb

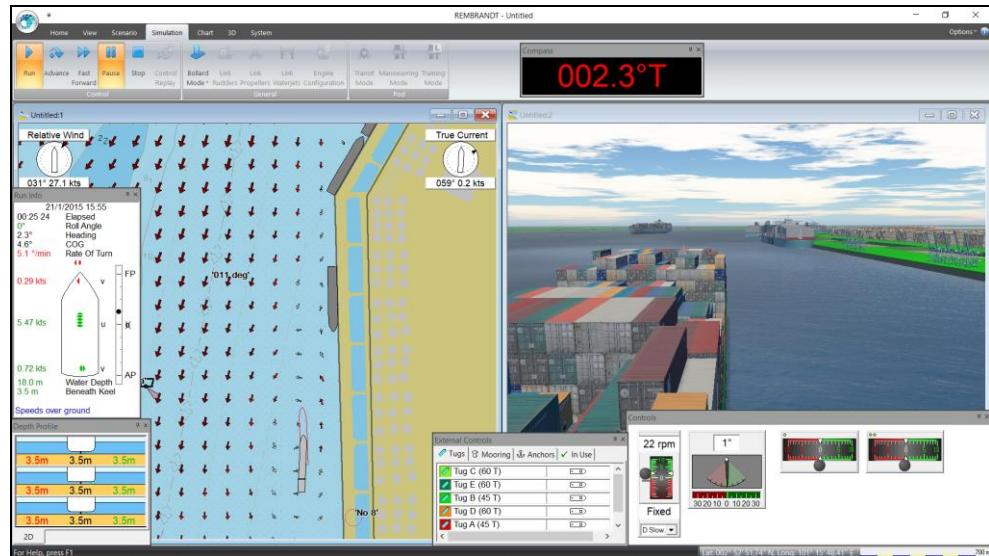


The vessel was pulled off the berth using two 45 tons bollard pull tugs. The tugs were able to pull against the SW wind pushing on the starboard side when operating at Half Power. Dead Slow Ahead was given to move ahead into a stronger current stream. This helped push the bow out and the tugs were then let go before proceeding to sea.

Degree of difficulty: 3/6

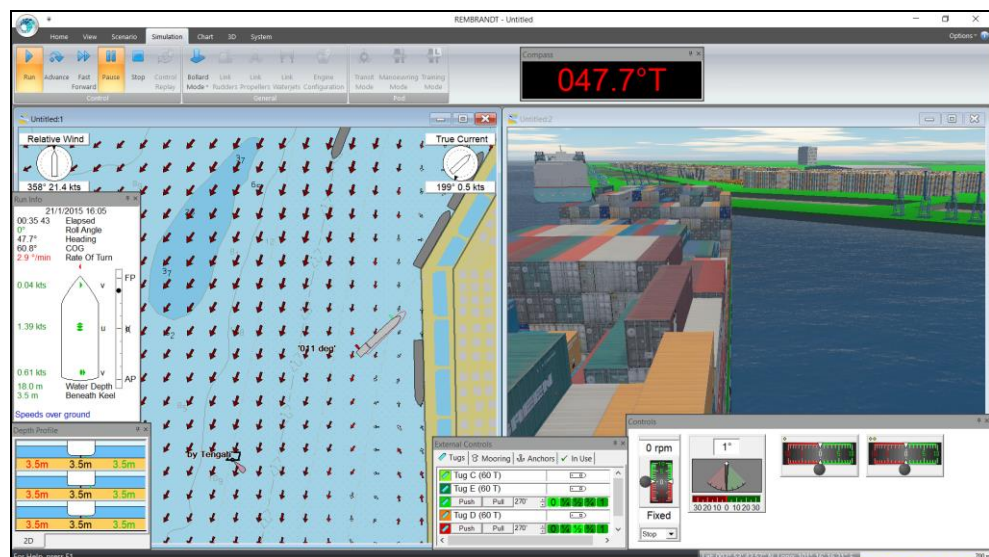
3.1.2

CT 14 - 8,100 TEU Containership Simulation Runs

Run 17**R17WPCT14NE20kFId1530hT45tx2StbdArr.rmb**

The vessel entered the channel at Half Ahead. The speed was reduced before passing Selat Buoy and the vessel cleared the South Channel shortly after to take advantage of the weak currents closer to the wharves. Speed was about 5.5 knots. When off the berth the two 45 tons bollard pull tugs assisted in pushing the vessel alongside. The forward tug had to work at $\frac{3}{4}$ Power to push the bow in.

Degree of difficulty: 3/6

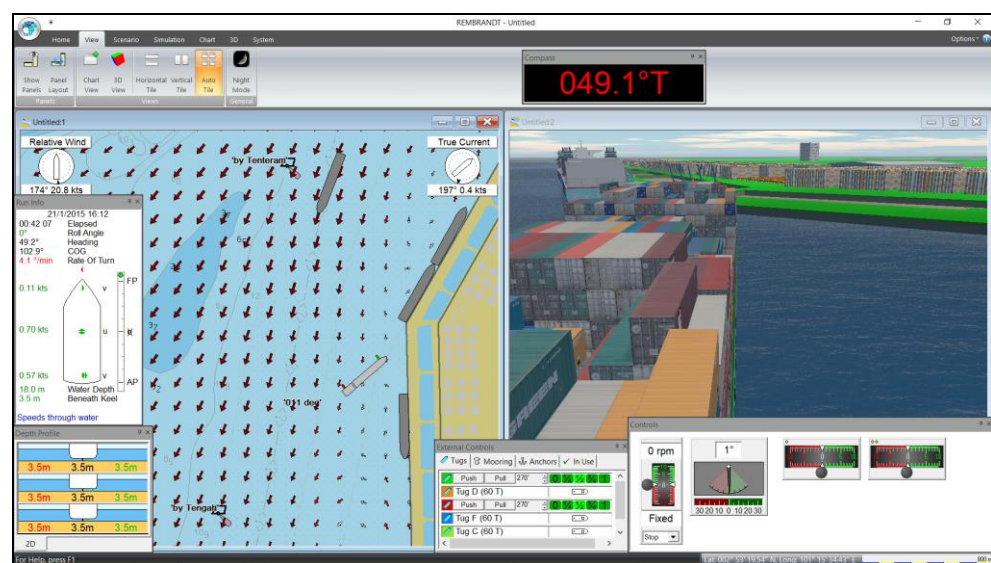
Run 18**R18WPCT14NE20kFId1530hT45tx2StbdArr.rmb**

The vessel entered the channel at Half Ahead. The speed was reduced when passing Selat Buoy. As the currents close to the CT-14 berth were very weak, it was decided to approach the berth at a sharper angle, stemming the wind. This was done with good control over the vessel but when the NE wind got on the starboard side, the forward tug still had to push at $\frac{3}{4}$ Power to get the bow in.

Degree of difficulty: 3/6

Run 19

R19WPCT14SW20kFld1530hT45tx2StbdArr.rmb

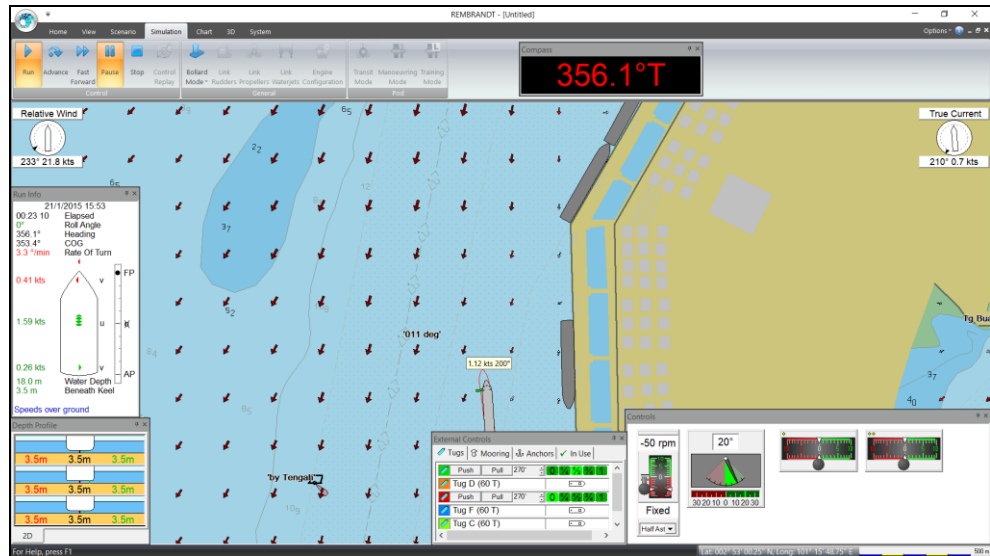


The vessel entered the channel at Half Ahead. The speed was reduced when passing Selat Buoy. The vessel was stopped off CT-15 and tugs made fast before approaching the berth. In order not to have the current on the starboard side, a sharper approach was made to the berth. The tugs, operating at a maximum of Half Power assisted the vessel in going alongside.

Degree of difficulty: 4/6

Run 20

R20WPCT14SW20kFId1530hT45tx2StbdArr.rmb

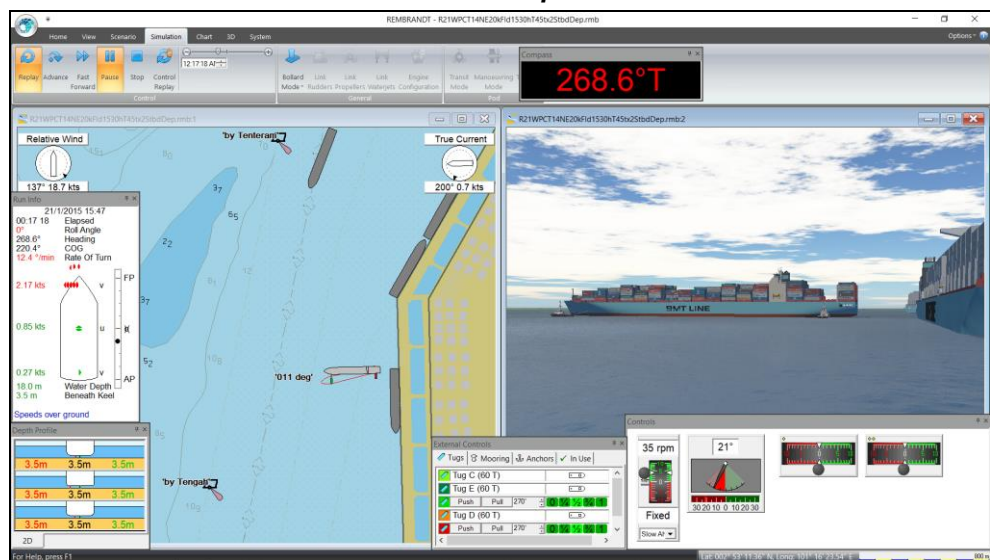


The vessel entered the channel at Half Ahead. The speed was reduced when passing Selat Buoy. The vessel was stopped off CT-15 and tugs made fast before approaching the berth. When the current got on the starboard side of the vessel, the forward tug was unable to push the bow in. The aft tug and helm and engine were then used to 'twist' the vessel to starboard. The tugs, operating at a maximum of ¾ Power then assisted the vessel in going alongside.

Degree of difficulty: 4/6

Run 21

R21WPCT14NE20kFId1530hT45tx2StbdDep.rmb



The vessel was pulled off the berth using two 45 tons bollard pull tugs operating at Half Power. When off the berth, she was swung to port and departed to sea after the tugs were let go.

Minimum available channel clearance for through traffic: 500 metres.

Degree of difficulty: 3/6

Run 22

R22WPCT14NE20kFid1530hT45tx2PortDep.rmb

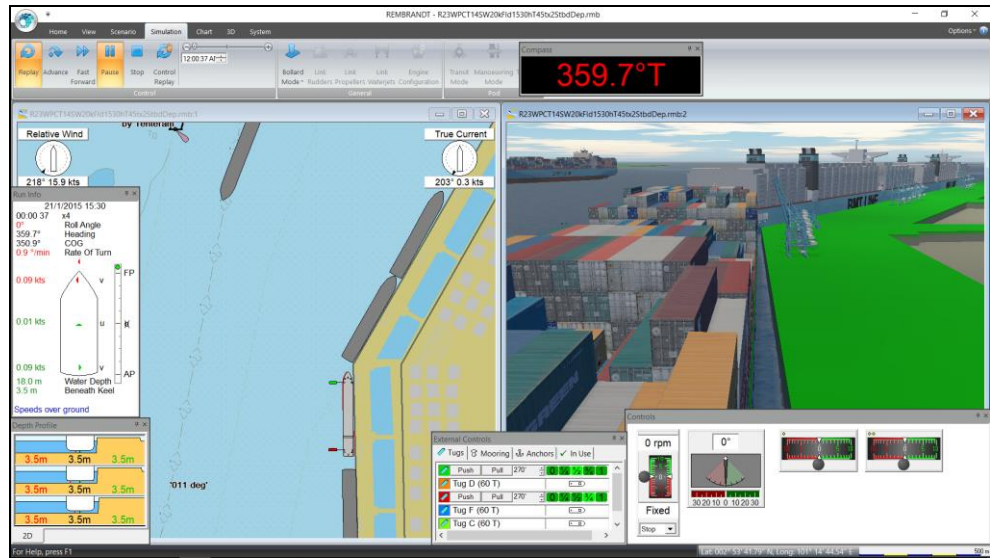


The vessel was pulled off the berth using two 45 tons bollard pull tugs operating at Half Power. When off the berth, the tugs were let go and she departed to sea.

Degree of difficulty: 3/6

Run 23

R23WPCT14SW20kFId1530hT45tx2StbdDep.rmb



The vessel was pulled off the berth using two 45 tons bollard pull tugs and swung to port before proceeding to sea. The aft tug had to operate at ¾ Power in the initial stage of unberthing to pull the vessel off the berth.

Minimum available channel clearance for through traffic: 500 metres.

Degree of difficulty: 3/6

Run 24

R24WPCT14SW20kFId1530hT45tx2PortDep.rmb

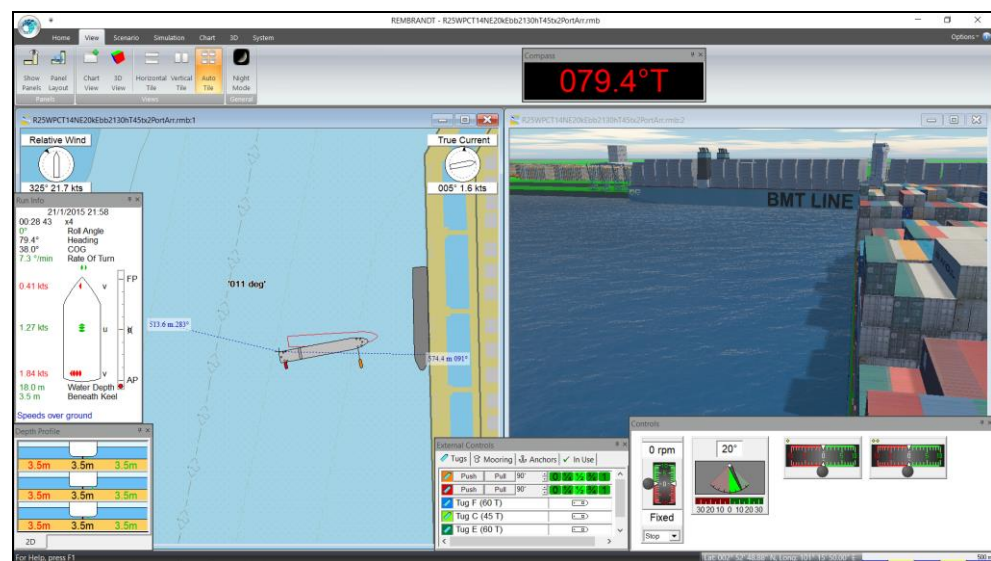


The vessel was pulled off the berth using two 45 tons bollard pull tugs. The forward tug had to operate at a maximum of Full Power and the aft tug $\frac{3}{4}$ Power to pull the vessel off the berth. When off the berth, the stern was opened to the current before pulling the bow around. The tugs were then let go and the vessel departed to sea. The bow thruster was not used.

Degree of difficulty: 4/6

Run 25

R25WPCT14NE20kEbb2130hT45tx2PortArr.rmb



The vessel entered the channel at Half Ahead keeping close to the starboard side. The engine speed was reduced to Dead Slow Ahead before passing the re-located Selat Buoy and shortly after the engine was stopped and put Half Astern. The vessel carried her way up to CT-15 and when almost stopped, a starboard turn was executed. After turning around, she was backed to berth portside-to. The aft tug had to work at Full Power to push the vessel against the 20 knots NE wind and in the final stage of berthing.

Minimum available channel clearance for through traffic: 510m

Degree of difficulty: 4/6

Run 26

R26WPCT14NE20kEbb2130hT45tx2PortArr.rmb



The vessel entered the channel at Half Ahead keeping close to the starboard side. The engine speed was reduced to Dead Slow Ahead after passing the re-located Selat Buoy and shortly after that, the engine was stopped and put Half Astern. When almost stopped, a starboard swing was executed. During the swing, the forward tug had to operate at $\frac{3}{4}$ Power to pull the bow to starboard away from the wharf.

Minimum available channel clearance for through traffic: 420m

Degree of difficulty: 4/6

Run 27

R27WPCT14SW20kEbb2130hT45tx2PortArr.rmb



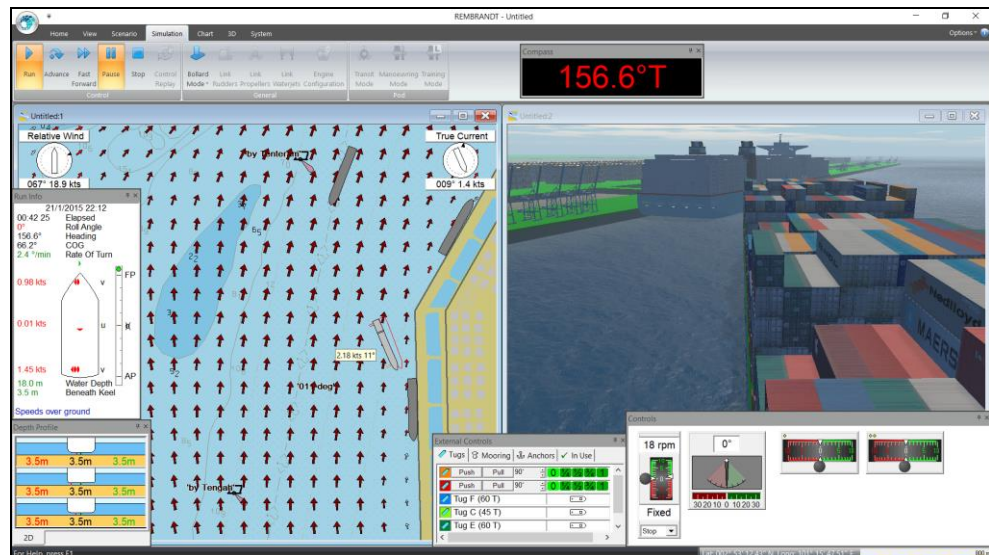
The vessel entered the channel at Half Ahead keeping close to the starboard side. The engine speed was reduced when passing the re-located Selat Buoy and shortly after the engine was stopped and put Half Astern. The vessel carried her way up to CT-15 and when almost stopped, a starboard turn was executed. After turning around, she was backed to berth portside-to. Both tugs had to work at Full Power to hold the vessel against the wind and current in the final stage of berthing.

Minimum available channel clearance for through traffic: 405m

Degree of difficulty: 4/6

Run 28

R28WPCT14SW20kEbb2130hT45tx2PortArr.rmb



The vessel entered the channel at Half Ahead keeping close to the starboard side. The engine speed was reduced to Dead Slow Ahead when passing the re-located Selat Buoy and shortly after the engine was stopped and put Half Astern. When almost stopped, a starboard turn was executed. Both tugs had to work at Full Power to hold the vessel against the wind and current in the final stage of berthing.

Minimum available channel clearance for through traffic: 420m

Degree of difficulty: 4/6

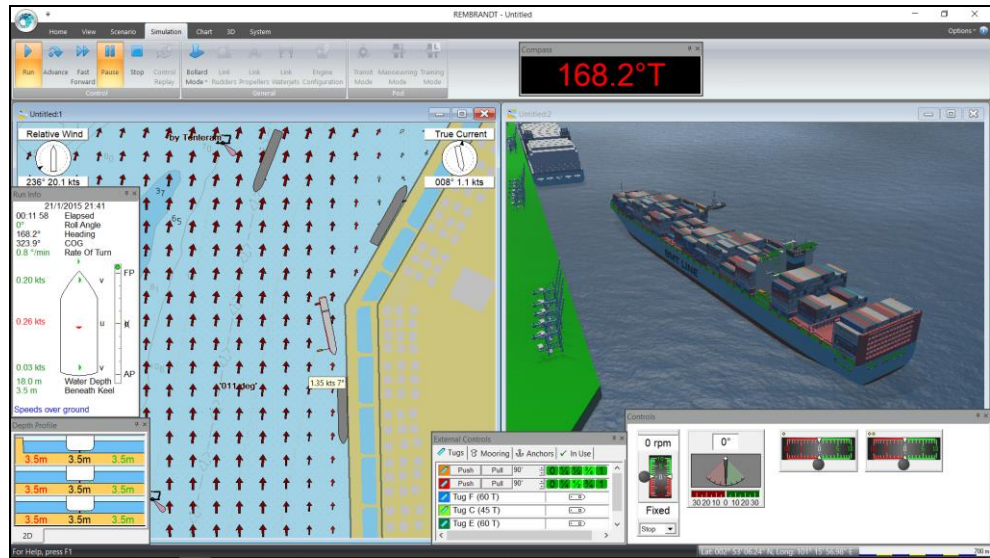
Run 29**R29WPCT14NE20kEbb2130hT45tx2StbdDep.rmb**

The vessel was pulled off the berth using two 45 tons bollard pull tugs. The intention was to open the stern to the current and execute a starboard swing. The aft tug however struggled to pull the stern with the bow dropping to port due to the wind. It was then decided to swing to port and the tugs were used at Full Power. The rate of turn was too slow and the vessel set bodily to starboard with the current. The helm and engine were then used to assist in the turn. After swinging around, the vessel proceeded out the channel at Half Ahead.

Minimum available channel clearance for through traffic: 430m

Degree of difficulty: 4/6

Run 30
R30WPCT14NE20kEbb2130hT45tx2PortDep.rmb



The vessel was pulled off the berth using two 45 tons bollard pull tugs. The forward tug struggled to pull the bow out. The vessel was then backed and the aft tug was ordered to push while the forward tug pulled at ¾ Power. When there was sufficient sternway, starboard helm was applied with the engine going ahead. This was successful in getting the current on the port side of the vessel to set her out. The vessel then transited the channel on Slow Ahead (about 7 knots).

Degree of difficulty: 4/6

Run 31
R31WPCT14SW20kEbb2130hT45tx2SbtdDep.rmb



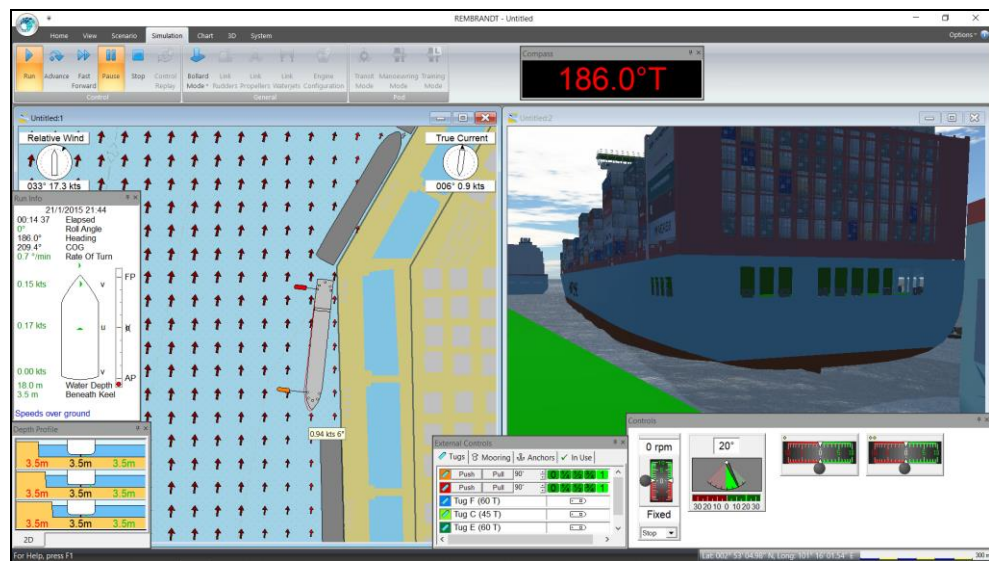
The vessel was pulled off the berth and backed before swinging to starboard. With the SW wind pressing her onto the berth, the two 45 tons bollard pull tugs had to work at Full Power at times during the manoeuvre. After swinging around, the vessel proceeded out the channel at Half Ahead.

Minimum available channel clearance for through traffic: 465m

Degree of difficulty: 4/6

Run 32

R32WPCT14SW20kEbb2130hT45tx2PortDep.rmb



With the SW wind pressing her onto the berth, the two 45 tons bollard pull tugs had to work at Full Power to pull the vessel off the berth. Even then the movement was slow and care had to be taken to keep the bow slightly open at all times. When there was sufficient clearance from the stern to the wharf, helm and engine were used to assist in opening the bow. This helped get the current between the ship and the wharf and the vessel then could clear the ship ahead on its way out to sea. In such environmental conditions, if the bow thruster was also of limited help, it may be prudent for the pilot to call for more tug assistance before proceeding ahead.

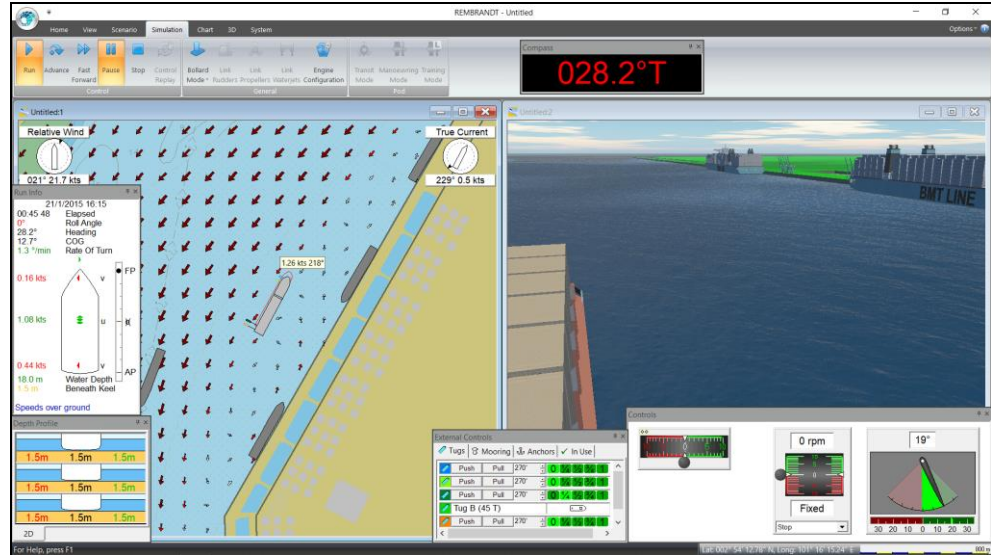
Degree of difficulty: 4/6

3.1.3

CT 10 - 22,000 TEU Containership Simulation Runs

Run 33

R33WPCT10NE20kFId1530hT60tx4SStbdArr.rmb

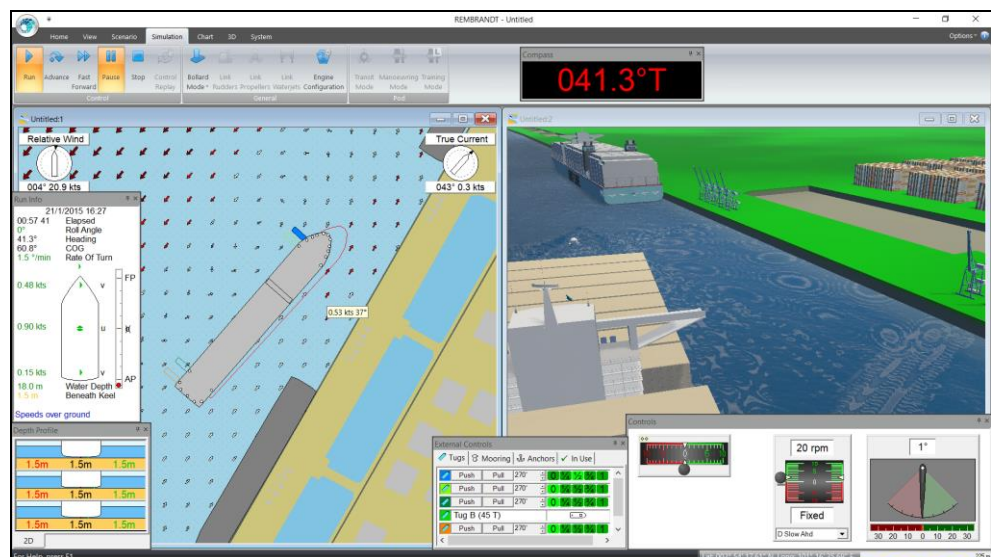


The vessel arrived with the bow pointing away from the channel entrance. She managed to alter course to successfully enter the channel on Half Ahead. Approaching Tengah, the engine was reduced to Dead Slow Ahead and later stopped. Four 60 tons bollard pull tugs were made fast and assisted in berthing operating at a maximum of Half Power.

Degree of difficulty: 3/6

Run 34

R34WPCT10NE20kFId1530hT60tx4SStbdArr.rmb

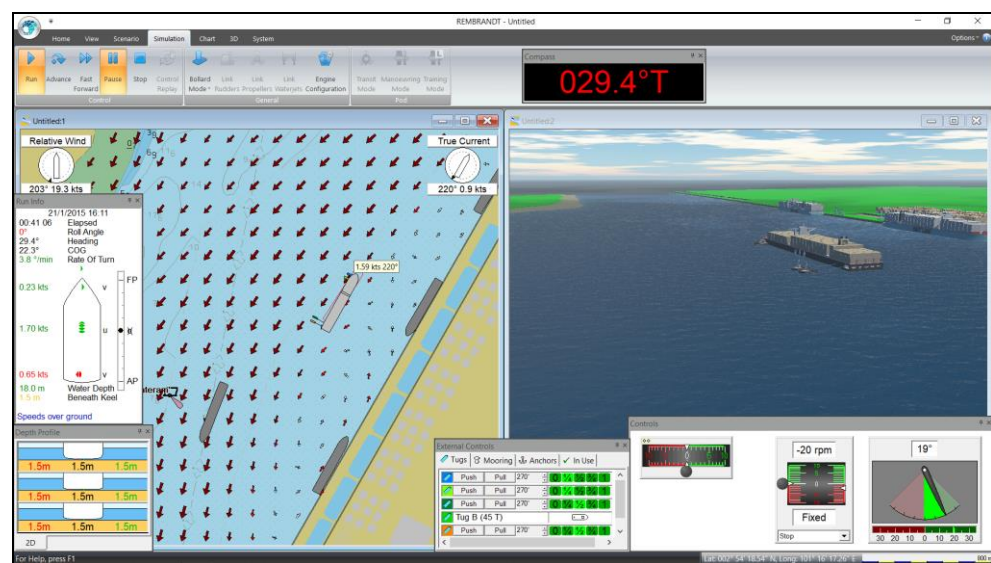


The vessel arrived with the bow pointing away from the channel entrance. She managed to alter course to successfully enter the channel on Half Ahead. Approaching Tengah, the engine was reduced to Dead Slow Ahead and stopped when passing CT-13. Four 60 tons bollard pull tugs were made fast and assisted in berthing with only two tugs used at a maximum of Half Power. A counter current was observed at the berth during the final stage in berthing.

Degree of difficulty: 3/6

Run 35

R35WPCT10SW20kFId1530hT60tx4StbdArr.rmb

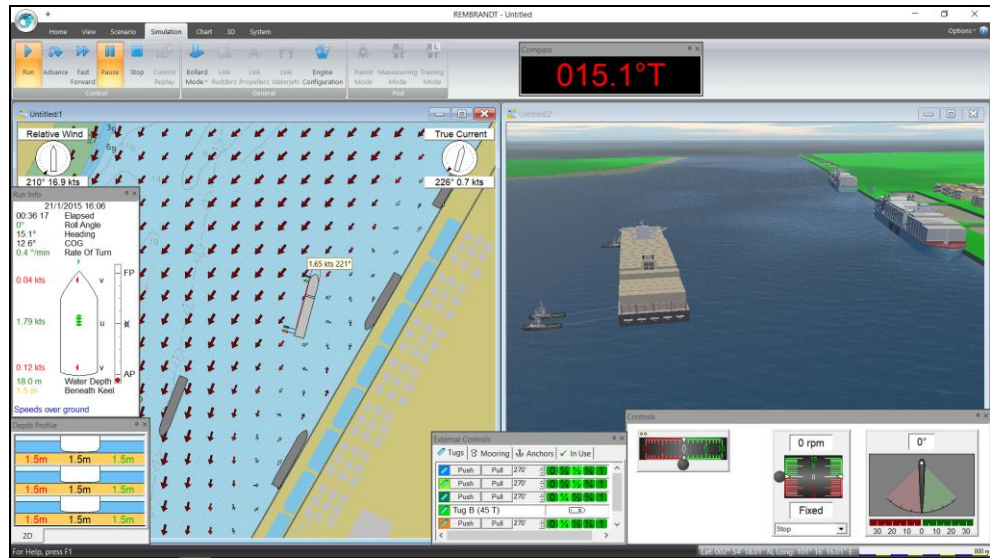


The vessel arrived with the bow pointing away from the channel entrance. She managed to alter course to successfully enter the channel on Half Ahead. Approaching Tengah, the engine was reduced to Dead Slow Ahead and later stopped. Approaching the berth, the bow caught the flood stream and set to port. This was corrected by pulling with the aft tugs. The four 60 tons bollard pull tugs assisted in berthing operating at a maximum of Half Power.

Degree of difficulty: 3/6

Run 36

R36WPCT10SW20kFId1530hT60tx4StbdArr.rmb

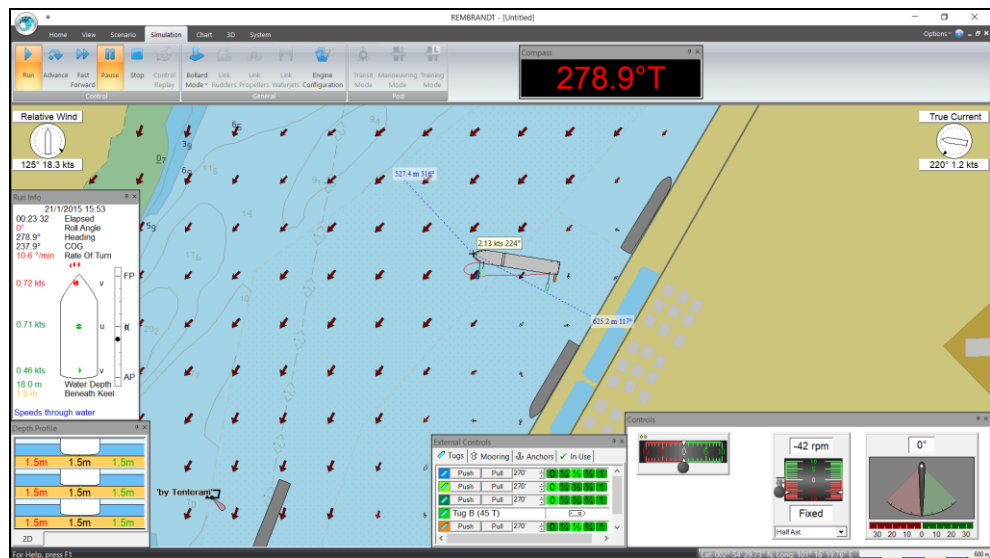


The vessel arrived with the bow pointing away from the channel entrance. She managed to alter course to successfully enter the channel on Half Ahead. Approaching Tengah, the engine was reduced to Dead Slow Ahead and later stopped. Approaching the berth, the bow caught the flood stream and set to port. This was corrected by pulling with the aft tugs. The four 60 tons bollard pull tugs assisted in berthing operating at a maximum of Half Power.

Degree of difficulty: 3/6

Run 37

R37WPCT10NE20kFId1530hT60tx4StbdDep.rmb



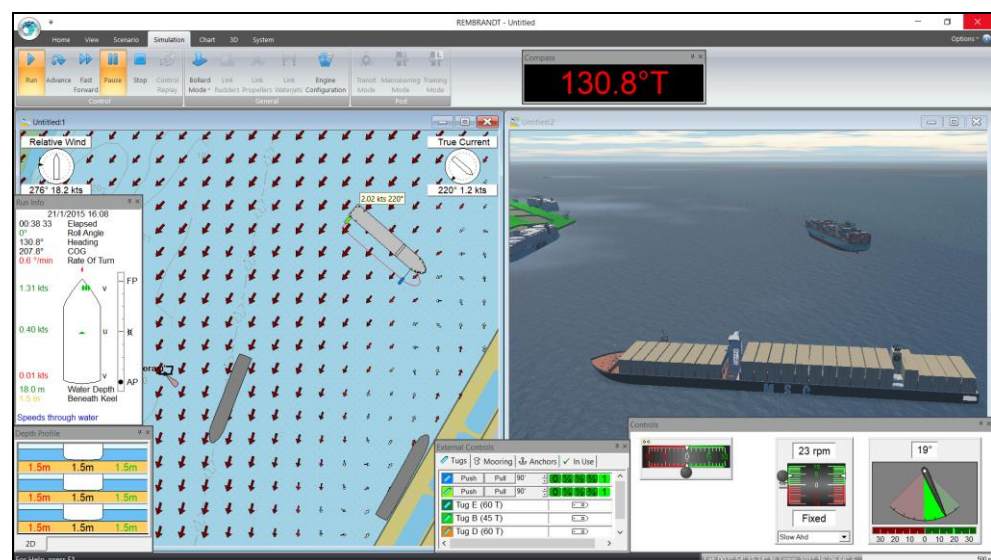
The vessel was pulled off the berth using only two of the four 60 tons bollard pull tugs. She was then swung to port keeping close to the wharf. After the swing, the tugs were cast off and the vessel proceeded to sea.

Minimum available channel clearance for through traffic: 525 metres.

Degree of difficulty: 3/6

Run 38x

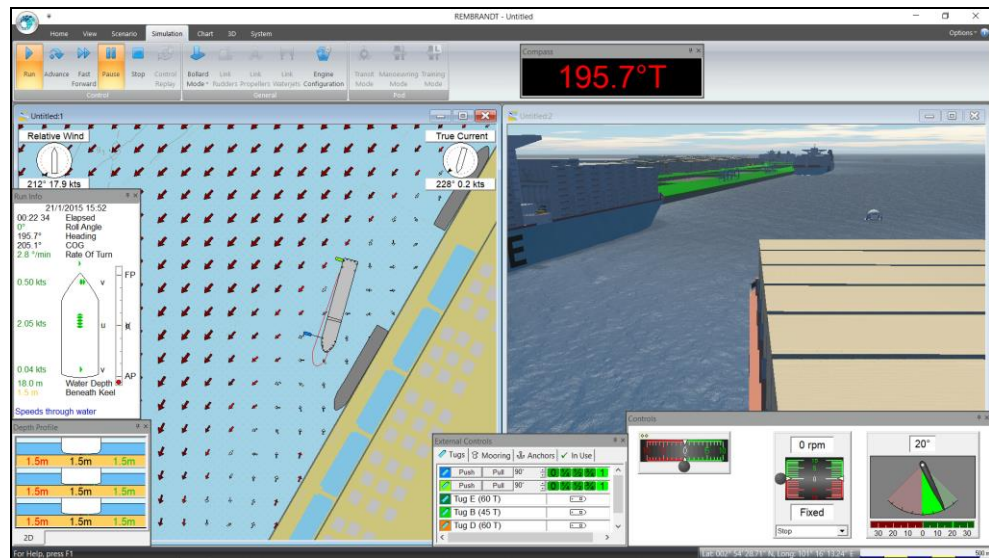
R38xWPCT10NE20kFId1530hT60tx2PortDep.rmb



The vessel was pulled off the berth using only two 60 tons bollard pull tugs. The stern was opened to allow the flood current to set her off the berth. The force of the flood current and the wind, acting on the port side, was however too strong for the tugs to overcome. Both tugs working at Full Power, together with helm and engine failed to 'twist' her to starboard.

Control has to be exercised to prevent the stern from setting too far into the channel.

Run was stopped to try a different technique using the same resources.

Run 38**R38WPCT10NE20kFId1530hT60tx2PortDep.rmb**

This is a re-run of Run 38x. The vessel was pulled off the berth using only two 60 tons bollard pull tugs. Care was taken not to open the stern too wide to the flood current. The forward tug was used to pull the bow to starboard after the stern was opened. The rate of swing was however slow, even with the stern tug pushing and helm and engine being used. The tugs were then used at Full Power. This helped with increase the rate of turn and the vessel proceeded to sea at Slow Ahead (about 7.5 knots) after the tugs were let go. Four 60 tons bollard pull tugs will increase the factor of safety in such environmental conditions.

Degree of difficulty: 4/6

Run 39**R39WPCT10SW20kFId1530hT60tx4StbdDep.rmb**

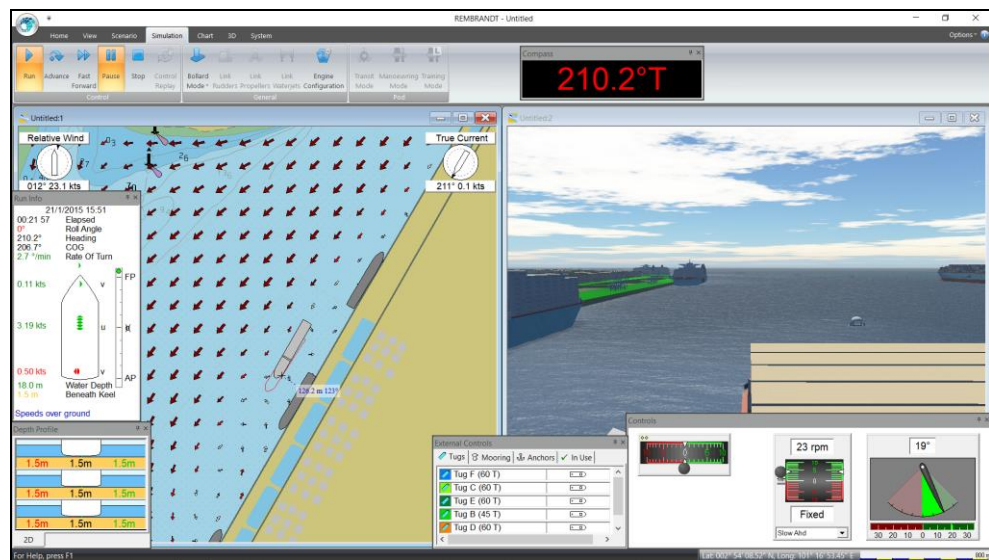
The vessel was pulled off the berth using four 60 tons bollard pull tugs. She was then swung to port keeping close to the wharf. After the swing, the tugs were cast off and the vessel proceeded to sea. She was able to maintain her transit outside the existing South Channel until Selat Buoy, after which she crossed over to keep closer to the port-hand mark.

Minimum available channel clearance for through traffic: 510 metres.

Degree of difficulty: 3/6

Run 40

R40WPCT10SW20kFId1530hT60tx4SPortDep.rmb

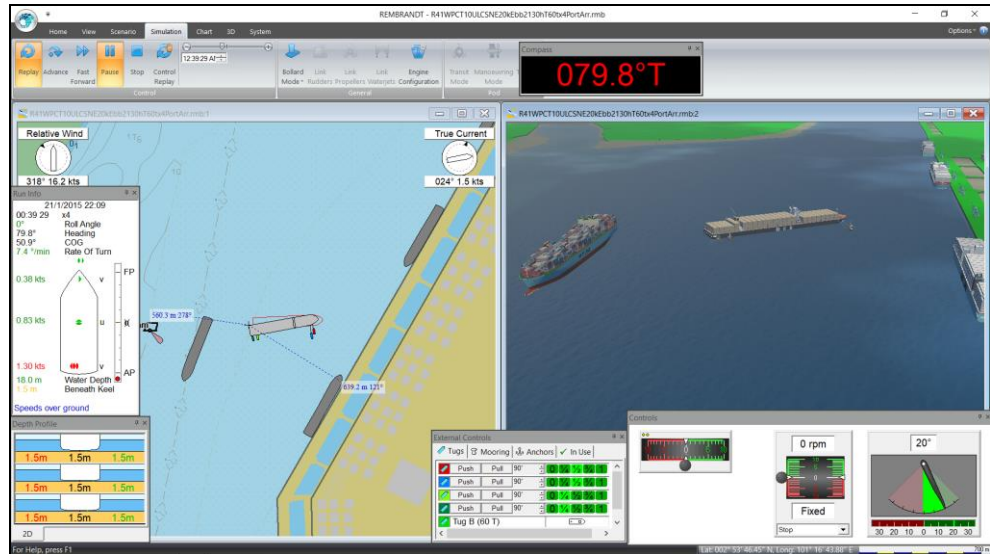


The vessel was pulled off the berth using four 60 tons bollard pull tugs. The tugs were then cast off and the vessel proceeded to sea crossing the channel near Tengah Buoy and then maintaining transit closer to the port-hand marks. Channel transit speed was less than 7.5 knots (Slow Ahead).

Degree of difficulty: 3/6

Run 41

R41WPCT10NE20kEbb2130hT60tx4PortArr.rmb



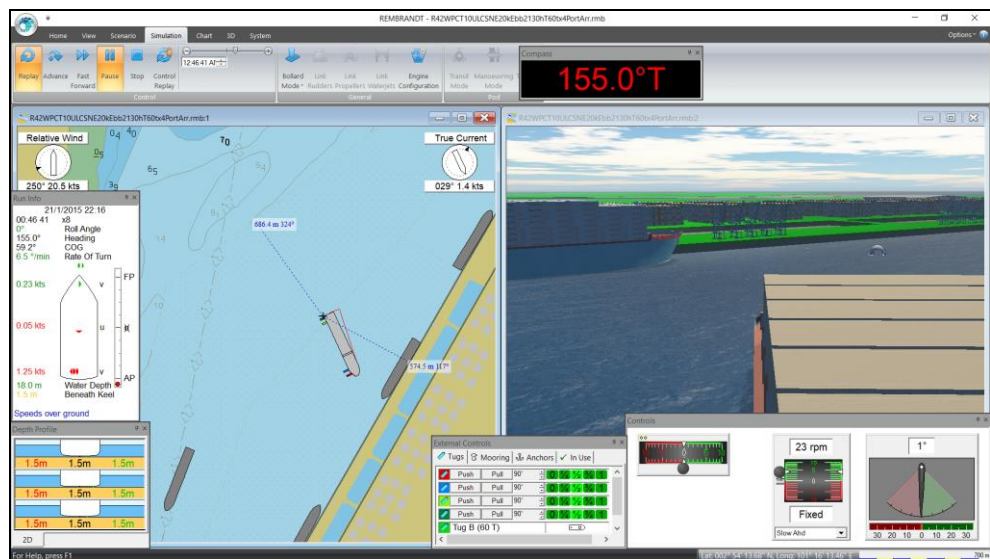
The vessel entered the channel at over 12 knots. She was then slowed down tugs made fast. After she moved out of the channel off CT-13, the astern engine was given to stop her before swinging to starboard. She was then backed to her berth and pushed alongside. The tugs operated at a maximum of Half Power.

Minimum available channel clearance for through traffic: 560m

Degree of difficulty: 4/6

Run 42

R42WPCT10NE20kEbb2130hT60tx4PortArr.rmb



The vessel entered the channel at over 12 knots. She was then slowed down and four 60 tons bollard pull tugs were made fast before swinging to starboard. She was then backed to her berth and pushed alongside. The tugs operated at a maximum of Half Power.

Minimum available channel clearance for through traffic: 680m

Degree of difficulty: 4/6

Run 43

R43WPCT10SW20kEbb2130hT60tx4PortArr.rmb



The vessel entered the channel at over 12 knots. She was then slowed down tugs made fast. After she moved out of the channel off CT-13, the astern engine was given to stop her before swinging to starboard. She was then backed to her berth and pushed alongside. The tugs operated at a maximum of Half Power.

Minimum available channel clearance for through traffic: 490m

Degree of difficulty: 4/6

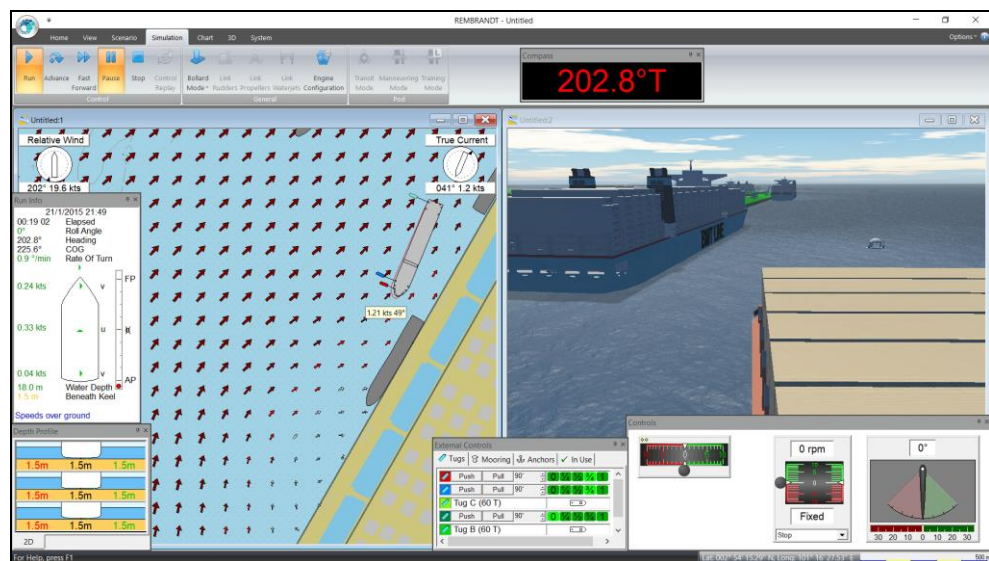
The vessel was pulled off the berth using four 60 tons bollard pull tugs. She was swung to starboard off the berth. The tugs were then cast off and the vessel proceeded to sea. All tugs operated at a maximum of Half Power.

Minimum available channel clearance for through traffic: 570m

Degree of difficulty: 4/6

Run 46

R46WPCT10NE20kEbb2130hT60tx4PortDep.rmb

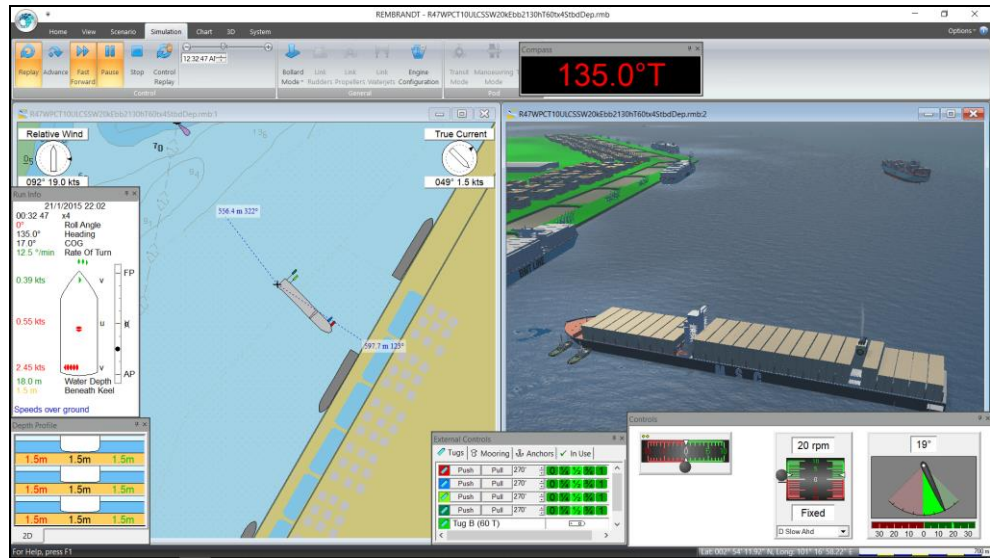


The vessel was pulled off the berth using four 60 tons bollard pull tugs. There was difficulty in pulling the bow off the berth with the current pressing on the starboard side and the two forward tugs had to operate at $\frac{3}{4}$ Power. After releasing the tugs the vessel proceeded to sea keeping port helm regularly to counter the current pushing on the port bow.

Degree of difficulty: 4/6

Run 47

R47WPCT10SW20kEbb2130hT60tx4StbdDep.rmb



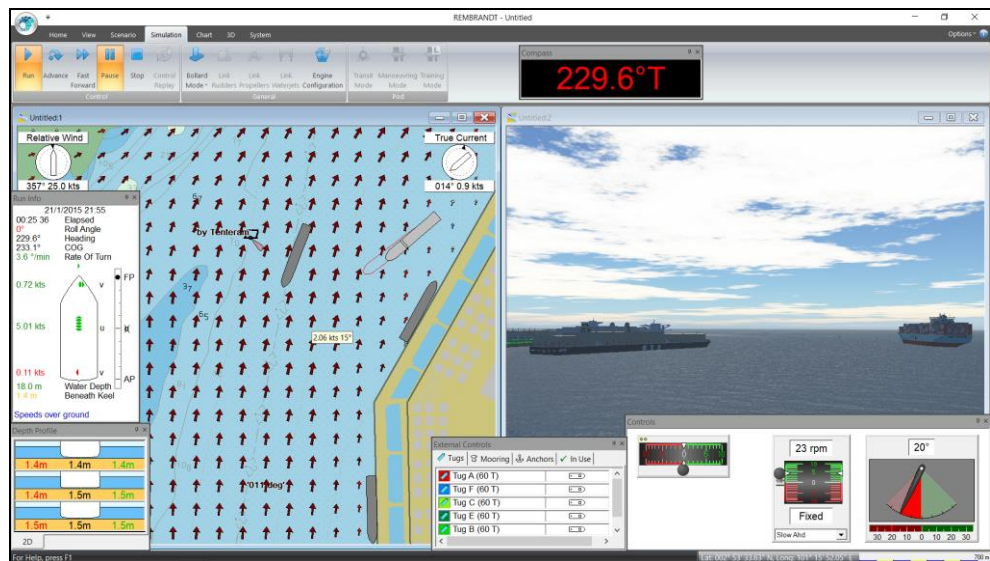
The vessel was pulled off the berth using four 60 tons bollard pull tugs. When off the berth, she was backed and swung to starboard. The tugs were then cast off and the vessel proceeded to sea. All tugs operated at a maximum of Half Power.

Minimum available channel clearance for through traffic: 555m

Degree of difficulty: 4/6

Run 48

R48WPCT10SW20kEbb2130hT60tx4PortDep.rmb



The vessel was pulled off the berth using four 60 tons bollard pull tugs. The forward tugs had to operate at $\frac{3}{4}$ Power. When off the berth, the vessel headed to sea, altering course early to limit the angle of the current, especially off the 'knuckle'. In the channel, transiting at over 10 knots, port helm had to be applied constantly to counter the set to starboard.

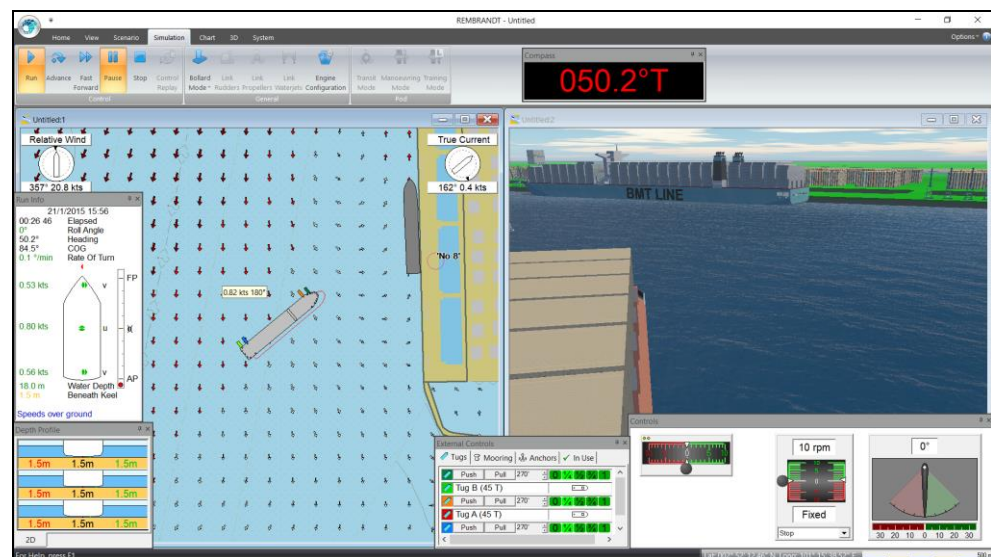
Degree of difficulty: 4/6

3.1.4

CT 10 - 22,000 TEU Containership Simulation Runs

Run 49

R49WPCT17NE20kFId1530hT60tx4StbdArr.rmb



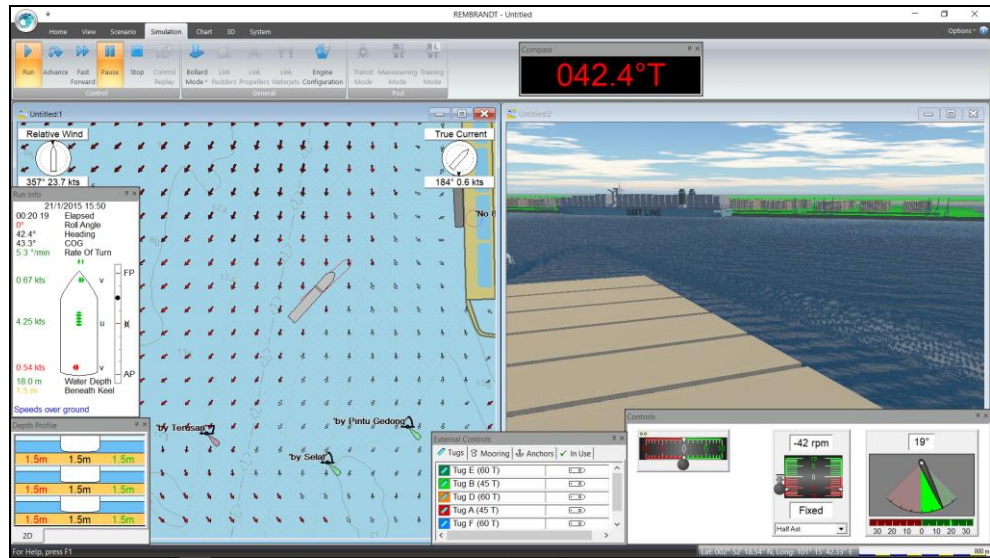
The vessel entered the channel on Half Ahead (about 11 knots). When approaching the Re-located Selat Buoy, a starboard sheer was initiated. After passing the buoy, the engine was stopped and Half Astern ordered. She pulled up about one ship's length from Berth CT-16. The tugs then assisted in pushing her alongside.

A counter current was noticed at the wharf. This would allow portside berthing during the flood stream.

Degree of difficulty: 4/6

Run 50

R50WPCT17NE20kFId1530hT60tx4StbdArr.rmb

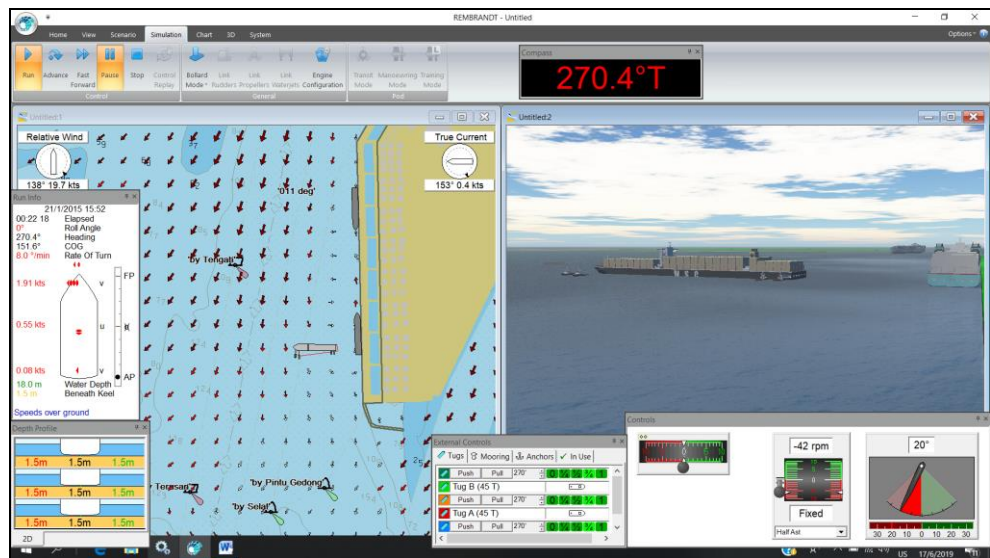


The vessel entered the channel on Half Ahead (about 11 knots). When approaching the re-located Selat Buoy, speed was reduced and a starboard sheer was initiated. After passing the buoy, the engine was stopped and Half Astern ordered. She pulled up about one ship's length from Berth CT-16. The tugs then assisted in pushing her alongside.

Degree of difficulty: 4/6

Run 51

R51WPCT17NE20kFId1530hT60tx4StbdDep.rmb

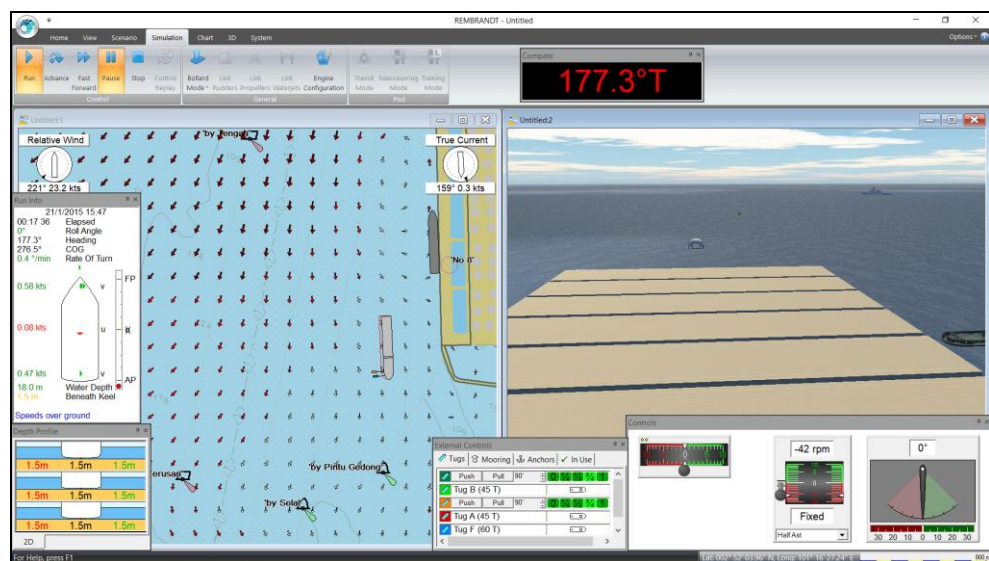


The vessel was pulled off the berth and swung to port off CT-16 using four 60 tons bollard pull tugs operating at a maximum of $\frac{3}{4}$ Power. After swinging around she cast off the tugs and proceeded to sea. The outbound passage was close to the western edge of the channel. It would be safer to continue the swing longer to reduce the angle of entry into the channel.

Degree of difficulty: 4/6

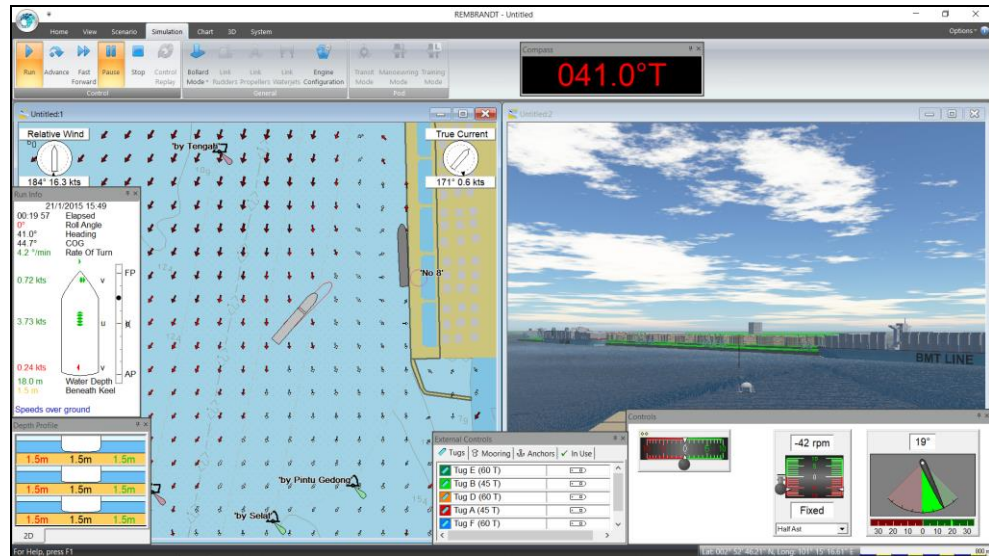
Run 52

R52WPCT17NE20kFid1530hT60tx4PortDep.rmb

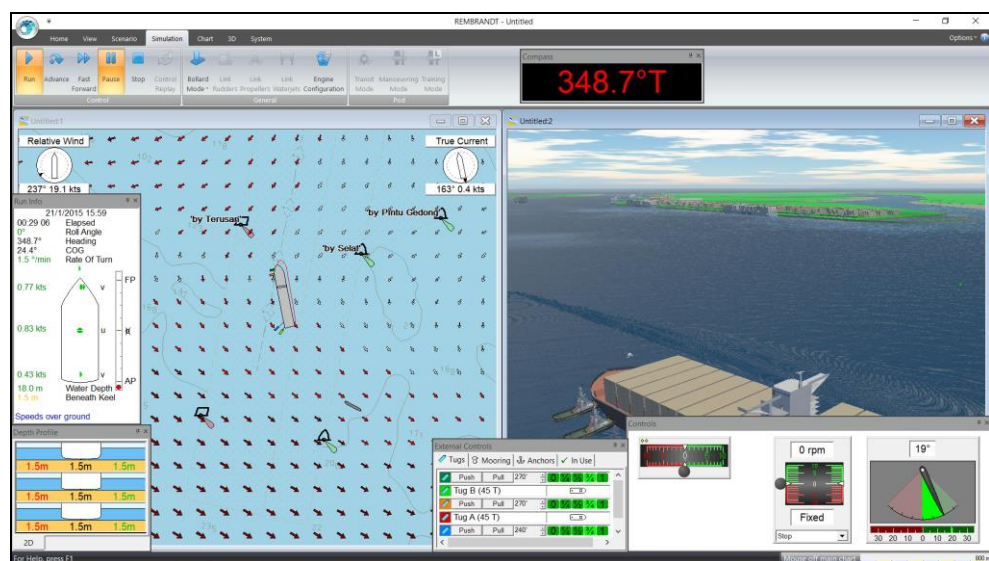


The vessel was pulled off the berth using four 60 tons bollard pull tugs. She was then swung to starboard to point toward the channel. The forward tugs had to operate at a maximum of $\frac{3}{4}$ Power. When the re-located Selat Buoy was on the port bow, the tugs were cast off and the vessel proceeded to sea.

Degree of difficulty: 3/6

Run 53**R53WPCT17SW20kFId1530hT60tx4StbdArr.rmb**

The vessel entered the channel on Half Ahead (about 11 knots). A starboard shear was initiated, and speed was reduced. The engine was then stopped and Half Astern ordered. She pulled up about one ship's length from Berth CT-16. The tugs then assisted in pushing her alongside with the aft tugs working at $\frac{3}{4}$ Power to hold against the wind.

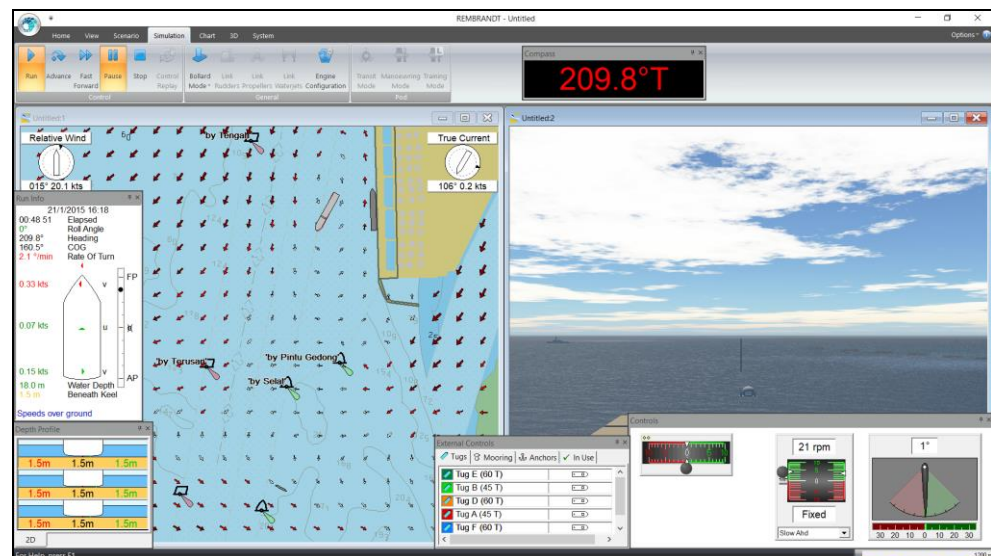
Degree of difficulty: 4/6**Run 54****R54WPCT17SW20kFId1530hT60tx4StbdArr.rmb**

The vessel approached the channel on Slow Ahead. Speed was reduced to Dead Slow Ahead and tugs were made fast. She entered the channel at about 5 knots. A starboard sheer was initiated but the rate of turn was too slow. The tugs were then used at $\frac{3}{4}$ Power to swing the vessel to starboard, south of the Terusan and Selat Buoys. Helm and engine were used to assist in the swing. When headed towards the CT-16, with the turn to starboard continuing, the tugs were stopped and the vessel proceeded ahead. She was stopped about one ship's length from the berth. The tugs then assisted in holding her against the wind as she went alongside.

Degree of difficulty: 4/6

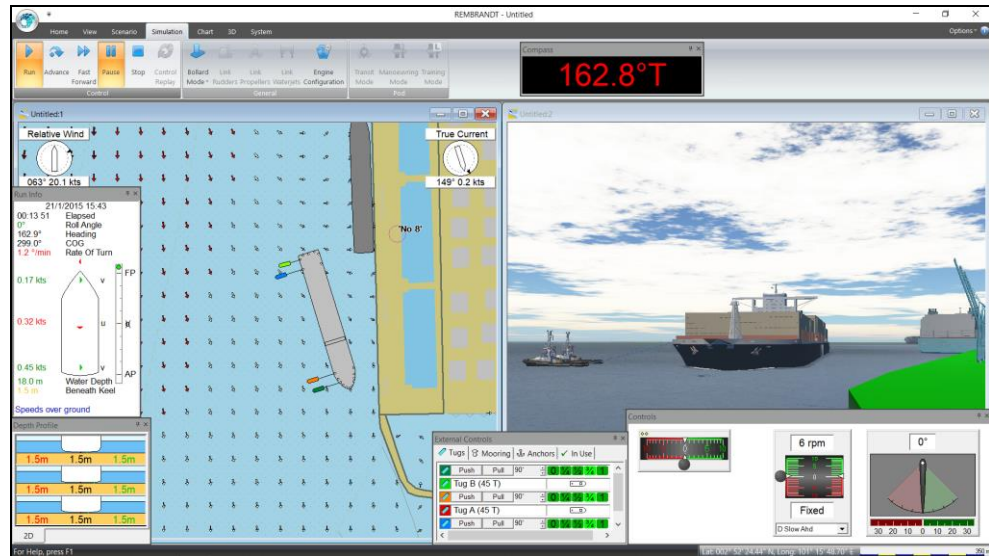
Run 55

R55WPCT17SW20kFld1530hT60tx4StbdDep.rmb



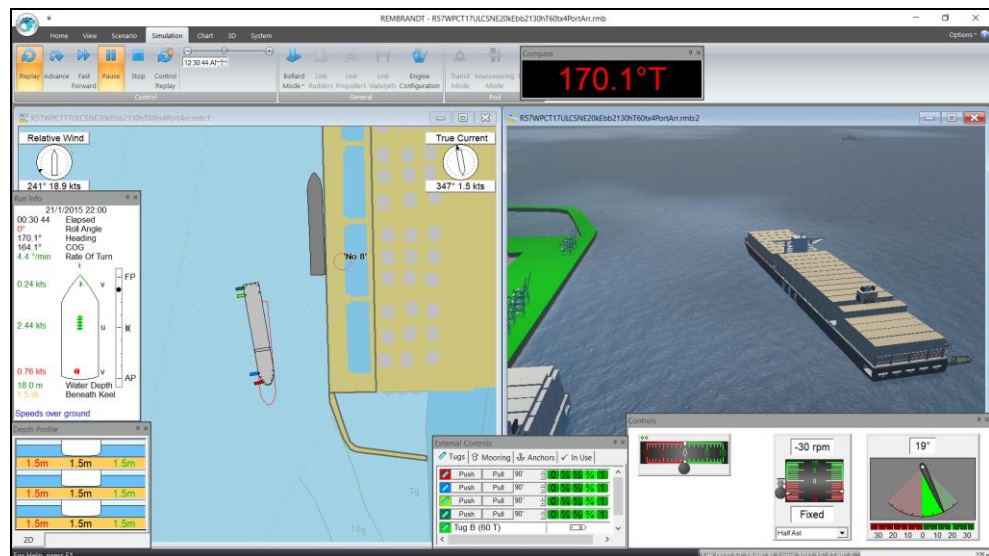
The vessel was pulled off the berth and swung to port using four 60 tons bollard pull tugs. The tugs operated at a maximum of $\frac{3}{4}$ Power. When the ship was pointed between the Selat and Terusan Buoys, the tugs were let go and the vessel proceeded to sea at Slow Ahead (about 7 knots).

Degree of difficulty: 3/6

Run 56**R56WPCT17SW20kFId1530hT60tx4PortDep.rmb**

The vessel was pulled off the berth and headed towards the channel using four 60 tons bollard pull tugs. The tugs operated at a maximum of $\frac{3}{4}$ Power. The tugs were then let go and the vessel proceeded to sea at Half Ahead (about 11 knots).

Degree of difficulty: 3/6

Run 57**R57WPCT17NE20kEbb2130hT60tx4PortArr.rmb**

The vessel entered the channel at over 12 knots. When approaching the Selat Buoy, starboard helm was applied to head towards the berth and Half Ahead on engine was maintained to help turn the vessel. The engine was then stopped and

put Half Astern to arrest the headway before making fast four 60 tons bollard pull tugs. The tugs then assisted in swinging the vessel to starboard with the help of helm and engine. $\frac{3}{4}$ Power was required by the tugs to effectively swing the vessel and assist in berthing.

Minimum available channel clearance for through traffic: 490m

Degree of difficulty: 4/6

Run 58

R58WPCT17NE20kEbb2130hT60tx4PortArr.rmb

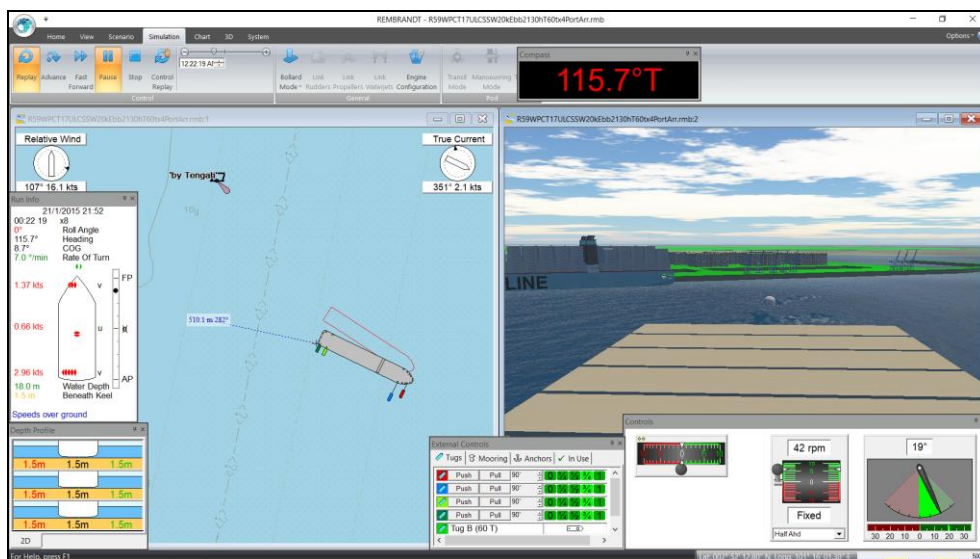


The vessel entered the channel at over 12 knots. When approaching the Selat Buoy, starboard helm was applied to head towards the berth and Half Ahead on engine was maintained to help turn the vessel. The engine was then stopped and put Half Astern to arrest the headway before making fast four 60 tons bollard pull tugs. The tugs then assisted in swinging the vessel to starboard with the help of helm and engine. $\frac{3}{4}$ Power was required by the tugs to effectively swing the vessel and assist in berthing.

Minimum available channel clearance for through traffic: 610m

Degree of difficulty: 4/6

Run 59
R59WPCT17SW20kEbb2130hT60tx4PortArr.rmb

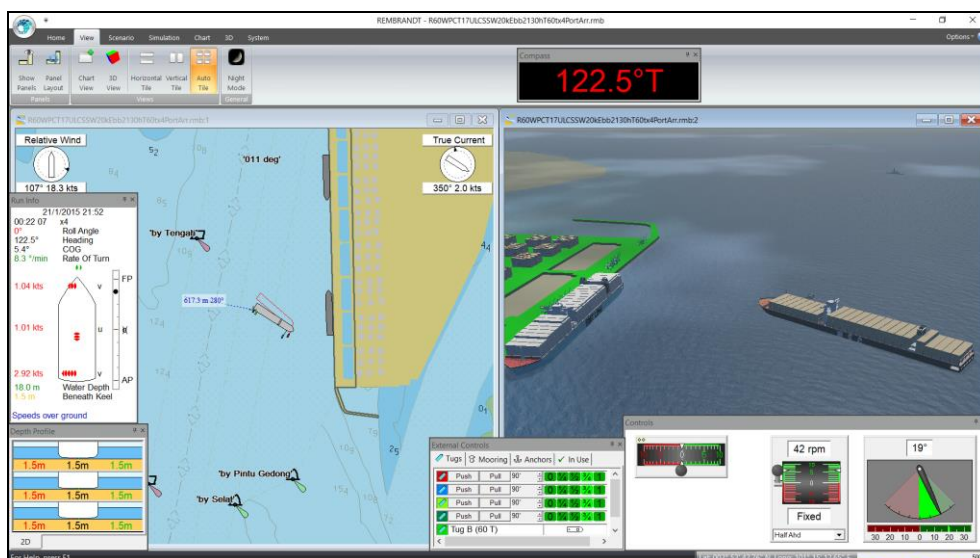


The vessel entered the channel at over 12 knots. When approaching the Selat Buoy, starboard helm was applied to head towards the berth and Half Ahead on engine was maintained to help turn the vessel. The engine was then stopped and put Half Astern to arrest the headway before making fast four 60 tons bollard pull tugs. The tugs then assisted in swinging the vessel to starboard with the help of helm and engine. ¾ Power was required by the tugs to effectively swing the vessel and assist in berthing.

Minimum available channel clearance for through traffic: 510m

Degree of difficulty: 4/6

Run 60
R60WPCT17SW20kEbb2130hT60tx4PortArr.rmb



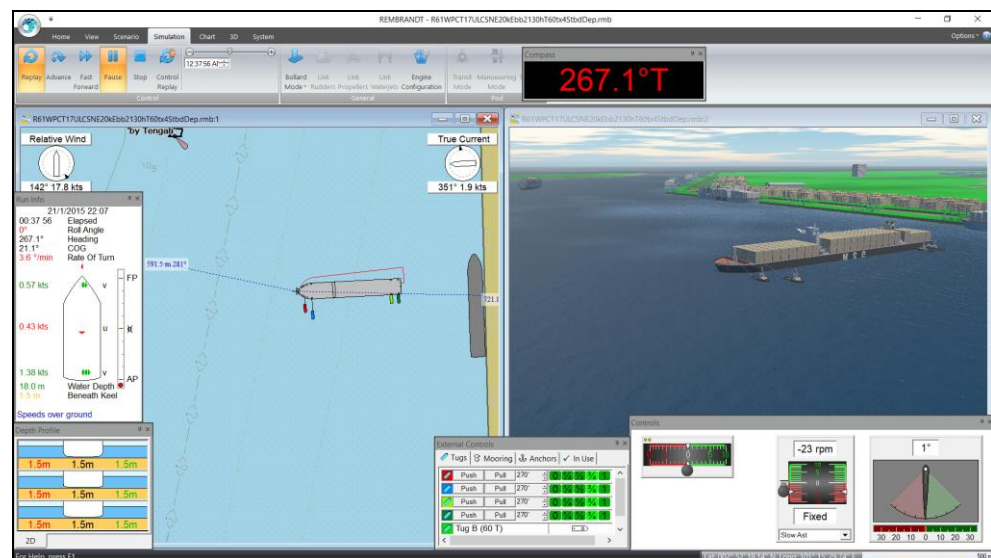
The vessel entered the channel at over 12 knots. When approaching the Selat Buoy, starboard helm was applied to head towards the berth and Half Ahead on engine was maintained to help turn the vessel. The engine was then stopped and put Half Astern to arrest the headway before making fast four 60 tons bollard pull tugs. The tugs then assisted in swinging the vessel to starboard with the help of helm and engine. $\frac{3}{4}$ Power was required by the tugs to effectively swing the vessel and assist in berthing.

Minimum available channel clearance for through traffic: 610m

Degree of difficulty: 4/6

Run 61

R61WPCT17NE20KEbb2130hT60tx4PStbdDep.rmb

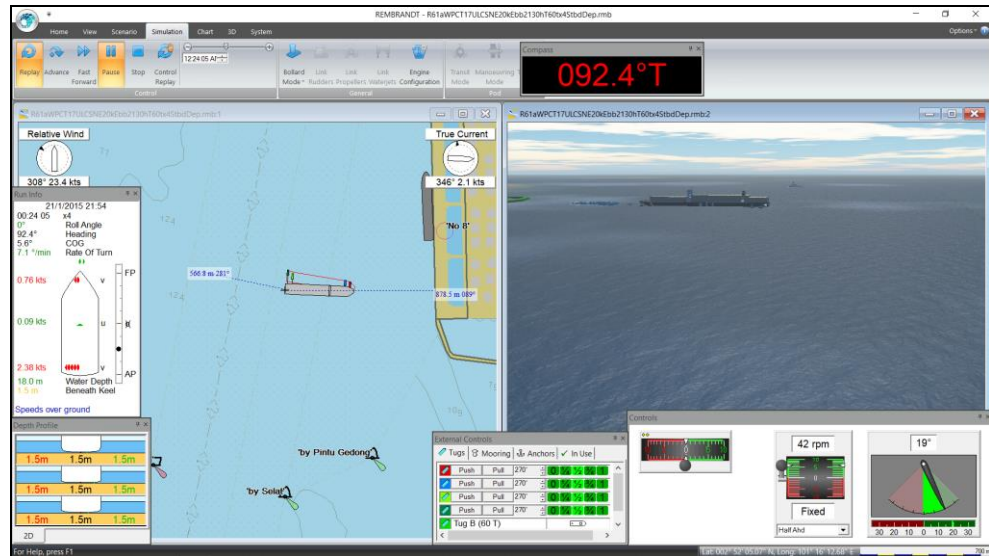


The vessel was pulled off the berth using four 60 tons bollard pull tugs. As the bow was falling to port, it was decided to do a port swing. The four tugs pulling at the bow and pushing at the stern at Half Power had difficulty swinging the vessels when it got further off the berth and was affected by the ebb current. As the rate of turn remained slow, the tugs were ordered to pull at $\frac{3}{4}$ and then Full Power. Finally helm and engine were needed to assist in swinging the vessel around.

After swinging around, the vessel transited the channel to sea at Half Ahead. The wider channel provided sufficient room to counter the set of the ebb current.

Minimum available channel clearance for through traffic: 590m

Degree of difficulty: 4/6

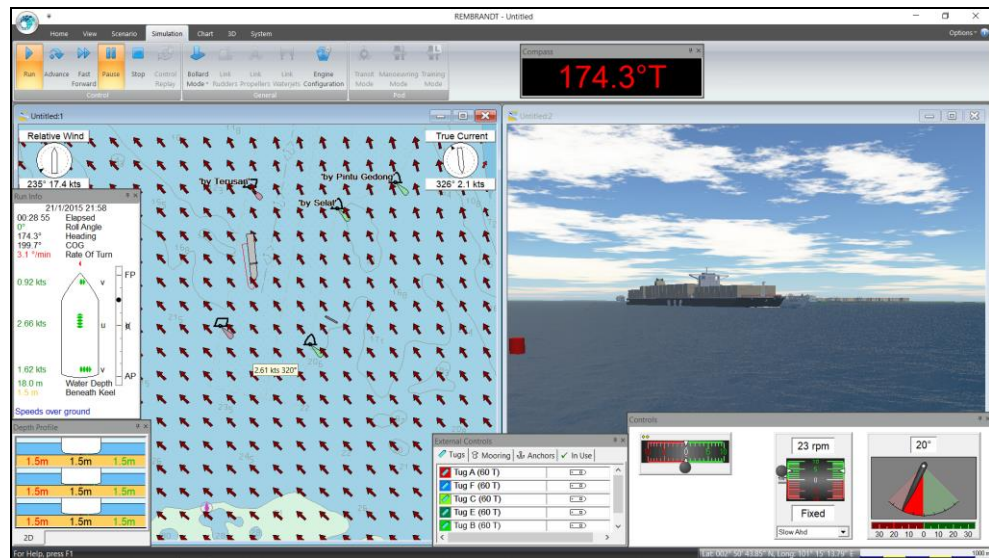
Run 61a**R61aWPCT17NE20kEbb2130hT60tx4PStbdDep.rmb**

This is a repeat of Run 61 but with a starboard turn.

The vessel was pulled off the berth using four 60 tons bollard pull tugs. It was decided to do a starboard swing off the berth. The four tugs pushing at the bow and pulling at the stern at Half Power had difficulty swinging the vessels until $\frac{3}{4}$ Power was used. Helm and engine were needed to assist in keeping the bow closer to the berth so that the stronger current at the stern can assist in the swing. After swinging around, the vessel transited the channel to sea at Half Ahead. The starboard swing was relatively easier to execute and took less time (40 minutes) than the port swing in the previous run.

Minimum available channel clearance for through traffic: 565m

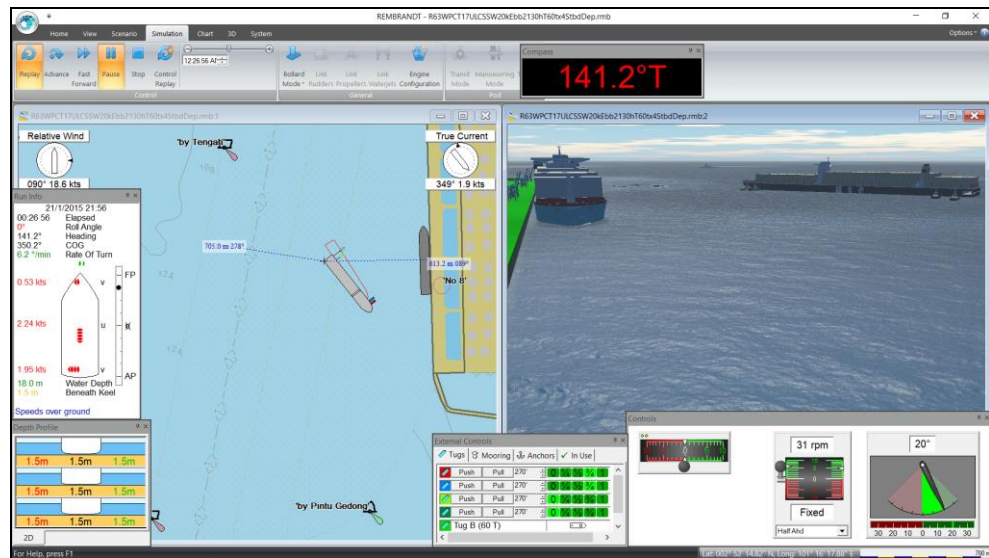
Degree of difficulty: 4/6

Run 62**R62WPCT17NE20kEbb2130hT60tx4PortDep.rmb**

The vessel was pulled off the berth using four 60 tons bollard pull tugs. The tugs were stopped and let go when the bow was heading towards the channel. The vessel then proceeded to sea at Slow Ahead, passing the re-positioned Selat Buoy at over 4 knots. The strong set of the current required heavy port helm to correct and the speed dropped to about 2.3 knots. With the strong set and the wind on the port side, the stern cleared the edge of the channel by only about 15 metres.

It would be prudent for slow, deeply laden vessels to keep the tugs to assist in maintaining a position close to the eastern side of the channel in such circumstances.

Degree of difficulty: 4/6

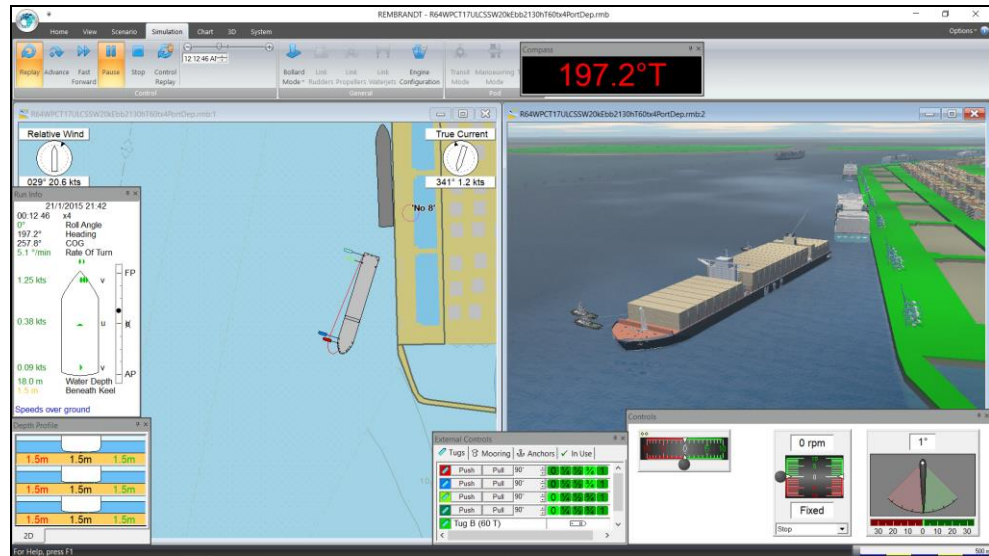
Run 63**R63WPCT17SW20kEbb2130hT60tx4StbdDep.rmb**

The vessel was pulled off the berth using four 60 tons bollard pull tugs operating at a maximum of $\frac{3}{4}$ Power. The stern was opened to the current and the forward tugs were ordered to stop and then push to starboard to execute a starboard swing off the berth. During the swing the wind and the current caused sternway. The helm and engine was then used to arrest the astern movement and assist in the starboard swing. When the wind and current were on the starboard side of the ship, the aft tugs were stopped. The forward tugs continued to push to get the pivot point as far away from the berth as possible in order to provide room for the stern.

When the vessel was facing the channel, the forward tugs were stopped and all tugs let go. The vessel then proceeded to sea at Half Ahead. The strong set of the current was manageable at a channel transit speed of over 9 knots.

Minimum available channel clearance for through traffic: 705 metres.

Degree of difficulty: 4/6

Run 64**R63WPCT17SW20kEbb2130hT60tx4StbdDep.rmb**

The vessel was pulled off the berth using four 60 tons bollard pull tugs operating at $\frac{3}{4}$ Power. The tugs were stopped and let go when the bow was heading towards the channel. The vessel then proceeded to sea at Half Ahead, passing the re-positioned Selat Buoy at over 7 knots.

Degree of difficulty: 4/6

4

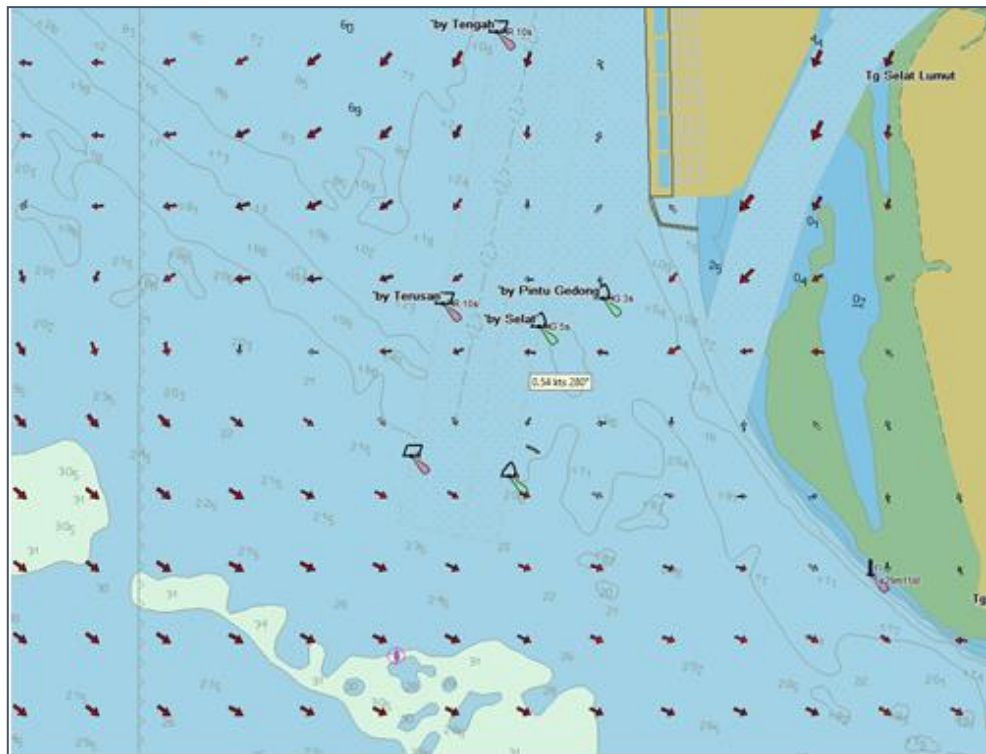
Observations & Findings

4.1

Currents

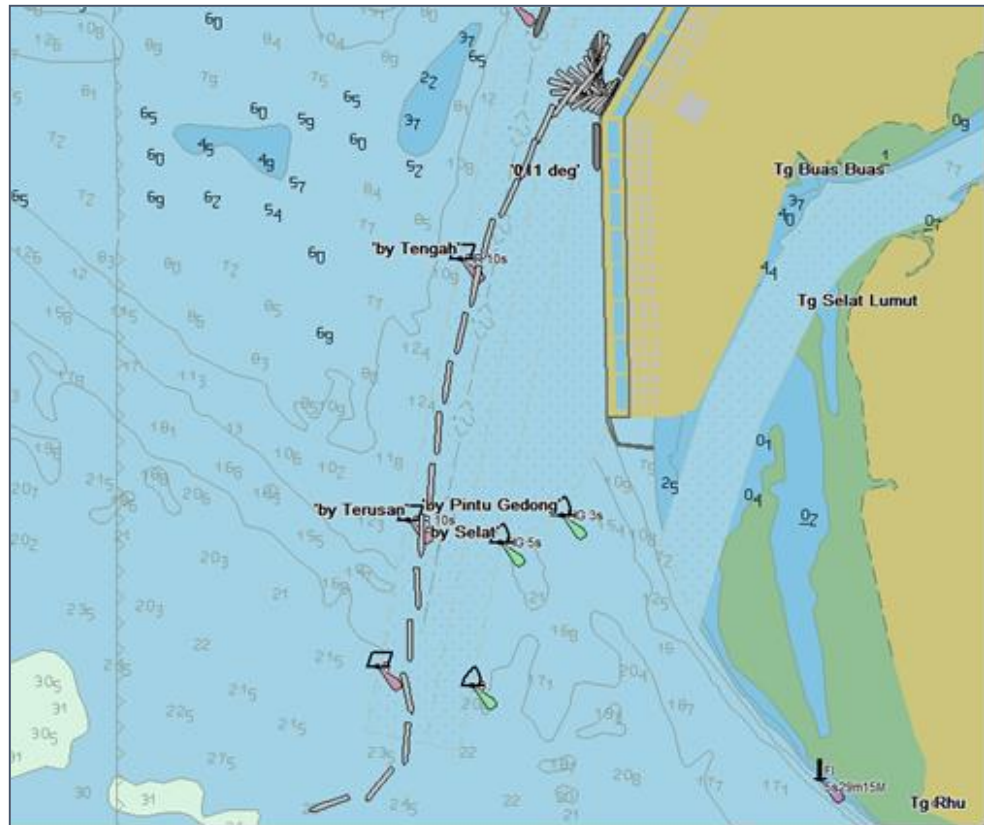
When approaching the port both the flood and ebb currents set across the entrance of the South Channel. Large vessels travelling at relatively slow speeds will have to counter the set by heading at an angle to the channel. In such situations it may be prudent for pilots to co-ordinate their movements so that the slow vessel does not encounter another large vessel at the entrance of the channel. Large vessels travelling at slow speeds could alternatively have tugs escorting them to assist, if necessary. The current flow becomes more aligned with the channel further upstream, reducing the swept path of the vessel.

Figure 4-1 Weak westerly flow near Terusan Buoy during the flood current



It was noticed that during a phase of the flood current, a weak flow to the west occurs near the Terusan Buoy. Although the flood current generally flows south-eastwards at the channel entrance, outbound vessels travelling at slow speed may be set towards the west near the Terusan Buoy. Vessels keeping close to the starboard side of the channel may encounter difficulty recovering from the set, especially if a strong NE wind was blowing.

Figure 4-2 Vessel being set by the westerly flow near Terusan Buoy and the easterly flow further south during the flood current



4.2 8,100 TEUs Containership

With two 45 tons bollard pull tugboats assisting, there was generally no difficulty in berthing and unberthing the 8,100 TEUs vessel at Berth CT13 and CT-14. However there were occasions when both tugs had to work at Full Power. One situation is when the bow has to be pushed against the current when berthing, if it protrudes past the 'knuckle' at CT-13/CT-14. Another occasion is when the tugs have to hold against the ebb current and 20 knots SW wind. The bow and stern thrusters were not used but in adverse current and weather conditions it may be prudent to deploy at least two 60 tons bollard pull tugs.

4.3 22,000 TEU Containership

The set of the current is across the channel for both the flood and ebb streams at the southern portion of the South Channel. With a strong cross current, the larger 22,000TEU vessel needed more space to align with the channel before making its approach. For large, deeply laden vessels such as the 22,000 TEU containership, the present position of the pilot station is too close to the extended entrance of the channel.

For the 22,000 TEU containership, the simulation runs were conducted using four

60 tons bollard pull tugs. These tugs had to frequently use up to $\frac{3}{4}$ Power to assist the vessel when manoeuvring in the peak environmental conditions. On one occasion Full Power was required to swing the vessel around against the strong wind and current. It will be prudent to deploy at least two 80 tons bollard pull and two 60 tons bollard pull tugs in adverse environmental conditions.

In summary the simulations showed that:

- In the conditions simulated, the 8,100 TEUs and 22,000 TEUs containerships were able to berth and unberth safely with the assistance of two 45 tons bollard pull tugs and four 60 tons bollard pull tugs respectively, in most situations. There were some occasions when more tug power would be required...
- The strength of the currents must be considered in the manoeuvre to be executed. A vessel at a wide angle to strong currents needs more tug power to overcome when pushing or pulling against it. In adverse environmental conditions, the tugs deployed may be unable to provide the full rated power as part of their power is used to overcome the same environmental conditions that the ship is exposed to.
- In the simulations, there was at least 400 metres of channel width available for through traffic. In many of the runs more than this was available. The encroachment in to the South Channel was for about 10 minutes during swing manoeuvres at some berths. The with co-ordination between pilots, the impact to two-way traffic flow in the South Channel can be minimised.
- The channel width, widened to 800 metres, provided adequate room for entry and departure in the peak conditions simulated.

5 Considerations and Recommendations

5.1 Considerations

The limitations of the simulator and the simulation runs conducted have to be considered. This evaluation provides an indication of the feasibility of the approaches to the berth and manoeuvring room available in the channel and off the berths. The runs demonstrate that in the circumstances simulated, the manoeuvres can be conducted successfully with the assistance of tugs.

It must be noted that the tug forces applied in the desktop simulations were vector forces. Not all the rated tug power will be available during operations, as some of the power will be sapped coping with the environmental conditions. The age and maintenance of the tugboats may also compromise their performance.

The simulated manoeuvres were conducted in adverse environmental conditions. In such wind, wave and swell conditions, the tug masters will have to be skilful in manoeuvring their vessels in close proximity of the containerships.

Based on the information provided in the port's marine information handbook, the MLWS level is 1.1 metres above Chart Datum. The runs were conducted with no height of tide. This provides an allowance that will be advantageous during operations.

5.2 Recommendations

Based on the simulation runs and the considerations above, it is recommended that:

- (a) The pilot boarding ground be shifted further to sea for large vessels as the extended channel reduces the distance to the present pilot boarding ground. This will provide more sea room for pilots to position their vessels for a safe entry.
- (b) For the 8,100 TEUs containership, at least two 60 tons bollard pull tugs are deployed to assist. For the 22,000 TEUs containership, at least two 80 tons bollard pull tugs and two 60 tons bollard pull tugs be provided. This will allow sufficient tug power to address adverse environmental conditions and also assist in recovery from emergency situations. In general, additional tug power will also help reduce the time to swing, berth or unberth the vessel. This will minimise impact on other port movements. It must be noted, however, that these tug recommendations are based on the manoeuvres conducted in adverse environmental conditions. In more benign conditions, two 45 tons bollard pull tugs and four 60 tons bollard pull tugs may be adequate for 8,100 TEUs Containership and 22,000 TEUs Containership, respectively.

- (c) The Aids to Navigation (AtoN), be re-positioned when dredging has been completed in order to facilitate the movement of vessels. In the simulations this re-positioning involved:
 - (i) Installing two navigation marks to mark the extended entrance of the channel.
 - (ii) Re-positioning the Selat Buoy further south after completion of dredging works in the area. If the submarine cable still runs in the same area but is buried deeper and armoured, another navigation mark can be installed outside the west bank in transit with the Tengah Buoy to indicate the position of the cable.
- (d) More simulation runs be conducted with these recommendations, if deemed acceptable, in place. The pilots and tugmasters can be provided familiarisation with the manoeuvres and expected conditions on a Full Mission Ship Simulator. This will also provide the opportunity for more comprehensive simulation runs be conducted to determine the window for safe operations for vessels in other conditions of loading, considering the supporting resources necessary, and develop best practices.
- (e) The height of tide and the environmental conditions have to be considered when setting the standard operating procedures to ensure that there will always be sufficient underkeel clearance for navigation and manoeuvring.
- (f) The conditions for movement of the vessel should be determined and included into the standard operating procedures and in the Passage Plan provided to shipmasters.
- (g) Although no tugs escorted the vessel during its passage through the channel, such measures could be considered, especially for large vessels exposed to cross-currents, to increase the factor of safety.
- (h) The simulation has been conducted for the Expansion at its fullest completion. Interim phases should be tested by local pilots and authorities in Full Mission simulation to gain their views and acceptance of the project.

5.3

Conclusion

Based on the layout of the proposed expansion and the areas to be dredged, simulation runs conducted indicate that there is adequate manoeuvring room for both the 8,100 TEUs and 22,000 TEUs containerships. With pilotage guidelines for movement, support from port traffic control and adequate tugboat assistance, the movements to the proposed berths can be conducted safely.

It must be noted that the simulations were conducted in the layout depicting the full development, including dredging. As the development is likely to take place in phases, it may be prudent to assess movements to any new berth before they are

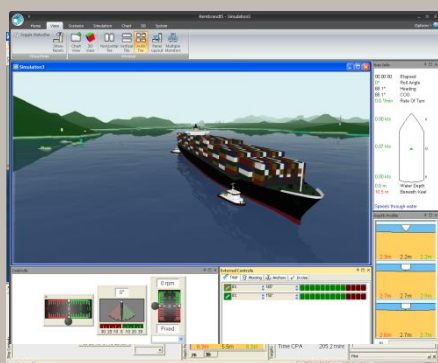
operational. This could be initially conducted on a desktop simulator to confirm the adequacy of the dredged area. Once finalised, Full Mission Ship Simulations can be conducted to prepare pilots and tug masters for the movements.

Appendix A

Description of PC Rembrandt

Manoeuvring Simulation

BMT PC Rembrandt



BMT has many years experience in all aspects of ship manoeuvring from full scale trials, free running and captive model tests to mathematical prediction and simulation.

PC Rembrandt V5.0 is a real and fast time ship-handling and manoeuvring simulator. It is PC based and designed using standard Windows user interfaces and structure to ensure user-friendliness. It is principally designed for the following applications:

- Manoeuvre rehearsal;
- Ship performance and operational assessments;

- Assessment of port arrangements (berths, channels, etc);
- Assessment of tug requirements;
- Ship-handling training;
- Incident investigations.

PC Rembrandt uses industry standard electronic charts as the interactive simulation backdrop enabling the mathematical model to interact with the bathymetry and land objects contained within the vector chart data. Mathematical ship models are based on specific ships and are modelled individually by BMT ARGOSS, based on many years experience in the manoeuvring performance of surface vessels.

PC Rembrandt V5.0 includes the following principal features:

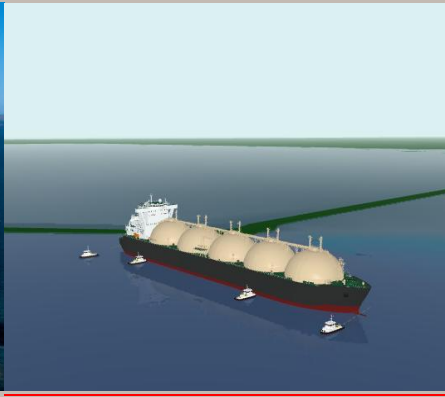
- Full ENC / ARCS chart display and functionality giving use of industry standard electronic charts for simulations with worldwide coverage for minimal additional costs.
- 3D visual databases for all vector charts generated at no cost and providing an ‘out of the bridge’ view from the ship, including night-time views and reduced visibility settings.

- 2-D underwater profiles showing the local bathymetry and channel dimensions.
- An advanced mathematical model including bank effects, dynamic squat, ship – ship interaction and wave forces.

The simulator includes many of the features found on modern Integrated Bridge Systems (IBS) and is available with a number of additional modules including, spatially variable currents, anchors, mooring lines, tugs and 3D traffic vessels.

The electronic charts are typically purchased by the end-user through their normal chart procurement processes. The charts used on-board a vessel (i.e. S-57 ENC or ARCS) can be used in the simulator. Ship models can be created individually for a client based on a specific ship or can be chosen from a library of nearly 100 vessels. All ship models are validated by BMT ARGOSS with assistance from nautical staff.

Dedicated control consoles can be supplied that utilise the same controls as the ship, therefore providing a realistic control interface to the simulator. These can be designed to match the layout on-board the ship.



Ship Models

All hydrodynamic ship models are created by our team of experienced Hydrodynamicists and Naval Architects. Vessels are individually modelled to reflect the characteristics of a ship or Class of ship. All vessels mathematically modelled for PC Rembrandt are fully validated and can be supplied singularly or as a library of different ships. For example, each license placed on-board a particular ship could be ship specific, yet a shore-based system could be configured to provide the option of simulating any ship in a particular fleet or a range of ship types common in a particular port.

Most ship types can be accommodated on the simulator, including:

- Bulk carriers;
- Container ships;
- Cruise ships;
- Ferries (ro-pax);

- Gas carriers (LNG / LPG);
- General cargo;
- Tankers (coastal → ULCC);
- Warships.

A wide range of environmental conditions, hydrodynamic effects and control systems can be modelled including:

- Wind (gusting), tide, current and waves;
- Bank effects, squat, and ship-ship interaction;
- CPP, podded propulsors and azimuth thrusters;
- Conventional, high-lift and flapped rudders;
- Diesel, diesel-electric and gas turbine propulsion systems;
- Joystick and DP controls.

Standard 'library' vessels of a range of different merchant and naval ship types are also available.

Each ship model goes through a comprehensive validation process, where the mathematical model is

prepared by BMT and validated against sea trials or model test information and against our own experience based on our extensive database of ship manoeuvring data. Following this first 'phase', the ship model is evaluated by a person familiar with the handling of the vessel, such as a Master or local Pilot. It is our aim to ensure that every ship model is indistinguishable in performance from the real ship.

Electronic Charts and 3D Visuals

PC Rembrandt V5.0 is compatible with the following format electronic charts which provide the interactive 'backdrop' to the simulations:

- ENC: Standard ENC's produced to the standard S57 data format;
- ARCS: ARCS charts stored in their natural Hydrographic Office (HO) format.

ENC and ARCS charts may be purchased from normal nautical chart distributors and provide extensive coverage of world-wide ports and navigable areas. For PC

Rembrandt systems used on-board, the same charts can be used on PC Rembrandt as on the ship's IBS.

Where vector charts (ENC and BMT formats) are available PC Rembrandt can create a 3D visual scene directly from the electronic chart. The 3D visual scene is created automatically at no additional cost, therefore removing the cost of expensive port databases. All seabed characteristics, land areas, major landmarks and aids to navigation defined by the chart are created and displayed in the 3D view. This includes all defined navigational light sectors, ranges and sequences.

The user may move around the visual scene at will and may use pre-defined viewpoints including bridge view, bridge wings and bridge wing views looking aft. Both visibility (to reflect the reduction due to fog) and daylight settings may be varied.



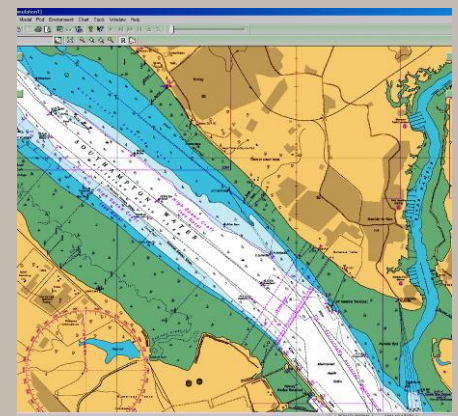
Software Modes and Features

The facilities of PC Rembrandt V5.0 include:

- Real or fast time simulations with the facility to pause or fast forward at any time.
 - Three chart display modes to suit individual preferences: Bow or track up, North up or fixed chart.
 - Historical and future position displays, heading line and analogue or digital gyro-compass.
 - Customisable display with saveable panel layouts.
 - Fully variable environmental conditions (wind, tide, current and waves).
 - Save and re-load facilities with re-play in real or fast time for use in briefing / de-briefing sessions for the bridge team and pro-active training sessions.
 - Detailed simulation reports, including position plots, graphs and tabular formats.
 - The ability to save simulations as scenario files, based on a particular port and environmental conditions.
 - On-screen pivot point indicator, showing its position along the length of the ship.
 - The ability to interrogate chart information for familiarisation
- with the characteristics of a particular port.
 - Accurate waypoint plotting on the electronic charts to represent particular tracks, enabling PC Rembrandt to be used for passage planning and training.
 - User defined 'hard-quays' and dolphins as part of the berth arrangements. The ship interacts with these and displays the impact velocity accordingly.
 - Placement of stationary vessels on the electronic chart to represent moored vessels in a particular port.
 - The use of traffic vessels in simulations to represent other port traffic, therefore increasing the realism of manoeuvres.
 - Channel cross-section view showing the position of the ship at bow and stern in a channel, when coming alongside a berth or in shallow / confined water.
 - User defined spatially variable currents in simulations, therefore taking into account the turning effect when the bow and stern are in different tidal streams.
 - Use of up to six tugs in simulations, allowing the effects of tug assistance to be incorporated into simulations.
 - The ability to use anchors, mooring lines and fenders during simulations, therefore allowing
- the dynamic effects of mooring lines and anchors to be included in the ship's mathematical model.
 - Use of navigational aids such as Range & Bearing markers, range rings and parallel index lines during simulation, to assist with navigational exercise and increase the realism of a particular manoeuvre.
 - Interactive help facilities and a detailed user guide.

PC Rembrandt V5.0 may be supplied with the following optional modules:

- Joystick Control Module
- Tugs Module
- Spatial Currents Module
- Anchors and Mooring Lines Module
- 3D Visuals for traffic and stationary vessels



- Track-pilot Module



PC Rembrandt is designed to run on the following specification PC:

PC:

- Intel Core i5 or better processor; or equivalent.
- Minimum 4GB of RAM.
- 1 or more dual-output graphics card with OpenGL 2 support (specific recommendations available).
- CD-ROM drive.
- 20 GB of hard disk space.
- 3 x USB & 1 x RS232 serial port.
- Windows XP Pro SP2 (English) or Win 7 Operating System
- 1 or more SXGA (1280 x 1024 pixel) display(s).

Purpose-built control consoles are available from BMT ARGOSS for use with PC Rembrandt. The consoles are designed to replicate a ship's controls layout and include industry standard control levers from Kwant and other manufacturers. Both desktop and Integrated Bridge System style console are available and all consoles are 'plug and play', using a single USB connection to the simulator PC.

The use of a control console allows the user to navigate and manoeuvre the ship using real ships controls, therefore increasing the realism of the simulation by providing 'hands-on' control.

PC Rembrandt Applications

PC Rembrandt is regularly and effectively used by pilots, ship operators, naval architects and port authorities for:

- The assessment of safe operating limits in a particular port under varying environmental conditions,

including under-keel clearance.

- Use of alternative methods of control, such as tugs and the optimisation of tug usage.
- Assessment of tug requirements for a given vessel in a particular port under defined environmental conditions
- Evaluations and risk assessments for new or proposed berths, terminals, approaches and channel design.
- Port familiarisation, manoeuvre rehearsals and verification of passage plans.
- Familiarisation of officers and pilots with the handling characteristics of a new vessel
- Training of junior and senior officers (and pilots) in ship-handling and the aspects particular to different ship types.

PC Rembrandt may be used at a client's office (shore-side) to provide overall company use as well as on-board ship, where it is ideally suited to the rehearsal of manoeuvres (with or without pilots) prior to commencement, the verification of passage plans and for providing junior officers with ship-handling experience that they would otherwise not receive.

PC Rembrandt v5.0 may be combined with an advanced Ship-handling Computer Based Training package to provide a formal and assessable structure to on-board training. It may also be combined with a navigational predictor (integrated into the ships IBS) giving a more accurate future position display on the ship's ECDIS and the capability to re-play actual manoeuvres VDR style.

STATEMENT OF COMPLIANCE

Particulars of Product

Name of Product: **Bridge Operation Simulator**Type designation: **REMBRANDT Simulator**

Particulars of Manufacturer

Manufacturer: **BMT Ship & Coastal Dynamics Ltd.**Manufacturer address: **Fareham , United Kingdom**

This is to confirm:

That the above product is found to comply with Class S- Standard for Certification of Maritime Simulators No. DNVGL-ST-0033 January 2011.

Application

The above Standard is based on requirements in the STCW Convention, Regulation I/12.

This Statement is valid until **2022-05-31**, provided the requirements for the retention of the Statement will be complied with.

Issued at **Sandefjord** on **2017-09-05**



Nils Gunnar Bøe
Area Manager

for **DNV GL**



Capt. Aksel David Nordholm
Auditor



Job Id:
Statement No: **001/170531**
DNV GL Id No.: **178127**

Application/Limitation

Rembrandt is designed for the following applications:

- Pilot and Master manoeuvre rehearsals and planning;
- Ship-handling and navigation (e.g. application of COLREGS) training;
- Ship-handler evaluation;
- Ship performance and operational assessments / limits;
- Assessment of port arrangements (berths, channels, etc);
- Incident investigations and emergency response planning.
- Pilot exemption certificates
- Ship handling experience and training



Lotsenbrüderschaft NOK I
Brunsbüttel
Eing. am 26.02.2016
Buch-Nr. 05 143116



Wasser- und
Schifffahrtsverwaltung
des Bundes

Generaldirektion Wasserstraßen und Schifffahrt
Kiellinie 247 • 24106 Kiel

Lotsenbrüderschaft NOK I
z. H. Herrn Hartmann
Schleusenstraße 9 - 11
25541 Brunsbüttel

Generaldirektion
Wasserstraßen und Schifffahrt
Außenstelle Nord
Kiellinie 247
24106 Kiel

Ihr Zeichen

Mein Zeichen
3100 S2-344.2/ 46 III

Datum
23. Februar 2016

Marita Wiebrodt
Telefon +49 (0)431 3394 8210
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**Anerkennung von Schiffsführungs- und Radarsimulatoren durch die
GDWS für die Aus- und Fortbildung von Seelotsen und Kanalsteuernern**
- Ihr Antrag vom 07.11.2014 - Buch Nr. 34/43/14 - auf Anerken-
nung des PC Rembrandt-5

Sehr geehrter Herr Hartmann,

nach erfolgreich durchgeführter Überprüfung der Anforderungen für die
Anerkennung von Schiffsführungs- und Radarsimulatoren (SFRS) für die
Aus- und Fortbildung von Seelotsen bzw. von Kanalsteuernern erteile ich
Ihnen die Anerkennung gemäß § 4 Abs. 3 Seelotsenaus- und -fortbil-
dungsverordnung.

Die Zulassung der Schiffsführungs- und Radarsimulatoren für die Aus- und
Fortbildung von Seelotsen und Kanalsteuernern ist fünf Jahre gültig.

Das Ergebnis der Überprüfung wird den Lotsenbrüderschaften und dem
Verein der Kanalsteuernern mitgeteilt.

Mit freundlichen Grüßen
Im Auftrag

Wiebrodt

Translation of WSV Certification

Approval of shiphandling and radar simulators by the GDWS for training and advanced training purposes of Sea Pilots and Kiel Canal Helmsmen – Your application from 07.11.2014 – Account No. 34/43/14 – for approval of PC Rembrandt-5

After successful examination of requirements for approval of navigation and radar simulators (SFRS) for the training and advanced training of ship pilots and canal helmsmen, I give you the approval conforming with § 4 para. 3 of the ship pilot training regulation.

The approval of the navigation and radar simulators for the training and advanced training of ship pilots and canal helmsmen is valid for 5 years.

The pilot association and the canal helmsmen organisation will be informed about the outcome of the review.

Dated – 26-02-2016

Appendix B

Pilot Card of 8,100 TEUs Containership

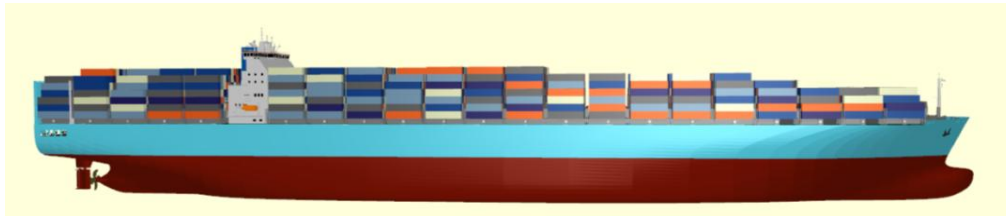
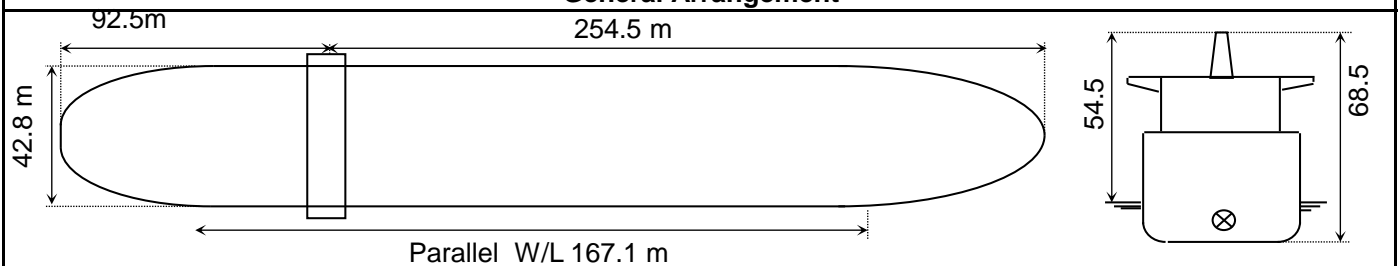
PILOT CARD

Ship Name: Container Ship 004 (L)
LC: LOADED

Ship's Particulars

LOA:	<u>347.0</u>	m	Capacity:	<u>8,000</u>	TEU
L _{BP} :	<u>331.5</u>	m	Block Coeff:	<u>0.68</u>	-
Beam:	<u>42.80</u>	m	Bulbous Bow:	<u>Y</u>	-
Draught (Aft):	<u>14.5</u>	m	Frontal Windage Area:	<u>1,284</u>	m ²
Draught (Fwd):	<u>14.5</u>	m	Lateral Windage Area:	<u>8,017</u>	m ²
Displacement:	<u>142,778</u>	tonnes	Air Draft:	<u>68.5</u>	m

General Arrangement



Propulsion Particulars

Engine Type:	<u>Diesel</u>	-			
MCR:	<u>54,840</u>	kW			
Astern Power:	<u>14,950</u>	kW			
Min. RPM:	<u>22</u>	-			
	<u>6.0</u>	kts			
Full Ahead - Full Astern:	<u>02:30</u>	min:sec			
Propeller Diameter:	<u>8.95</u>	m			
Pitch Ratio (P/D):	<u>1.253</u>	-			
Direction of Rotation:	<u>Right-handed</u>	-			

Telegraph	RPM	Speed (kts)
Full Ahead	65	17.8
Half Ahead	50	13.7
Slow Ahead	35	9.6
D. Slow Ahead	22	6.0
D. Slow Astern	-22	-4.2
Slow Astern	-35	-6.8
Half Astern	-50	-9.7
Full Astern	-65	-12.6

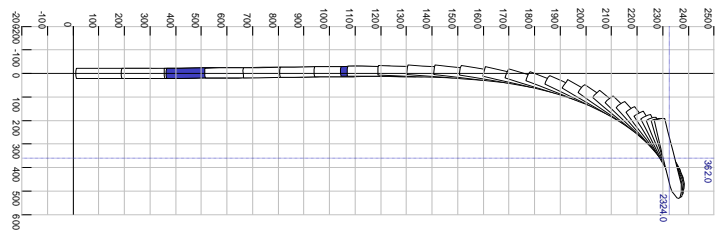
Steering Particulars

Rudder Type:	<u>Semi-balanced</u>		Midships to Hardover:	<u>15</u>	sec
Rudder Area:	<u>106.25</u>	m ²	Angle for neutral effect:	<u>1</u>	deg
Max. Angle:	<u>35</u>	Deg			

Manoeuvring Performance (Deep Water)

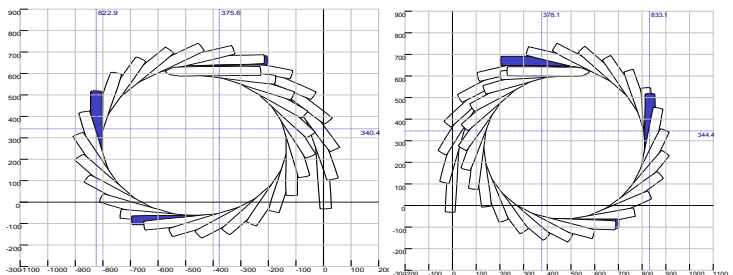
Crash Stop (Full Ahead - Full Astern)

Head Reach	<u>2246</u>	m
Transfer	<u>420</u>	m
Time to Stop:	<u>08:47</u>	min:sec
Time to Zero RPM:	<u>01:01</u>	min:sec
Time to Max. Astern RPM:	<u>02:00</u>	min:sec



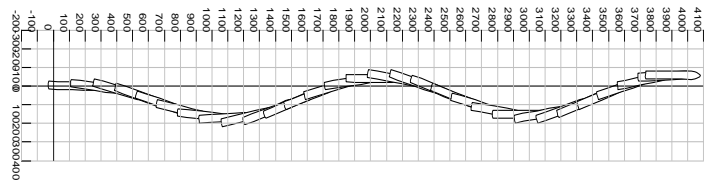
Turning Circle (Half Ahead)

Advance:	<u>659/668</u>	m
Transfer:	<u>376/378</u>	m
Tactical Diameter:	<u>823/833</u>	m
Speed Loss at 90 deg:	<u>25%</u>	%
Time to 90 deg:	<u>02:18</u>	min:sec



10/10 Zig-Zag (Half Ahead)

Time to 10 deg:	<u>00:51</u>	min:sec
1st Overshoot:	<u>7</u>	Deg
Time to overshoot:	<u>00:36</u>	min:sec
2nd Overshoot:	<u>10</u>	Deg
Time to overshoot:	<u>00:46</u>	min:sec



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For further information please contact:

Enquires PC Rembrandt

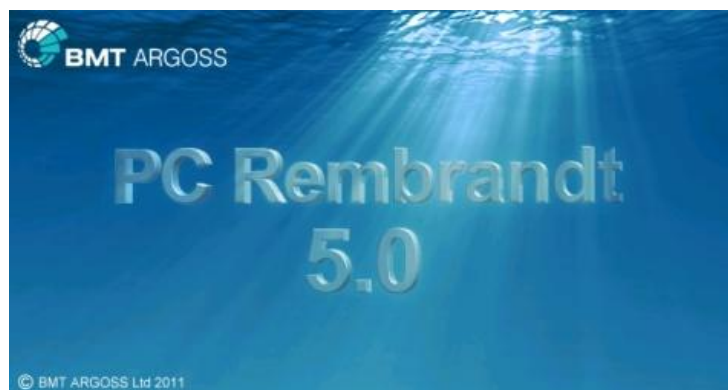
E-mail: pcrembrandt@bmtargoss.com

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BMT ARGOSS Ltd

First Floor, 3700 Parkway,
Solent Business Park, Whiteley,
Fareham, Hampshire PO15 7AL,
United Kingdom
Registered in England & Wales



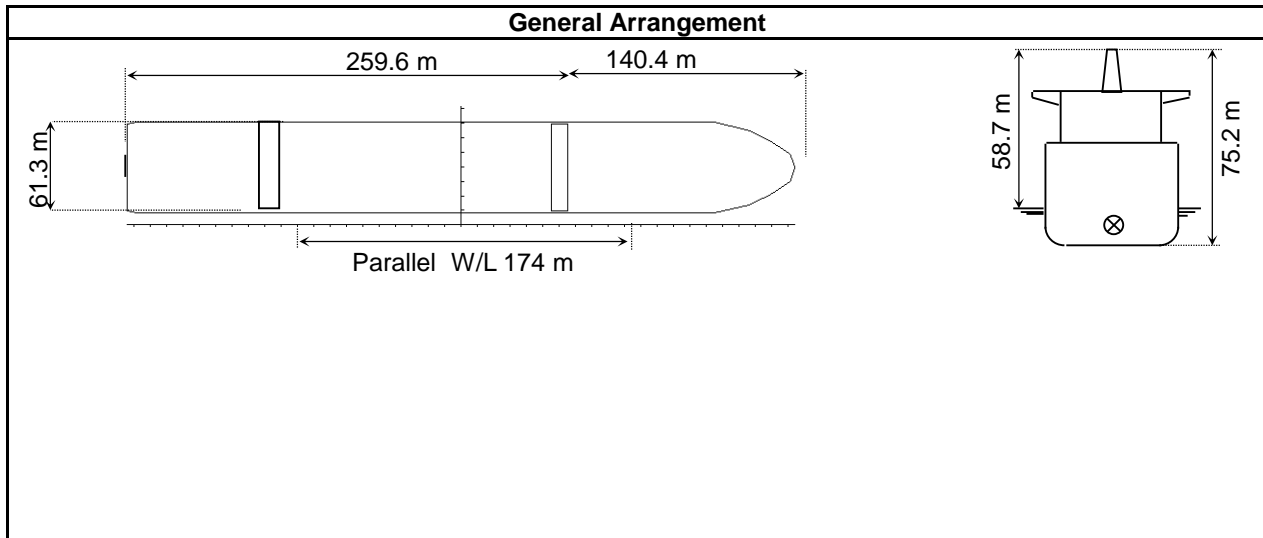
Appendix C

Pilot Card of 22,000TEUs Containership

PILOT CARD

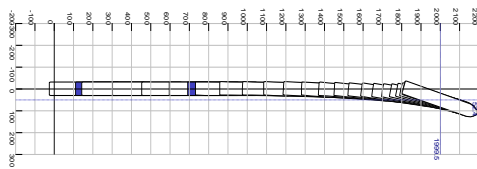
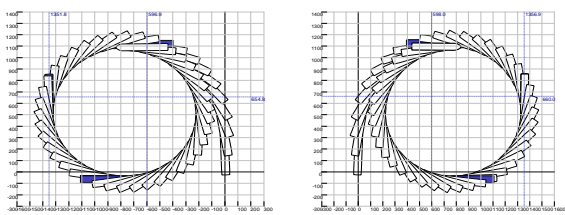
Ship Name: 22k TEU ULCS (L)	Loading Cond. : Fully-Loaded
	Type: ULCS

Ship's Particulars			
L _{OA} :	<u>400.0</u>	m	TEU (loaded) : <u>22,000</u>
L _{BP} :	<u>383.0</u>	m	at design draft= 16.5m
Beam:	<u>61.3</u>	m	Block Coeff: <u>0.71</u> -
Draught (Aft):	<u>16.5</u>	m	Bulbous Bow: <u>Y</u> -
Draught (Fwd):	<u>16.5</u>	m	Frontal Windage Area: <u>3,432</u> m ²
			Lateral Windage Area: <u>16,390</u> m ²



Propulsion Particulars			
Engine Type:	<u>Diesel</u>	-	
MCR:	<u>77,021</u>	kW	
Min. RPM:	<u>18</u>	-	
	<u>5.8</u>	kts	
Full ahead - Full Astern:	<u>01:29</u>	min:sec	
Propulsion Type:	<u>Single Screw FPP</u>		
Propeller Diameter:	<u>10</u>	m	
Pitch Ratio (P/D):	<u>1.05</u>	-	
Direction of Rotation:	<u>Right-handed (Clockwise)</u>		
	Telegraph	RPM	Speed (kts)
	Full Sea Ahead	75	22.4
	Full Ahead	59	18.0
	Half Ahead	42	13.1
	Slow Ahead	23	7.4
	D. Slow Ahead	20	6.5
	D. Slow Astern	-20	
	Slow Astern	-23	
	Half Astern	-42	
	Full Astern	-59	

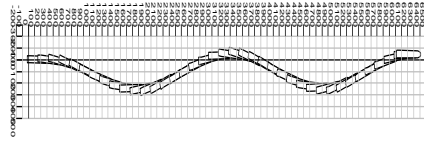
Steering Particulars			
Rudder Type:	<u>Semi-Balanced</u>		Midships to Hardover: <u>12.8</u> sec
Rudder Area:	<u>102</u>	m ²	Bow Thruster: <u>2 X 2,000</u> kW
Max. Angle:	<u>35</u>	Deg	Stern Thruster: <u>None</u> kW

Manoeuvring Performance (Deep Water)			
Crash Stop (Half Ahead - Full Astern)			
Head Reach	<u>1999</u>	m	
Transfer	<u>52</u>	m	
Time to Stop:	<u>07:09</u>	min:sec	
Time to Zero RPM:	<u>00:36</u>	min:sec	
Time to Max. Astern RPM:	<u>01:54</u>	min:sec	
Turning Circle (Half Ahead)			
	Port/Starboard		
Advance:	<u>1120/1125</u>	m	
Transfer:	<u>596/598</u>	m	
Tactical Diameter (TD):	<u>1351/1356</u>	m	
Speed Loss at 90 deg:	<u>39%</u>		
Time to 90 deg:	<u>03:20</u>	min:sec	

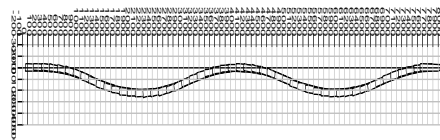
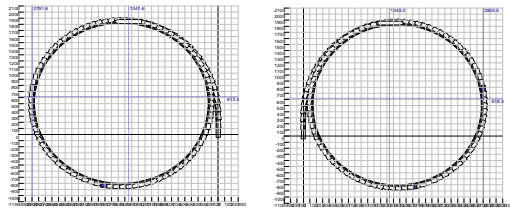
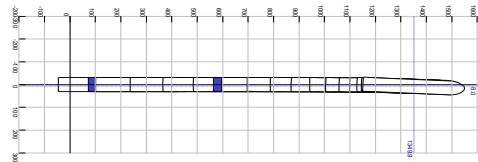
PILOT CARD

Ship Name: 22k TEU ULCS (L)	Loading Cond. : Fully-Loaded
	Type: ULCS

Manoeuvring Performance (Deep Water)		
10/10 Zig- Zag (Half Ahead)		
Time to 10 deg:	<u>01:05</u>	min:sec
1st Overshoot:	<u>5.8</u>	Deg
Time to overshoot:	<u>00:44</u>	min:sec
2nd Overshoot:	<u>8.1</u>	Deg
Time to overshoot:	<u>00:56</u>	min:sec



Manoeuvring Performance (Shallow Water, h/T=1.2)		
Crash Stop (Half Ahead - Full Astern)		
Head Reach	<u>1349</u>	m
Transfer	<u>7</u>	m
Time to Stop:	<u>05:19</u>	min:sec
Time to Zero RPM:	<u>00:36</u>	min:sec
Time to Max. Astern RPM:	<u>01:54</u>	min:sec
Turning Circle (Half Ahead)		
	Port/Starboard	
Advance:	<u>1848/1856</u>	m
Transfer:	<u>1341/1343</u>	m
Tactical Diameter (TD):	<u>2791/2802</u>	m
Speed Loss at 90 deg:	<u>38%</u>	
Time to 90 deg:	<u>07:35</u>	min:sec
10/10 Zig- Zag (Half Ahead)		
Time to 10 deg:	<u>02:03</u>	min:sec
1st Overshoot:	<u>1.6</u>	Deg
Time to overshoot:	<u>00:27</u>	min:sec
2nd Overshoot:	<u>1.7</u>	Deg
Time to overshoot:	<u>00:28</u>	min:sec



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 United Kingdom



Appendix D

Navigation Simulations Results

Revised Layout

Degree of difficulty in the simulation run (guidance)

Degree of Difficulty	General description	Scale
No Danger	Could be executed by shipmaster with little or no experience, e.g. anchoring in an open anchorage without any vessels around.	0/6
Very Safe	Could be executed by a shipmaster exercising due diligence.	1/6
Safe	Could be executed by shipmaster assisted by qualified pilot.	2/6
Challenging	Could be executed by shipmaster and qualified pilot, with adequate tug assistance.	3/6
Difficult	Could be executed by shipmaster and experienced pilot, with adequate tug support.	4/6
Very Difficult	Challenging physical or environmental conditions. Small margin of error. Could be executed by shipmaster and experienced pilot with adequate tug support and possibly, with external guidance, e.g. dockmaster.	5/6
Not Feasible	Manoeuvre not feasible. Physical or environmental conditions too overwhelming for vessel even with assistance of experienced pilot and adequate support, e.g. tidal height insufficient for vessel to transit.	6/6

Run Matrix

WESTPORTS PHASE 2	BERTHING		UNBERTHING	
	20 knots NE Wind	20 knots SW Wind	20 knots NE Wind	20 knots SW Wind
CT 13 – 8,100 TEU Container Vessel with LOA of 347m				
Peak Flood Currents	2 (Runs 1&2)	2 (Runs 3&4)	2 (Runs 5&6)	2 (Runs 7&8)
Peak Ebb Currents	2 (Runs 9&10)	2 (Runs 11&12)	2 (Runs 13&14)	2 (Runs 15&16)
CT 14 – 8,100 TEU Container Vessel with LOA of 347m				
Peak Flood Currents	2 (Runs 17&18)	2 (Runs 19&20)	2 (Runs 21& 22)	2 (Runs 23&24)
Peak Ebb Currents	2 (Runs 25&26)	2 (Runs 27&28)	2 (Runs 29&30)	2(Runs 31&32)
CT 10 – 22,100 TEU Container Vessel with LOA of 400m				
Peak Flood Currents	2 (Runs 33&34)	2 (Run 35&36)	2 (Runs 37, 38x&38)	2 (Runs 39&40)
Peak Ebb Currents	2 (Runs 41&42)	2 (Runs 43&44)	2 (Runs 45&46)	2 (Runs 47&48)
CT 17 – 22,000 TEU Container Vessel with LOA of 400m				
Peak Flood Currents	2 (Runs 49&50)	2 (Runs 51&52)	2 (Runs 53&54)	2 (Runs 55&56)
Peak Ebb Currents	2 (Runs 57&58)	2 (Runs 59&60)	2 (Runs 61, 61a&62)	2 (Runs 63&64)
TOTAL	16	16	16	16
	64 Runs			

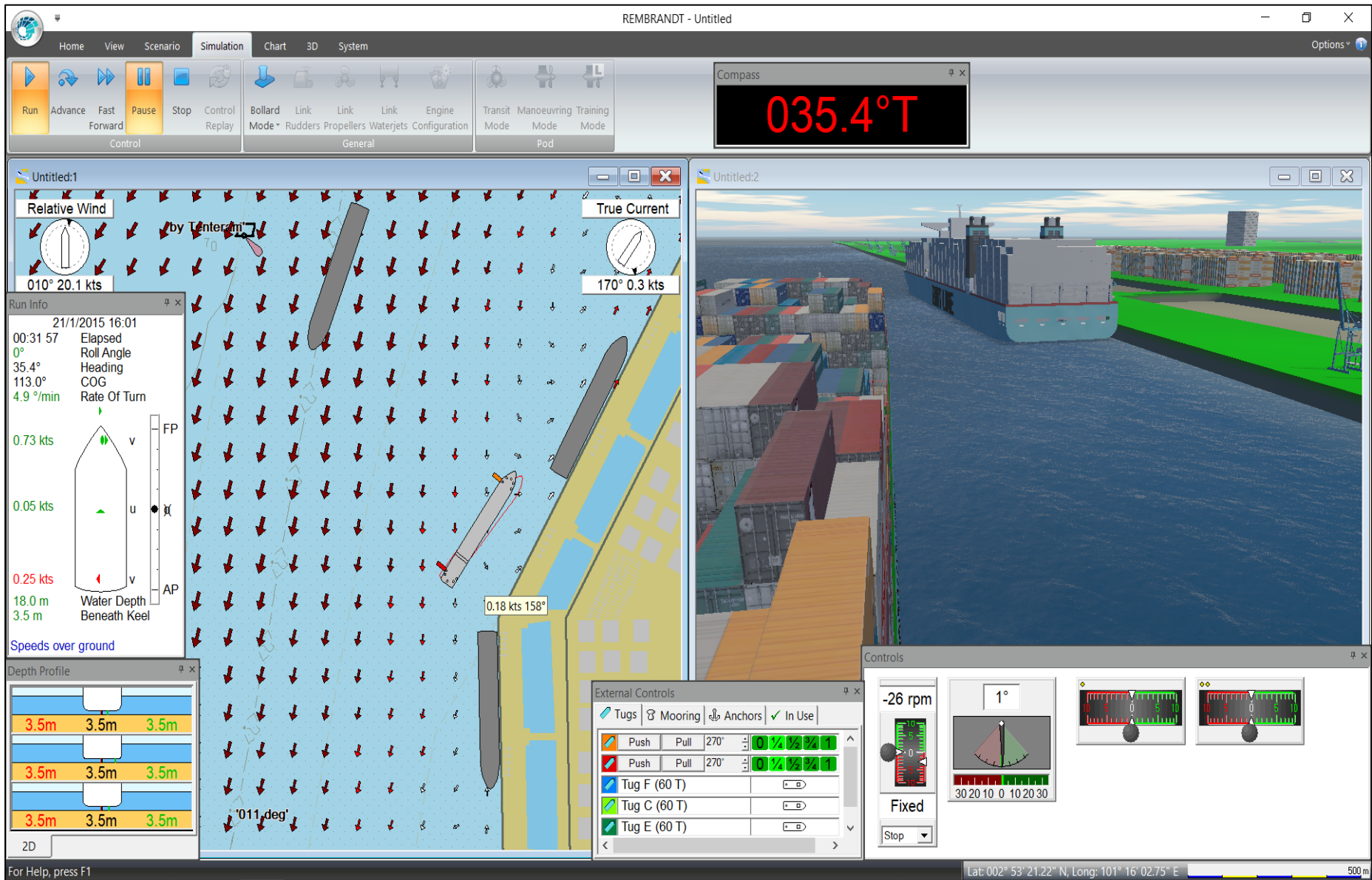
Note:

Emergency runs were not conducted, as these were already performed as part of the original set of navigation simulations.

Berth CT-13**Containership LOA 347m**

NE 20 knots Flood Current Arrival

Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
1	R1WPCT13NE20k Fld1530hT60tx2StbdArr.rmb	Fld (1530h)	NE 20 k	Arrival (Stbd a/s)	F: 60t A: 60t	The vessel experienced a strong set to starboard when approaching the entrance to the South Channel. She entered the channel at a speed of about 11 knots and kept the engine at Half Ahead until she passed the Selat Buoy. After the Selat Buoy, the southeasterly current flow shifted to a more southerly direction. The vessel was therefore stemming the current in the latter part of her approach to the berth. Off the berth, a weak counter current was experienced. Two 60 tons bollard pull tugs were made fast and they worked at Slow Power to push the vessel to the berth.	3/6

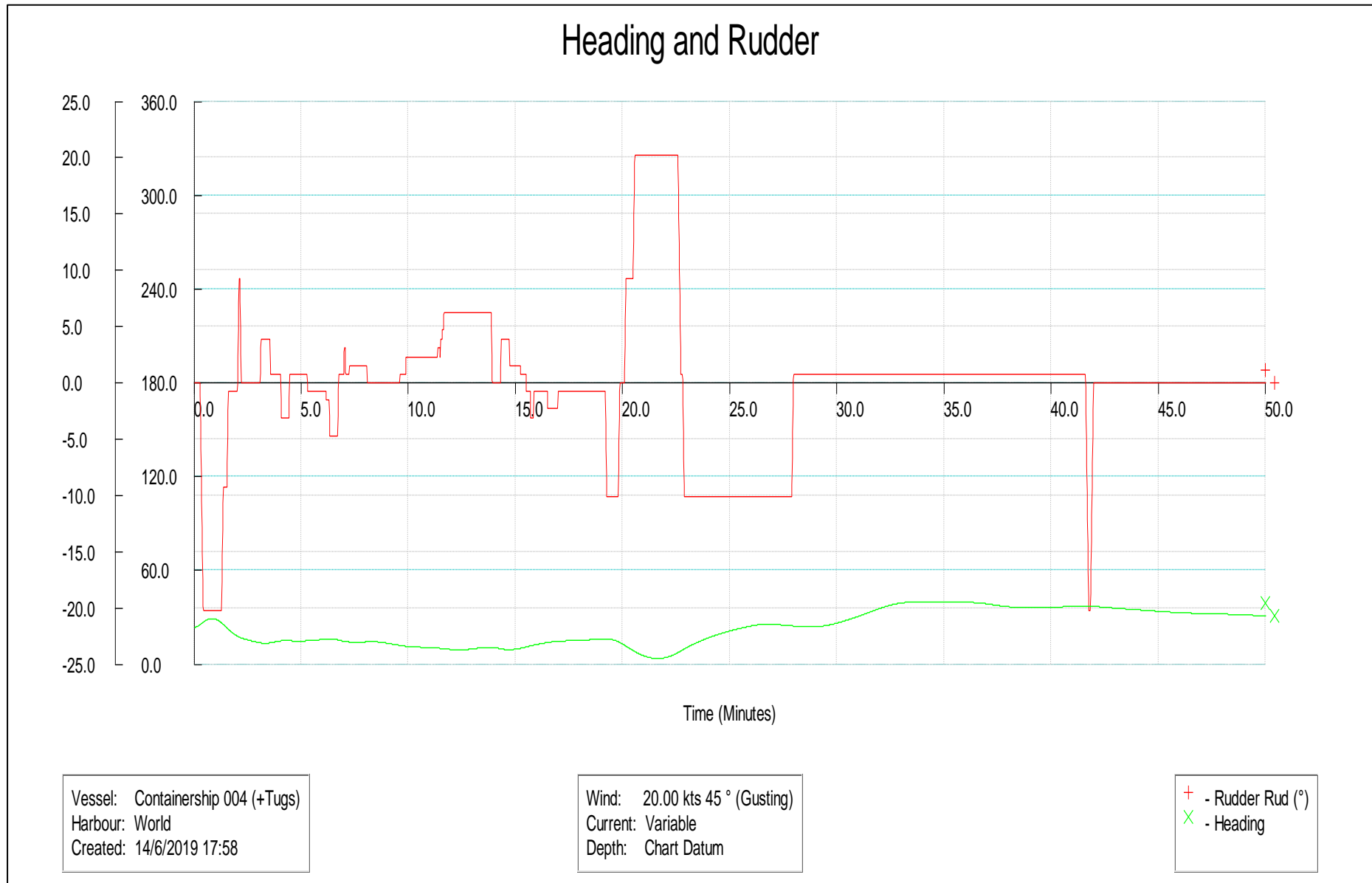


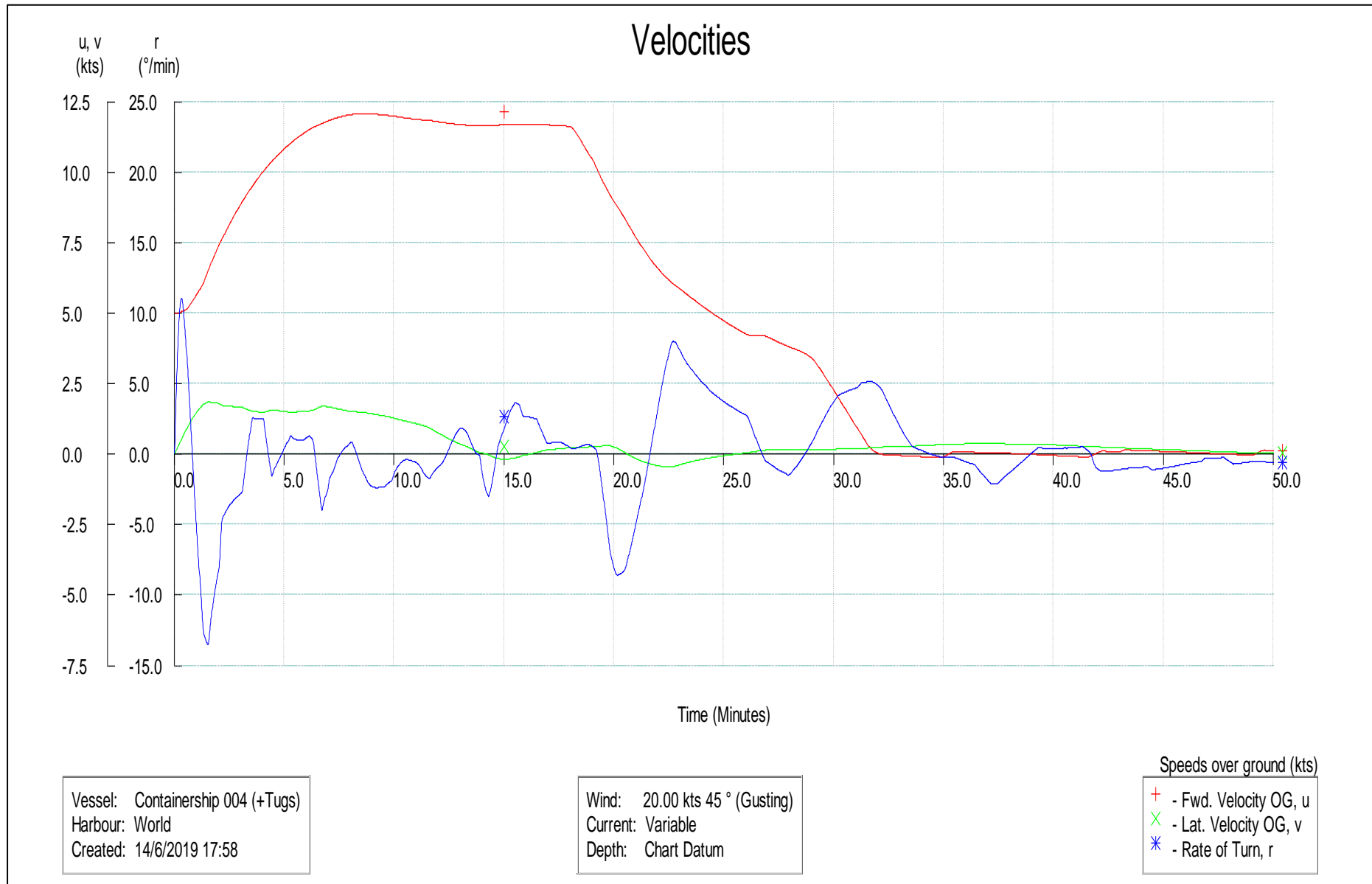
Vessel Track

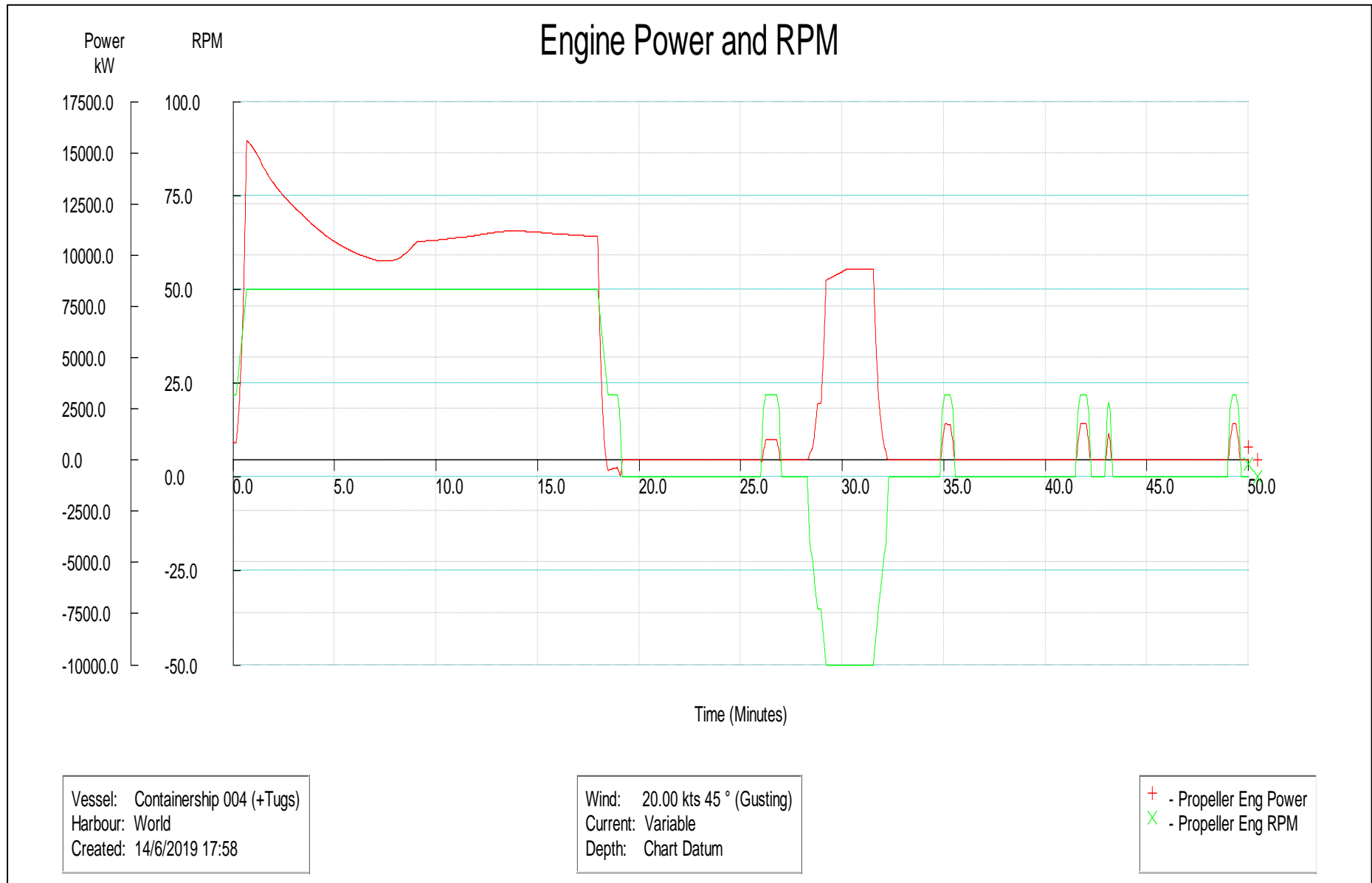


Vessel: Containership 004
Harbour: World
Created: 14/6/2019 17:58

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

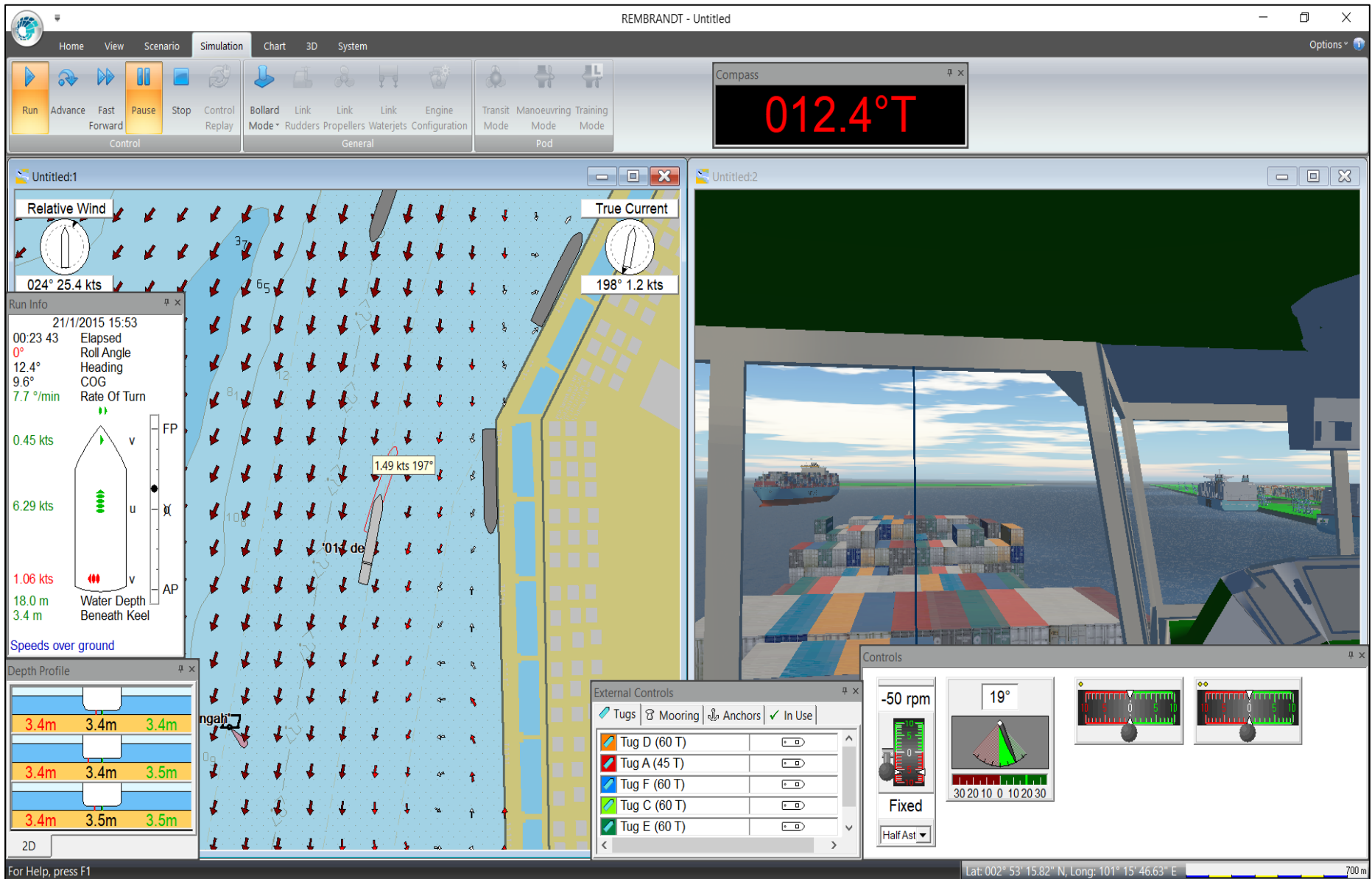








Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
2	R2WPCT13NE20kFI d1530hT45x2StbdAr r.rmb	Fld (1530h)	NE 20 k	Arrival (Stbd a/s)	F: 45t A: 45t	The vessel experienced a strong set to starboard when approaching the entrance to the South Channel. She entered the channel at a speed of over 11 knots and kept the engine at Half Ahead until she passed the Selat Buoy. After the Selat Buoy, the vessel was generally stemming the current. She remained in the channel until close to the berth. Two 45 tons bollard pull tugs were then made fast and assisted in pushing her alongside operating at a maximum of Half Power.	3/6

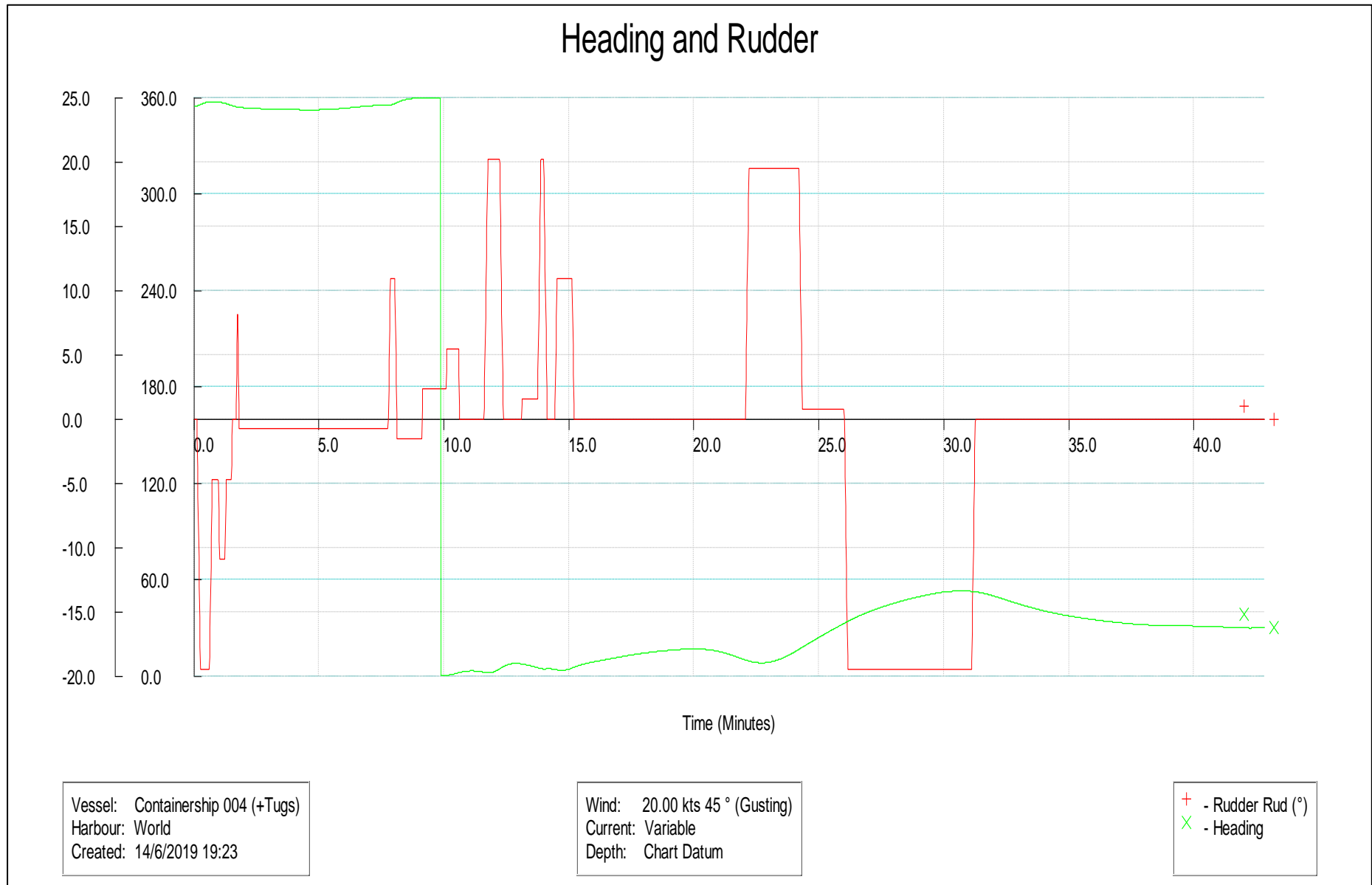


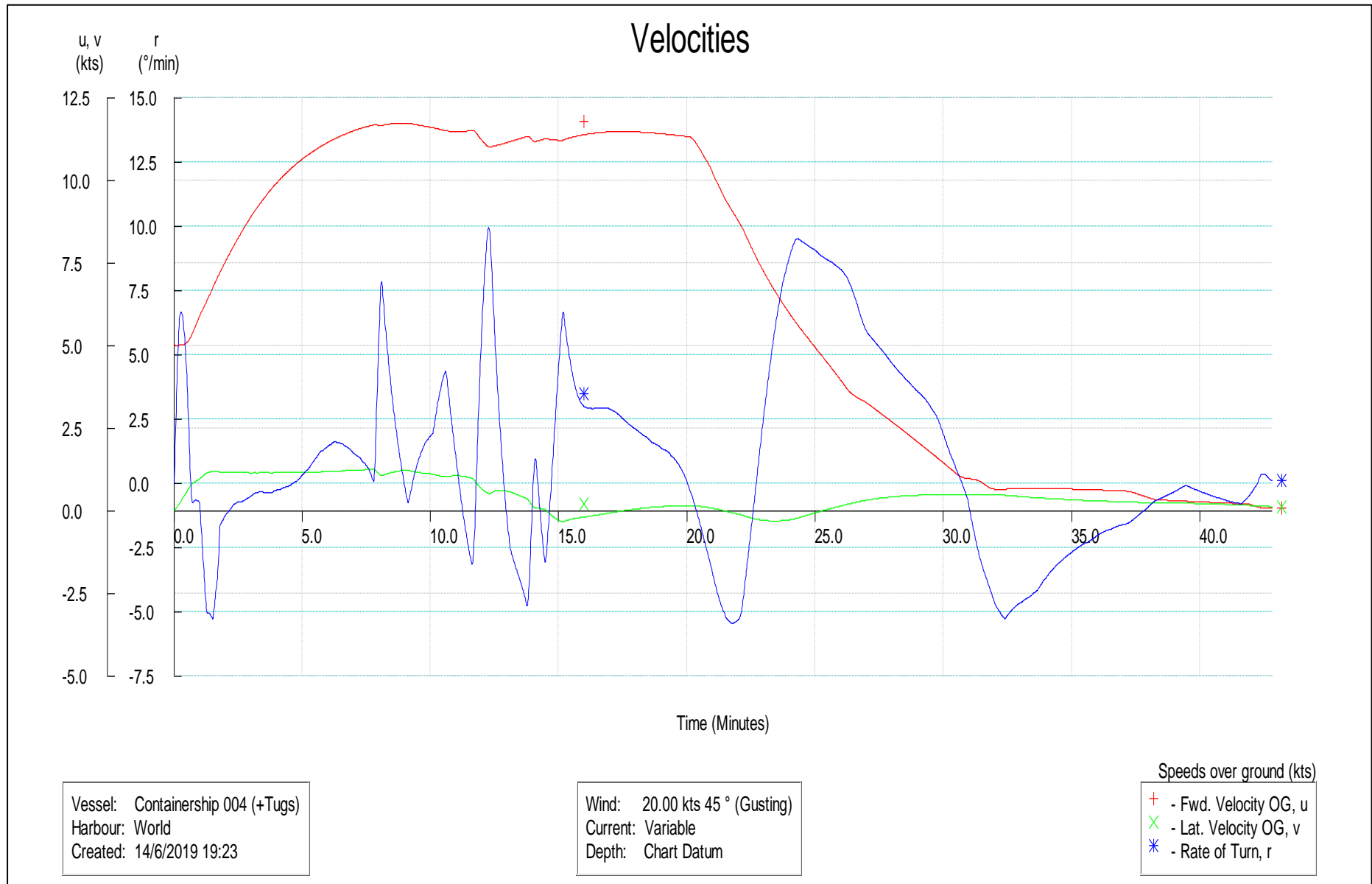
Vessel Track

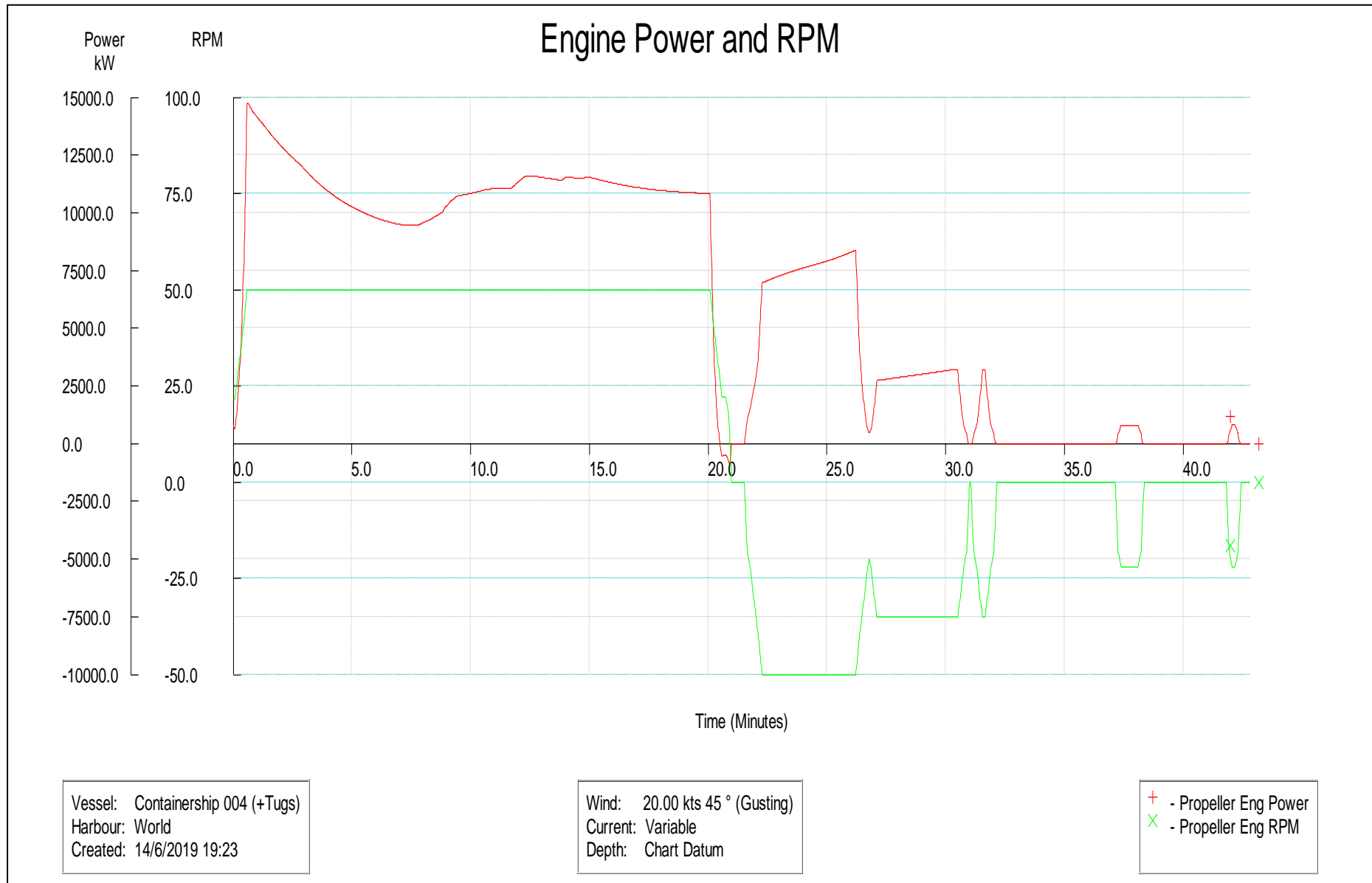


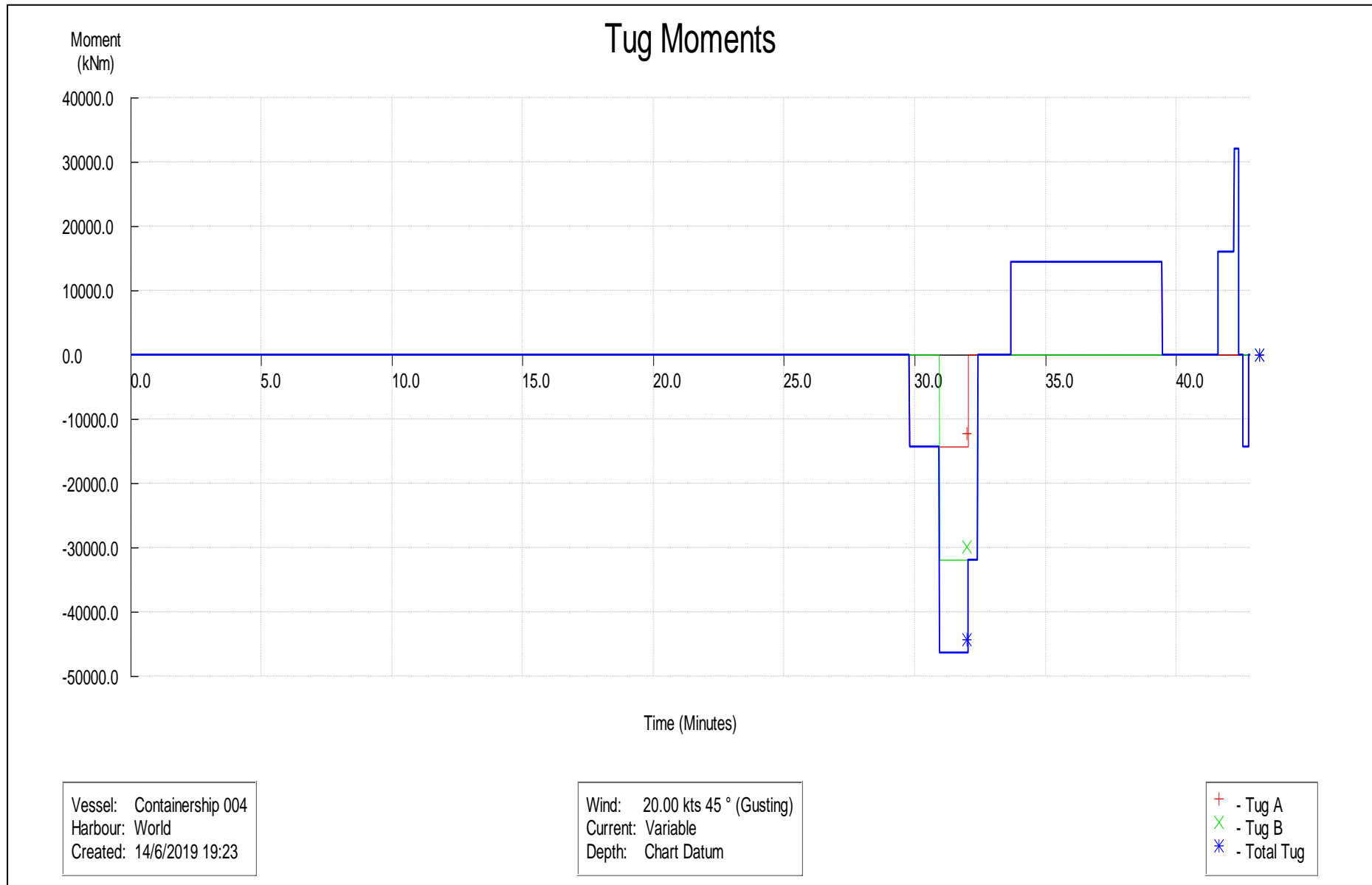
Vessel: Containership 004
Harbour: World
Created: 14/6/2019 19:23

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

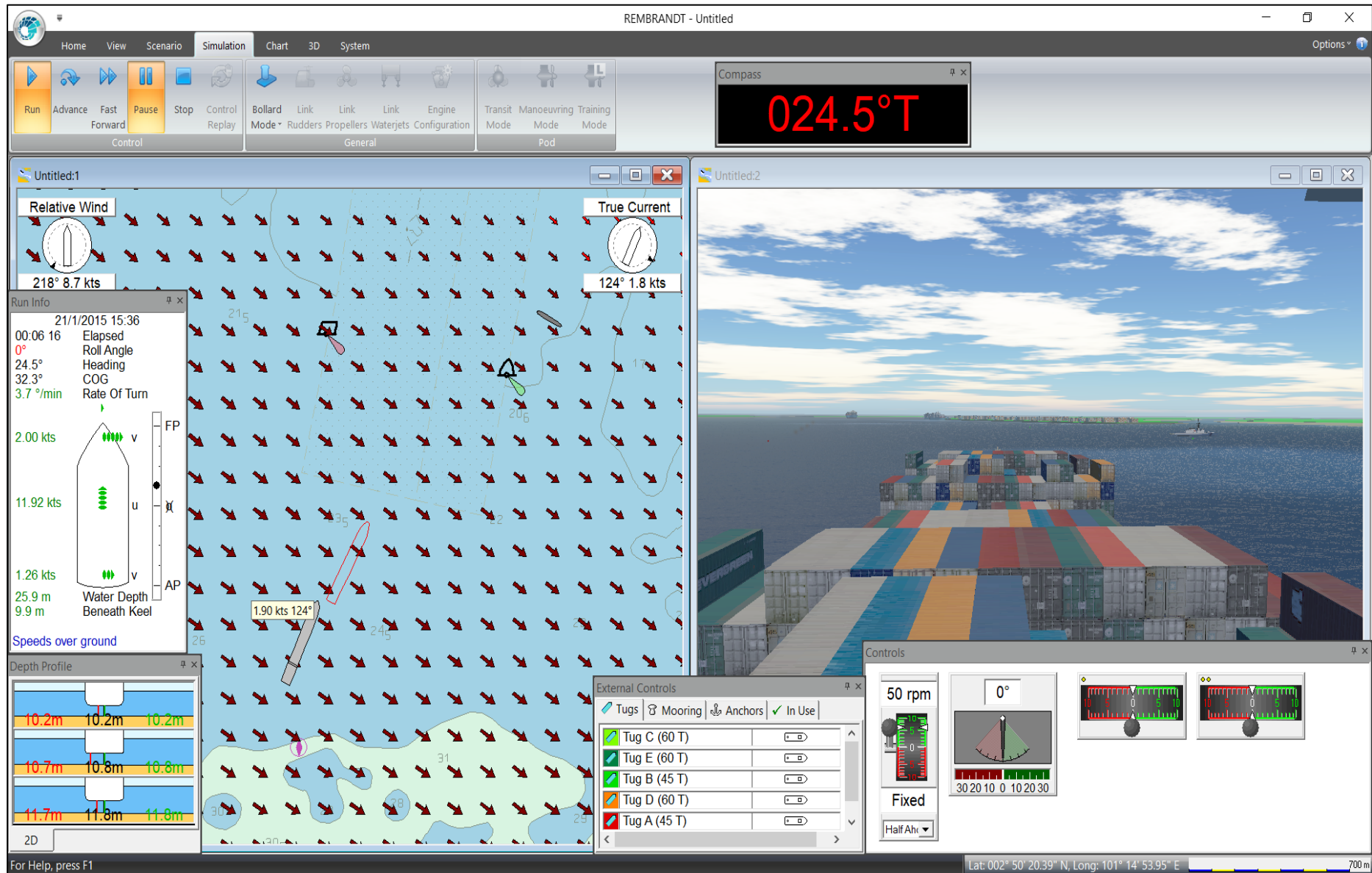








Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
3	R3WPCT13SW20k Fld1530hT45tx2Stb dArr.rmb	Fld (1530h)	SW 20 k	Arrival (Stbd a/s)	F: 45t A: 45t	The vessel experienced a strong set to starboard when approaching the entrance to the South Channel. She entered the channel at a speed of over 11 knots and kept the engine at Half Ahead until she passed the Selat Buoy. After the Selat Buoy, the vessel was generally stemming the current. She remained in the channel until close to the berth. Two 45 tons bollard pull tugs were then made fast and assisted in pushing her alongside operating at a maximum of Half Power.	3/6

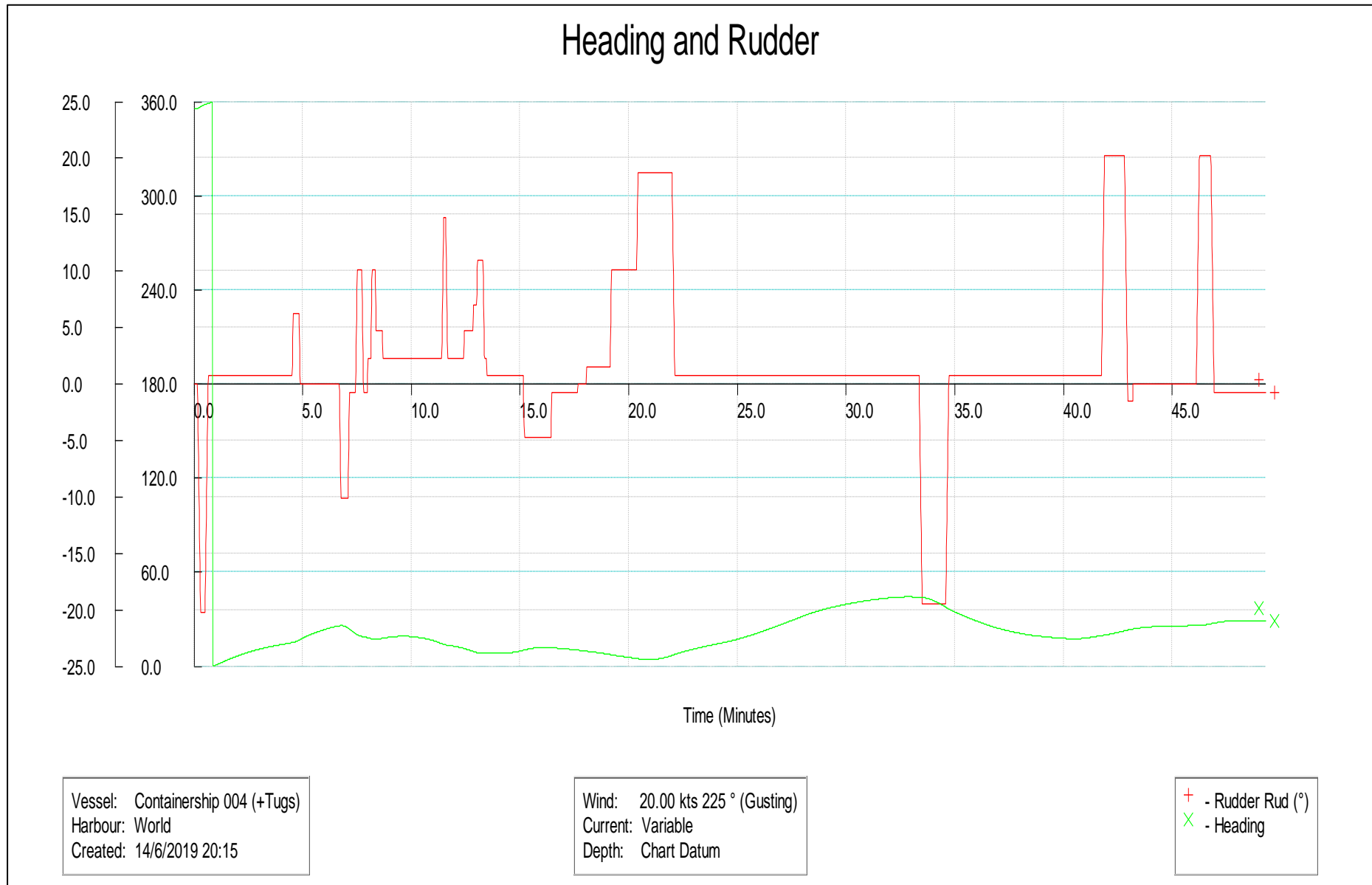


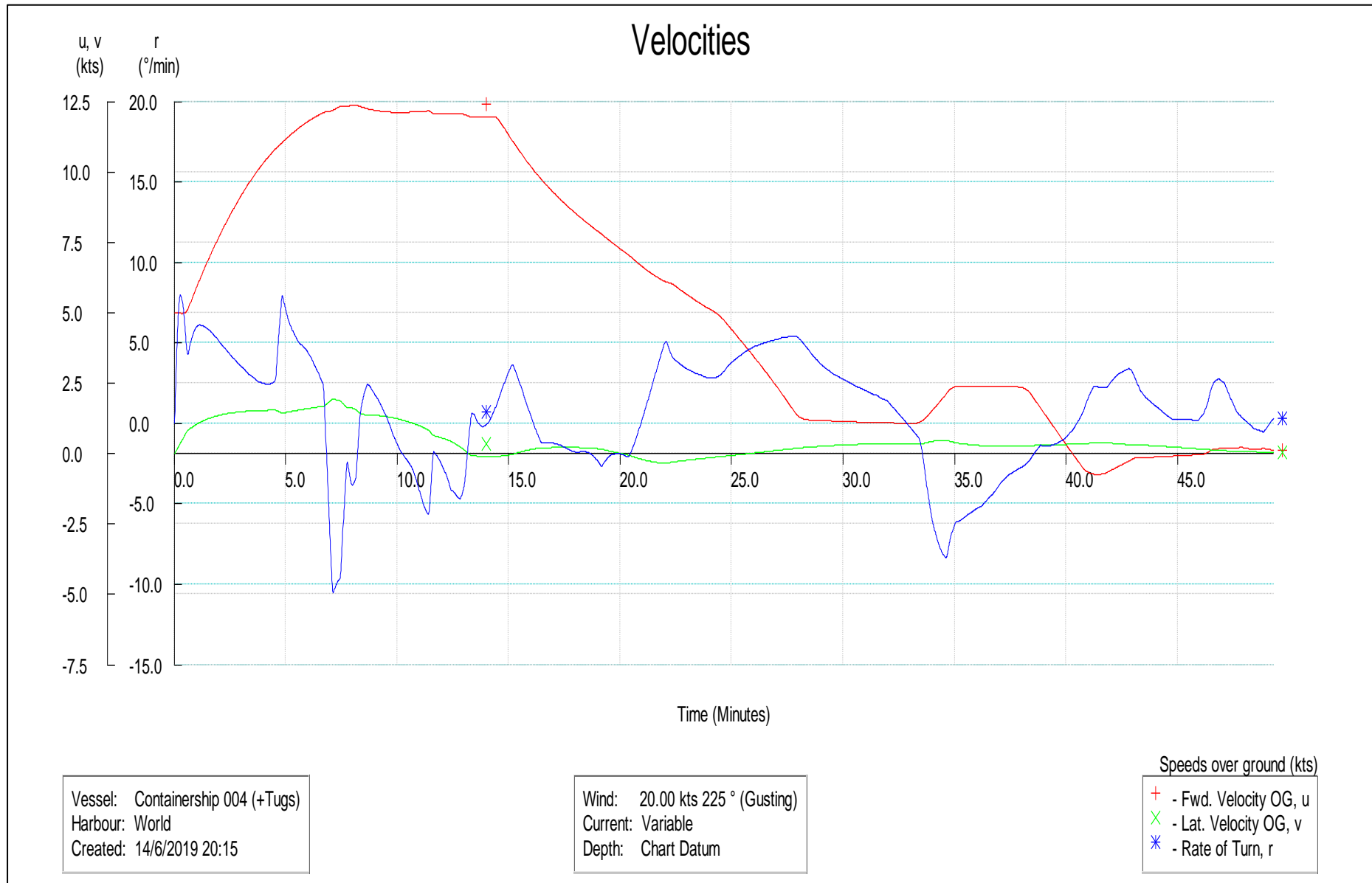
Vessel Track

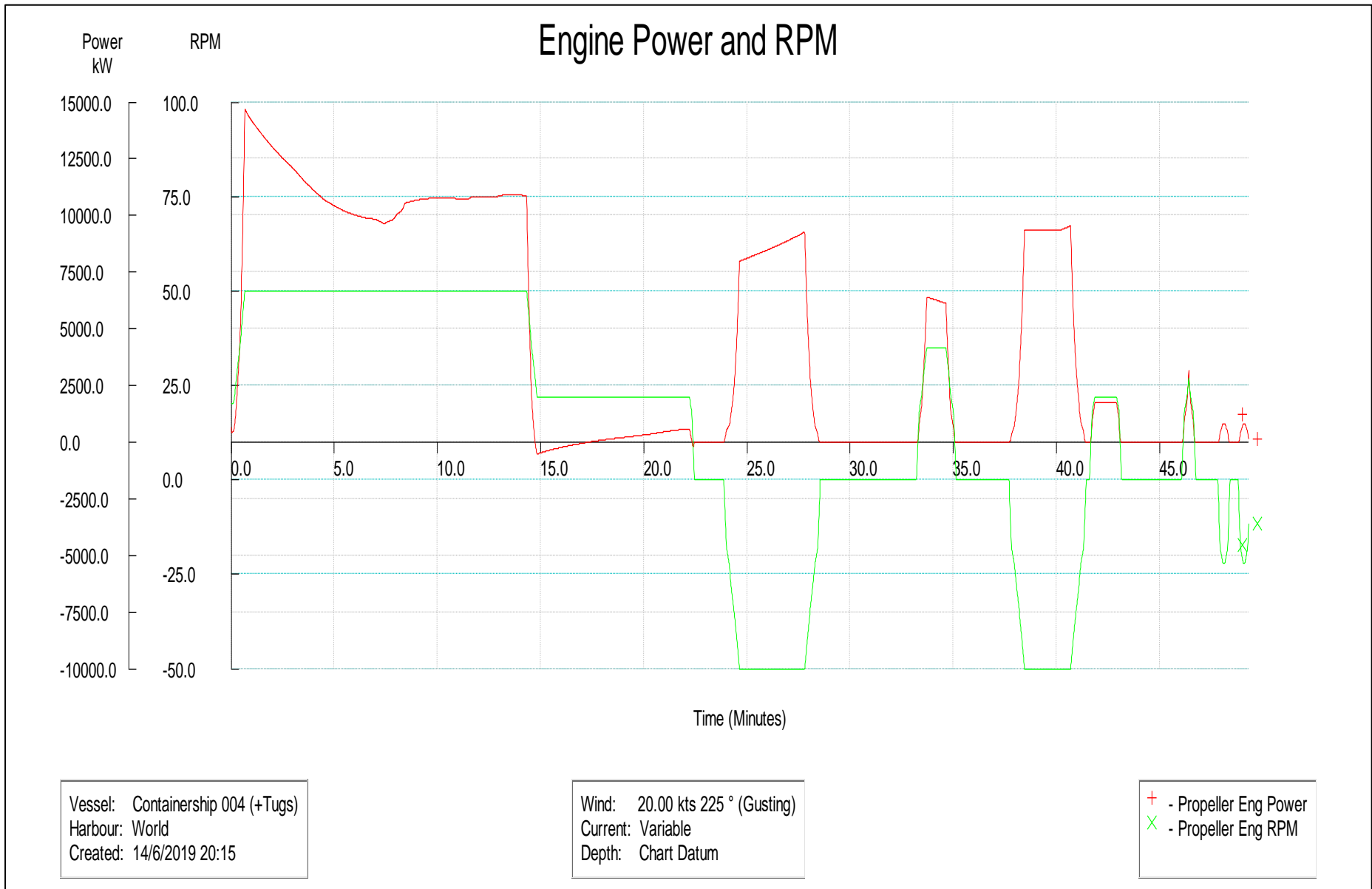


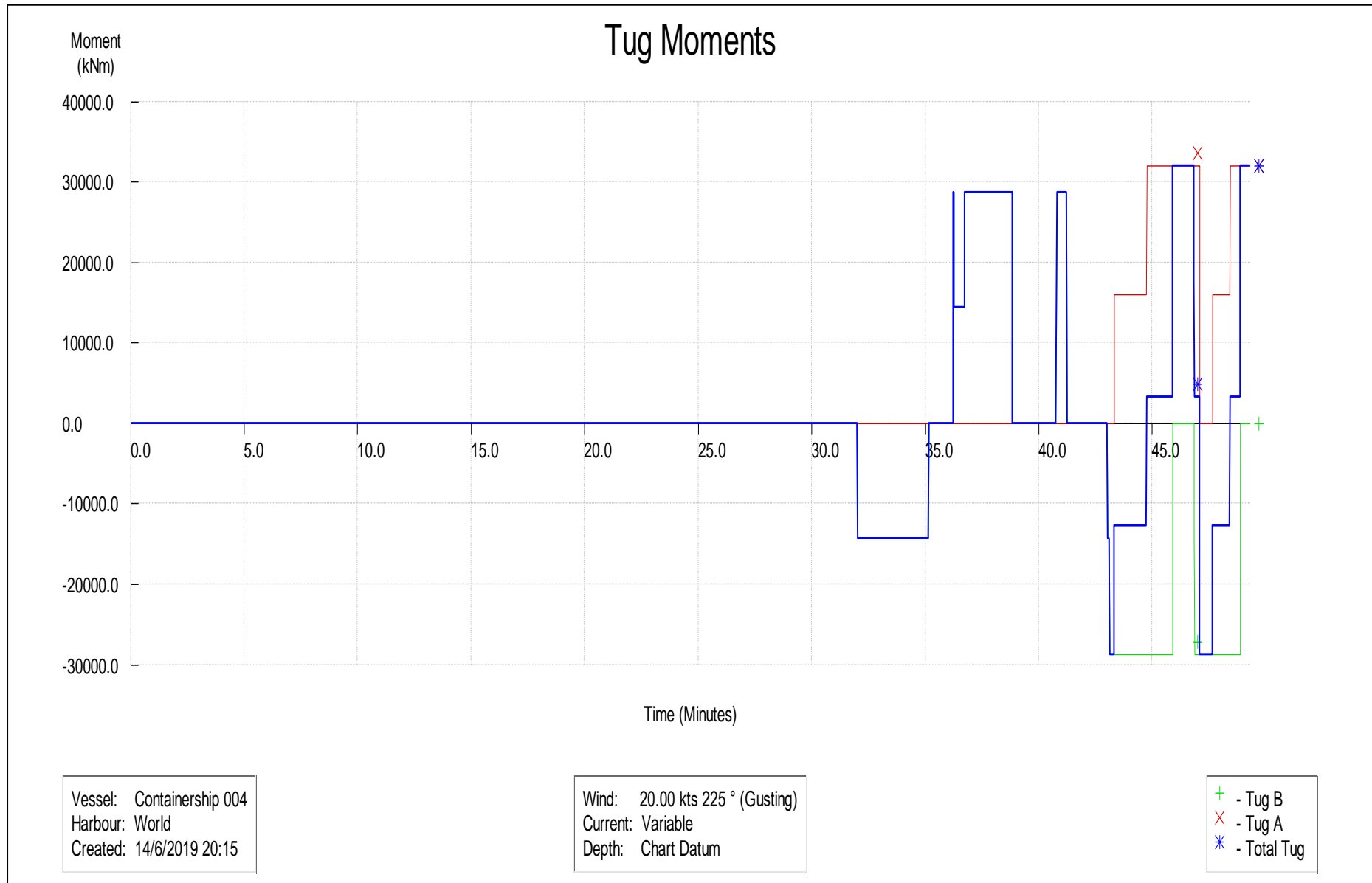
Vessel: Containership 004
Harbour: World
Created: 14/6/2019 20:15

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

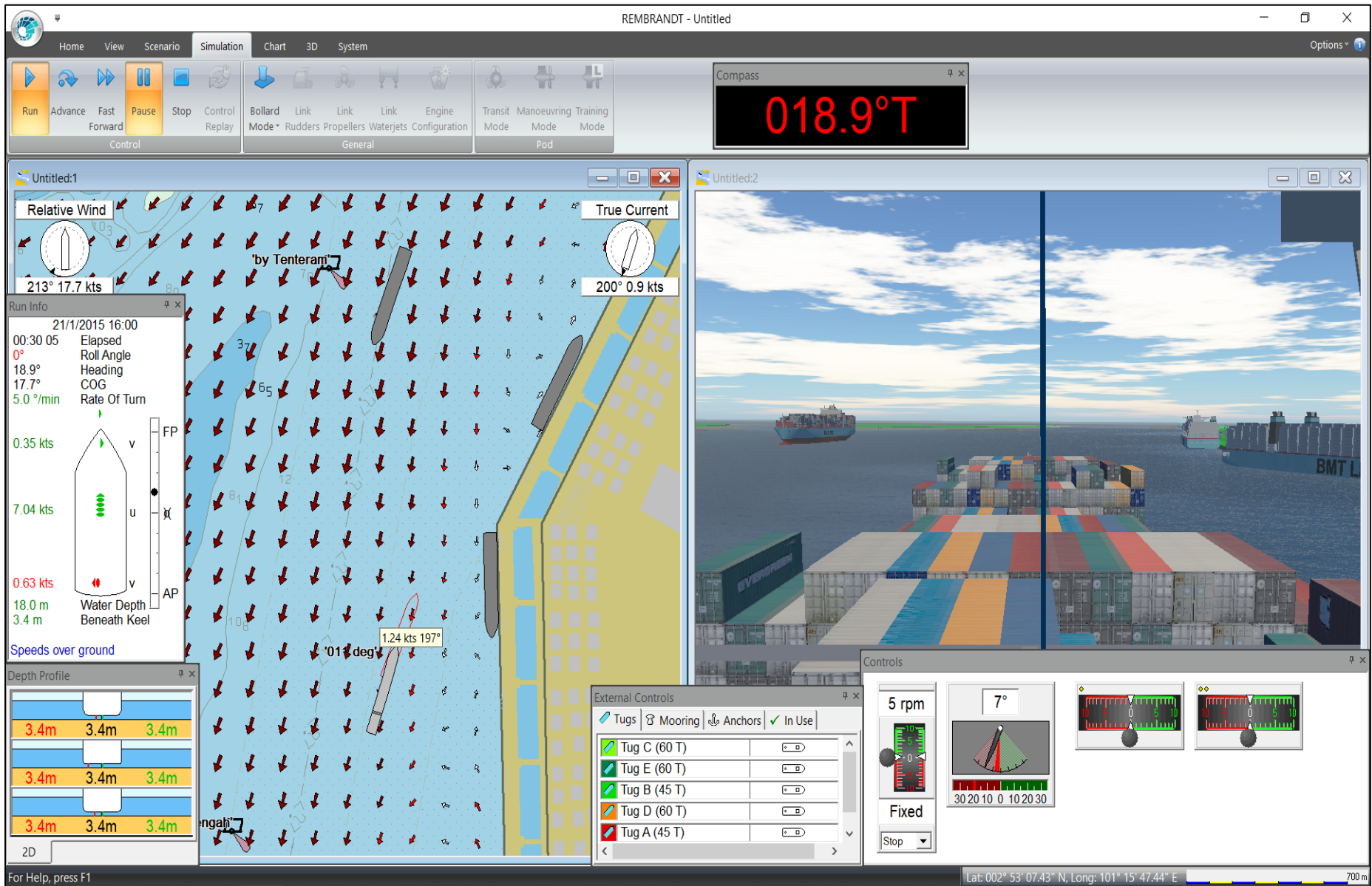








Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
4	R4WPCT13SW20k Fld1530hT45tx2Stb dArr.rmb	Fld (1530h)	SW 20 k	Arrival (Stbd a/s)	F: 45t A: 45t	The vessel experienced a strong set to starboard when approaching the entrance to the South Channel. She entered the channel at a speed of about 7.5 knots and kept the engine at Slow Ahead until CT-14. The engine was stopped and Half Astern was ordered. As the speed dropped, two 45 tons bollard pull tugs were made fast. After the vessel 'pulled up', the tugs assisted in pushing her alongside operating at a maximum of Half Power.	3/6



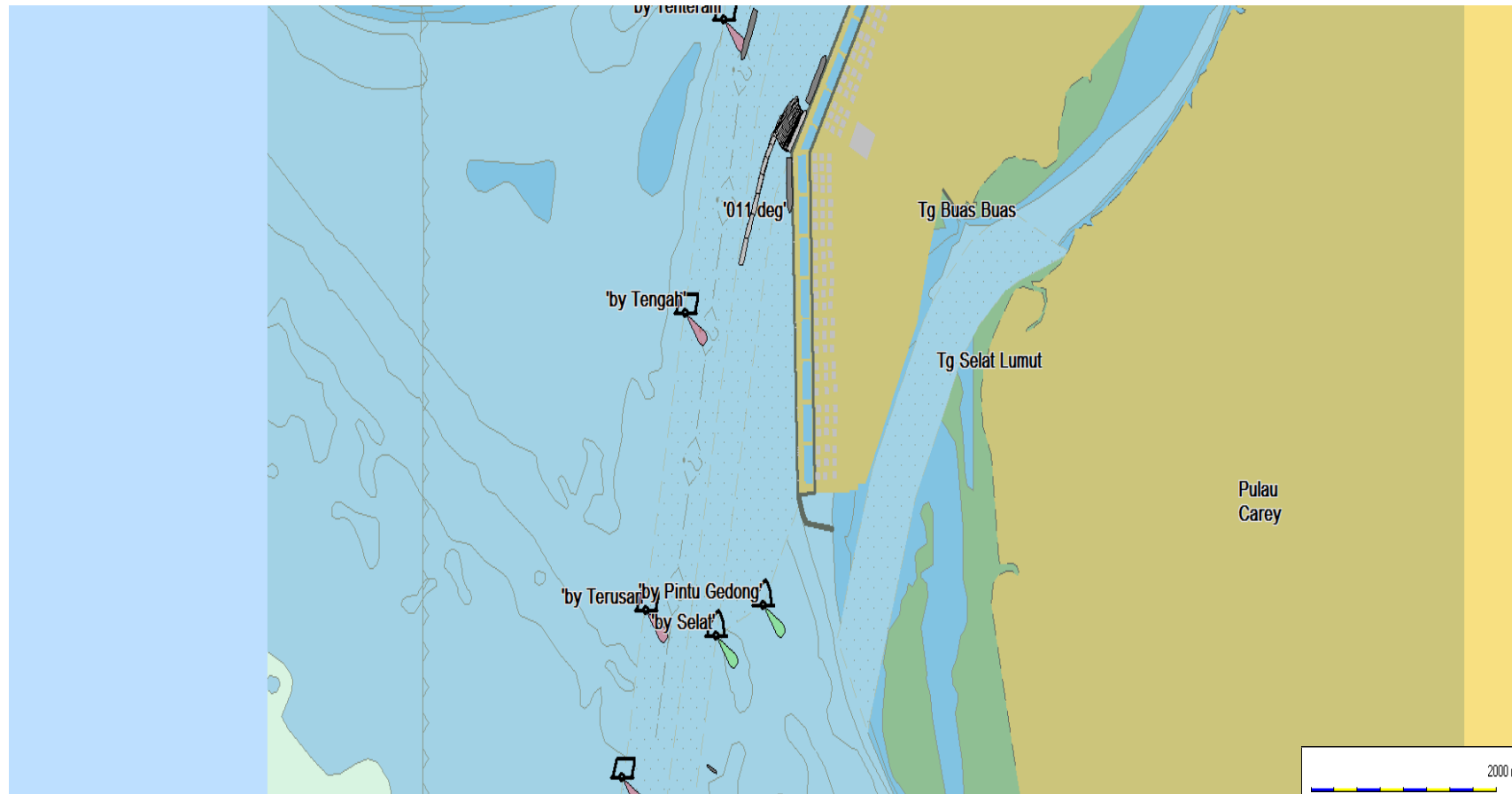
Vessel Track



Vessel: Containership 004
Harbour: World
Created: 15/6/2019 05:39

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

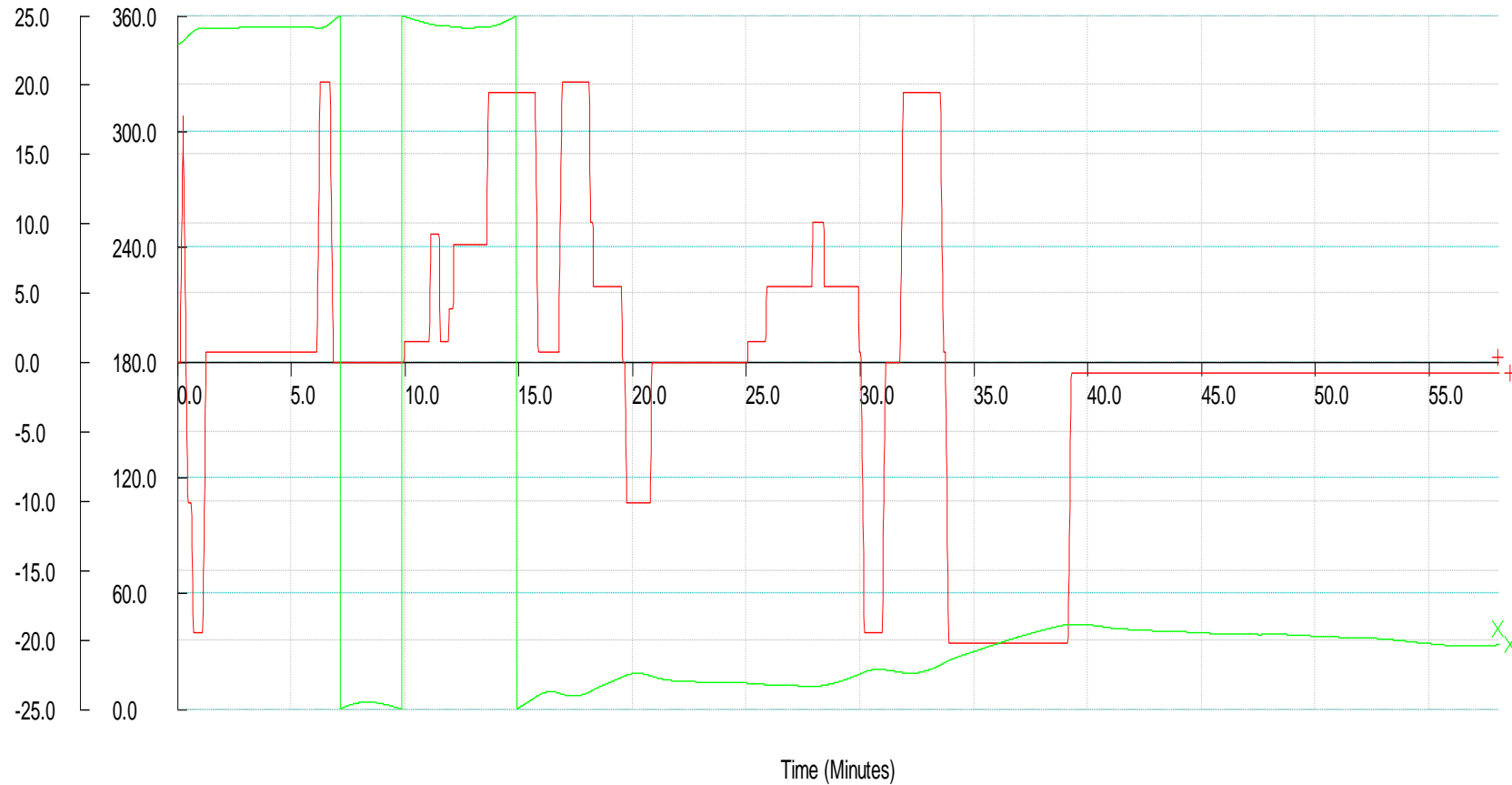
Vessel Track



Vessel: Containership 004
Harbour: World
Created: 15/6/2019 05:39

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

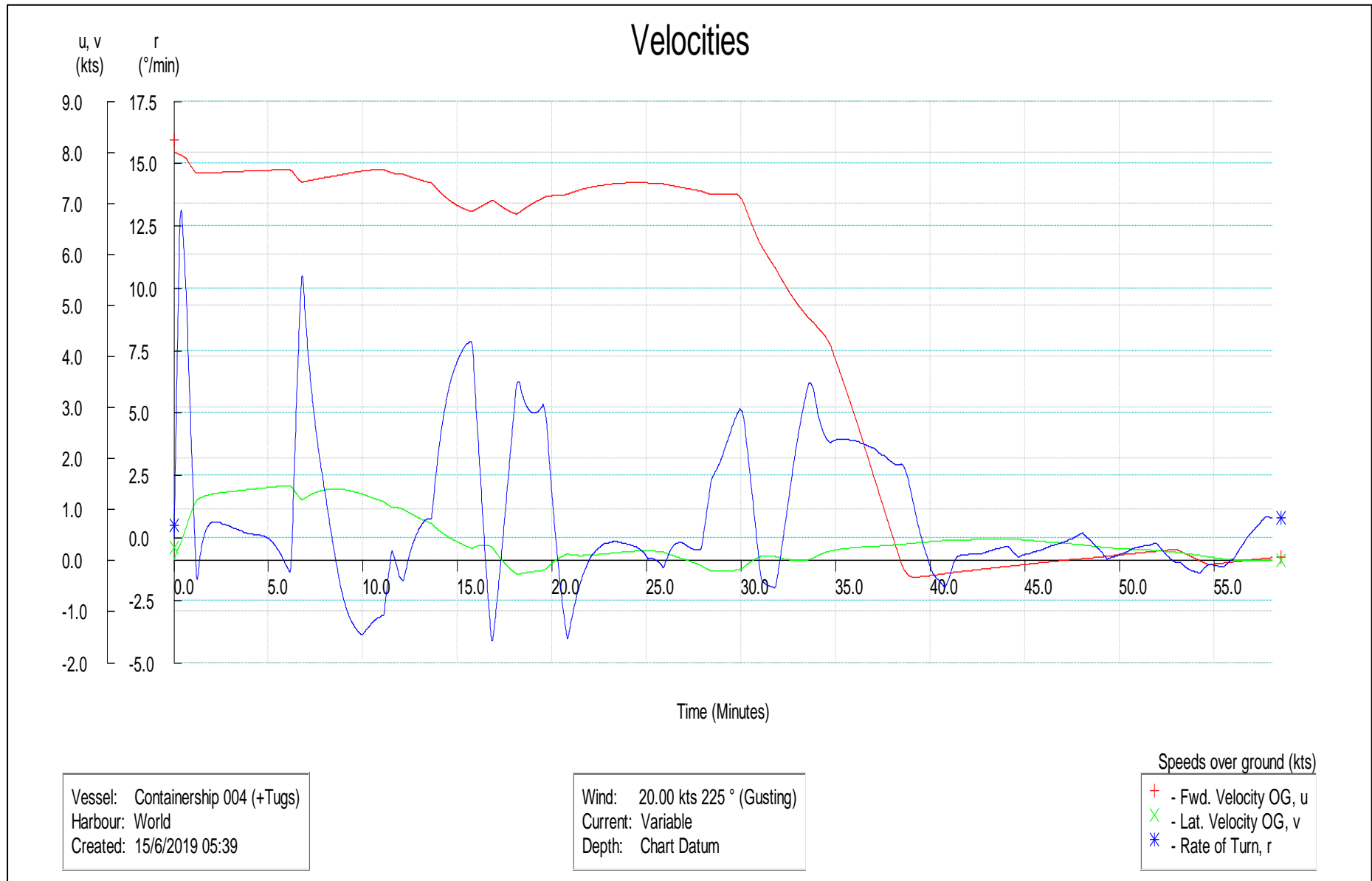
Heading and Rudder

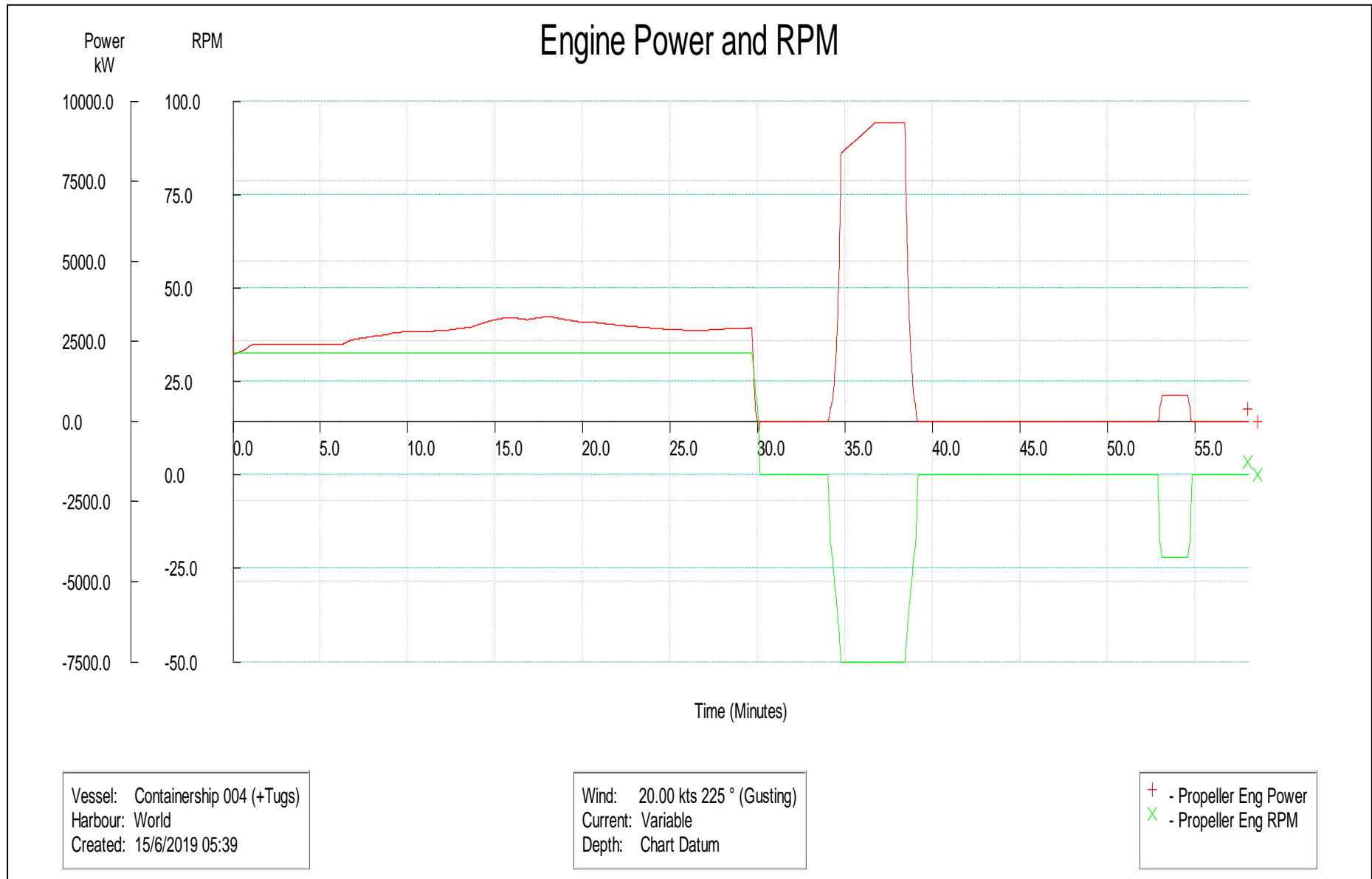


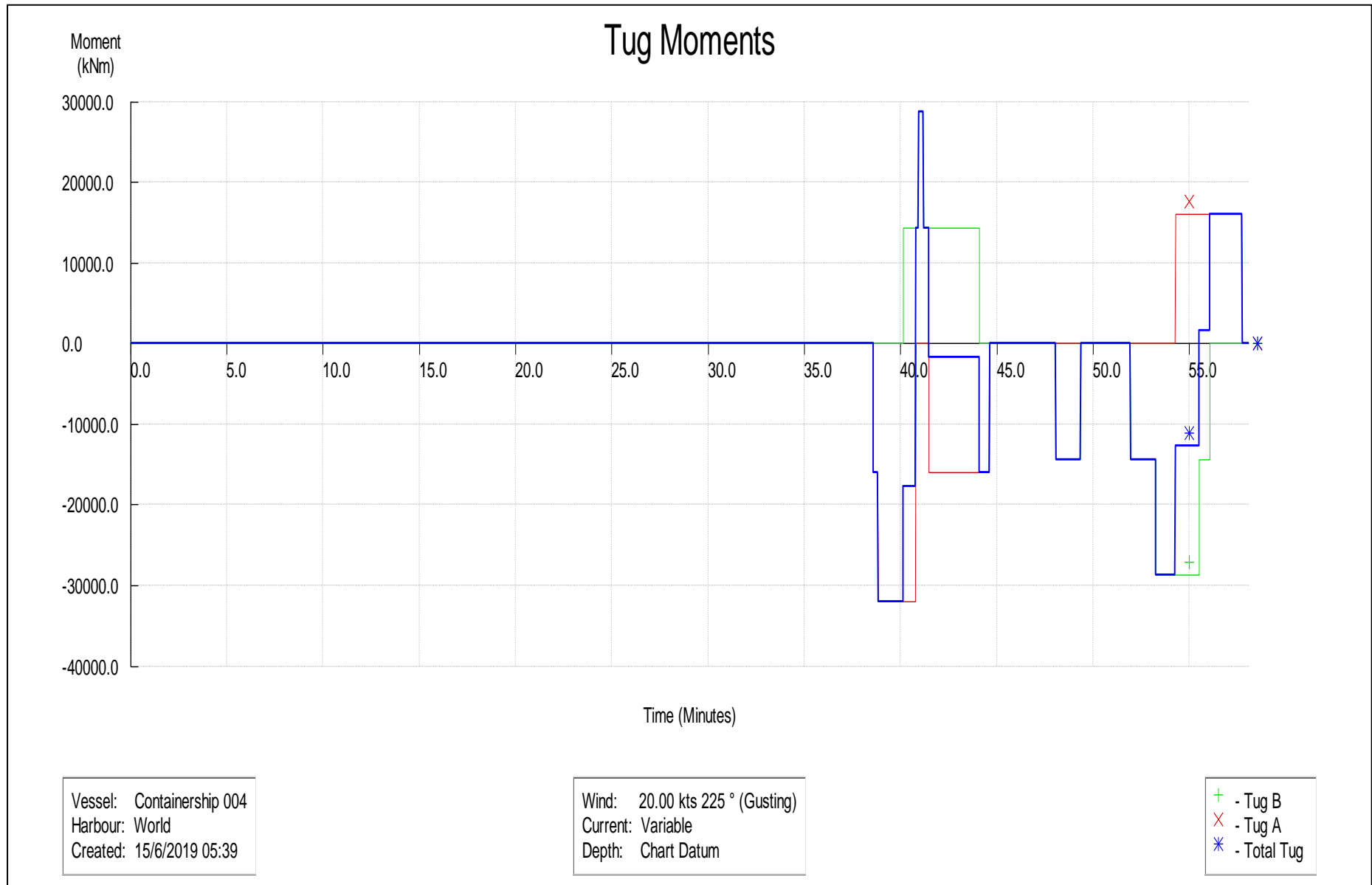
Vessel: Containership 004 (+Tugs)
 Harbour: World
 Created: 15/6/2019 05:39

Wind: 20.00 kts 225 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

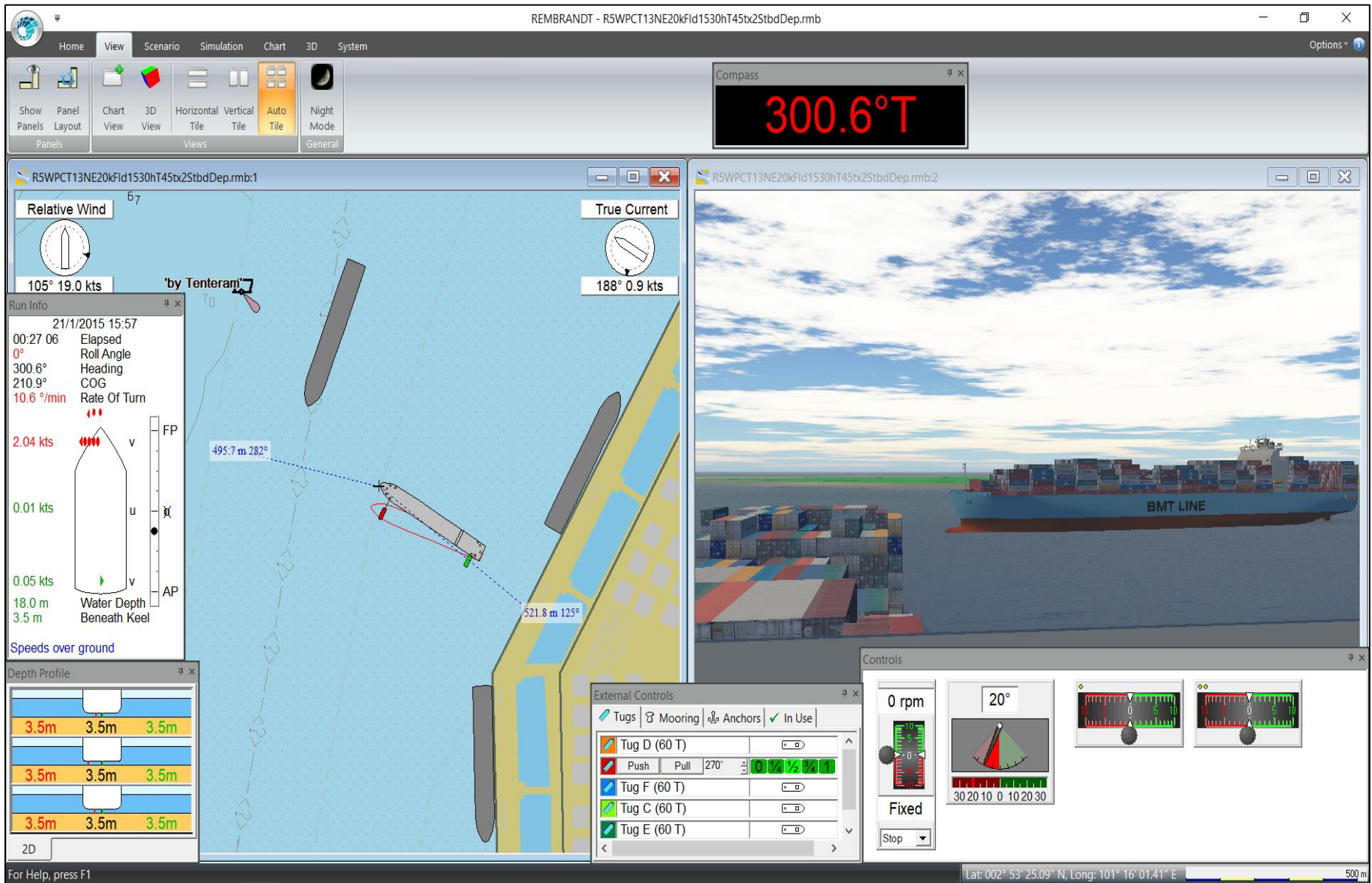
+ - Rudder Rud (°)
 X - Heading



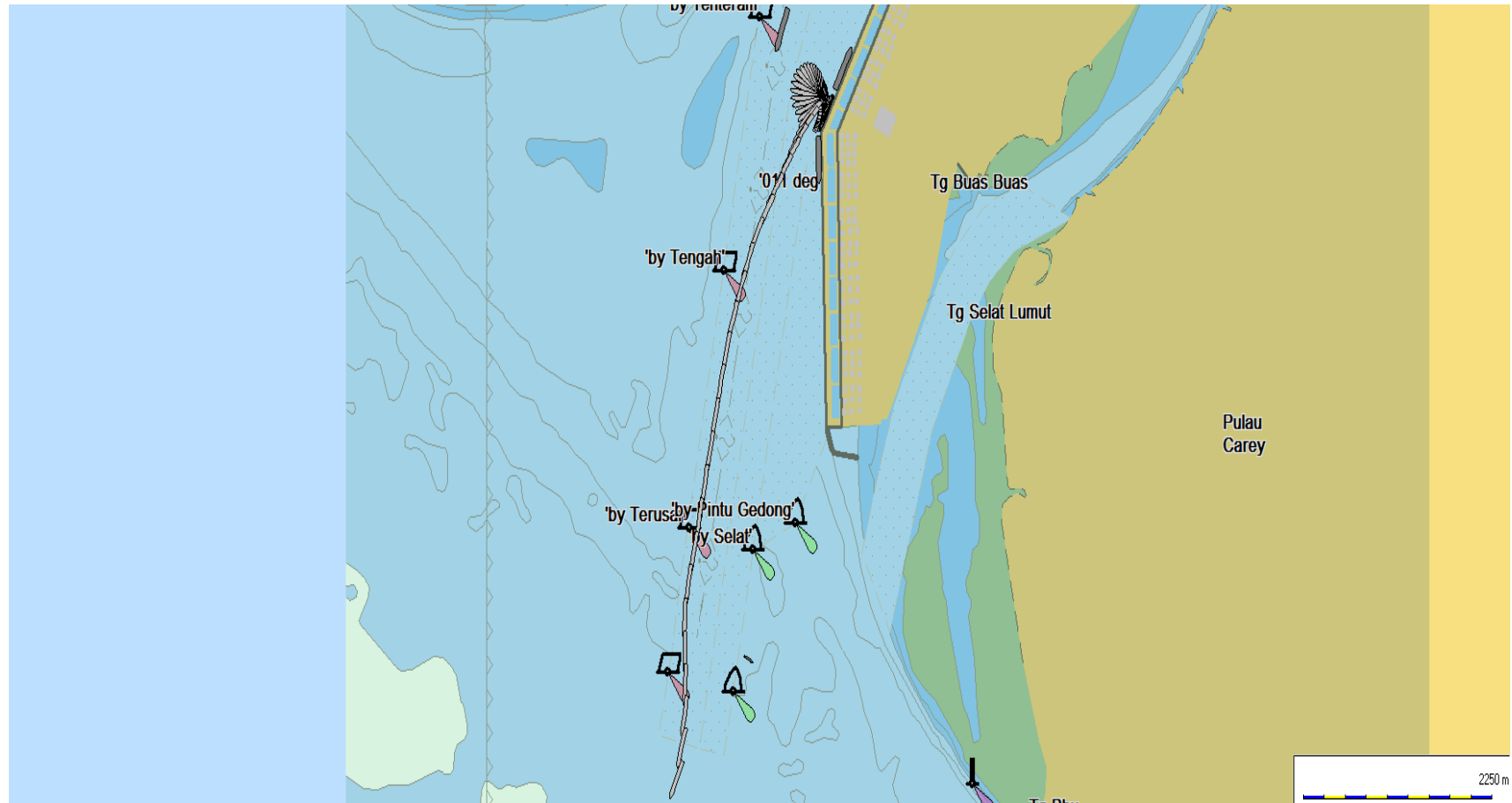




Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
5	R5WPCT13NE20k Fld1530hT45tx2Stb dDep.rmb	Fld (1530h)	NE 20 k	Departure (Stbd a/s)	F: 45t A: 45t	The vessel was pulled off the berth using two 45 tons bollard pull tugs and swung to port. The tugs operated at a maximum of Half Power. After swinging around the vessel proceeded to sea at Slow Ahead, transiting the channel at over 9 knots. Minimum available channel clearance: 495 metres.	3/6



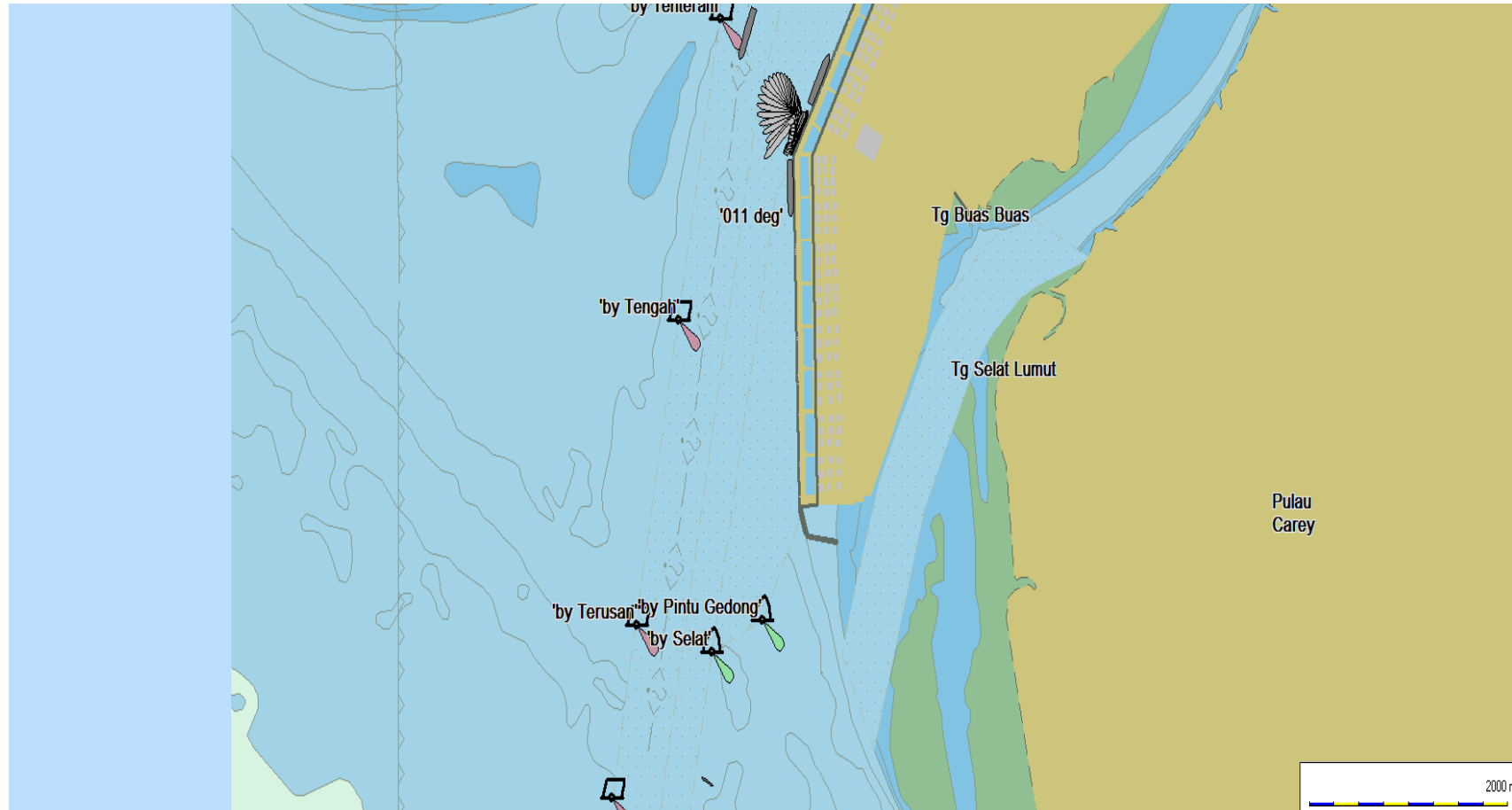
Vessel Track



Vessel: Containership 004
Harbour: World
Created: 15/6/2019 06:39

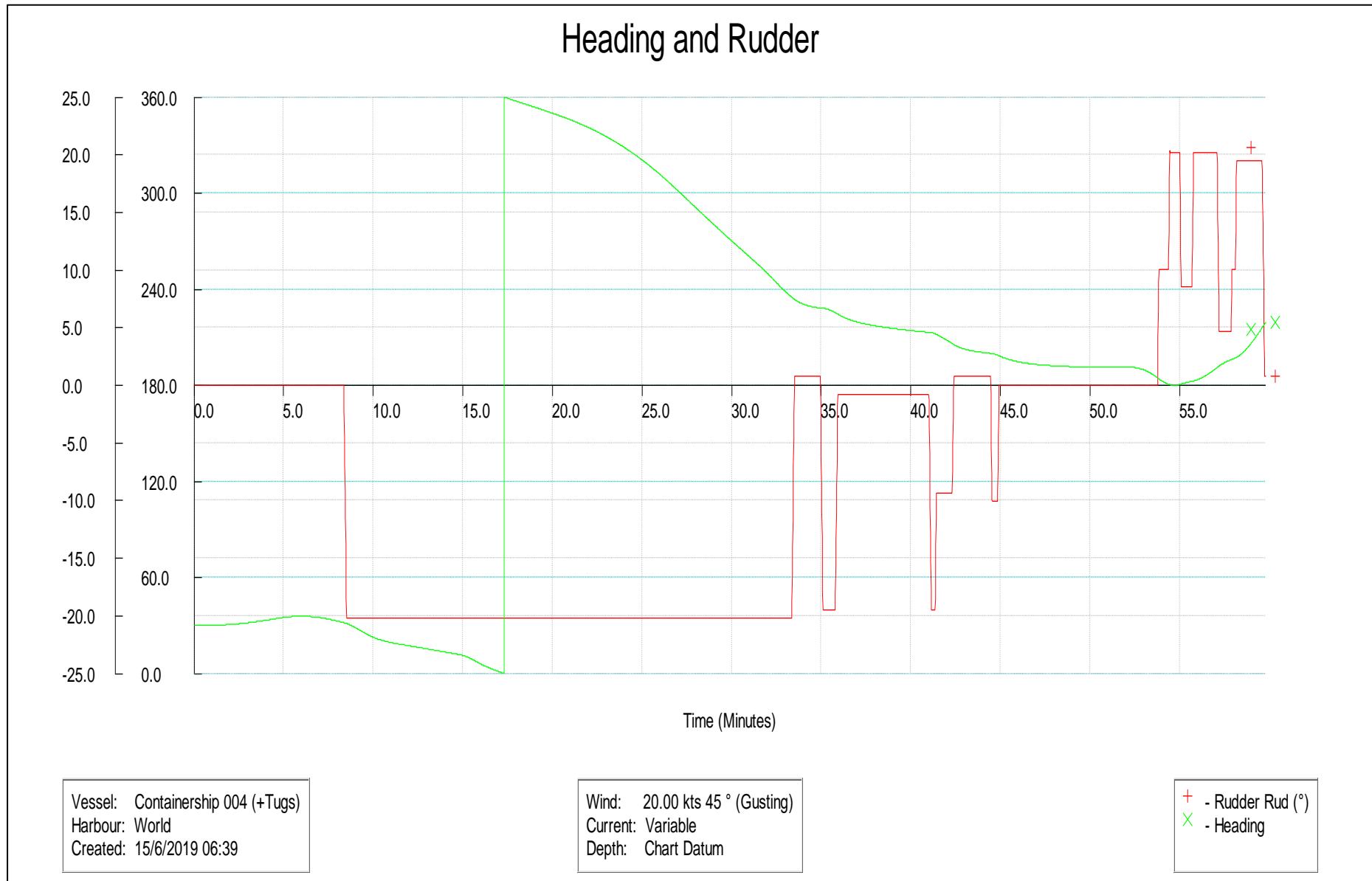
Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

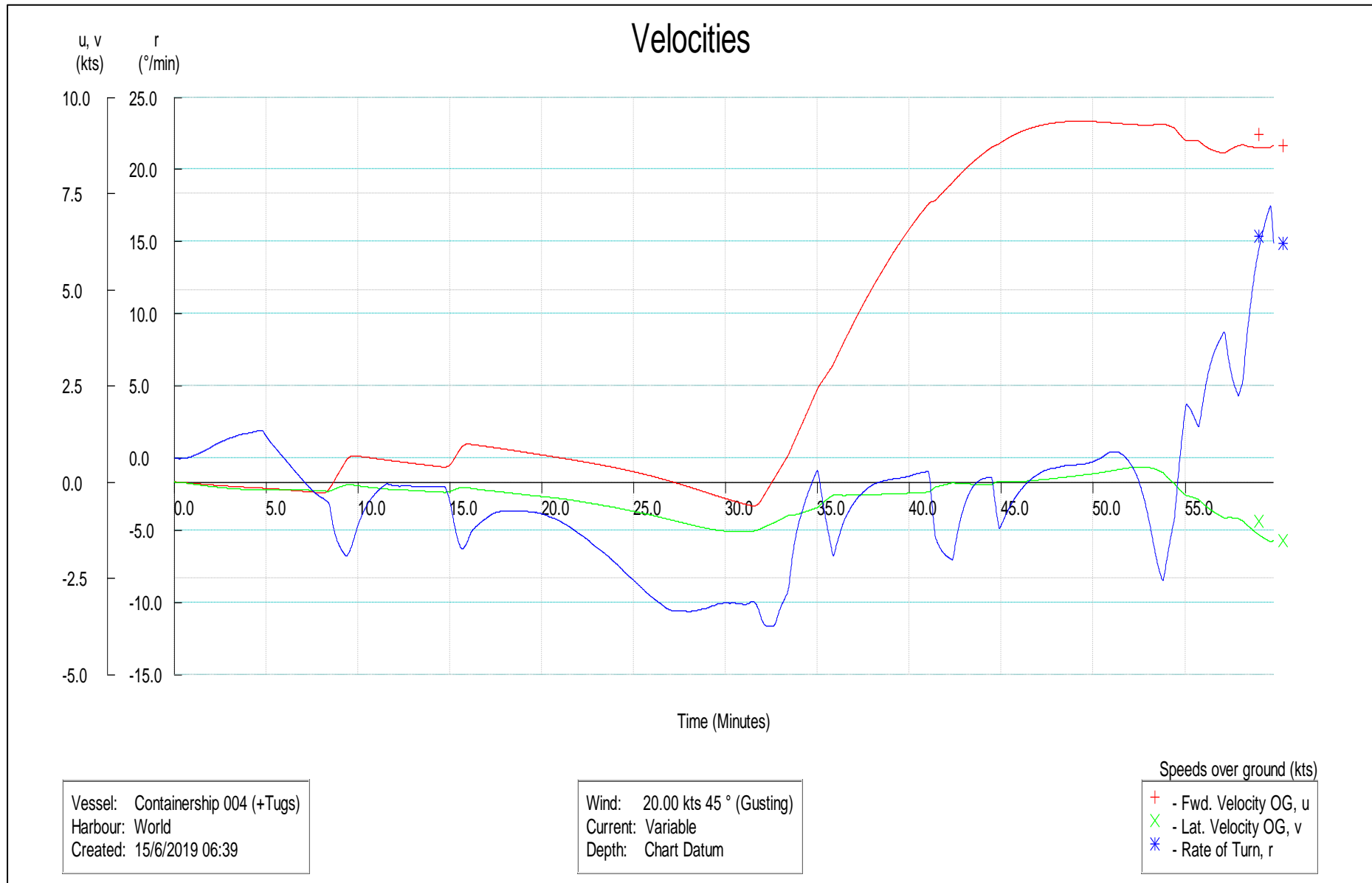
Vessel Track

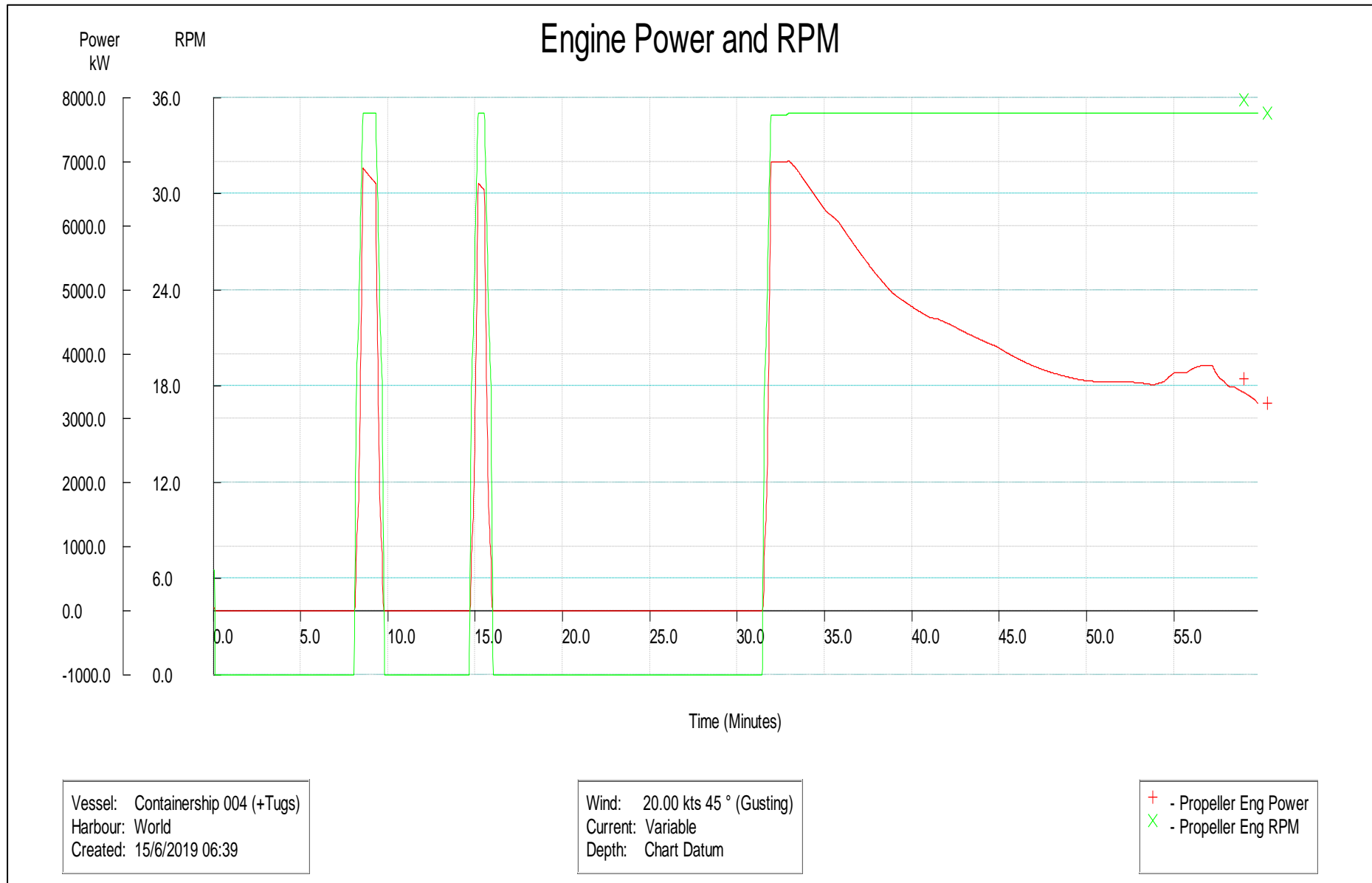


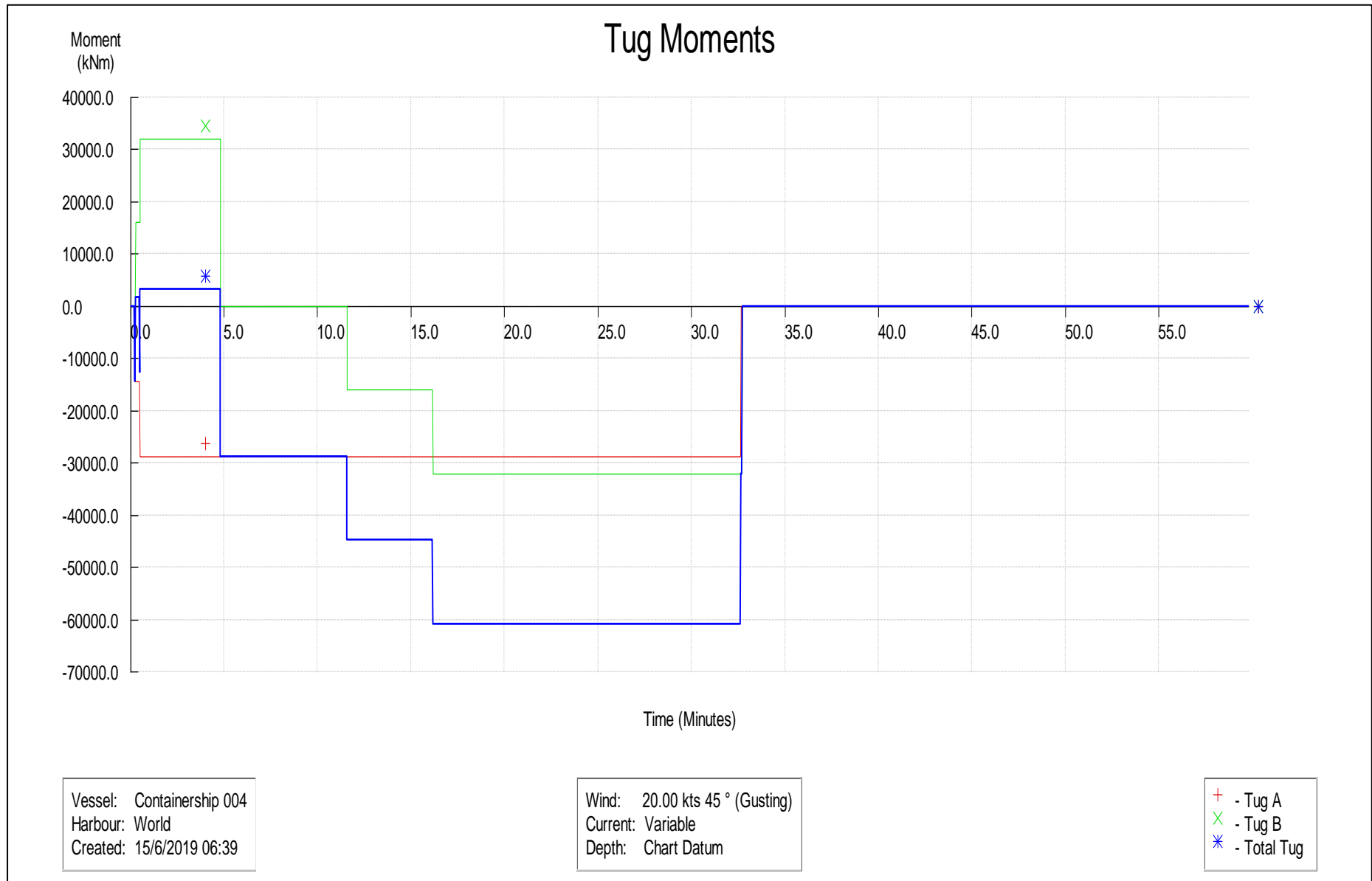
Vessel: Containership 004
Harbour: World
Created: 15/6/2019 06:39

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

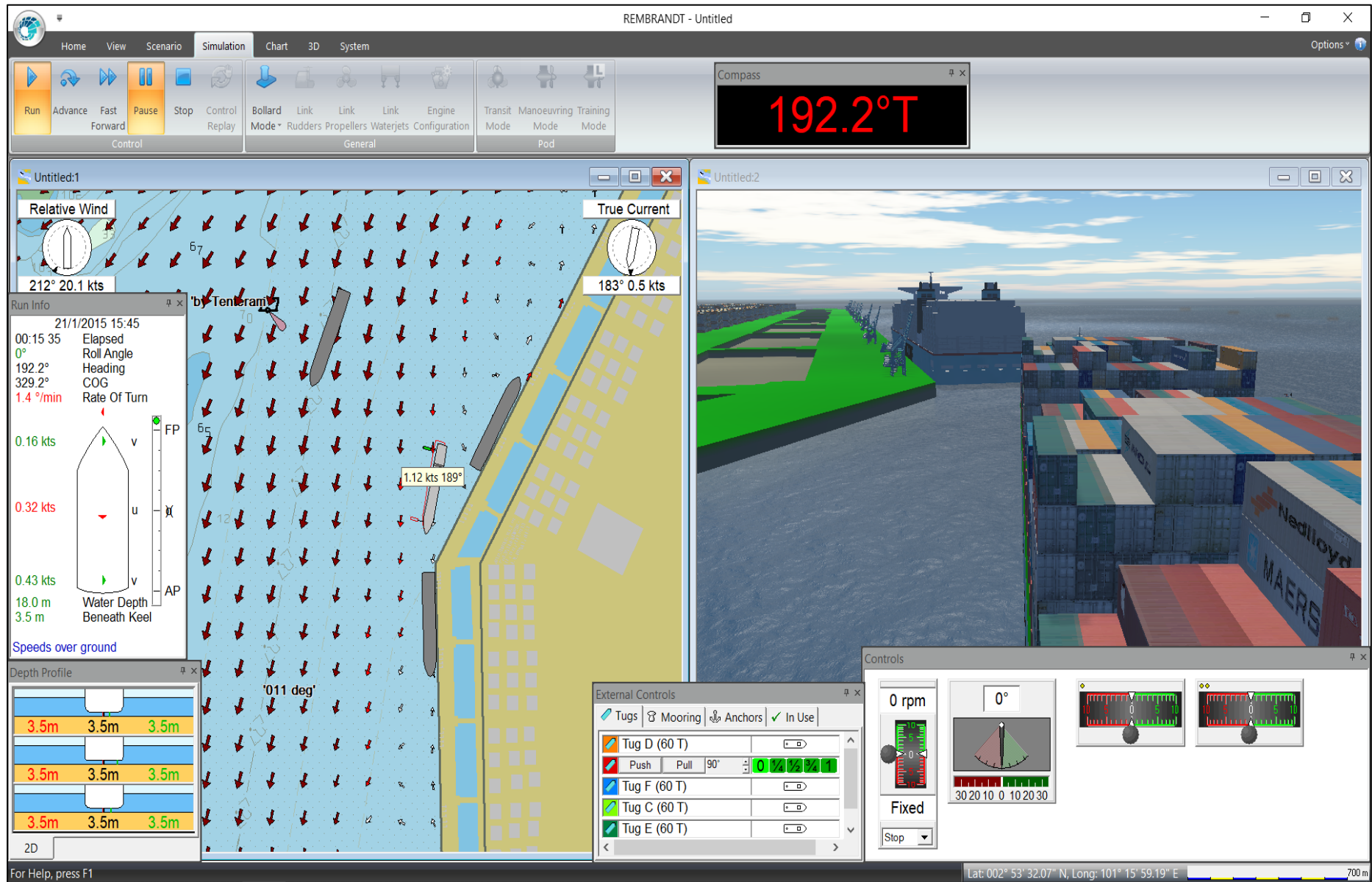




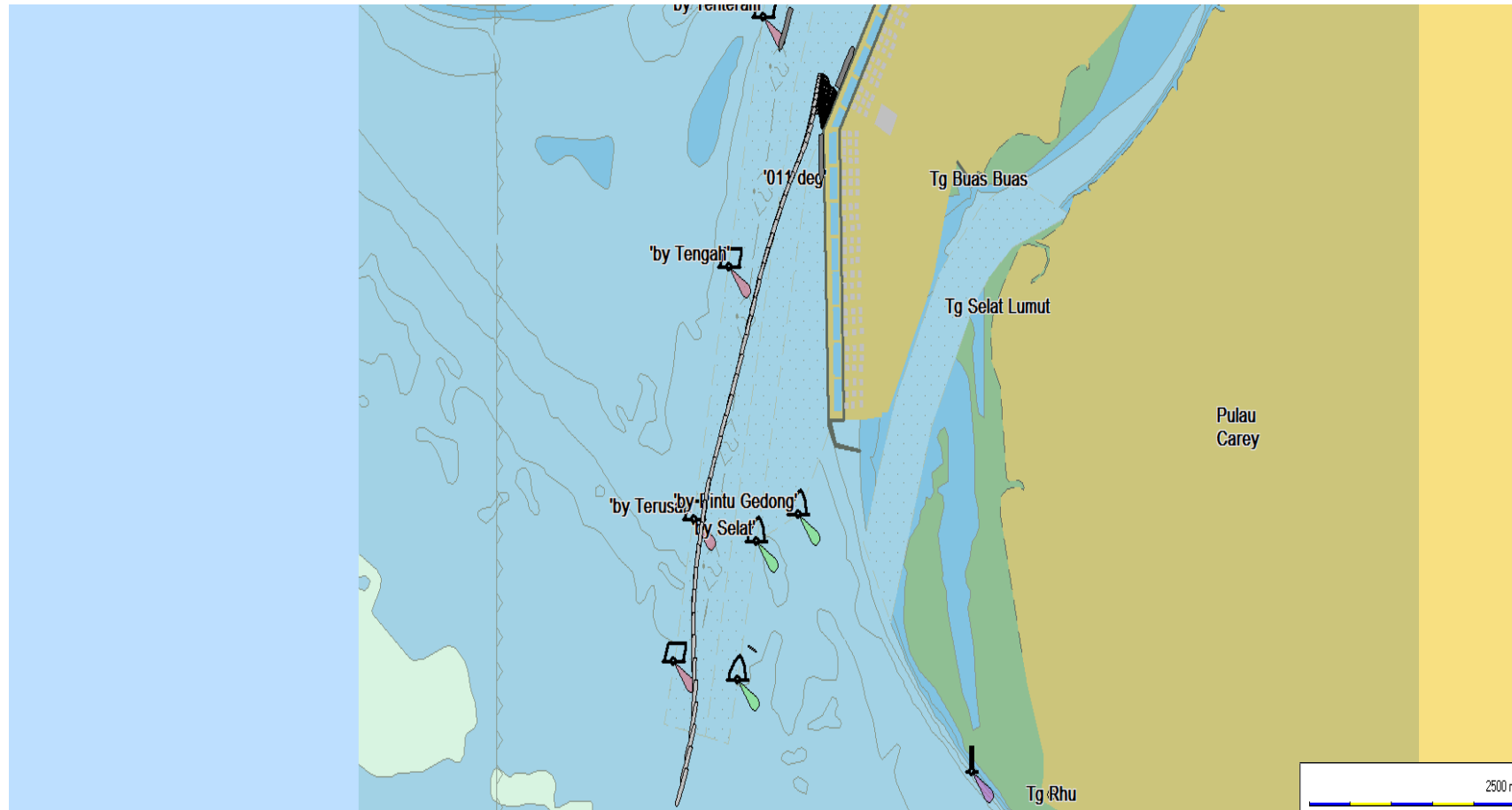




Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
6	R6WPCT13NE20k Fld1530hT45tx2Por tDep.rmb	Fld (1530h)	NE 20 k	Departure (Port a/s)	F: 45t A: 45t	The vessel was pulled off the berth using two 45 tons bollard pull tugs. The tugs operated at a maximum of Half Power. When clear of the berth, the vessel proceeded to sea, transiting the channel at Half Ahead (speed over 12 knots).	3/6



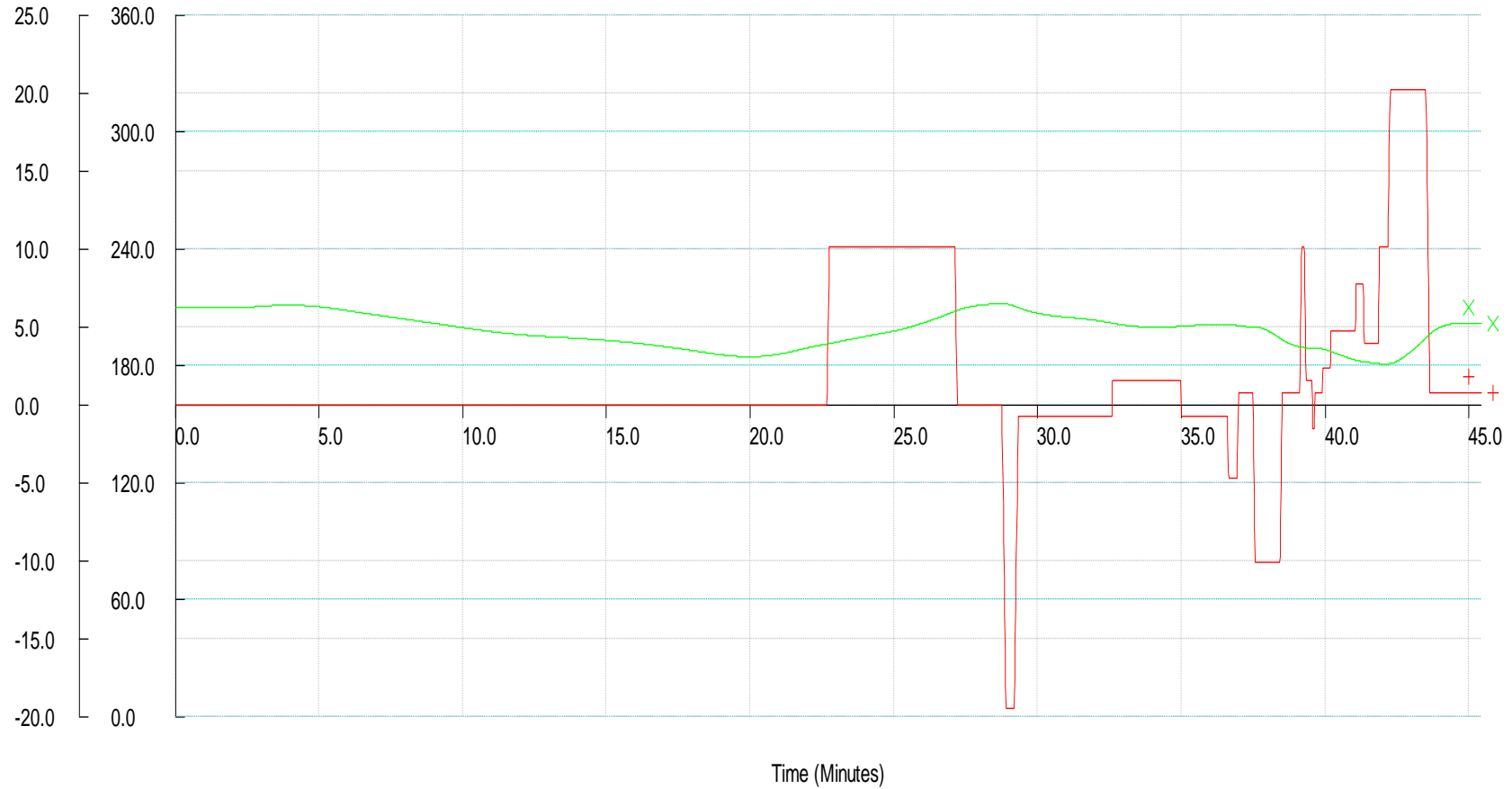
Vessel Track



Vessel: Containership 004
Harbour: World
Created: 15/6/2019 07:28

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

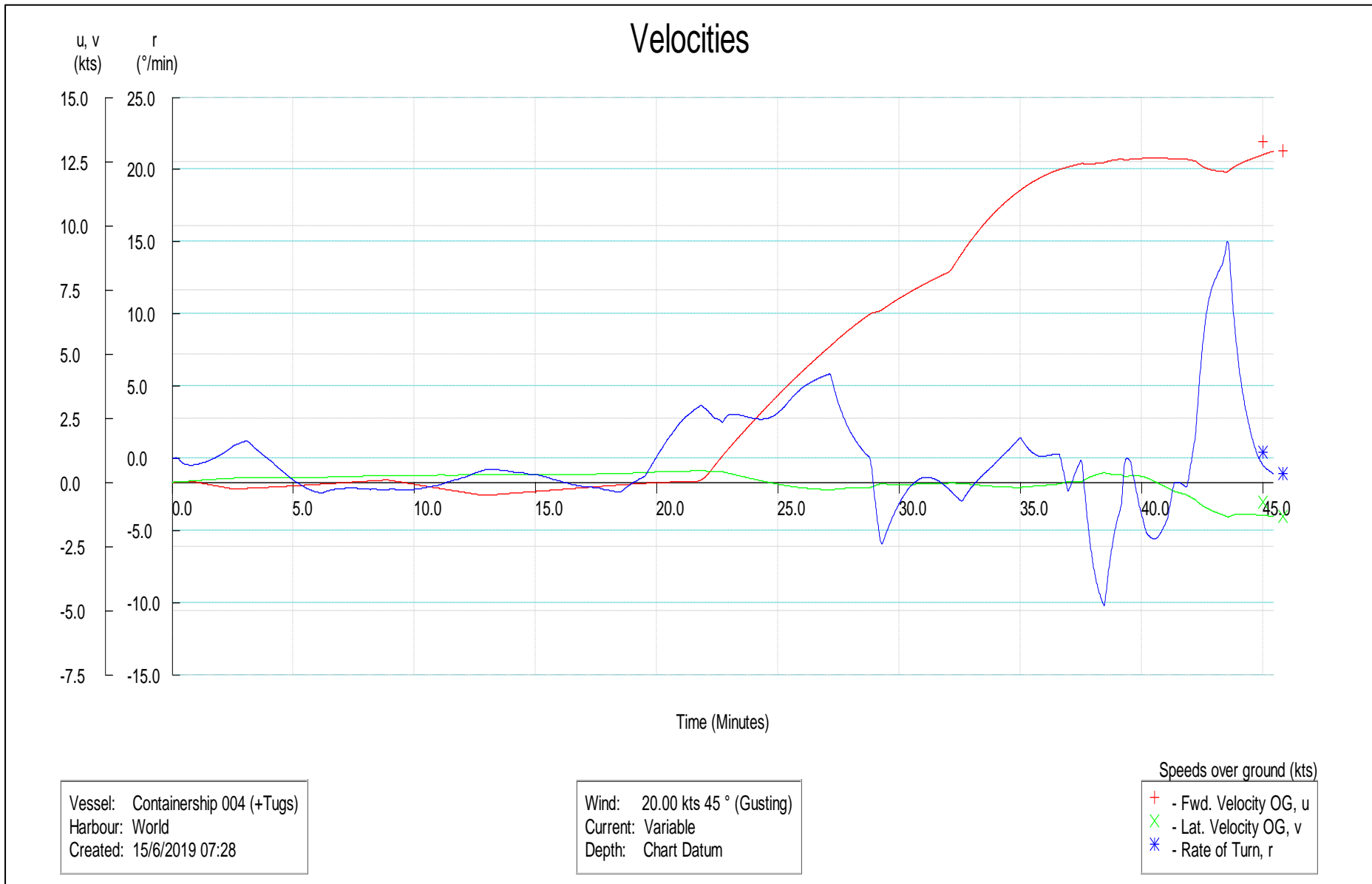
Heading and Rudder

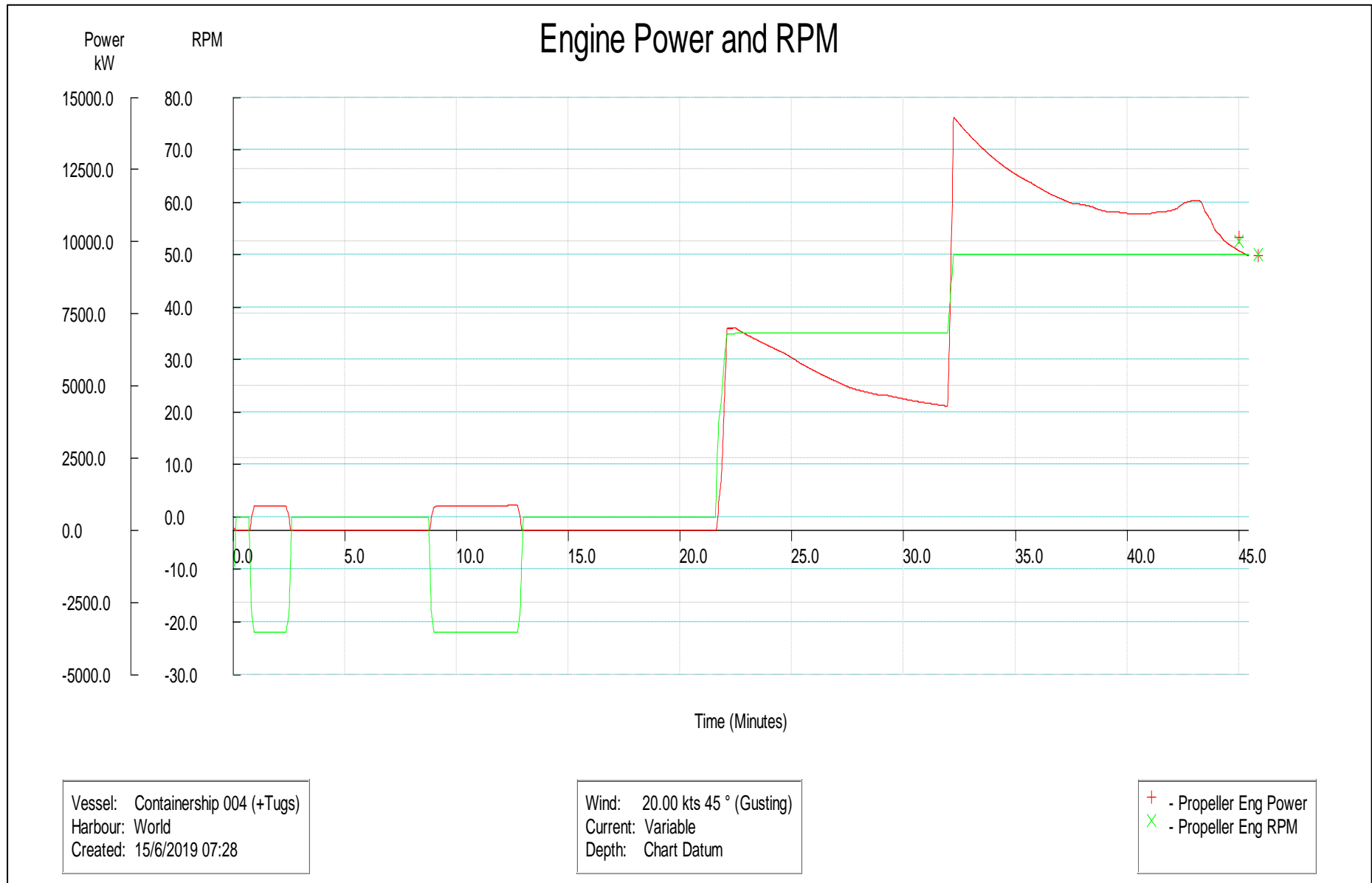


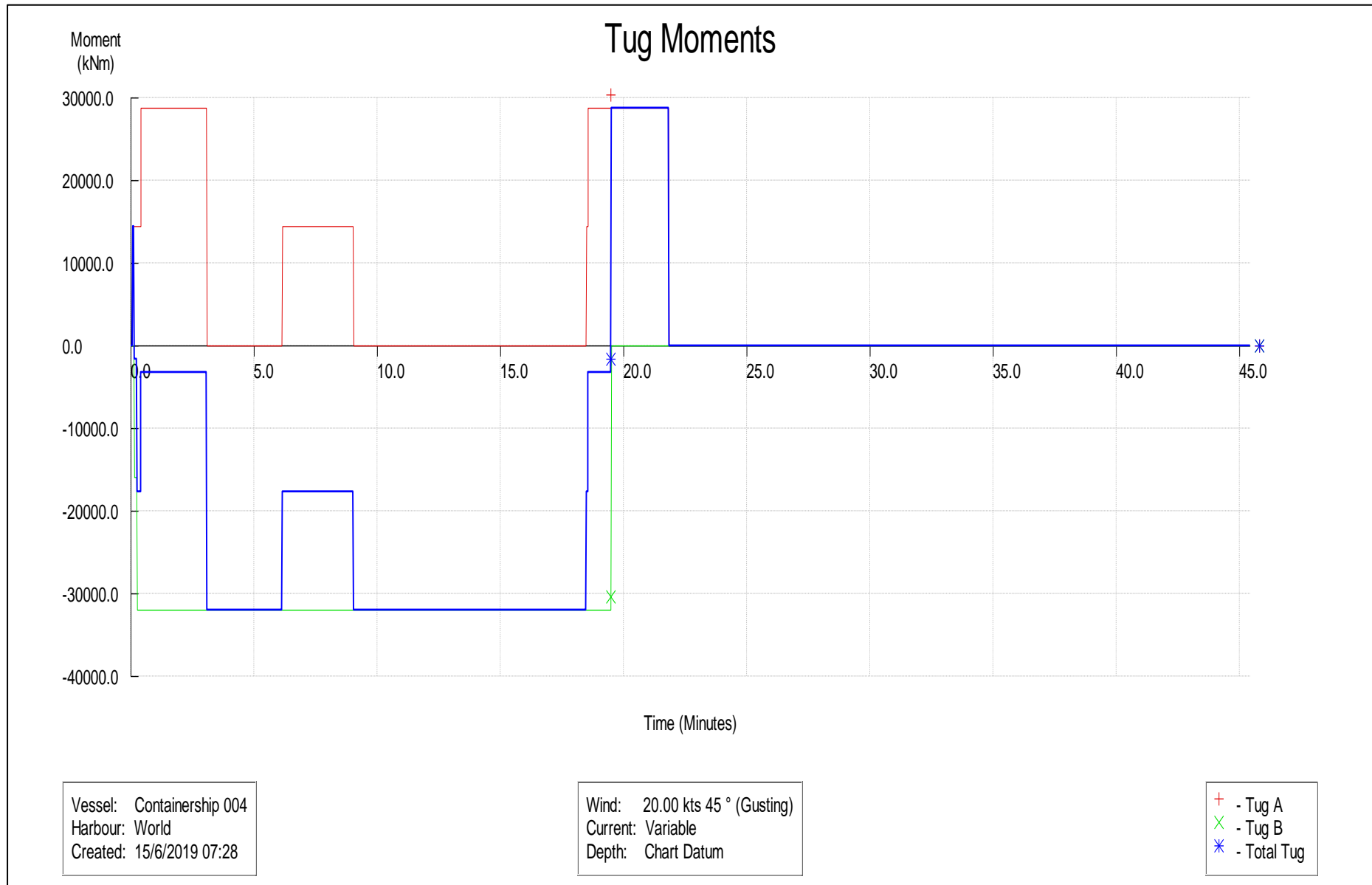
Vessel: Containership 004 (+Tugs)
 Harbour: World
 Created: 15/6/2019 07:28

Wind: 20.00 kts 45 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

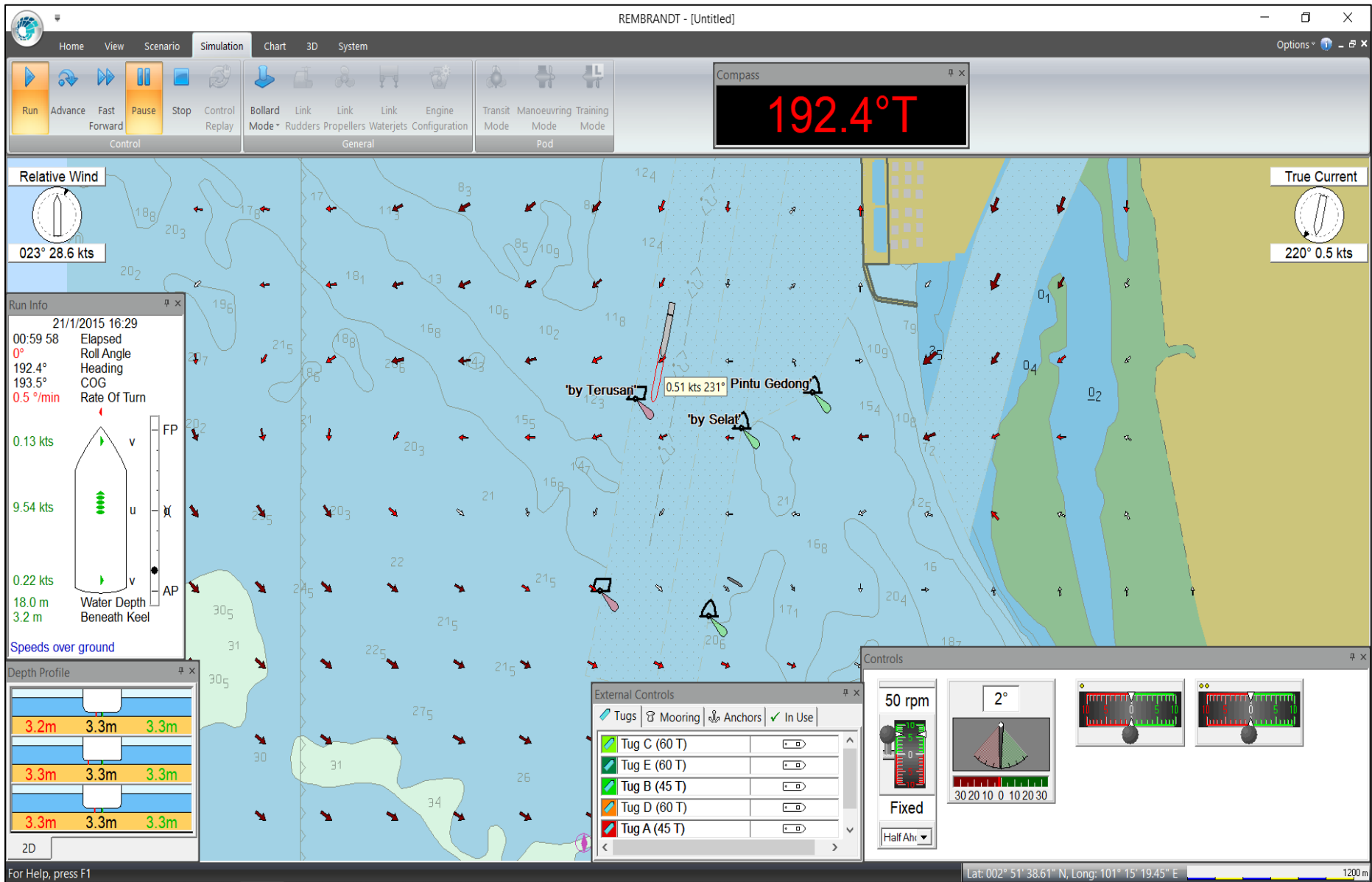
+ - Rudder Rud (°)
 X - Heading



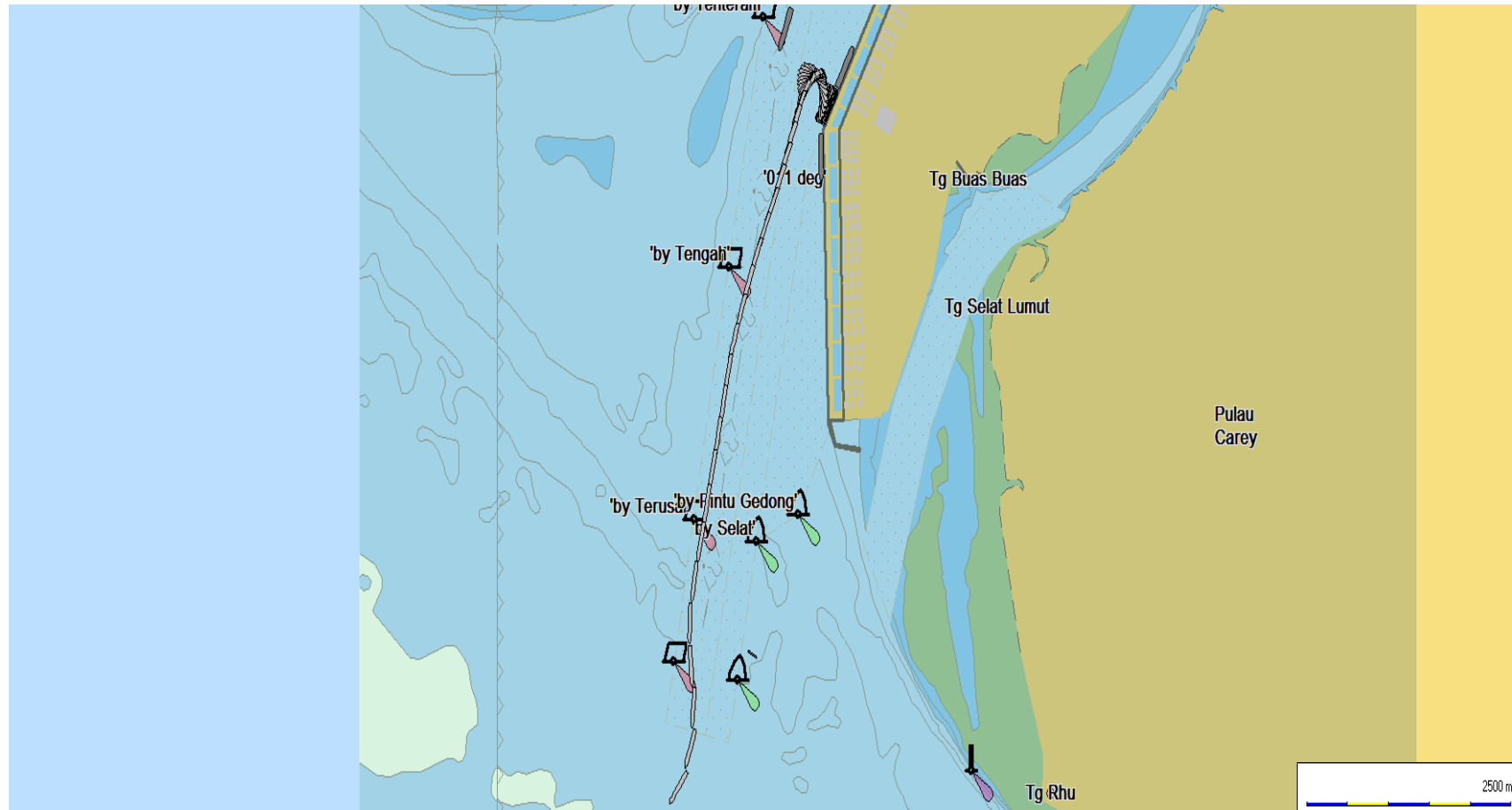




Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
7	R7WPCT13SW20k Fld1530hT45tx2Stb dDep.rmb	Fld (1530h)	SW 20 k	Departure (Stbd a/s)	F: 45t A: 45t	<p>The vessel was pulled off the berth using two 45 tons bollard pull tugs. The stern opened up faster initially and this was used to advantage to get the SW wind on the starboard side in order to clear it off the berth as far as possible before commencing the swing to port. As it moved further away, the stronger flood current at mid-stream slowed the movement of the stern away from the berth. The aft tug was stopped and the forward tug then pulled at Half Power to swing to port with the assistance of helm and engine. After completion of the swing, the vessel proceeded to sea, transiting the channel at Half Ahead (speed over 12 knots).</p> <p>Note: during the flood current, a weak flow to the west was noticed near the Terusan Buoy.</p> <p>Minimum available channel clearance: 500 metres.</p>	3/6



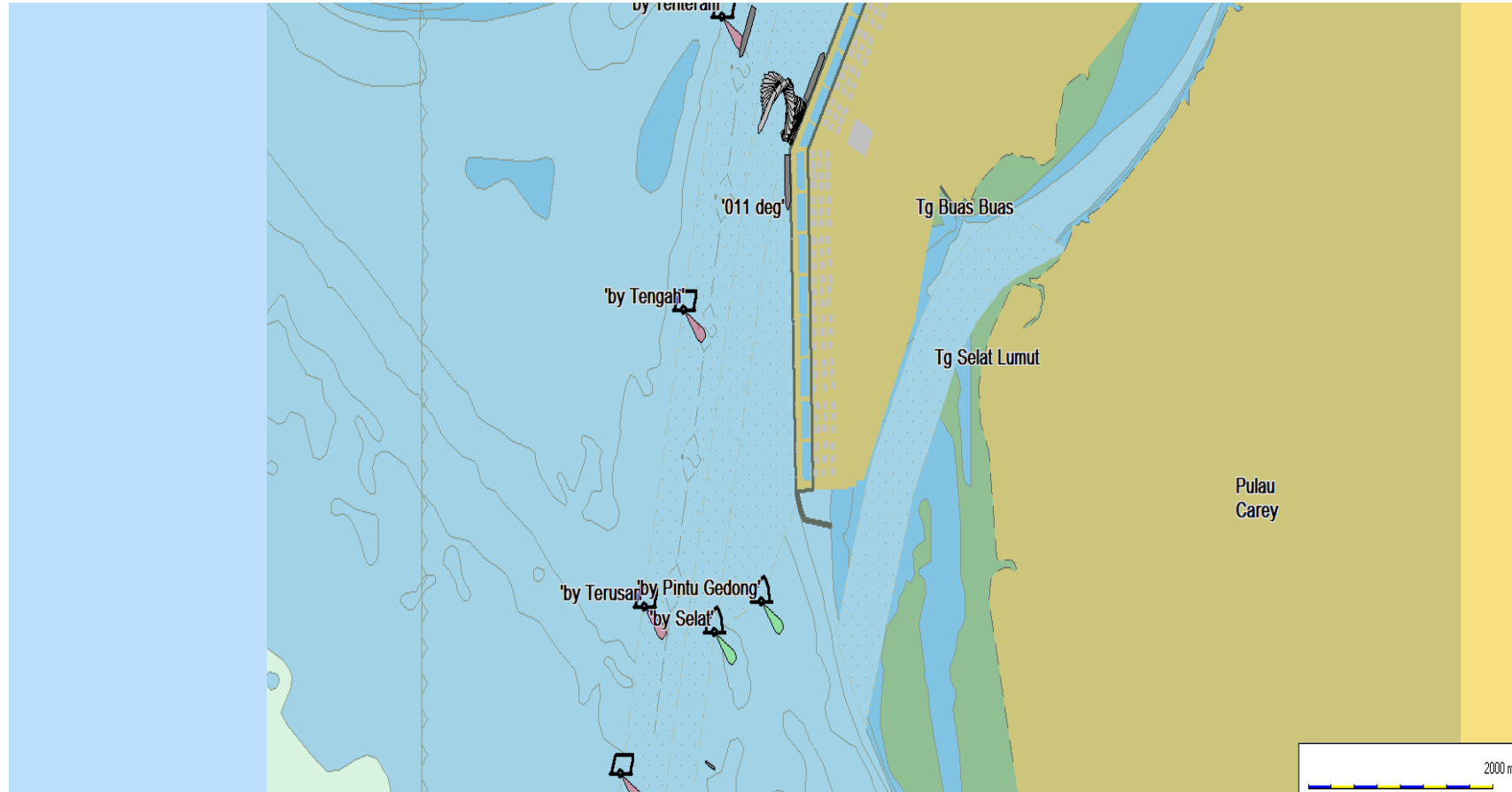
Vessel Track



Vessel: Containership 004
Harbour: World
Created: 15/6/2019 07:53

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

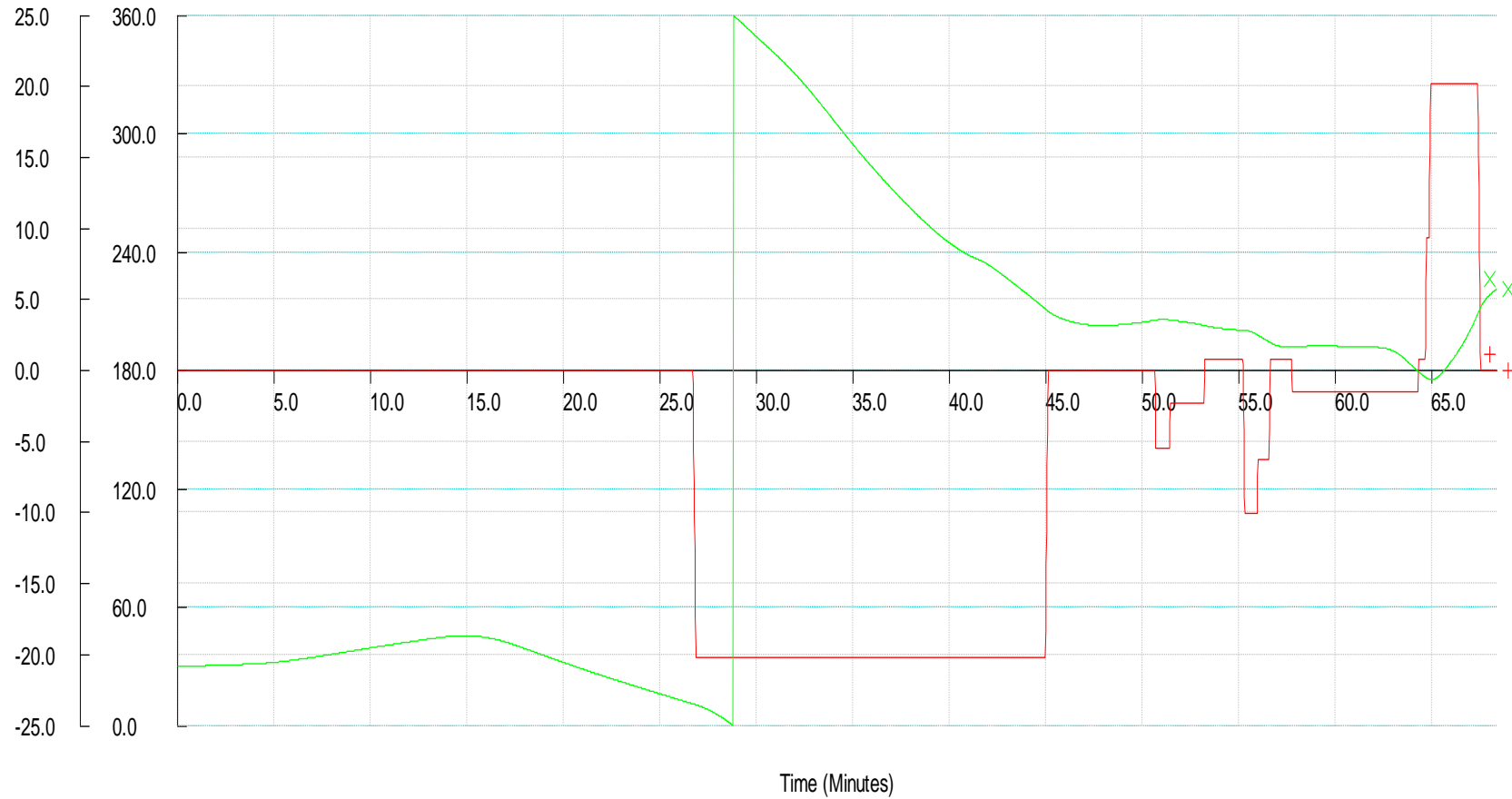
Vessel Track



Vessel: Containership 004
Harbour: World
Created: 15/6/2019 07:53

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

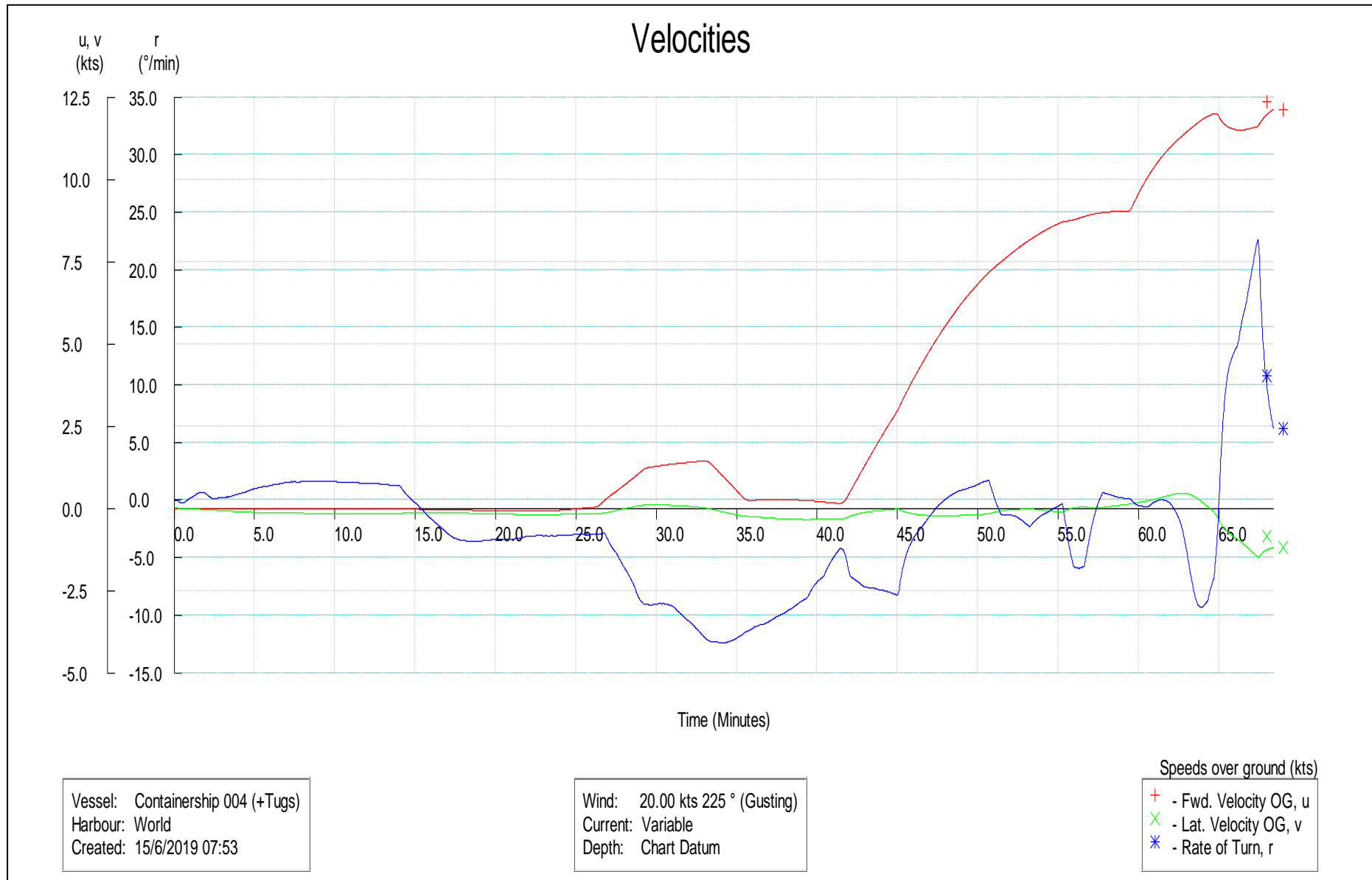
Heading and Rudder

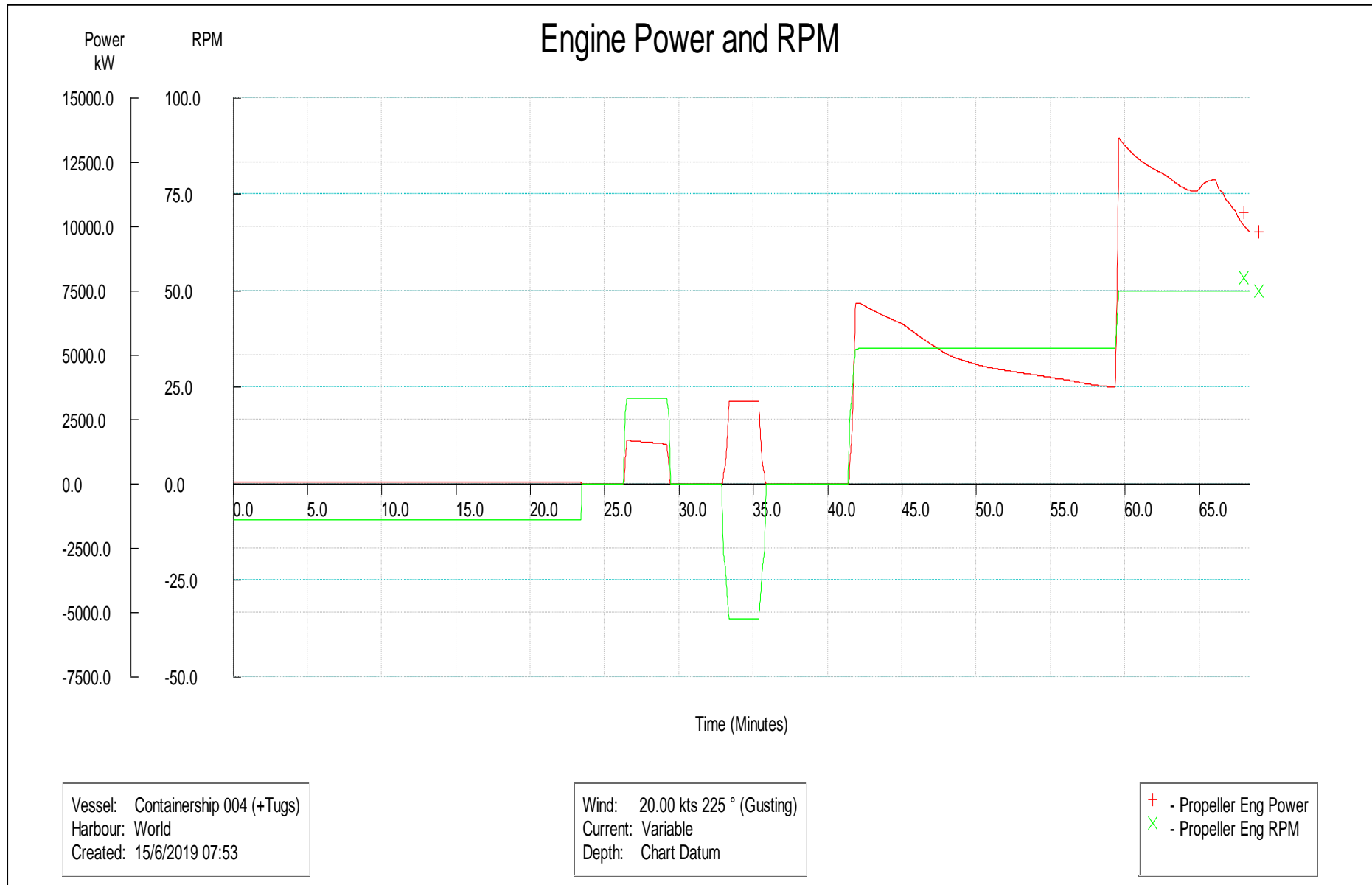


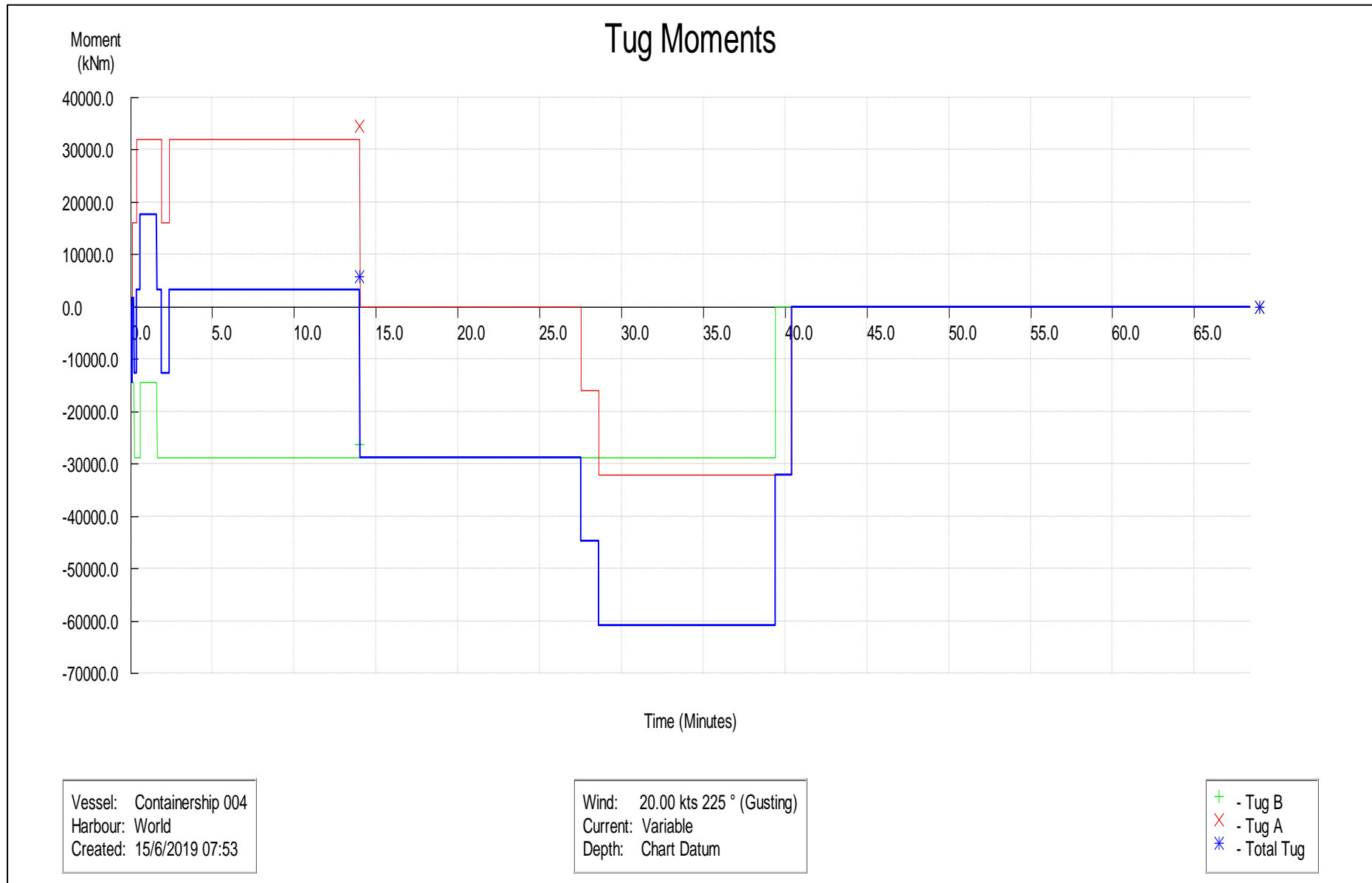
Vessel: Containership 004 (+Tugs)
 Harbour: World
 Created: 15/6/2019 07:53

Wind: 20.00 kts 225 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

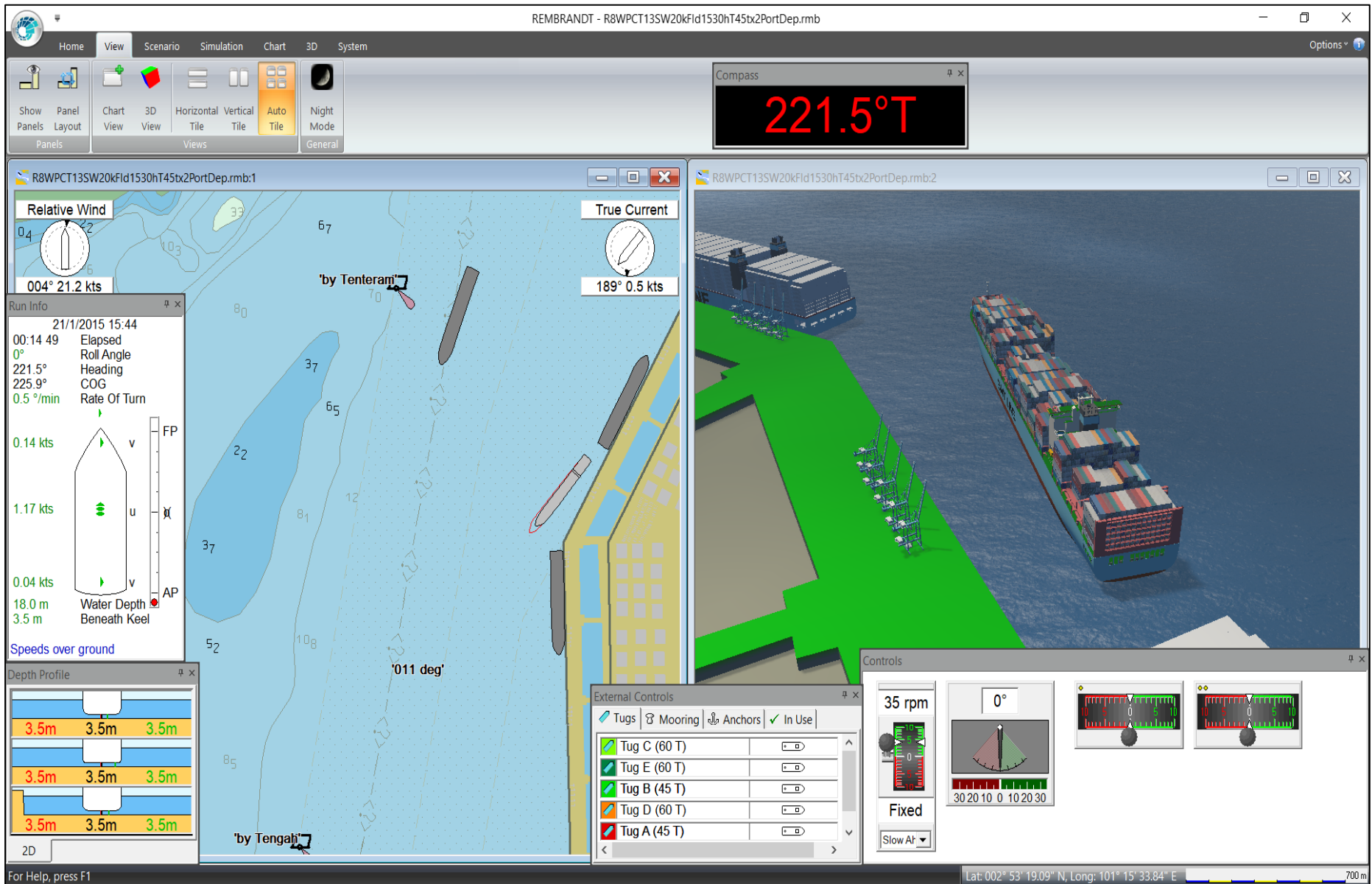
+ - Rudder Rud (°)
 X - Heading



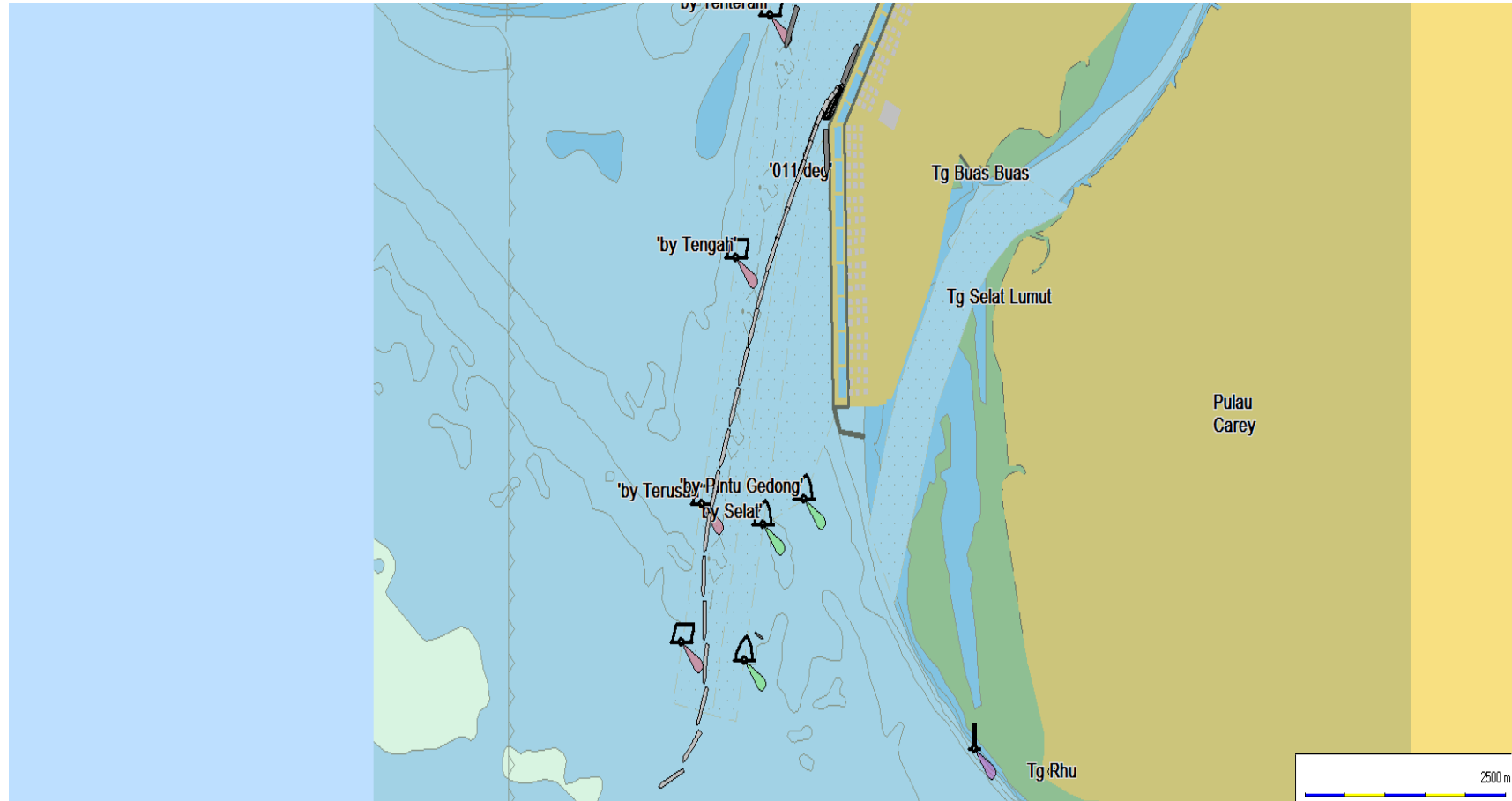




Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
8	R8WPCT13SW20k Fld1530hT45tx2Por tDep.rmb	Fld (1530h)	SW 20 k	Departure (Port a/s)	F: 45t A: 45t	The vessel was pulled off the berth using two 45 tons bollard pull tugs. When the bow was heading into the wind, the tugs were stopped and the vessel proceeded to sea. The tugs operated at a maximum of Half Power.	3/6



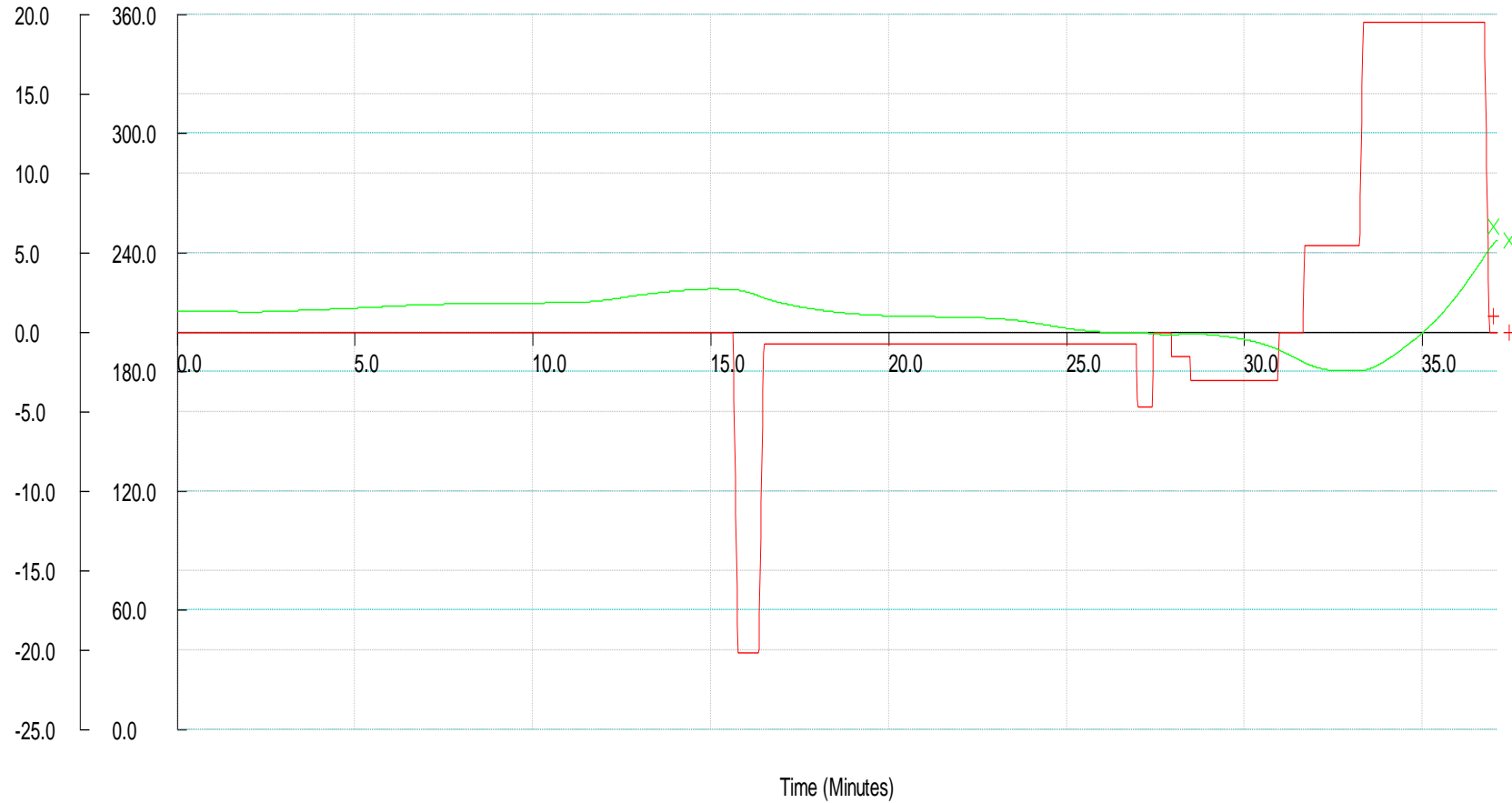
Vessel Track



Vessel: Containership 004
Harbour: World
Created: 15/6/2019 08:28

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

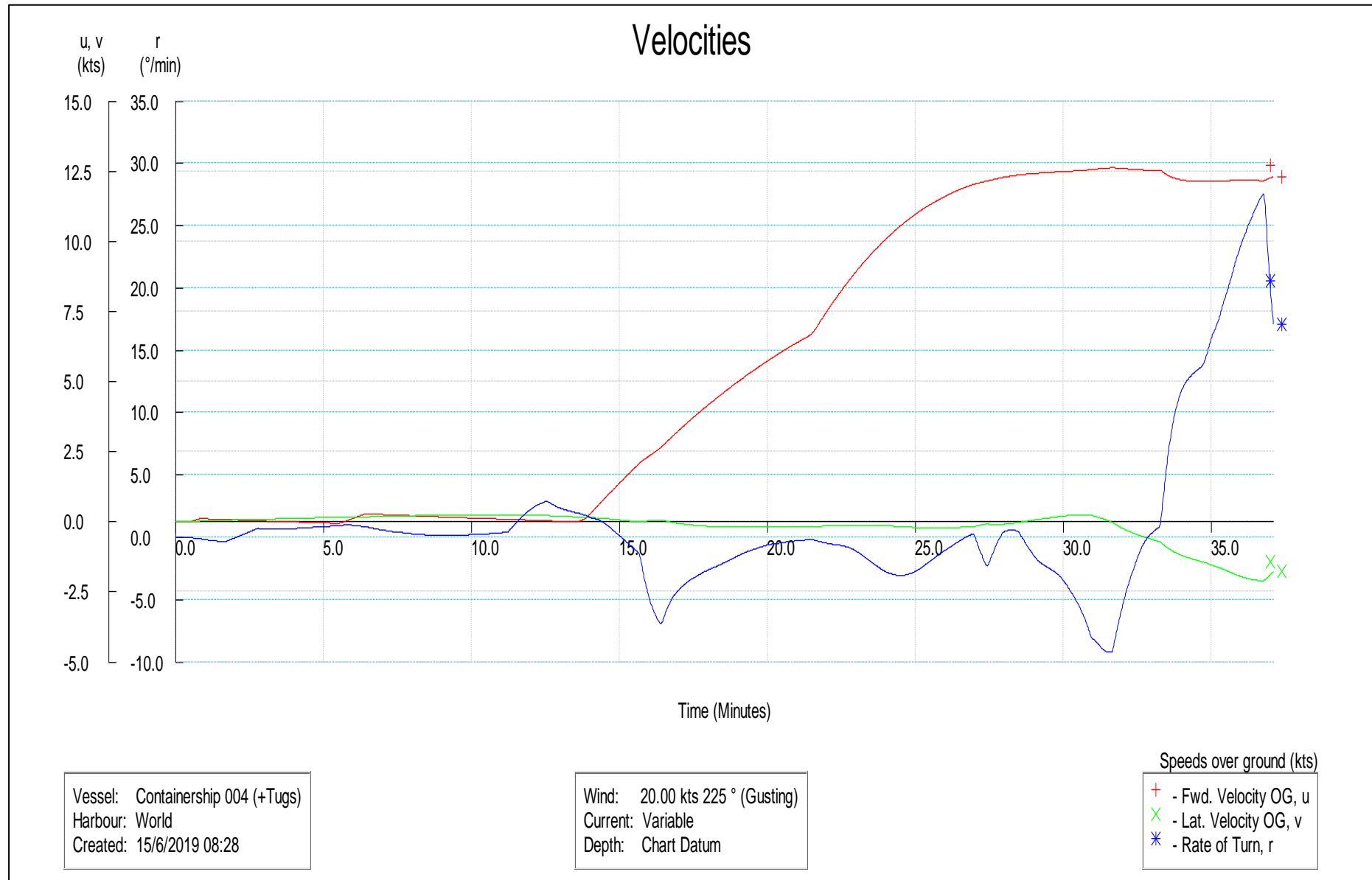
Heading and Rudder



Vessel: Containership 004 (+Tugs)
 Harbour: World
 Created: 15/6/2019 08:28

Wind: 20.00 kts 225 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

+ - Rudder Rud (°)
 x - Heading

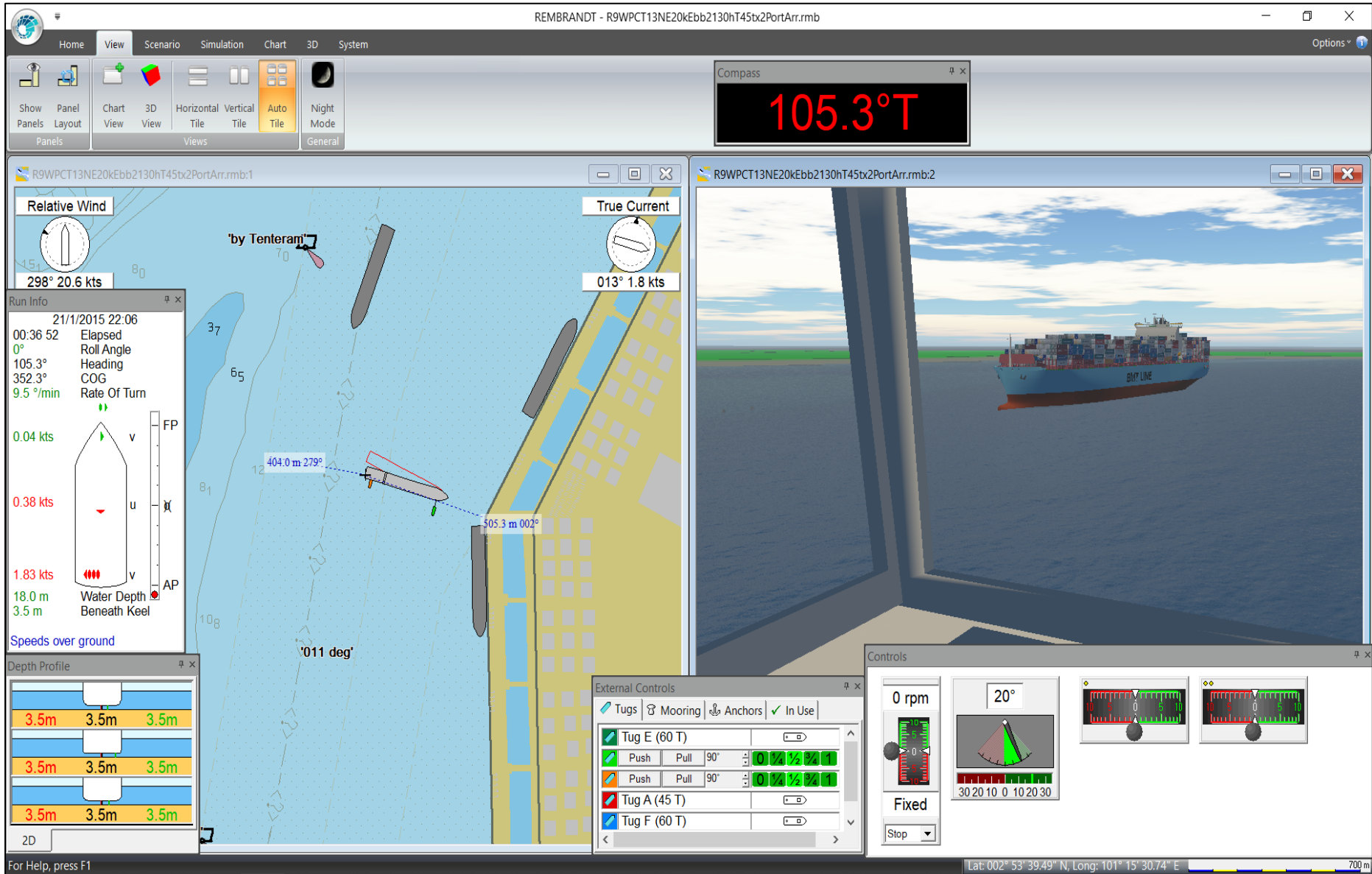






NE 20 knots Ebb Current Arrival

Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
9	R9WPCT13NE20k Ebb2130hT45tx2PortArr.rmb	Ebb (2130h)	NE 20 k	Arrival (Port a/s)	F: 45t A: 45t	<p>The vessel experienced a strong set to port in the ebb current when approaching the entrance to the dredged channel. She was manoeuvred at Half Ahead, close to the starboard bouys in order to keep off the outbound channel. When approaching the berth, the speed was reduced and two 45 tons bollard pull tugs were made fast on the starboard bow and starboard quarter. The tugs assisted in swinging the vessel to starboard of the berth and pushing her alongside. Even after taking care to keep the bow north of the 'knuckle', close to the berth, the forward tug had to operate at Full Power to push the bow against the current. Taking this into consideration, it may be prudent to deploy a 60 tons bollard pull tug forward in peak current conditions.</p> <p>Min. available channel width: 400m</p>	4/6

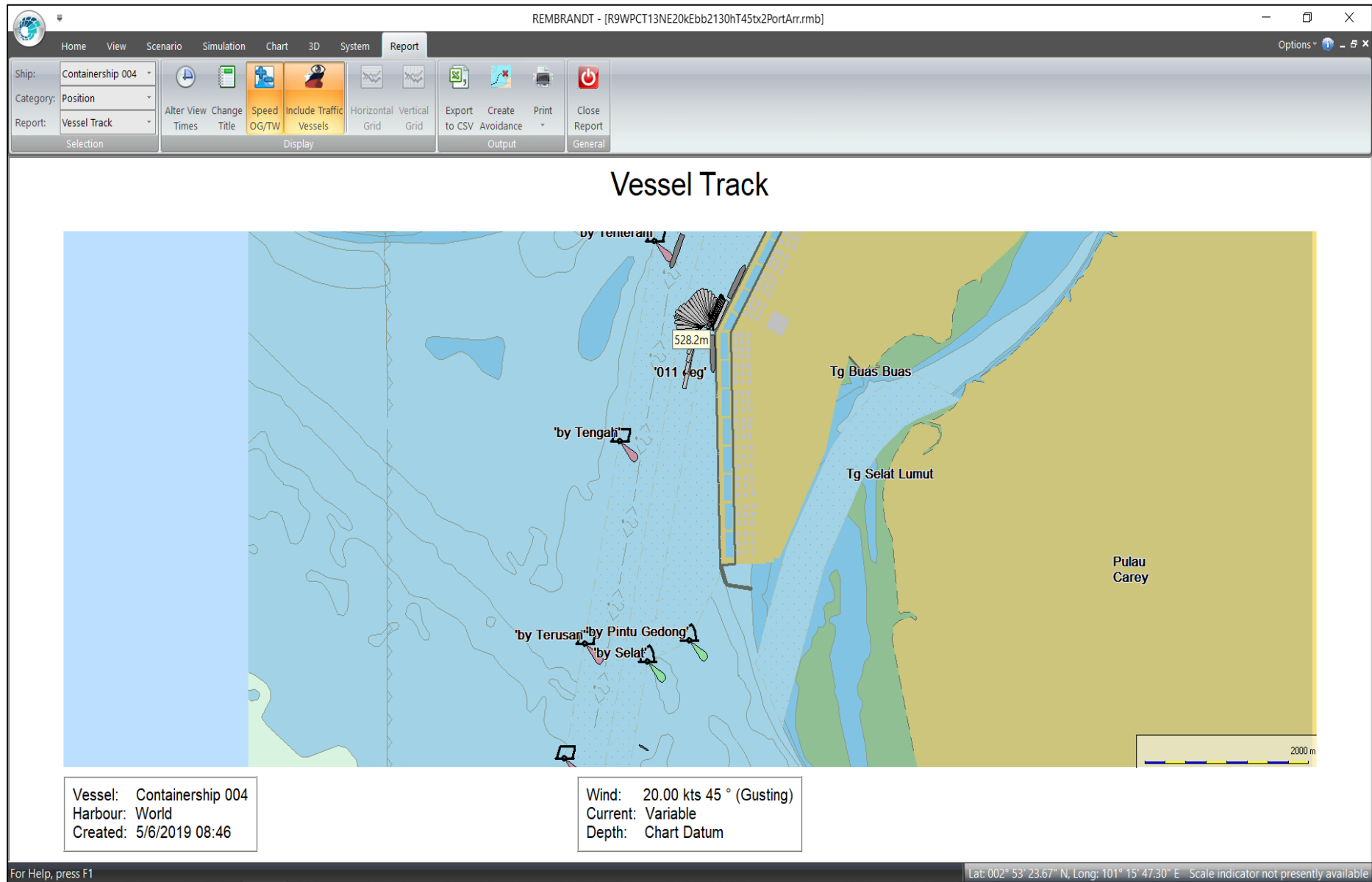


Vessel Track

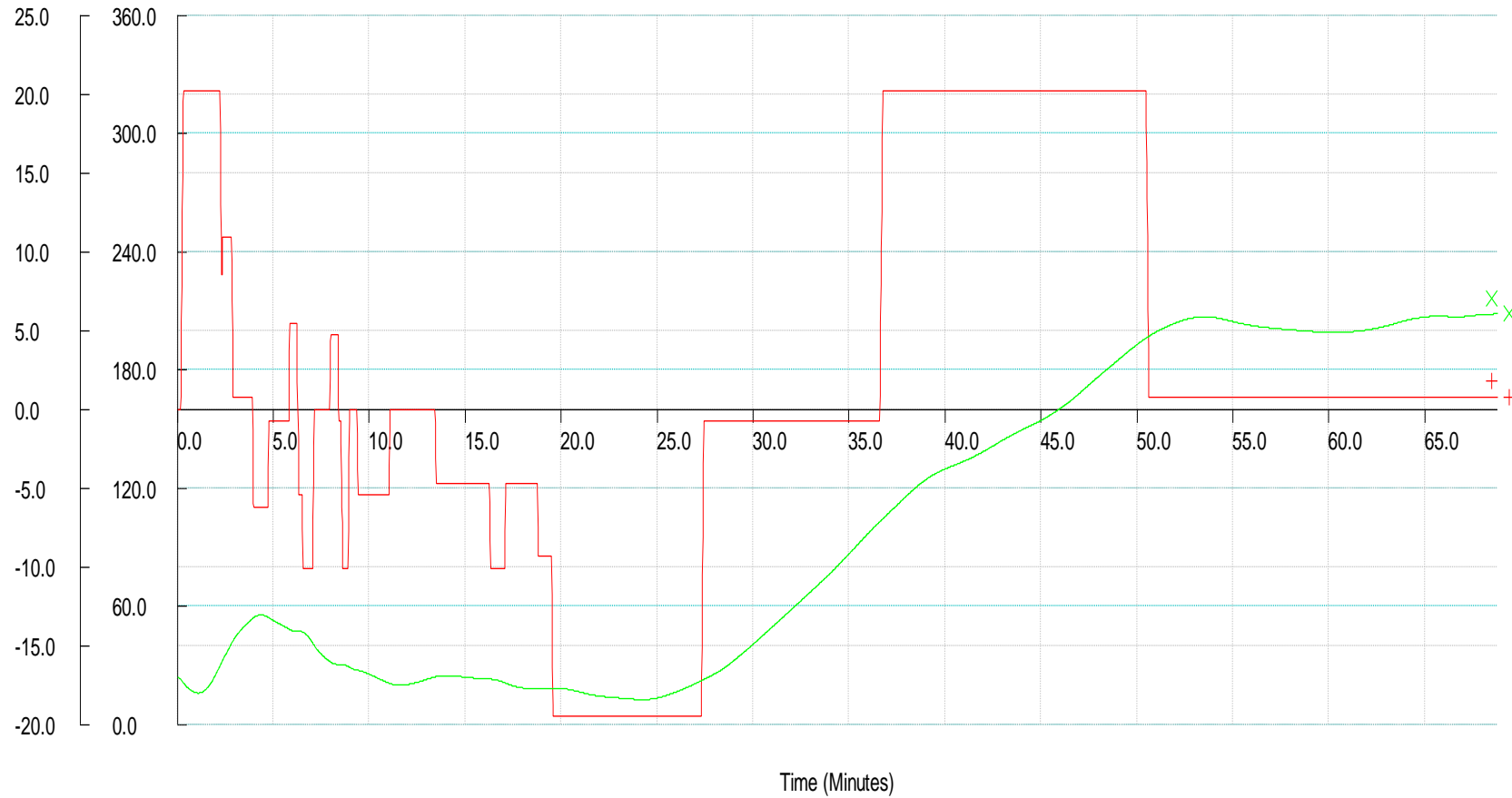


Vessel: Containership 004
Harbour: World
Created: 5/6/2019 15:35

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum



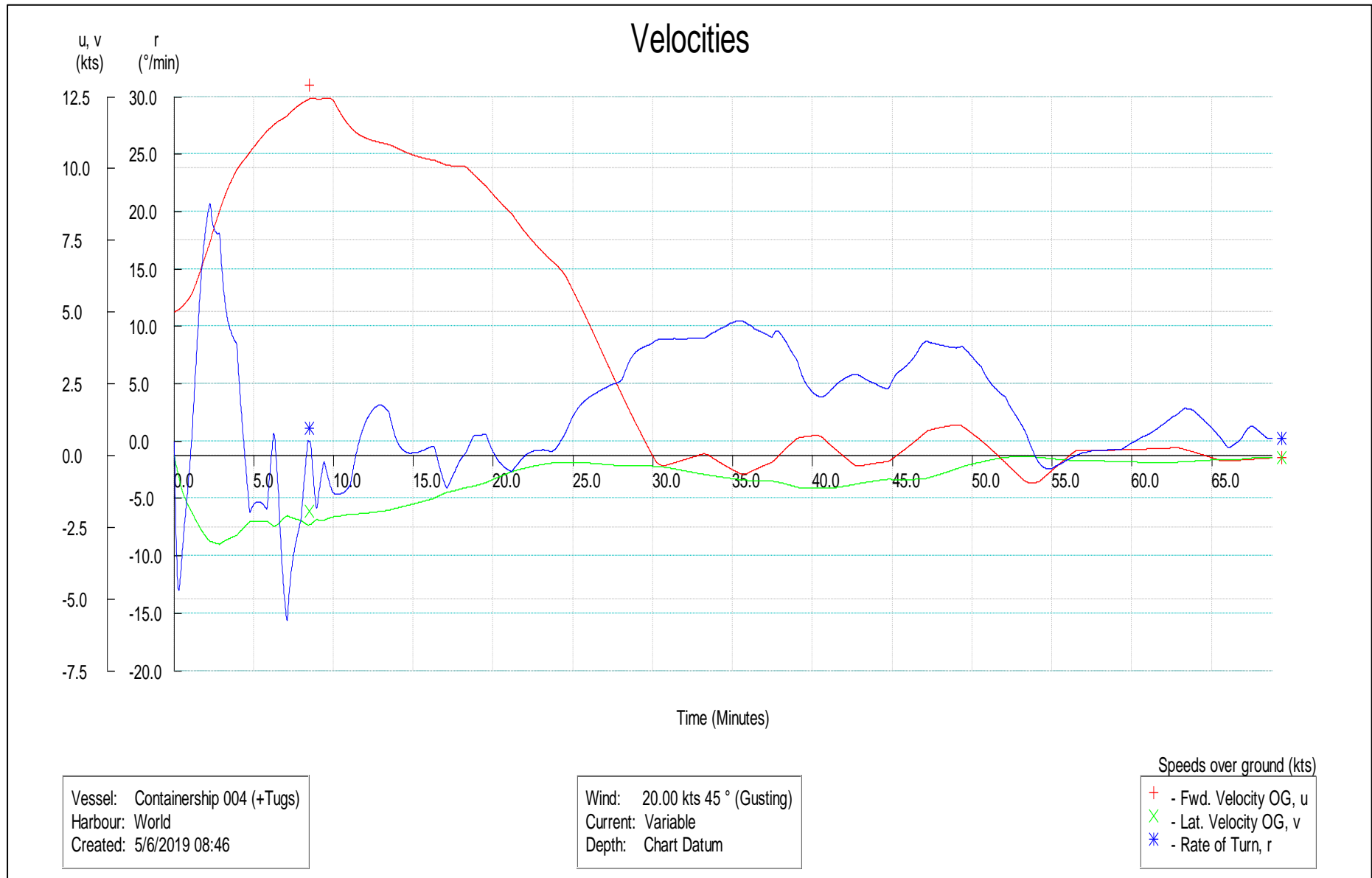
Heading and Rudder

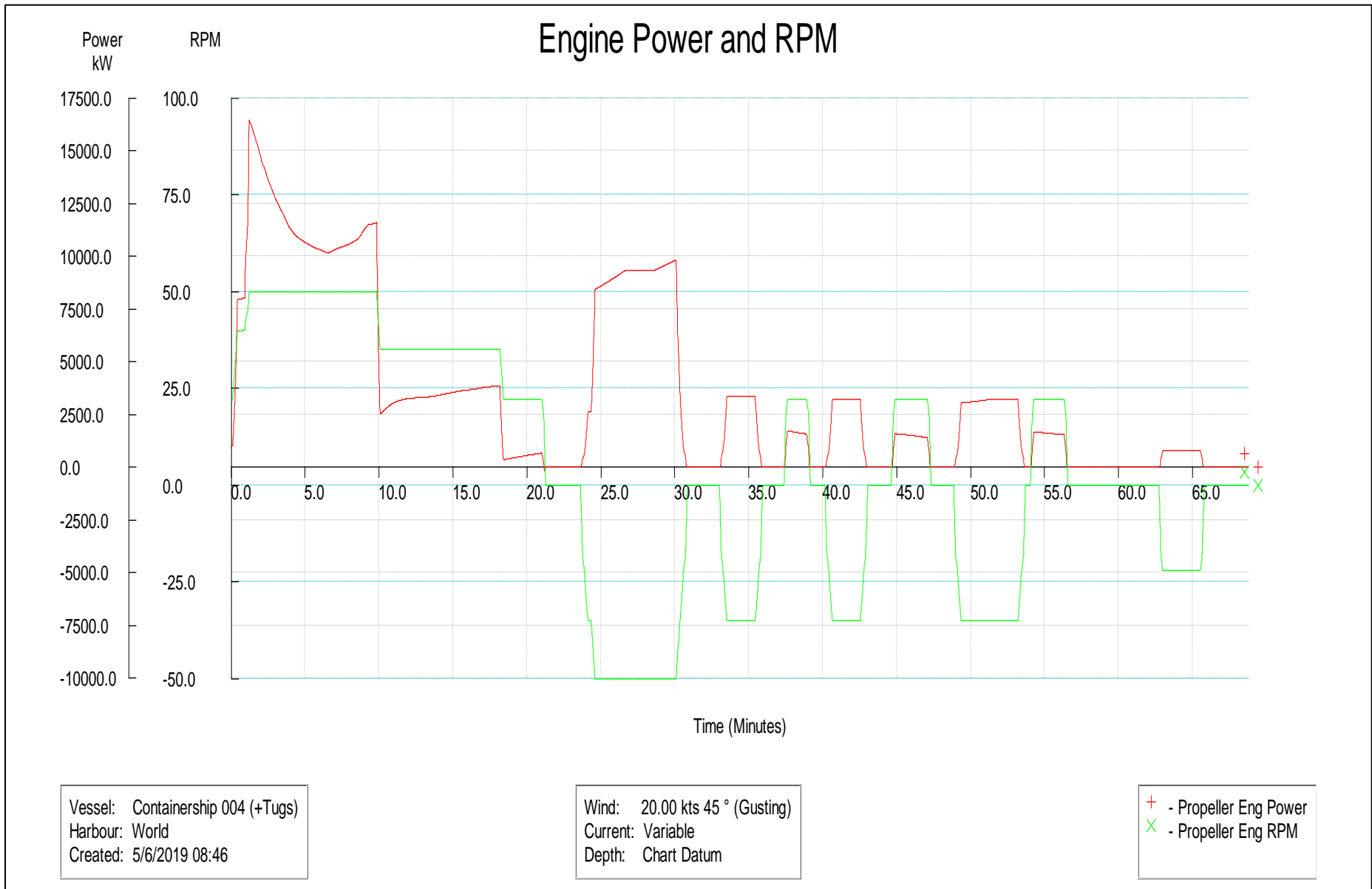


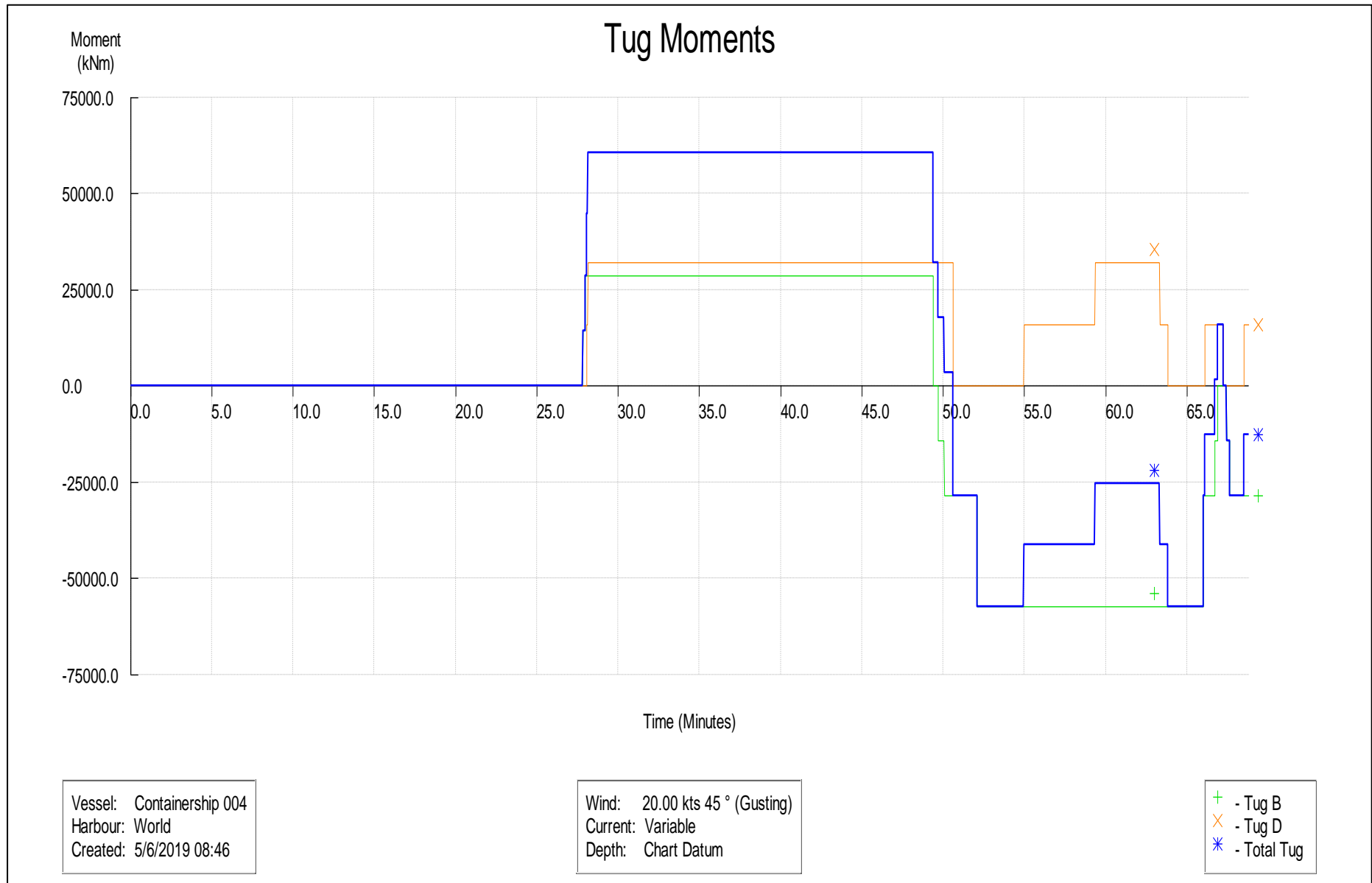
Vessel: Containership 004 (+Tugs)
 Harbour: World
 Created: 5/6/2019 08:46

Wind: 20.00 kts 45 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

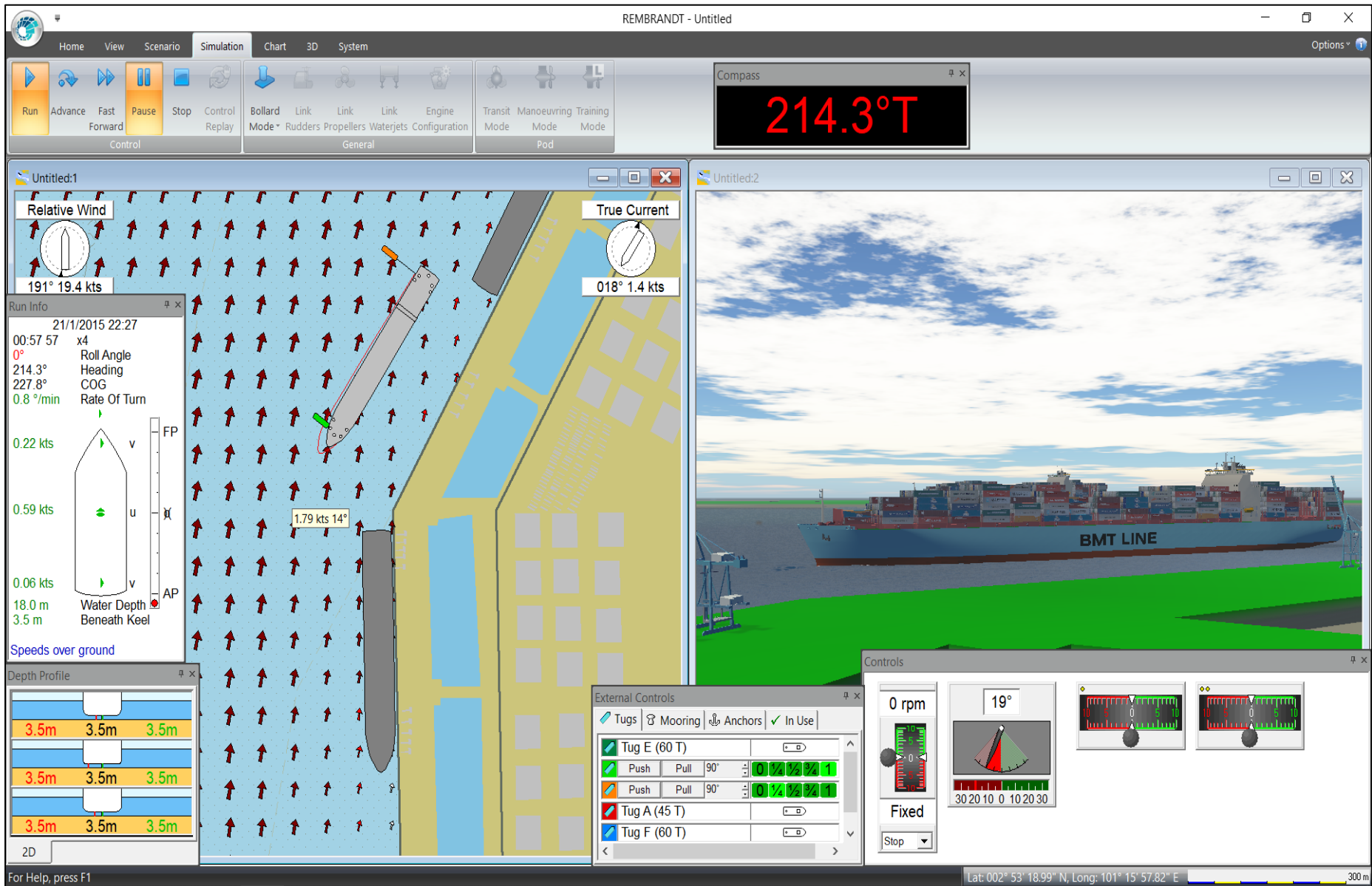
+ - Rudder Rud (°)
 X - Heading

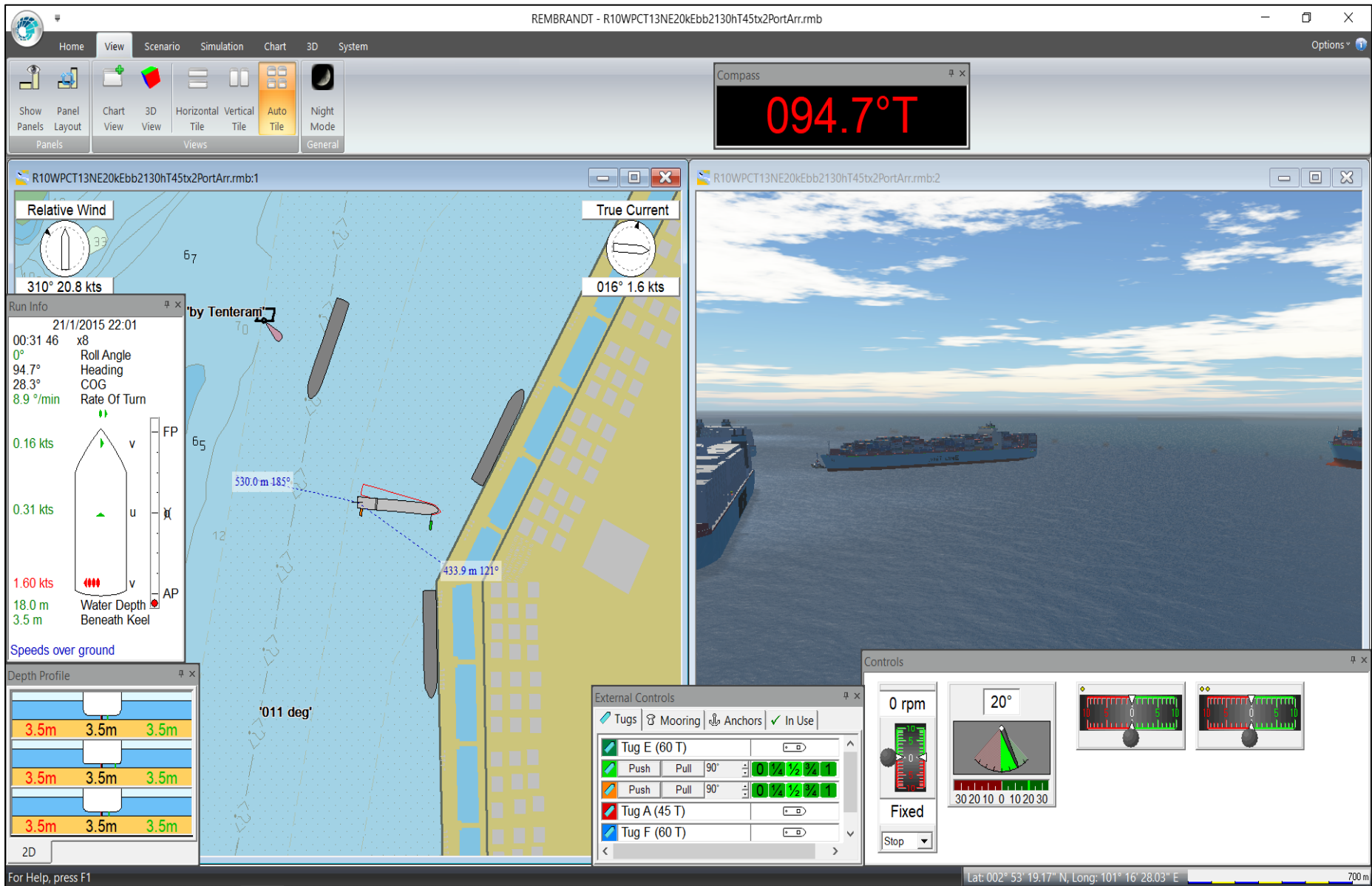






Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
10	R10WPCT13NE20 kEbb2130hT45x2P ortArr.rmb	Ebb (2130h)	NE 20 k	Arrival (Port a/s)	F: 45t A: 45t	<p>The vessel experienced a strong set to port in the ebb current when approaching the entrance to the dredged channel. She was manoeuvred at Half Ahead, close to the starboard bouys in order to keep off the outbound channel. When approaching the berth, the speed was reduced and two 45 tons bollard pull tugs were made fast on the starboard bow and starboard quarter. The tugs assisted in swinging the vessel to starboard of the berth and pushing her alongside. The forward tug had to operate at Full Power to push the bow against the current. Taking this into consideration, it may be prudent to deploy a 60 tons bollard pull tug forward in peak current conditions. Alternatively more clearance from the 'knuckle' will allow the vessel to avoid the 'push-off' at the 'knuckle'.</p> <p>Min. available channel width: 530m</p>	4/6





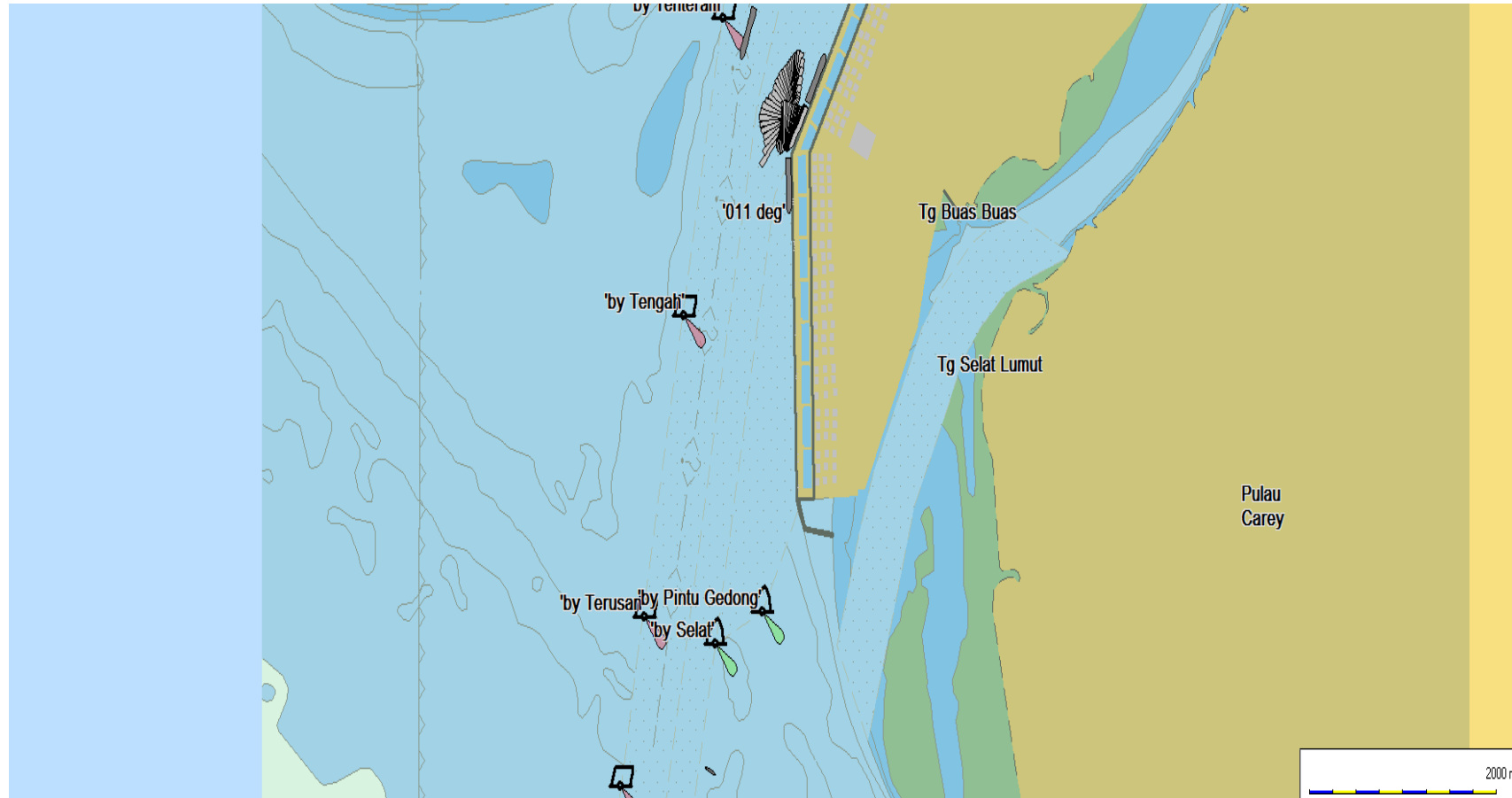
Vessel Track



Vessel: Containership 004
Harbour: World
Created: 12/6/2019 18:20

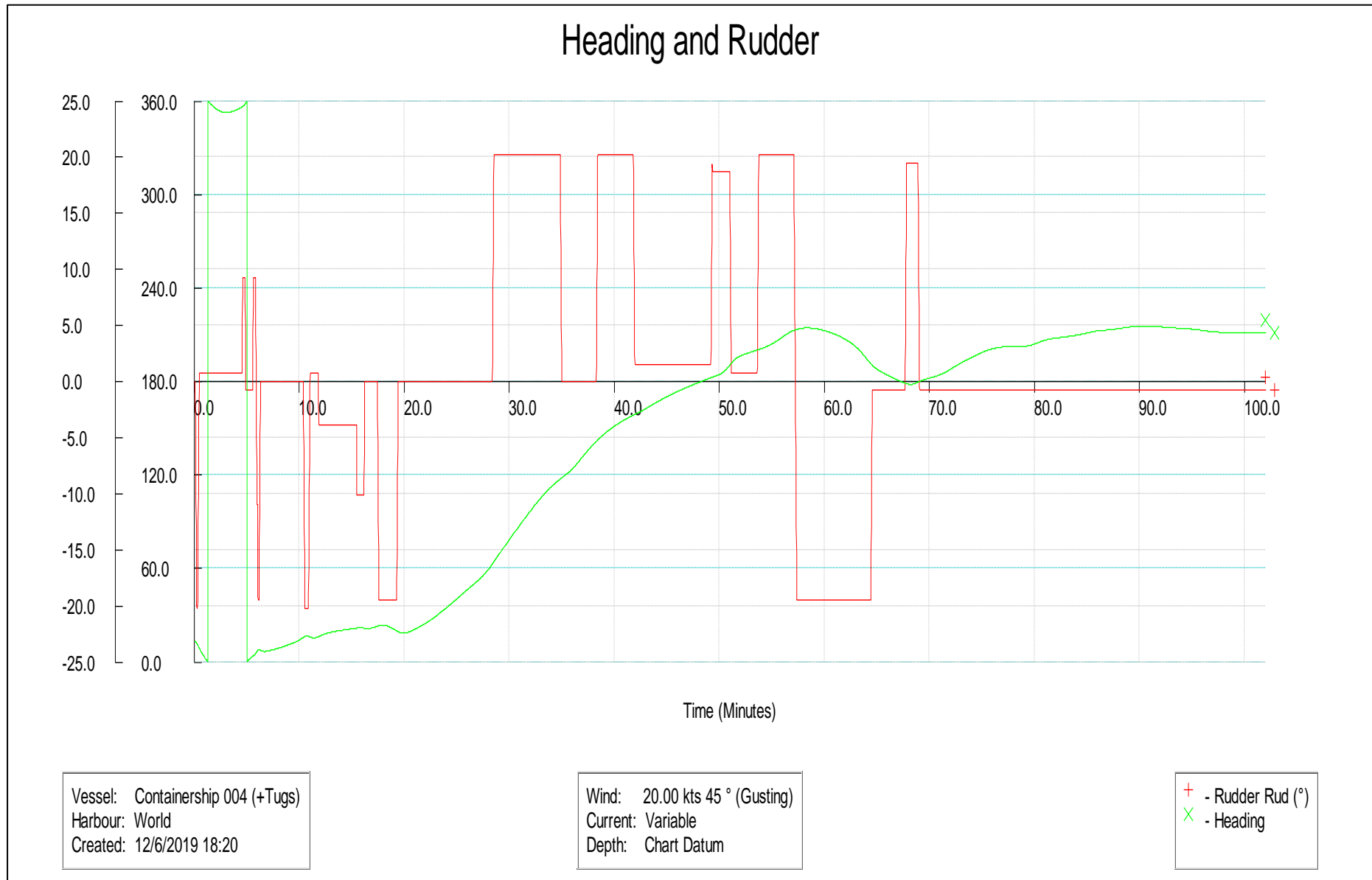
Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

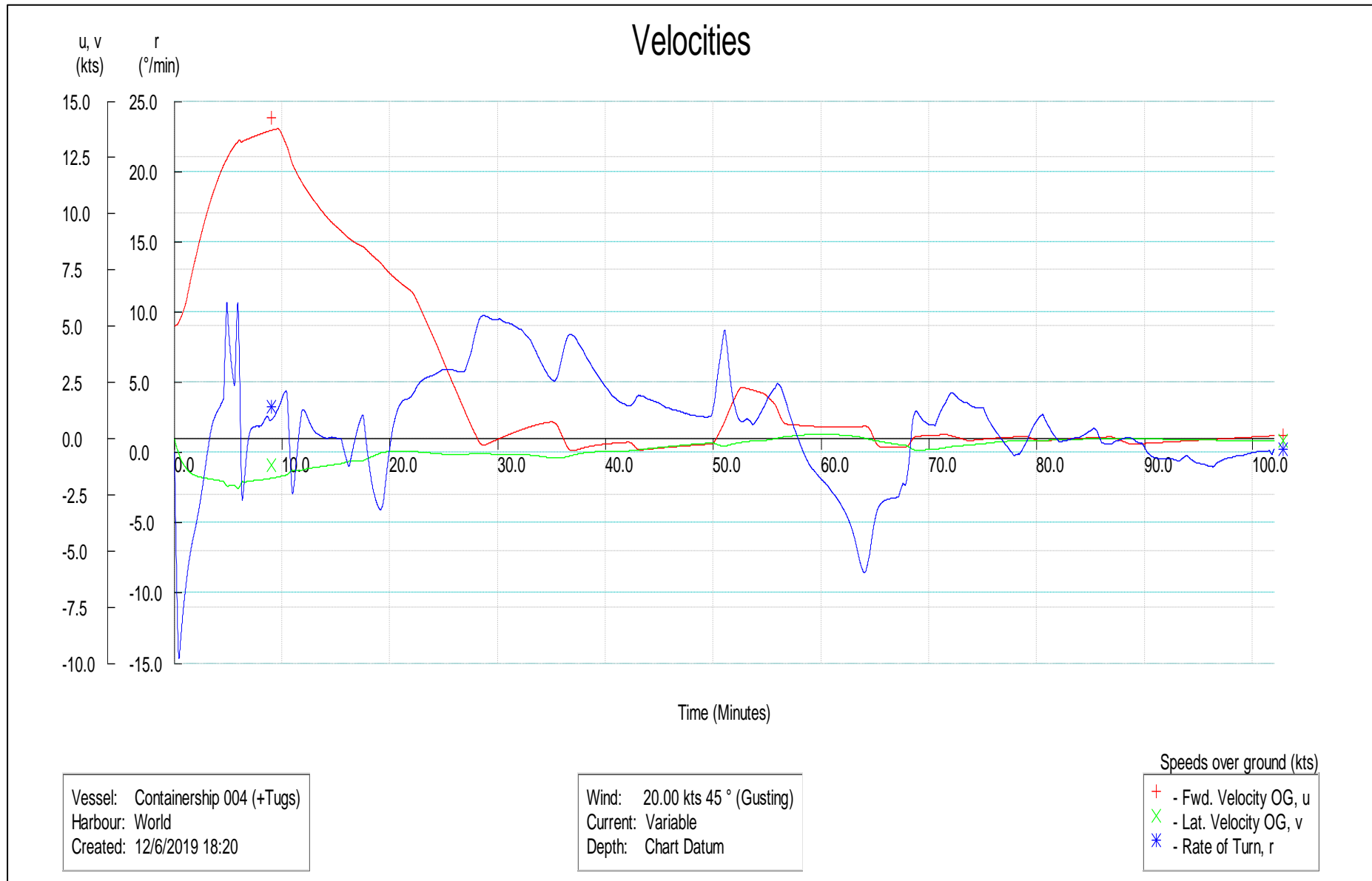
Vessel Track

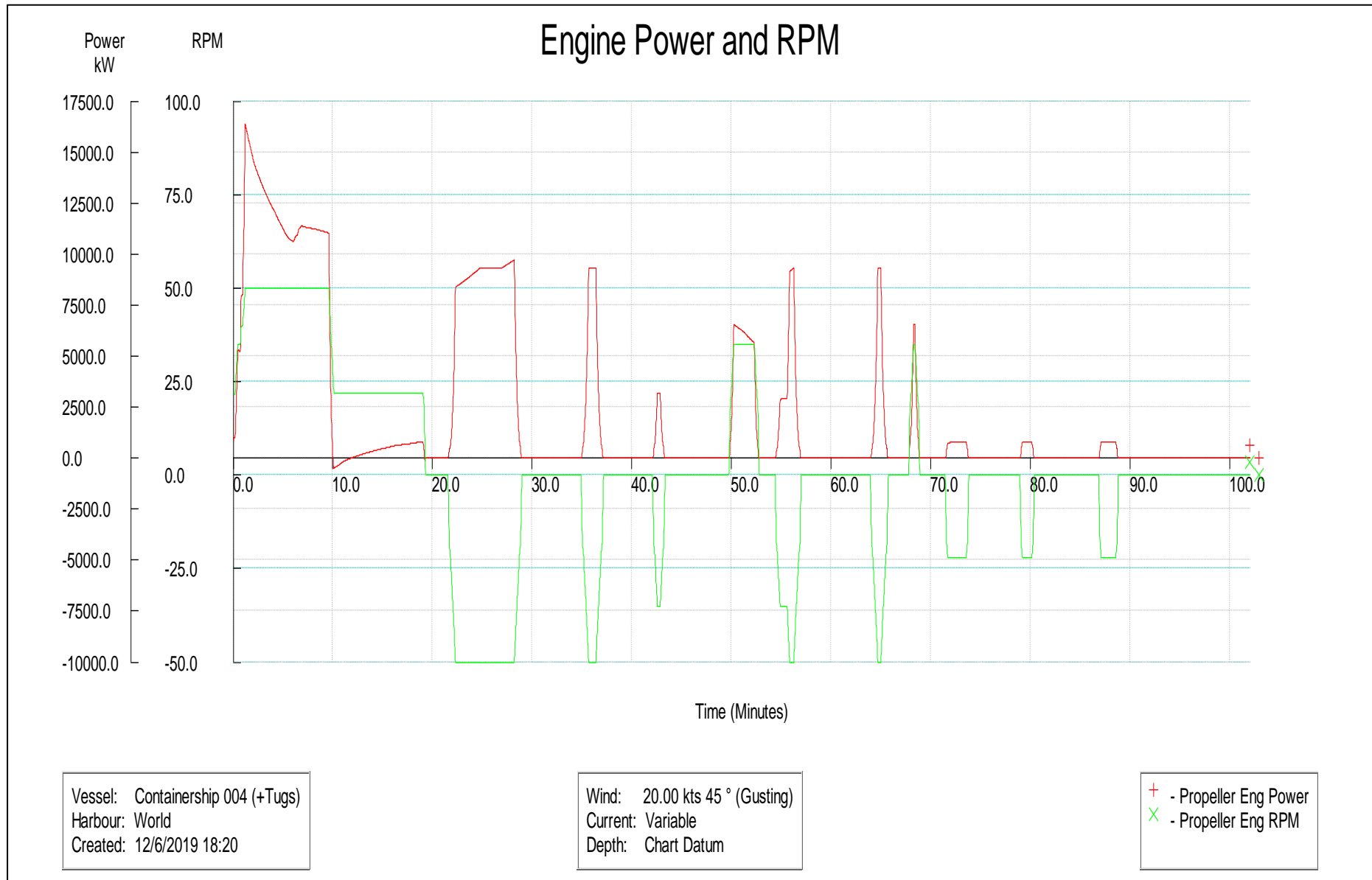


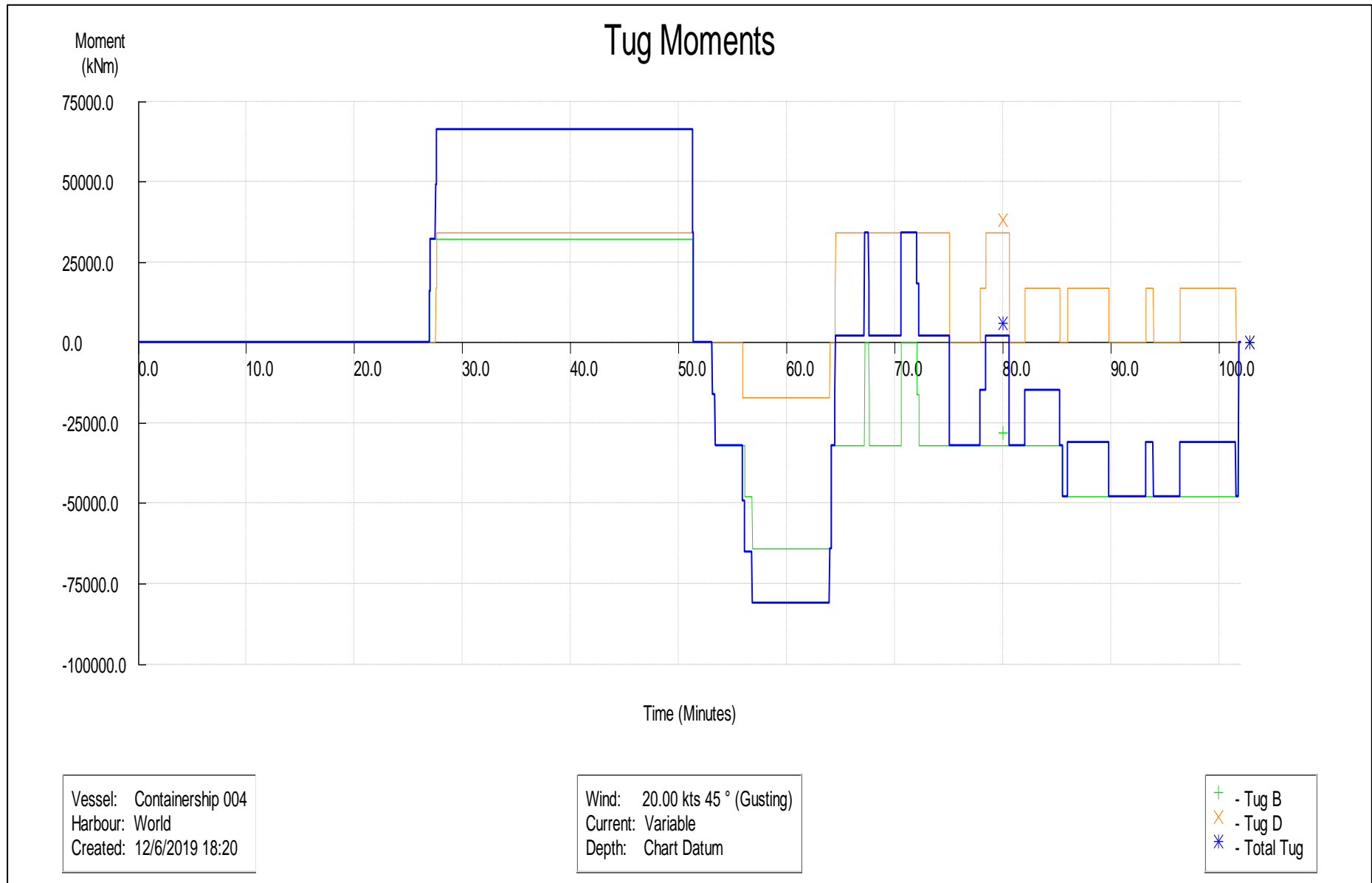
Vessel: Containership 004
Harbour: World
Created: 12/6/2019 18:20

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum



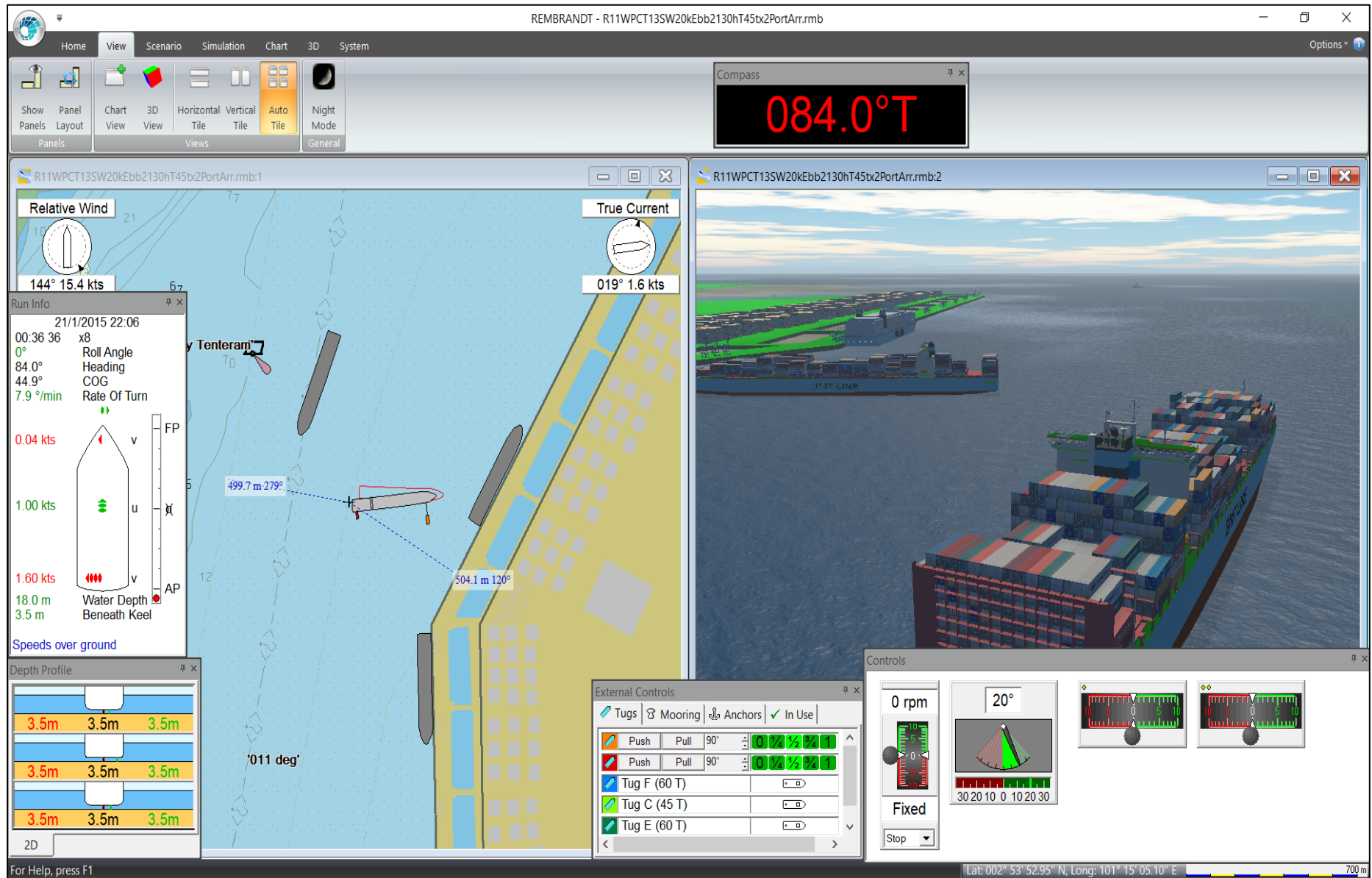


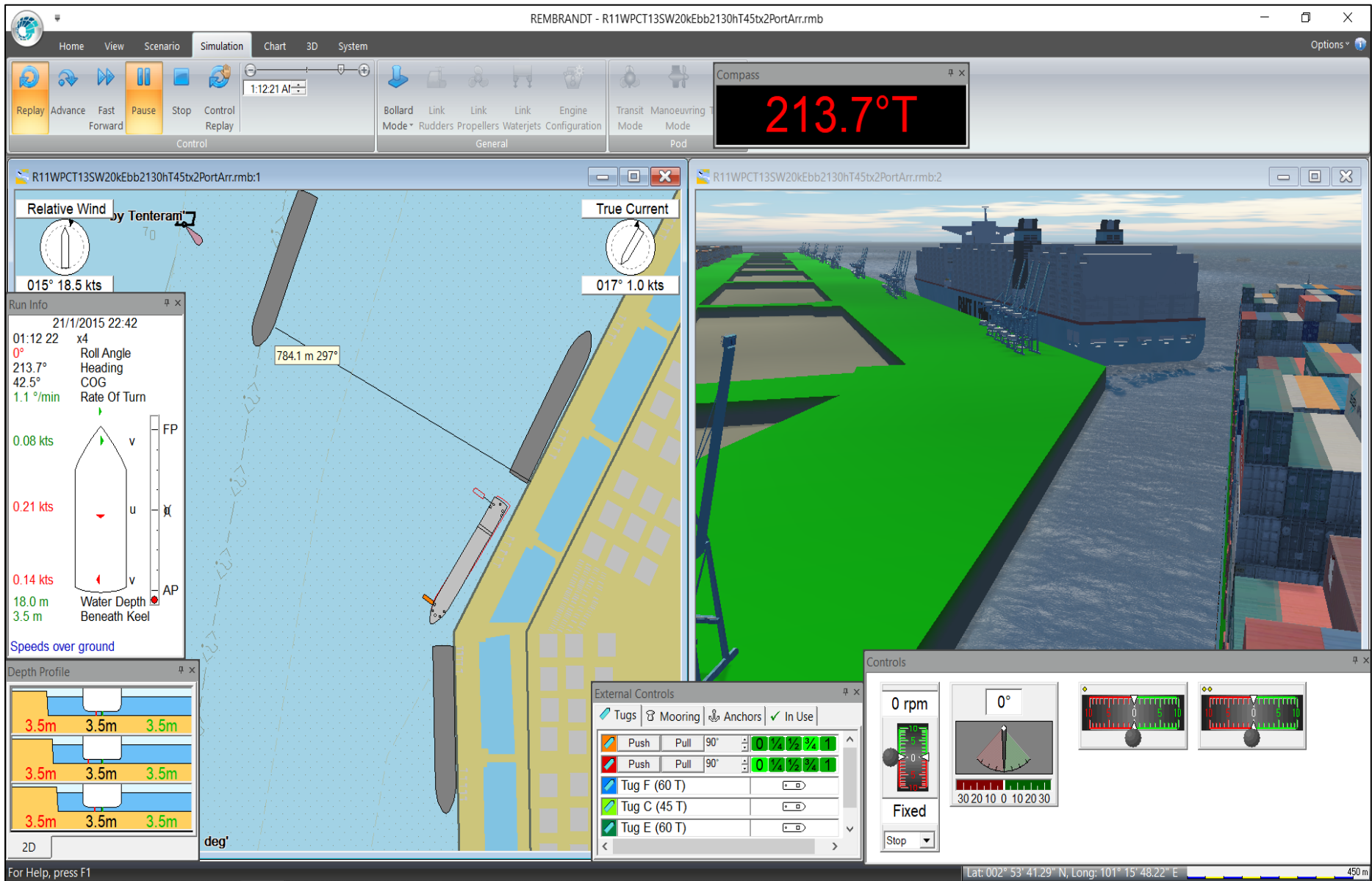




SW 20 knots Ebb Current Arrival

Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
11	R11WPCT13SW20 kEbb2130hT45x2P ortArr.rmb	Ebb (2130h)	SW 20 k	Arrival (Port a/s)	F: 45t A: 45t	Approaching the channel entrance, the vessel experienced a strong set to port in the ebb current. She was manoeuvred at Half Ahead, close to the starboard buoys in order to keep clear of the outbound channel. When approaching the berth, the speed was reduced and two 45 tons bollard pull tugs were made fast on the starboard bow and starboard quarter. The tugs assisted in swinging the vessel to starboard, off the berth, and pushing her alongside. When approaching 'knuckle', the forward tug had to operate at $\frac{3}{4}$ Power to push the bow against the current. Available channel width: 500m.	4/6



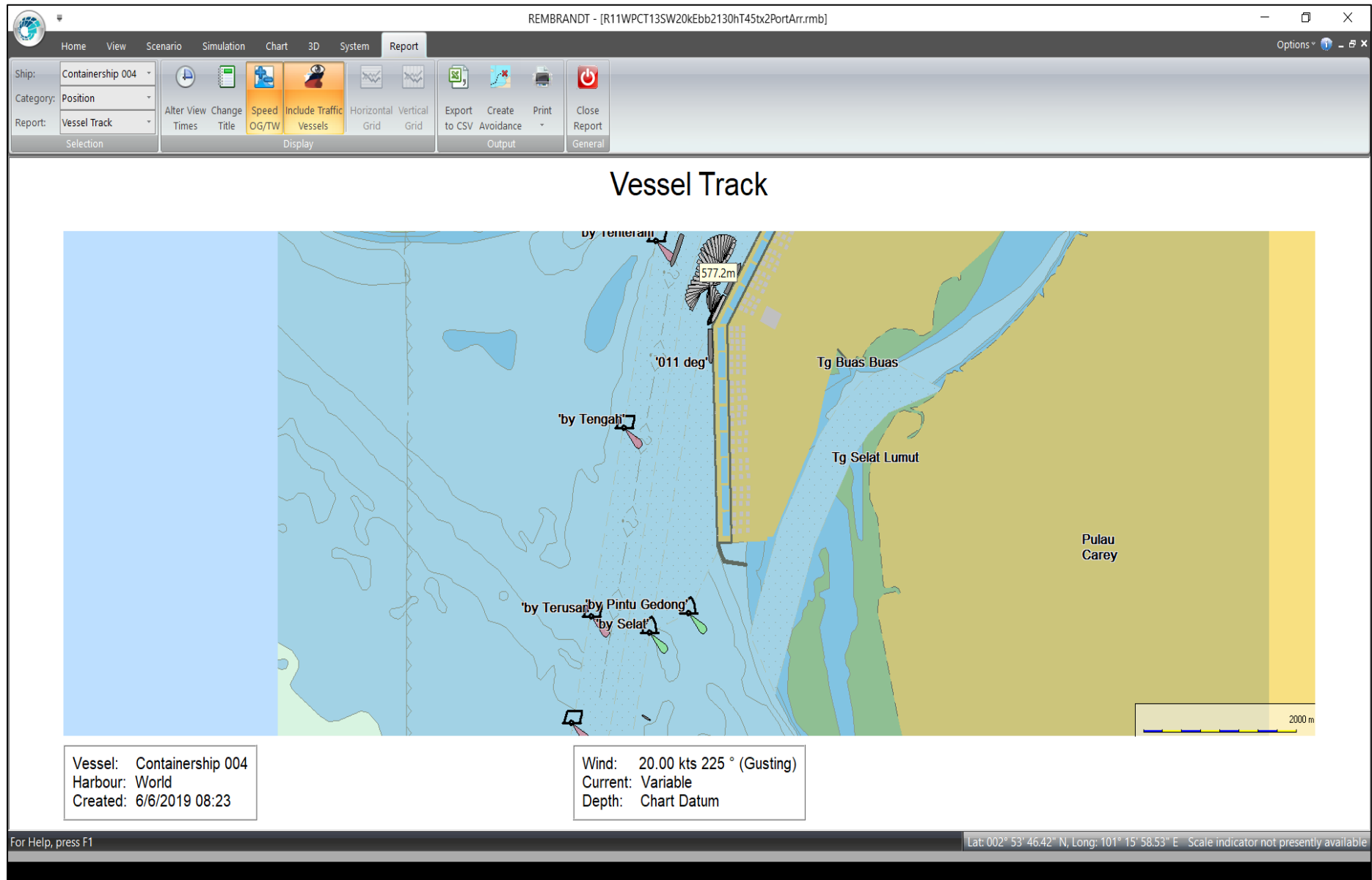


Vessel Track

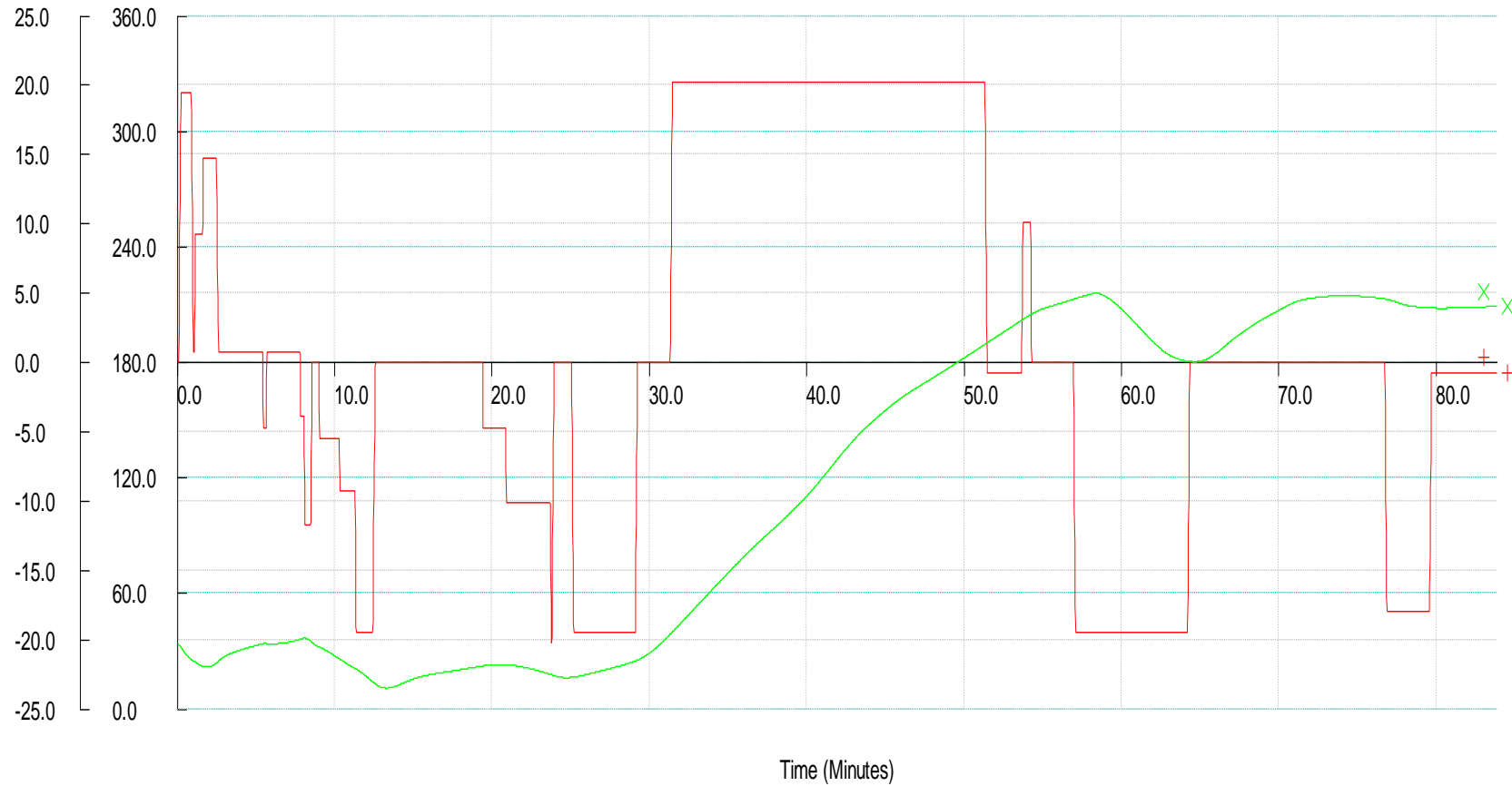


Vessel: Containership 004
Harbour: World
Created: 6/6/2019 08:23

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum



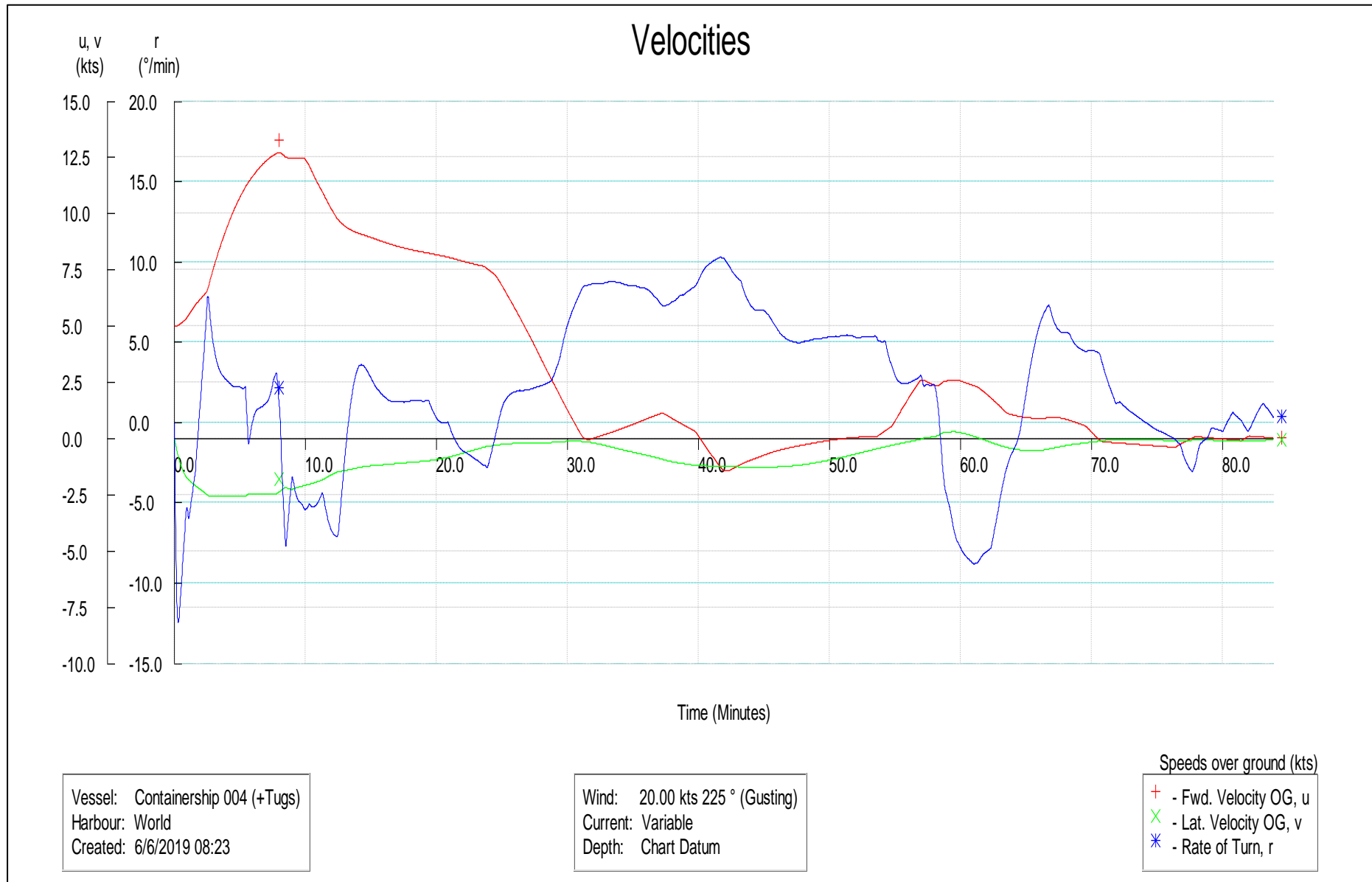
Heading and Rudder

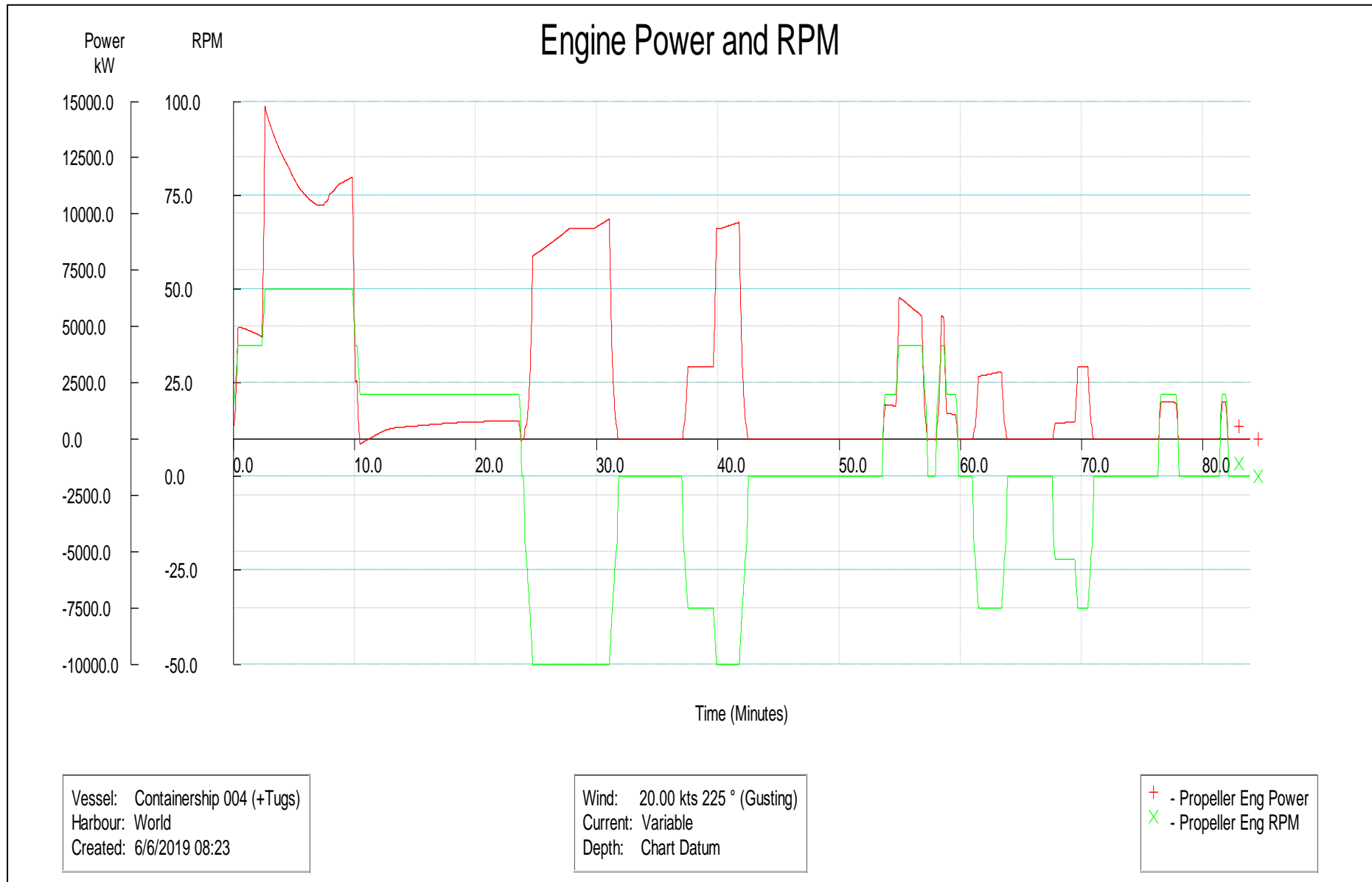


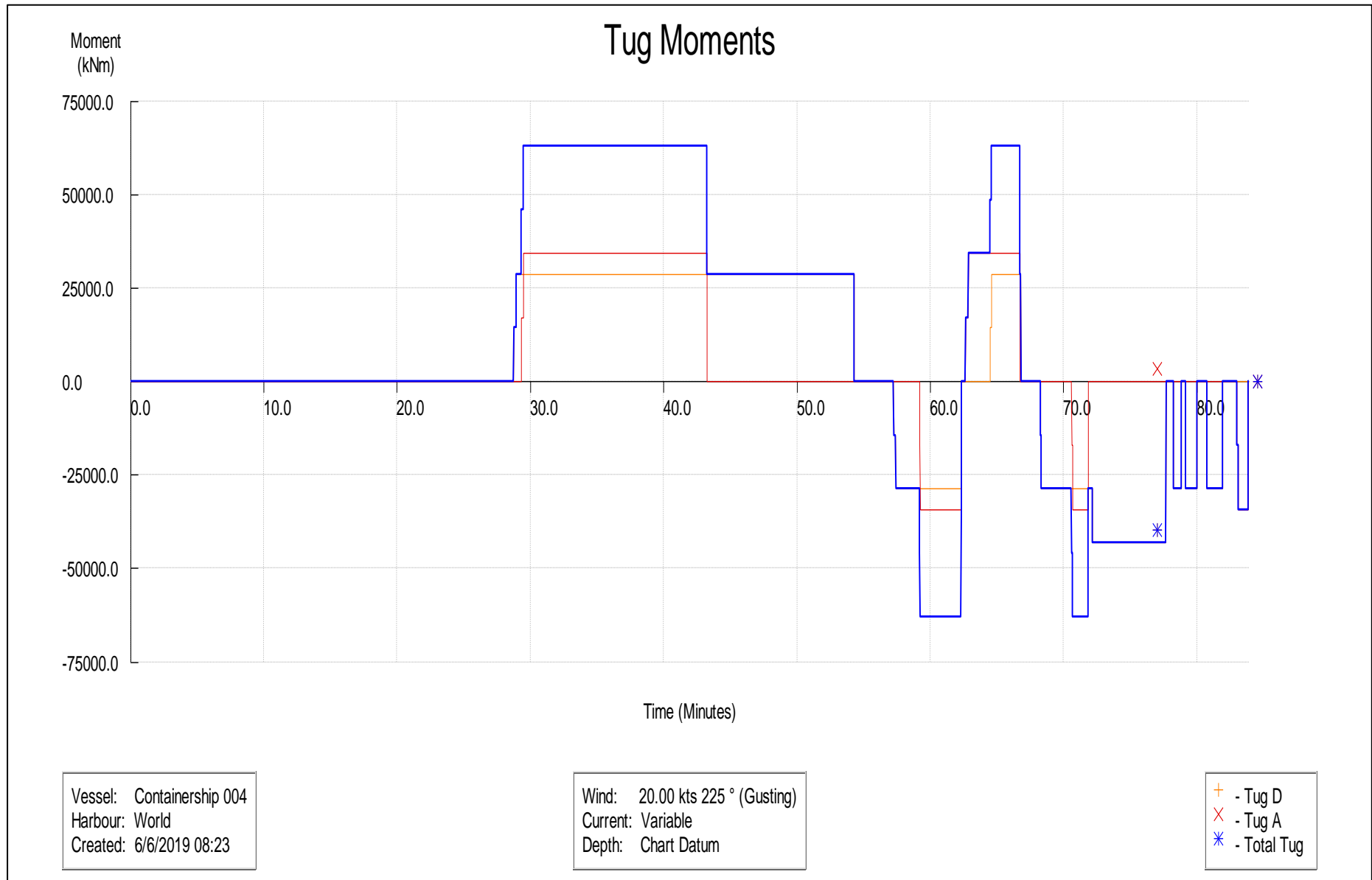
Vessel: Containership 004 (+Tugs)
 Harbour: World
 Created: 6/6/2019 08:23

Wind: 20.00 kts 225 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

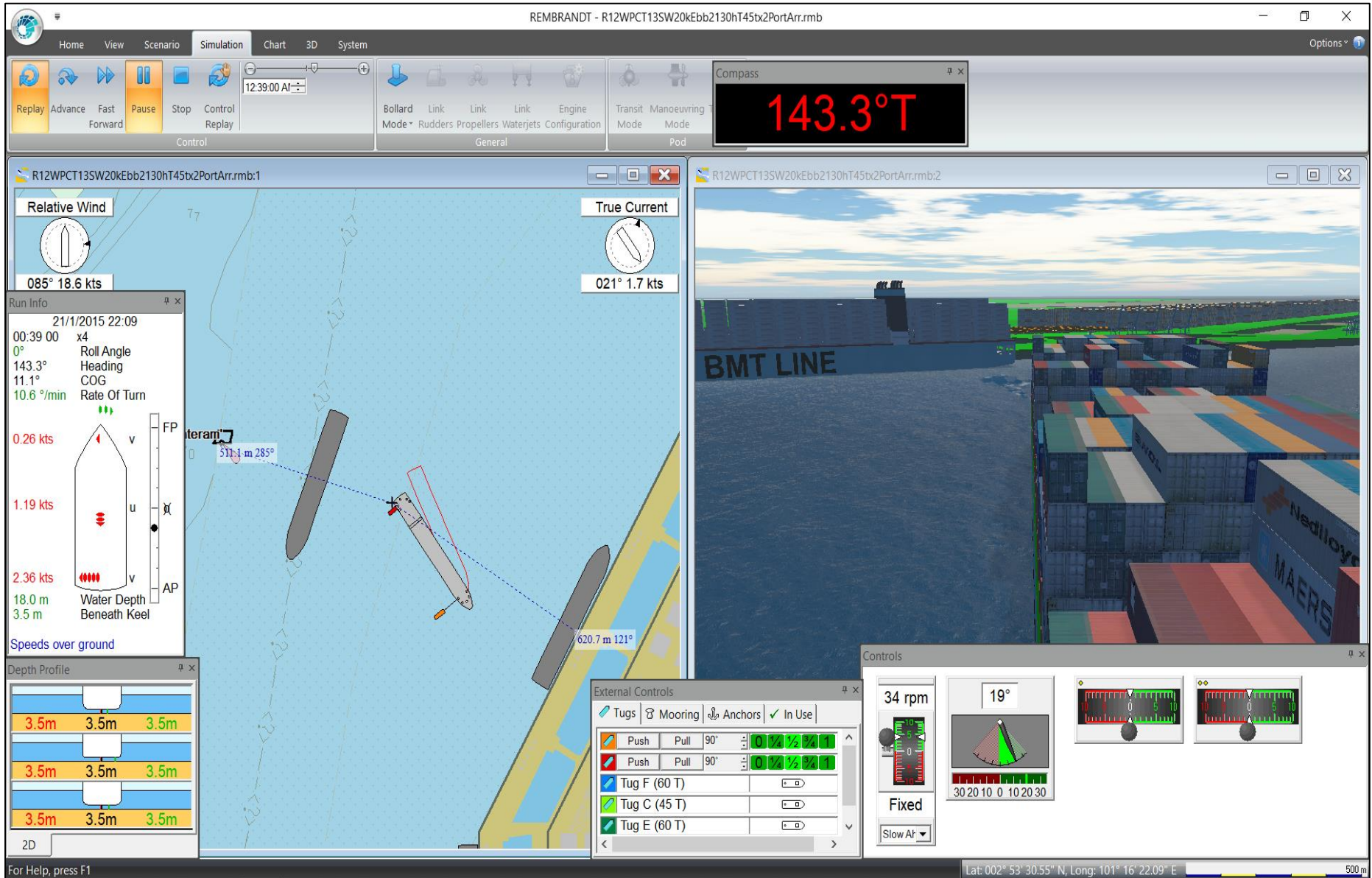
+ - Rudder Rud (°)
 X - Heading







Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
12	R12WPCT13SW20 kEbb2130hT45tx2P ortArr.rmb	Ebb (2130h)	SW 20 k	Arrival (Port a/s)	F: 45t A: 45t	<p>Approaching the channel entrance, the vessel experienced a strong set to port in the ebb current. She was manoeuvred at Half Ahead, closer to the starboard buoys in order to keep clear of the outbound channel. When approaching the berth, the speed was reduced and two 45 tons bollard pull tugs were made fast on the starboard bow and starboard quarter. The tugs assisted in swinging the vessel to starboard. As she swung the vessel closed in on the ship at Berth CT-9. Astern engine was given to create more room for the swing. When the vessel was stemming the current, the approach was made to the berth. When approaching 'knuckle', the forward tug had to operate at Full Power to push the bow against the current.</p> <p>Available channel width: 510m.</p>	4/6



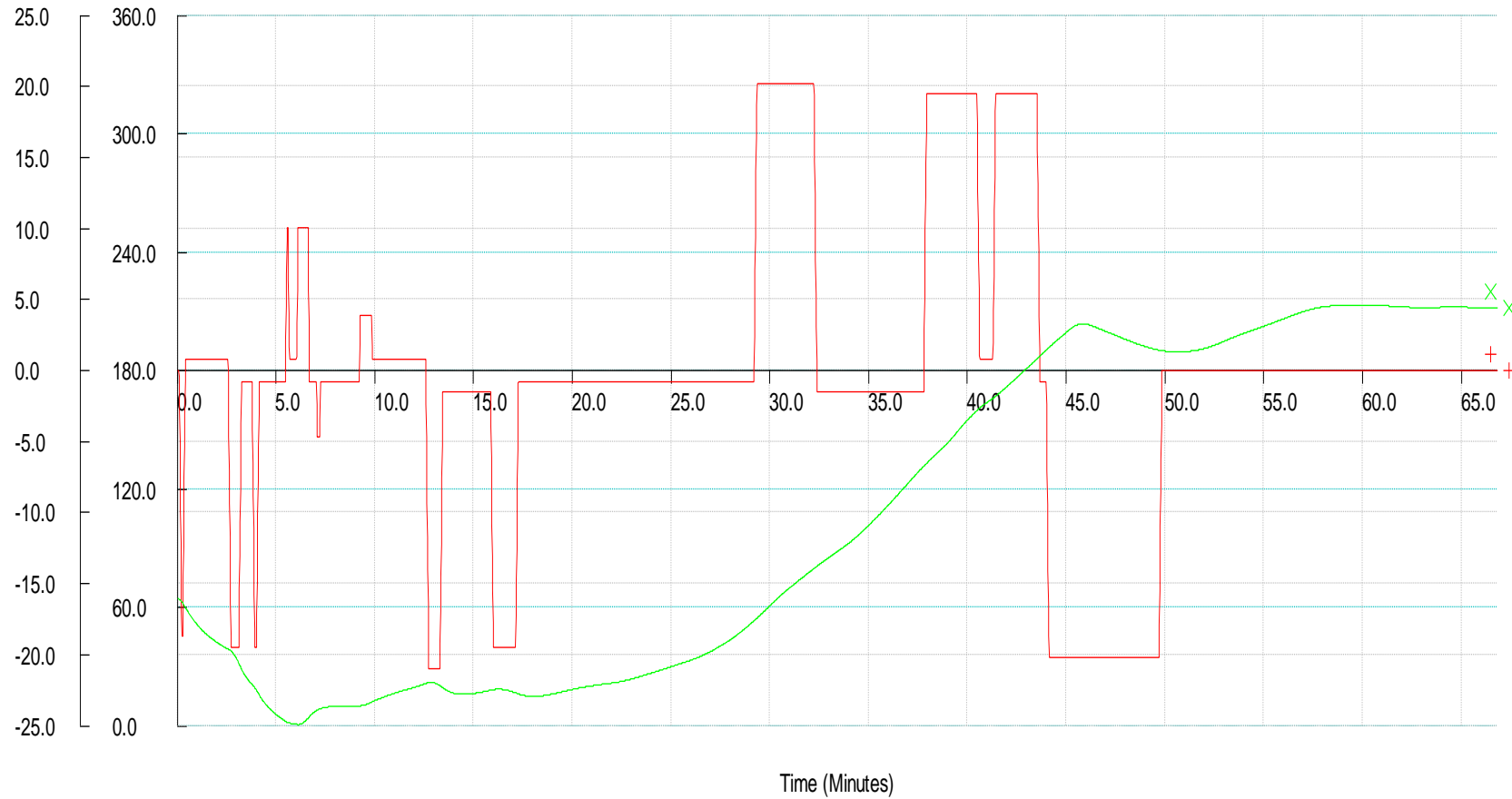
Vessel Track



Vessel: Containership 004
Harbour: World
Created: 12/6/2019 20:11

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

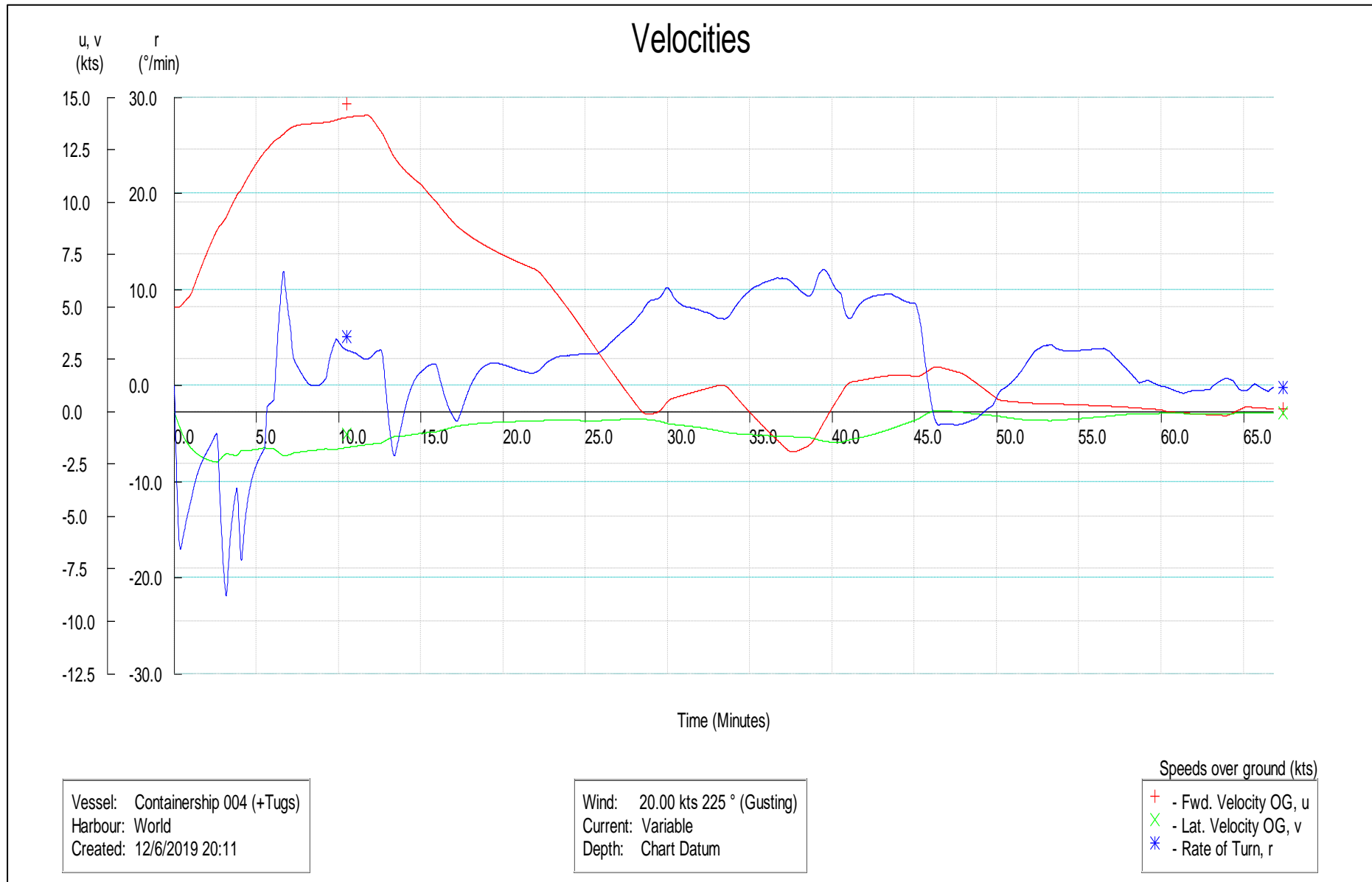
Heading and Rudder

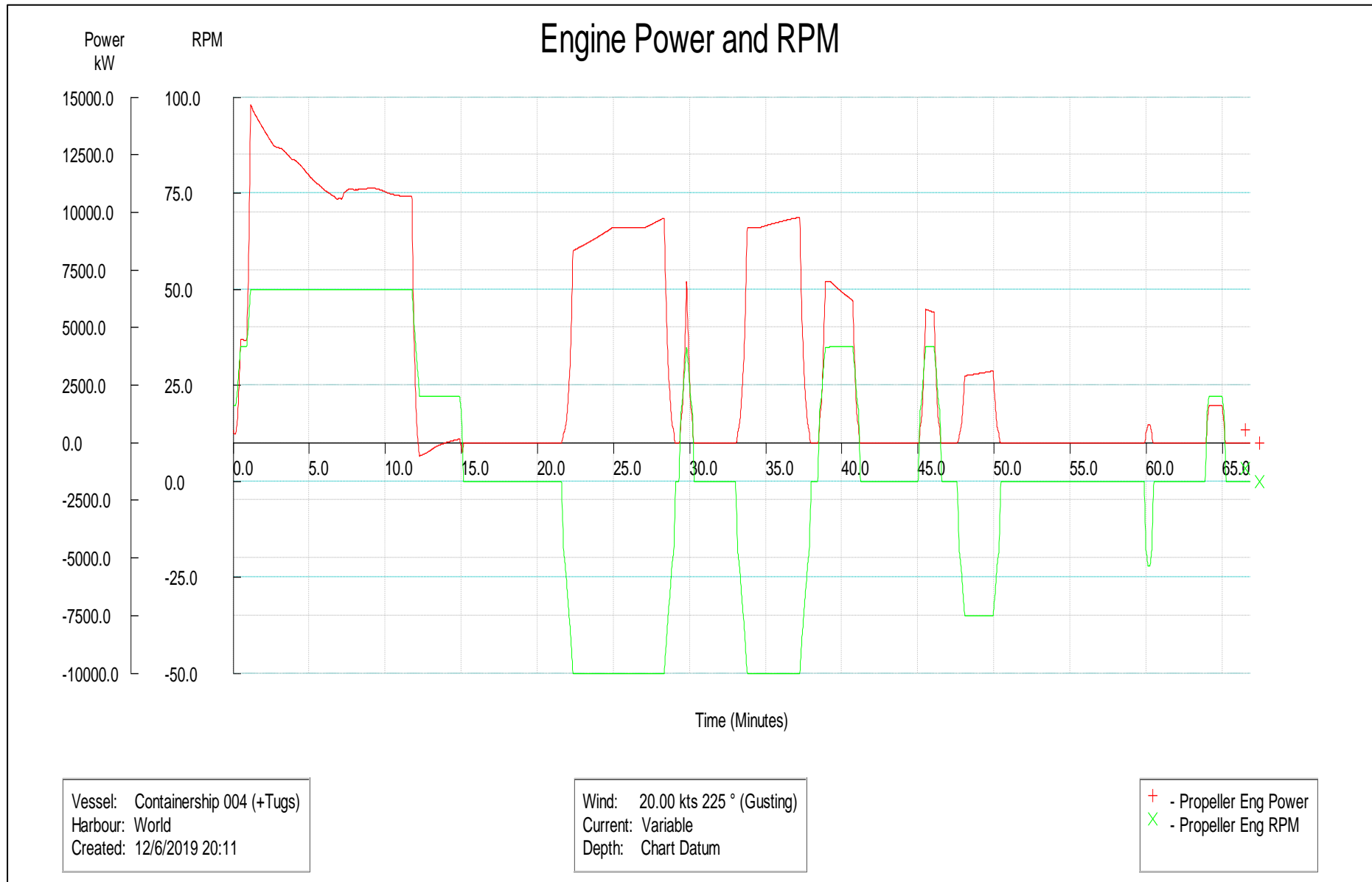


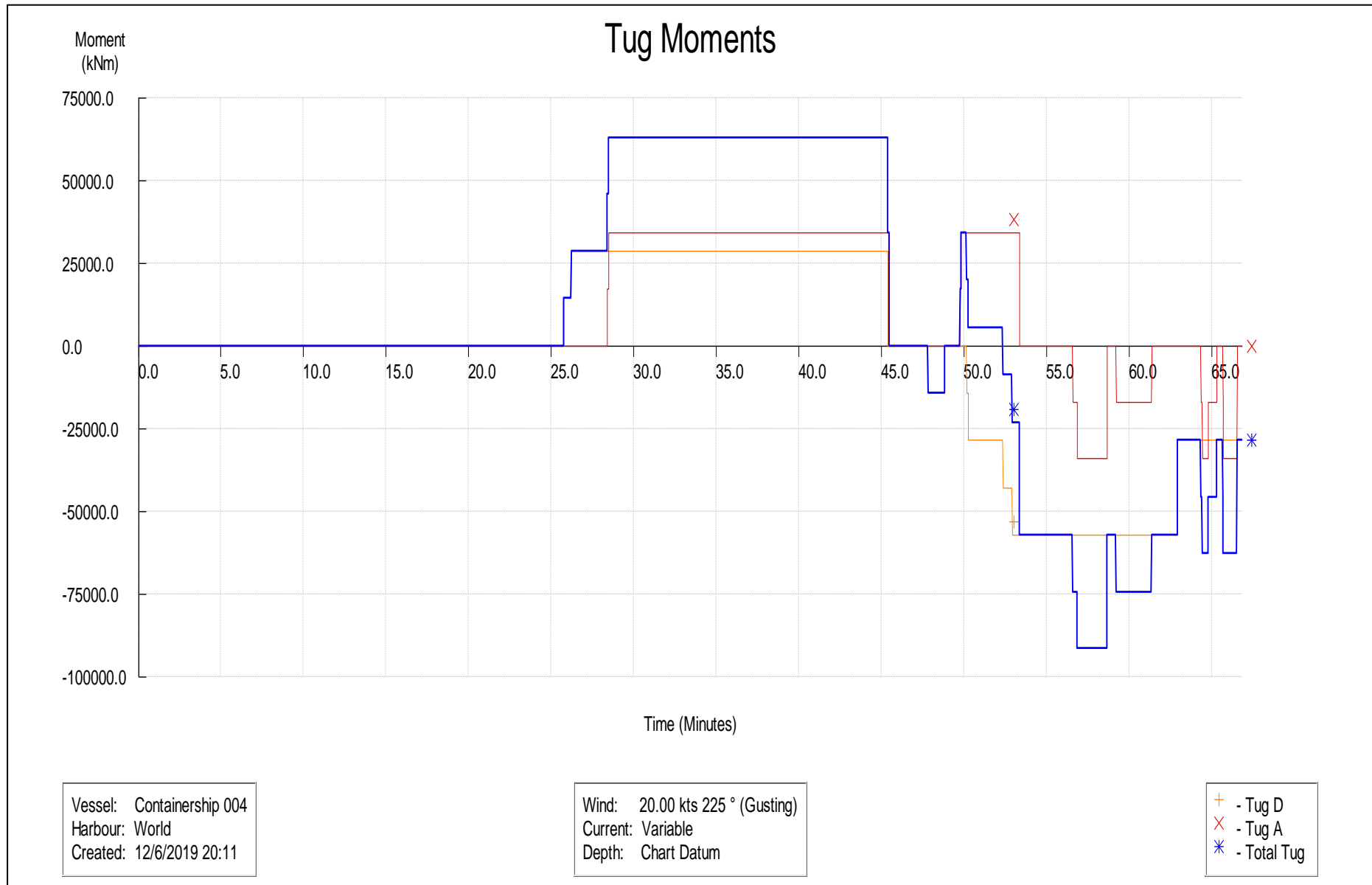
Vessel: Containership 004 (+Tugs)
 Harbour: World
 Created: 12/6/2019 20:11

Wind: 20.00 kts 225 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

+ - Rudder Rud (°)
 x - Heading

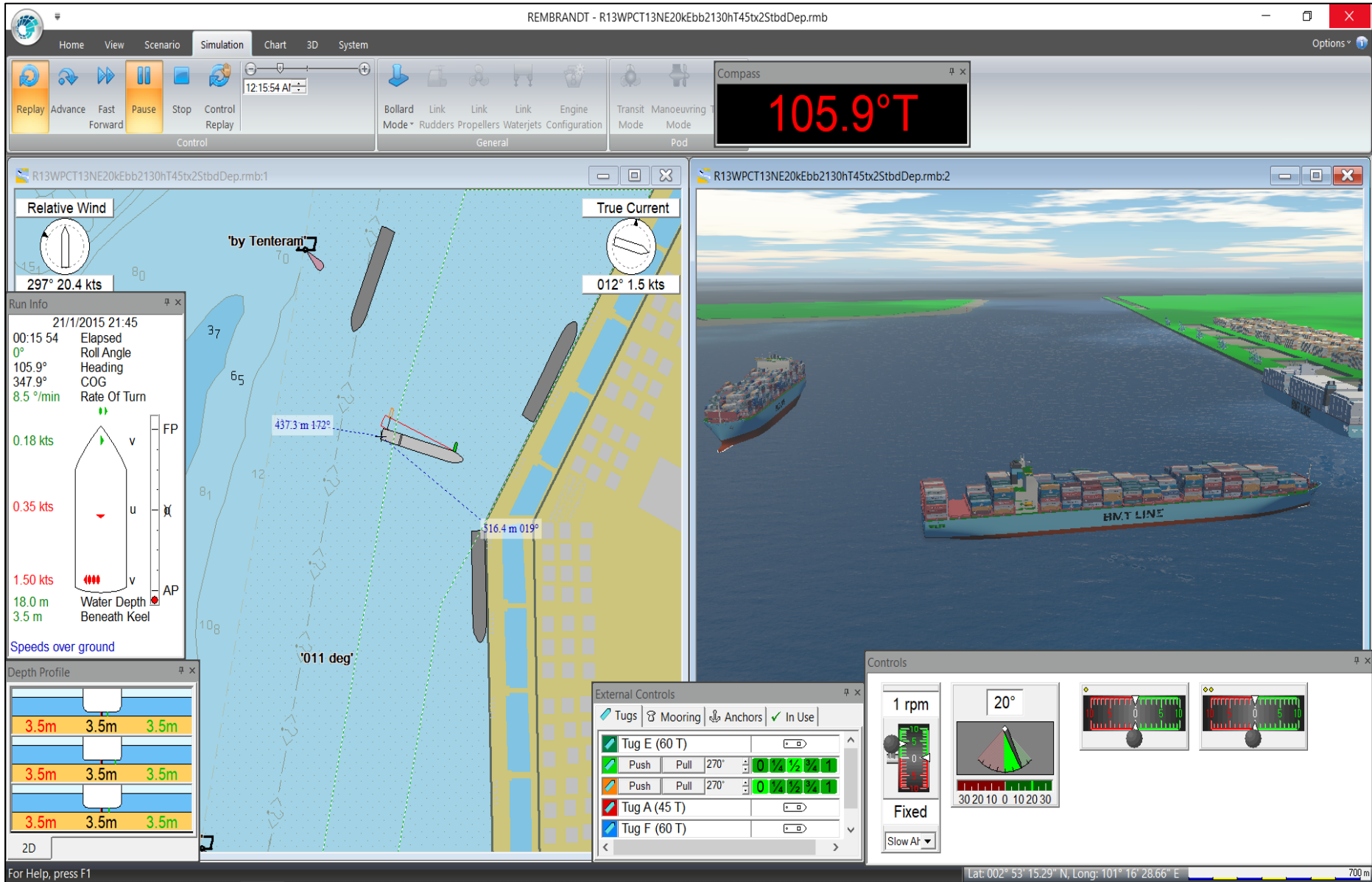




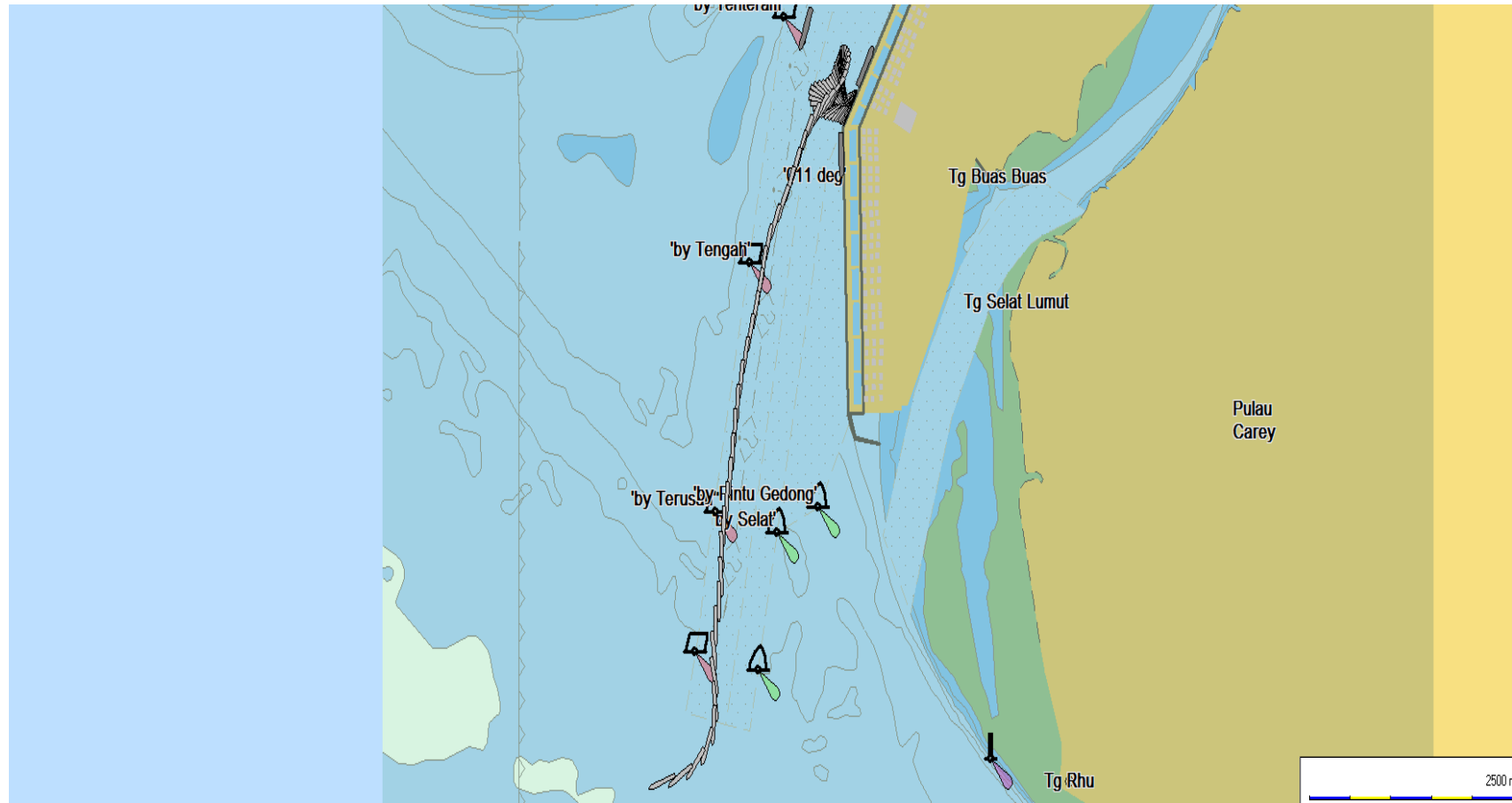


NE 20knots Ebb Departure

Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
13	R13WPCT13NE20 kEbb2130hT45x2S tbdDep.rmb	Ebb (2130h)	NE 20 k	Dep (Stbd a/s)	F: 45t A: 45t	<p>The vessel was pulled off the berth using two 45 tons bollard pull tugs and swung to starboard. The stronger midstream current helped to swing the stern around and the swing was completed after about 40 minutes and the vessel proceeded to sea at Slow Ahead after letting go the tugs. With a speed of about 7 knots a strong set to starboard was experienced after passing the Terusan Buoy. The heading was adjusted to between 175 and 180 degrees to counter the set and clear the channel safely. It is not recommended for two large deep drafted vessels to pass each other at the entrance of the channel under such environmental conditions.</p> <p>Minimum available channel width: 435m</p>	3/6



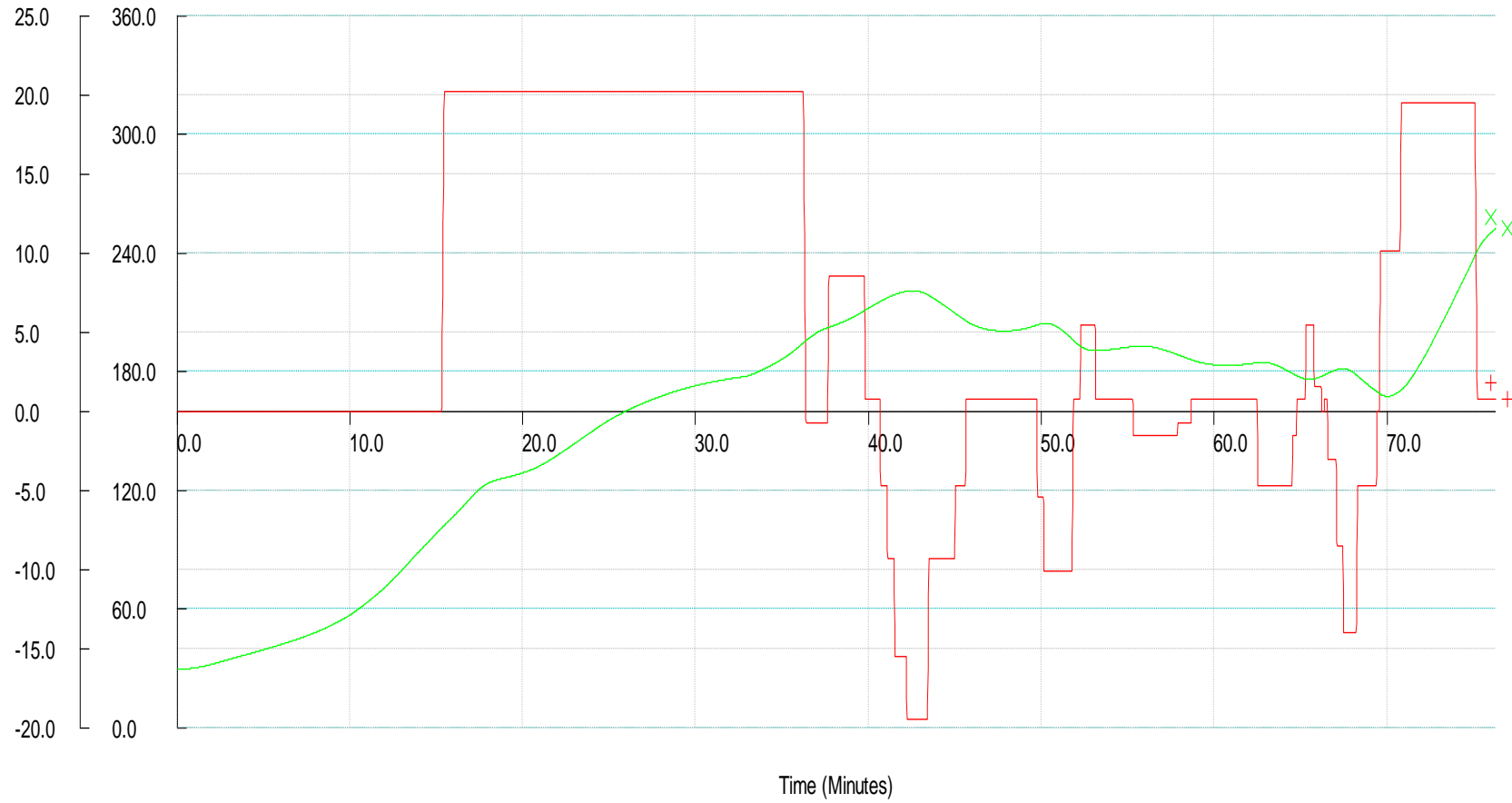
Vessel Track



Vessel: Containership 004
Harbour: World
Created: 5/6/2019 05:14

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

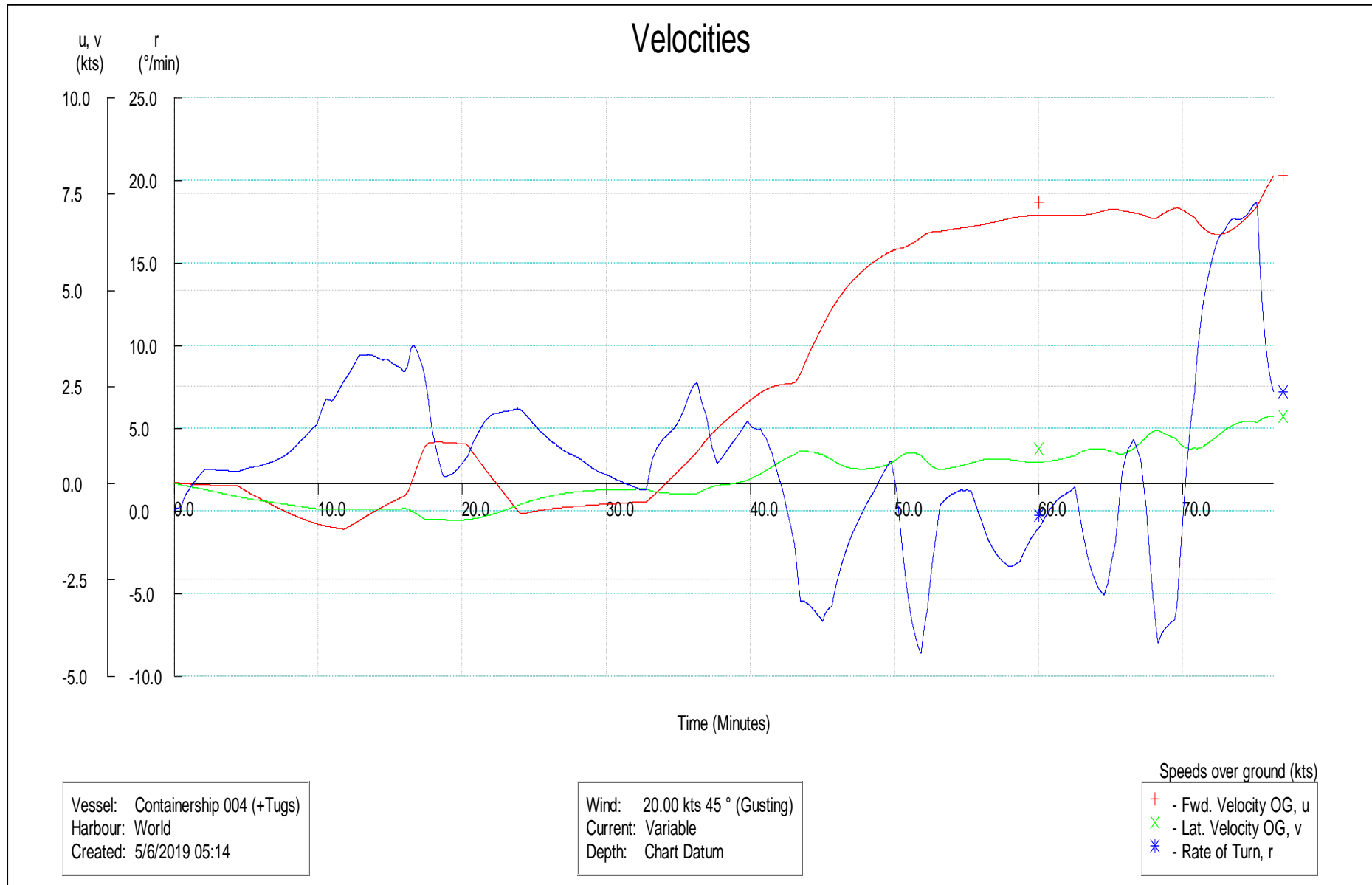
Heading and Rudder

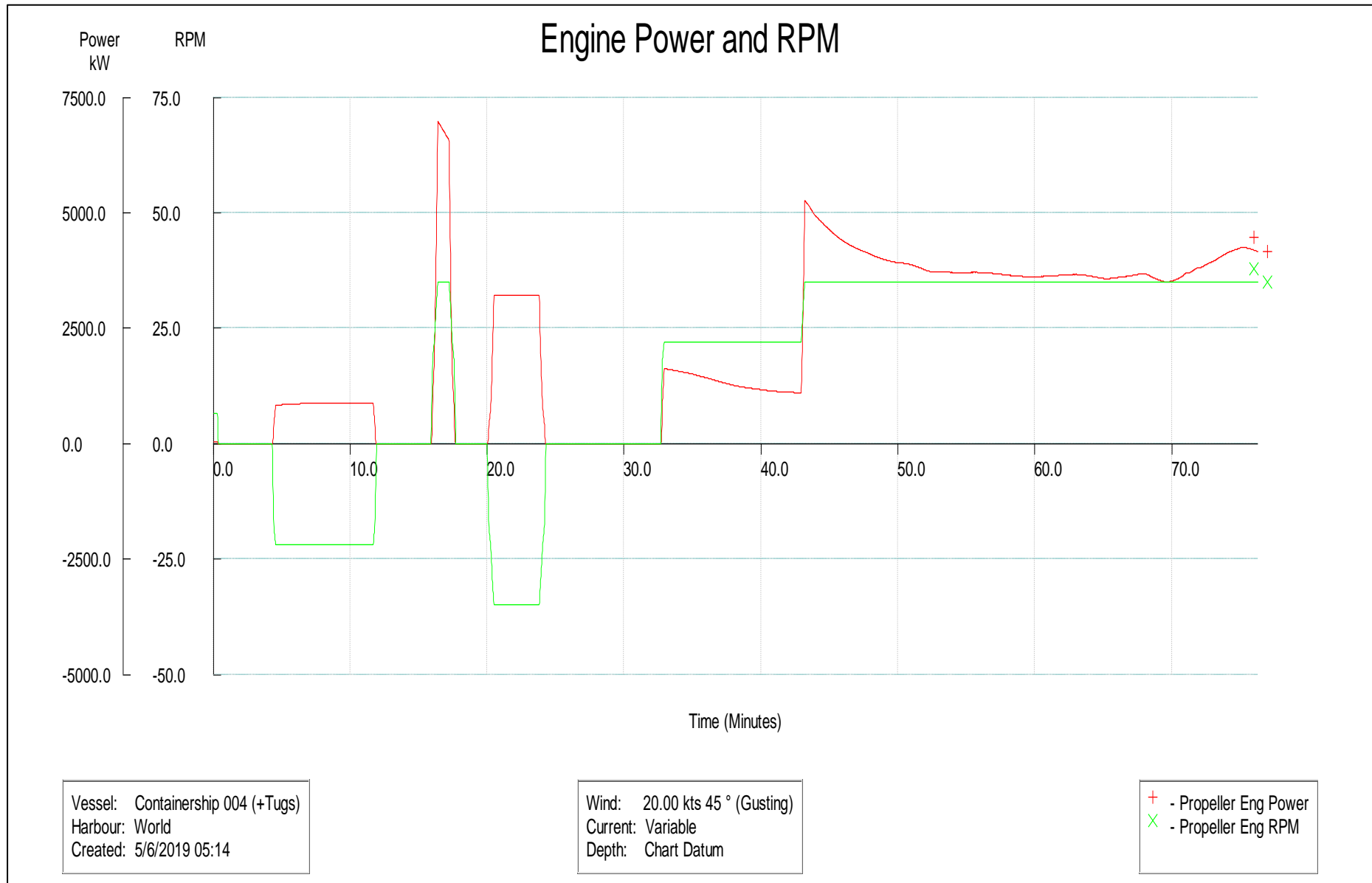


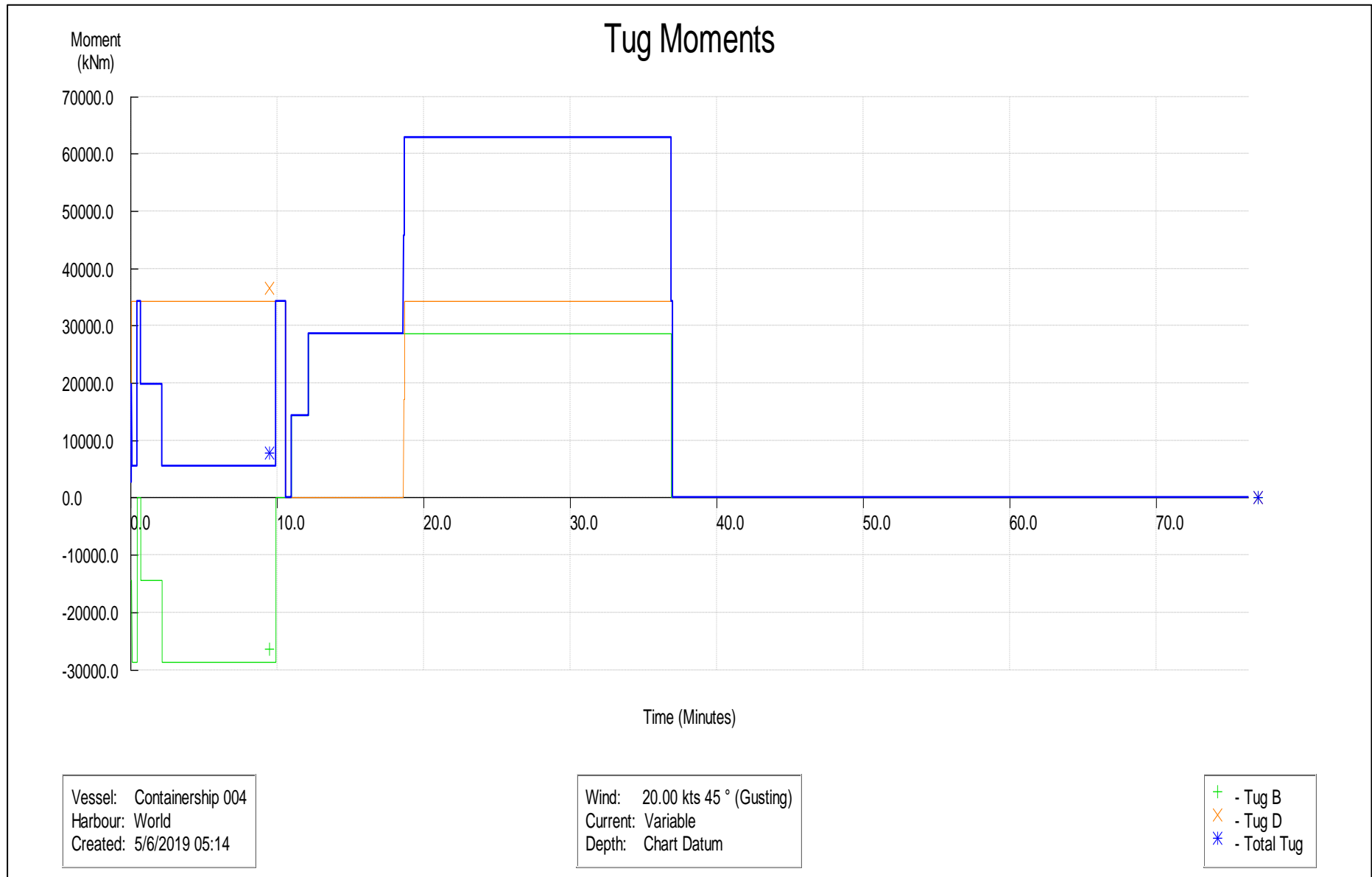
Vessel: Containership 004 (+Tugs)
 Harbour: World
 Created: 5/6/2019 05:14

Wind: 20.00 kts 45 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

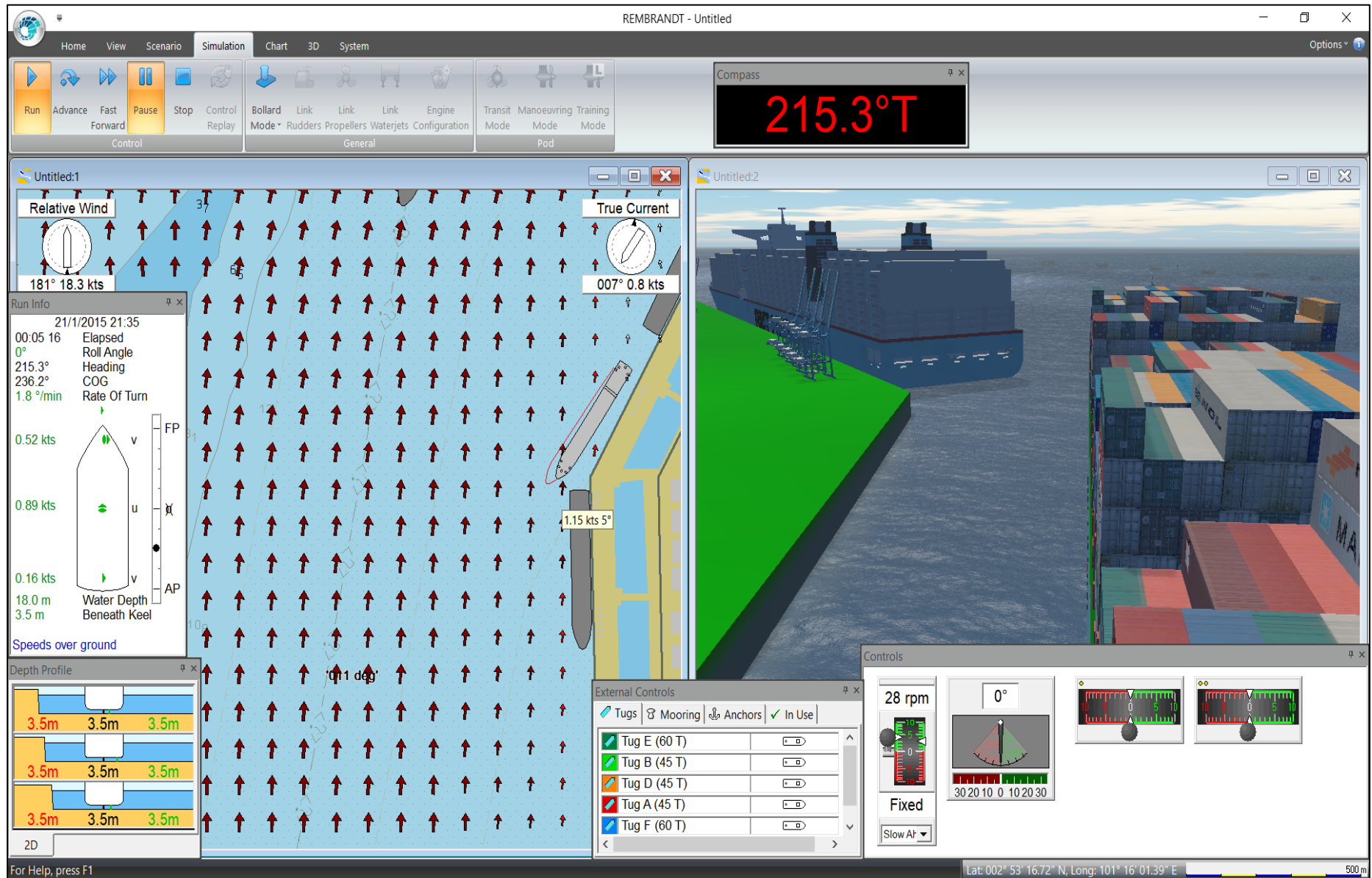
+ - Rudder Rud (°)
 x - Heading



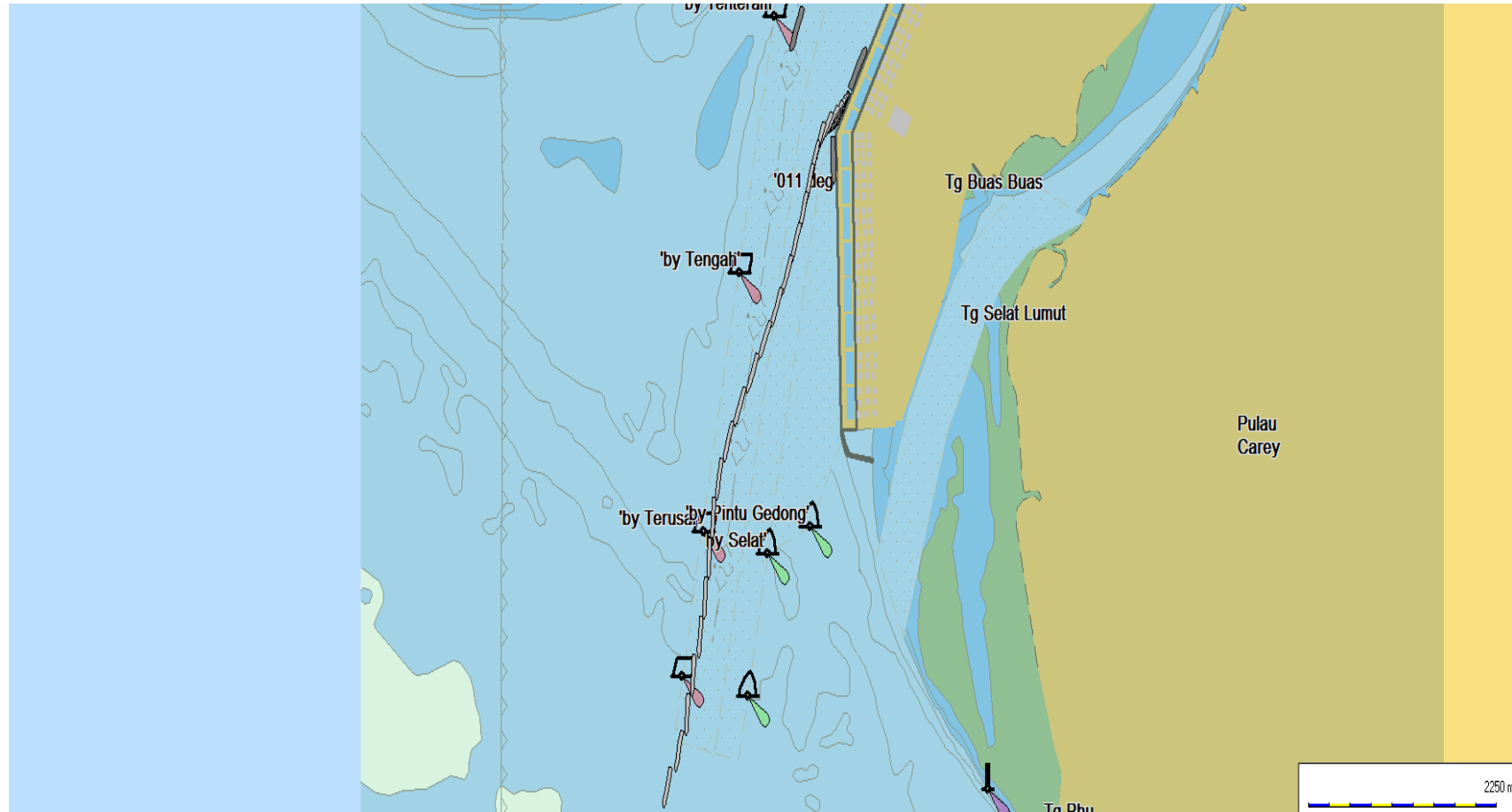




Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
14	R14WPCT13NE20 kEbb2130hT45tx2P ortDep.rmb	Ebb (2130h)	NE 20 k	Dep (Port a/s)	F: 45t A: 45t	The vessel was pulled off the berth using two 45 tons bollard pull tugs. The NE wind on the port side and the current off the 'knuckle' helped to push the vessel off the berth and bow to starboard. When off the berth, it was decoded to merge into the South Channel at a small angle. This reduced the angle to the Ebb current and provided more control in the outbound passage. It also allows other vessels using the channel to move with less hinderance.	3/6



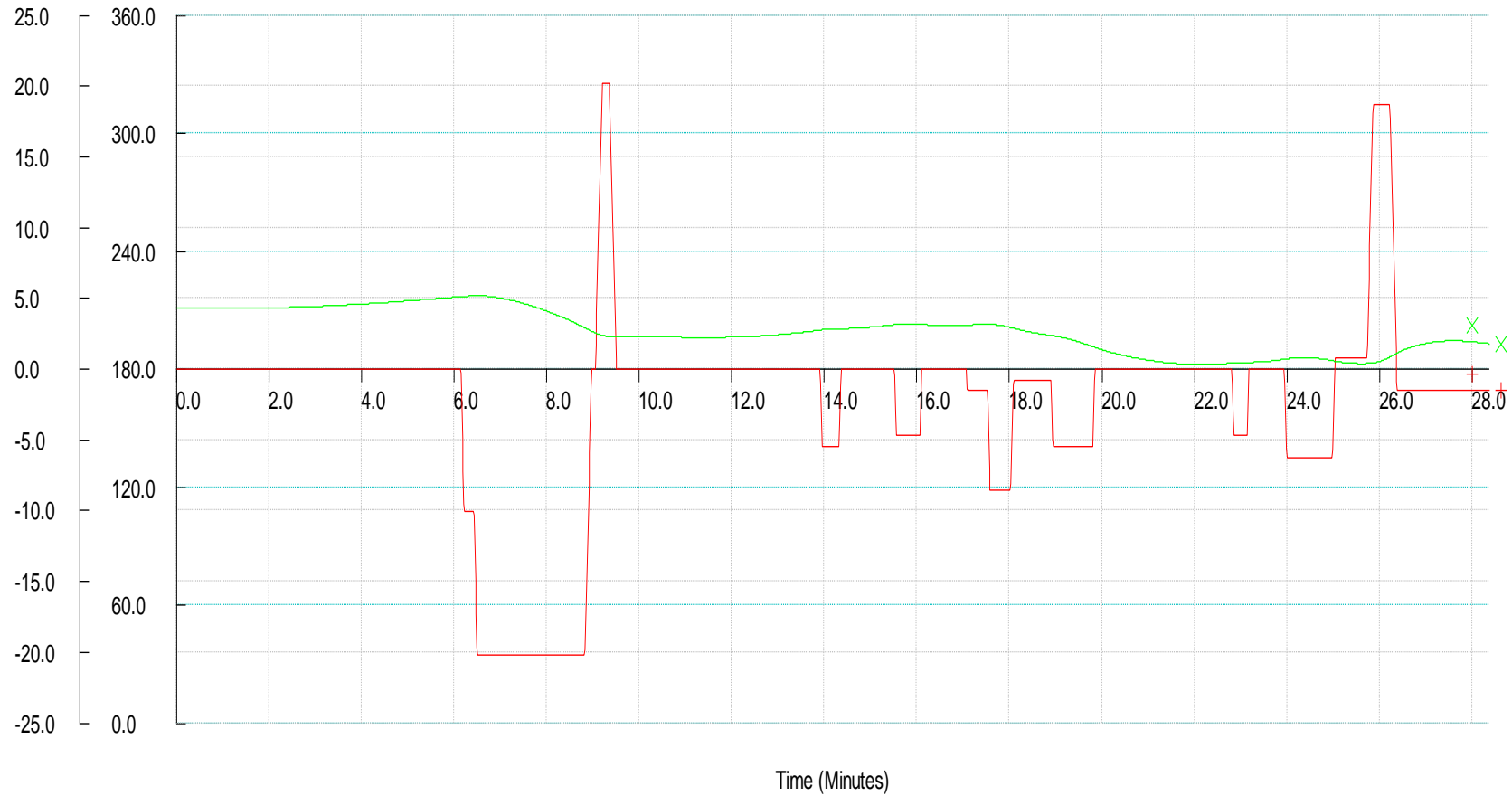
Vessel Track



Vessel: Containership 004
Harbour: World
Created: 14/6/2019 10:30

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

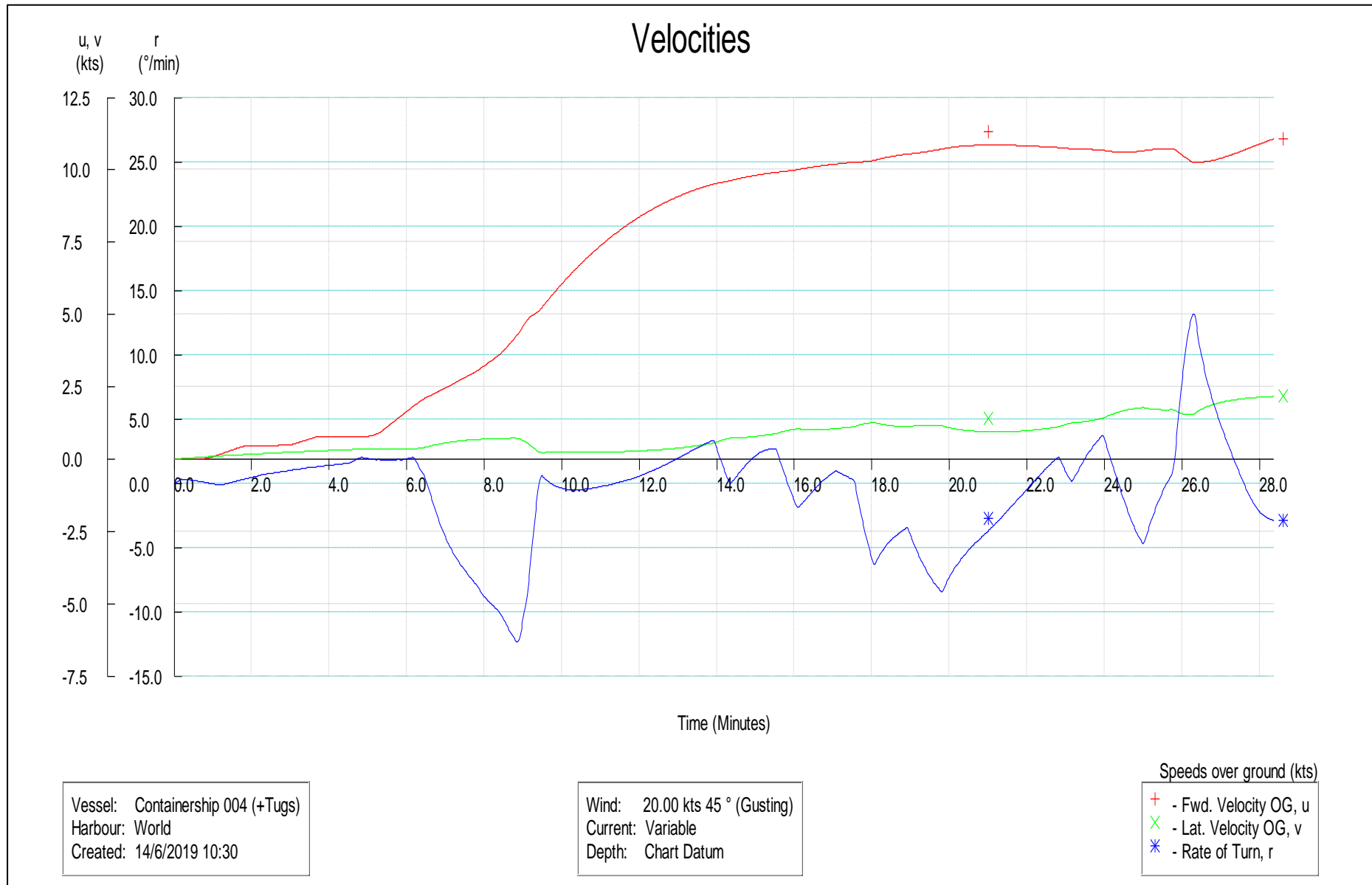
Heading and Rudder

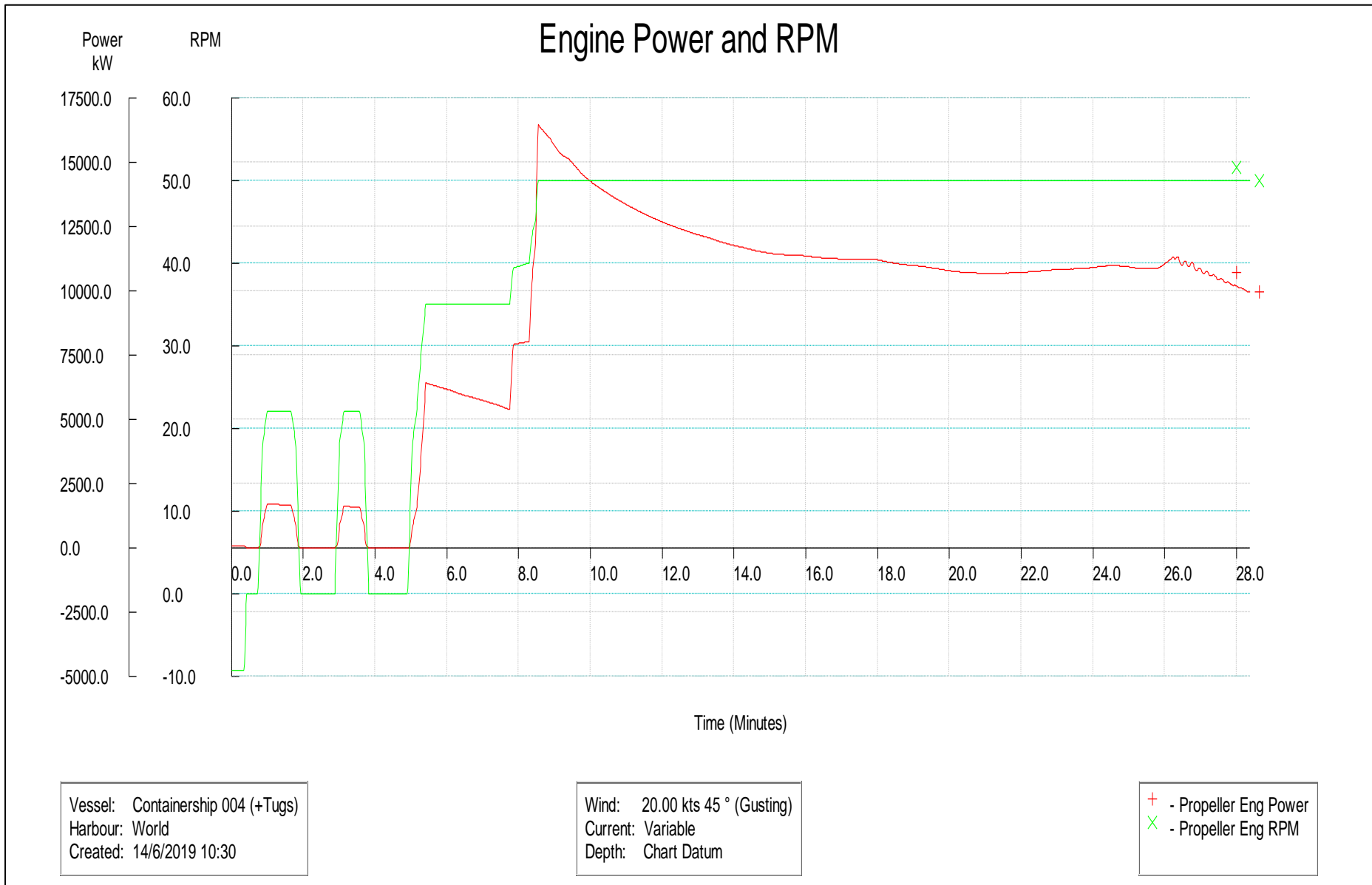


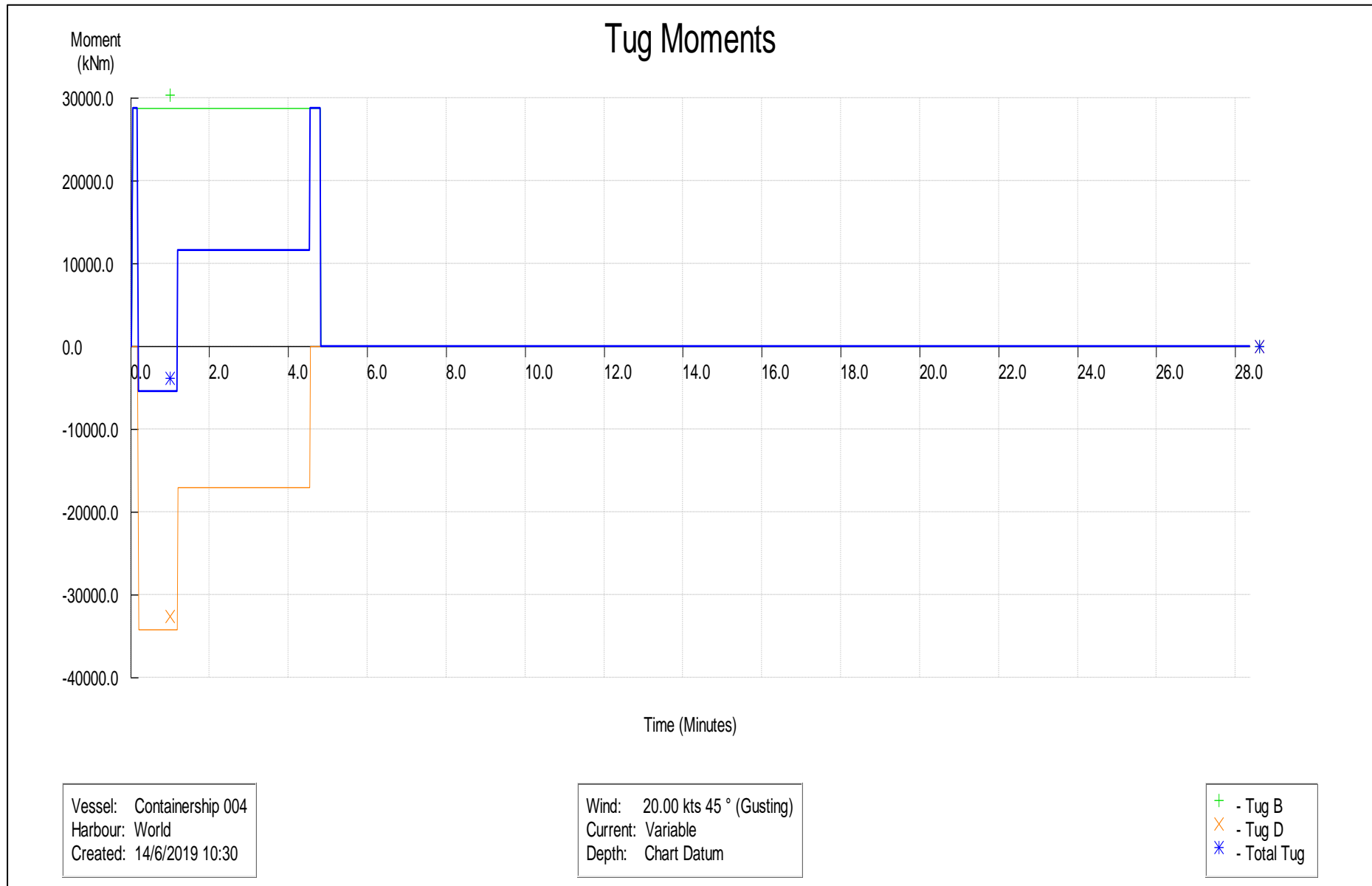
Vessel: Containership 004 (+Tugs)
 Harbour: World
 Created: 14/6/2019 10:30

Wind: 20.00 kts 45 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

+ - Rudder Rud (°)
 x - Heading

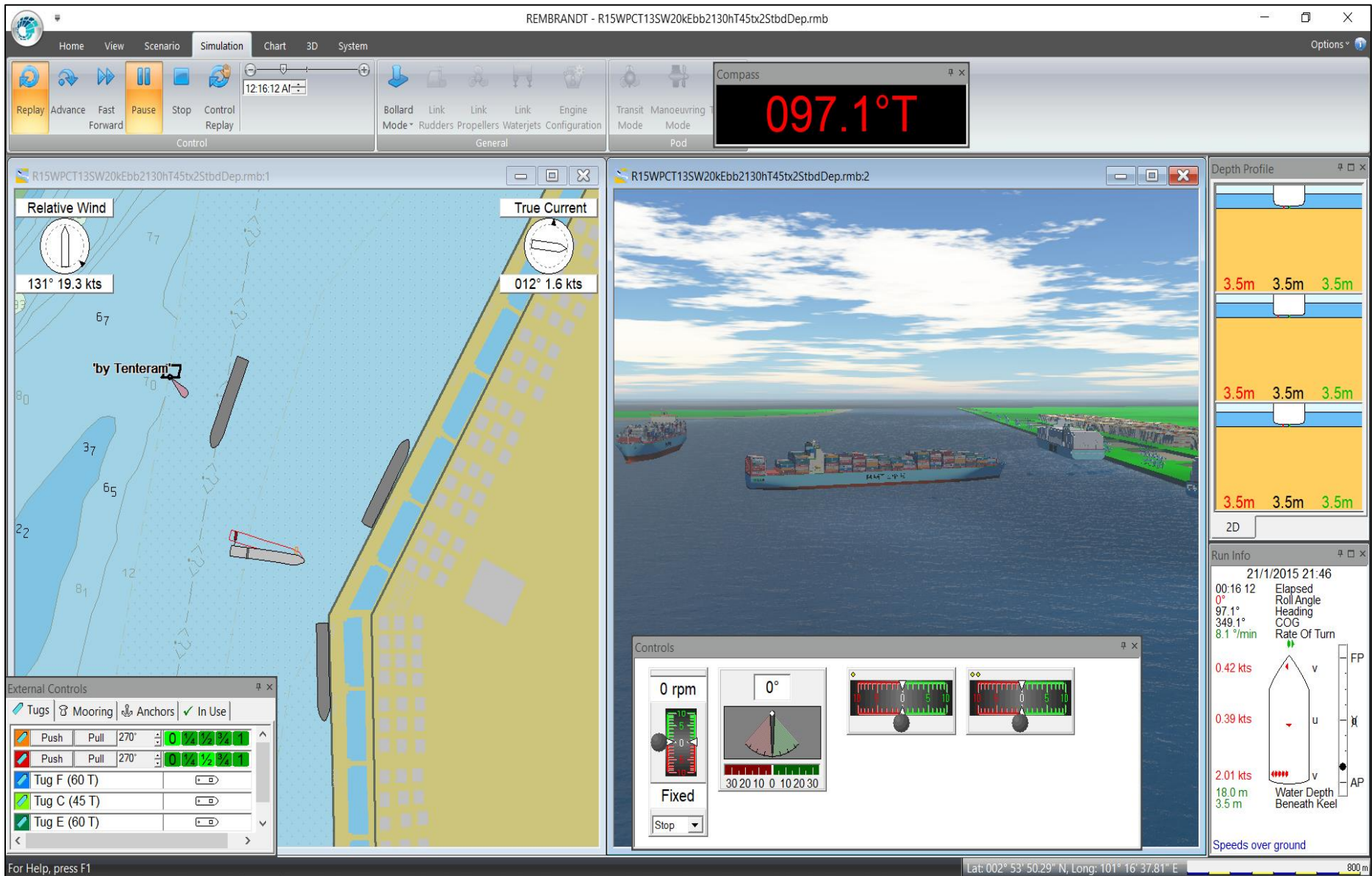


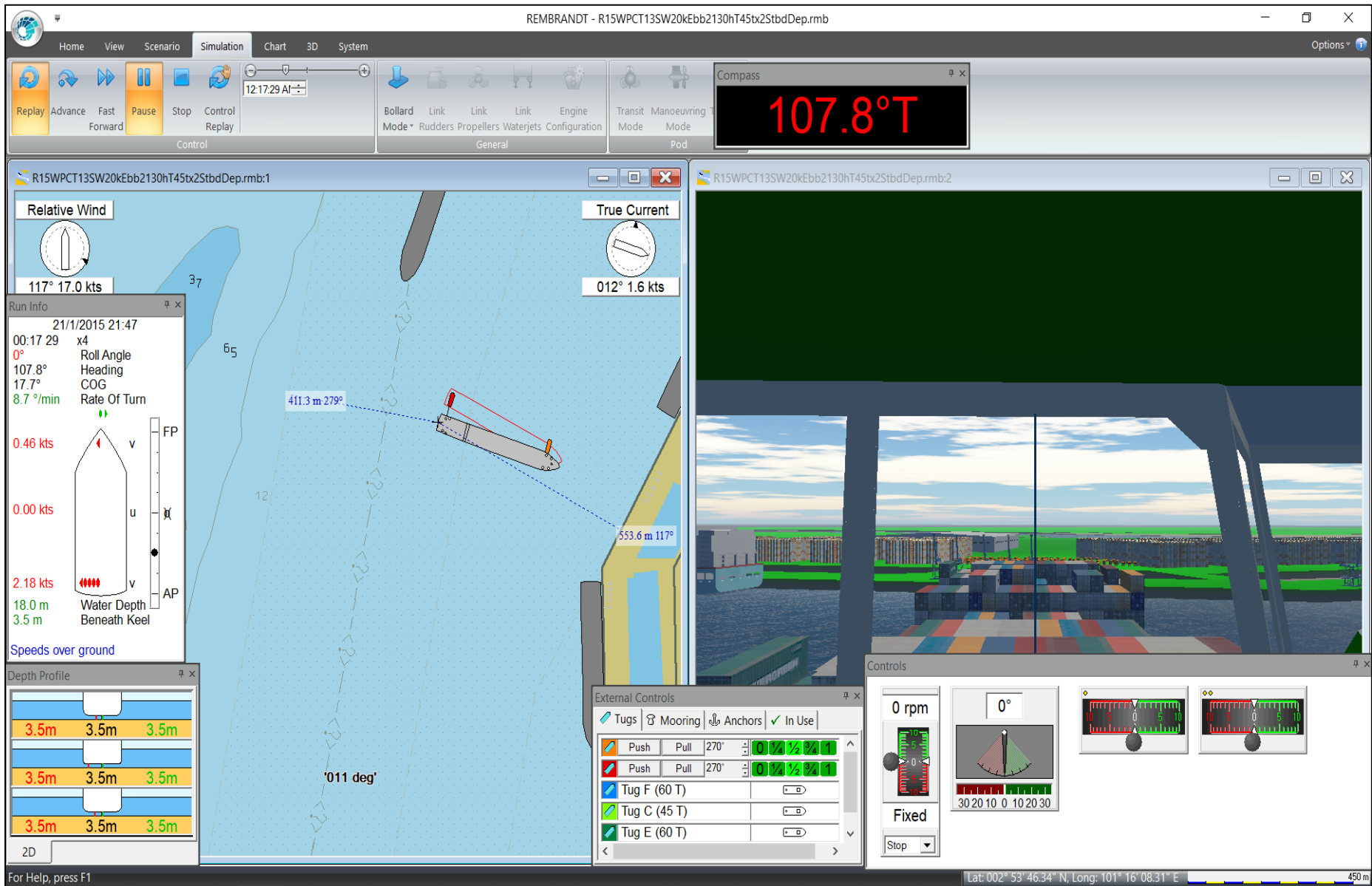




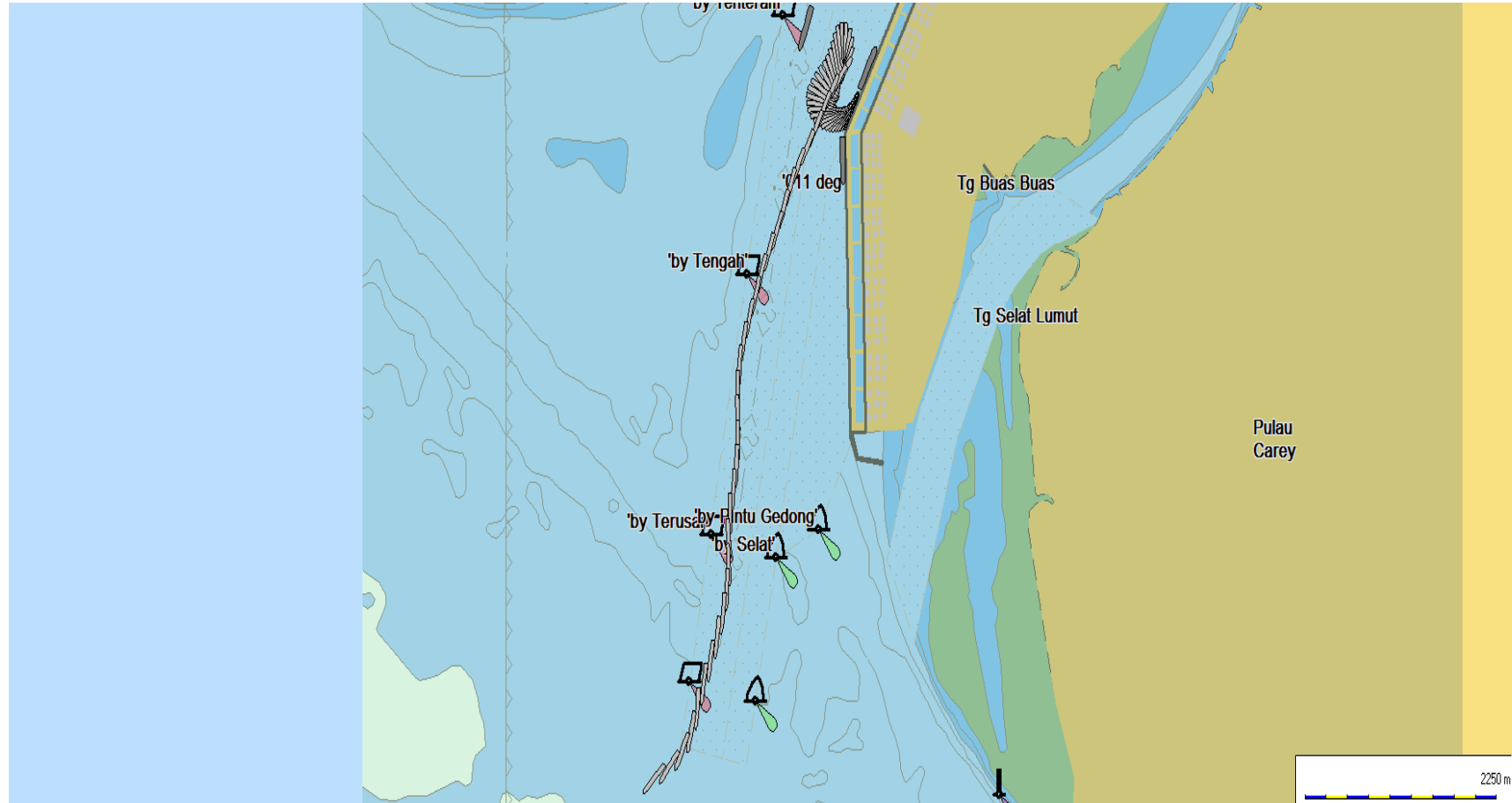
SW 20 knots Ebb Departure

Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
15	R15WPCT13SW20 kEbb2130hT45x2S tbdDep.rmb	Ebb (2130h)	SW 20 k	Dep (Stbd a/s)	F: 45t A: 45t	<p>The vessel was pulled off the berth using two 45 tons bollard pull tugs and swung to starboard. The current and the wind helped to swing the stern around but also caused the vessel to set bodily to port. The tugs, together with helm and engine was then used to complete the swing before heading to sea. and the swing was completed in about 35 minutes and the vessel proceeded to sea at Slow Ahead after letting go the tugs. With a speed of about 7 knots a strong set to starboard was experienced after passing the Terusan Buoy. The heading was adjusted to between 175 and 180 degrees to counter the set and clear the channel safely. It is prudent to back astern after unberthing in order to allow more room for the set.</p> <p>Available channel width: 410m</p>	3/6



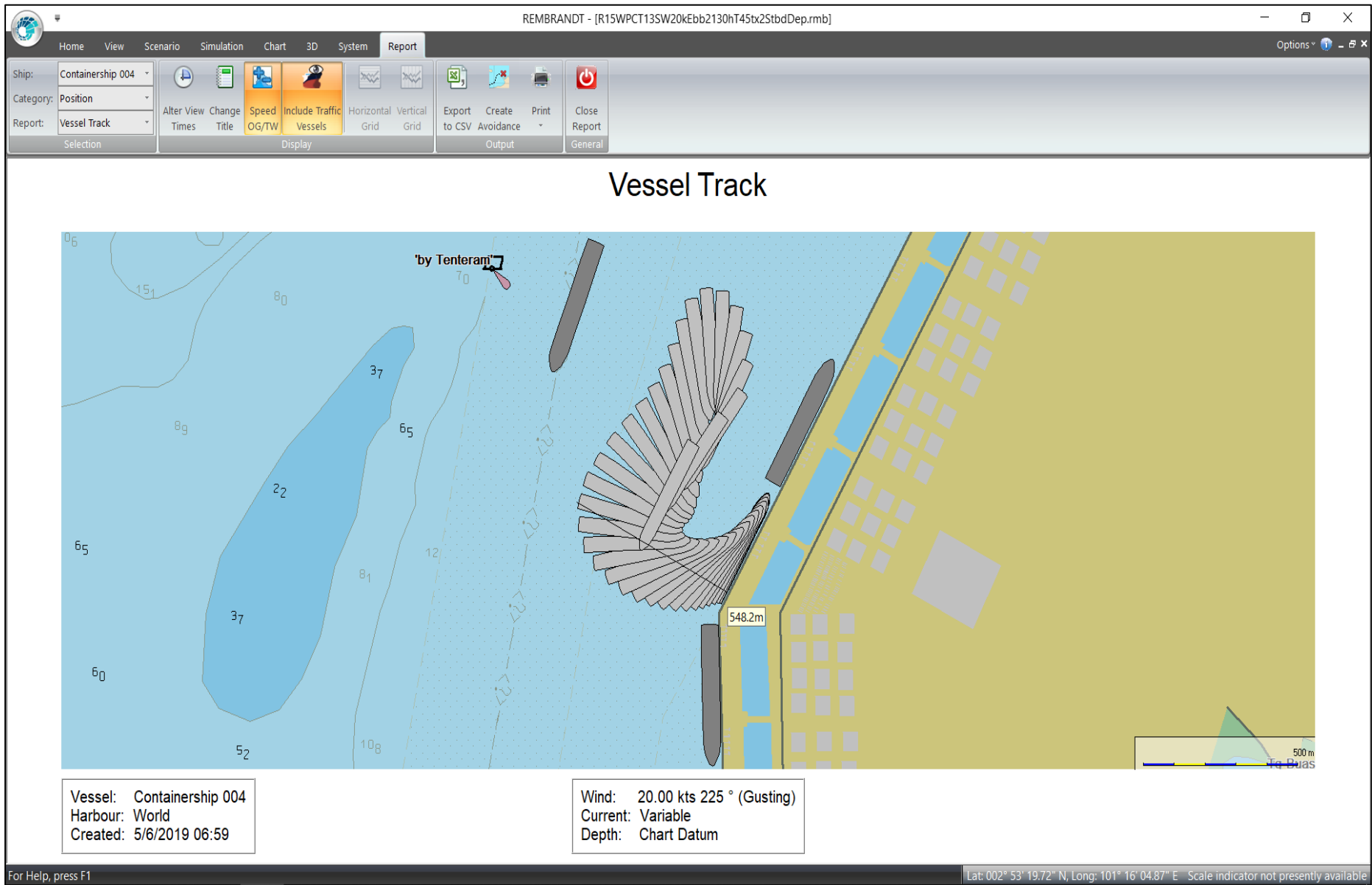


Vessel Track

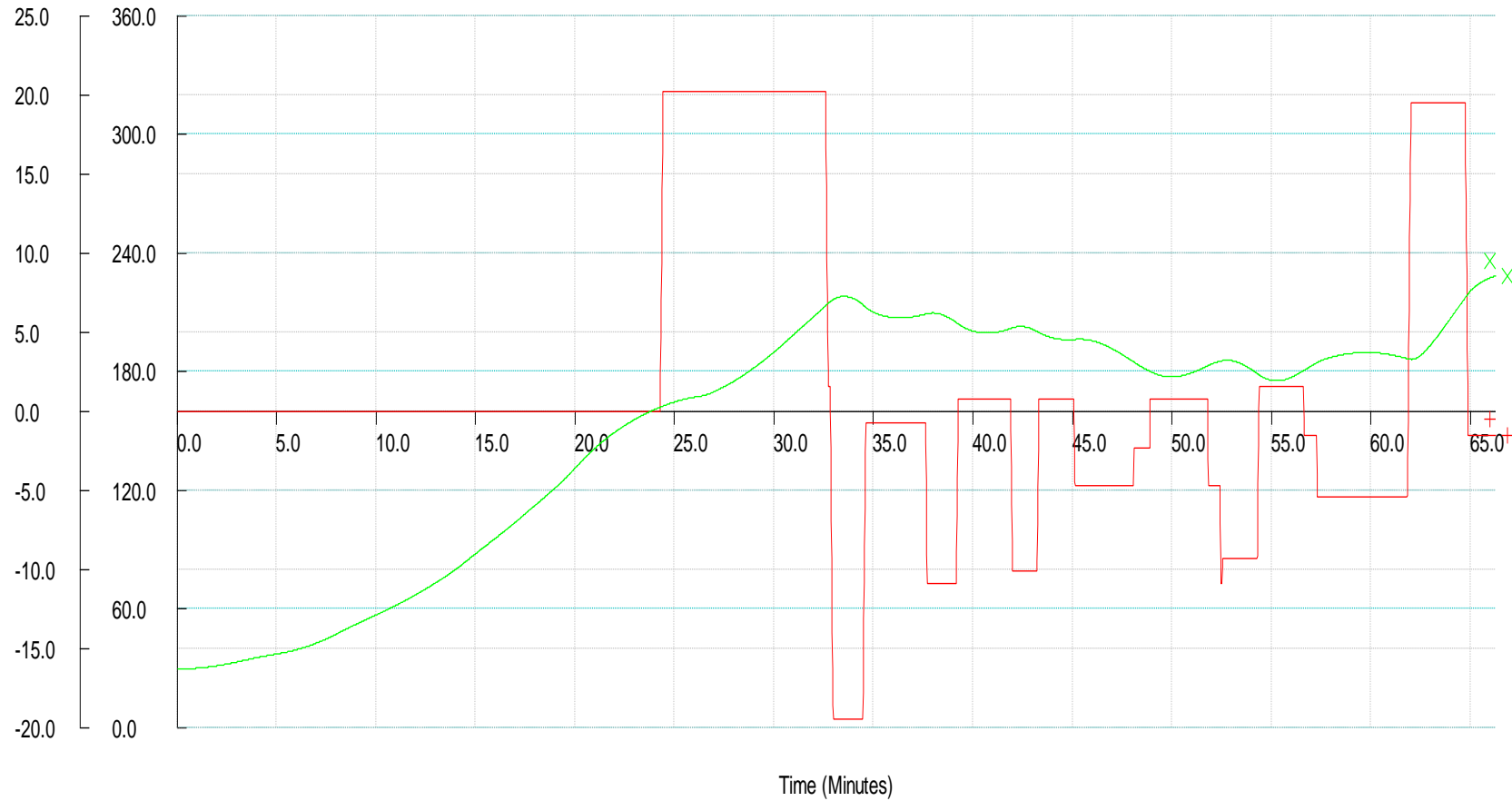


Vessel: Containership 004
Harbour: World
Created: 5/6/2019 14:06

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum



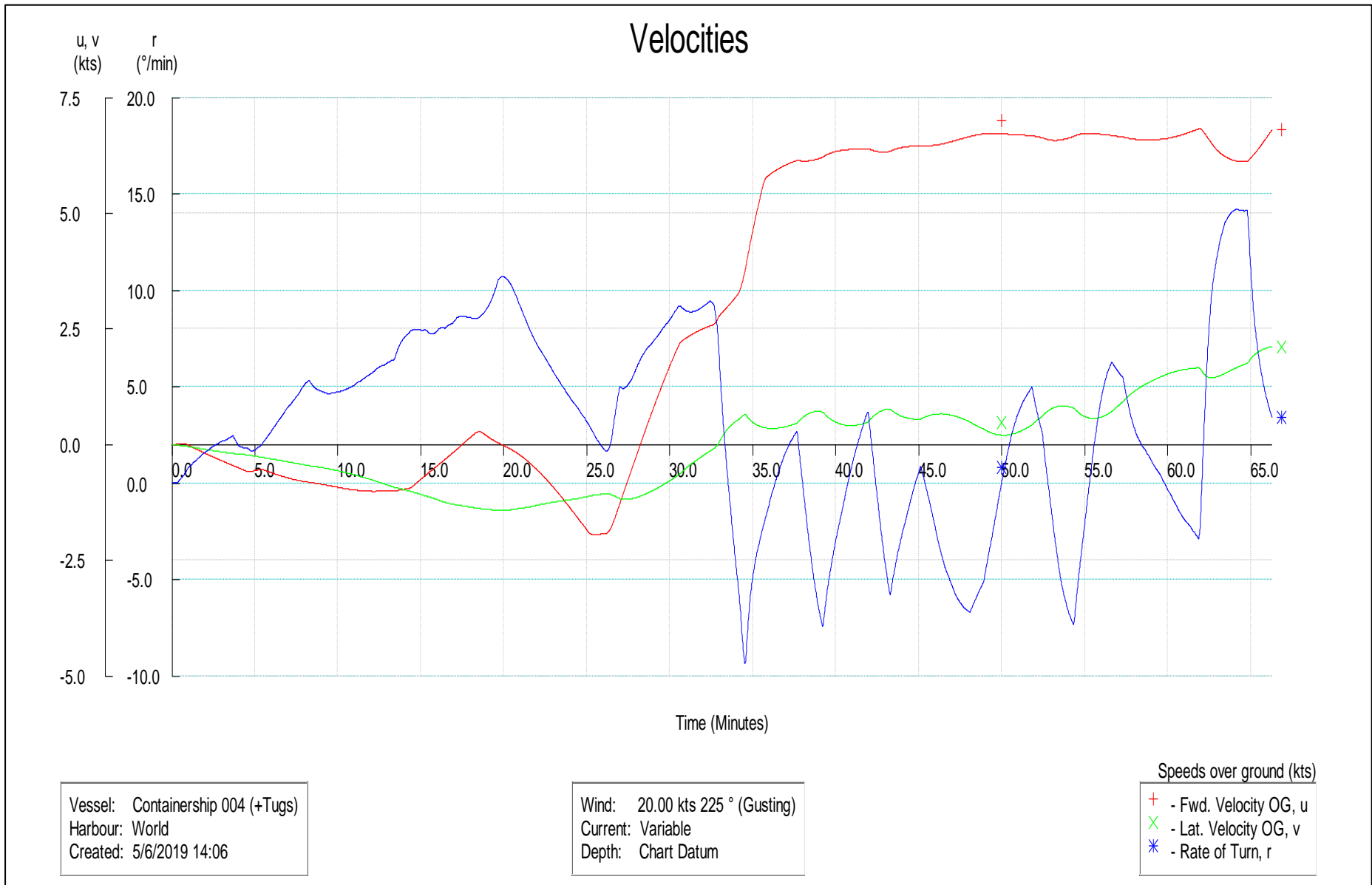
Heading and Rudder

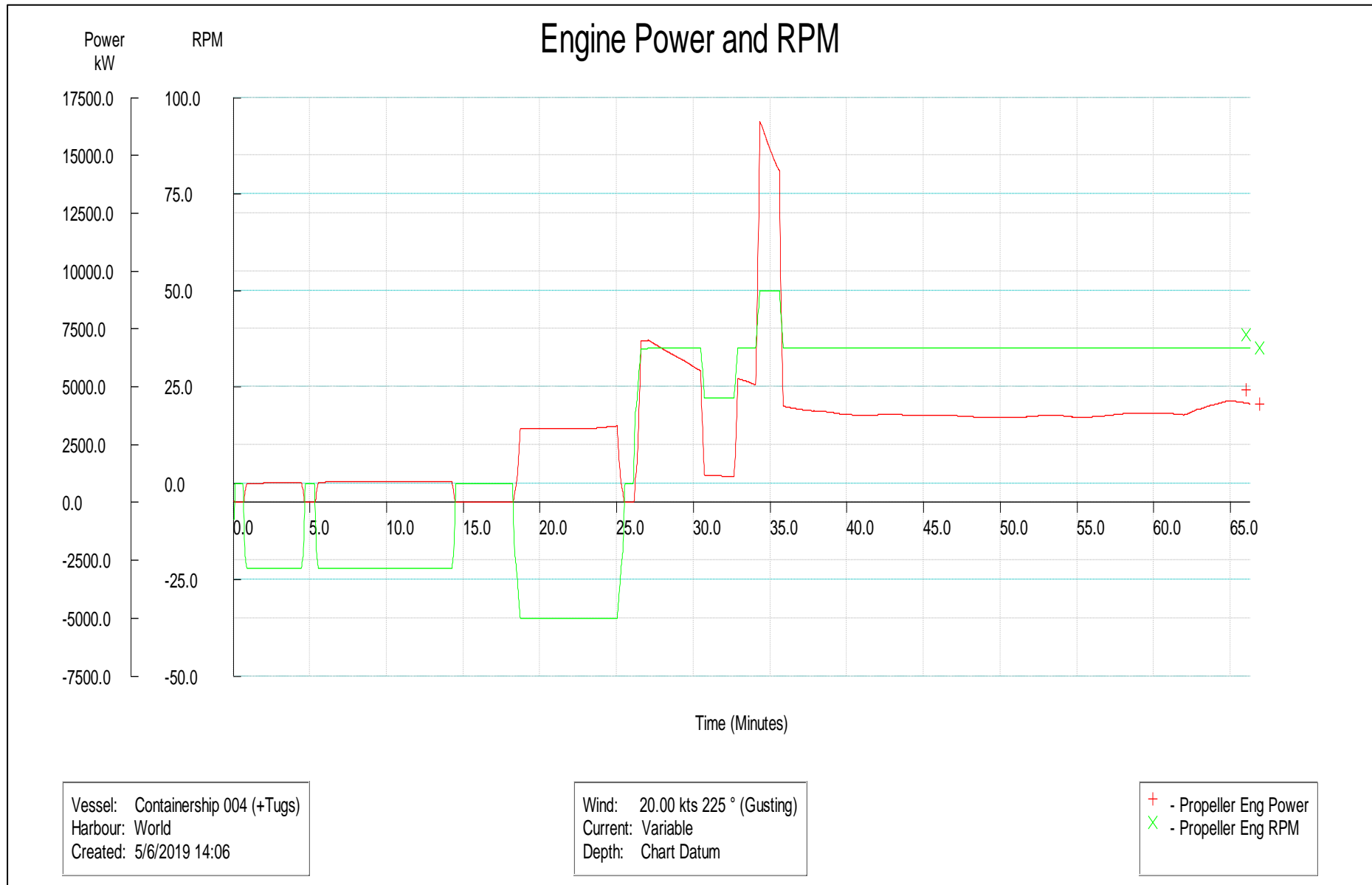


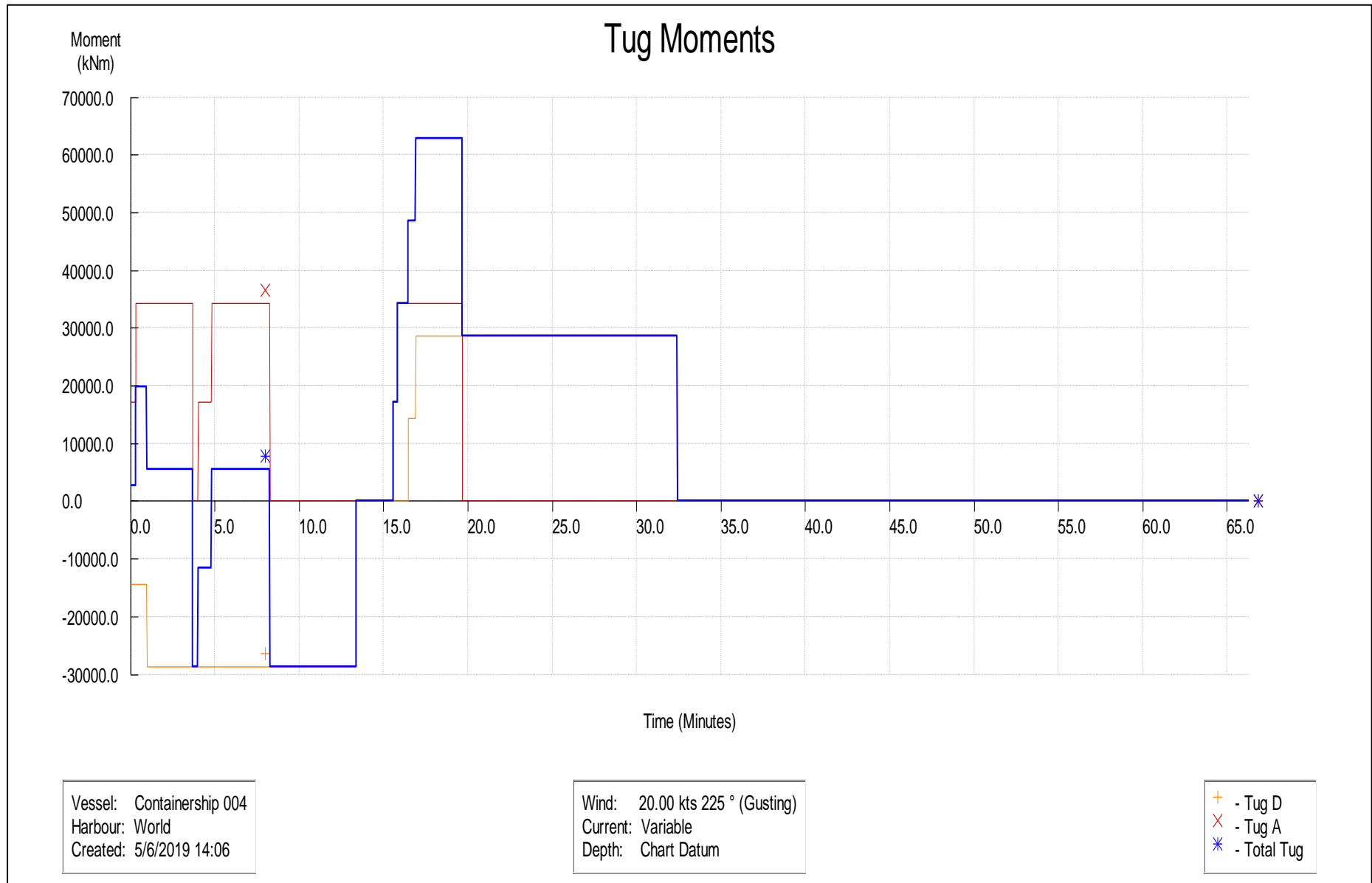
Vessel: Containership 004 (+Tugs)
 Harbour: World
 Created: 5/6/2019 14:06

Wind: 20.00 kts 225 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

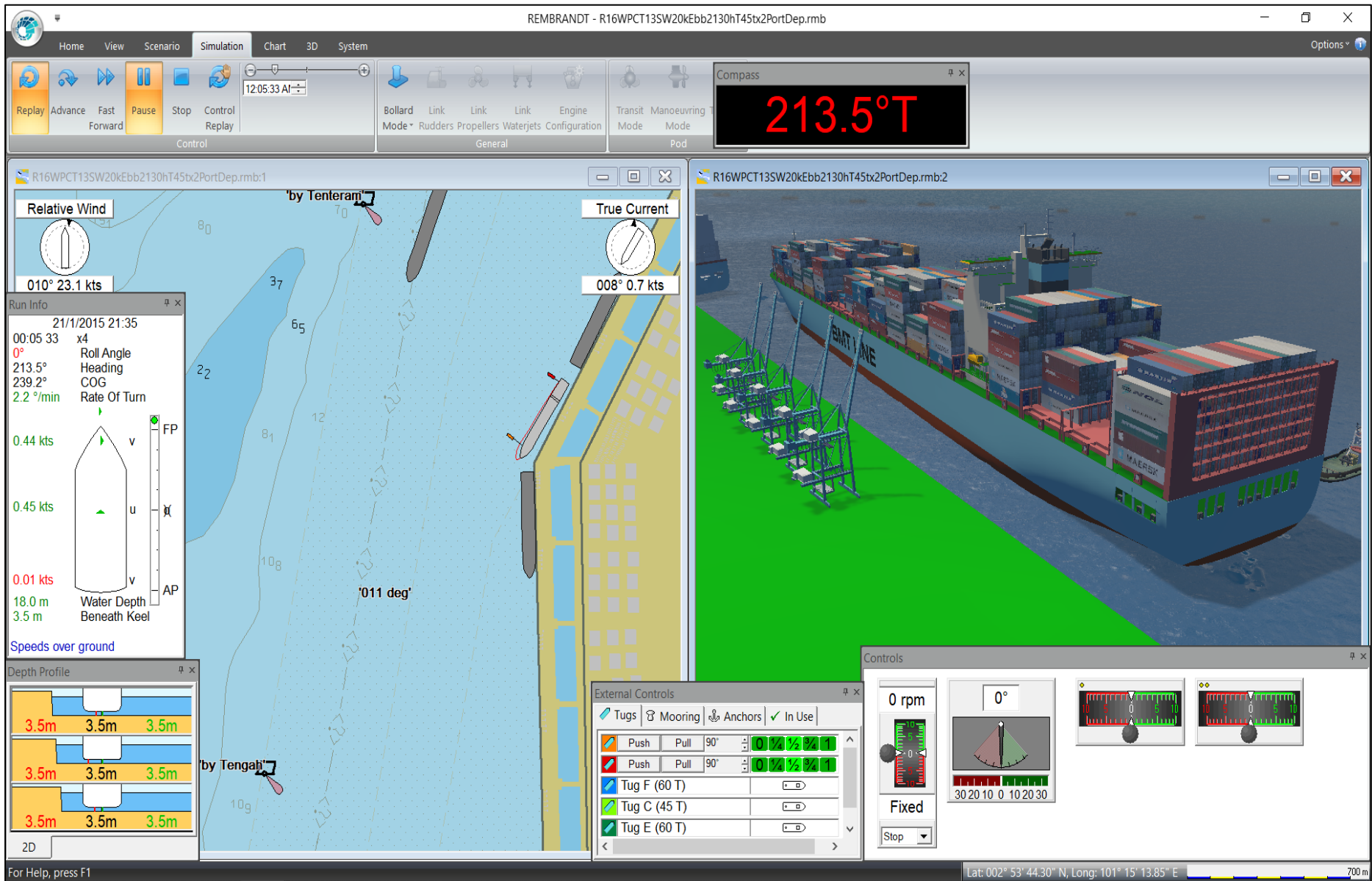
+ - Rudder Rud (°)
 x - Heading



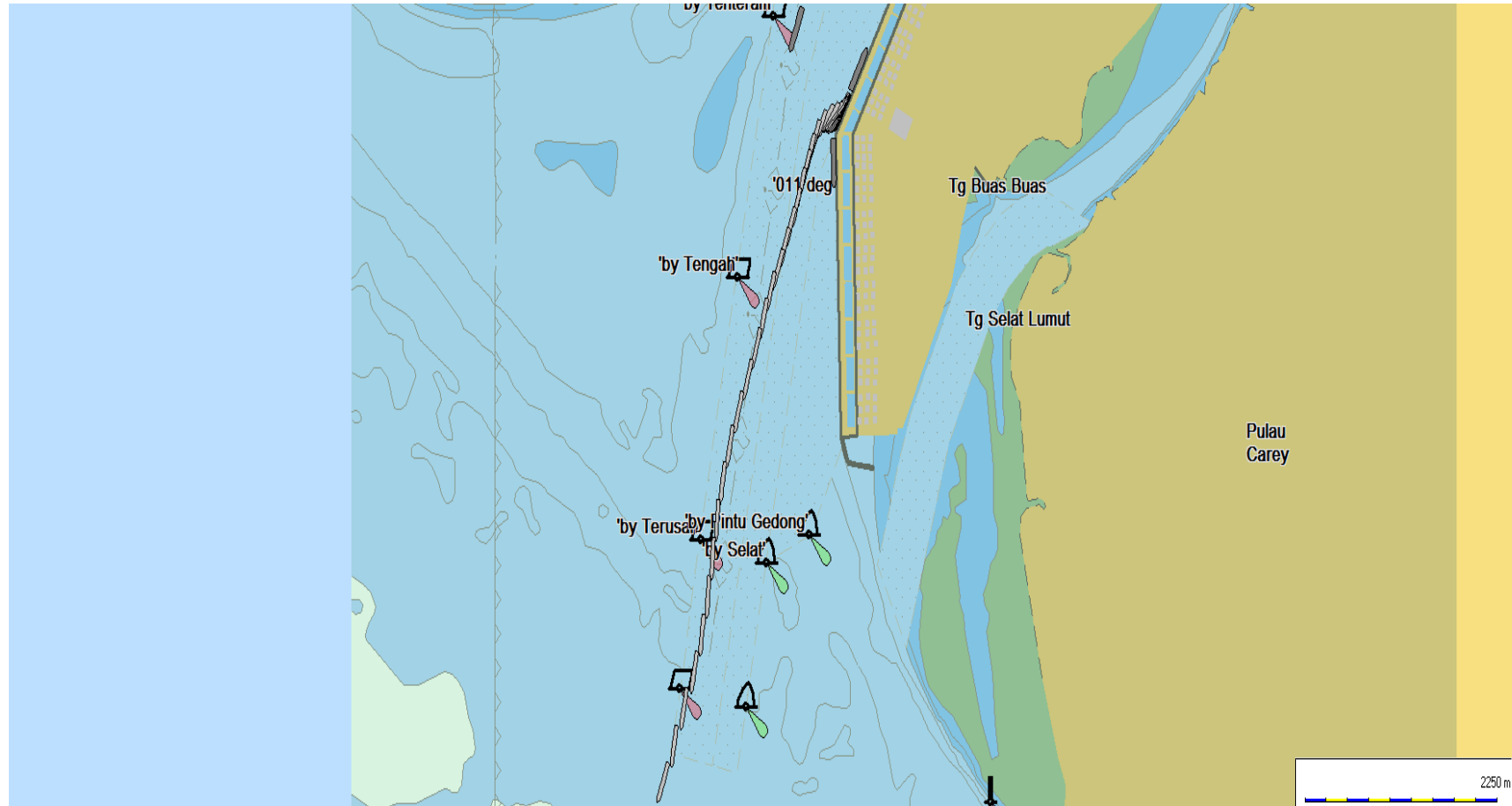




Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
16	R16WPCT13SW20 kEbb2130hT45tx2P ortDep.rmb	Ebb (2130h)	SW 20 k	Dep (Port a/s)	F: 45t A: 45t	The vessel was pulled off the berth using two 45 tons bollard pull tugs. The tugs were able to pull against the SW wind pushing on the starboard side when operating at Half Power. Dead Slow Ahead was given to move ahead into a stronger current stream. This helped push the bow out and the tugs were then let go. before proceeding to sea.	3/6



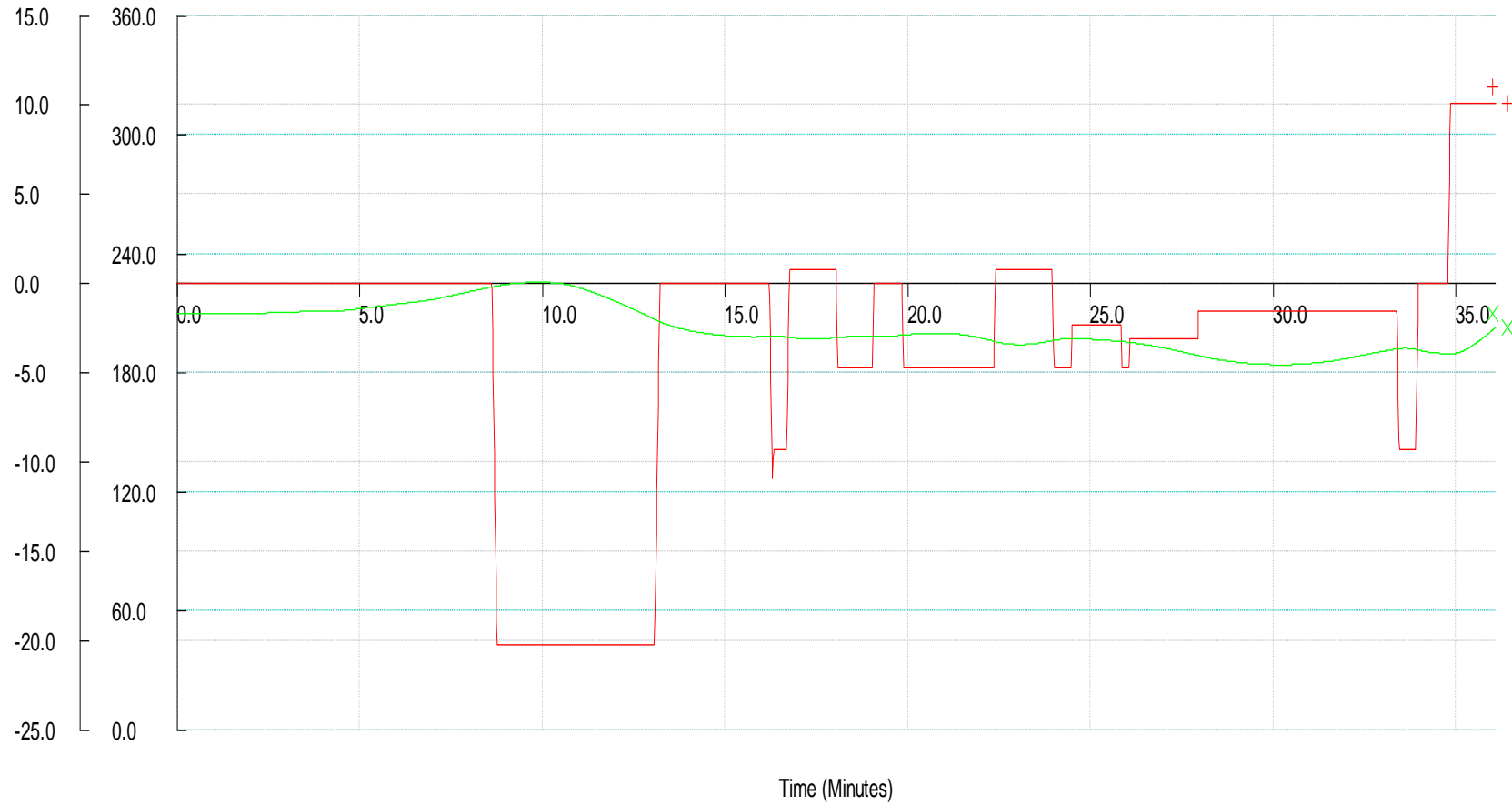
Vessel Track



Vessel: Containership 004
Harbour: World
Created: 14/6/2019 11:01

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

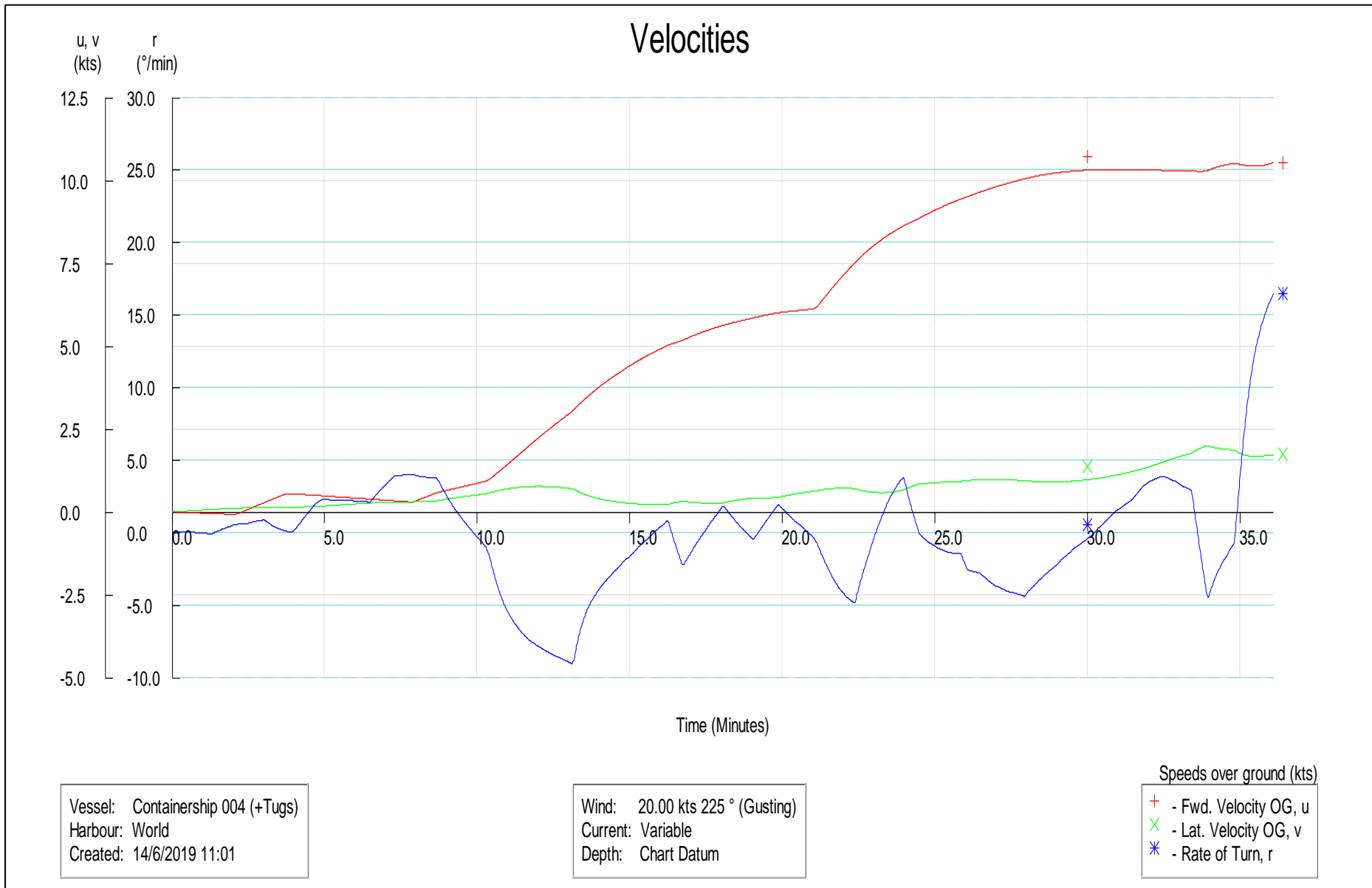
Heading and Rudder

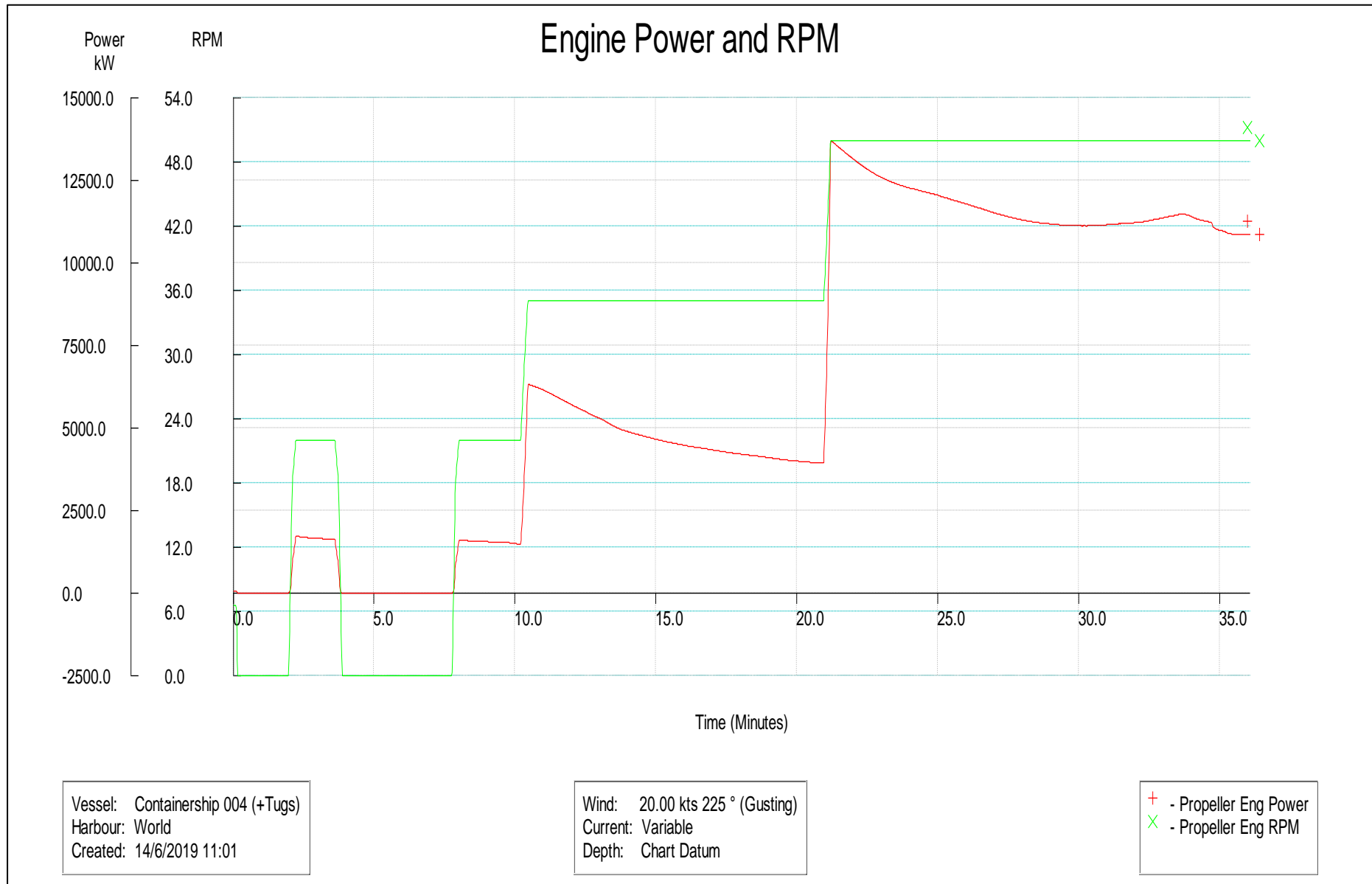


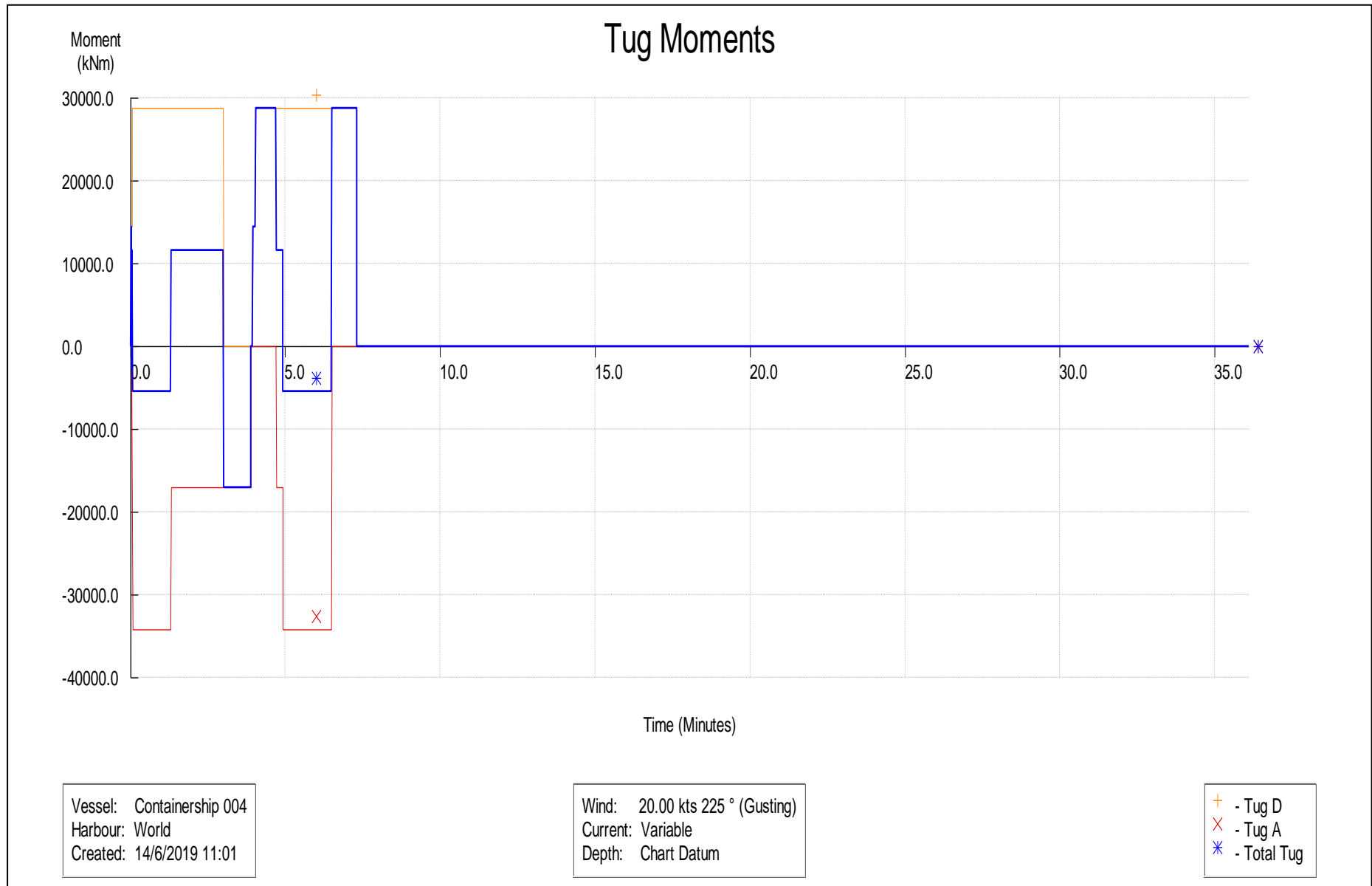
Vessel: Containership 004 (+Tugs)
 Harbour: World
 Created: 14/6/2019 11:01

Wind: 20.00 kts 225 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

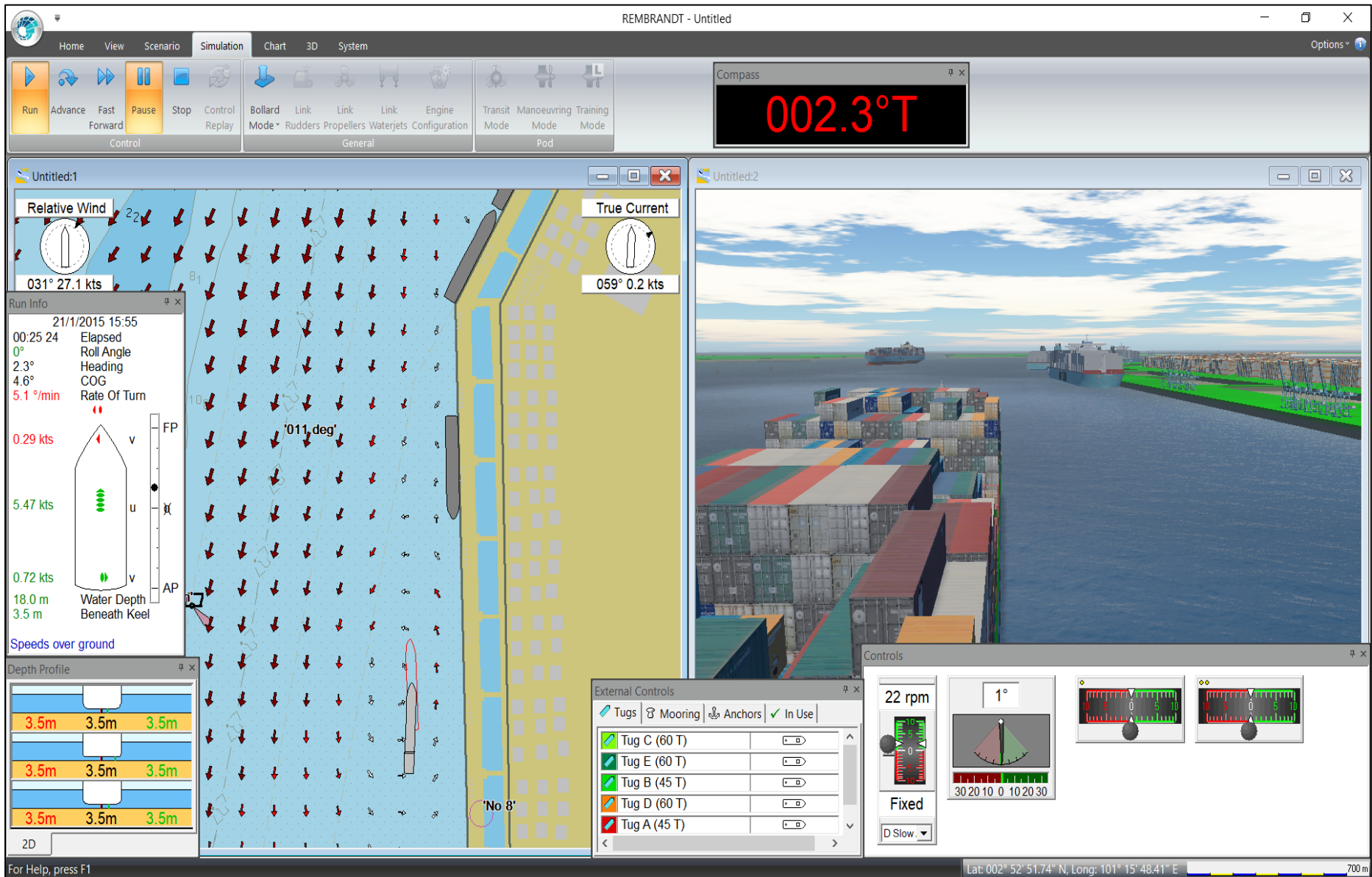
+ - Rudder Rud (°)
 x - Heading







Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
17	R17WPCT14NE20 kFld1530hT45tx2St bdArr.rmb	Flood (1530h)	NE 20 k	Arrival (Stbd a/s)	F: 45t A: 45t	The vessel entered the channel at Half Ahead. The speed was reduced before passing Selat Buoy and the vessel cleared the South Channel shortly after to take advantage of the weak currents closer to the wharves. Speed was about 5.5 knots. When off the berth the two 45 tons bollard pull tugs assisted in pushing the vessel alongside. The forward tug had to work at $\frac{3}{4}$ Power to push the bow in.	3/6

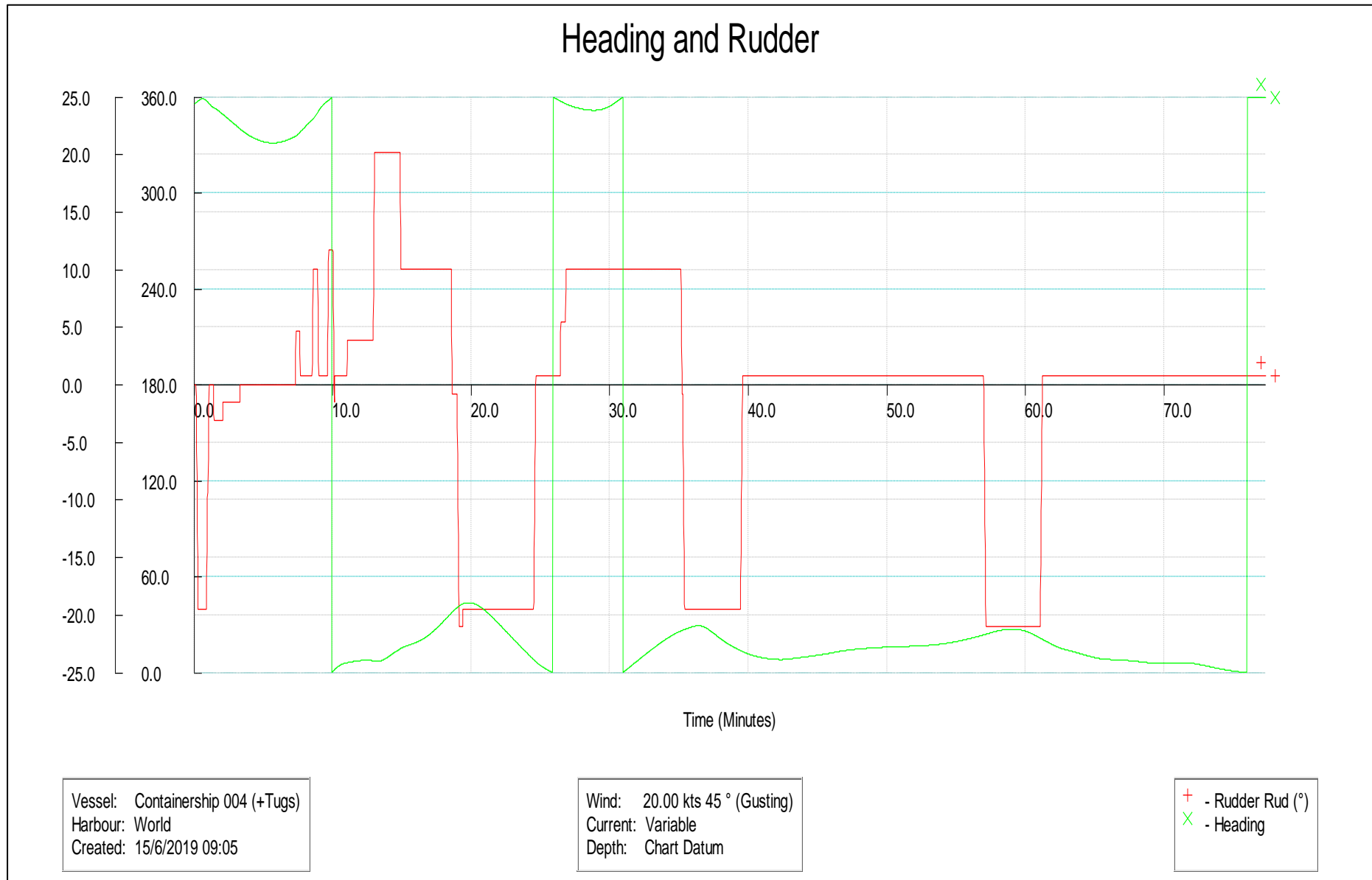


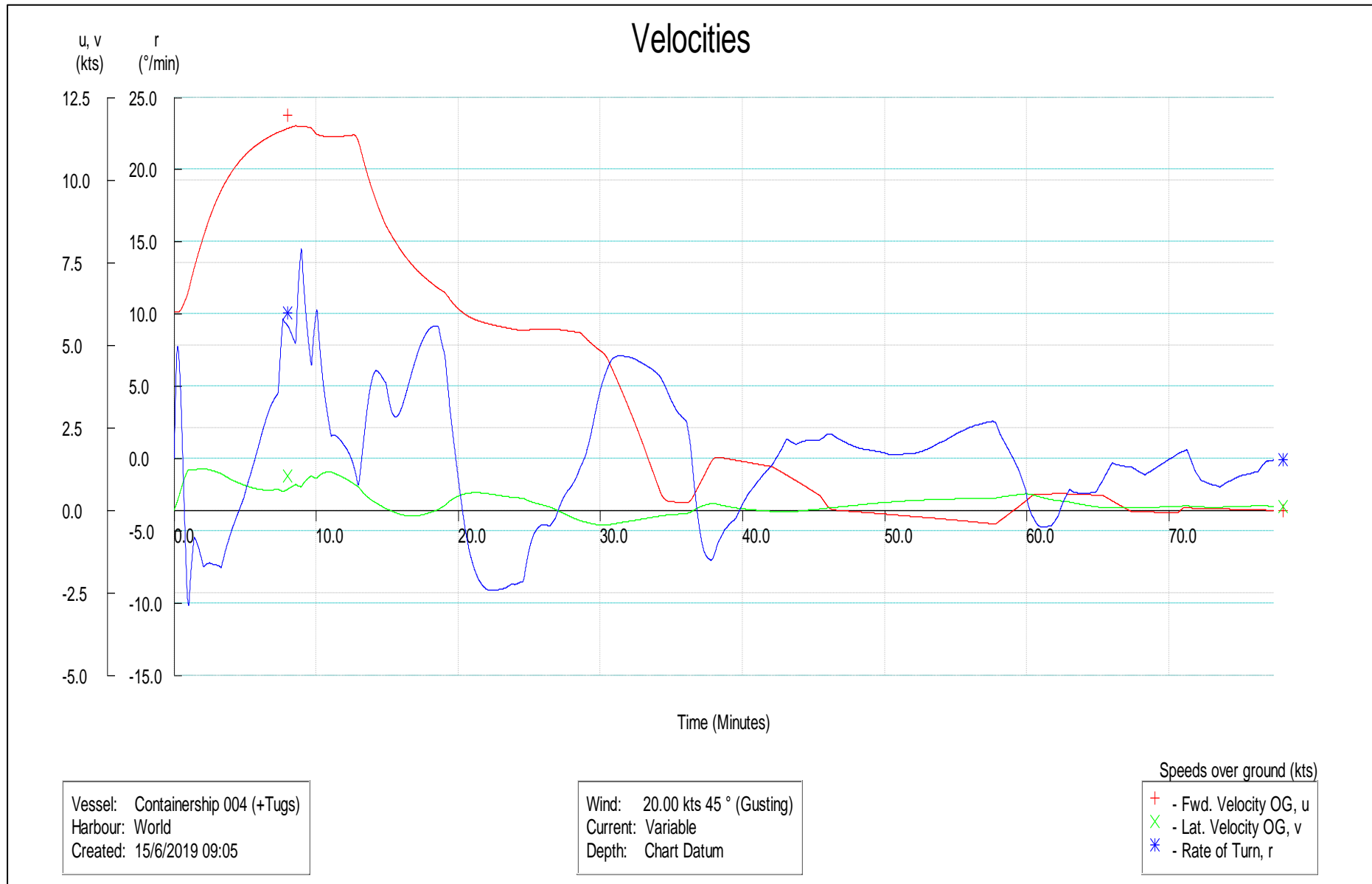
Vessel Track

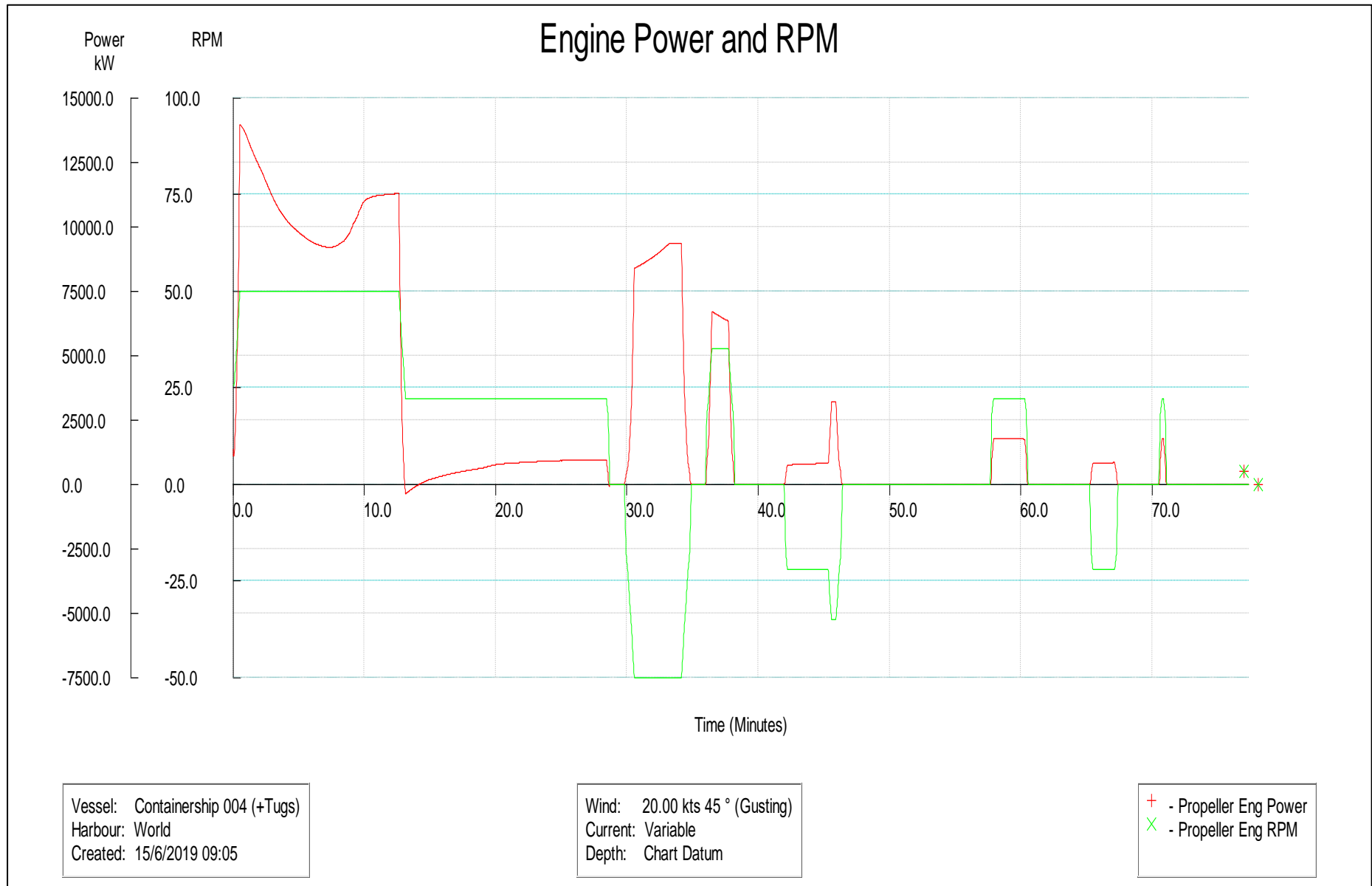


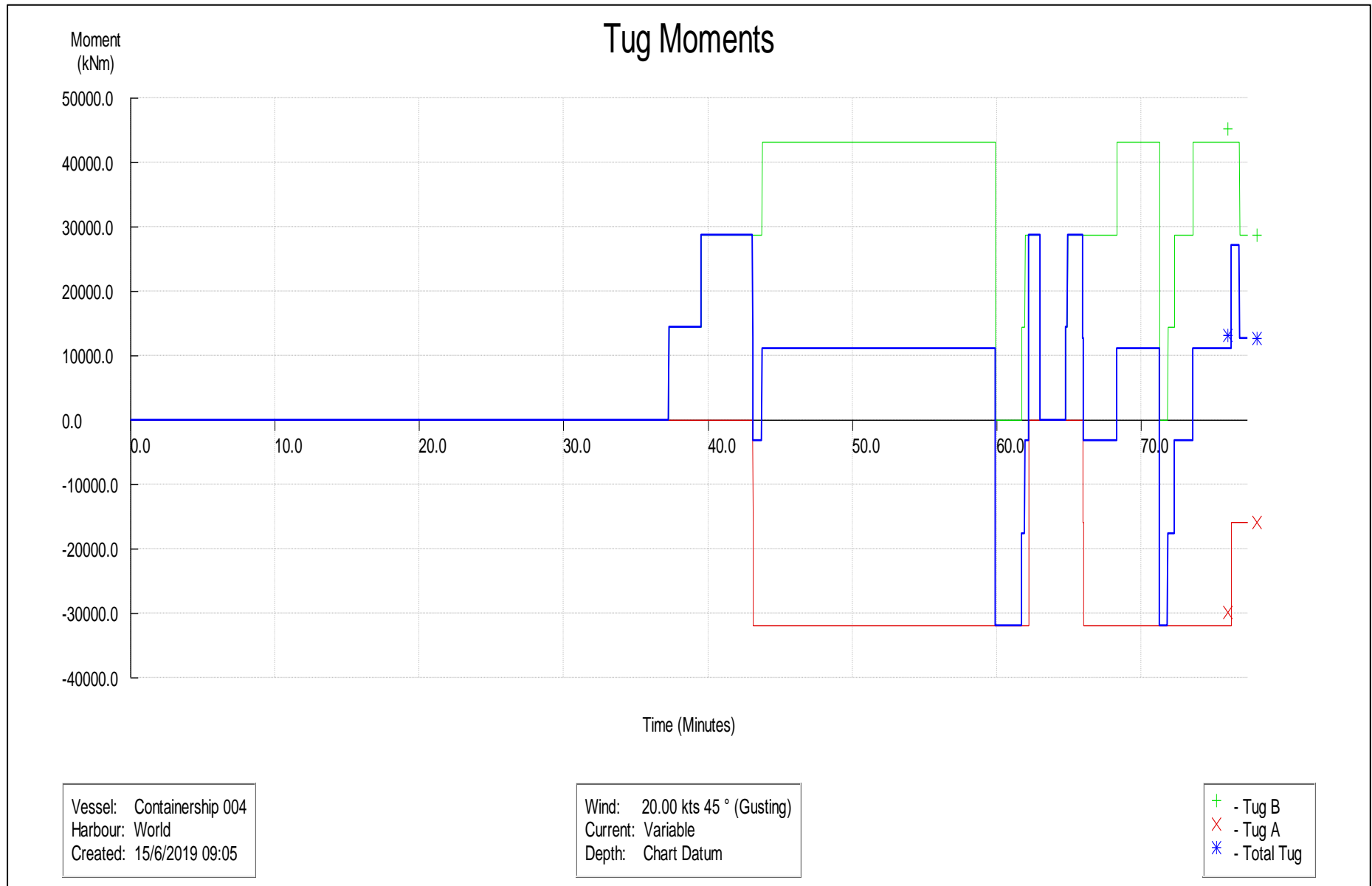
Vessel: Containership 004
Harbour: World
Created: 15/6/2019 09:05

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

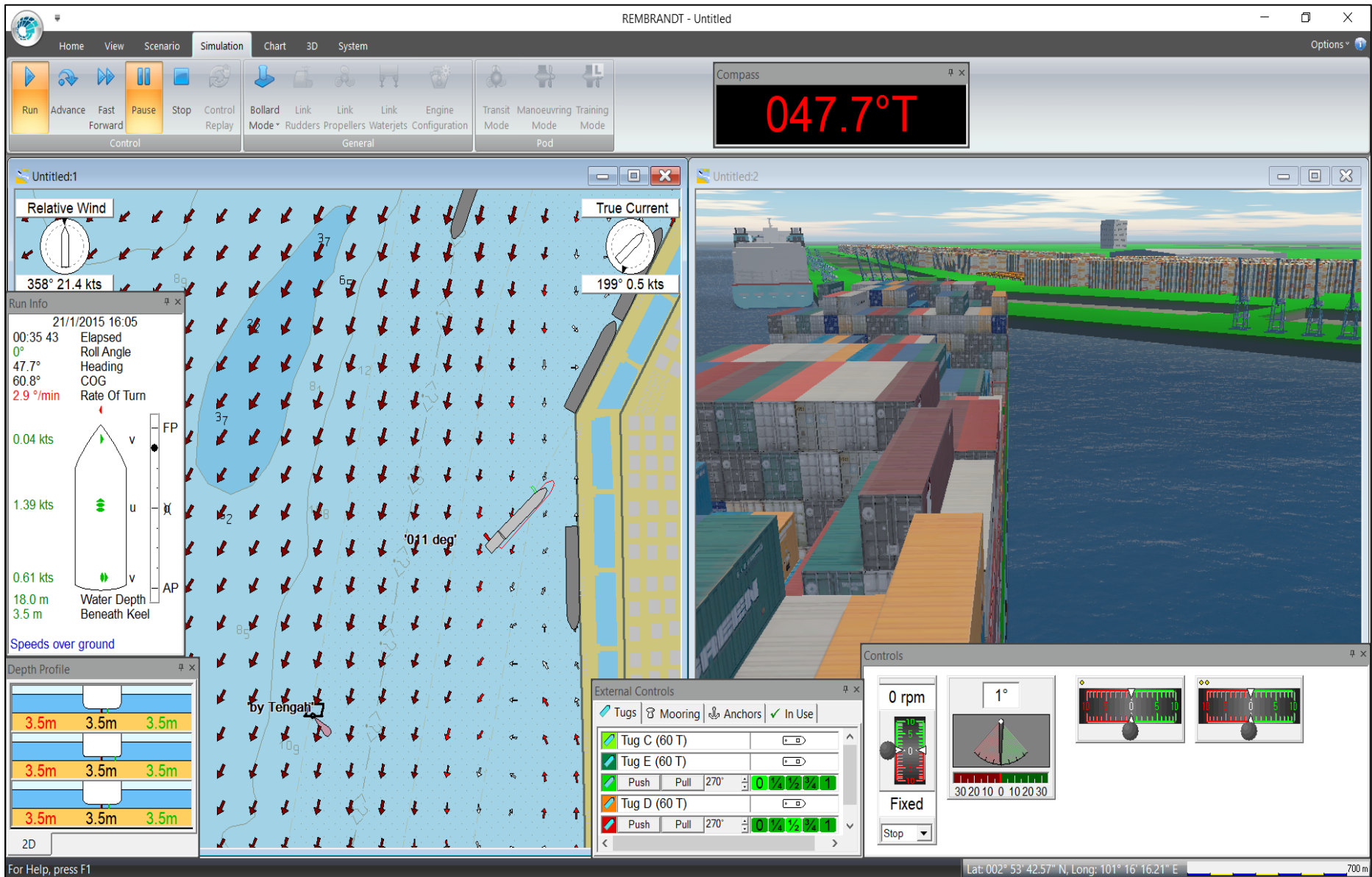




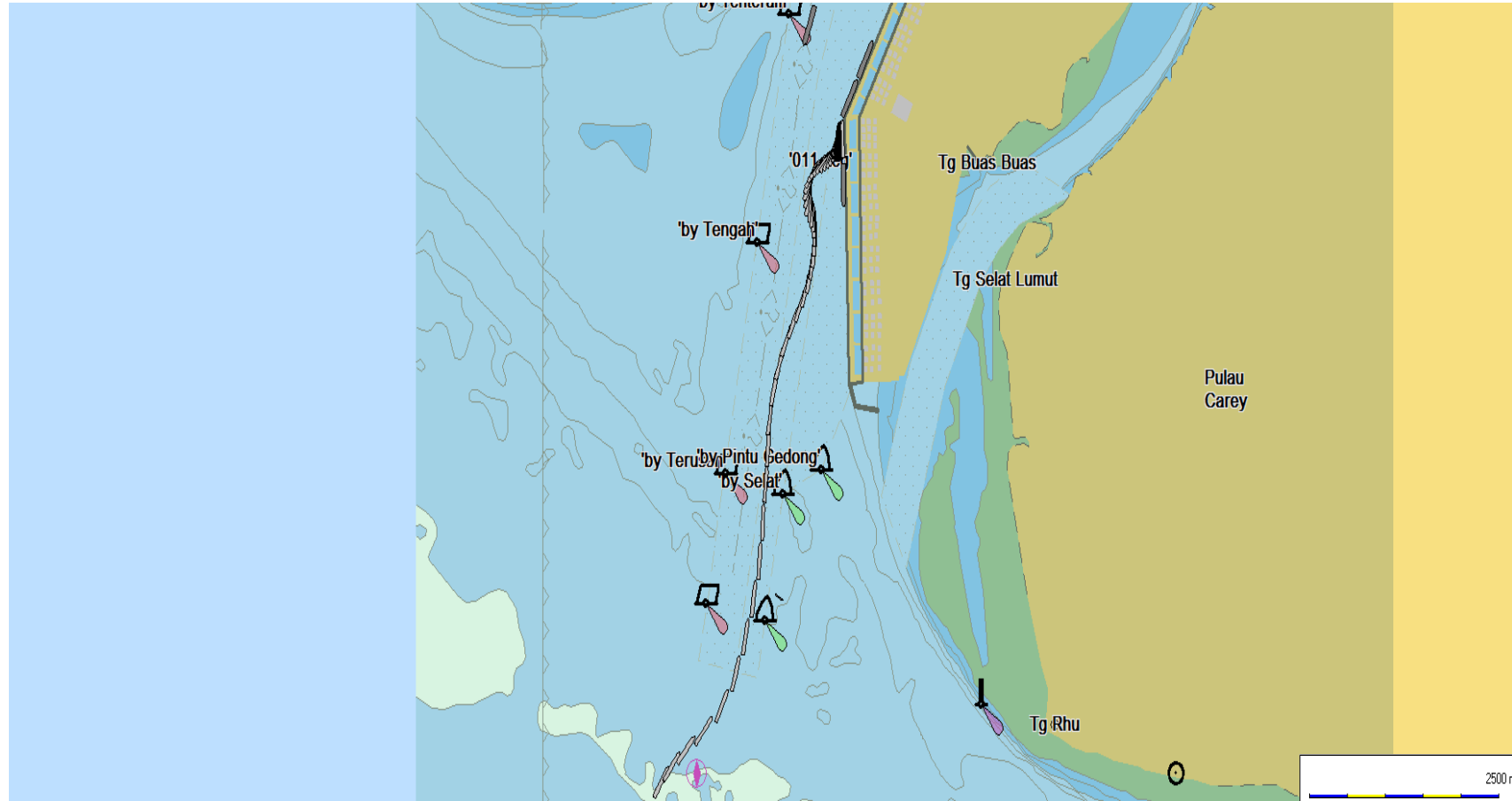




Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
18	R18WPCT14NE20 kFld1530hT45tx2St bdArr.rmb	Flood (1530h)	NE 20 k	Arrival (Stbd a/s)	F: 45t A: 45t	The vessel entered the channel at Half Ahead. The speed was reduced when passing Selat Buoy. As the currents close to the CT-14 berth were very weak, it was decided to approach the berth at a sharper angle, stemming the wind. This was done with good control over the vessel but when the NE wind got on the starboard side, the forward tug still had to push at ¾ Power to get the bow in.	3/6

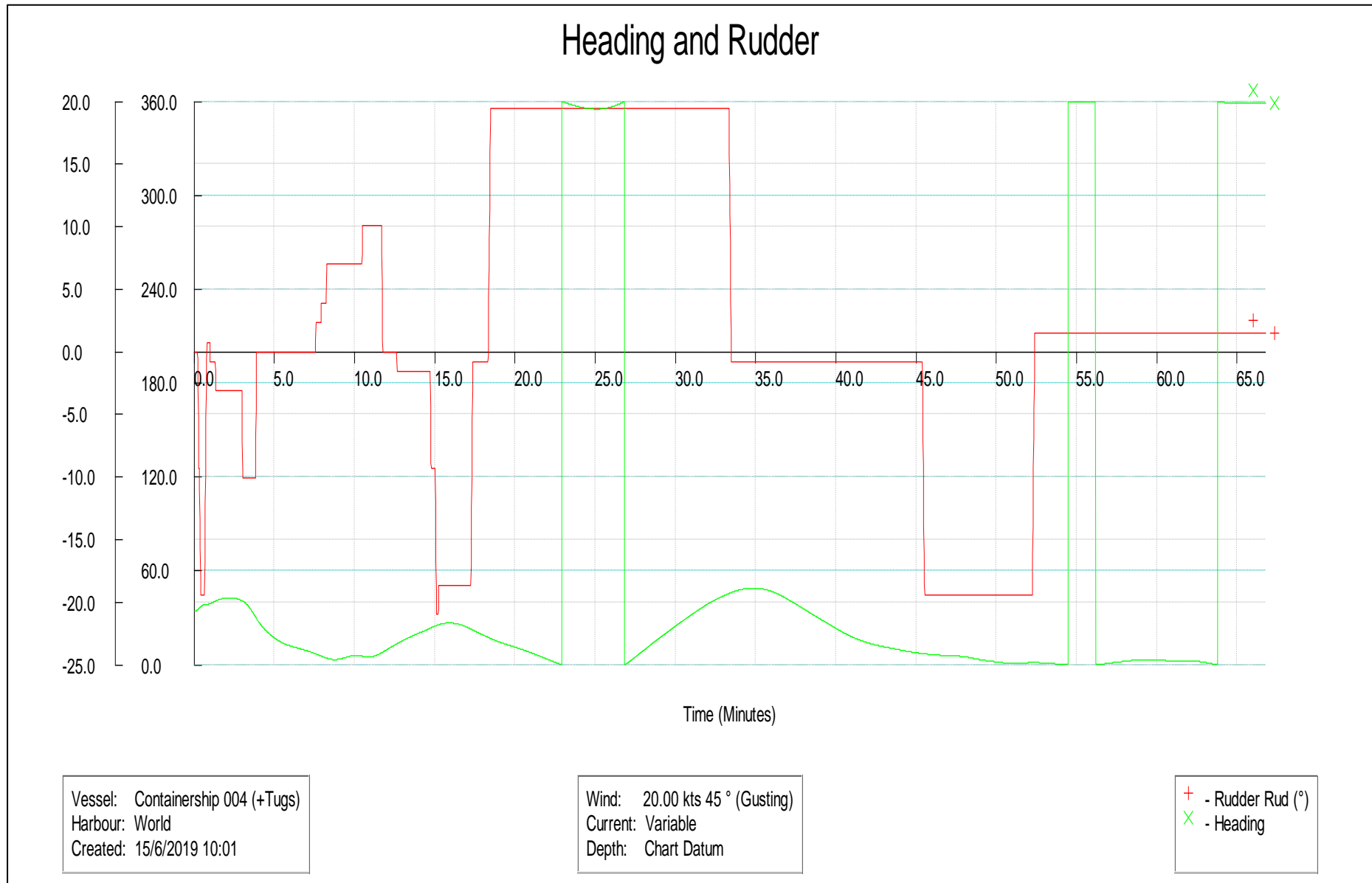


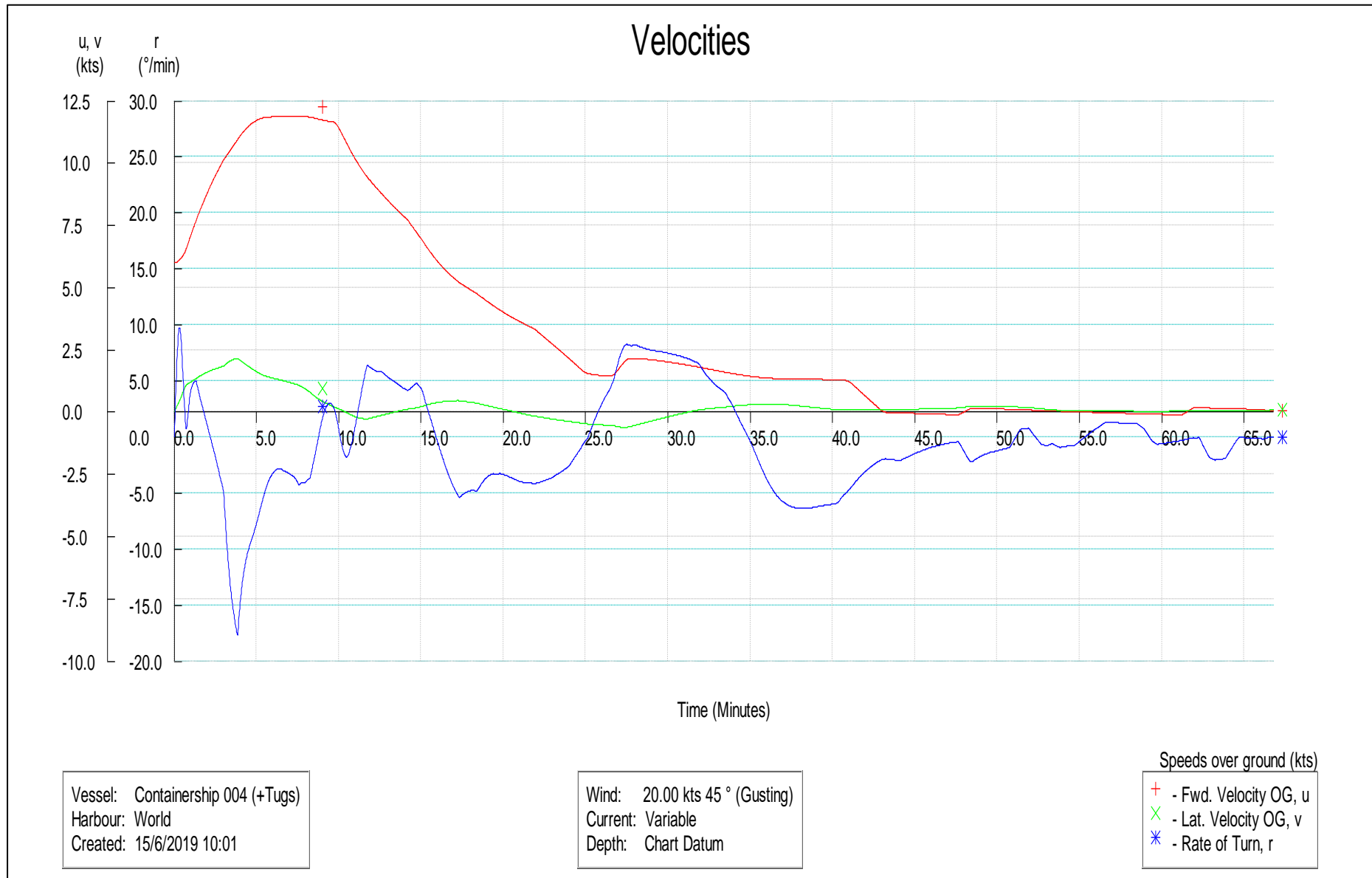
Vessel Track

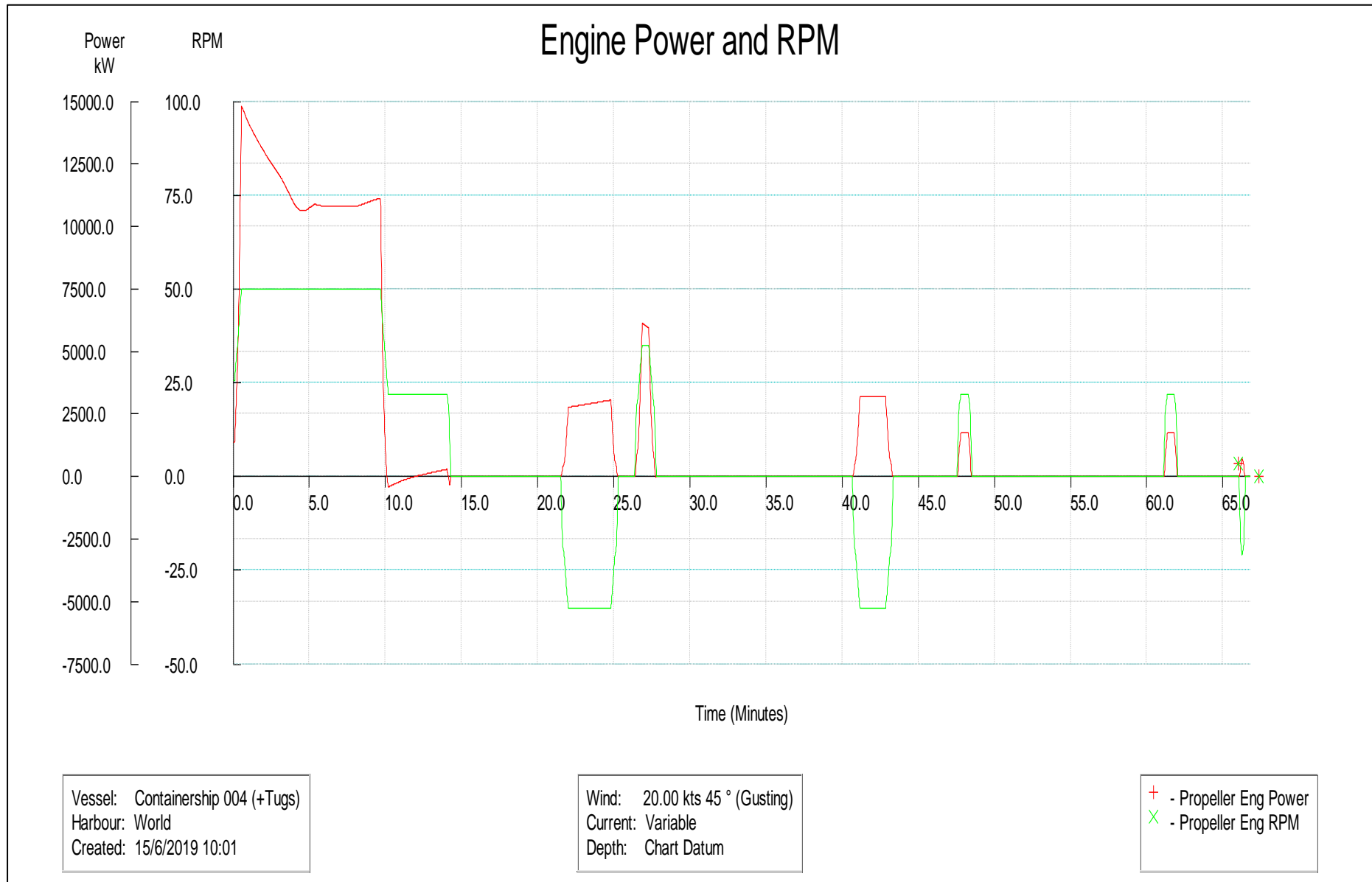


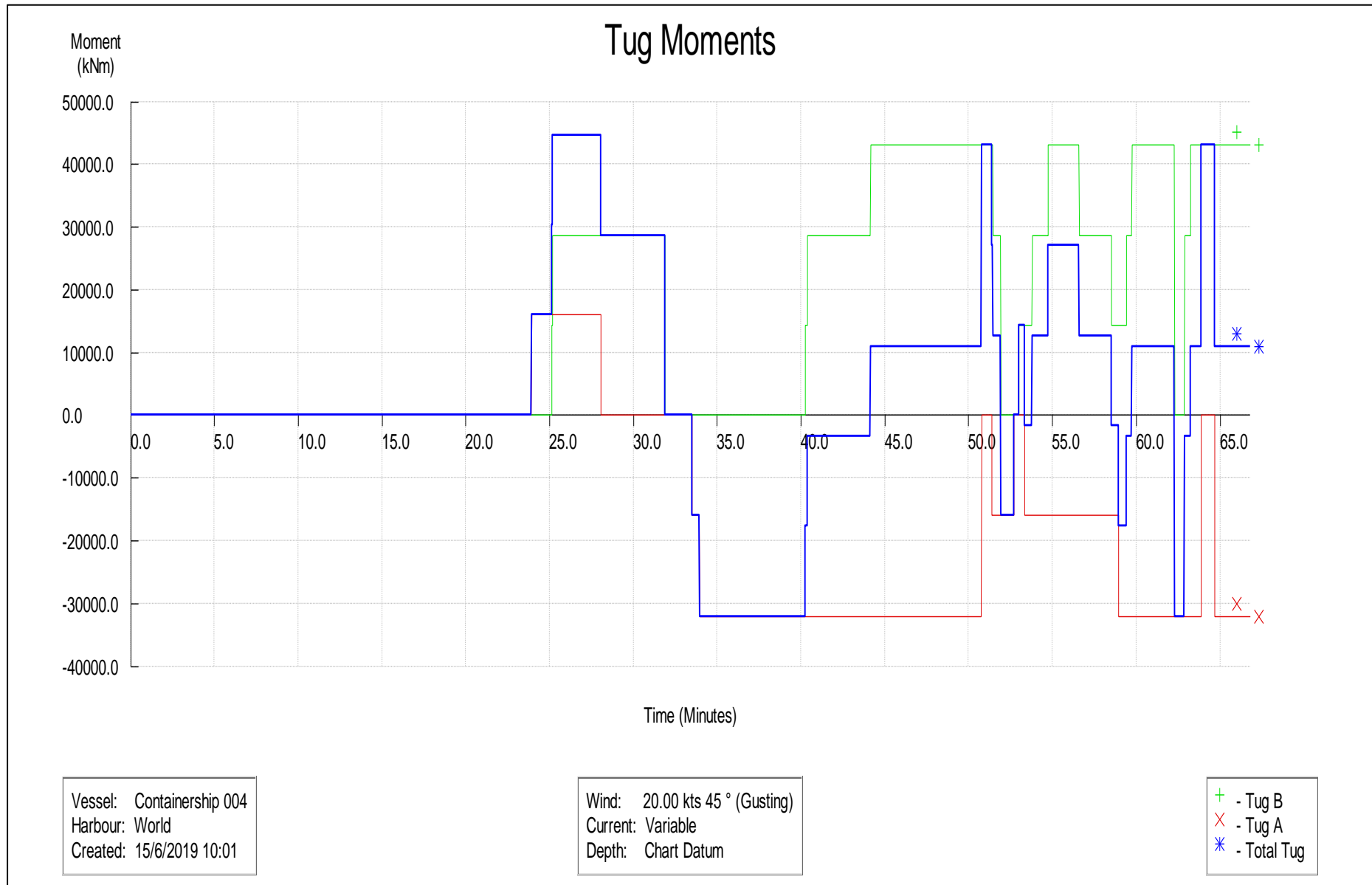
Vessel: Containership 004
Harbour: World
Created: 15/6/2019 10:01

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

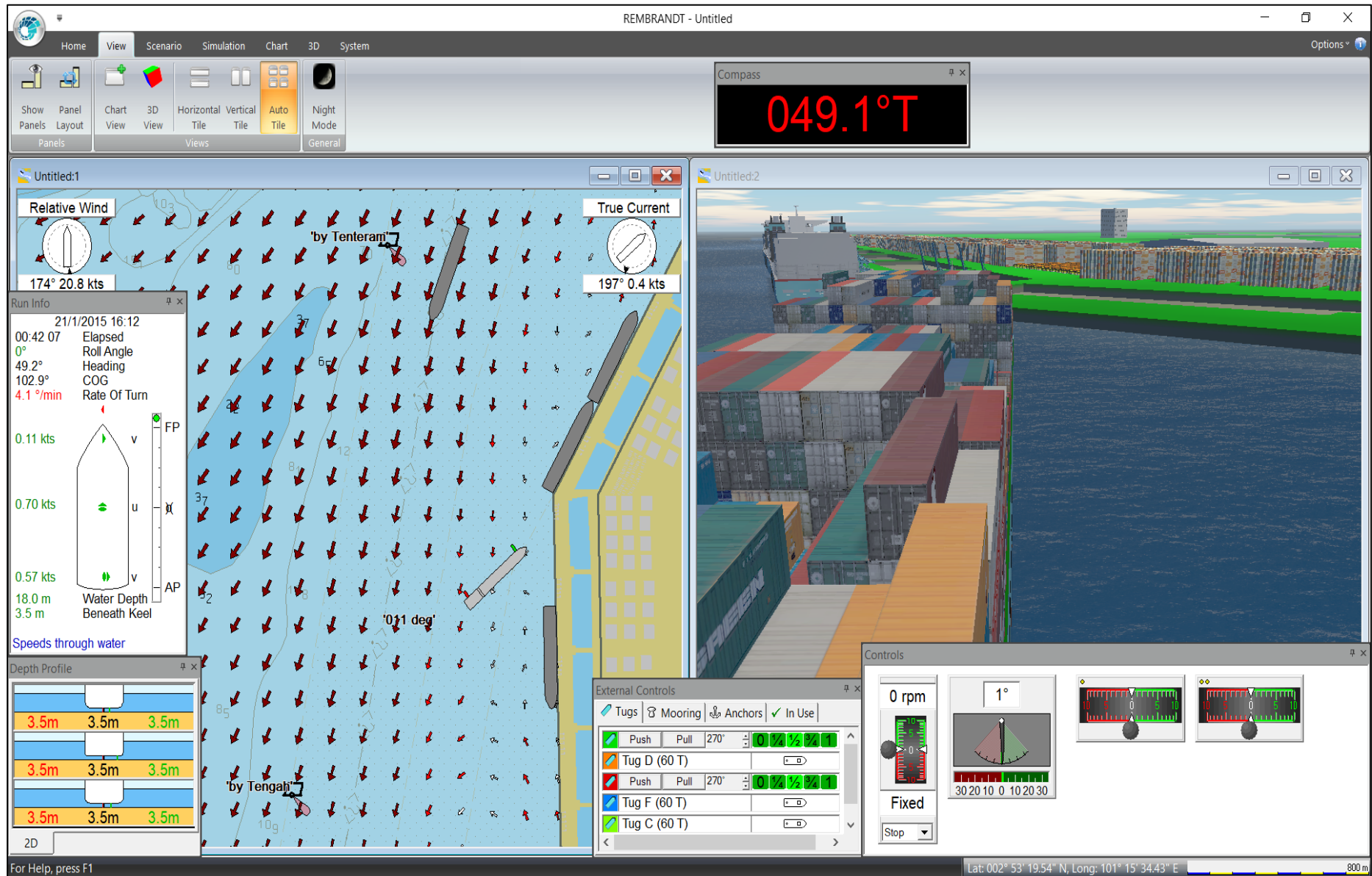








Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
19	R19WPCT14SW20 kFld1530hT45tx2St bdArr.rmb	Flood (1530h)	SW 20 k	Arrival (Stbd a/s)	F: 45t A: 45t	The vessel entered the channel at Half Ahead. The speed was reduced when passing Selat Buoy. The vessel was stopped off CT-15 and tugs made fast before approaching the berth. In order not to have the current on the starboard side, a sharper approach was made to the berth. The tugs, operating at a maximum of Half Power assisted the vessel in going alongside.	4/6



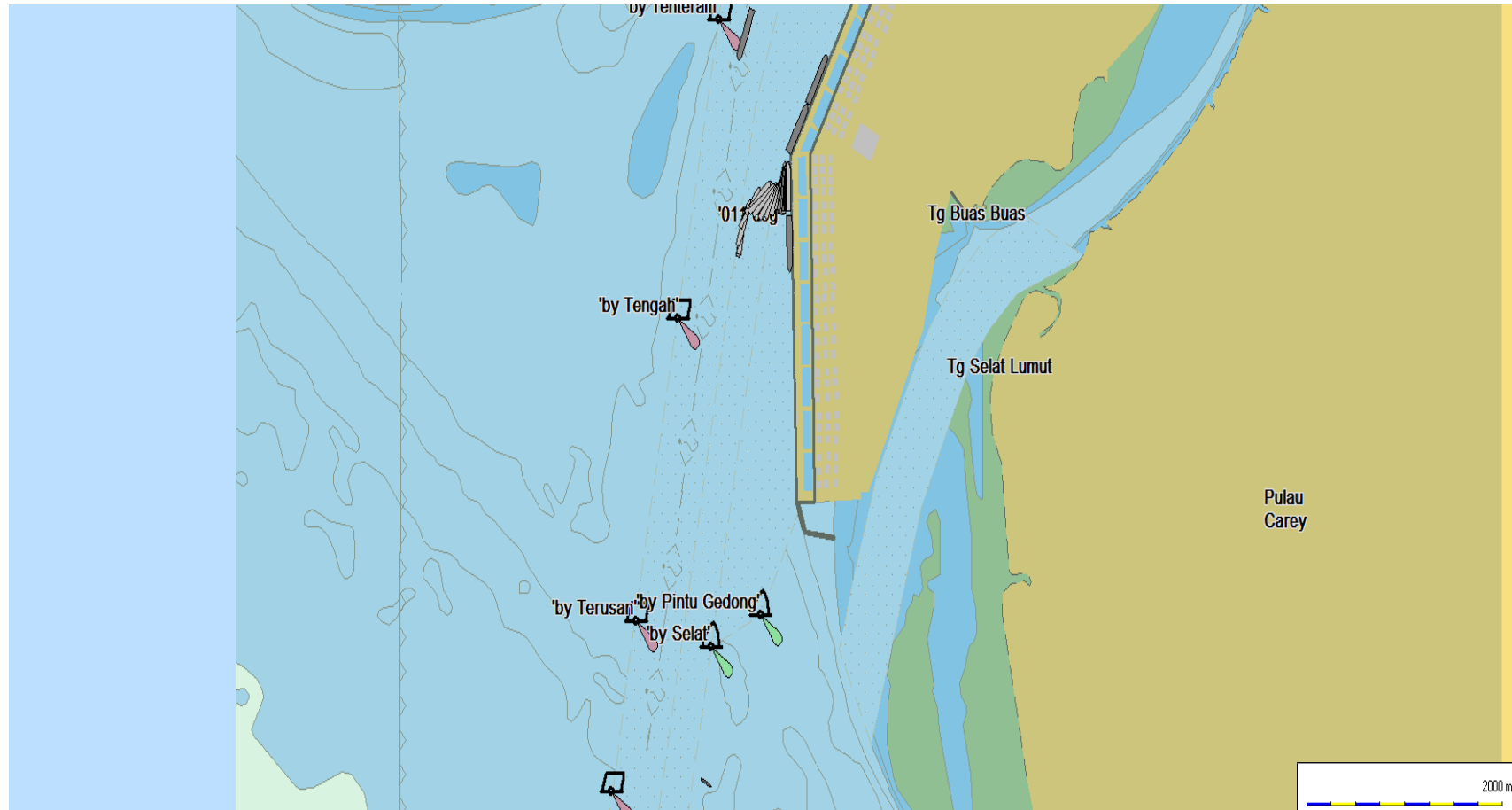
Vessel Track



Vessel: Containership 004
Harbour: World
Created: 15/6/2019 12:16

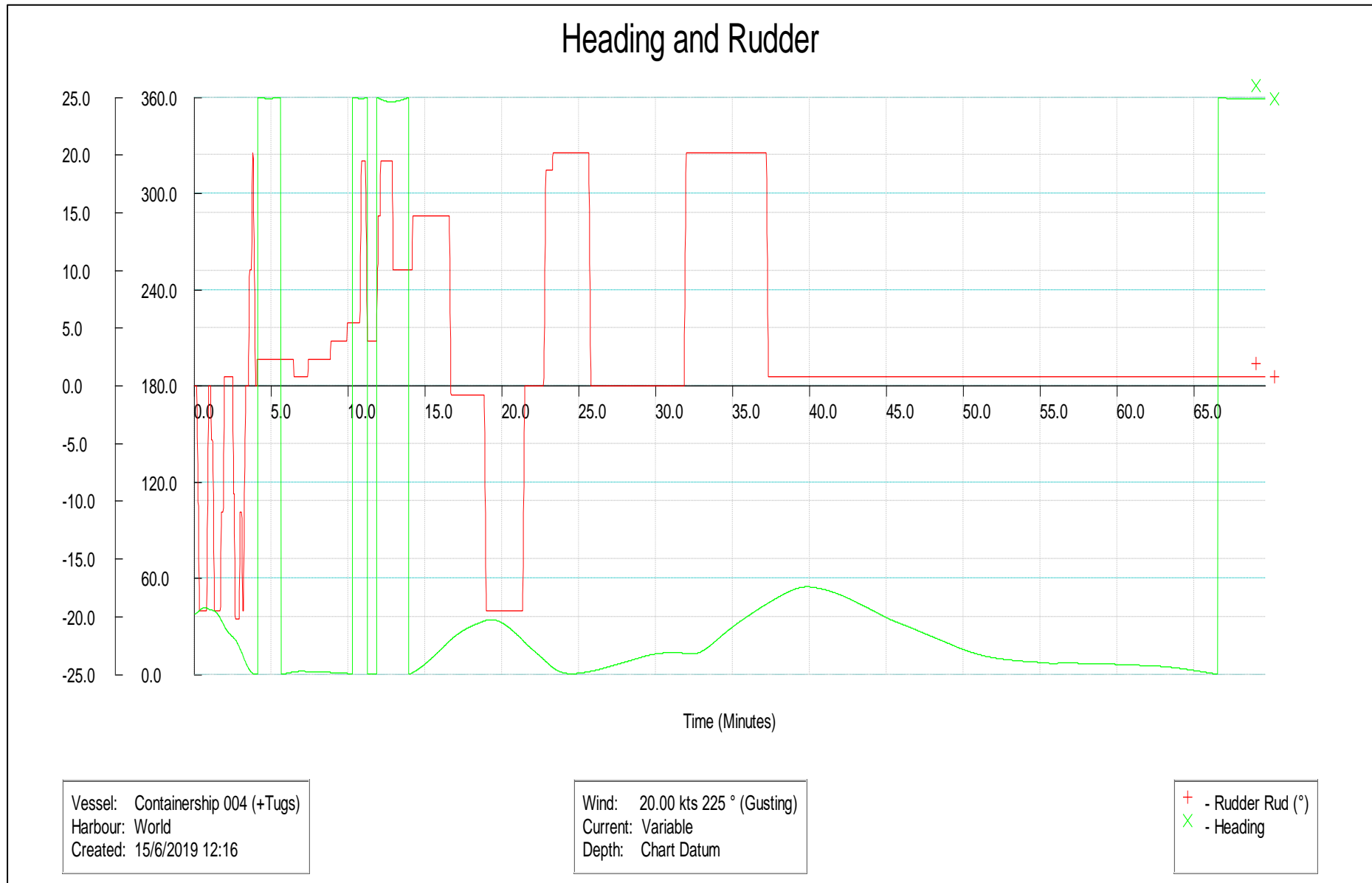
Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

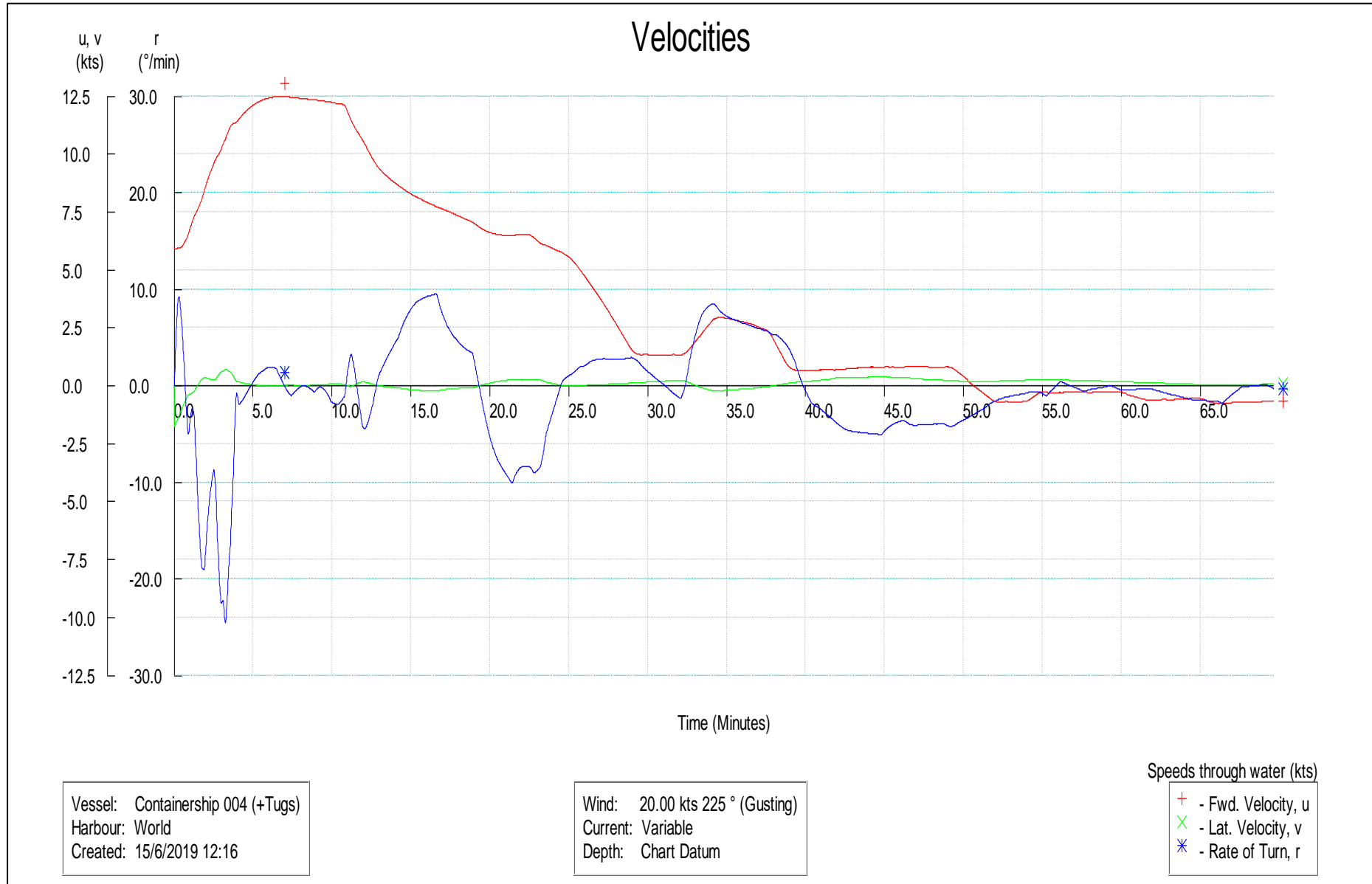
Vessel Track

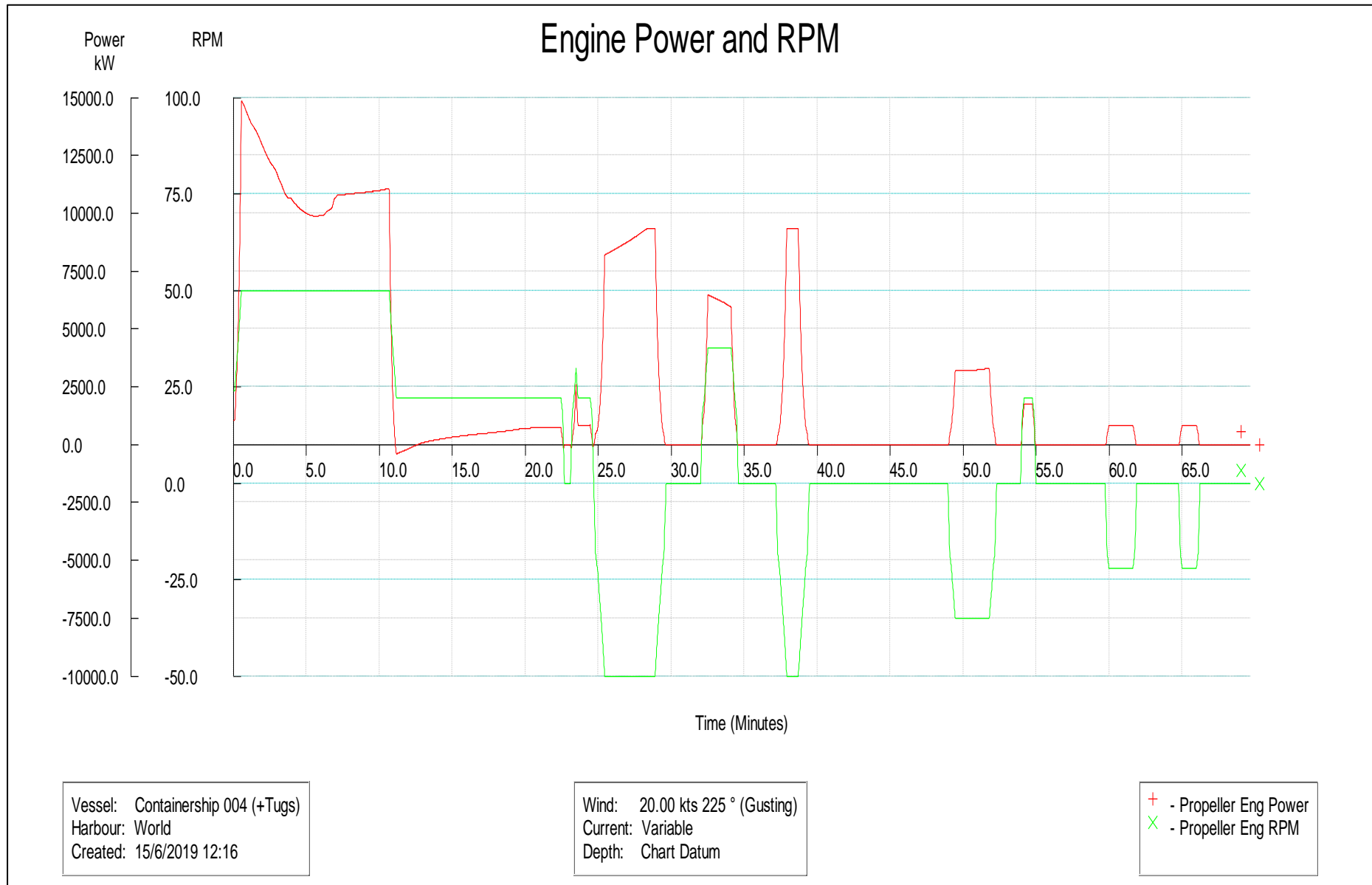


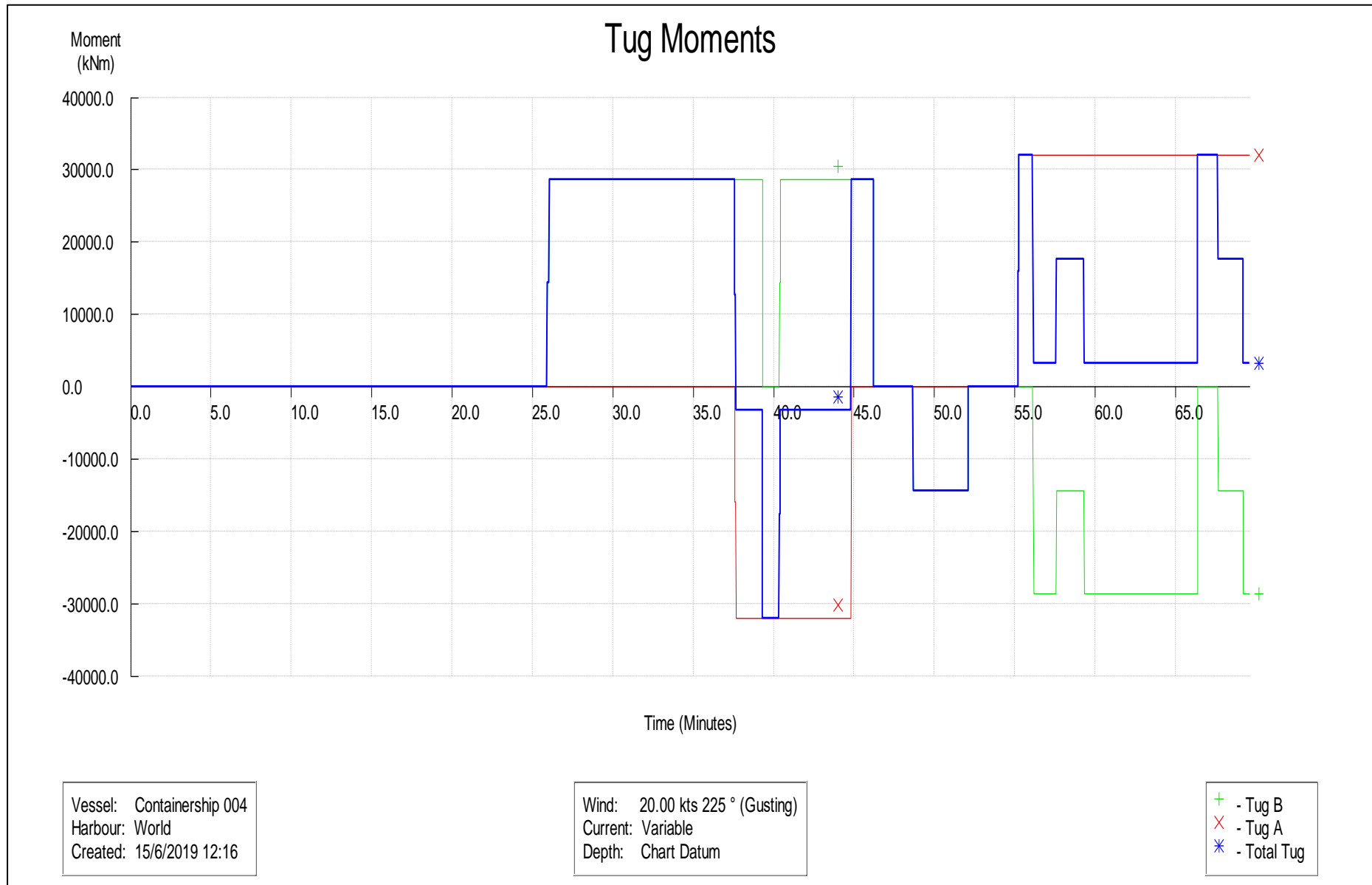
Vessel: Containership 004
Harbour: World
Created: 15/6/2019 12:16

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

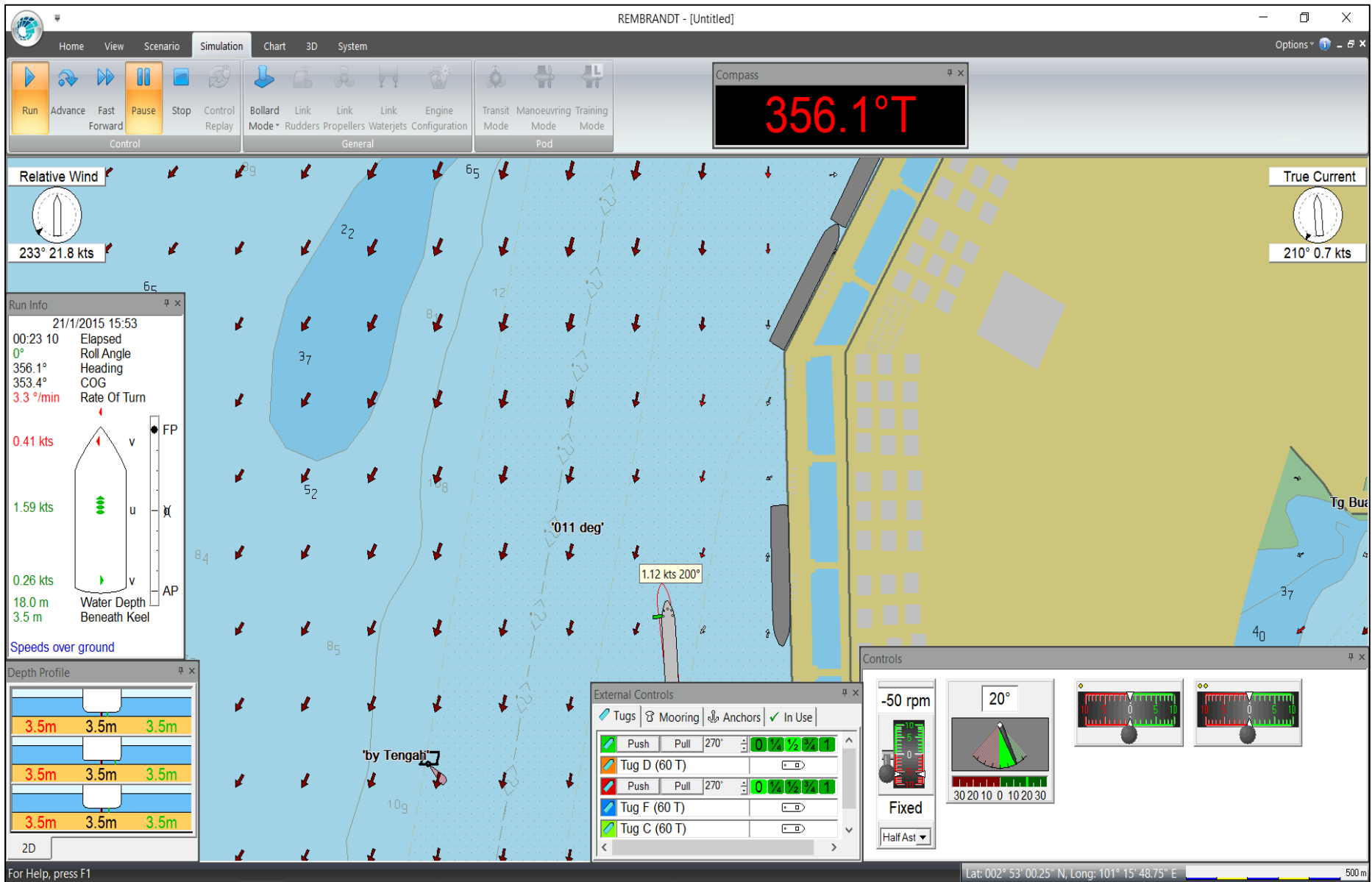




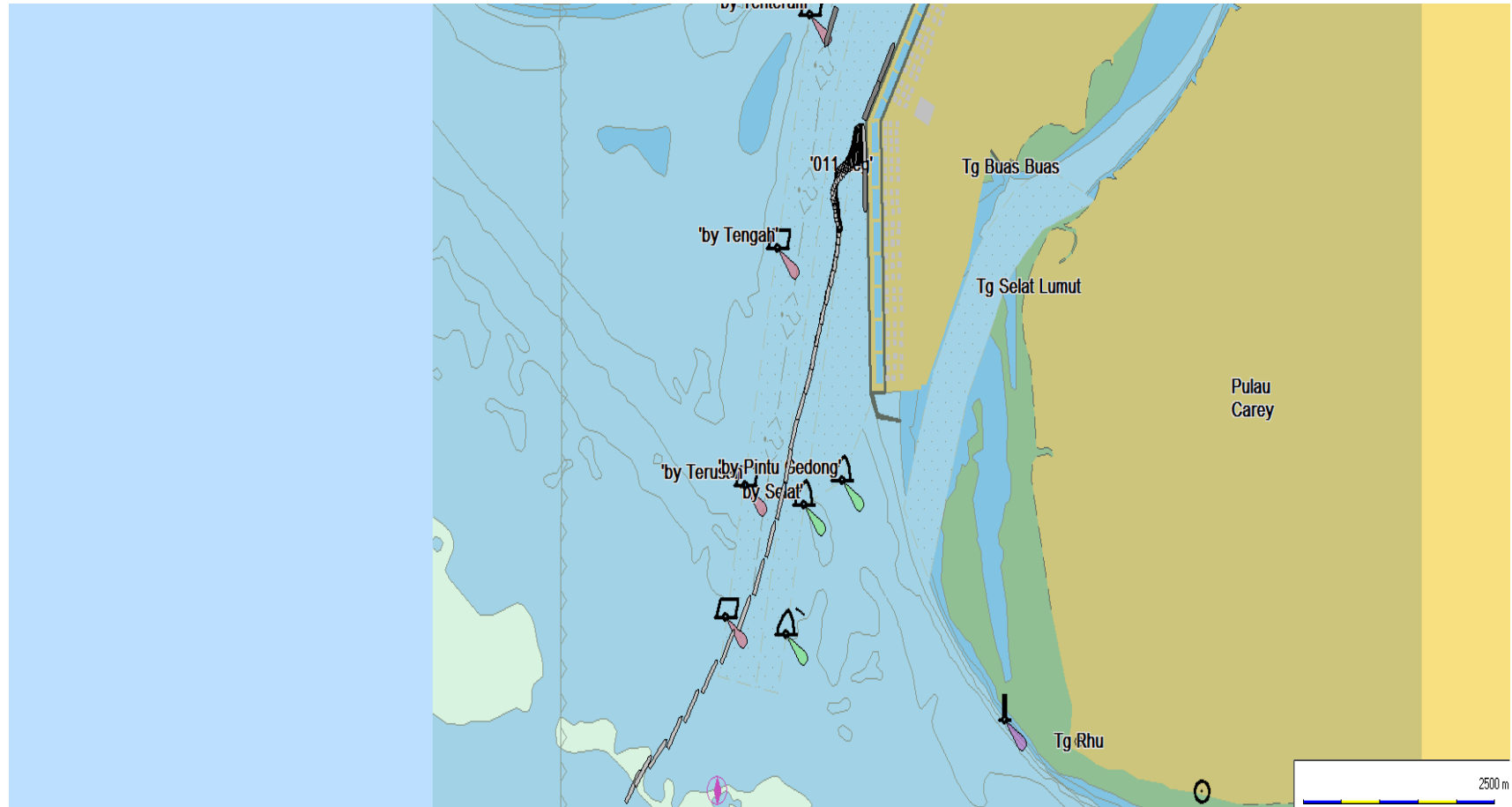




Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
20	R20WPCT14SW20 kFId1530hT45tx2St bdArr.rmb	Flood (1530h)	SW 20 k	Arrival (Stbd a/s)	F: 45t A: 45t	The vessel entered the channel at Half Ahead. The speed was reduced when passing Selat Buoy. The vessel was stopped off CT-15 and tugs made fast before approaching the berth. When the current got on the starboard side of the vessel, the forward tug was unable to push the bow in. The aft tug and helm and engine was then used to 'twist' the vessel to starboard. The tugs, operating at a maximum of $\frac{3}{4}$ Power then assisted the vessel in going alongside.	4/6

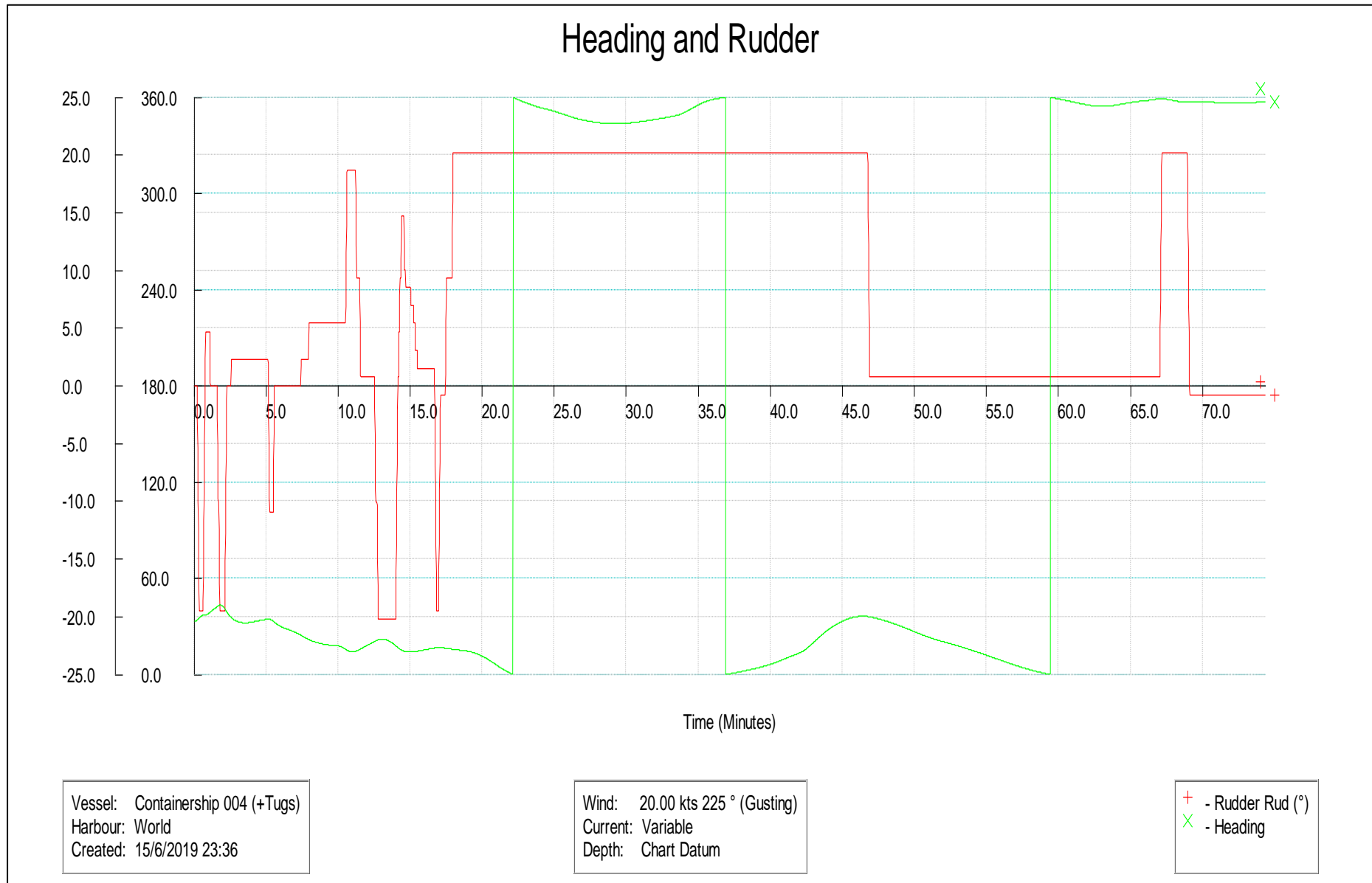


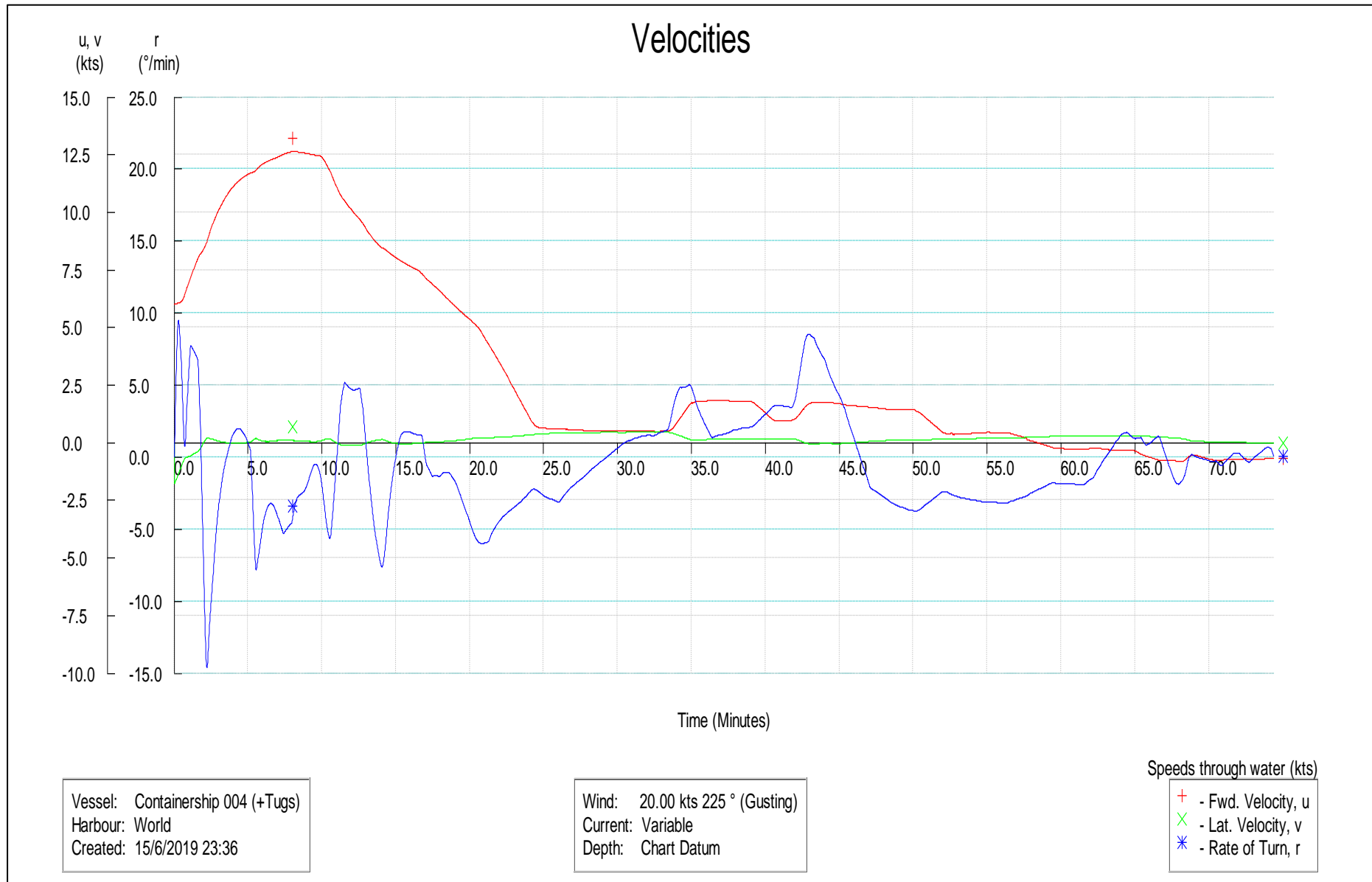
Vessel Track

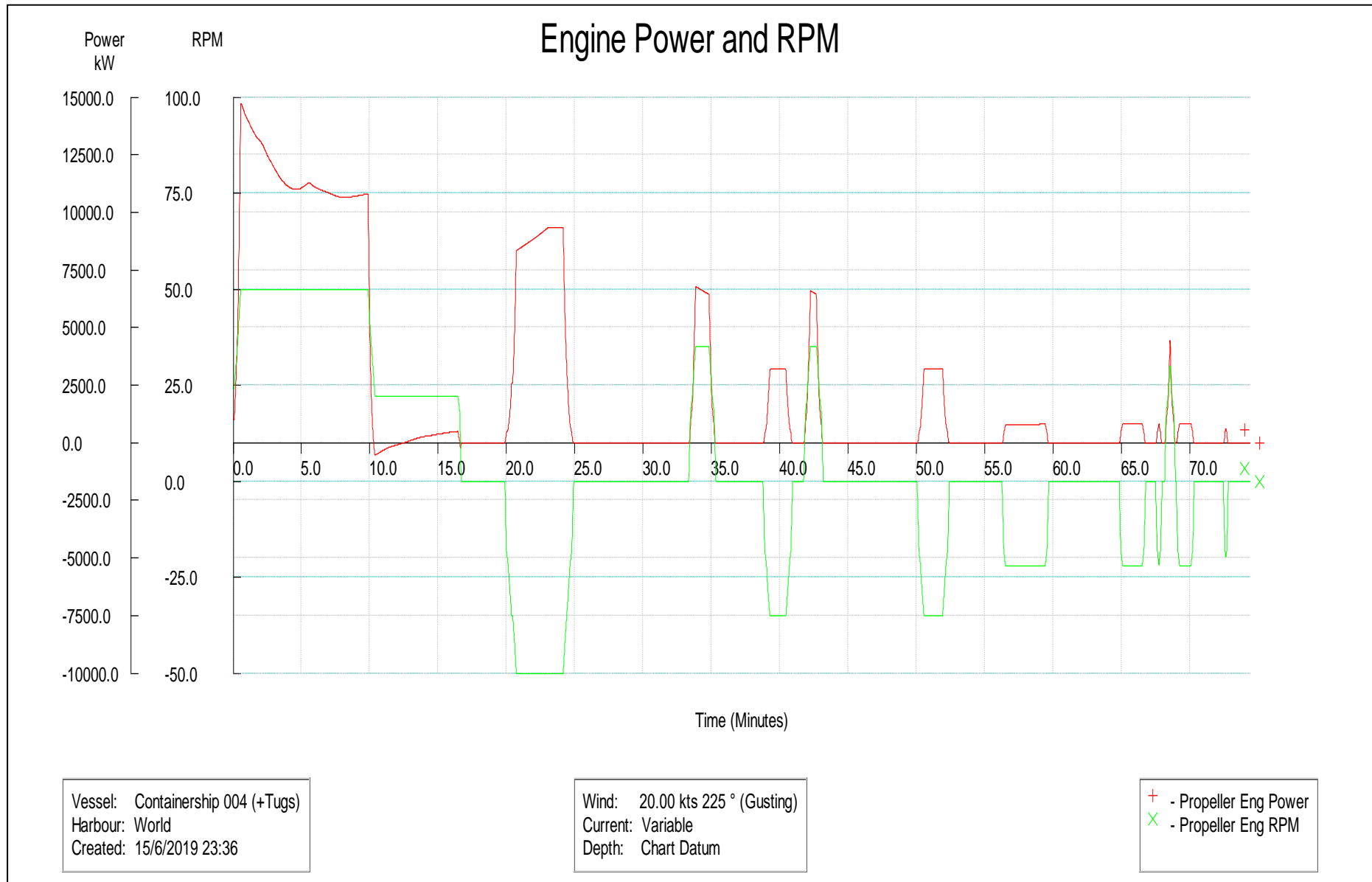


Vessel: Containership 004
Harbour: World
Created: 16/6/2019 07:00

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

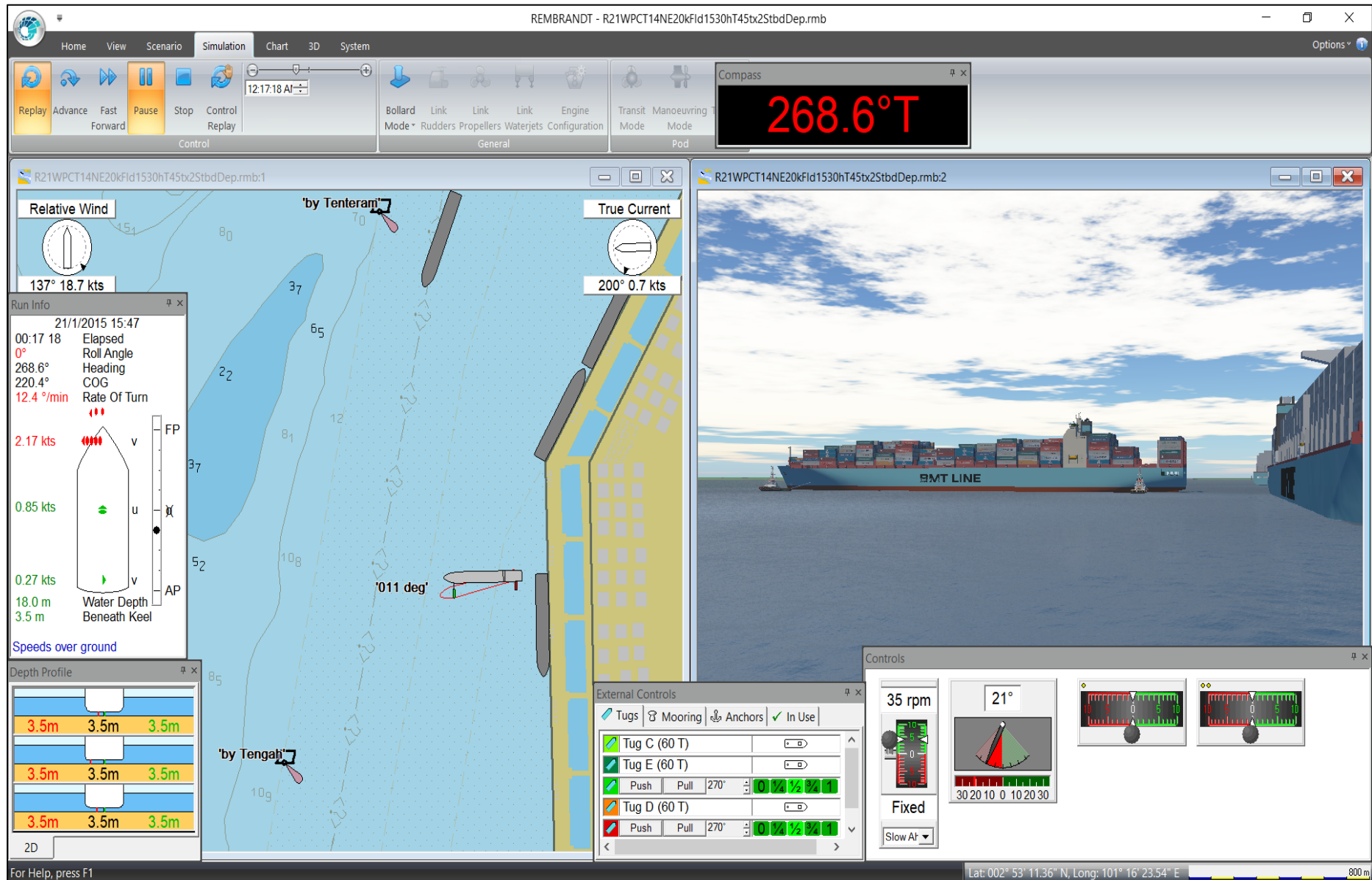




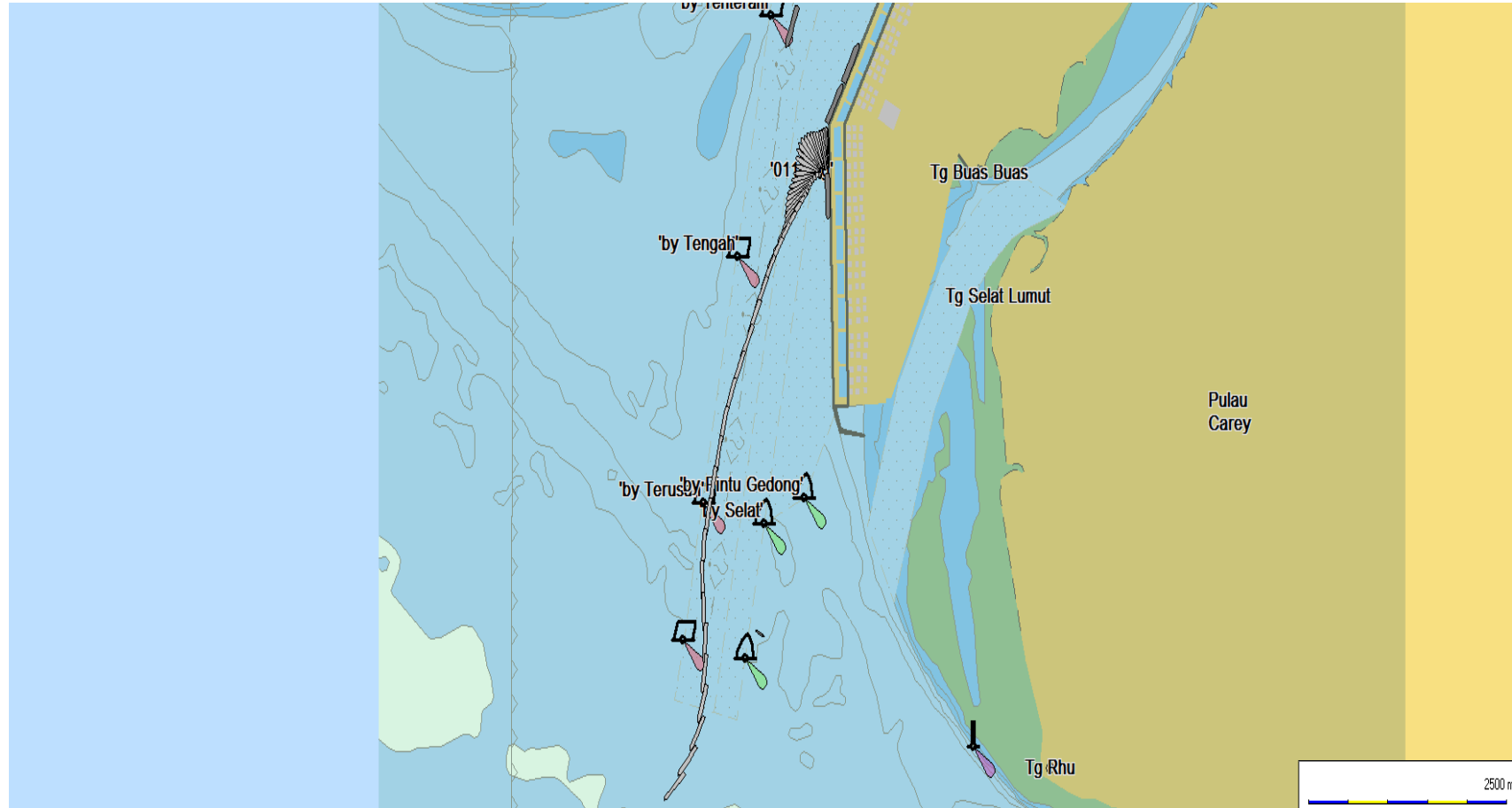




Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
21	R21WPCT14NE20 kFld1530hT45tx2St bdDep.rmb	Flood (1530h)	NE 20 k	Departure (Stbd a/s)	F: 45t A: 45t	The vessel was pulled off the berth using two 45 tons bollard pull tugs operating at Half Power. When off the berth, she was swung to port and departed to sea after the tugs were let go. Minimum available channel clearance: 500 metres.	3/6



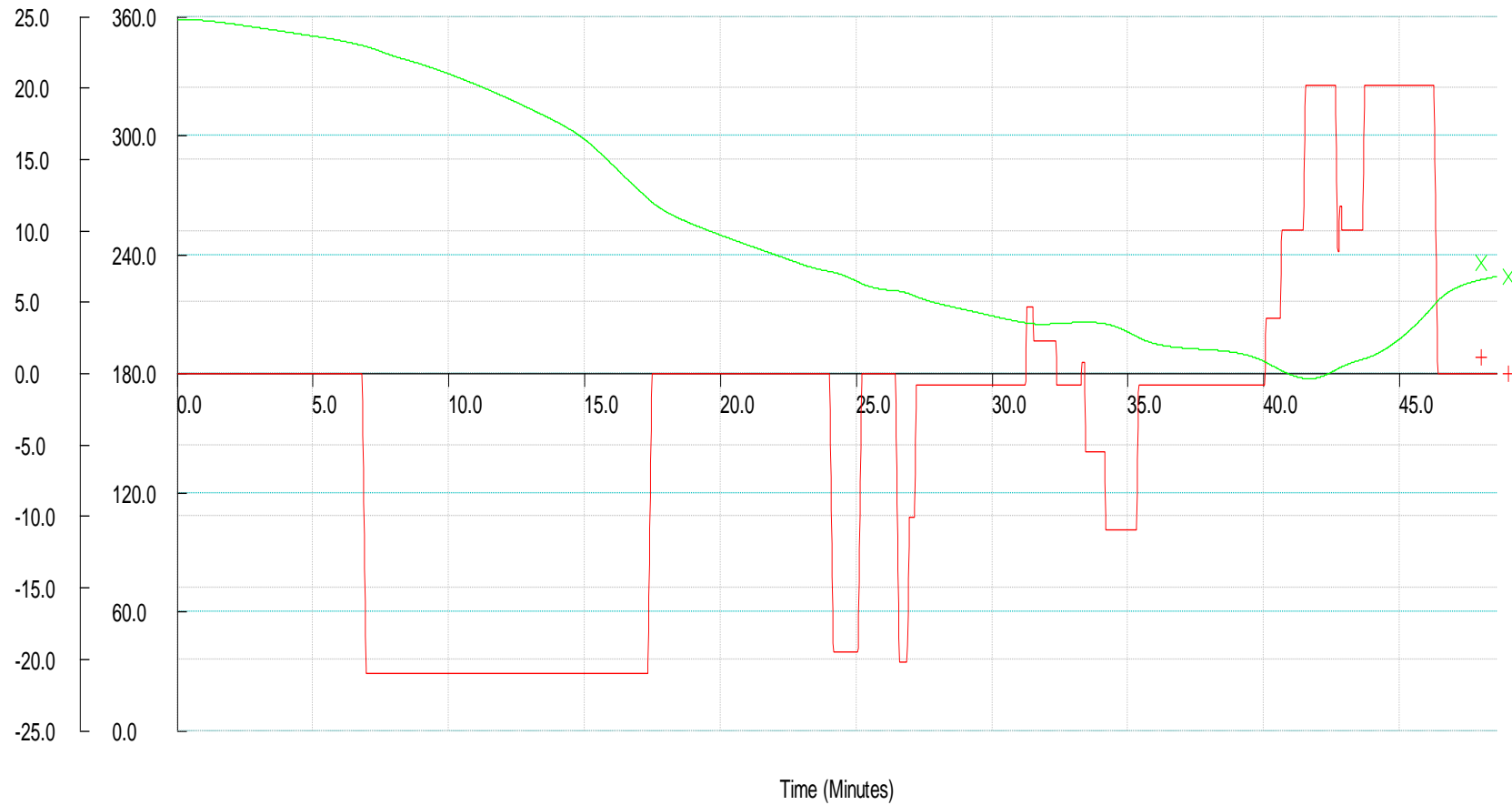
Vessel Track



Vessel: Containership 004
Harbour: World
Created: 16/6/2019 07:47

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

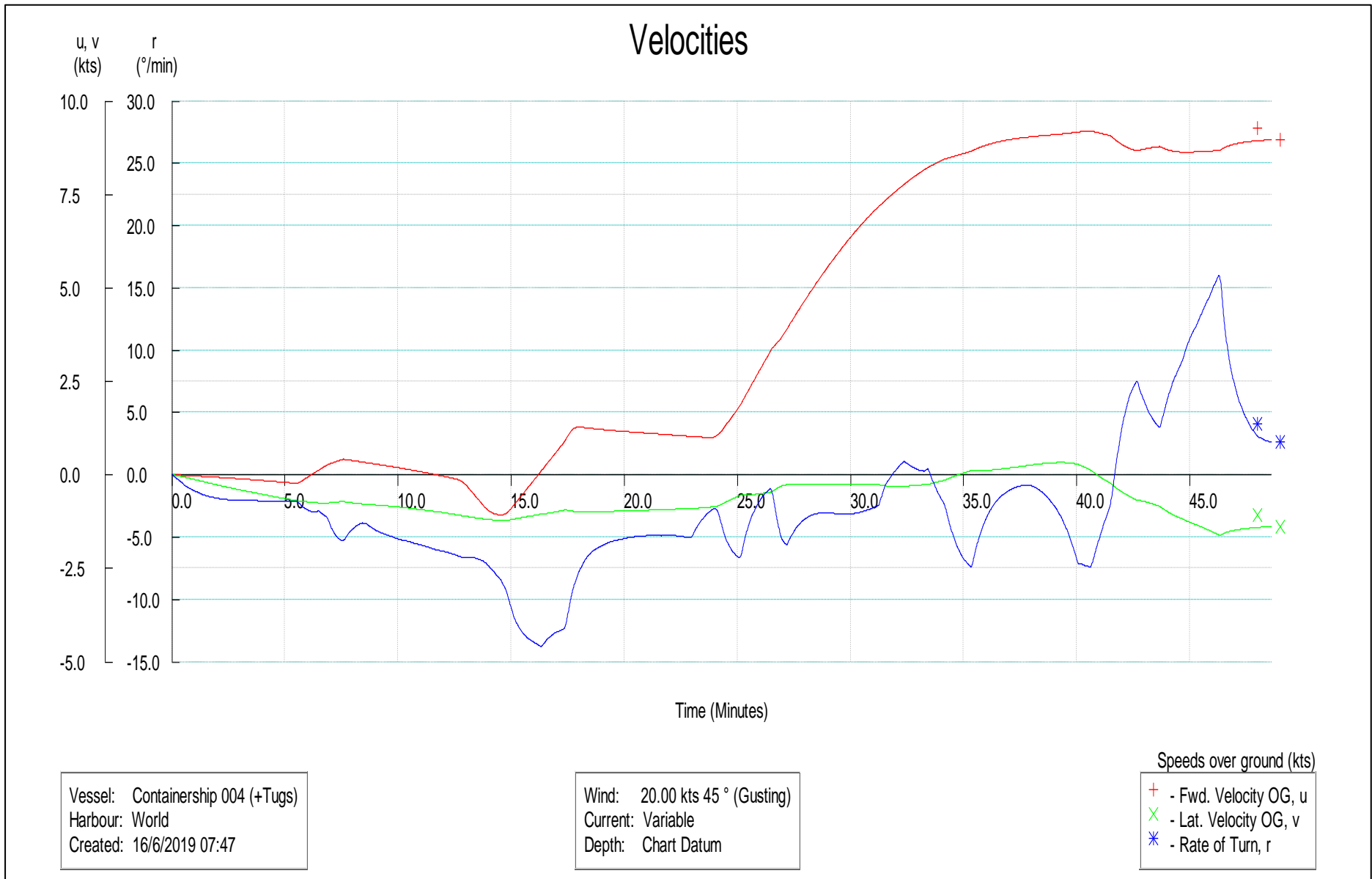
Heading and Rudder

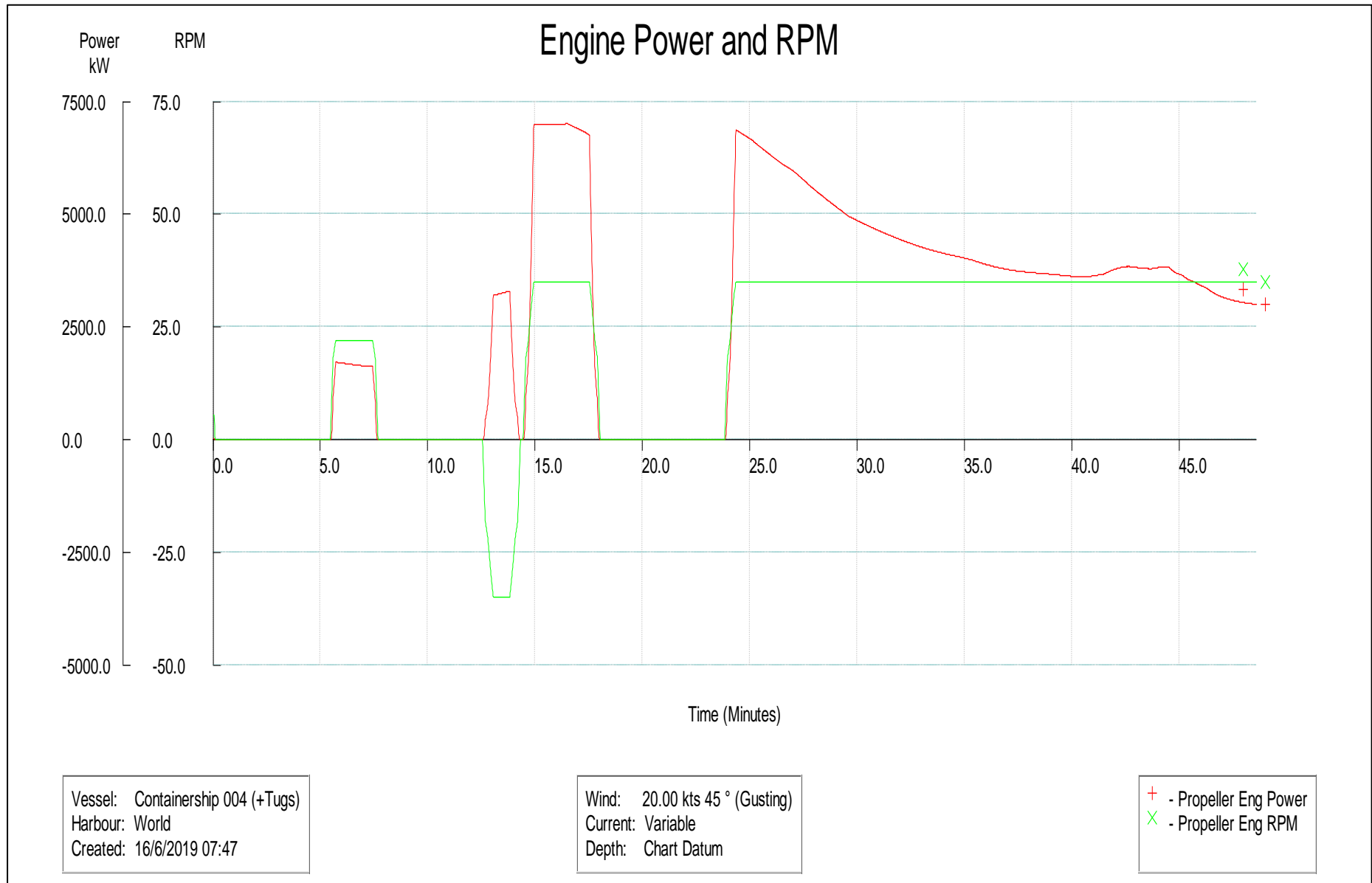


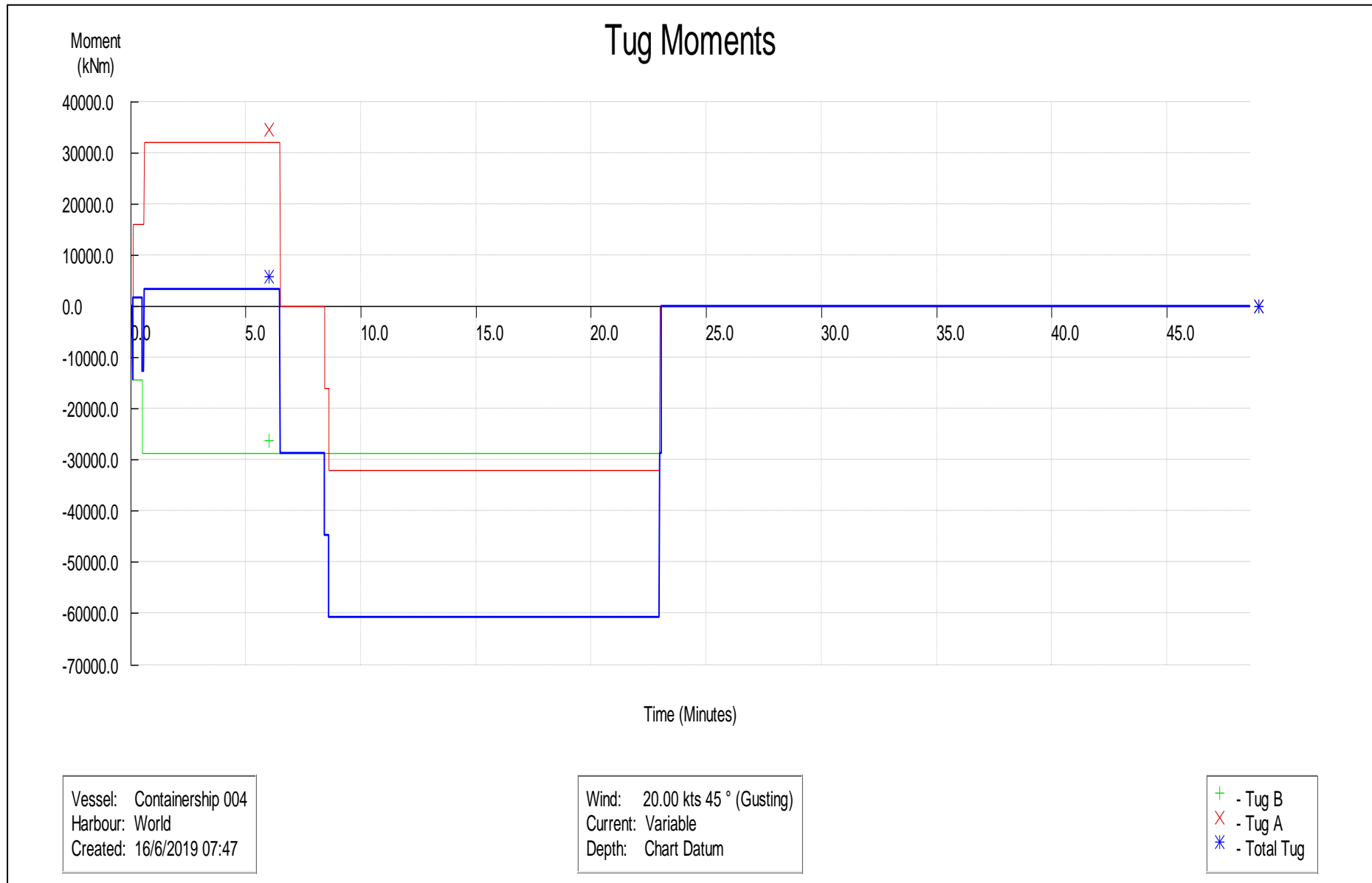
Vessel: Containership 004 (+Tugs)
 Harbour: World
 Created: 16/6/2019 07:47

Wind: 20.00 kts 45 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

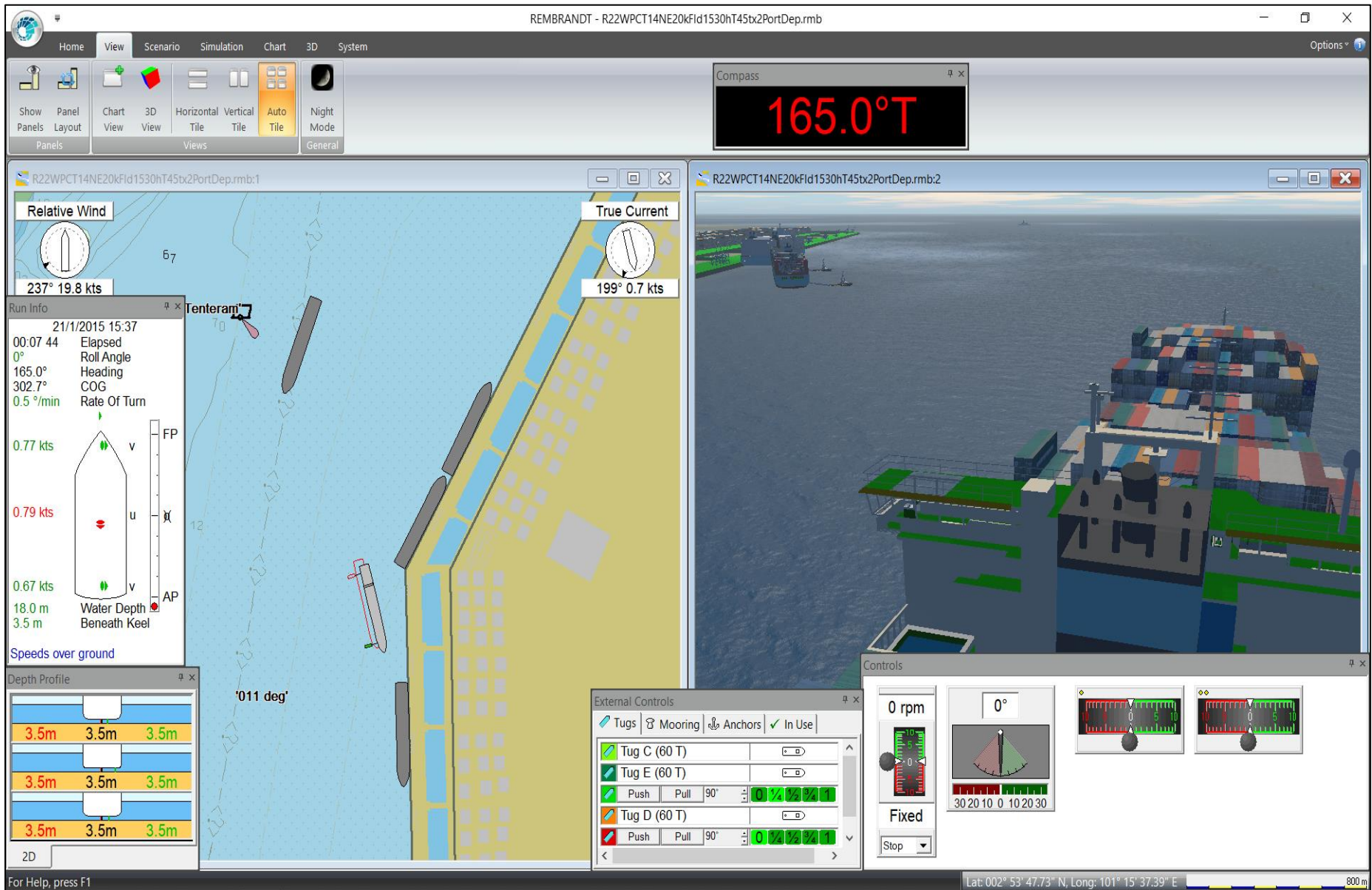
+ - Rudder Rud (°)
 X - Heading



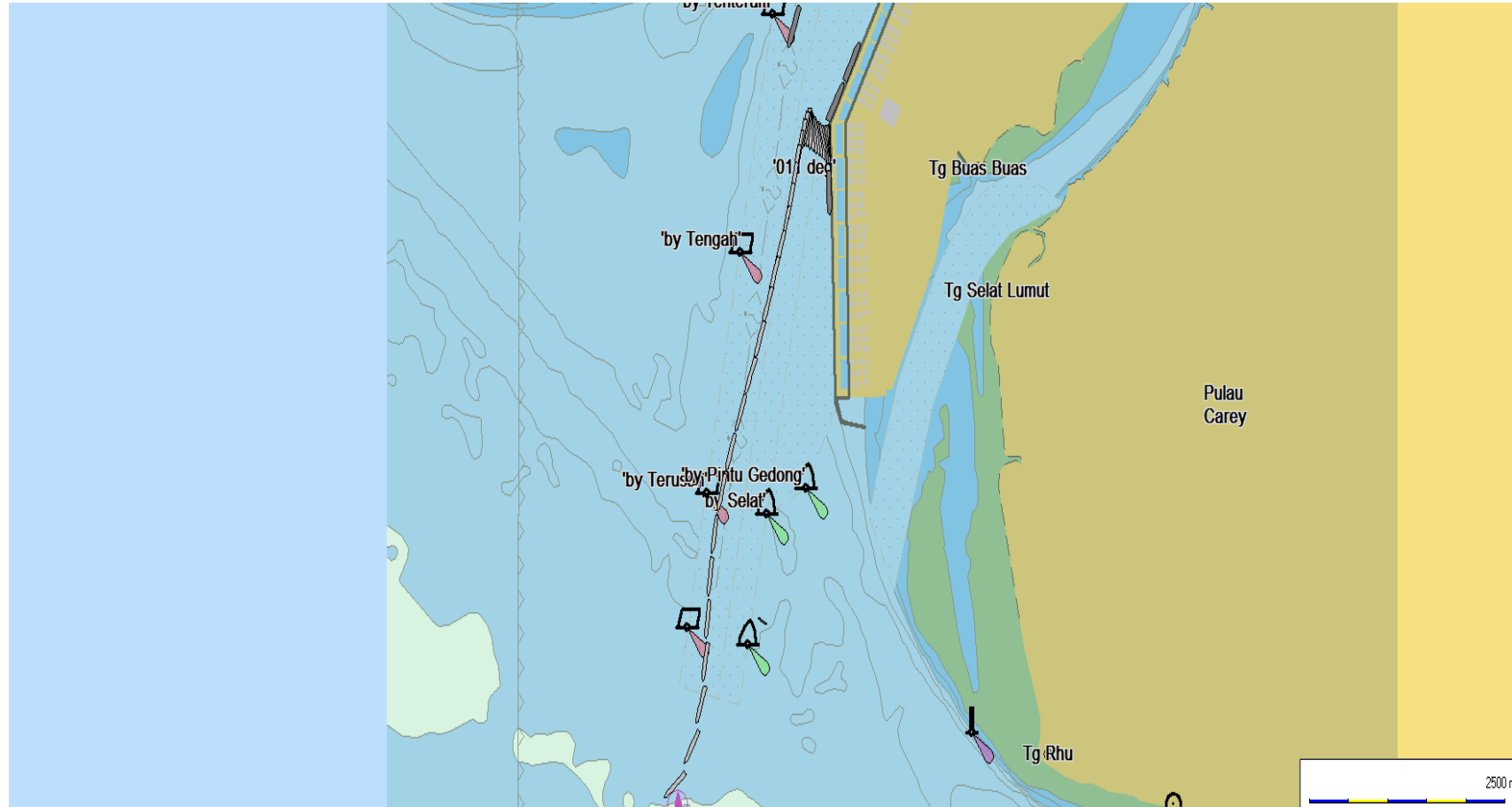




Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
22	R22WPCT14NE20 kFld1530hT45tx2P ortDep.rmb	Flood (1530h)	NE 20 k	Departure (Port a/s)	F: 45t A: 45t	The vessel was pulled off the berth using two 45 tons bollard pull tugs operating at Half Power. When off the berth, the tugs were let go and she departed to sea.	3/6



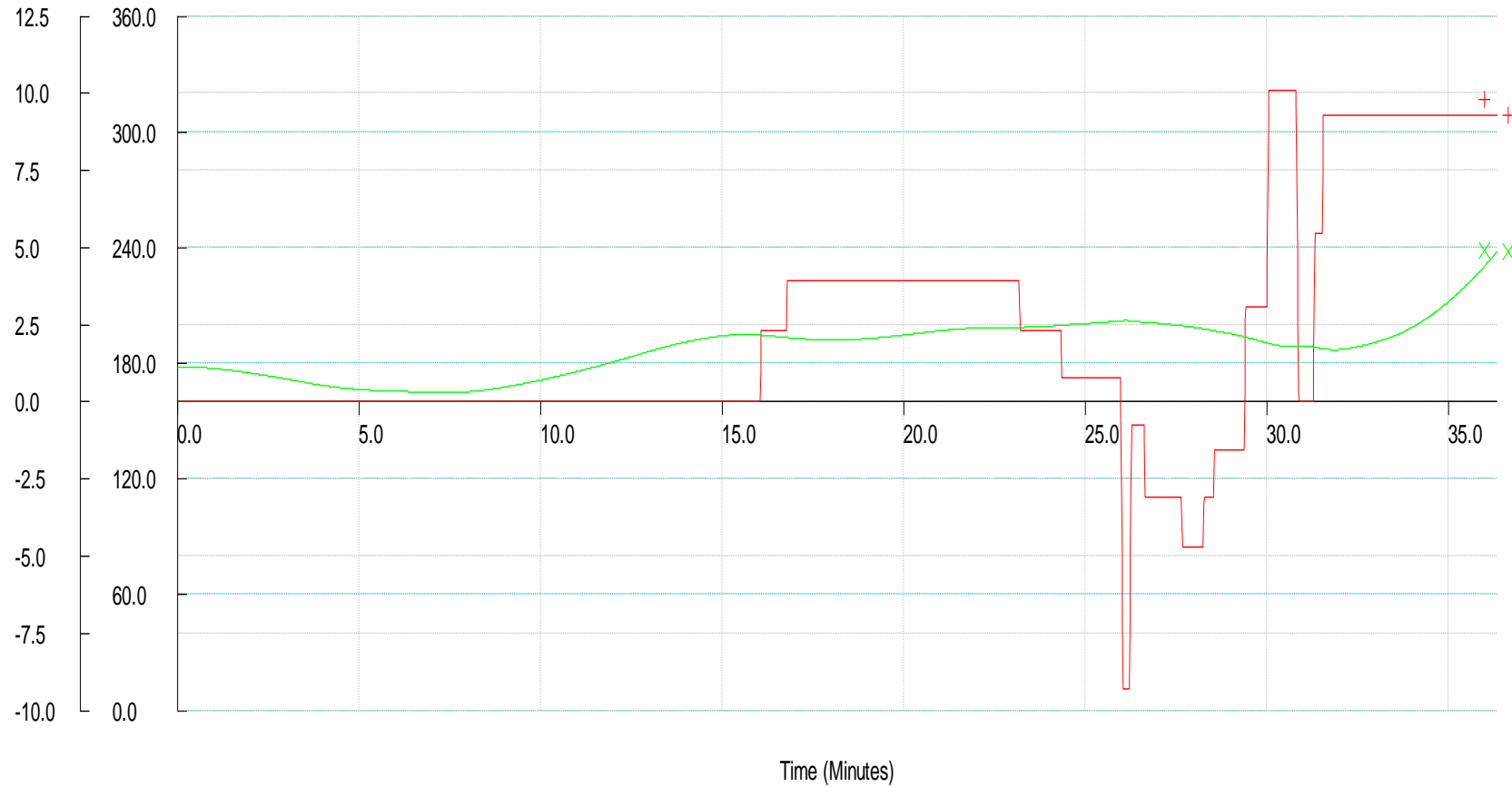
Vessel Track



Vessel: Containership 004
Harbour: World
Created: 16/6/2019 16:22

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

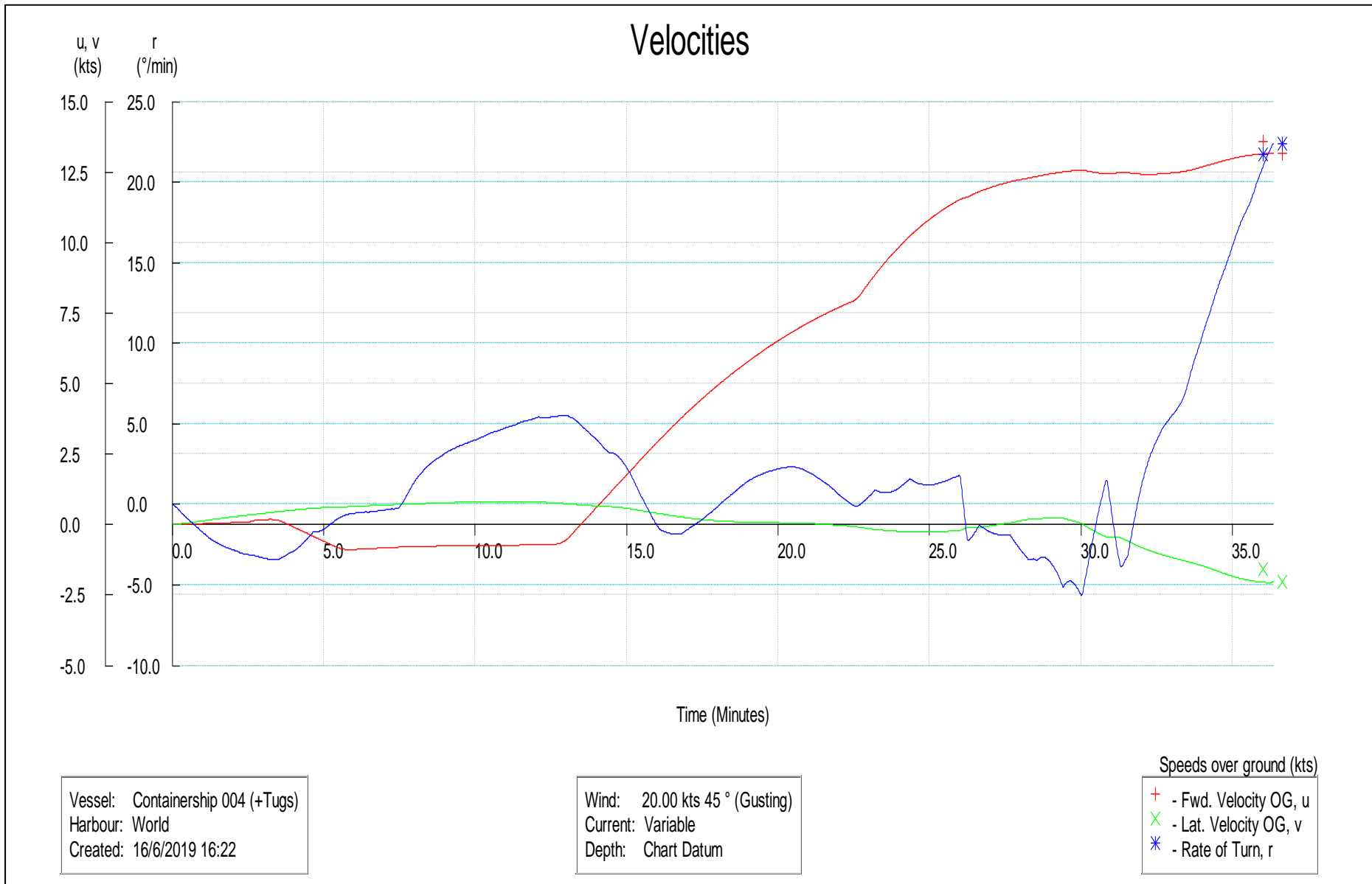
Heading and Rudder

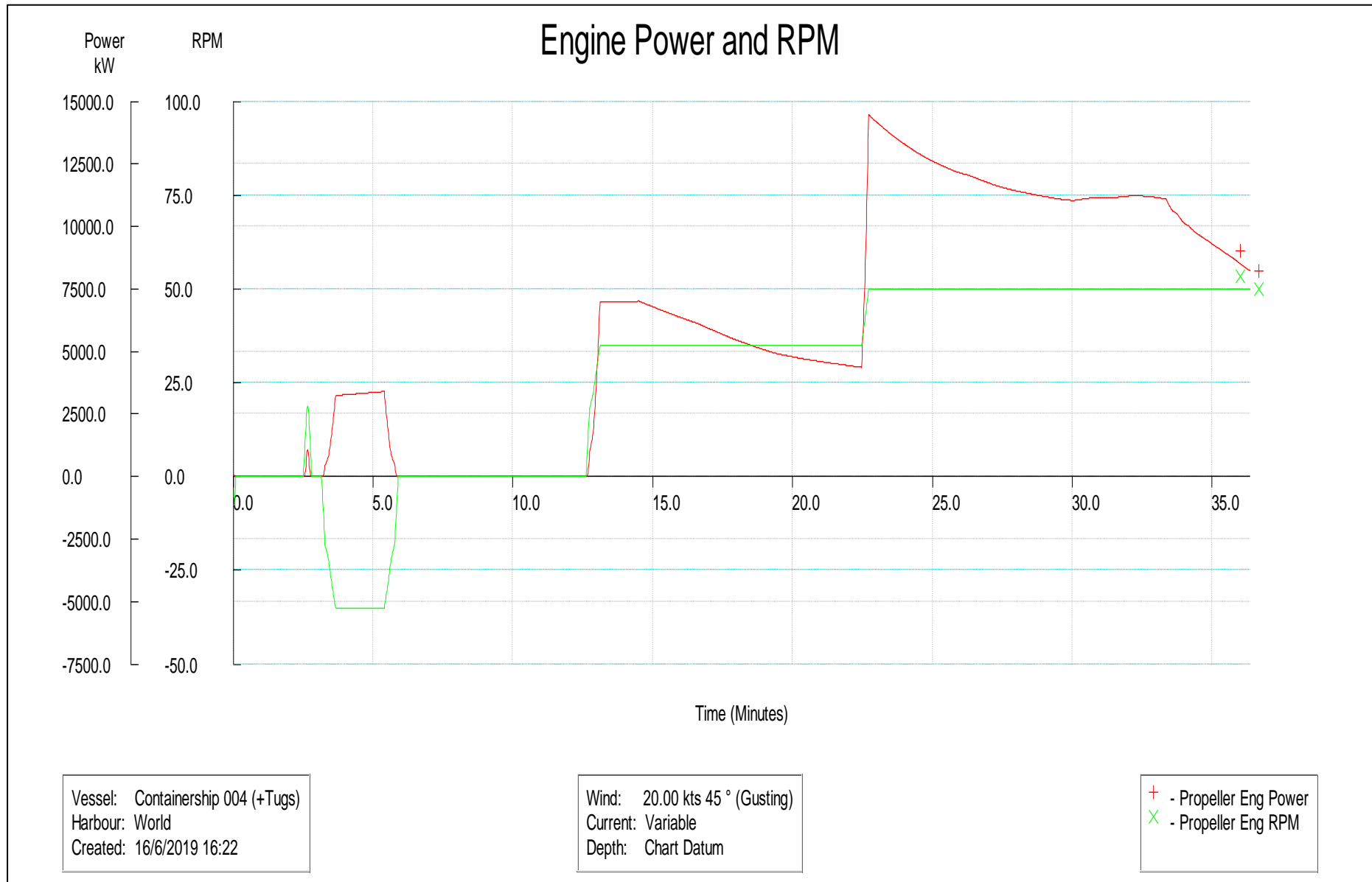


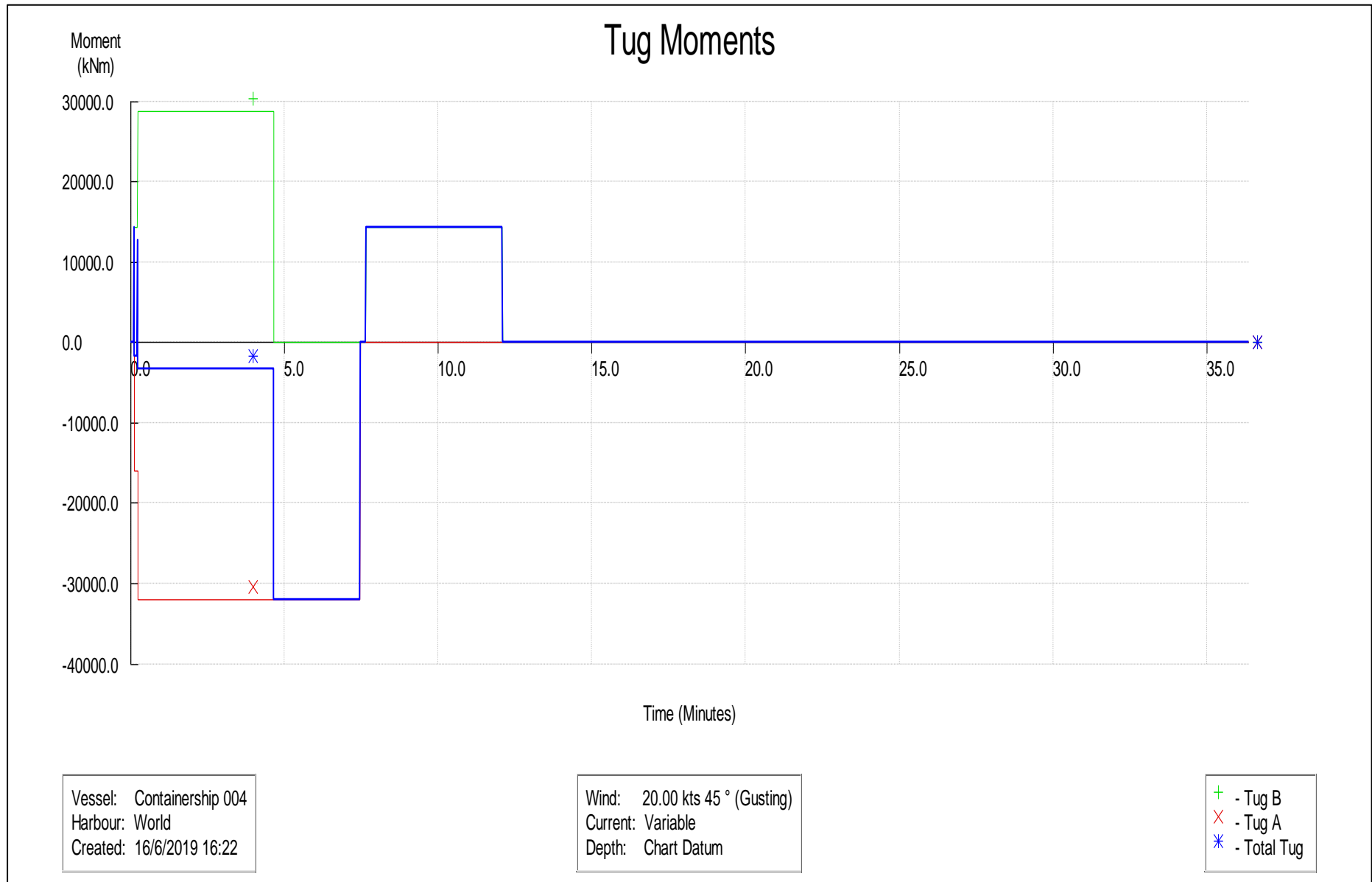
Vessel: Containership 004 (+Tugs)
 Harbour: World
 Created: 16/6/2019 16:22

Wind: 20.00 kts 45 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

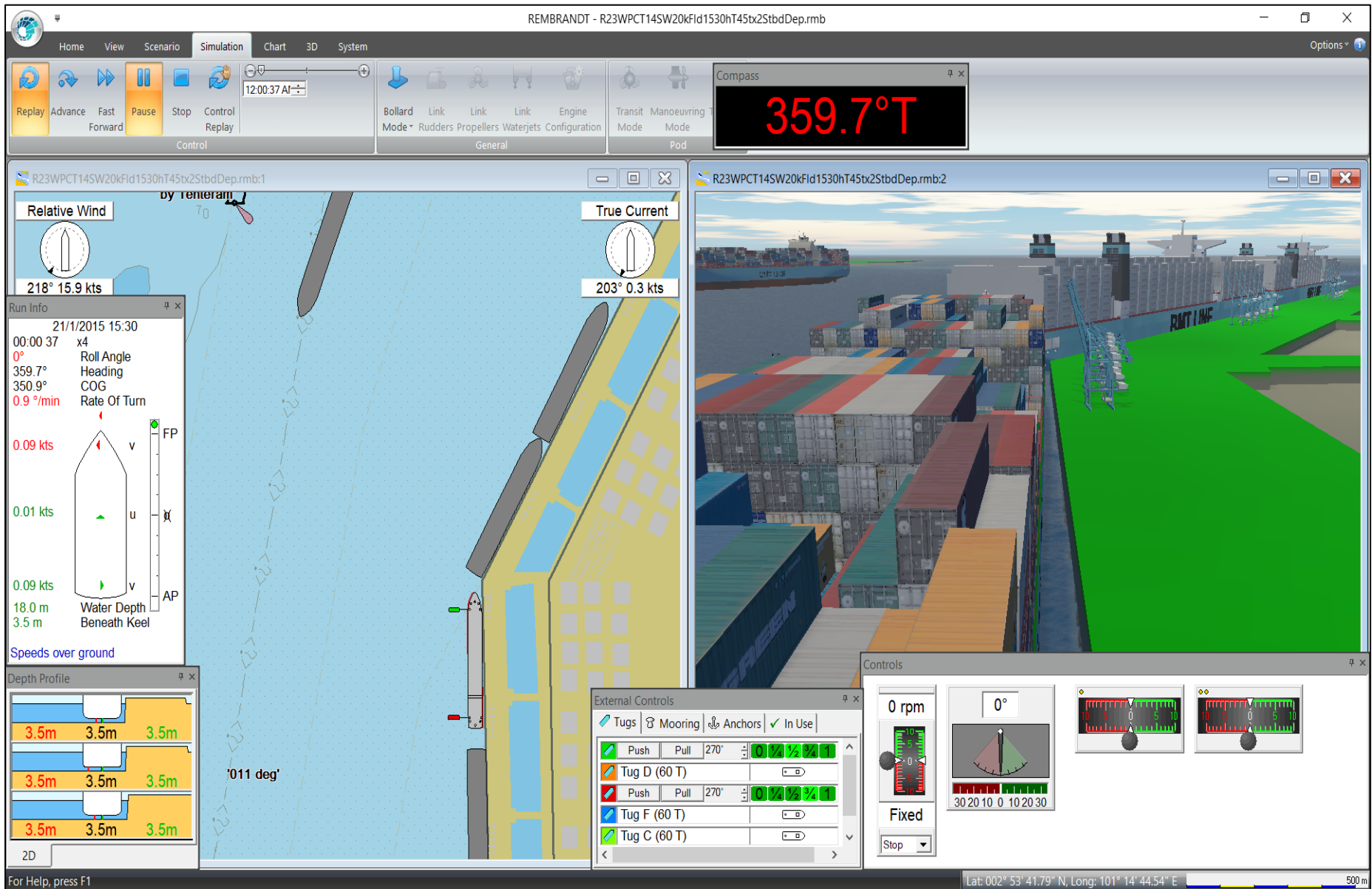
+ - Rudder Rud (°)
 x - Heading



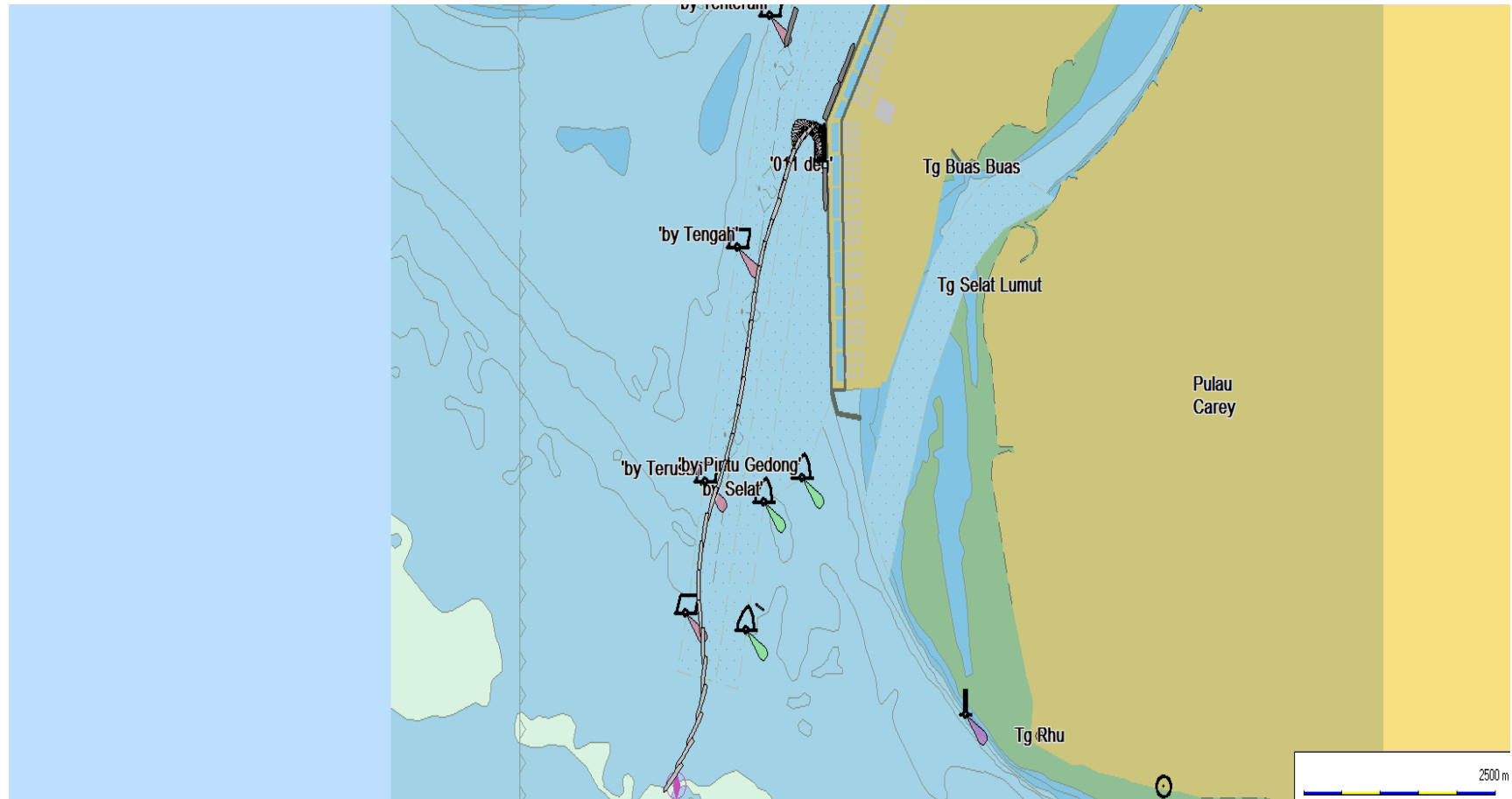




Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
23	R23WPCT14SW20 kFld1530hT45tx2St bdDep.rmb	Flood (1530h)	SW 20 k	Departure (Stbd a/s)	F: 45t A: 45t	The vessel was pulled off the berth using two 45 tons bollard pull tugs and swung to port before proceeding to sea. The aft tug had to operate at $\frac{3}{4}$ Power in the initial stage of unberthing to pull the vessel off the berth. Minimum available channel clearance: 500 metres.	3/6



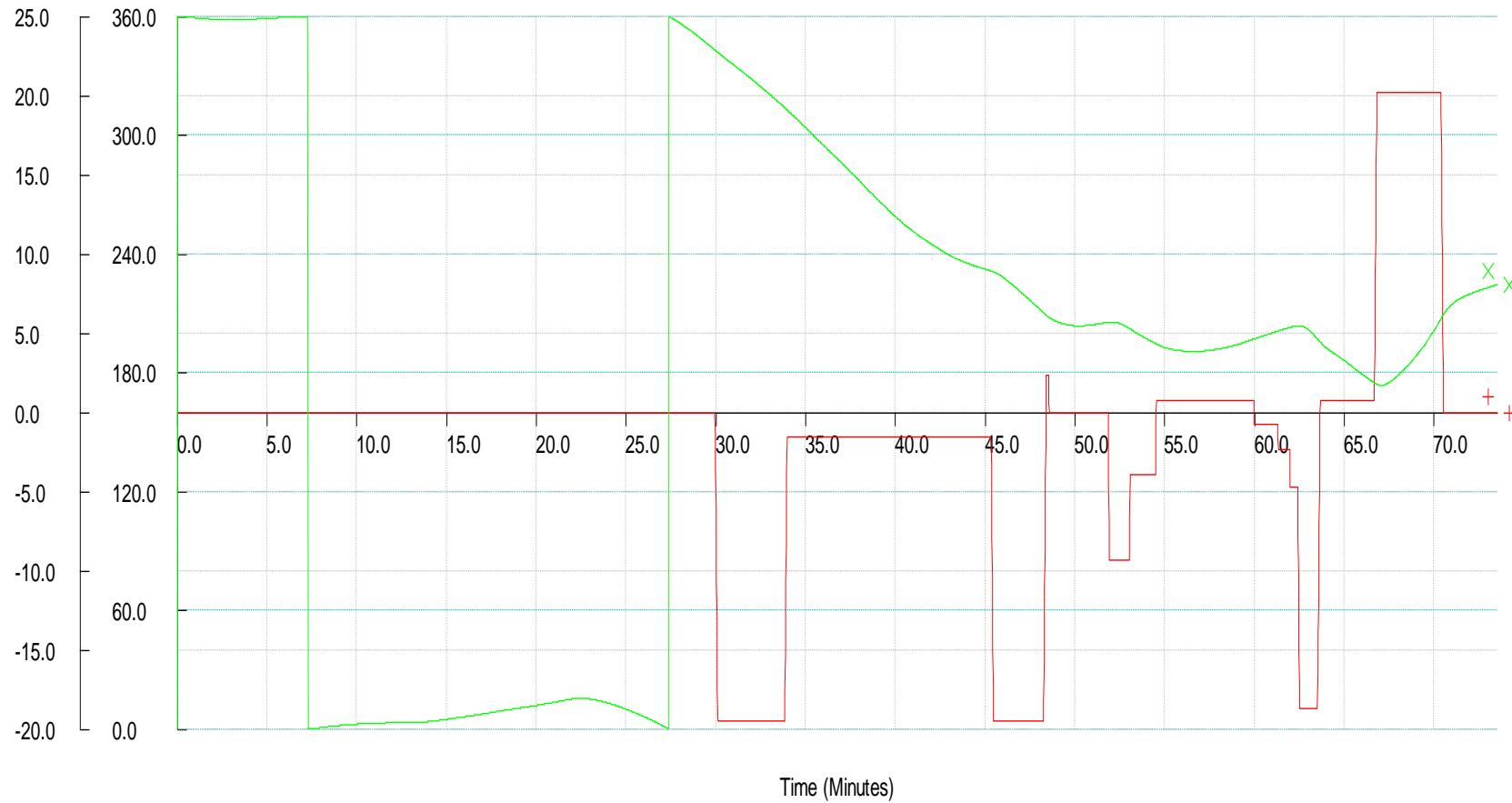
Vessel Track



Vessel: Containership 004
Harbour: World
Created: 16/6/2019 16:42

Wind: 20.00 kts 225° (Gusting)
Current: Variable
Depth: Chart Datum

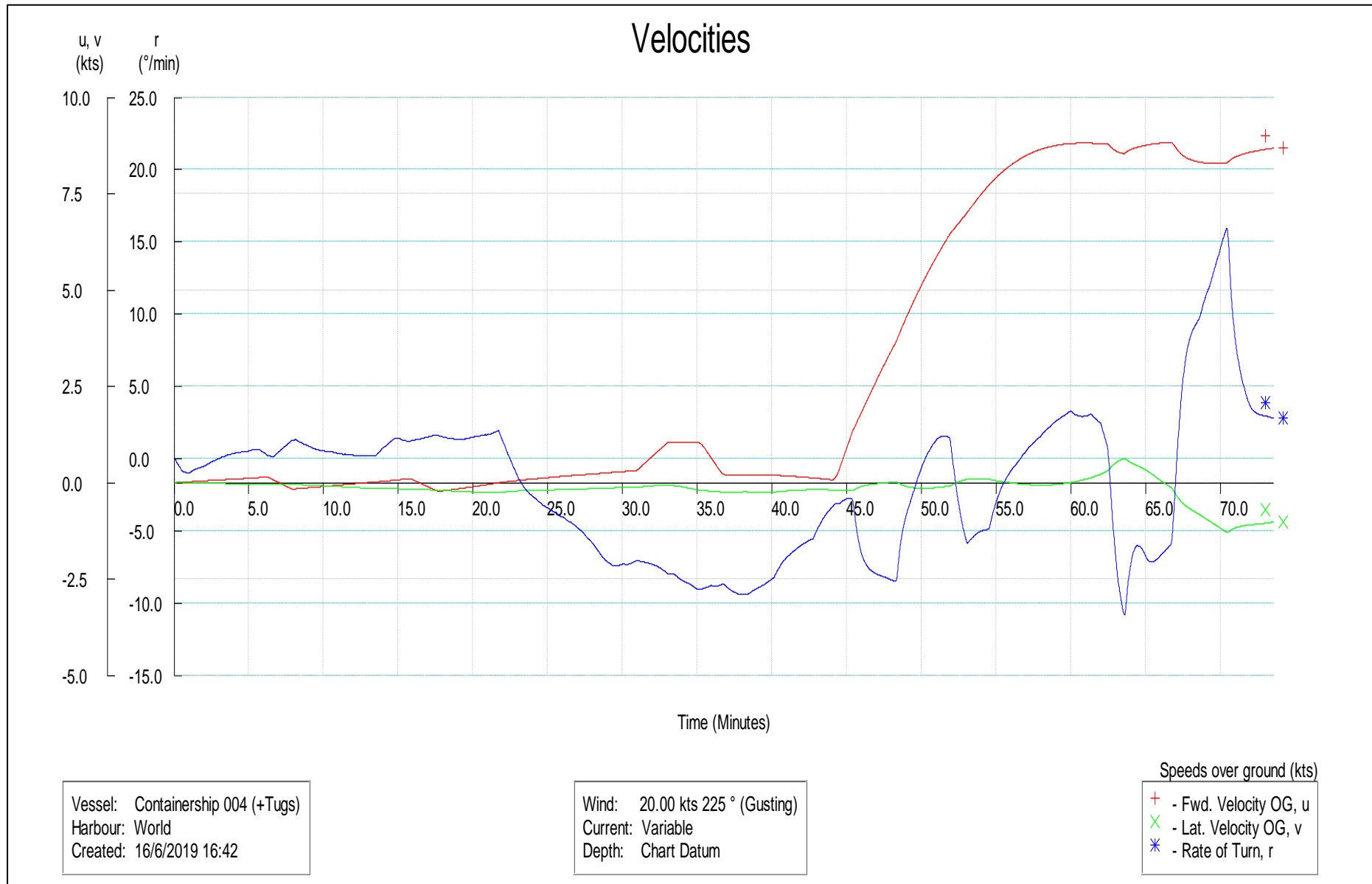
Heading and Rudder

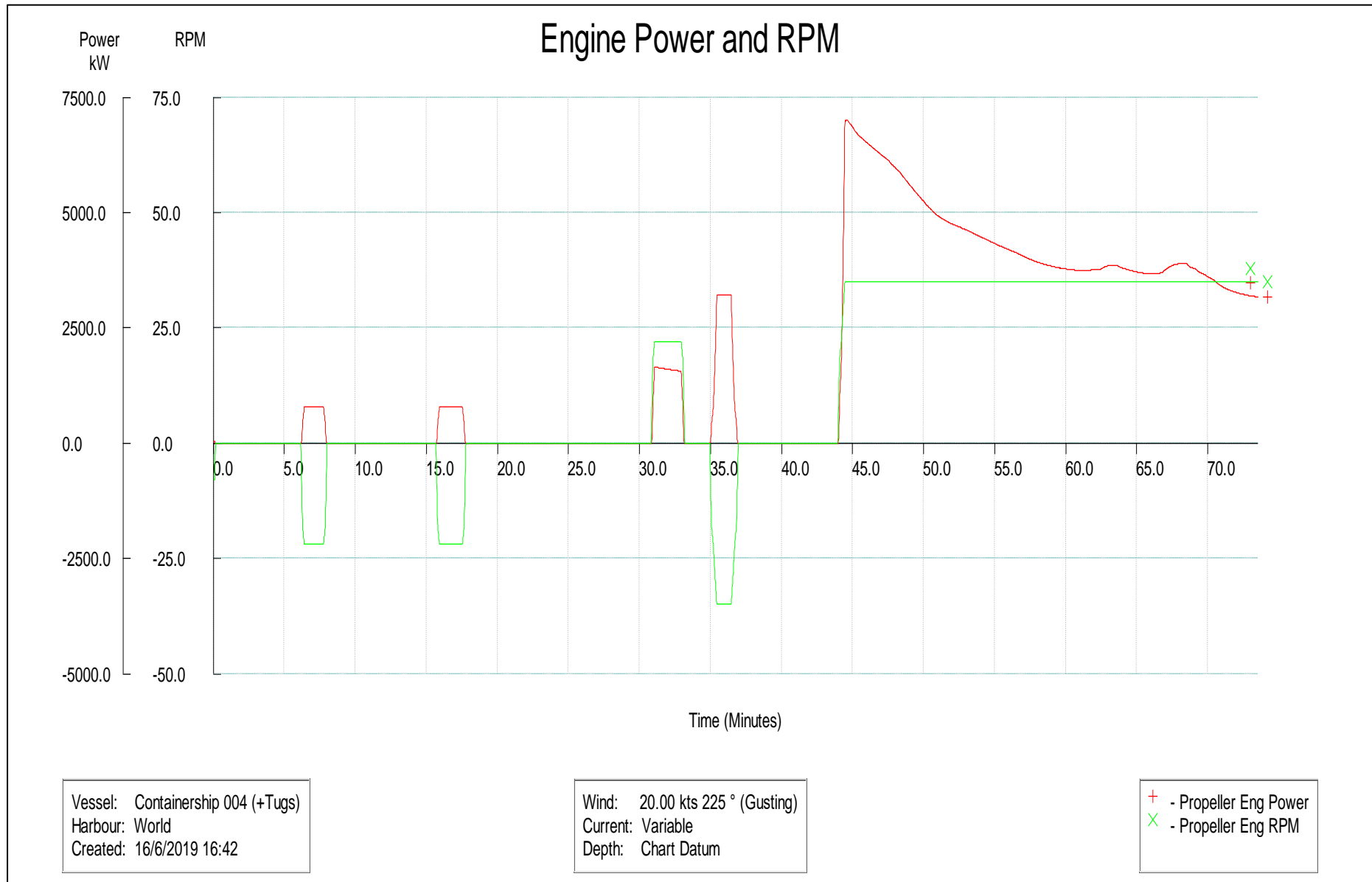


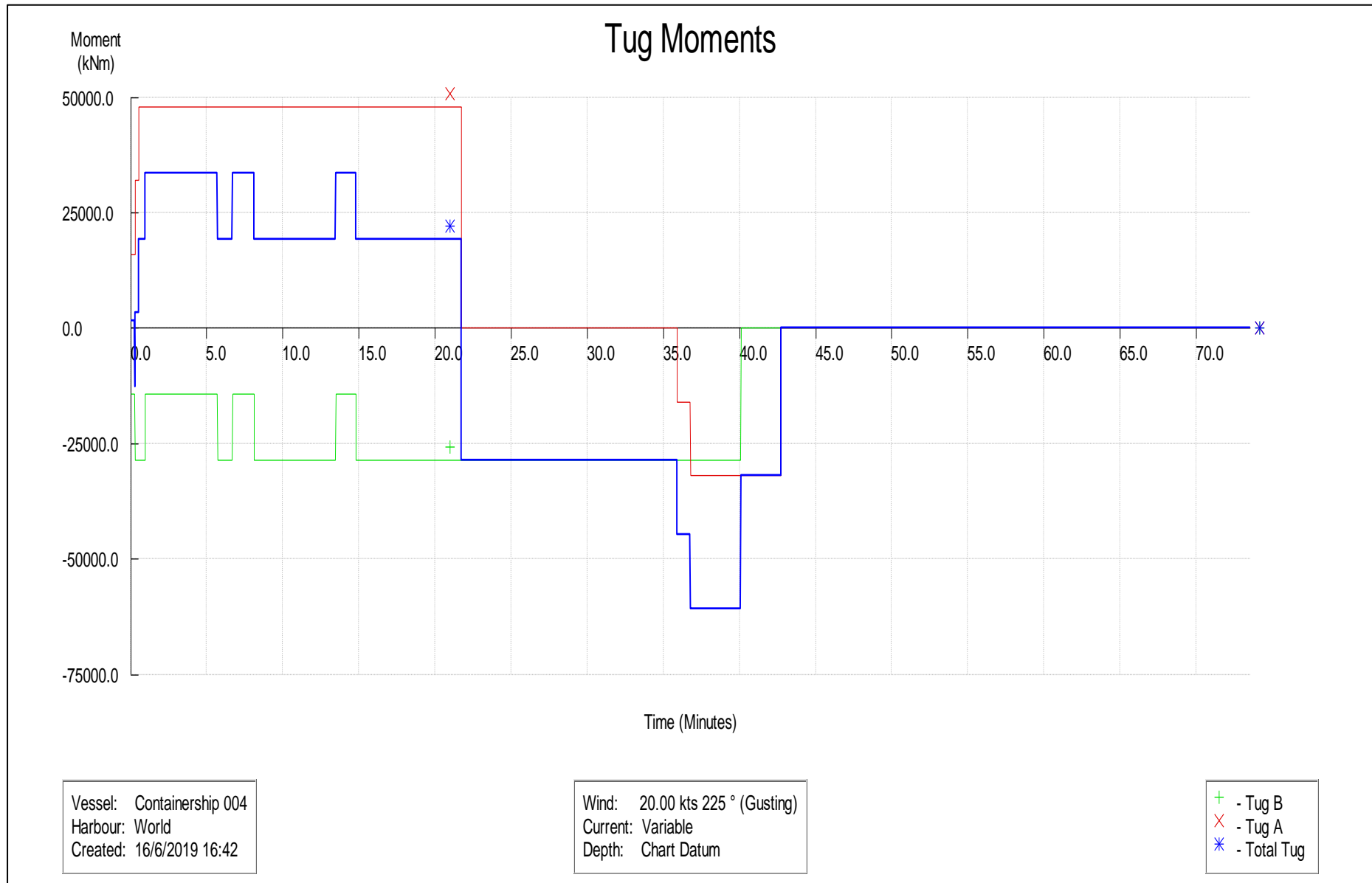
Vessel: Containership 004 (+Tugs)
 Harbour: World
 Created: 16/6/2019 16:42

Wind: 20.00 kts 225 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

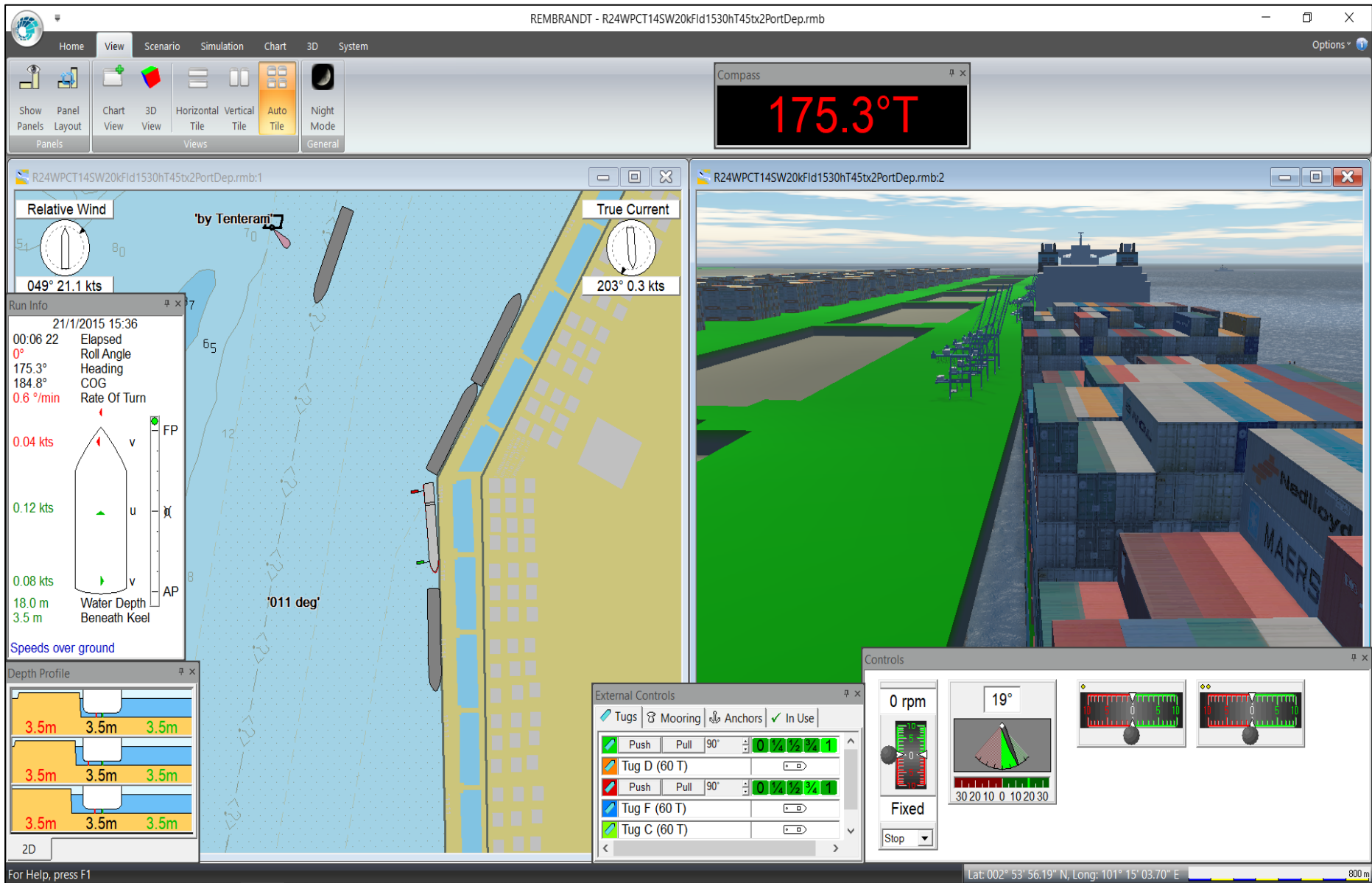
+ - Rudder Rud (°)
 X - Heading



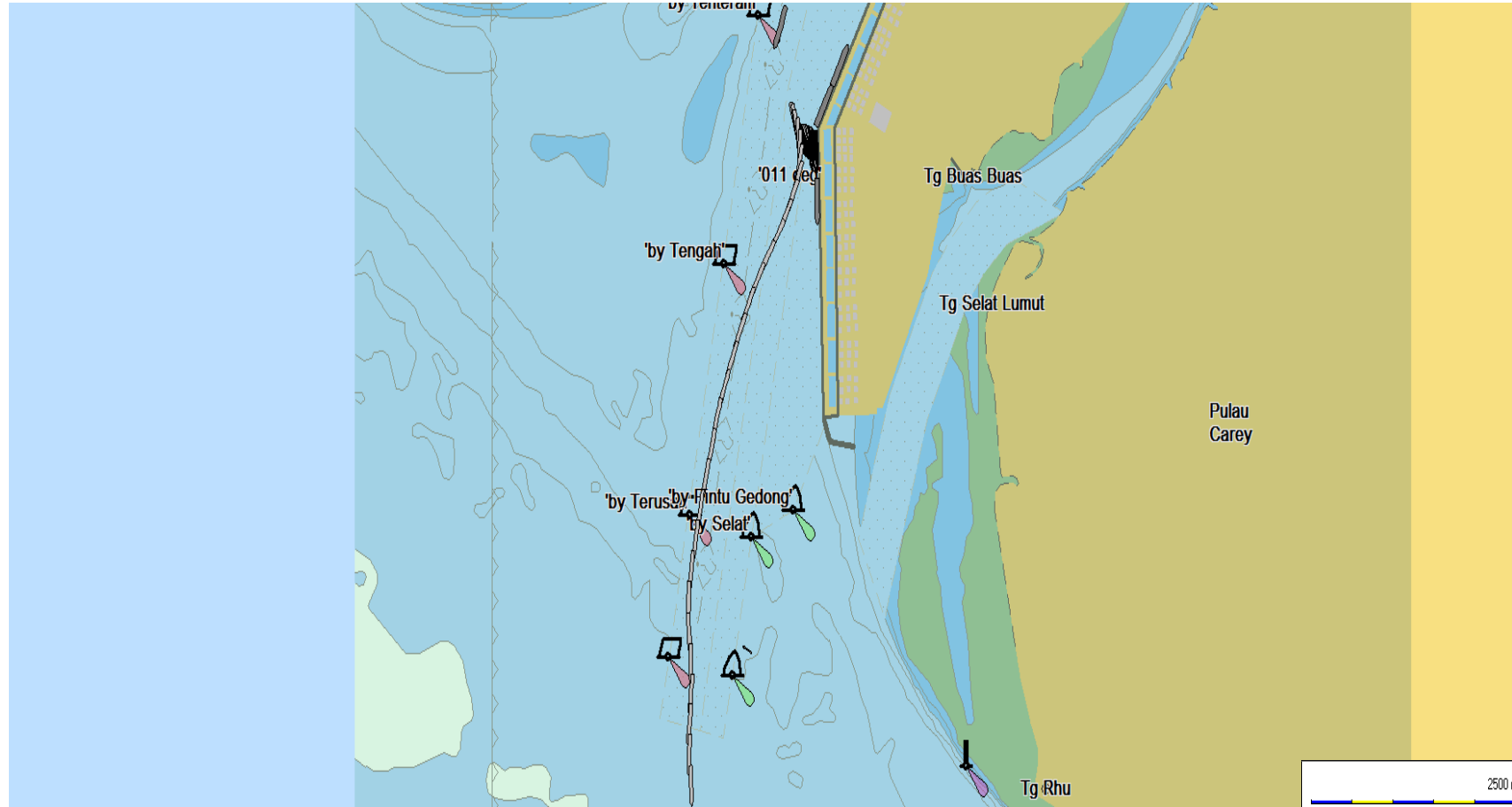




Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
24	R24WPCT14SW20 kFld1530hT45tx2P ortDep.rmb	Flood (1530h)	SW 20 k	Departure (Port a/s)	F: 45t A: 45t	The vessel was pulled off the berth using two 45 tons bollard pull tugs. The forward tug had to operate at a maximum of Full Power and the aft tug $\frac{3}{4}$ Power to pull the vessel off the berth. When off the berth, the stern was opened to the current before pulling the bow around. The tugs were then let go and the vessel departed to sea. The bow thruster was not used.	4/6



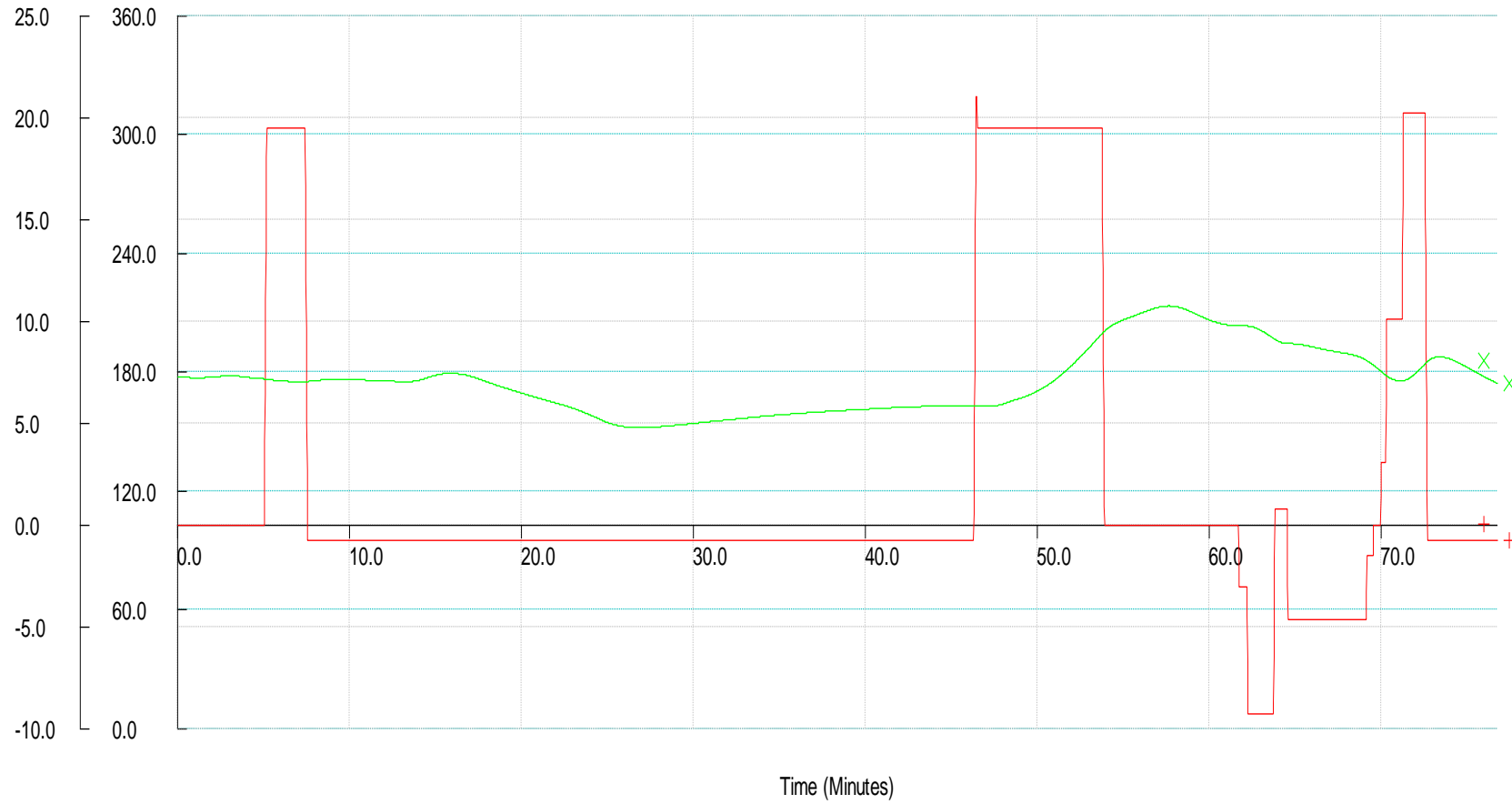
Vessel Track



Vessel: Containership 004
Harbour: World
Created: 16/6/2019 17:08

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

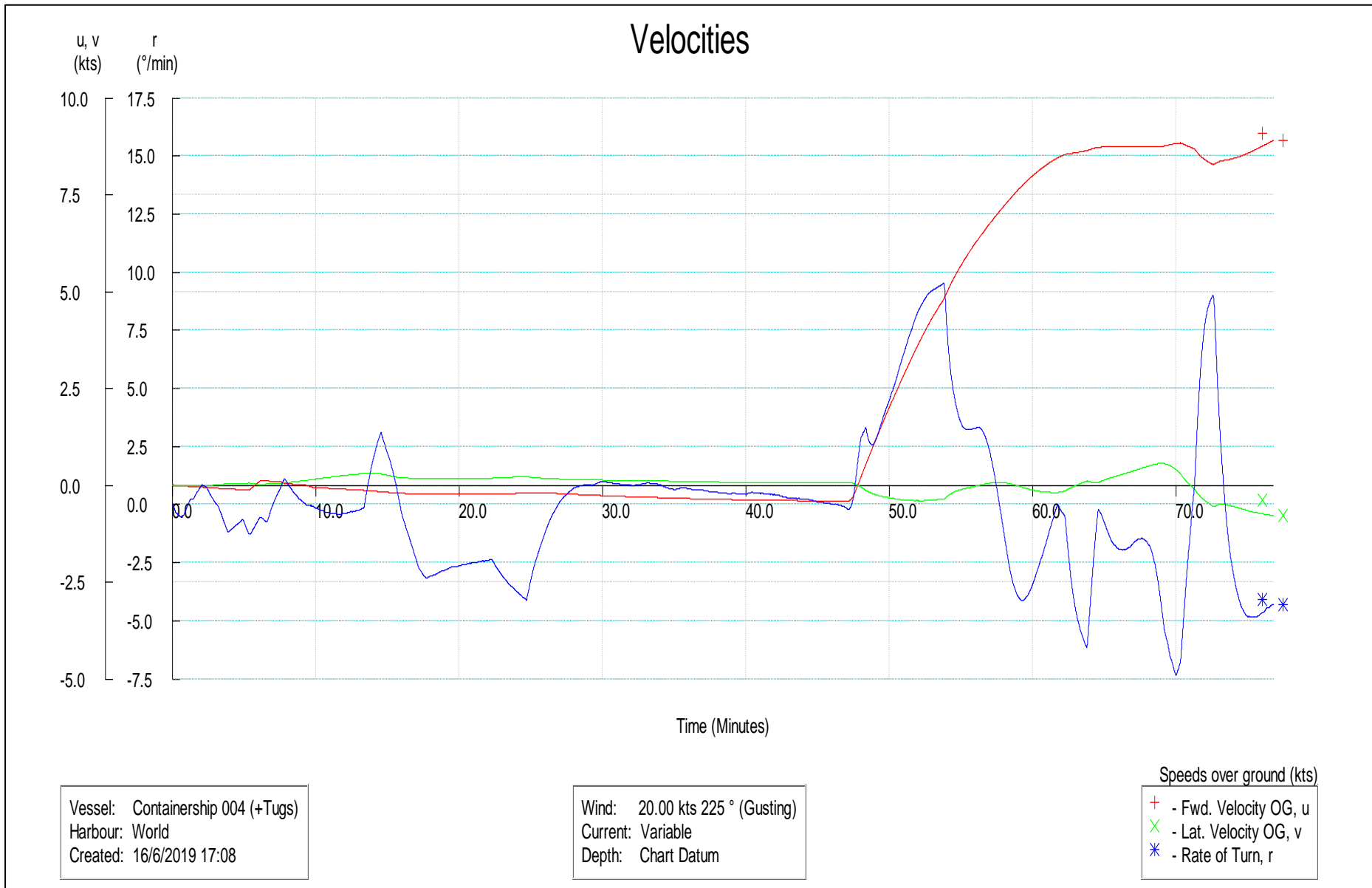
Heading and Rudder

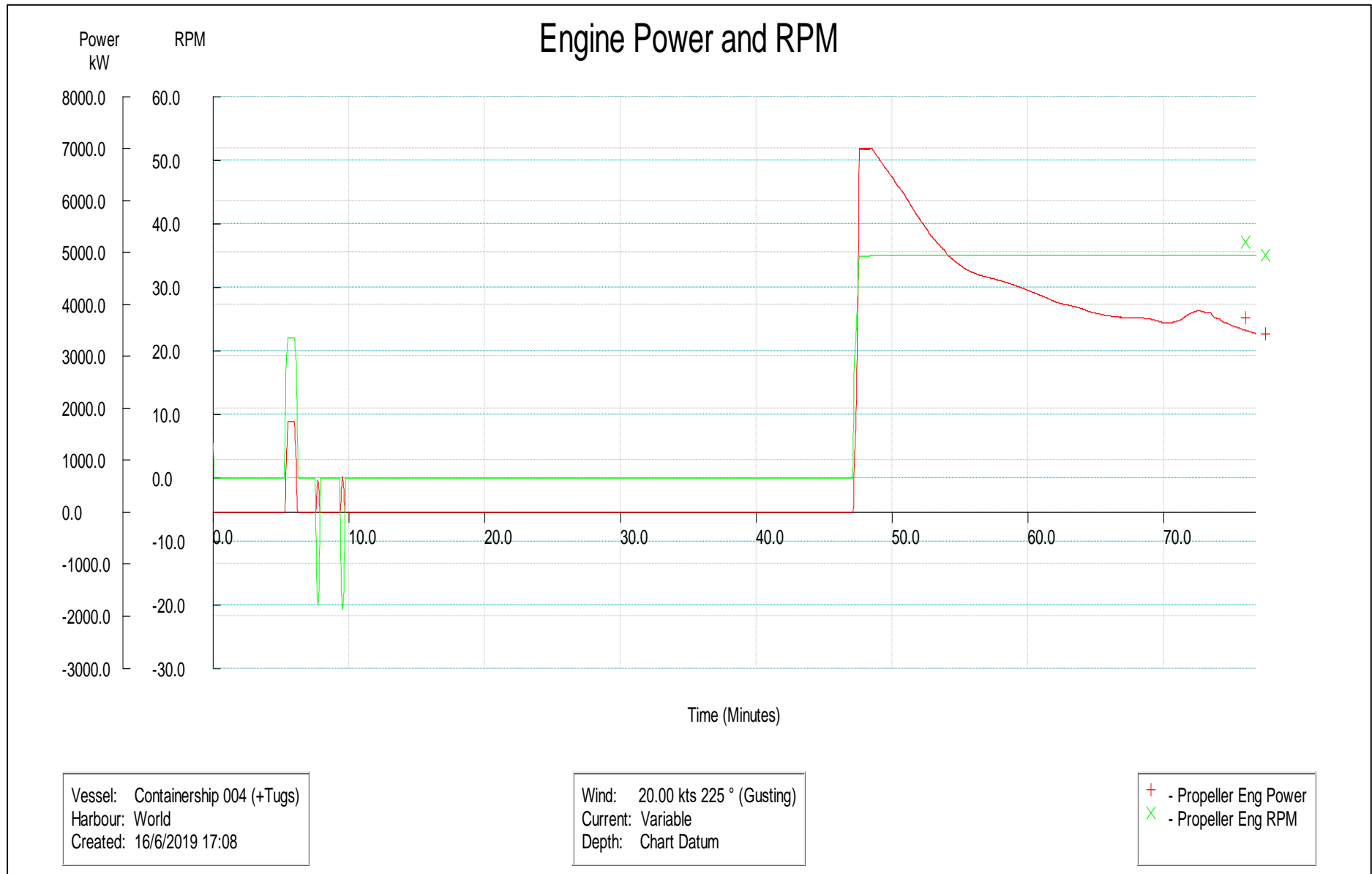


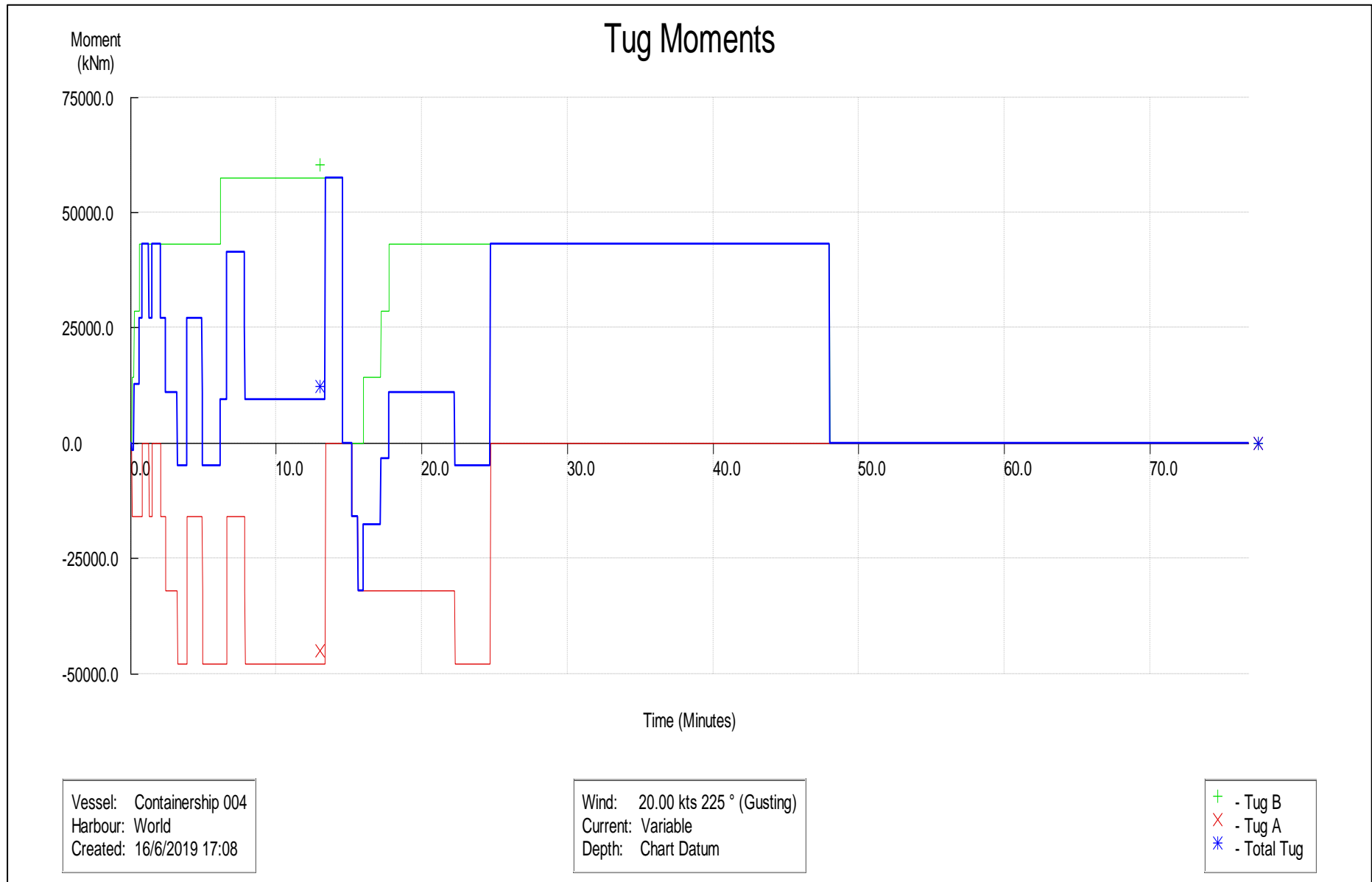
Vessel: Containership 004 (+Tugs)
 Harbour: World
 Created: 16/6/2019 17:08

Wind: 20.00 kts 225 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

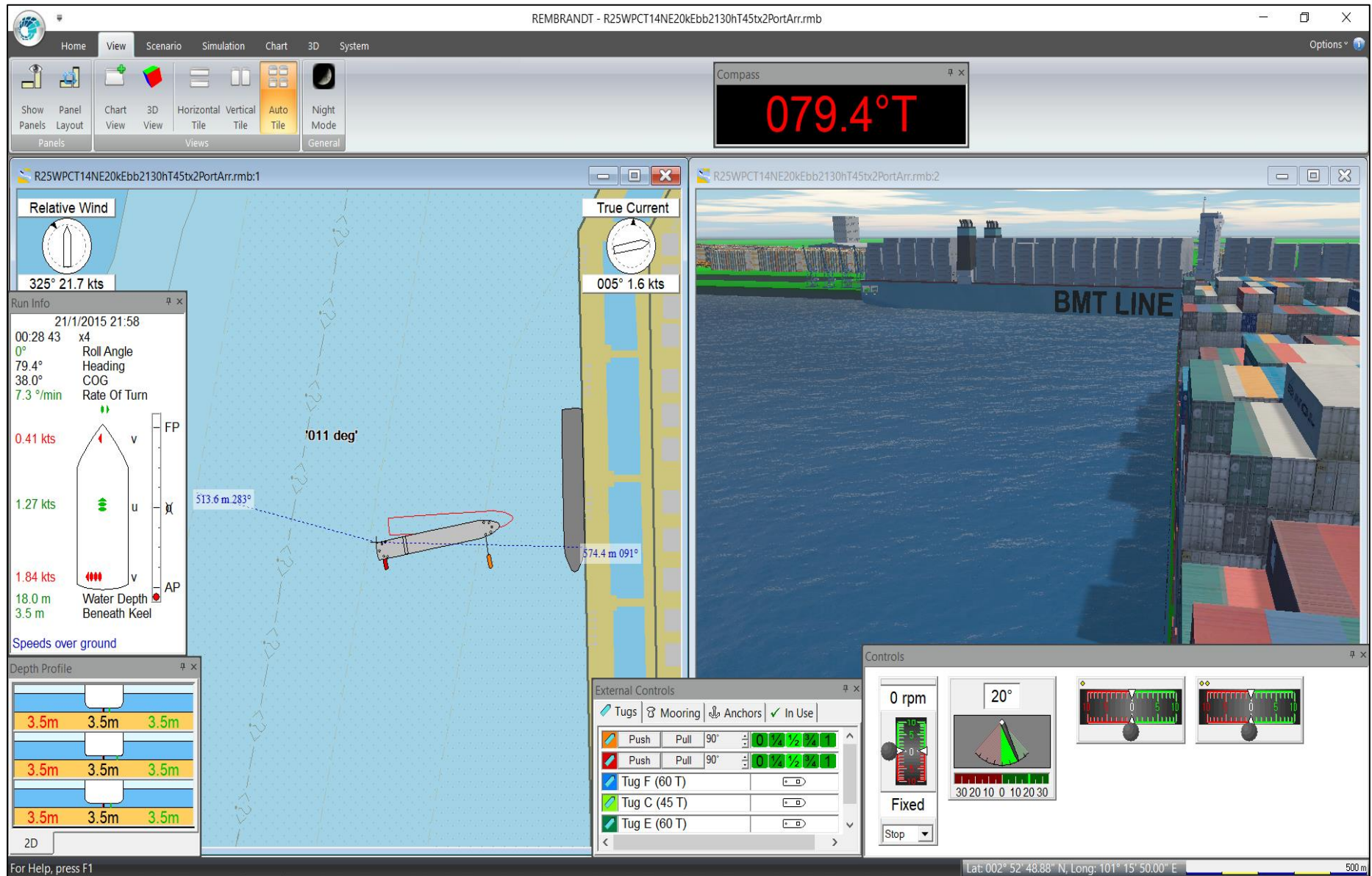
+ - Rudder Rud (°)
 X - Heading







Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
25	R25WPCT14NE20 kEbb2130hT45tx2P ortArr.rmb	Ebb (2130h)	NE 20 k	Arrival (Port a/s)	F: 45t A: 45t	<p>The vessel entered the channel at Half Ahead keeping close to the starboard side. The engine speed was reduced to Dead Slow Ahead before passing the re-located Selat Buoy and shortly after the engine was stopped and put Half Astern. The vessel carried her way up to CT-15 and when almost stopped, a starboard turn was executed. After turning around, she was backed to berth portside-to. The aft tug had to work at Full Power to push the vessel against the 20 knots NE wind and in the final stage of berthing.</p> <p>Minimum available channel width: 510m</p>	4/6



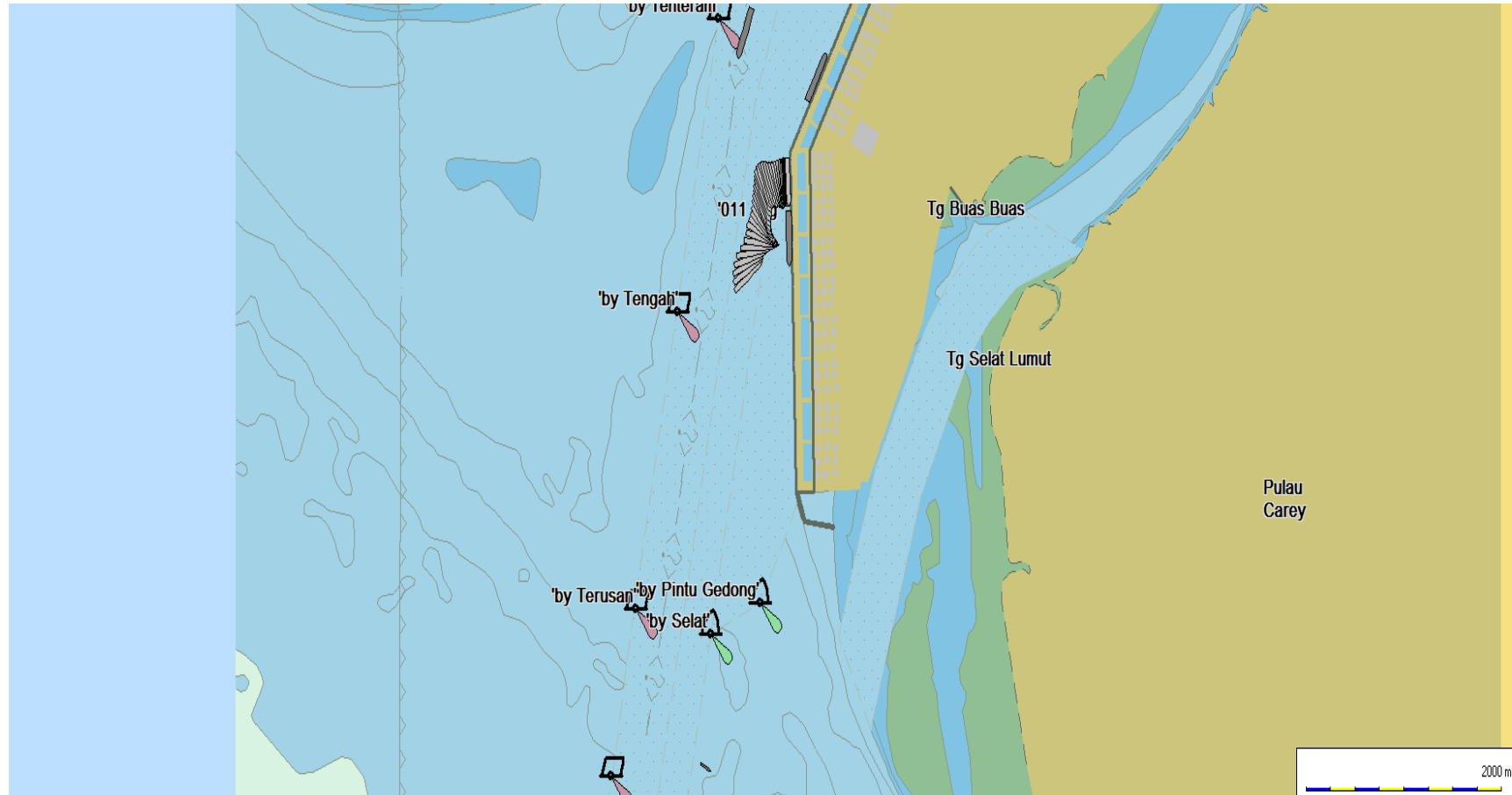
Vessel Track



Vessel: Containership 004
Harbour: World
Created: 9/6/2019 14:51

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

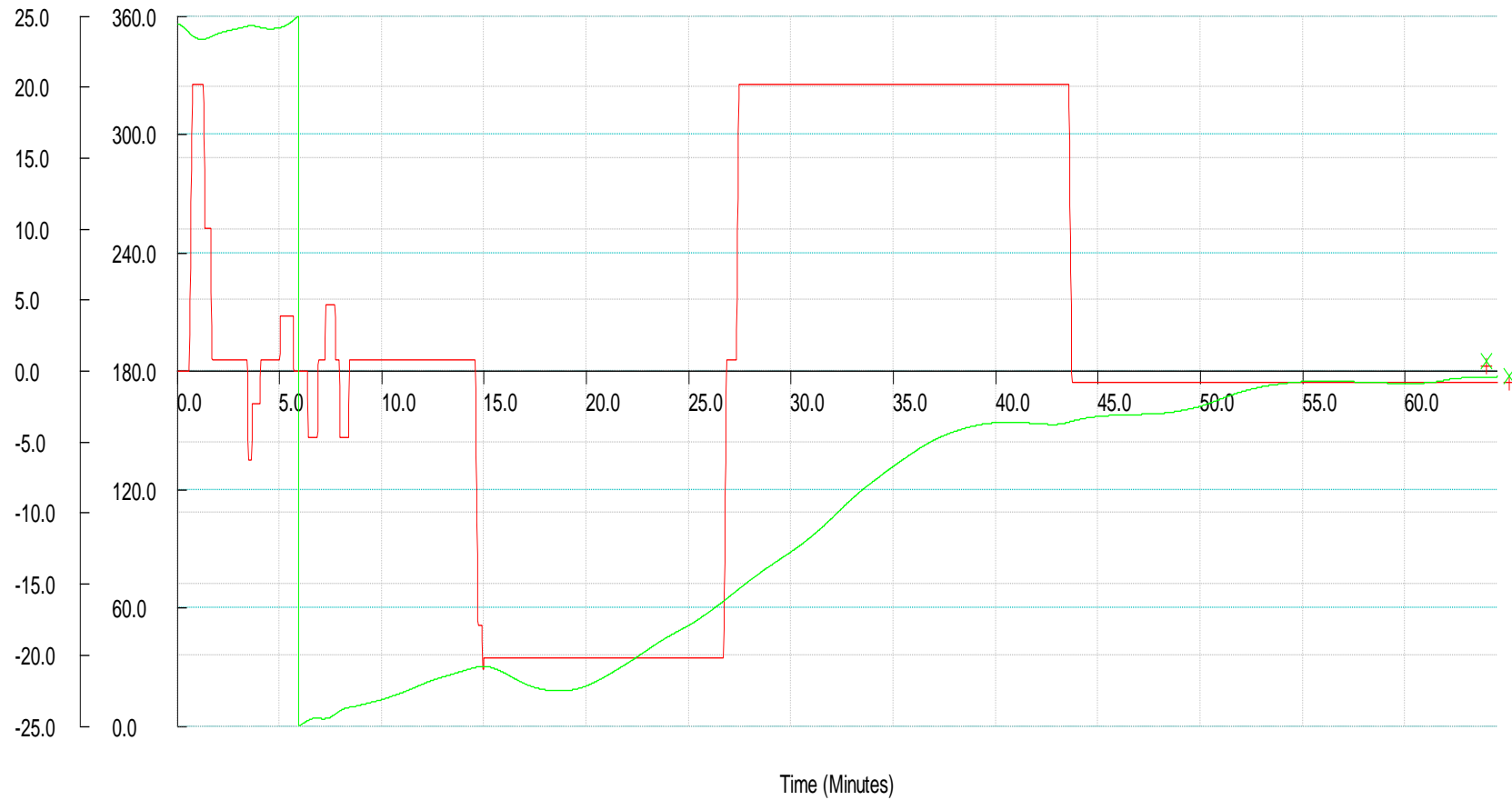
Vessel Track



Vessel: Containership 004
Harbour: World
Created: 9/6/2019 14:51

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

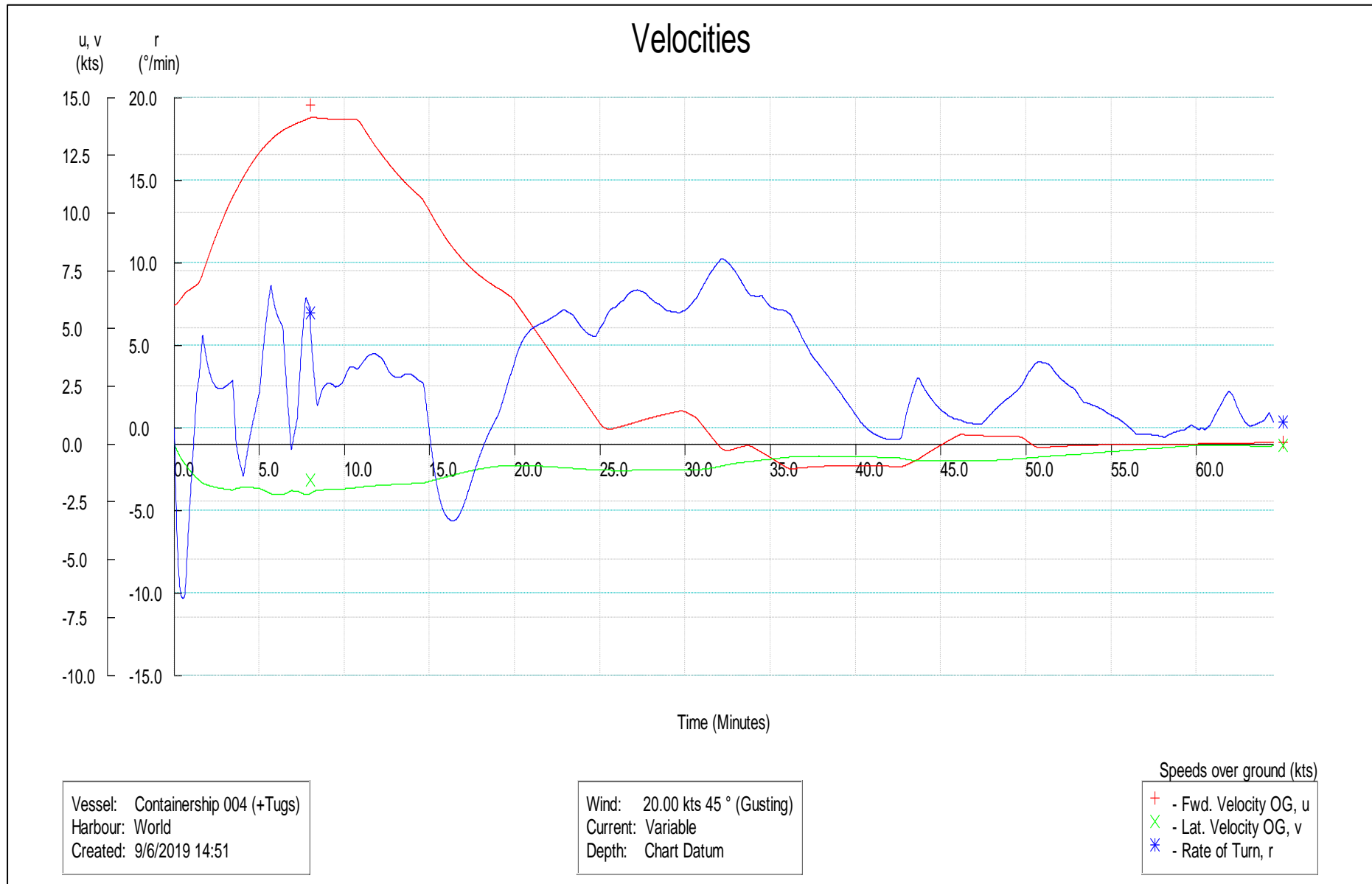
Heading and Rudder

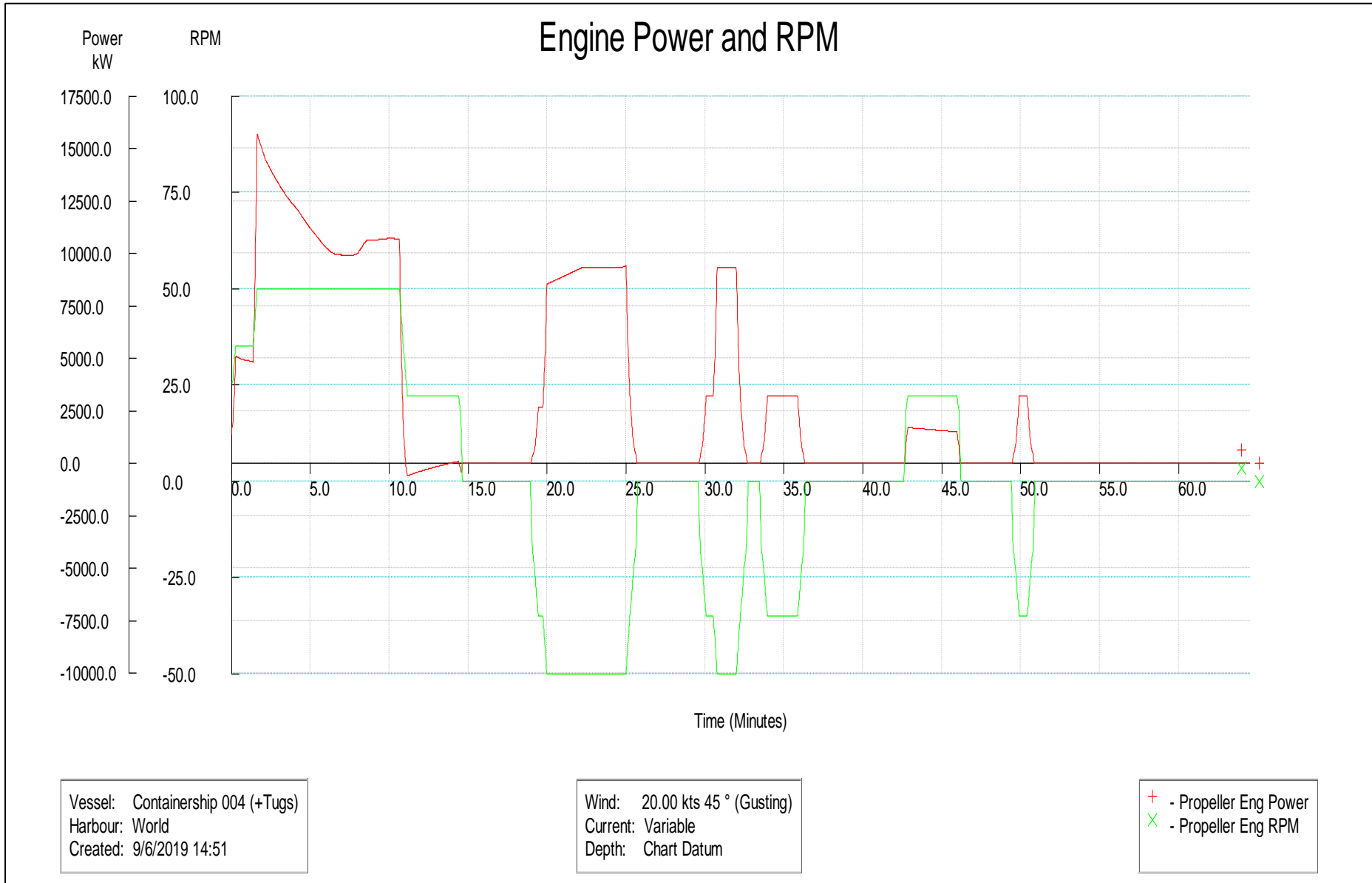


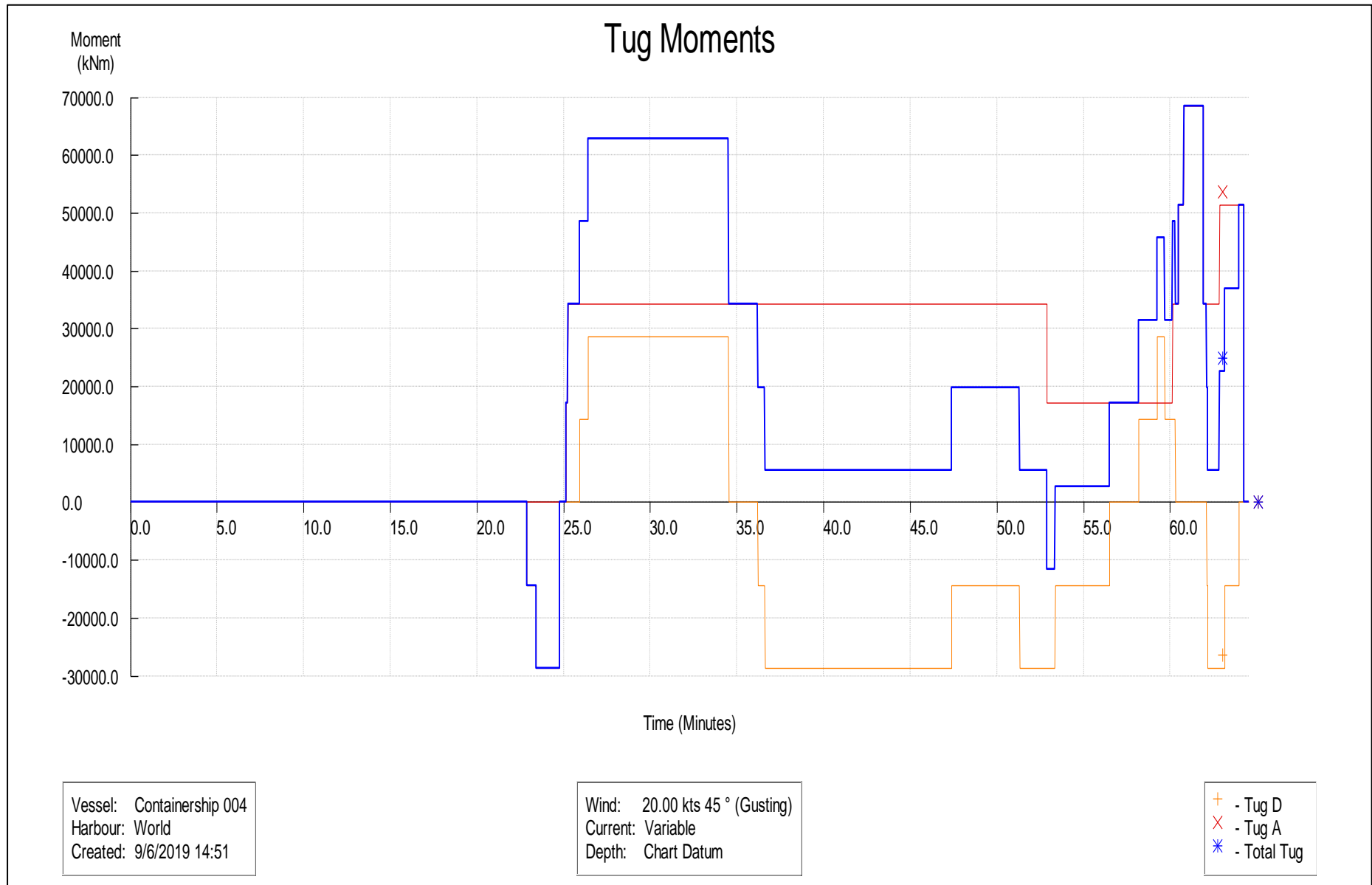
Vessel: Containership 004 (+Tugs)
 Harbour: World
 Created: 9/6/2019 14:51

Wind: 20.00 kts 45 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

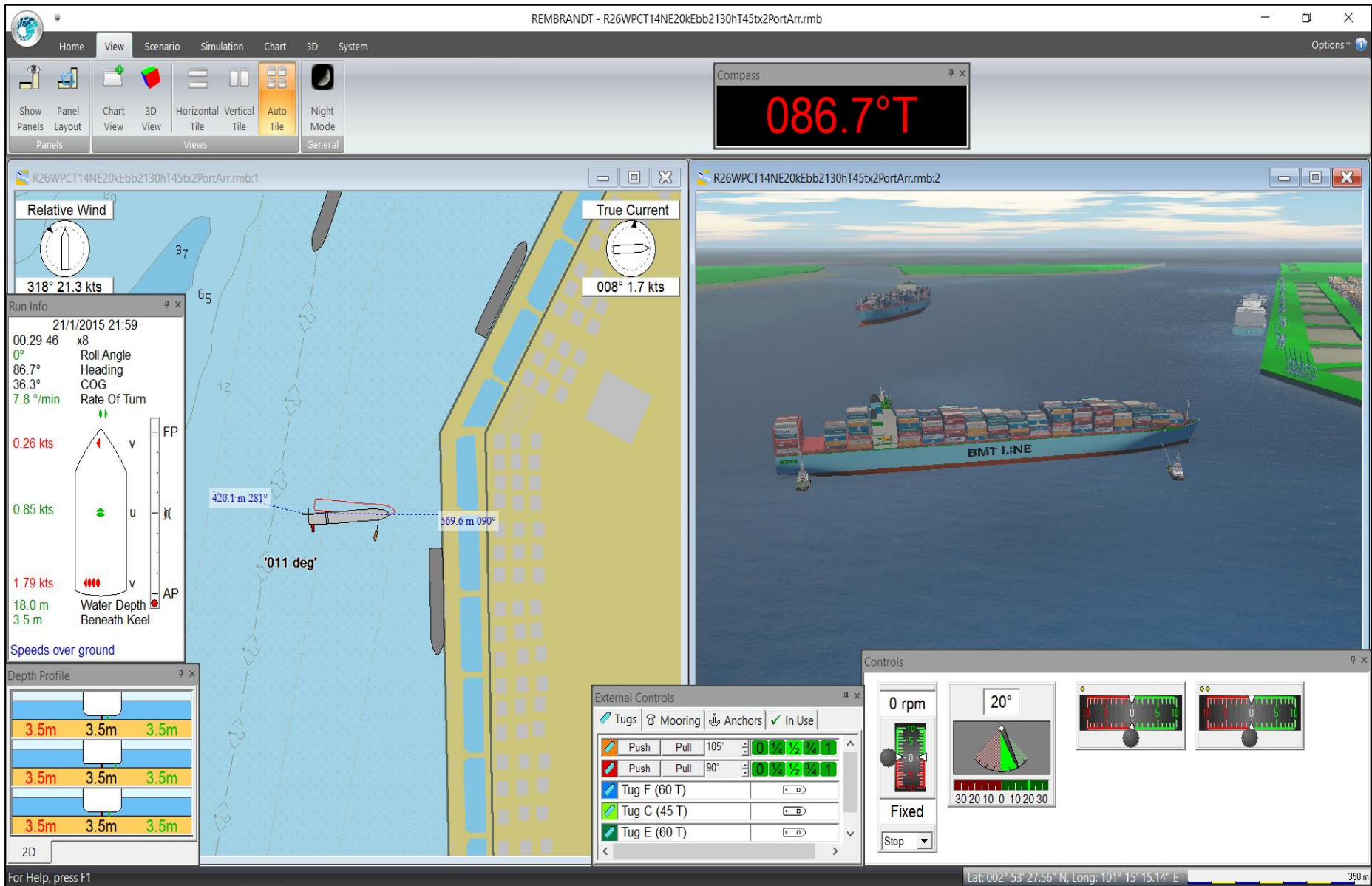
+ - Rudder Rud (°)
 X - Heading







Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
26	R26WPCT14NE20 kEbb2130hT45tx2P ortArr.rmb	Ebb (2130h)	NE 20 k	Arrival (Port a/s)	F: 45t A: 45t	The vessel entered the channel at Half Ahead keeping close to the starboard side. The engine speed was reduced to Dead Slow Ahead after passing the re-located Selat Buoy and shortly after that, the engine was stopped and put Half Astern. When almost stopped, a starboard swing was executed. During the swing, the forward tug had to operate at $\frac{3}{4}$ Power to pull the bow to starboard away from the wharf. Minimum available channel width: 420m	4/6



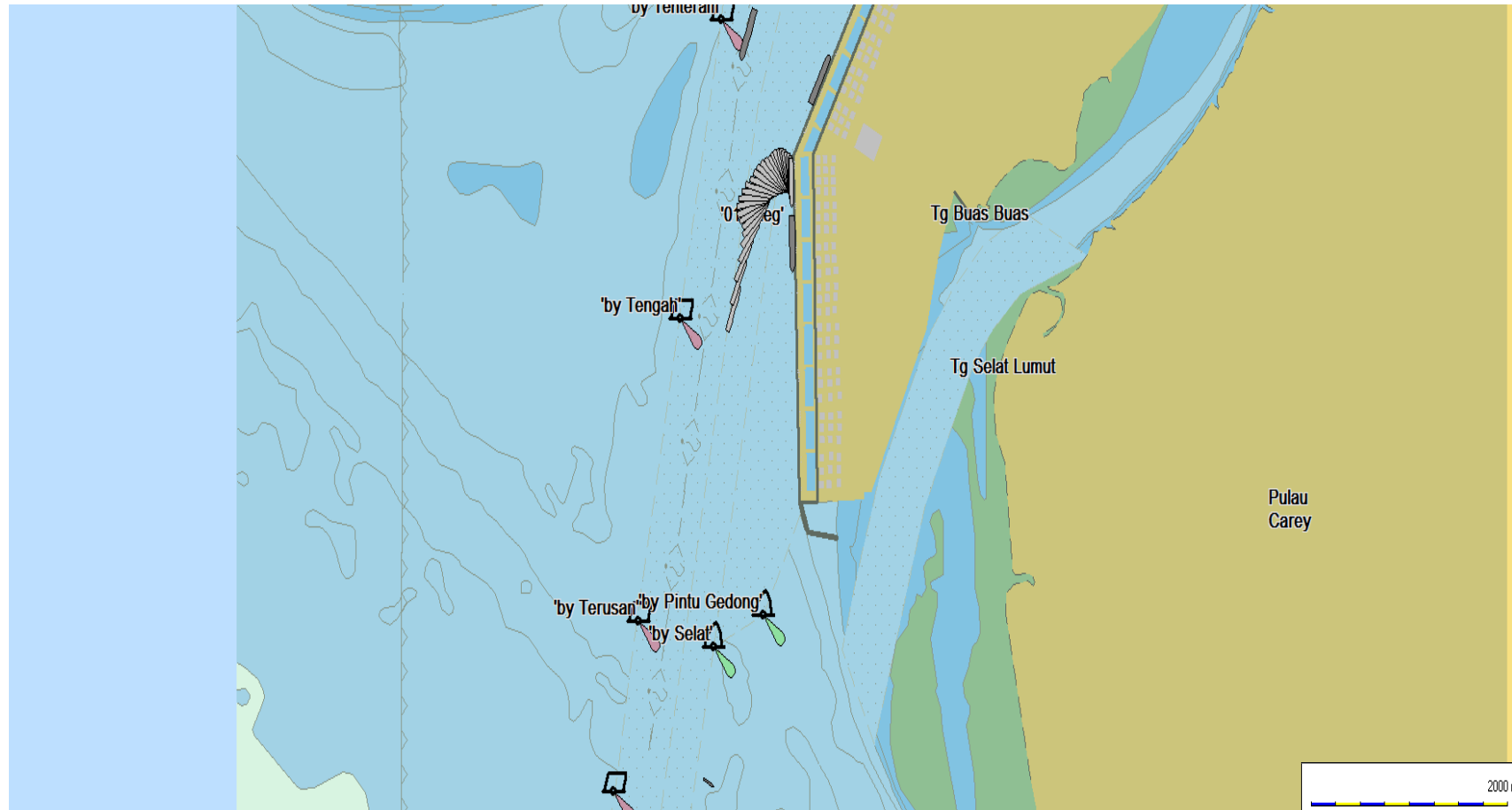
Vessel Track



Vessel: Containership 004
Harbour: World
Created: 14/6/2019 13:04

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

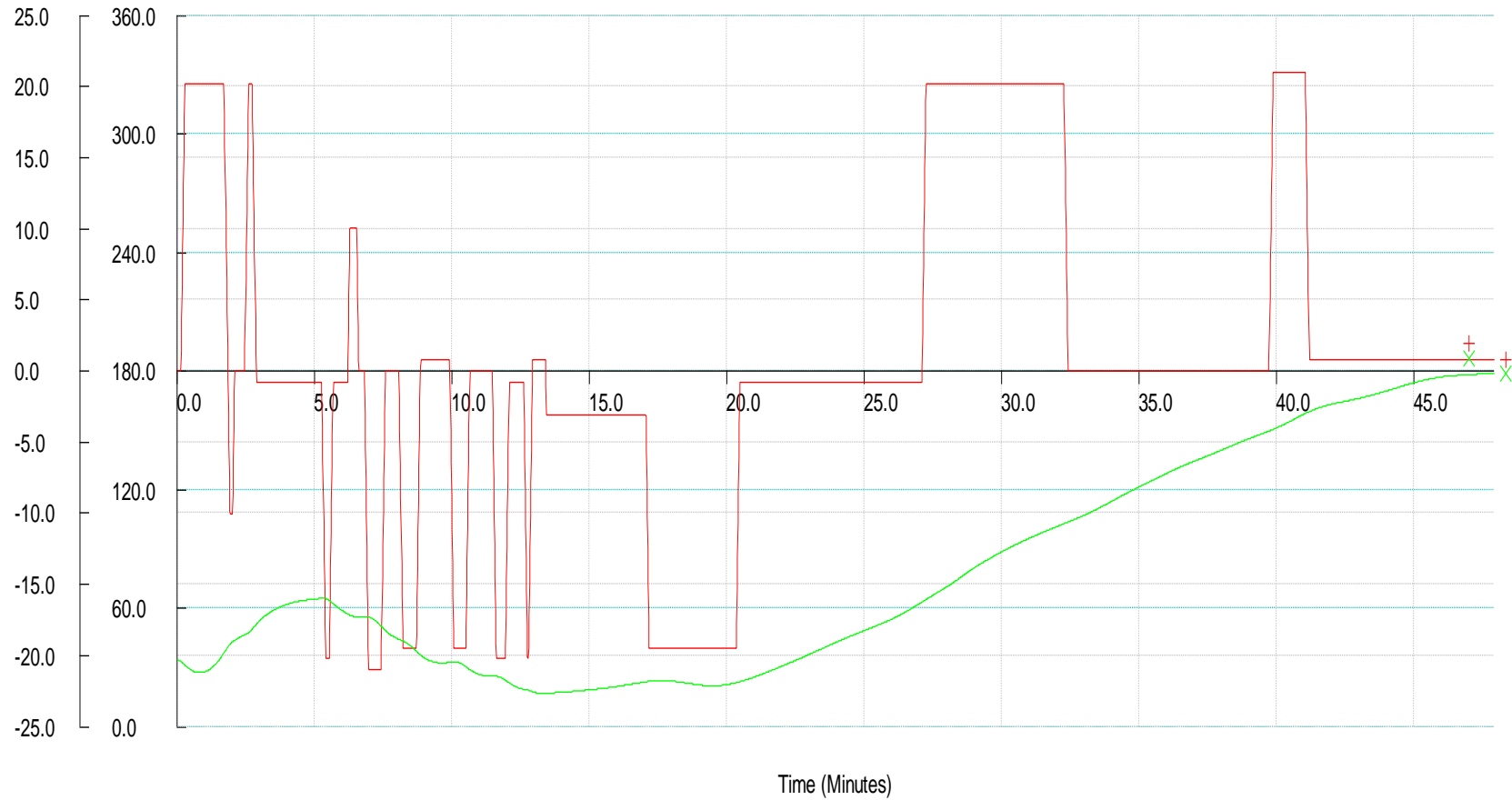
Vessel Track



Vessel: Containership 004
Harbour: World
Created: 14/6/2019 13:04

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

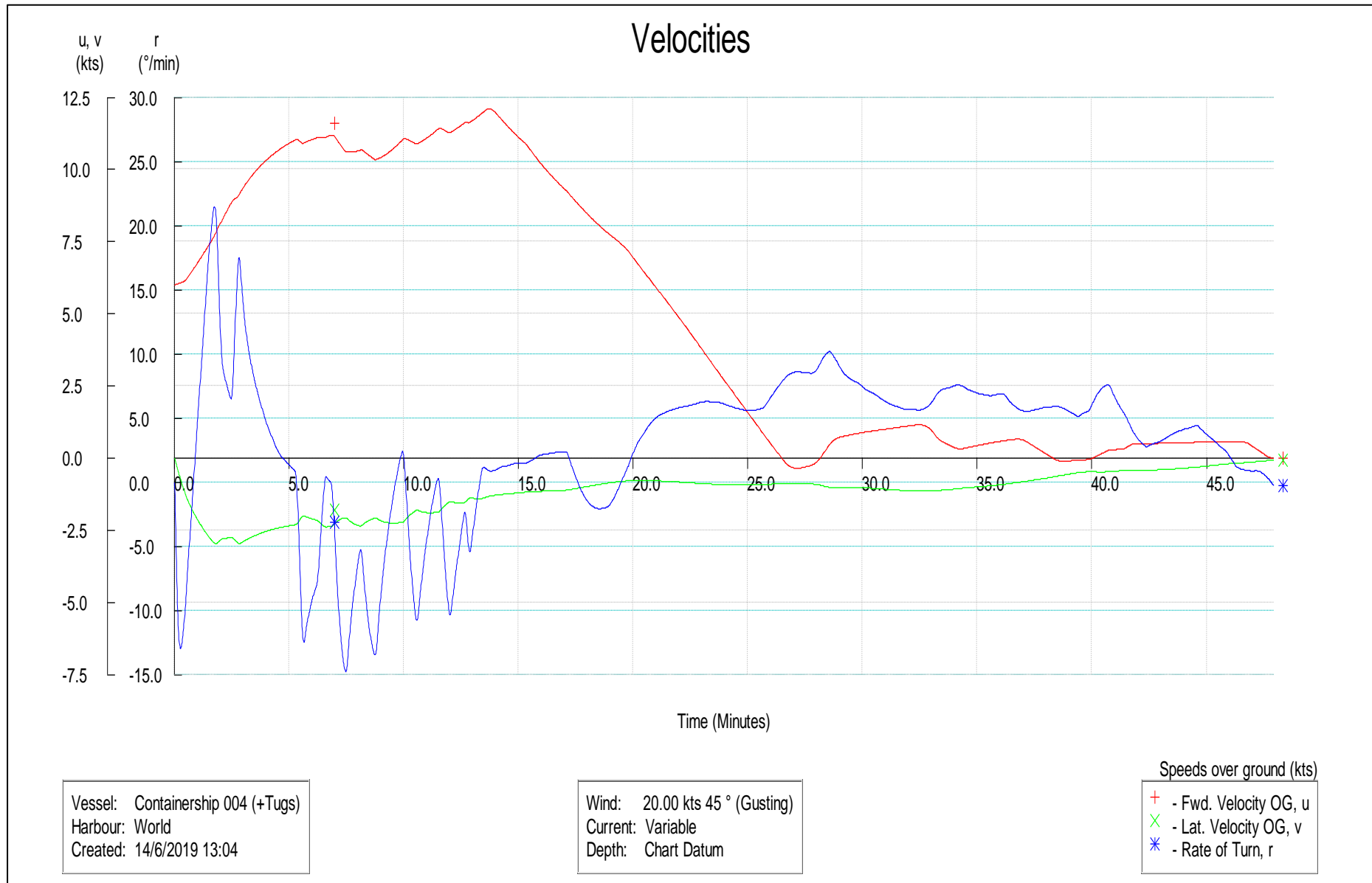
Heading and Rudder

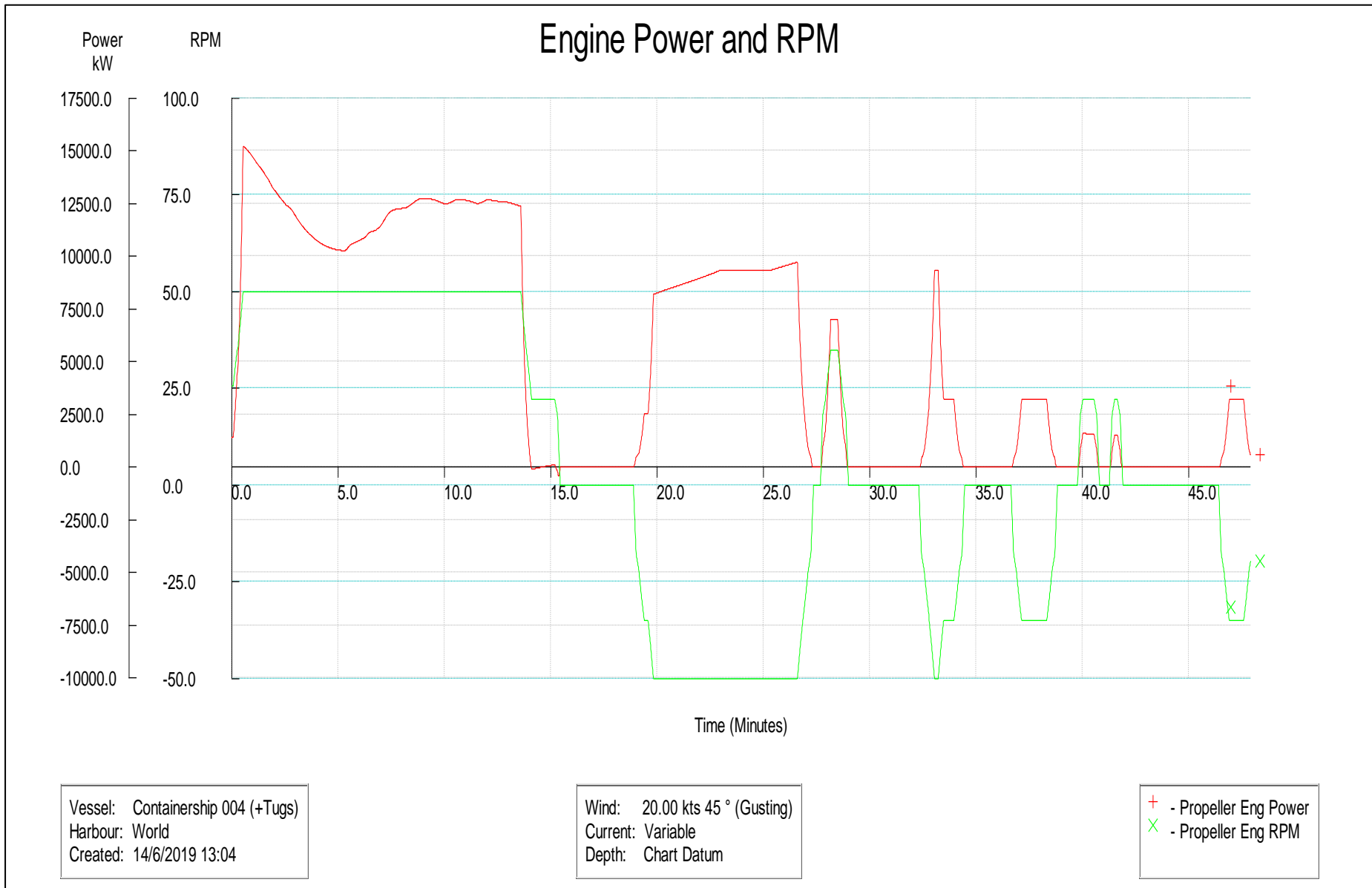


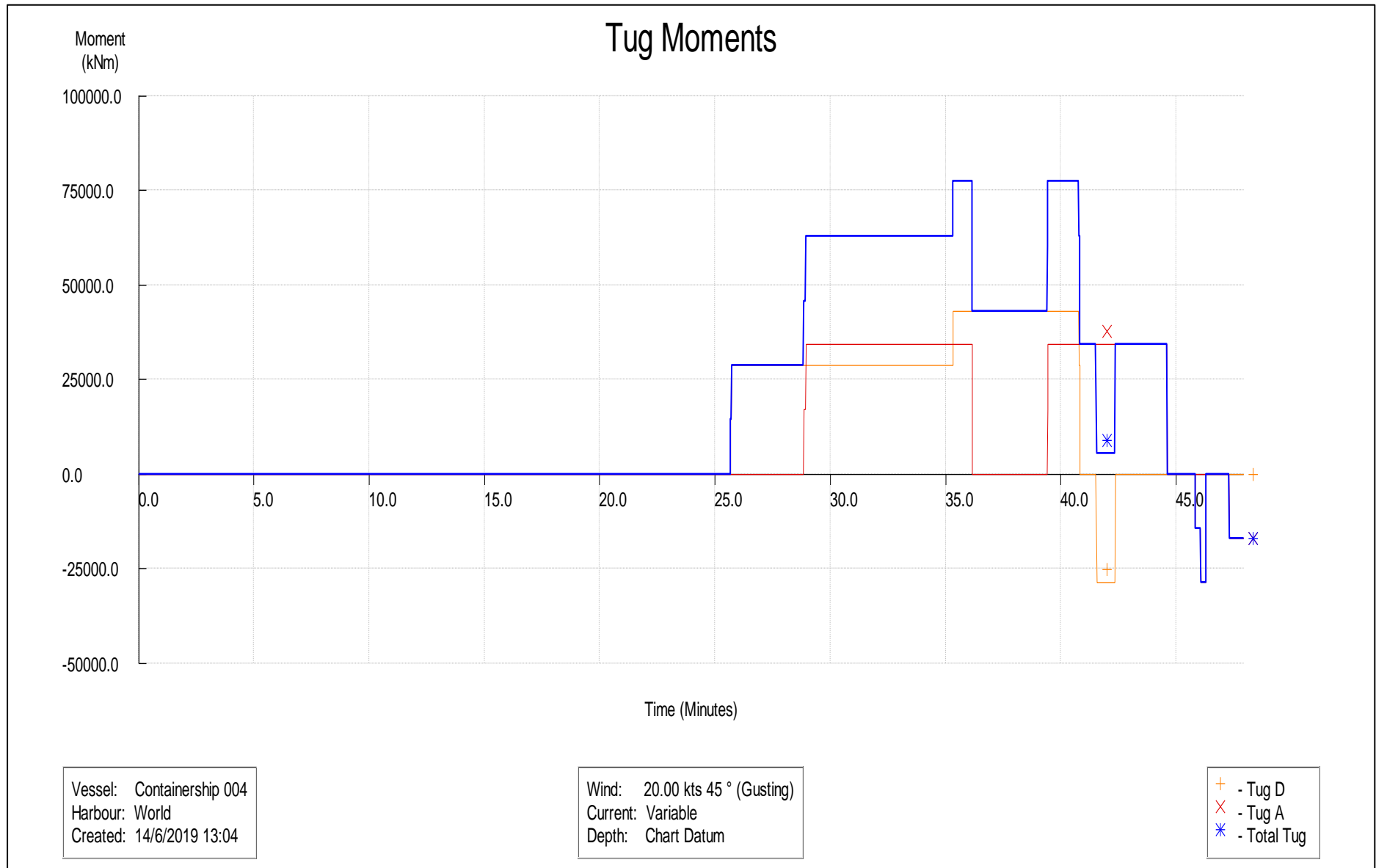
Vessel: Containership 004 (+Tugs)
 Harbour: World
 Created: 14/6/2019 13:04

Wind: 20.00 kts 45 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

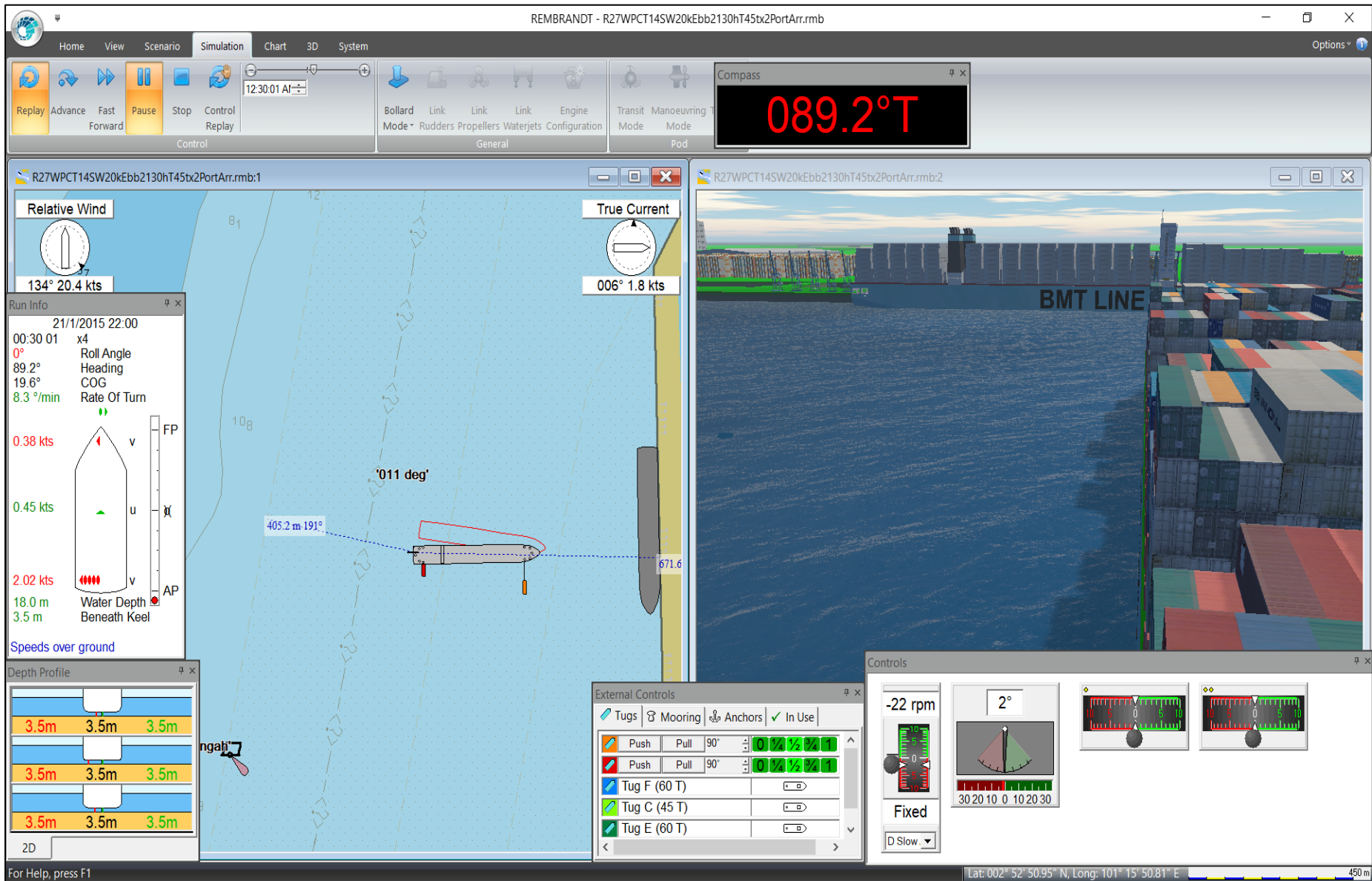
+ - Rudder Rud (°)
 X - Heading







Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
27	R27WPCT14SW20 kEbb2130hT45tx2P ortArr.rmb	Ebb (2130h)	SW 20 k	Arrival (Port a/s)	F: 45t A: 45t	The vessel entered the channel at Half Ahead keeping close to the starboard side. The engine speed was reduced when passing the re-located Selat Buoy and shortly after the engine was stopped and put Half Astern. The vessel carried her way up to CT-15 and when almost stopped, a starboard turn was executed. After turning around, she was backed to berth portside-to. Both tugs had to work at Full Power to hold the vessel against the wind and current in the final stage of berthing. Minimum available channel width: 405m	4/6



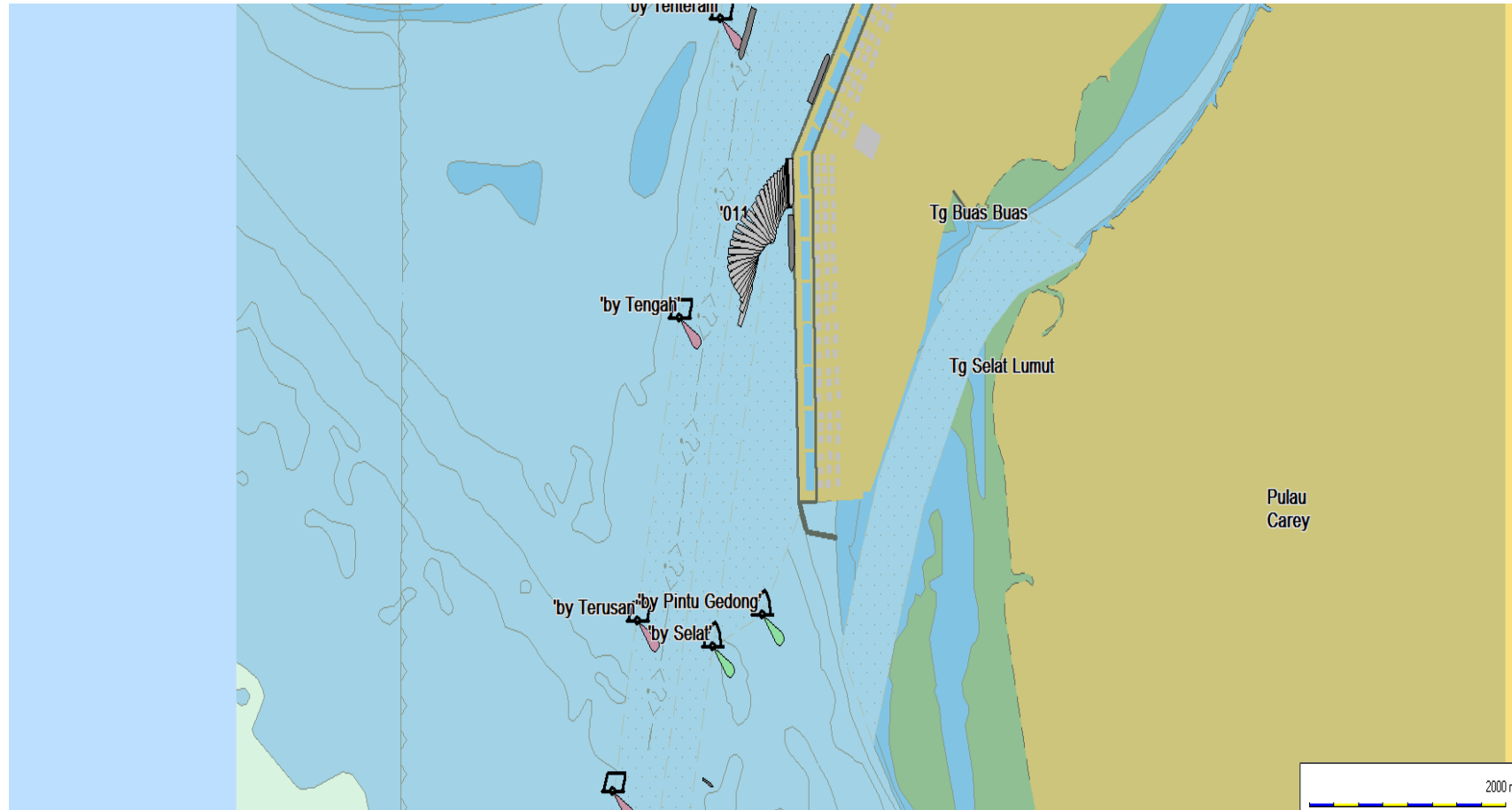
Vessel Track



Vessel: Containership 004
Harbour: World
Created: 6/6/2019 12:32

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

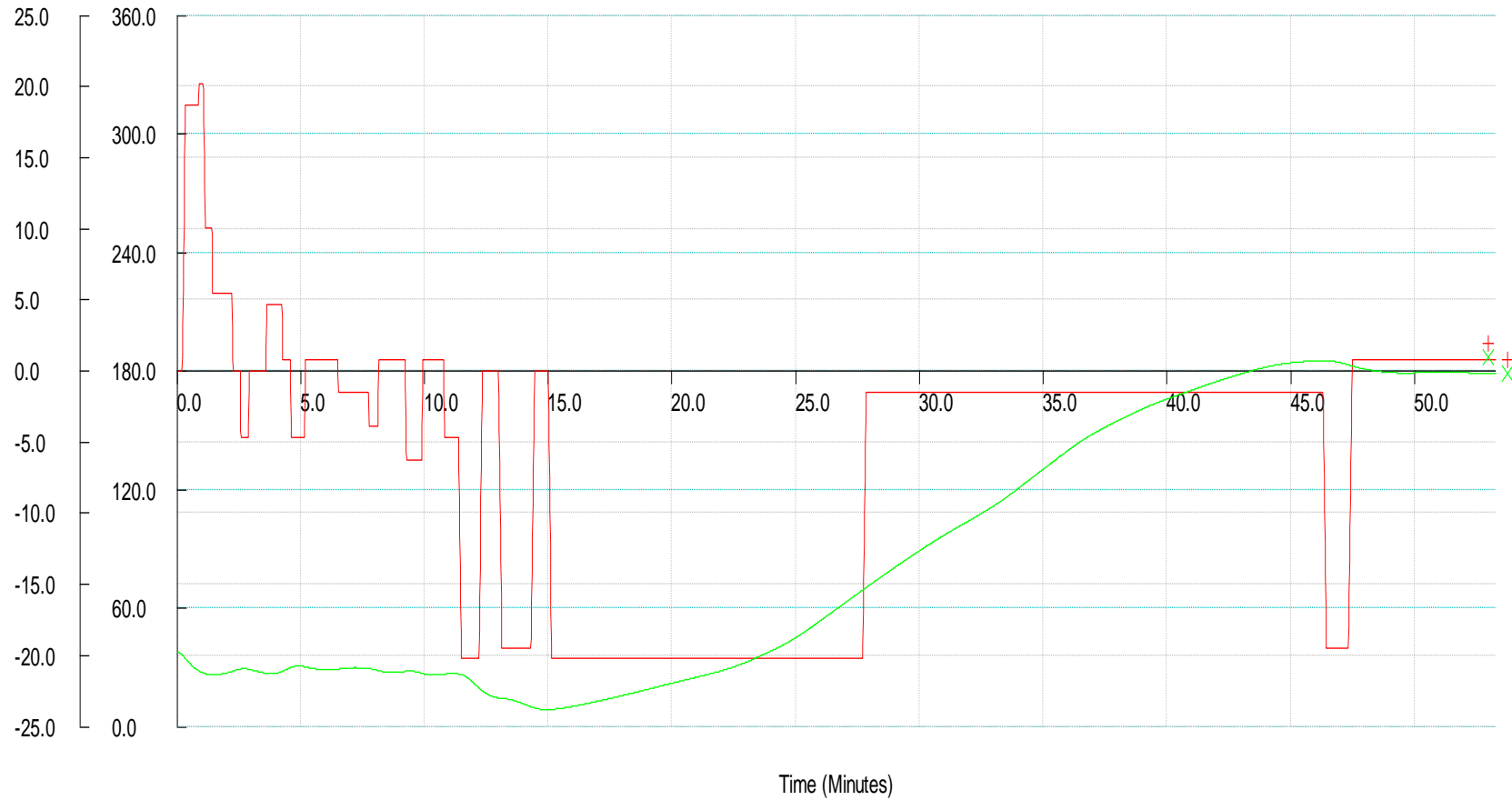
Vessel Track



Vessel: Containership 004
Harbour: World
Created: 6/6/2019 12:32

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

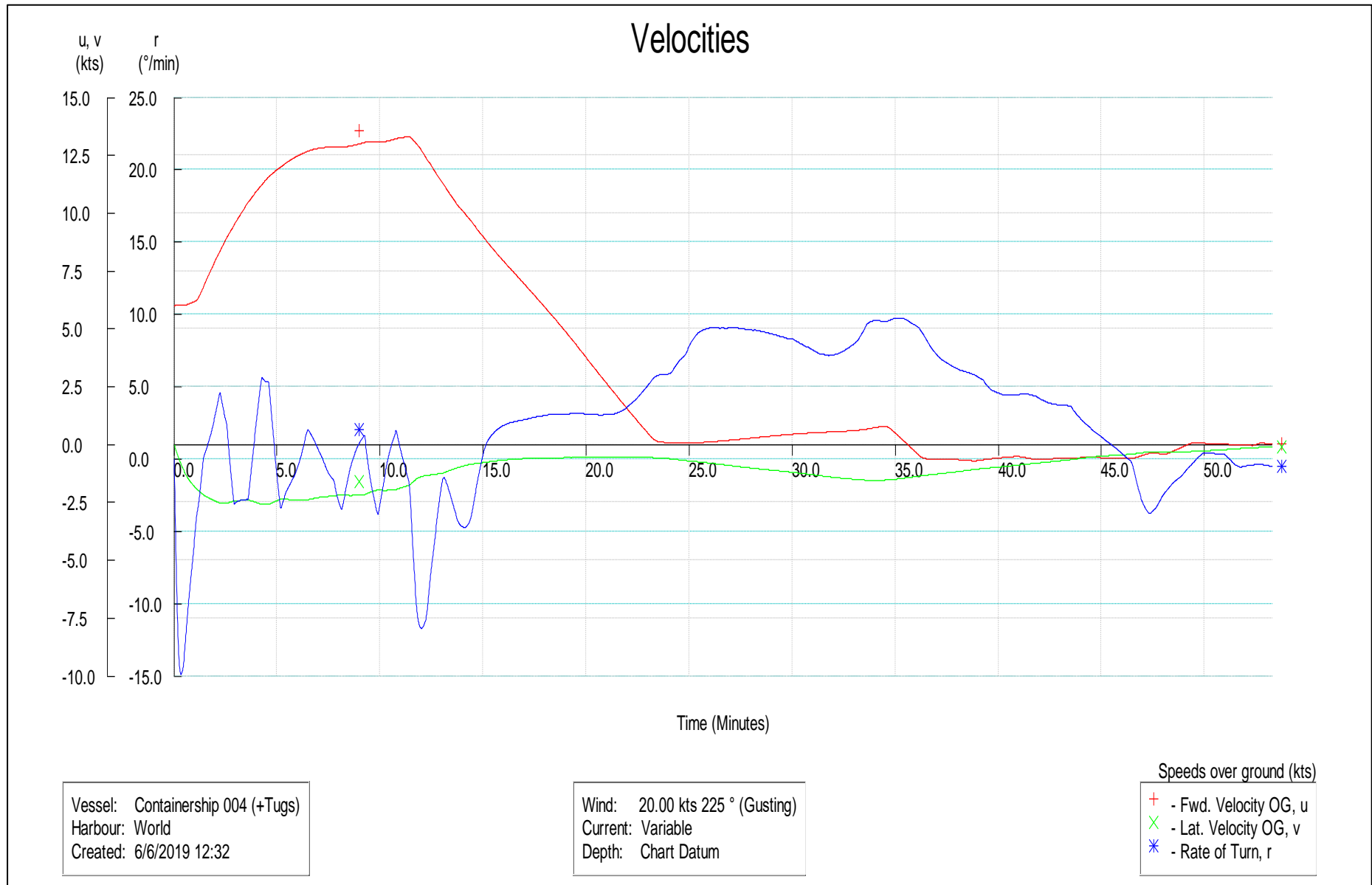
Heading and Rudder

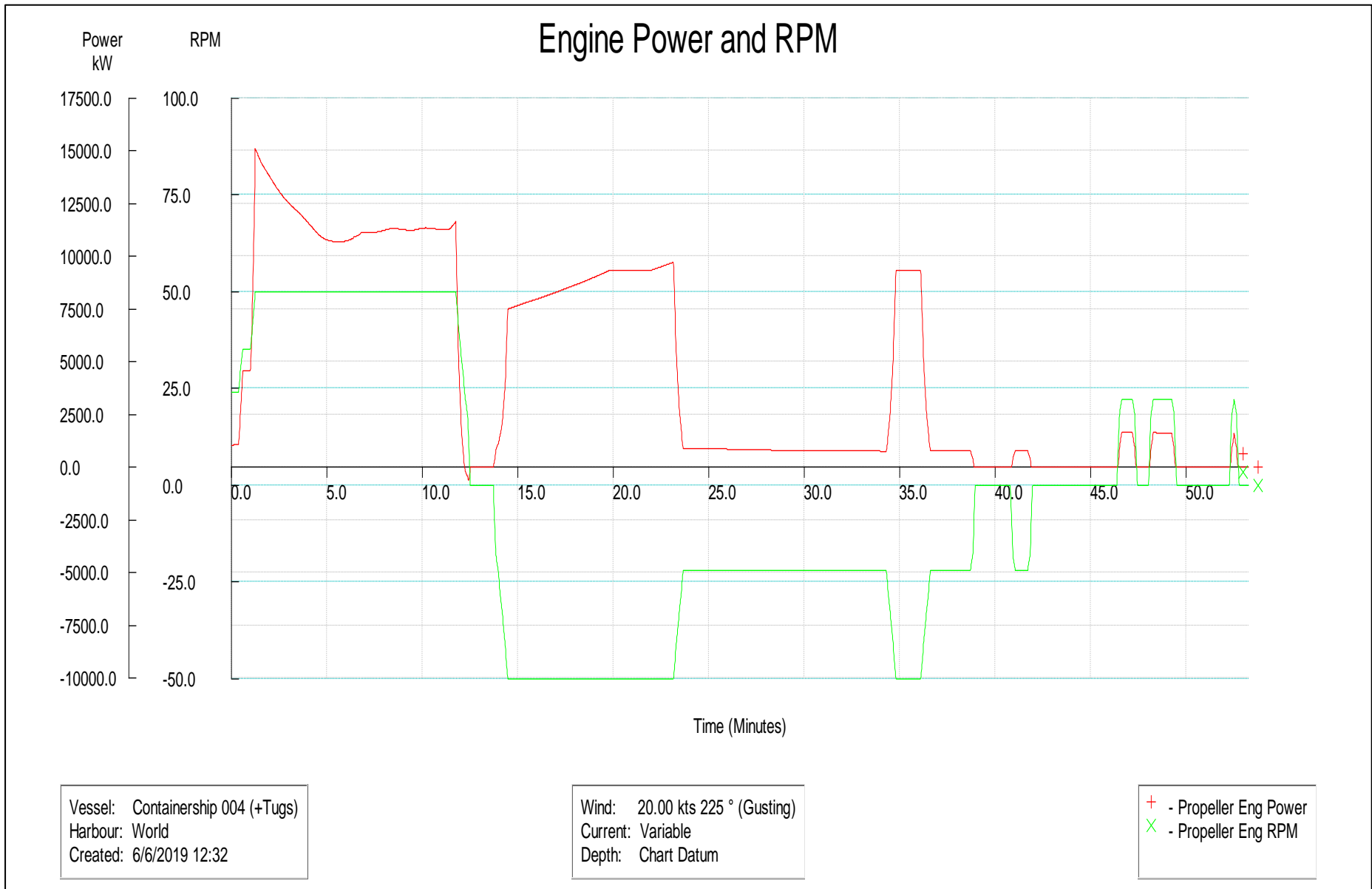


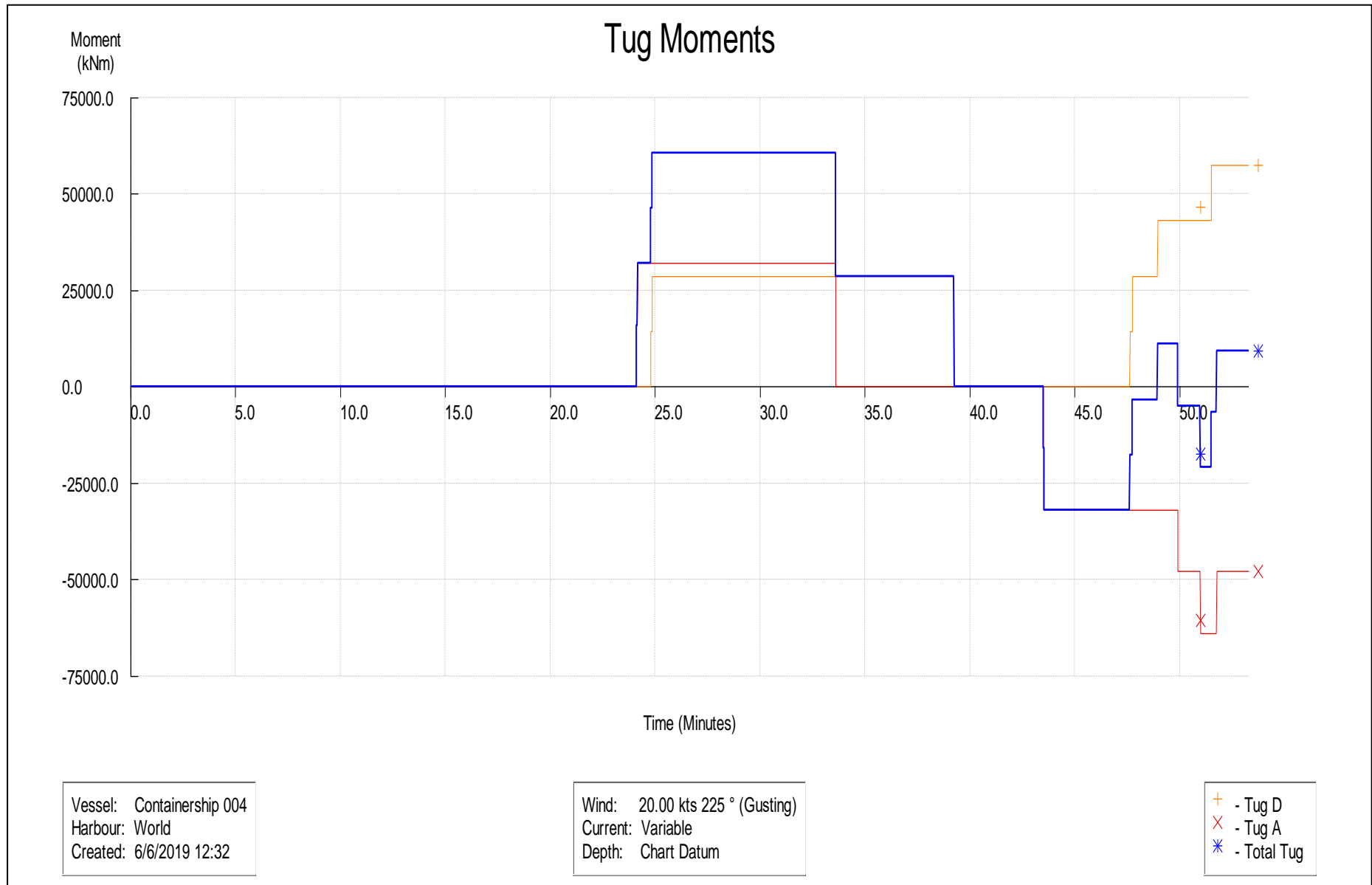
Vessel: Containership 004 (+Tugs)
 Harbour: World
 Created: 6/6/2019 12:32

Wind: 20.00 kts 225 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

+ - Rudder Rud (°)
 X - Heading

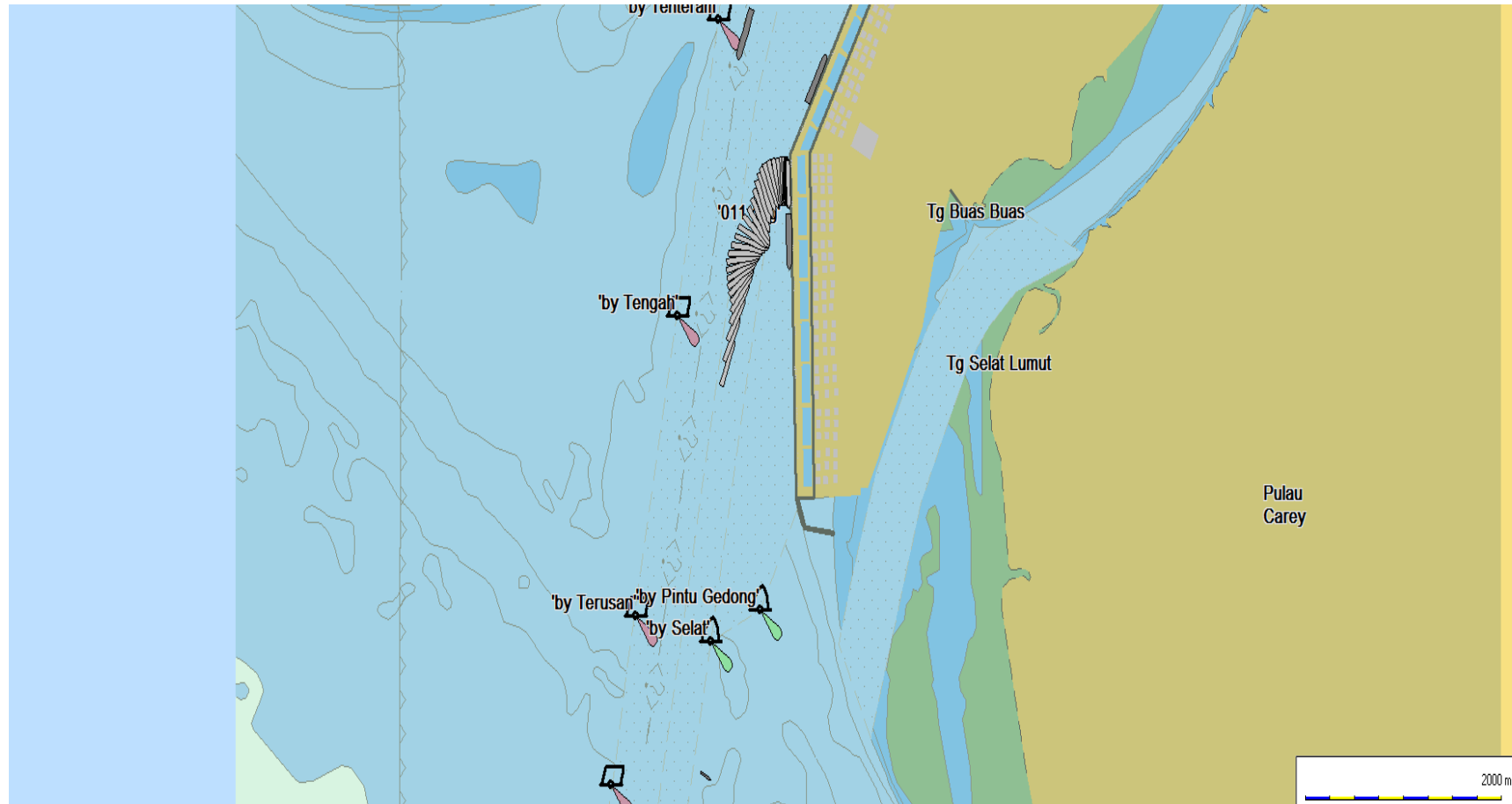






Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
28	R28WPCT14SW20 kEbb2130hT45tx2P ortArr.rmb	Ebb (2130h)	SW 20 k	Arrival (Port a/s)	F: 45t A: 45t	The vessel entered the channel at Half Ahead keeping close to the starboard side. The engine speed was reduced to Dead Slow Ahead when passing the re-located Selat Buoy and shortly after the engine was stopped and put Half Astern. When almost stopped, a starboard turn was executed. Both tugs had to work at Full Power to hold the vessel against the wind and current in the final stage of berthing. Minimum available channel width: 420m	4/6

Vessel Track



Vessel: Containership 004
Harbour: World
Created: 14/6/2019 14:05

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

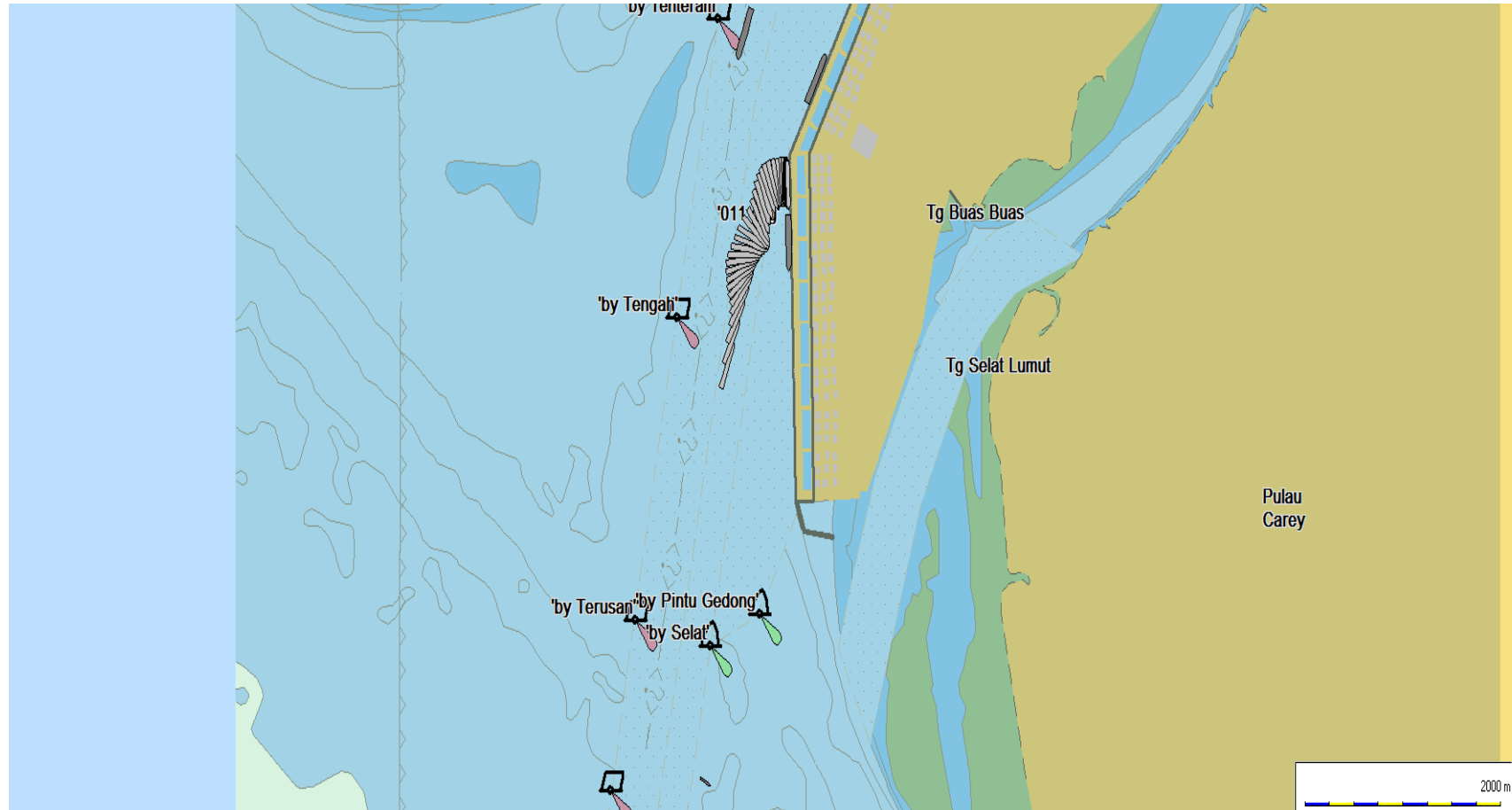
Vessel Track



Vessel: Containership 004
Harbour: World
Created: 14/6/2019 14:05

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

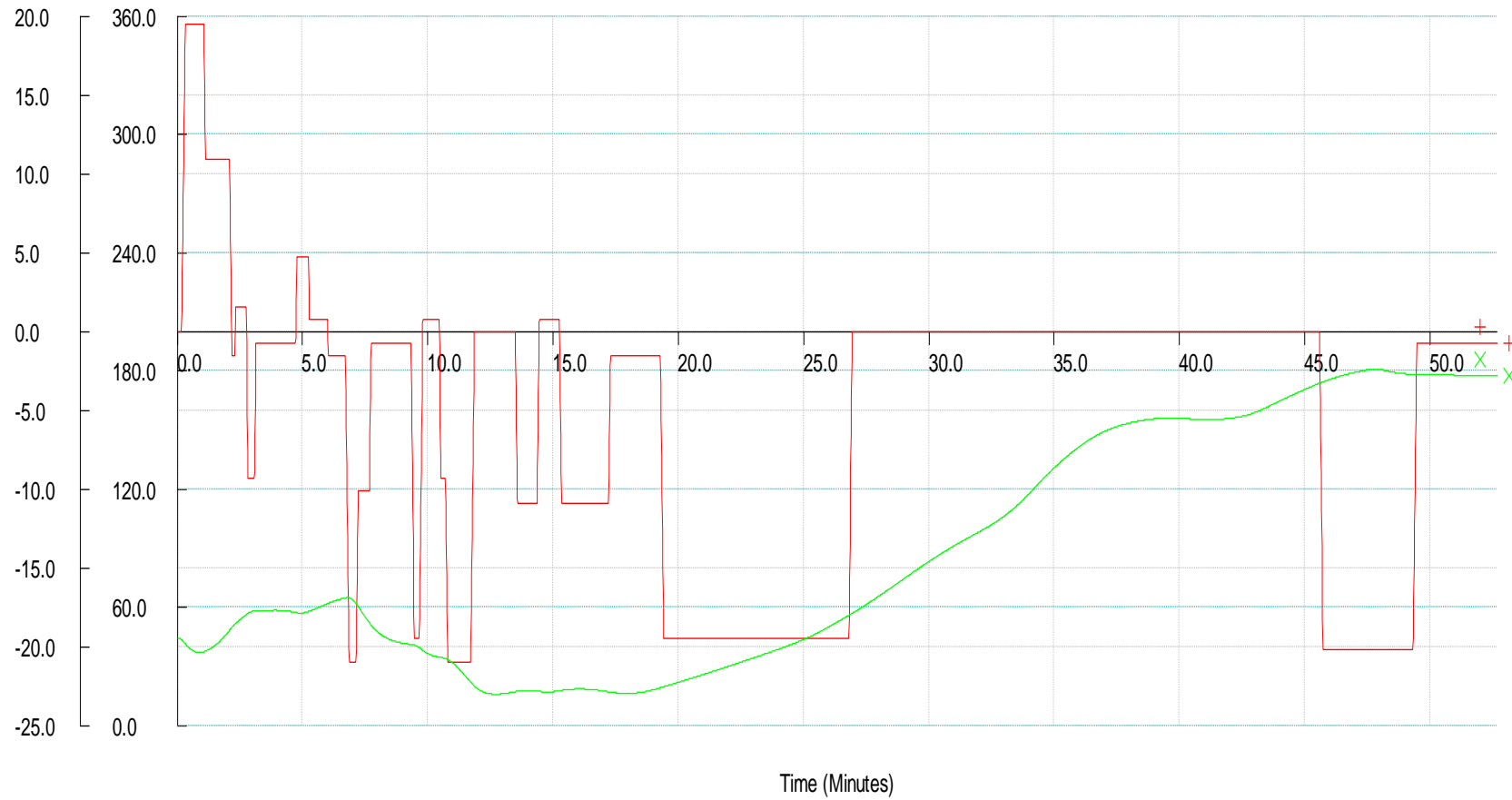
Vessel Track



Vessel: Containership 004
Harbour: World
Created: 14/6/2019 14:05

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

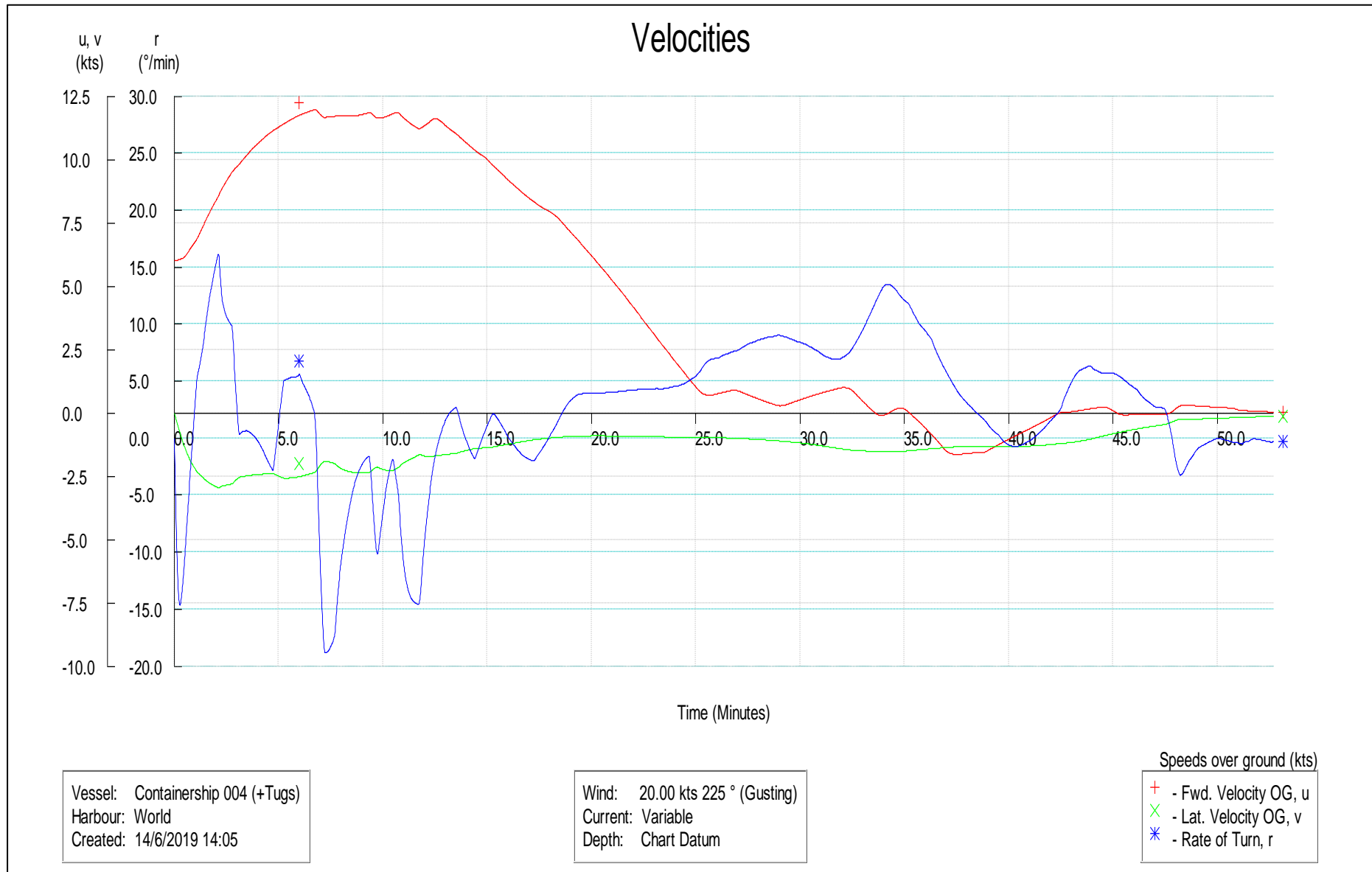
Heading and Rudder

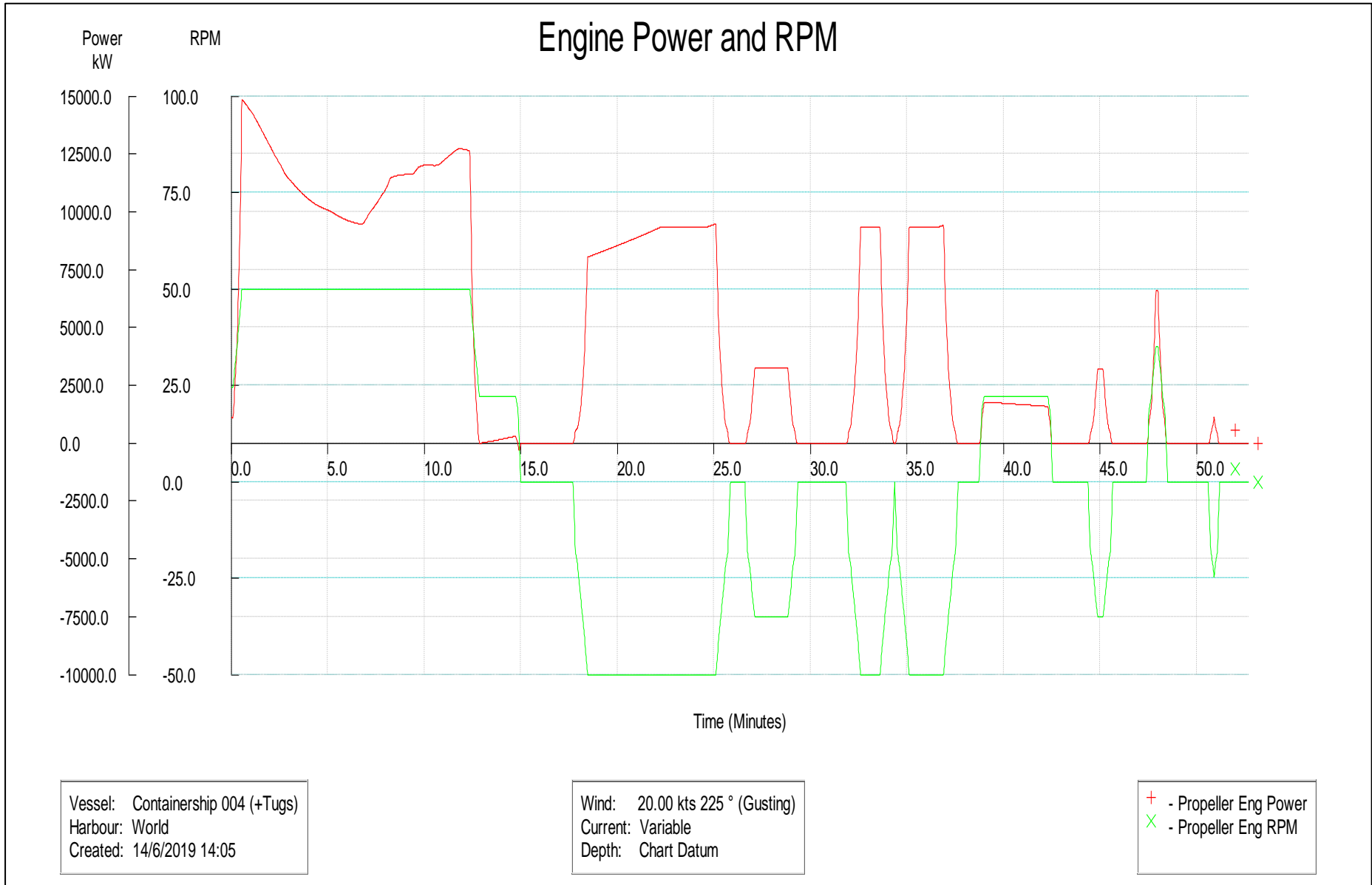


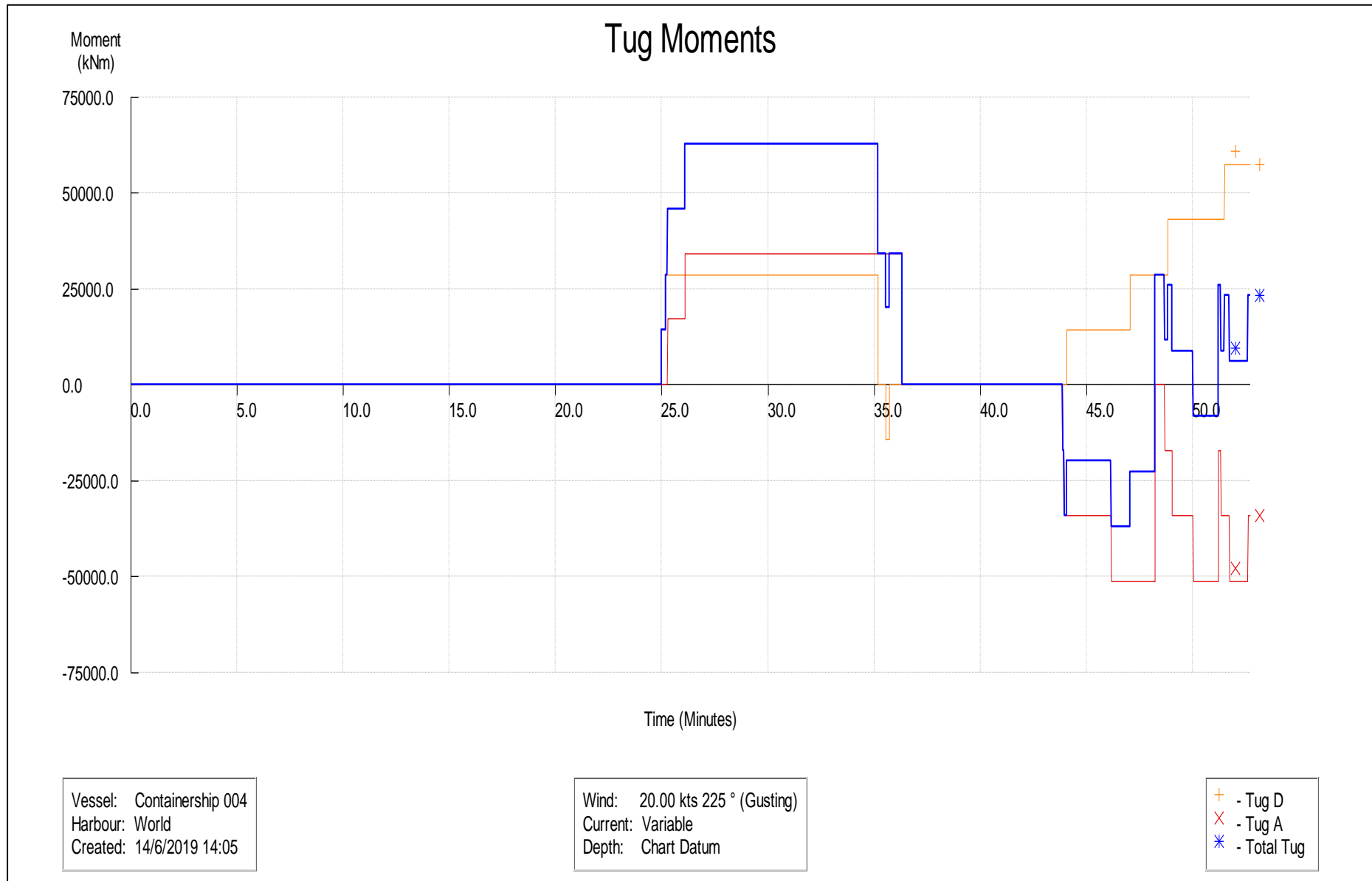
Vessel: Containership 004 (+Tugs)
 Harbour: World
 Created: 14/6/2019 14:05

Wind: 20.00 kts 225 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

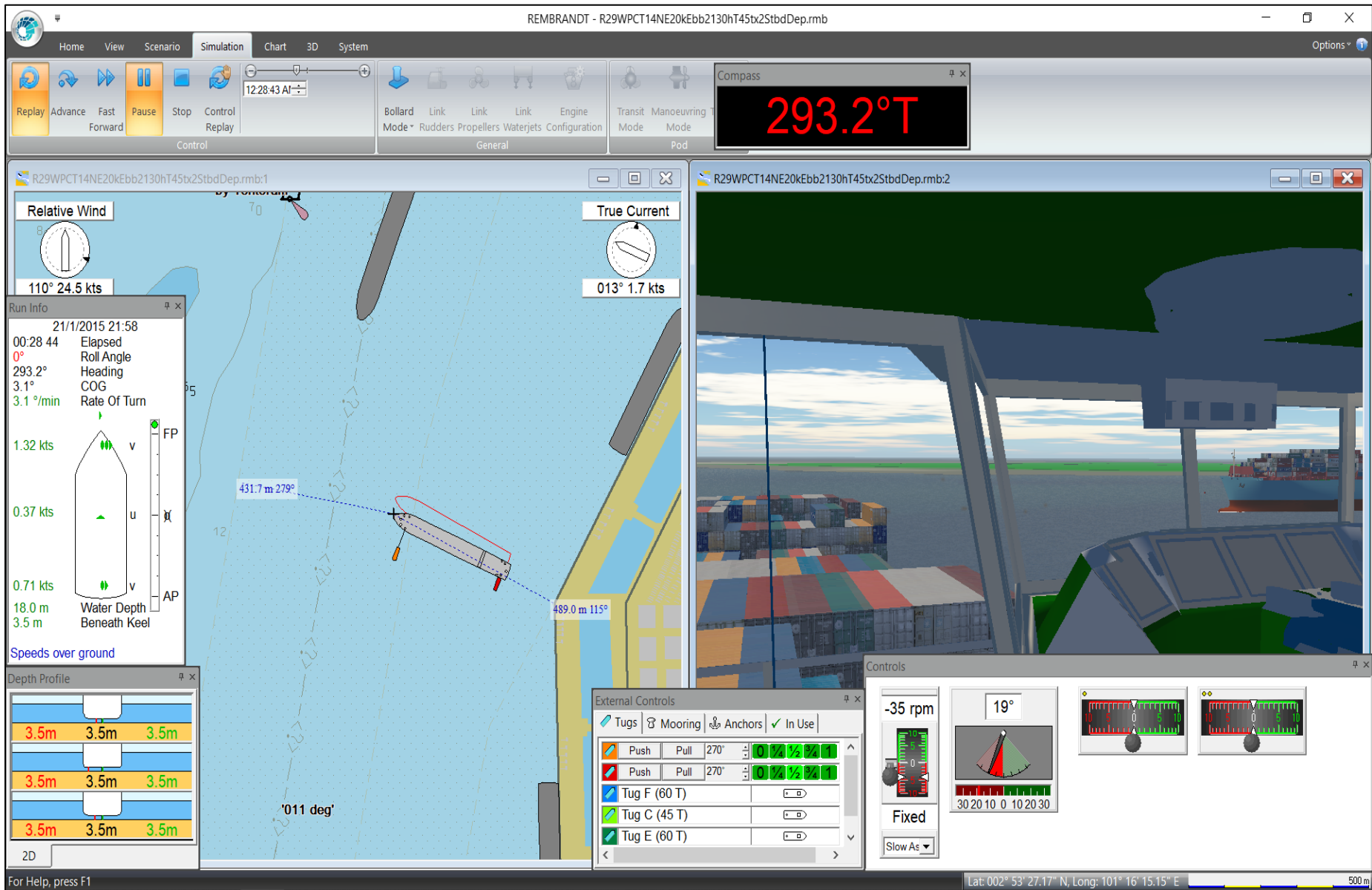
+ - Rudder Rud (°)
 X - Heading



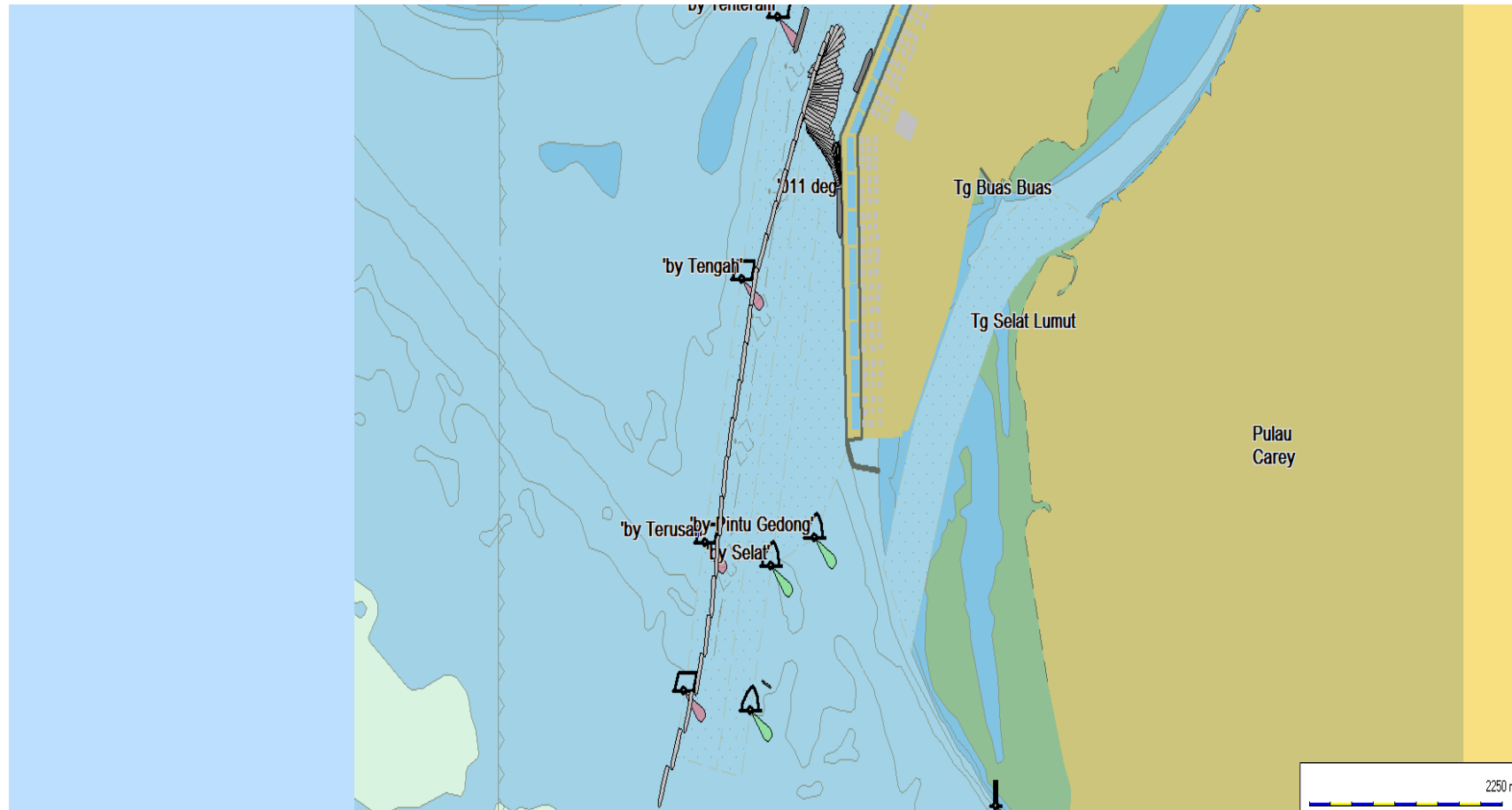




Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
29	R29WPCT14NE20 kEbb2130hT45tx2S tbdDep.rmb	Ebb (2130h)	NE 20 k	Departure (Stbd a/s)	F: 45t A: 45t	<p>The vessel was pulled off the berth using two 45 tons bollard pull tugs. The intention was to open the stern to the current and execute a starboard swing. The aft tug however struggled to pull the stern with the bow dropping to port due to the wind. It was then decided to swing to port and the tugs were used at Full Power. The rate of turn was too slow and the vessel set bodily to starboard with the current. The helm and engine were then used to assist in the turn. After swinging around, the vessel proceeded out the channel at Half Ahead.</p> <p>Minimum available channel width: 430m</p>	4/6



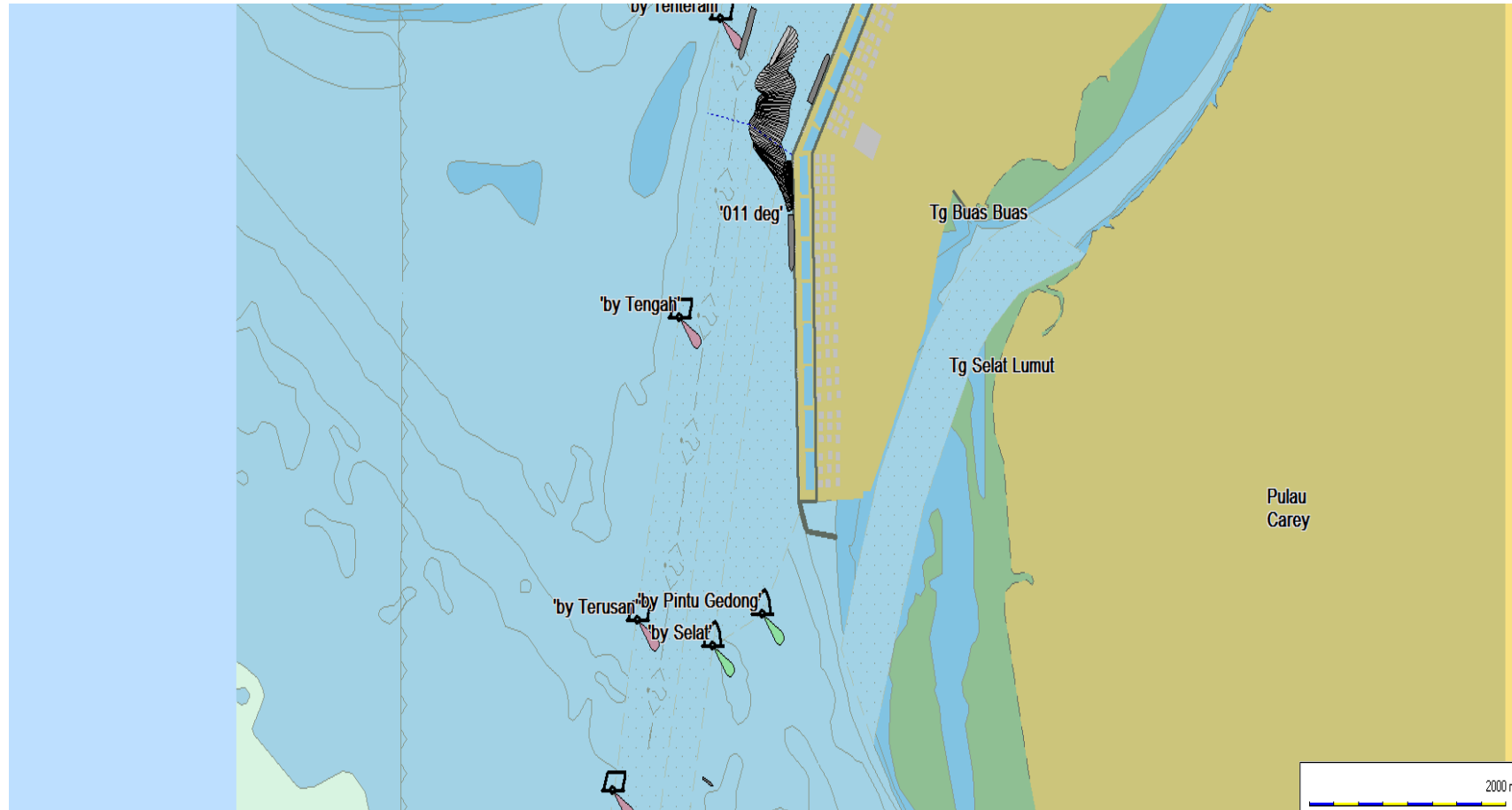
Vessel Track



Vessel: Containership 004
Harbour: World
Created: 9/6/2019 15:41

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

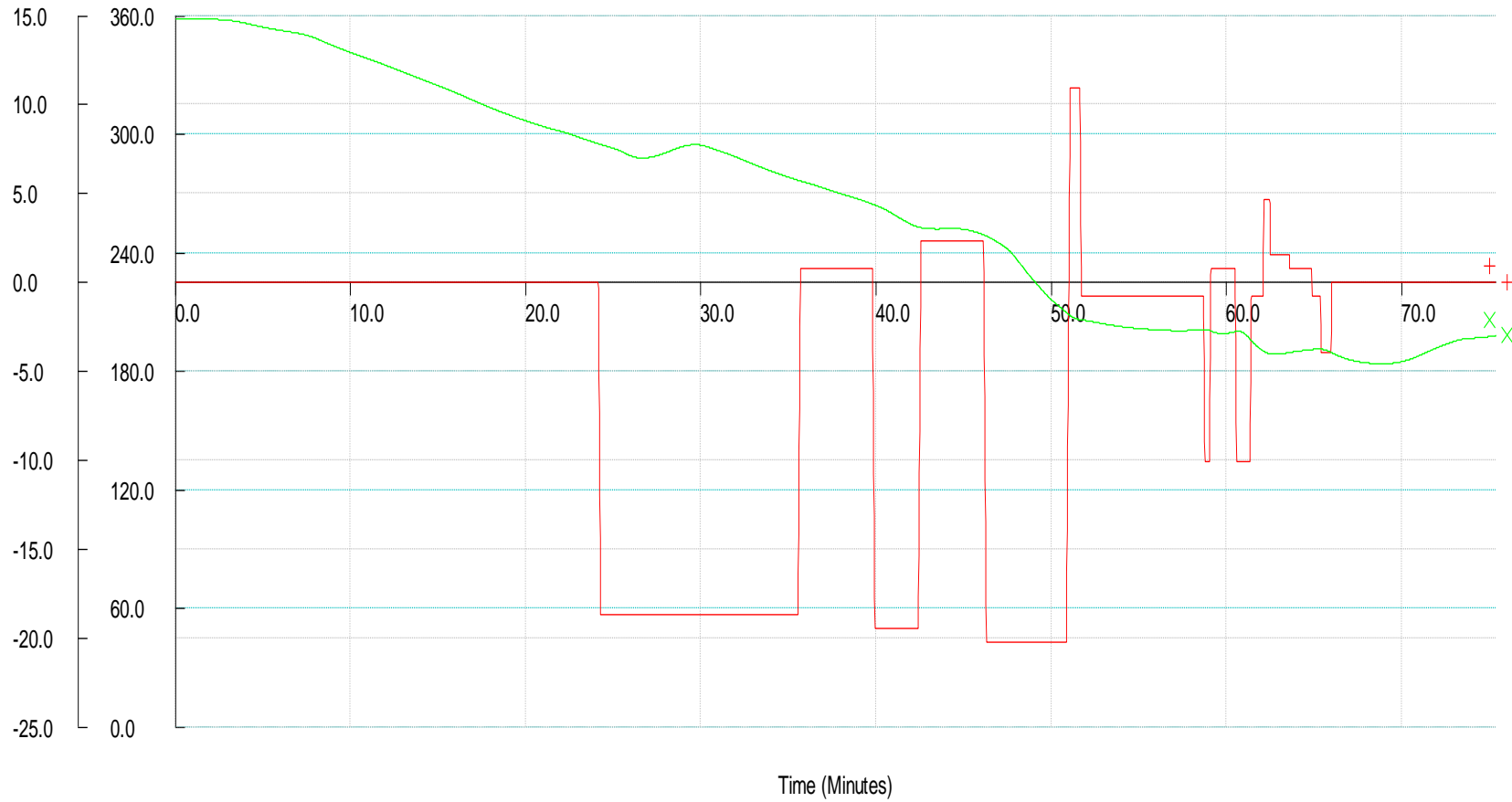
Vessel Track



Vessel: Containership 004
Harbour: World
Created: 9/6/2019 15:41

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

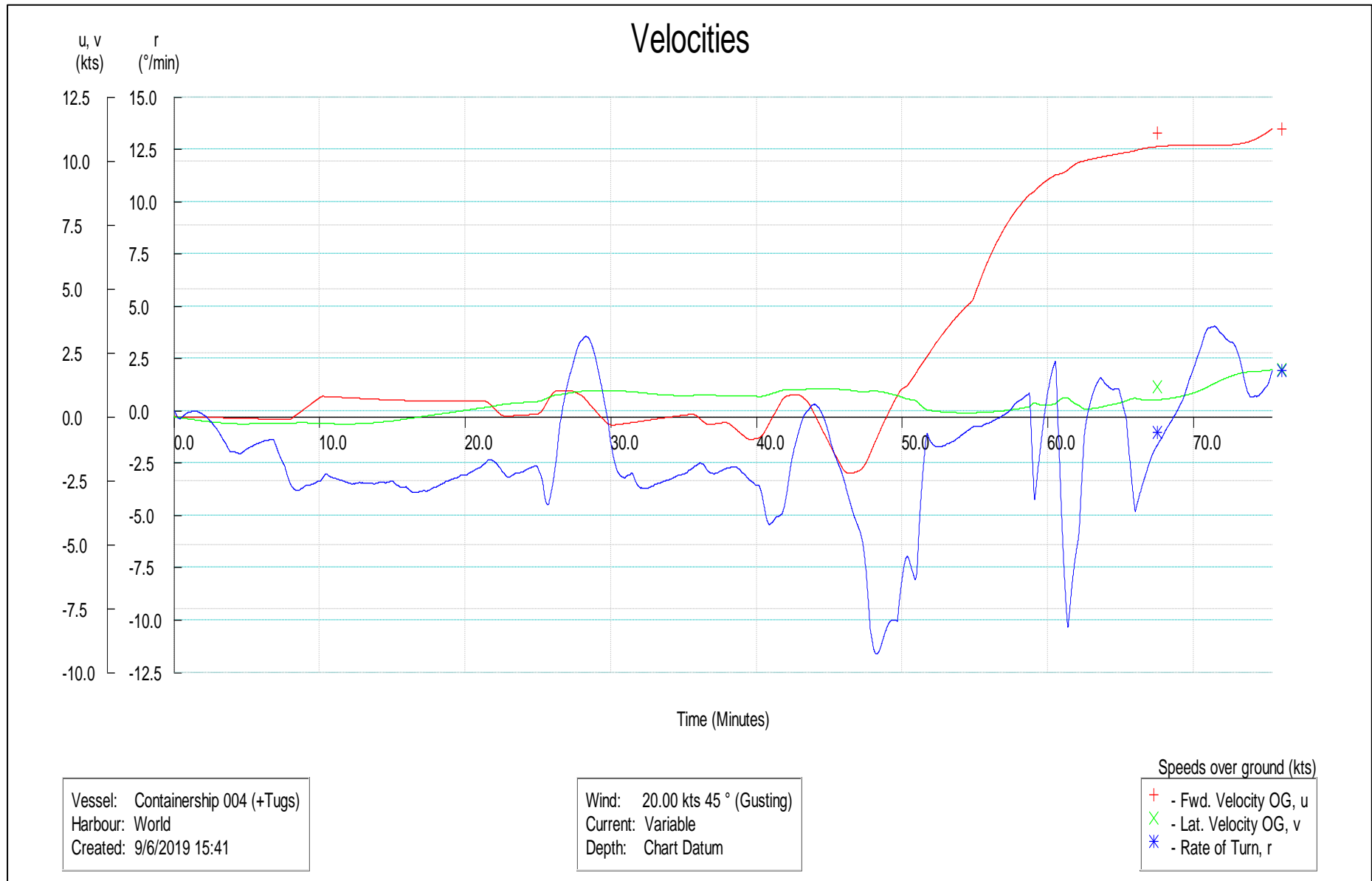
Heading and Rudder



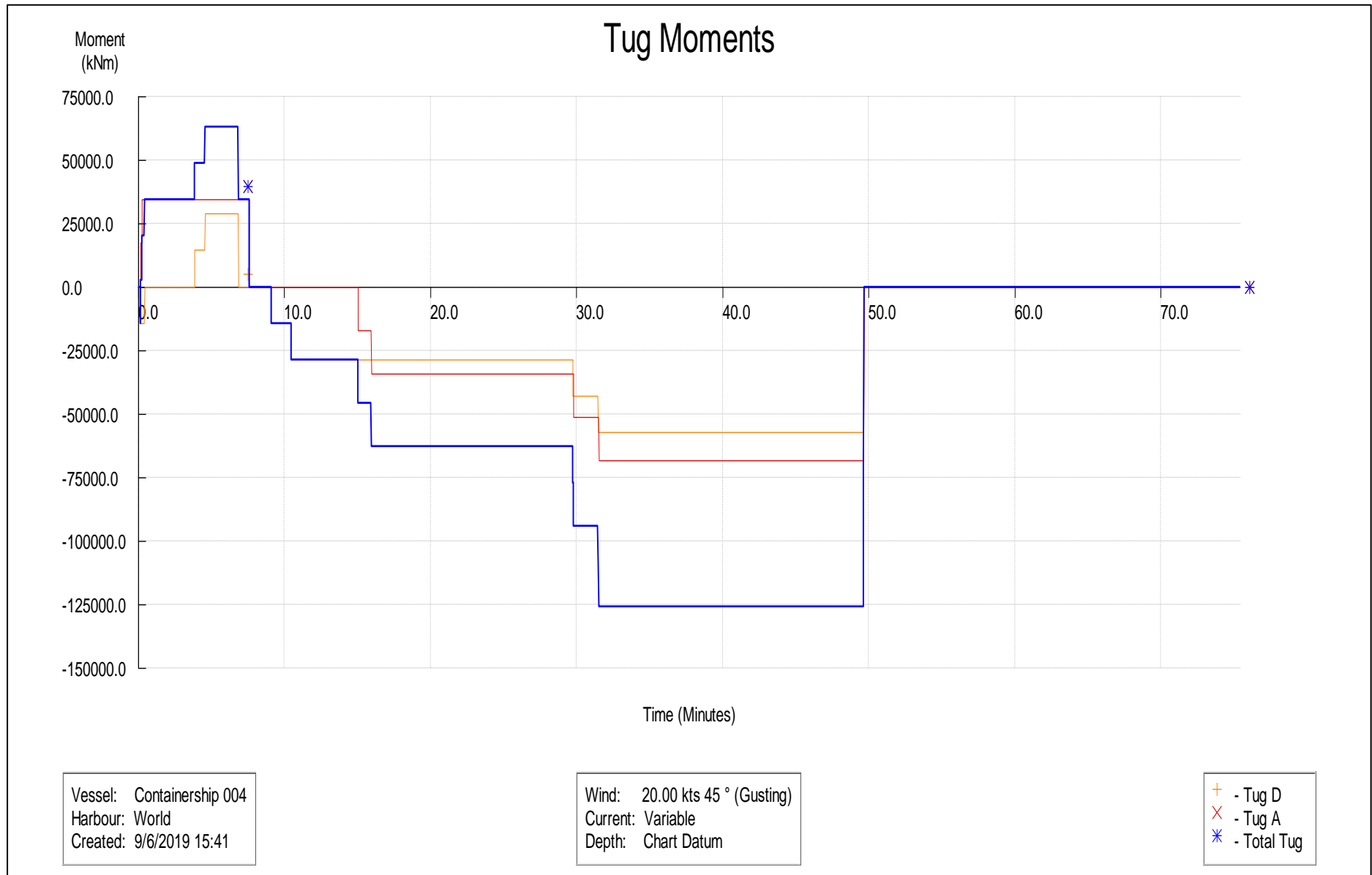
Vessel: Containership 004 (+Tugs)
 Harbour: World
 Created: 9/6/2019 15:41

Wind: 20.00 kts 45 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

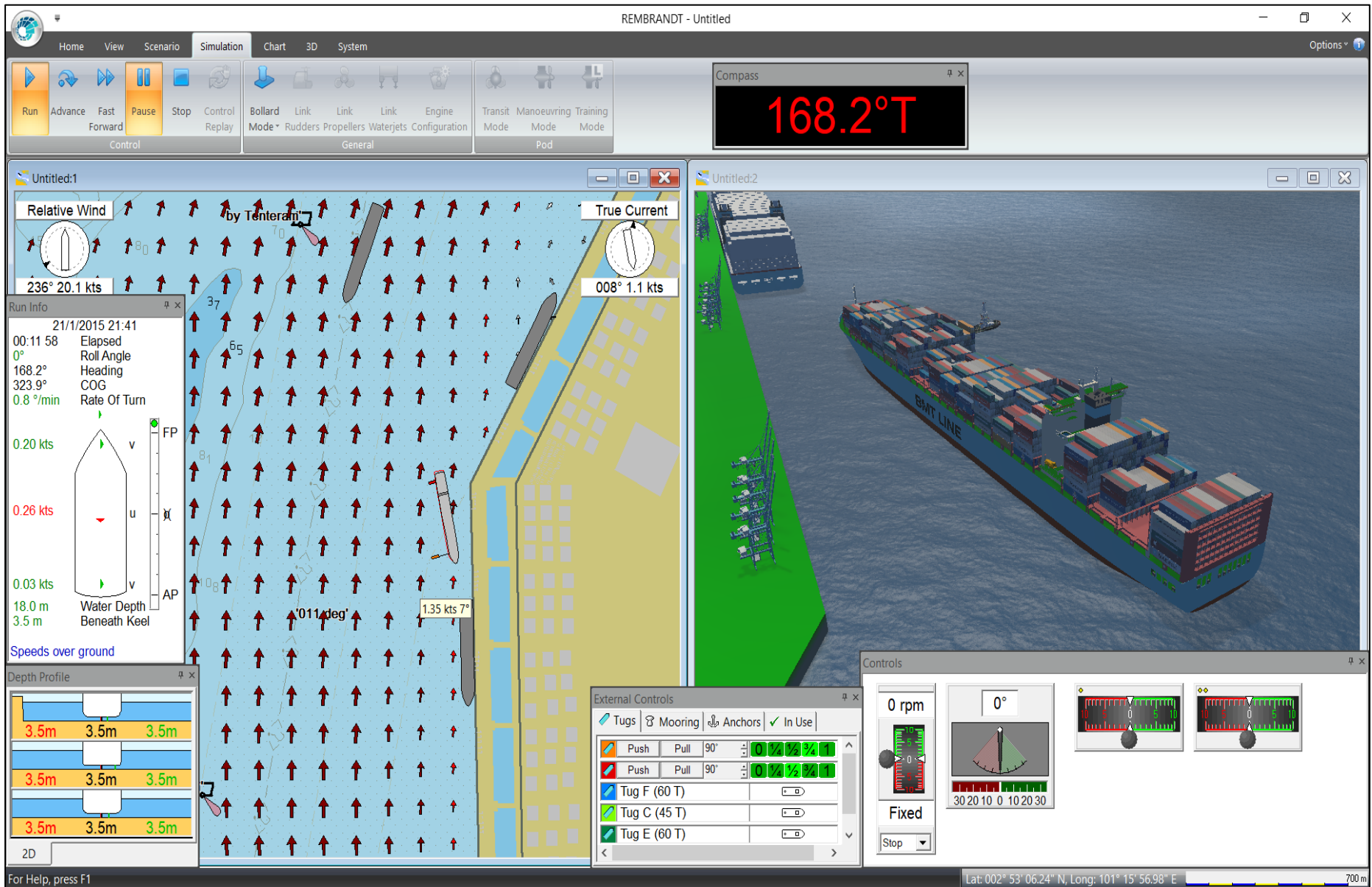
+ - Rudder Rud (°)
 X - Heading



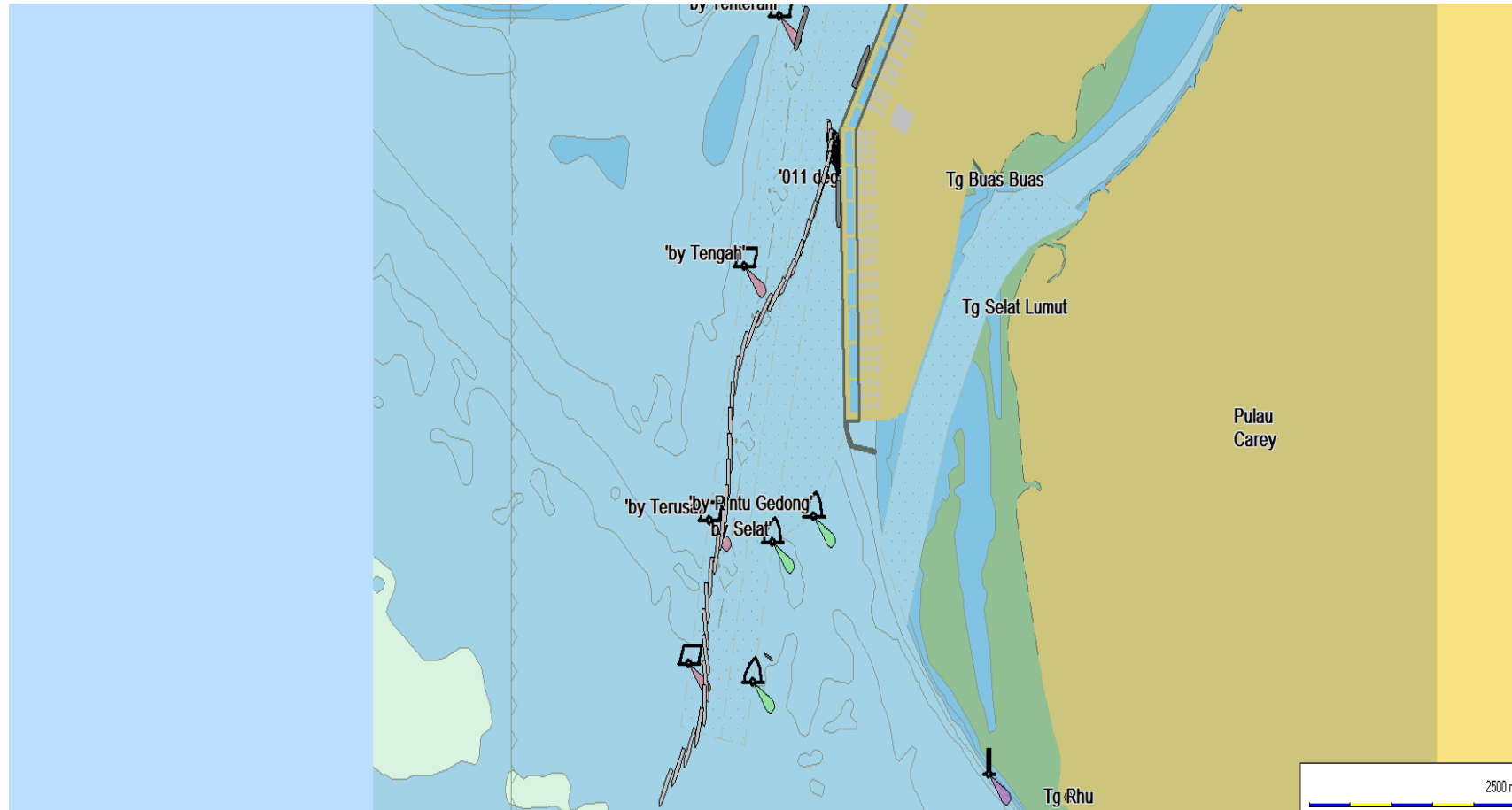




Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
30	R30WPCT14NE20 kEbb2130hT45tx2P ortDep.rmb	Ebb (2130h)	NE 20 k	Departure (Port a/s)	F: 45t A: 45t	The vessel was pulled off the berth using two 45 tons bollard pull tugs. The forward tug struggled to pull the bow out. The vessel was then backed and the aft tug was ordered to push while the forward tug pulled at $\frac{3}{4}$ Power. When there was sufficient sternway, starboard helm was applied with the engine going ahead. This was successful in getting the current on the port side of the vessel to set her out. The vessel then transited the channel on Slow Ahead (about 7 knots).	4/6



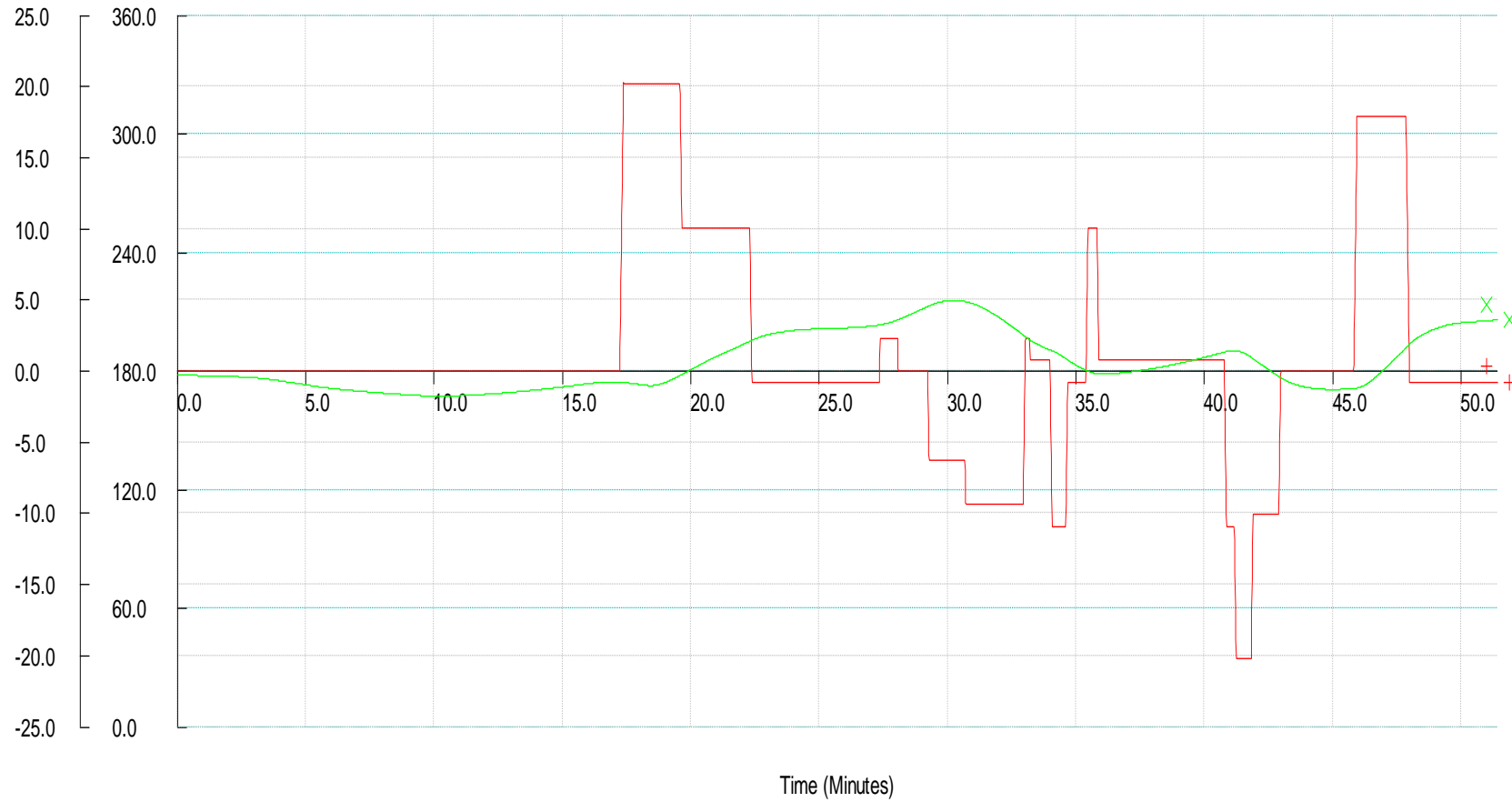
Vessel Track



Vessel: Containership 004
Harbour: World
Created: 14/6/2019 15:26

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

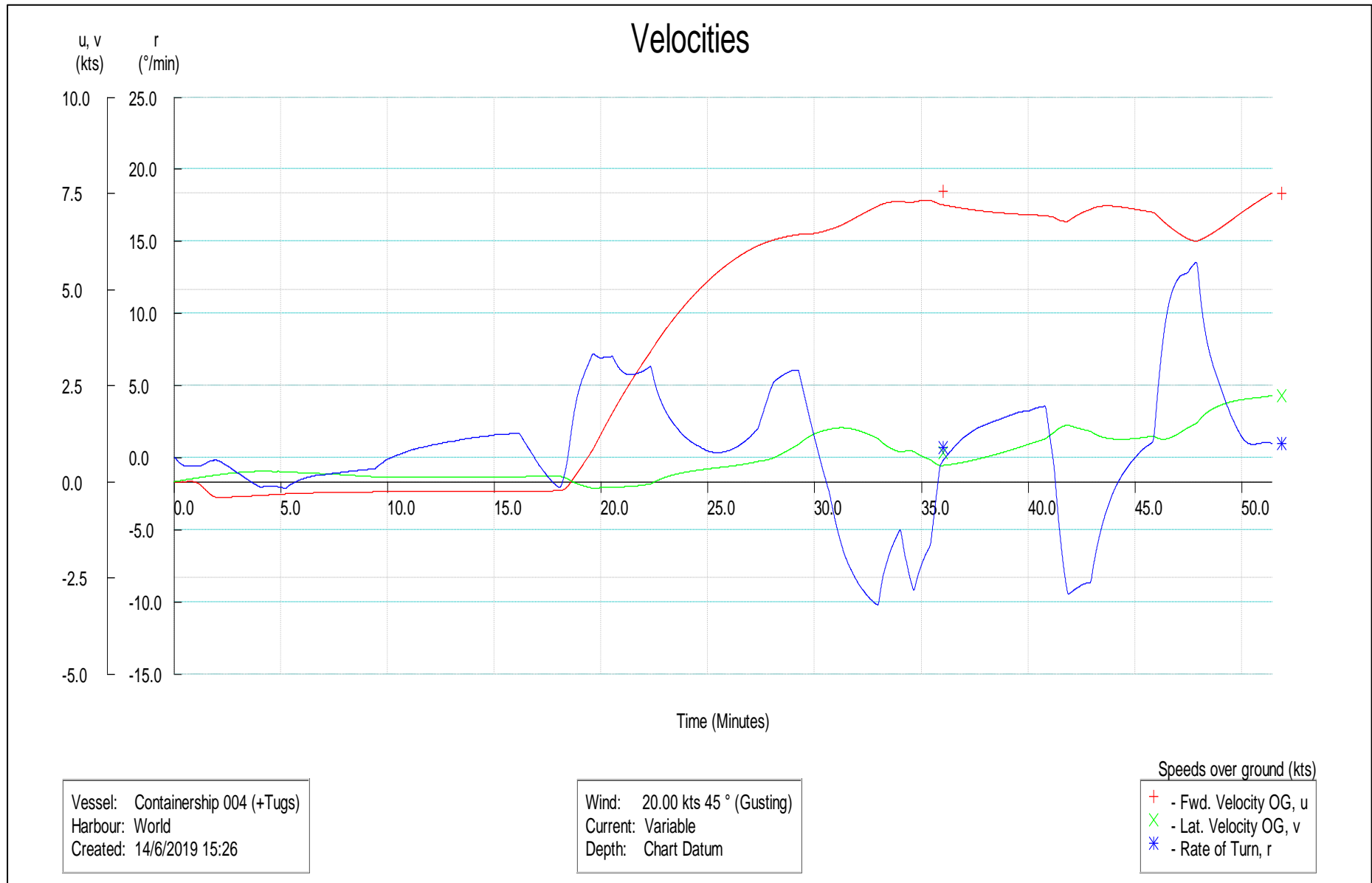
Heading and Rudder

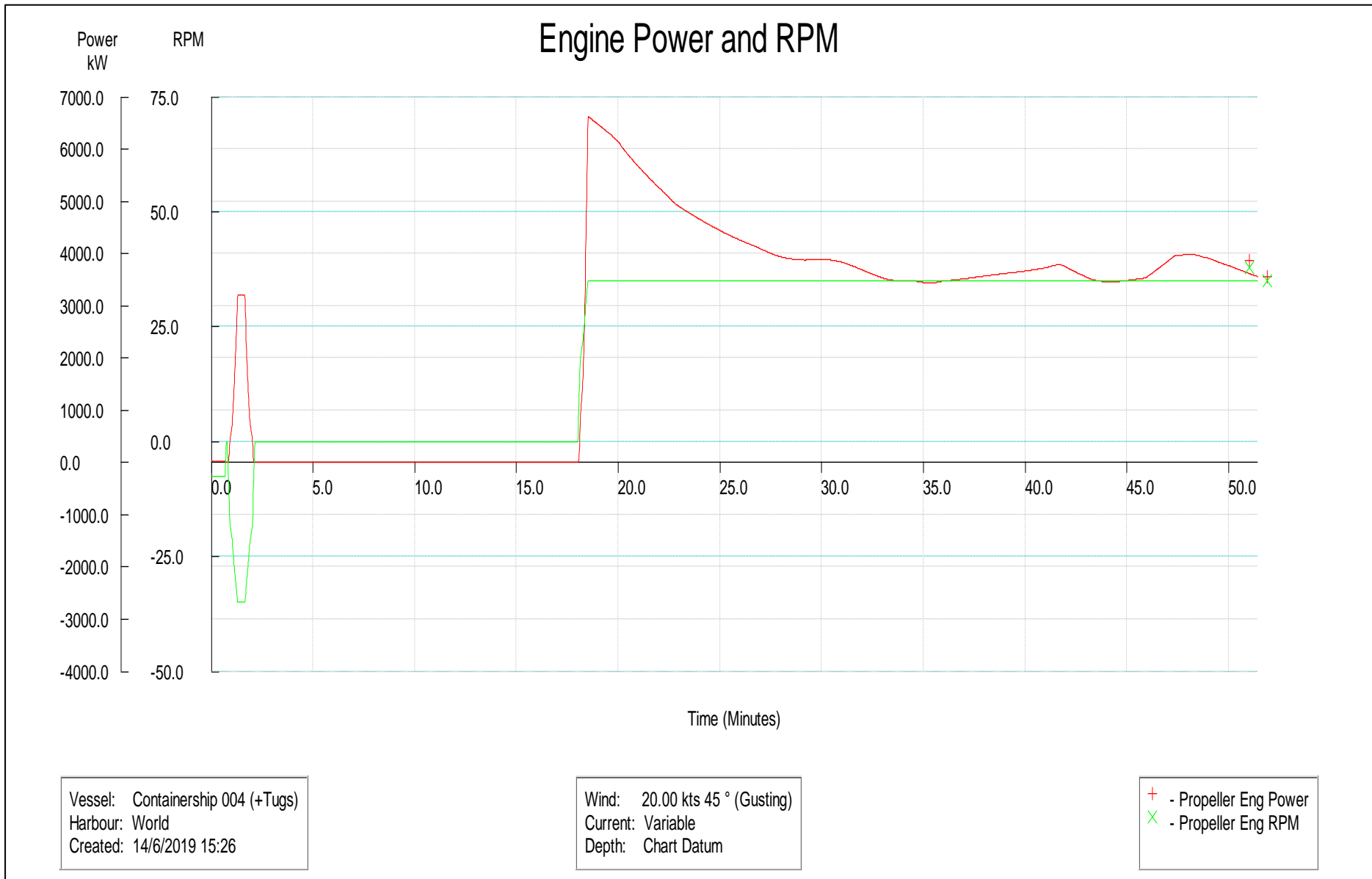


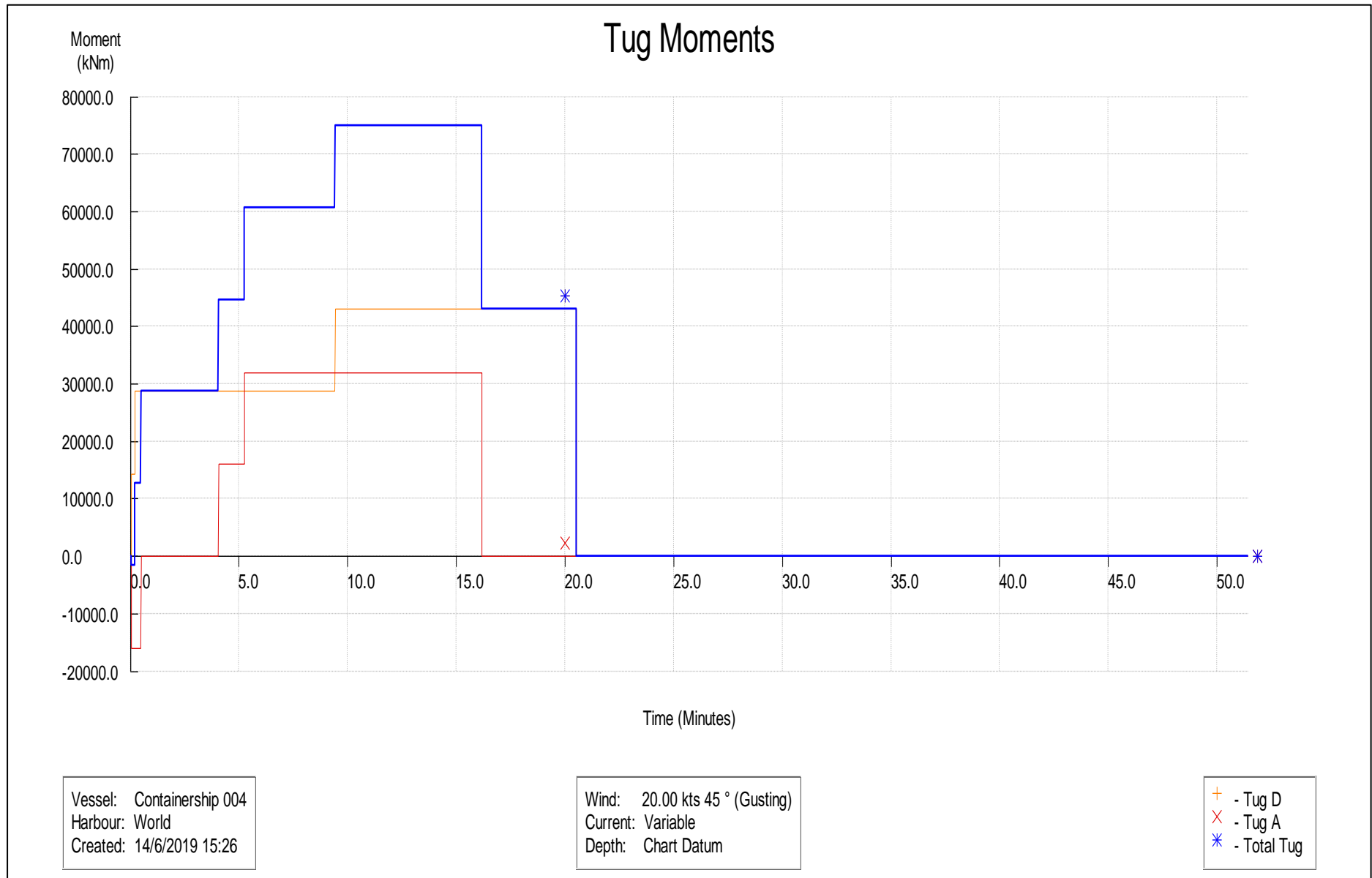
Vessel: Containership 004 (+Tugs)
 Harbour: World
 Created: 14/6/2019 15:26

Wind: 20.00 kts 45 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

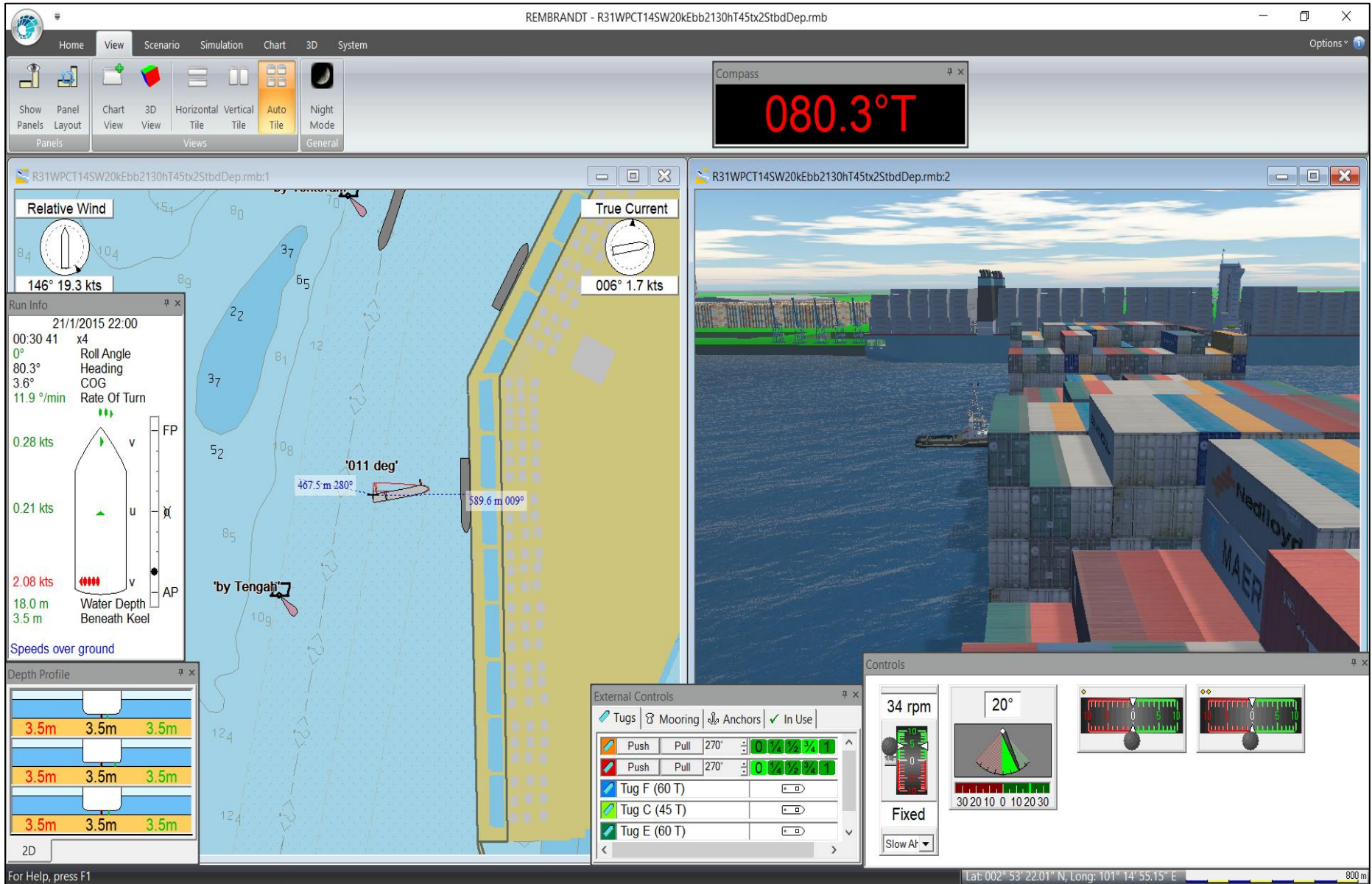
+ - Rudder Rud (°)
 x - Heading



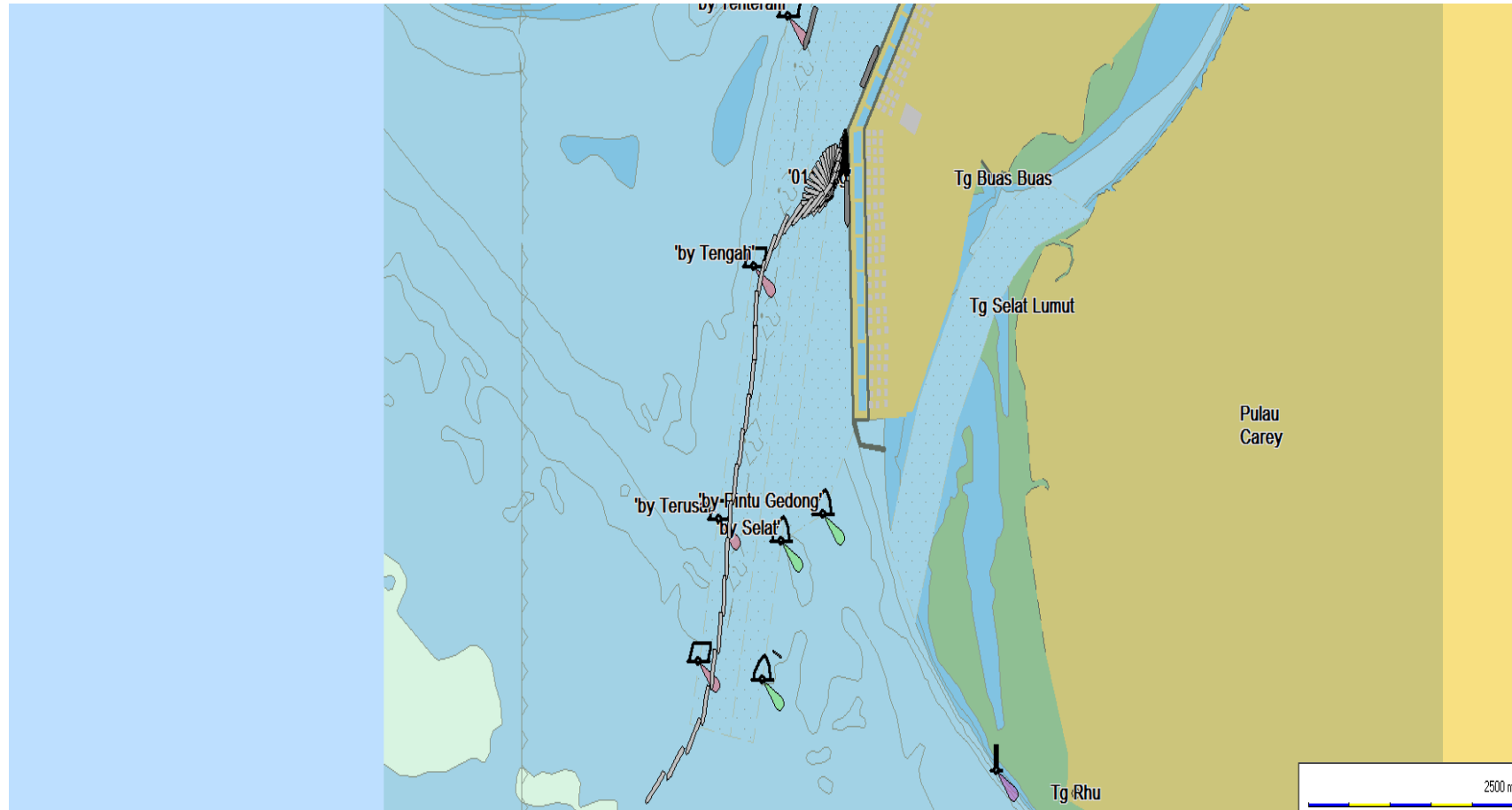




Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
31	R31WPCT14SW20 kEbb2130hT45tx2S tbdDep.rmb	Ebb (2130h)	SW 20 k	Dep (Stbd a/s)	F: 45t A: 45t	The vessel was pulled off the berth and backed before swinging to starboard. With the SW wind pressing her onto the berth, the two 45 tons bollard pull tugs had to work at Full Power at times during the manoeuvre. After swinging around, the vessel proceeded out the channel at Half Ahead. Minimum available channel width: 465m	4/6

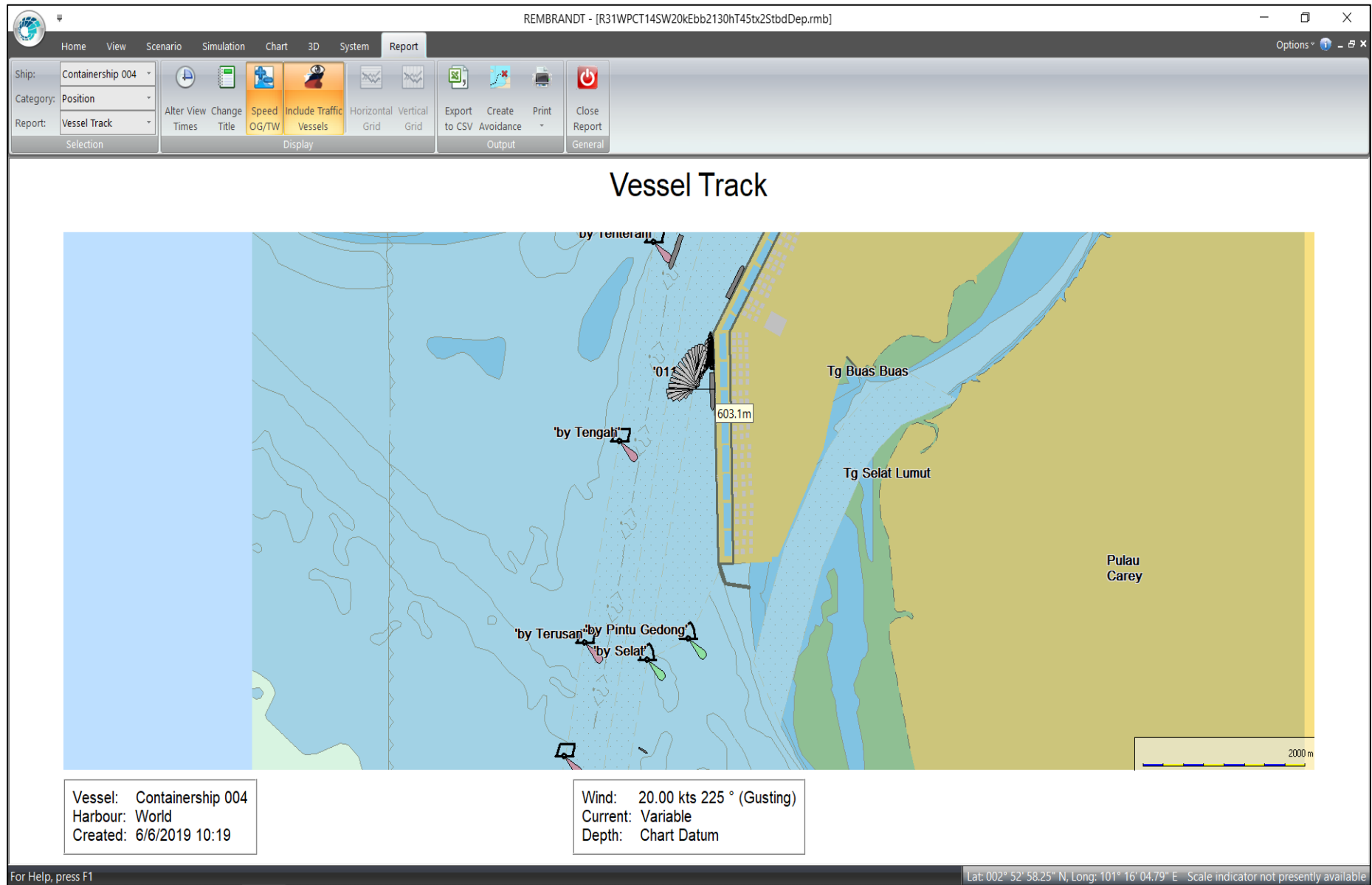


Vessel Track

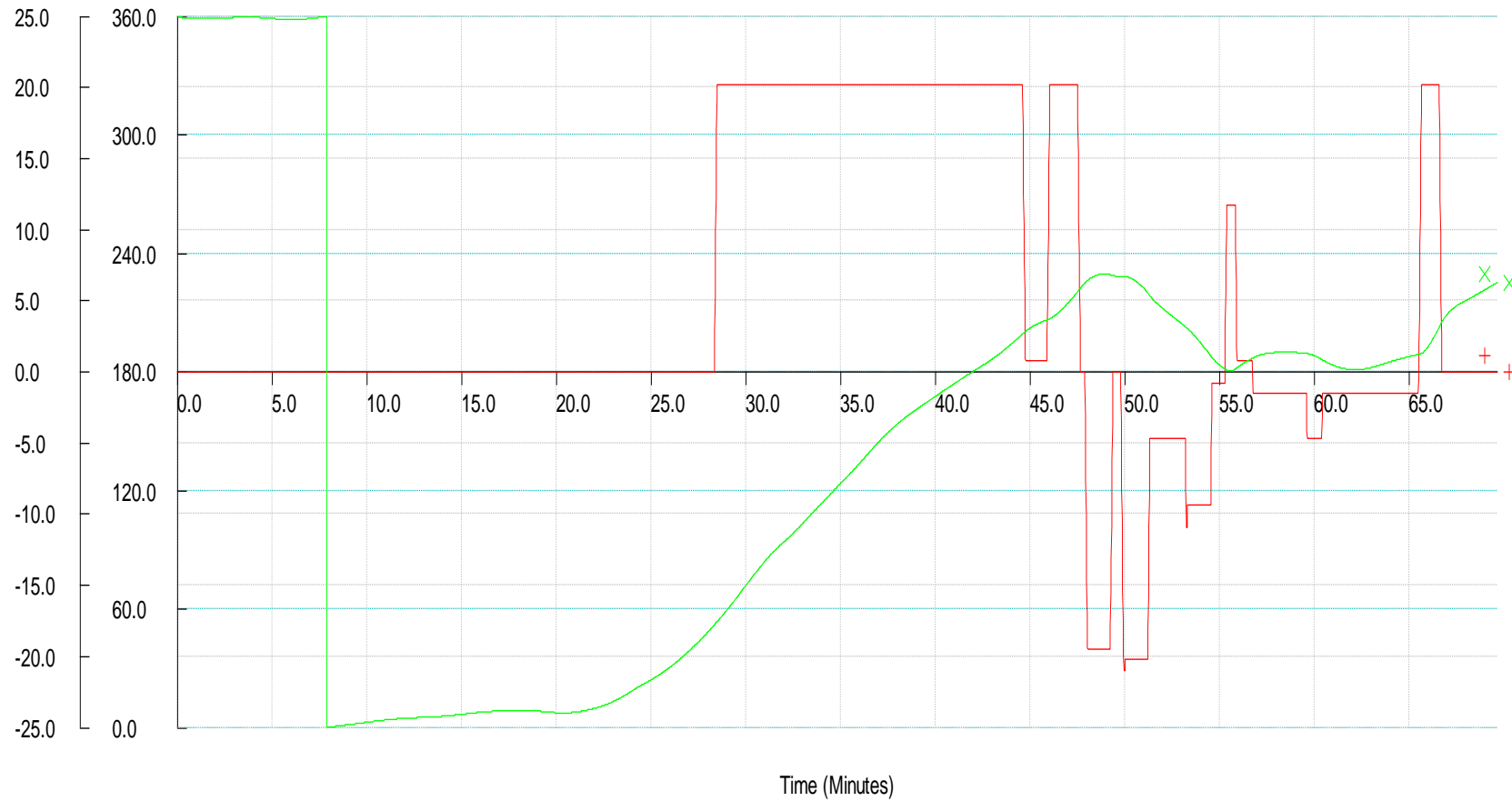


Vessel: Containership 004
Harbour: World
Created: 6/6/2019 10:19

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum



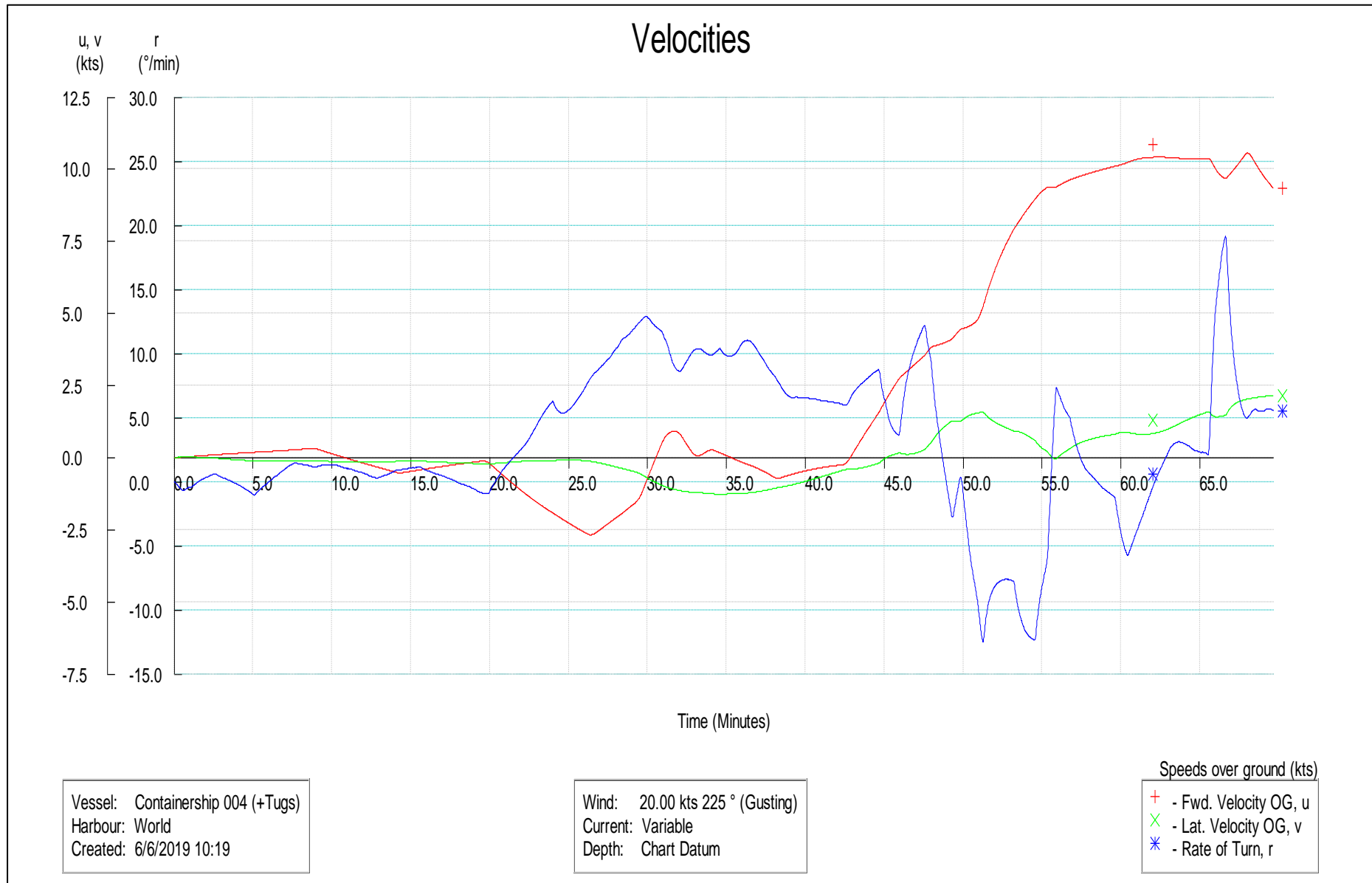
Heading and Rudder

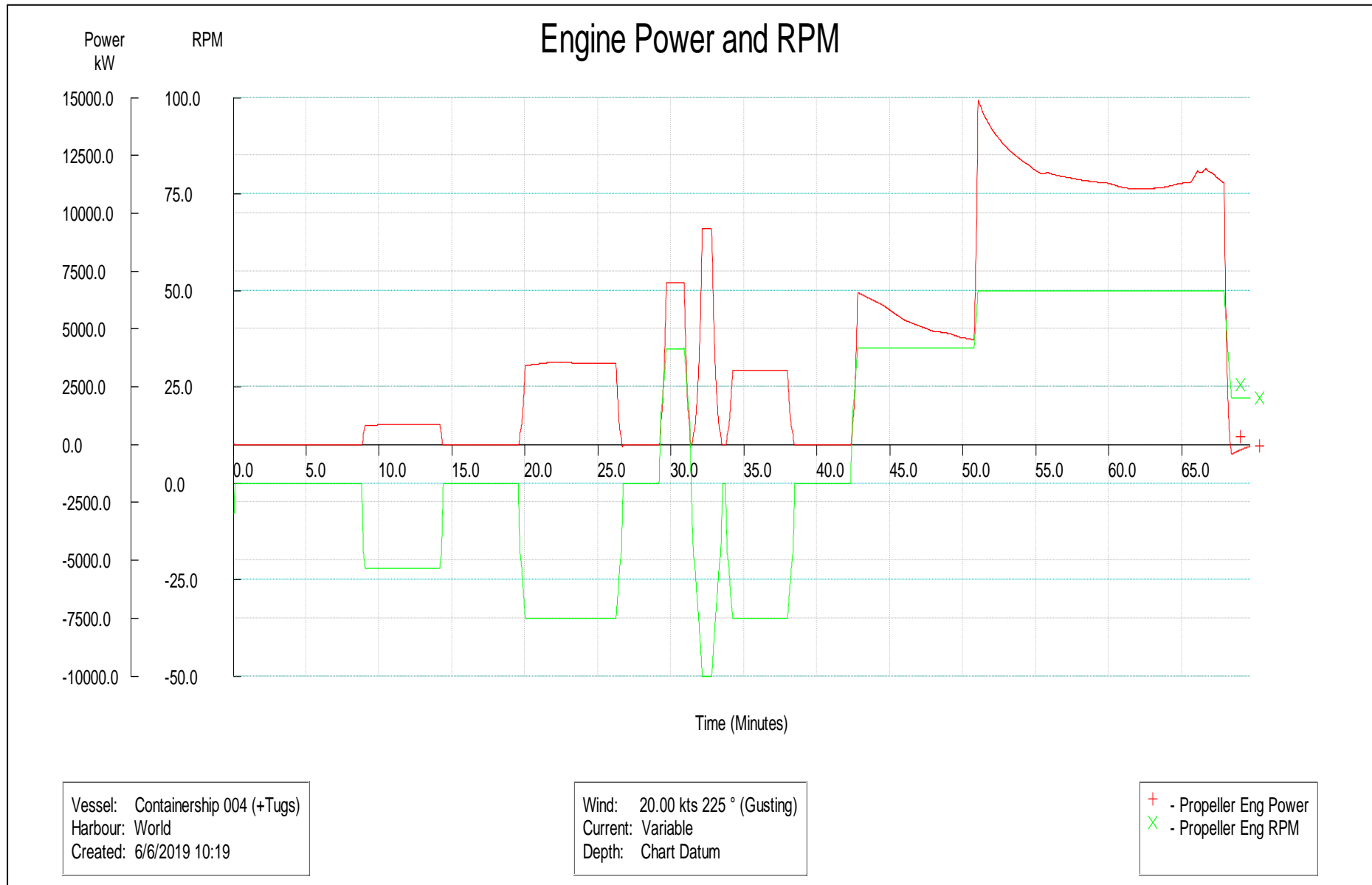


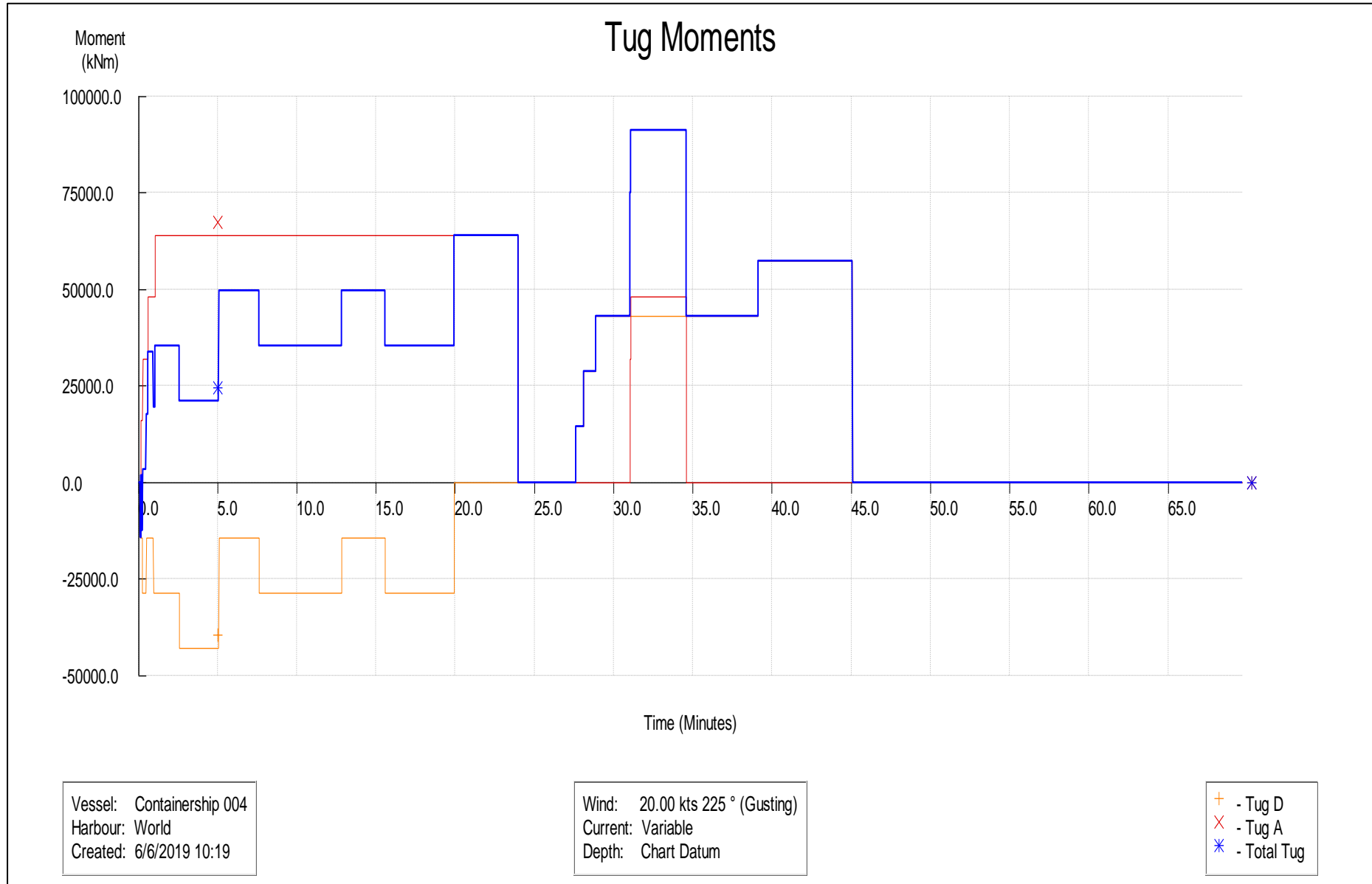
Vessel: Containership 004 (+Tugs)
 Harbour: World
 Created: 6/6/2019 10:19

Wind: 20.00 kts 225° (Gusting)
 Current: Variable
 Depth: Chart Datum

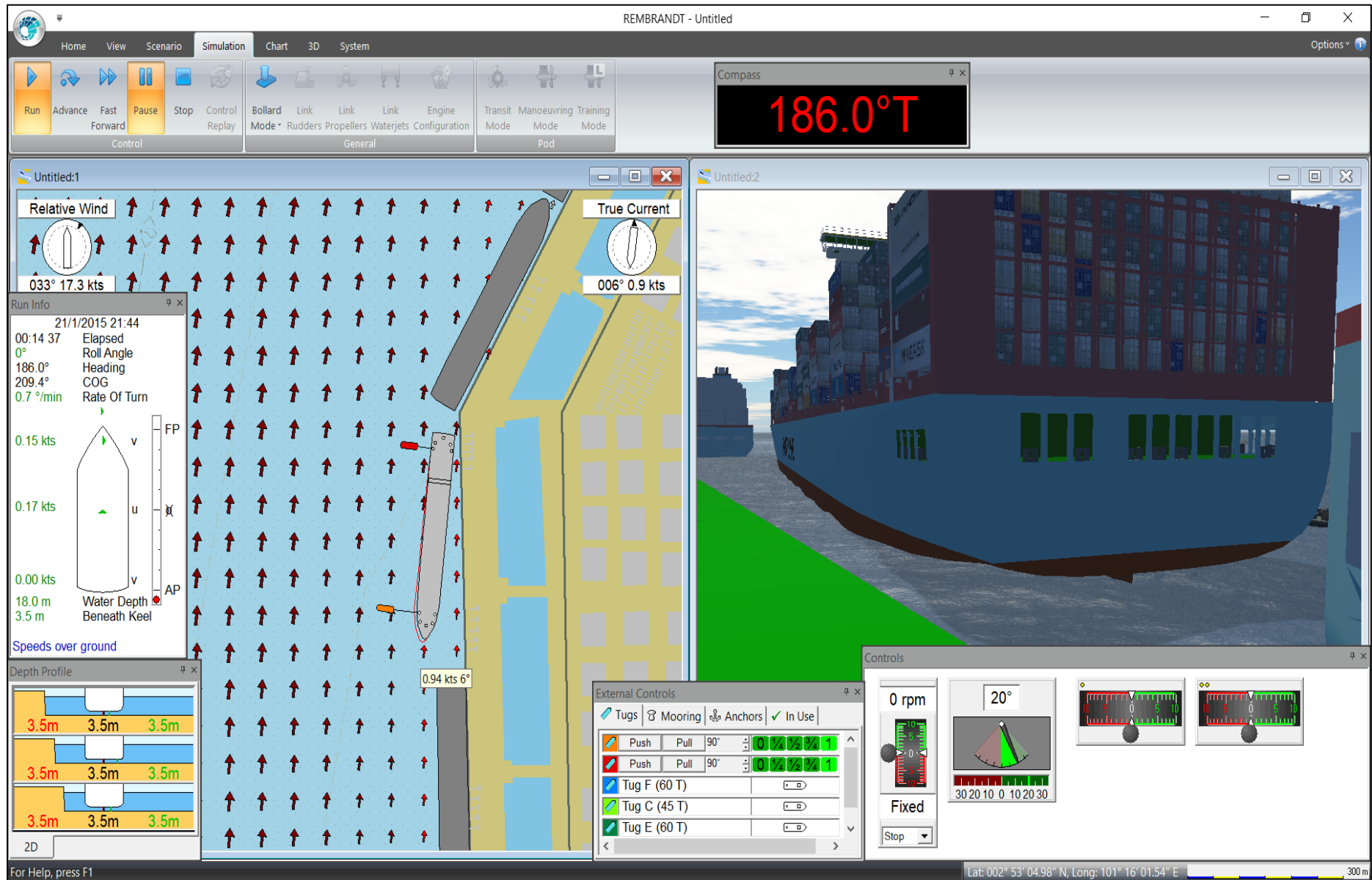
+ - Rudder Rud (°)
 x - Heading



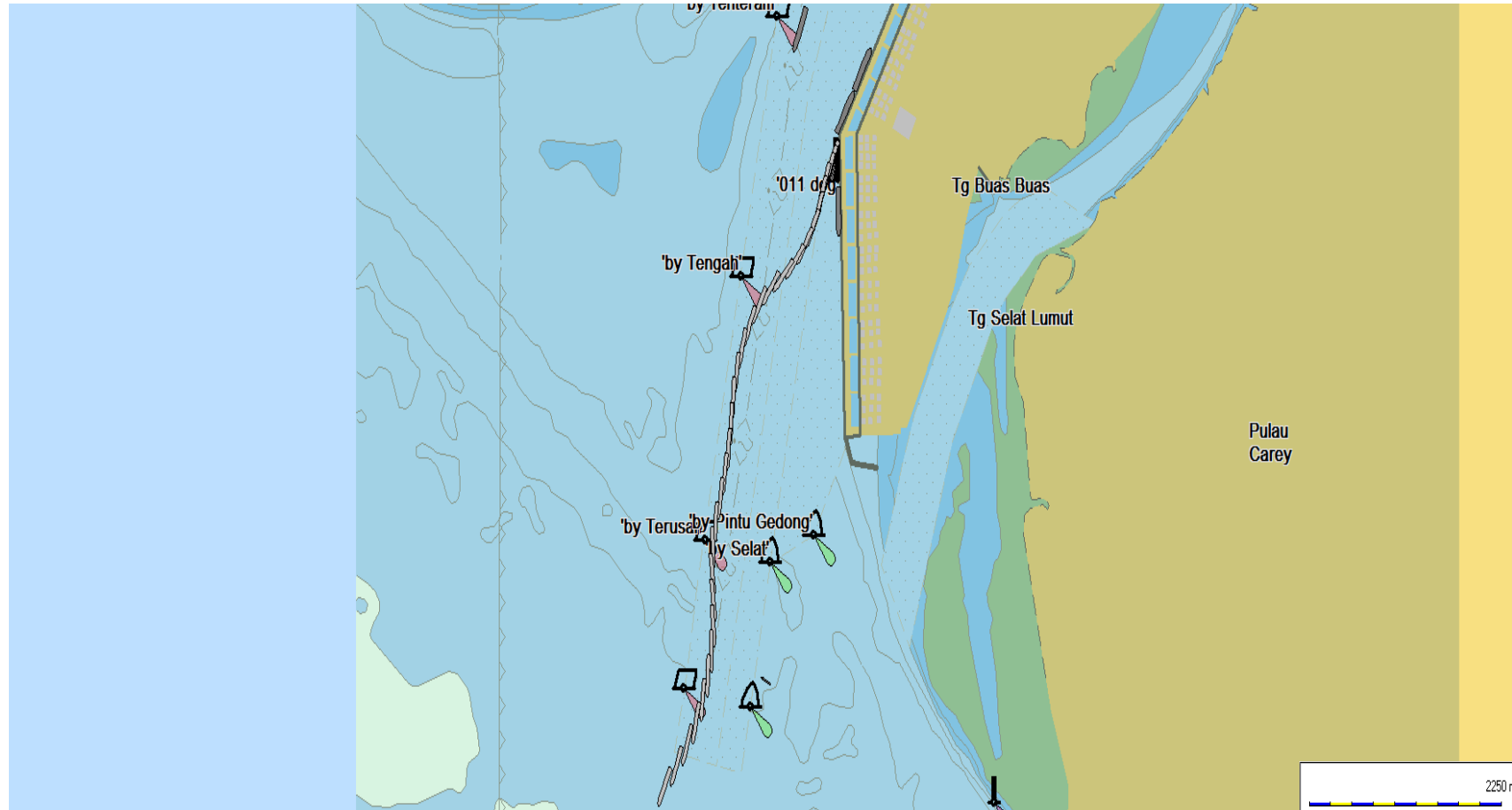




Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
32	R32WPCT14SW20 kEbb2130hT45tx2P ortDep.rmb	Ebb (2130h)	SW 20 k	Dep (Port a/s)	F: 45t A: 45t	With the SW wind pressing her onto the berth, the two 45 tons bollard pull tugs had to work at Full Power to pull the vessel off the berth. Even then the movement was slow and care had to be taken to keep the bow slightly open at all times. When there was sufficient clearance from the stern to the wharf, helm and engine were used to assist in opening the bow. This helped get the current between the ship and the wharf and the vessel then could clear the ship ahead on its way out to sea. In such environmental conditions, if the bow thruster was also of limited help, it may be prudent for the pilot to call for more tug assistance before proceeding ahead.	4/6



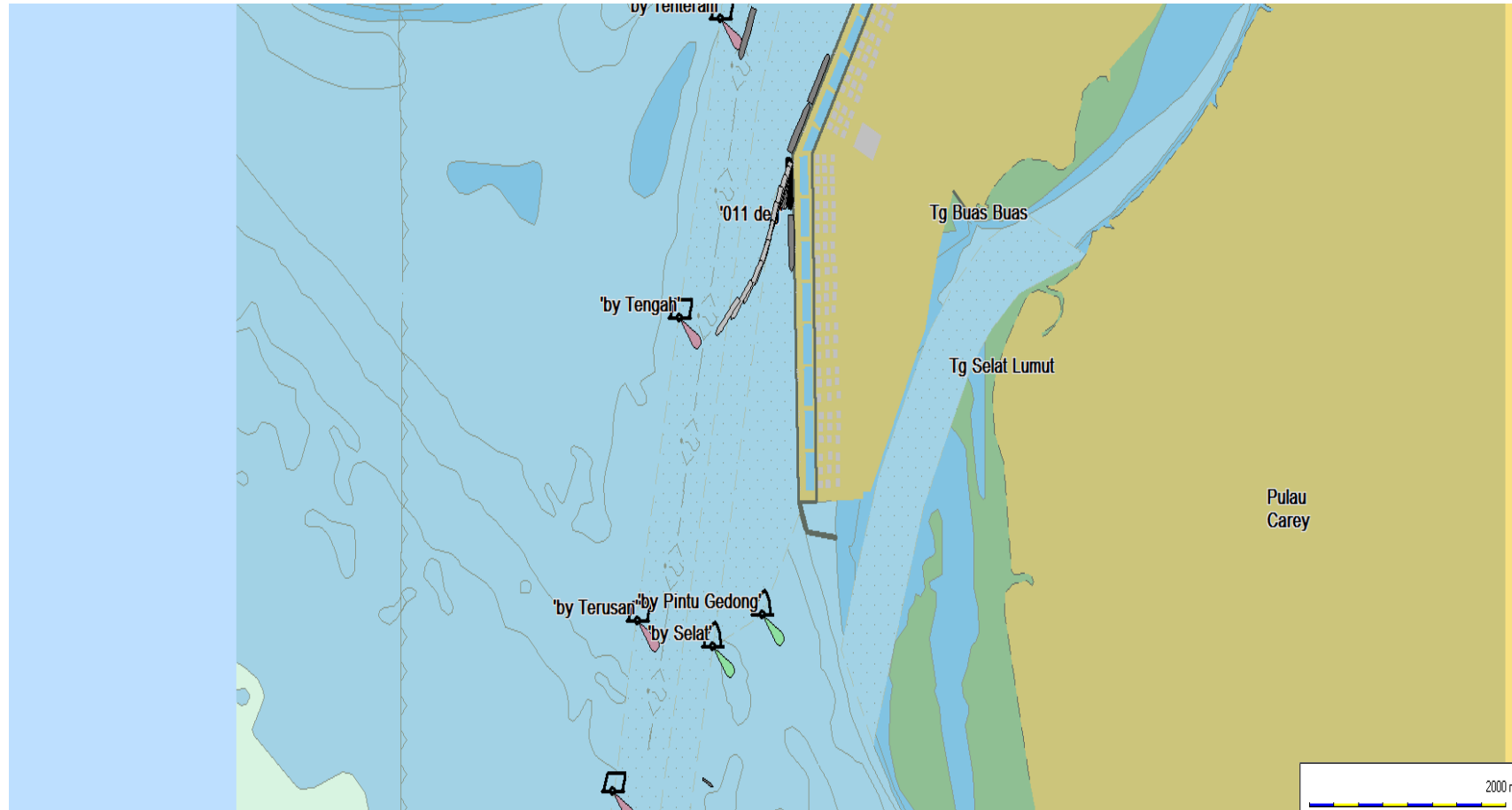
Vessel Track



Vessel: Containership 004
Harbour: World
Created: 14/6/2019 16:08

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

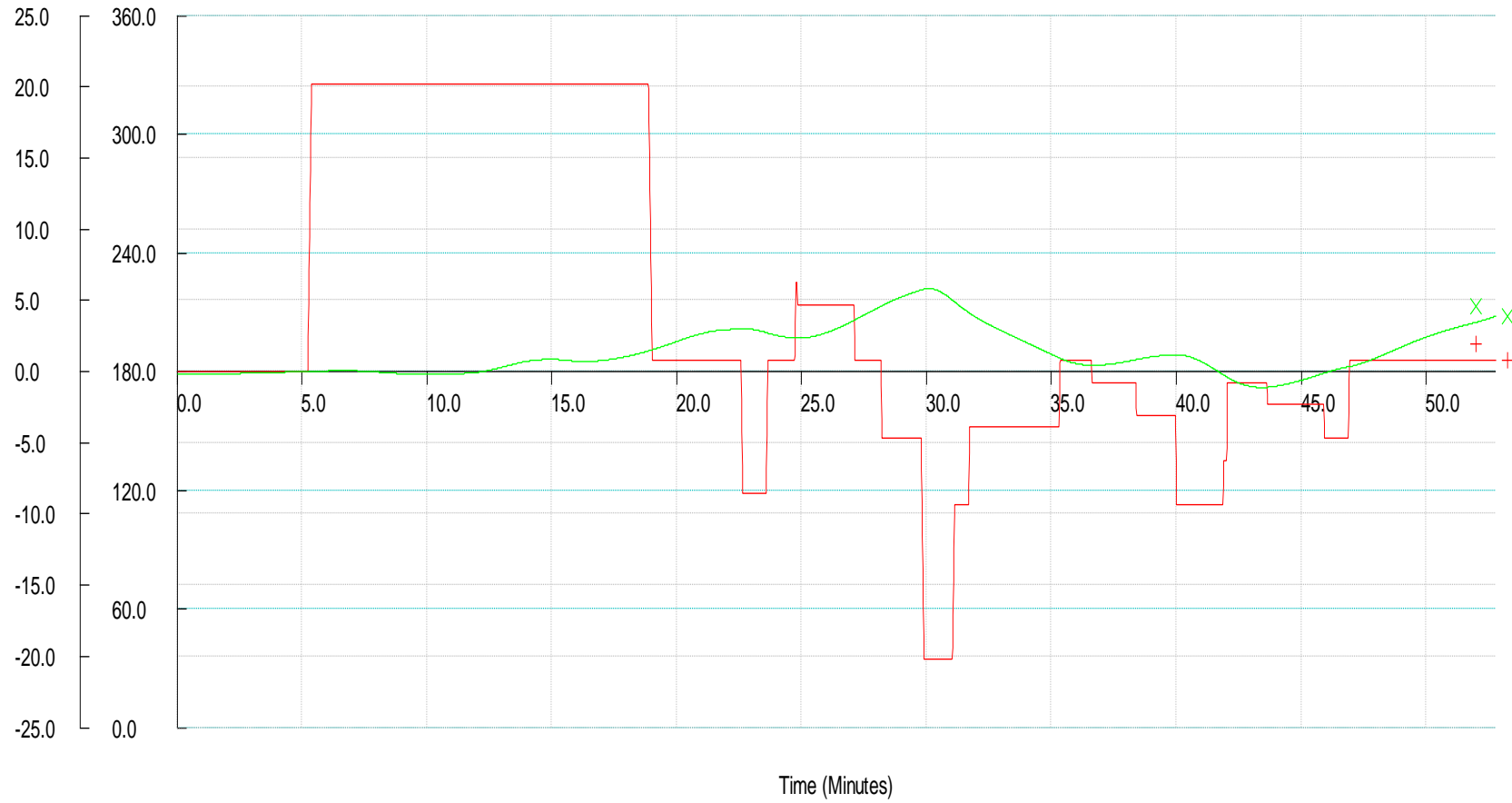
Vessel Track



Vessel: Containership 004
Harbour: World
Created: 14/6/2019 16:08

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

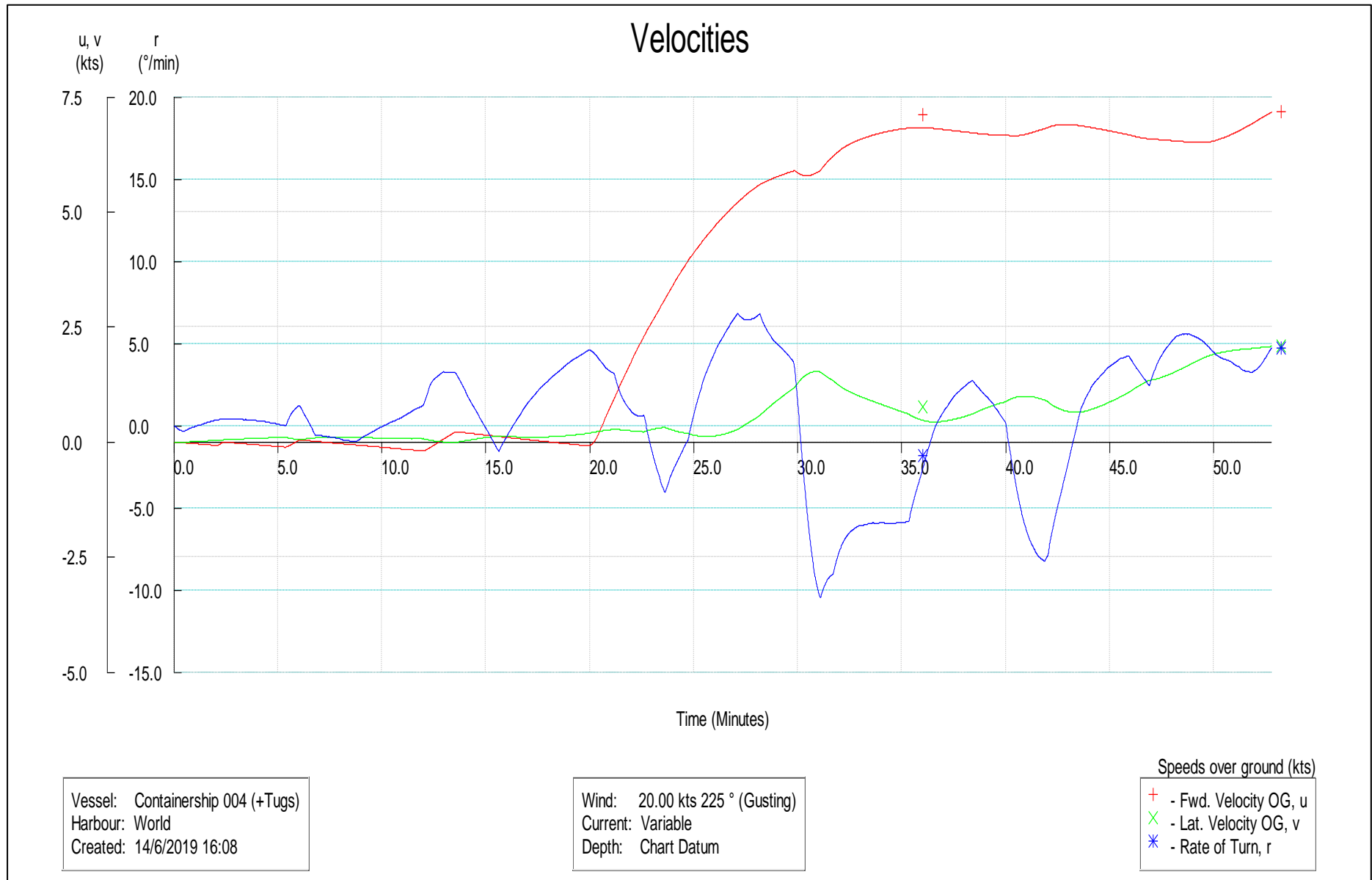
Heading and Rudder

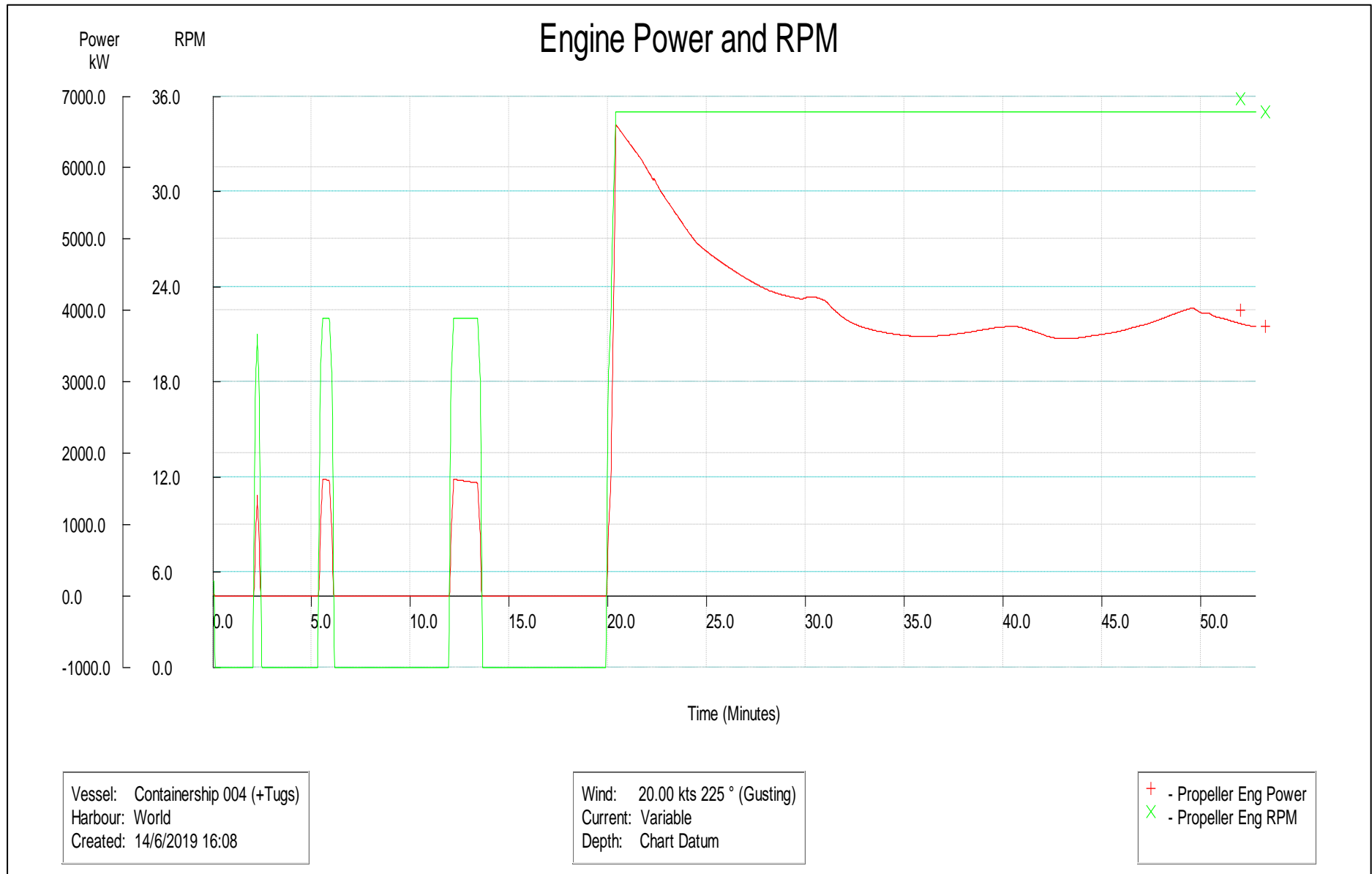


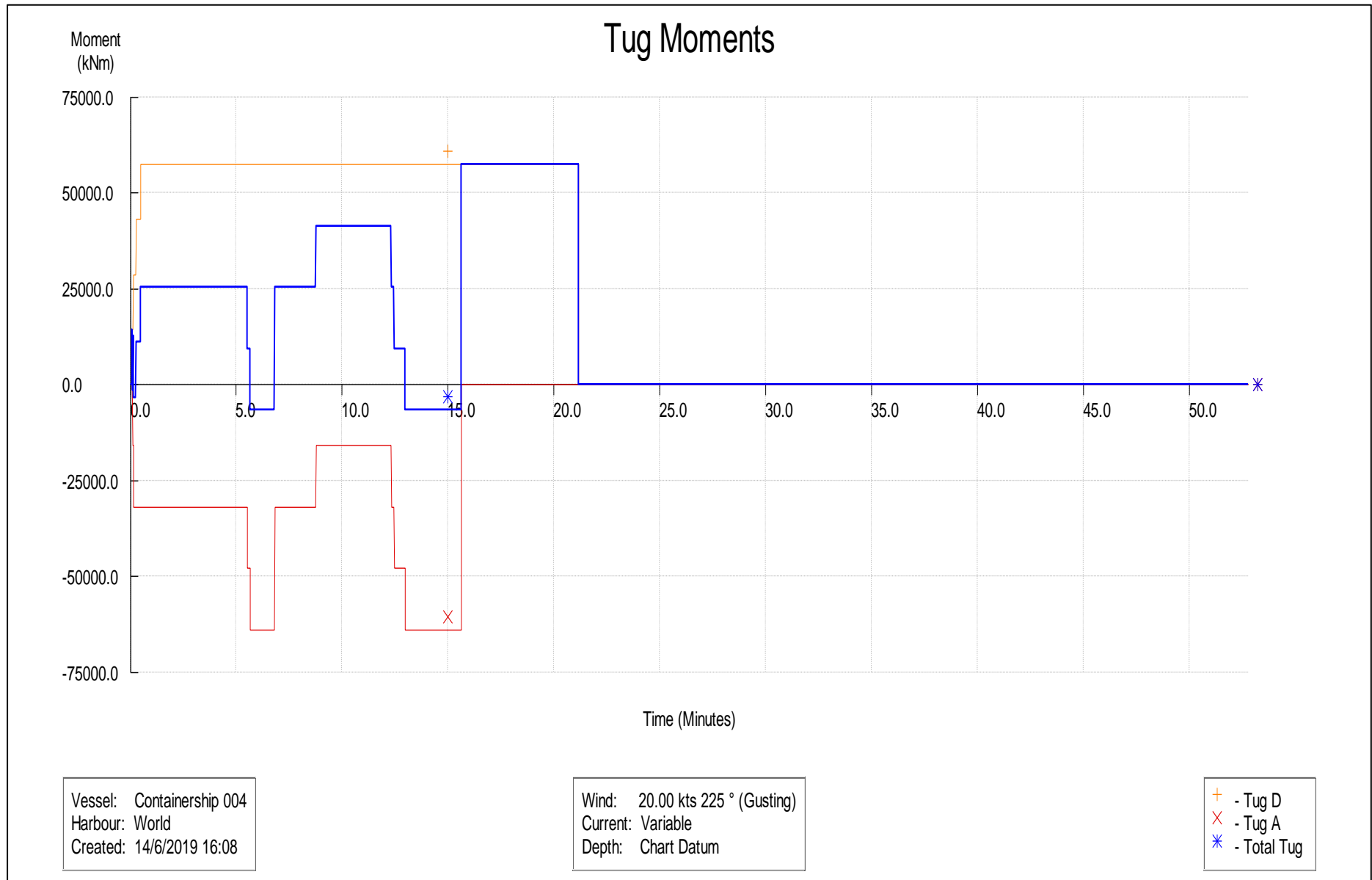
Vessel: Containership 004 (+Tugs)
 Harbour: World
 Created: 14/6/2019 16:08

Wind: 20.00 kts 225 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

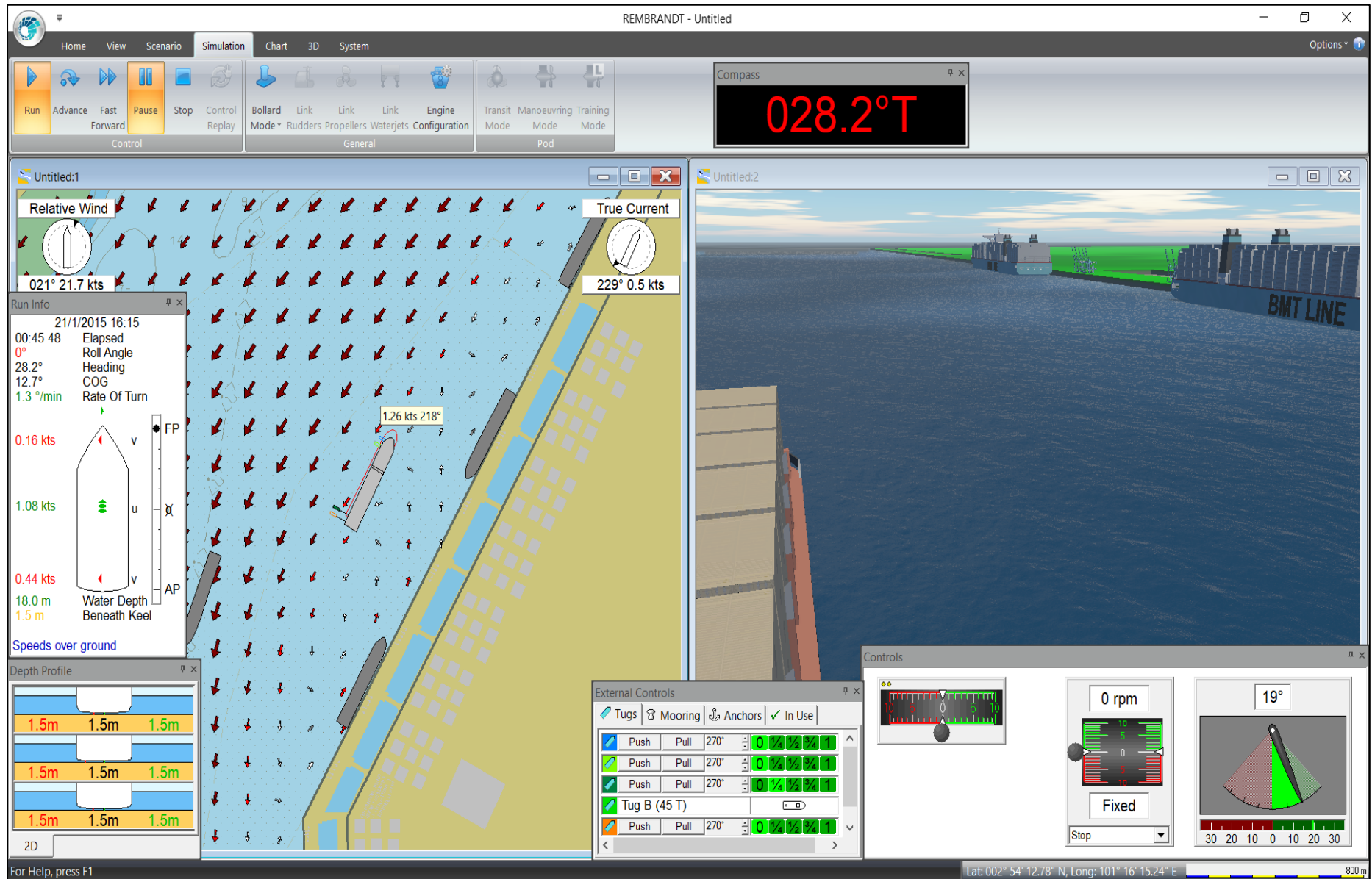
+ - Rudder Rud (°)
 x - Heading







Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
33	R33WPCT10NE20 kFId1530hT60tx4St bdArr.rmb	FId (1530h)	NE 20 k	Arrival (Stbd a/s)	F: 60t x 2 A: 60t x 2	The vessel arrived with the bow pointing away from the channel entrance. She managed to alter course to successfully enter the channel on Half Ahead. Approaching Tengah, the engine was reduced to Dead Slow Ahead and later stopped. Four 60 tons bollard pull tugs were made fast and assisted in berthing operating at a maximum of Half Power.	3/6



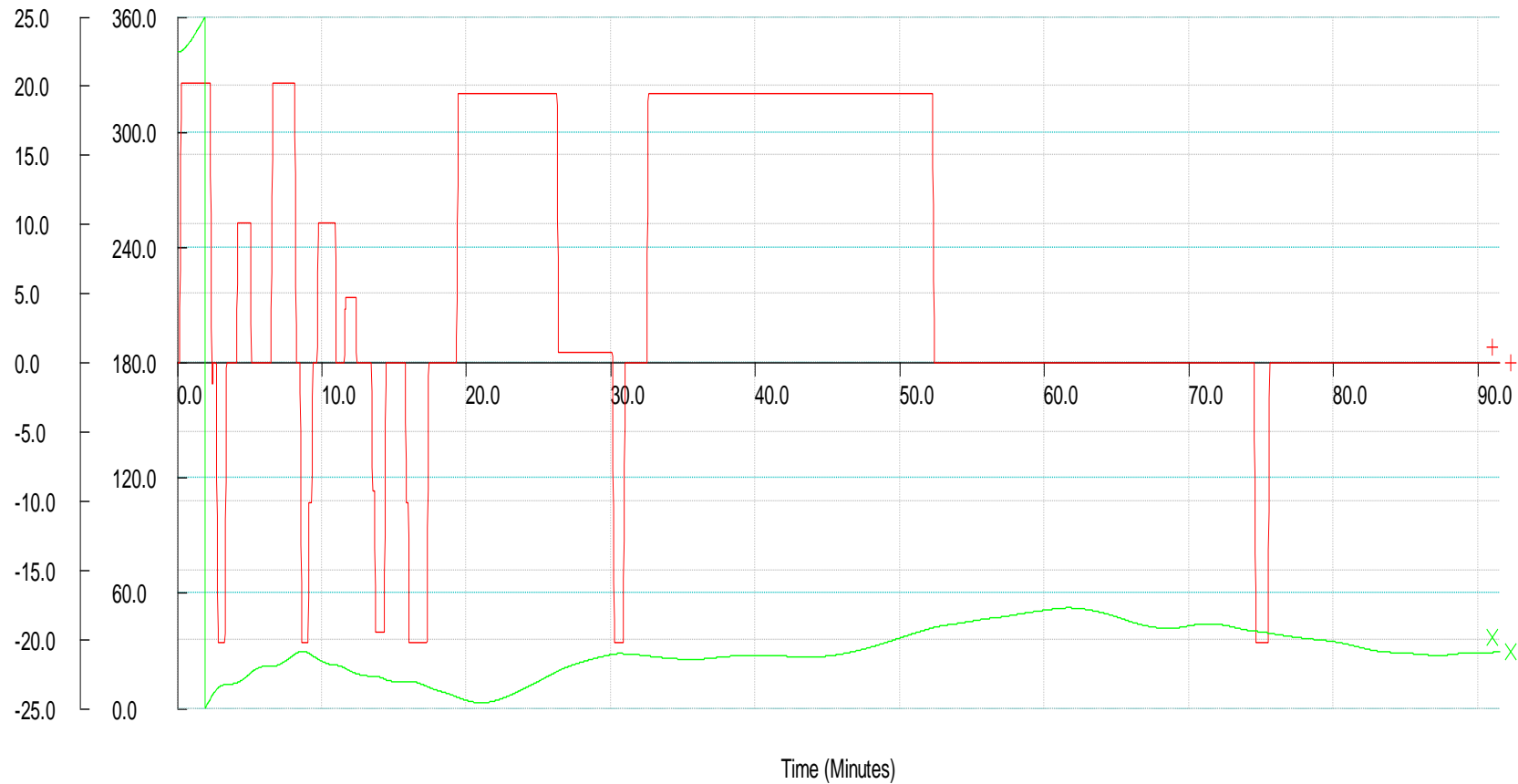
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 17/6/2019 14:31

Wind: 20.00 kts 45° (Gusting)
Current: Variable
Depth: Chart Datum

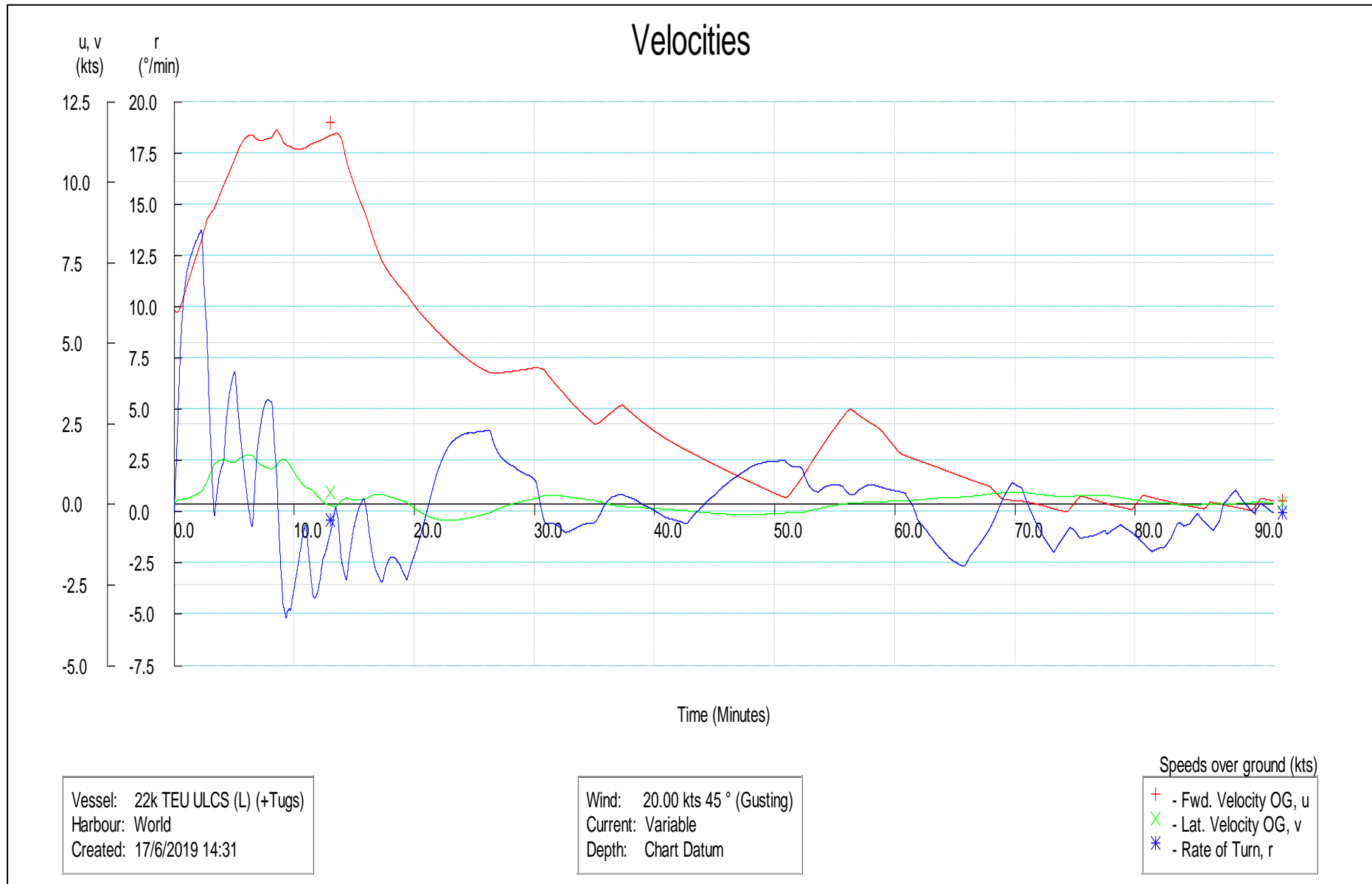
Heading and Rudder

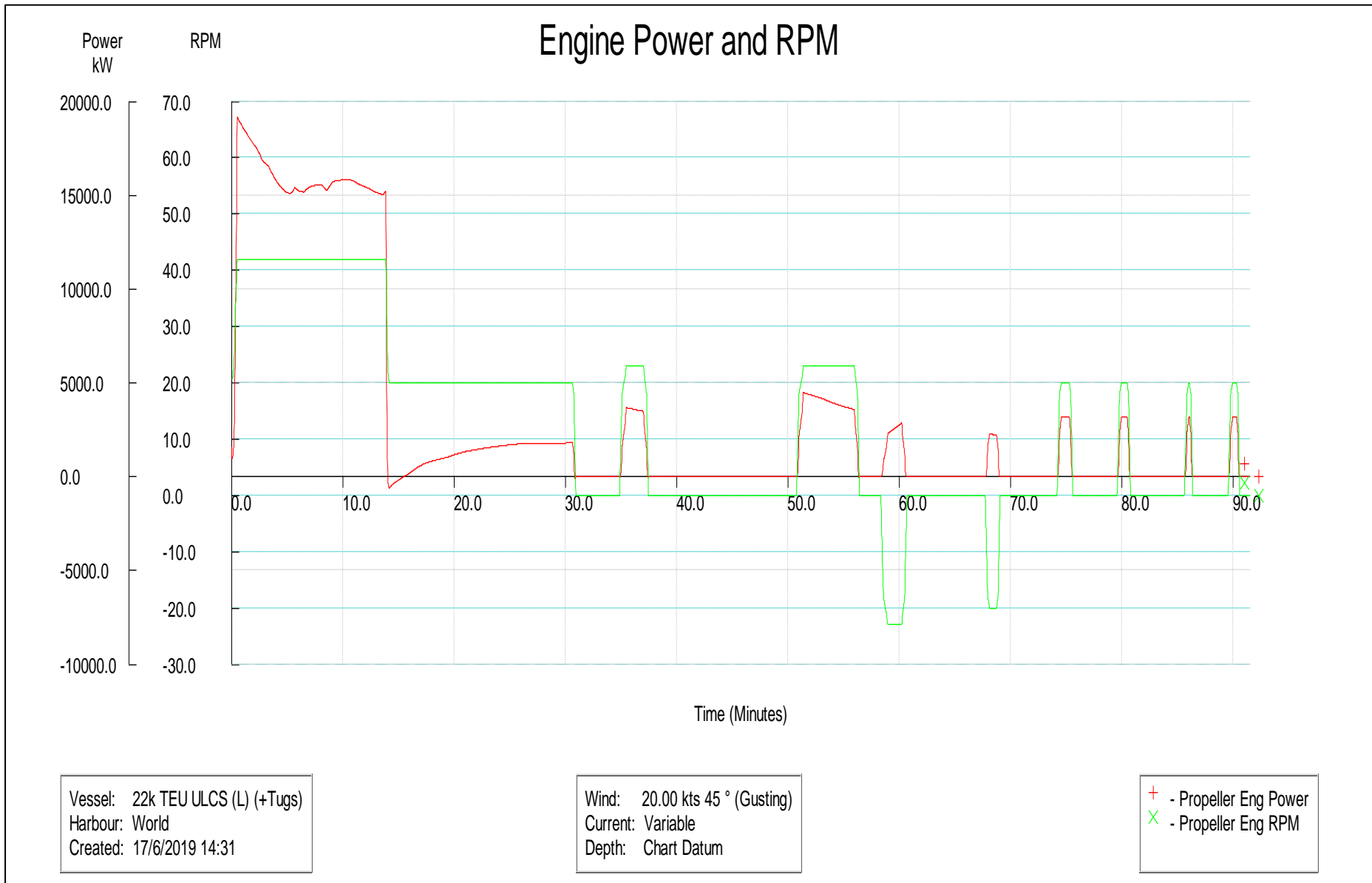


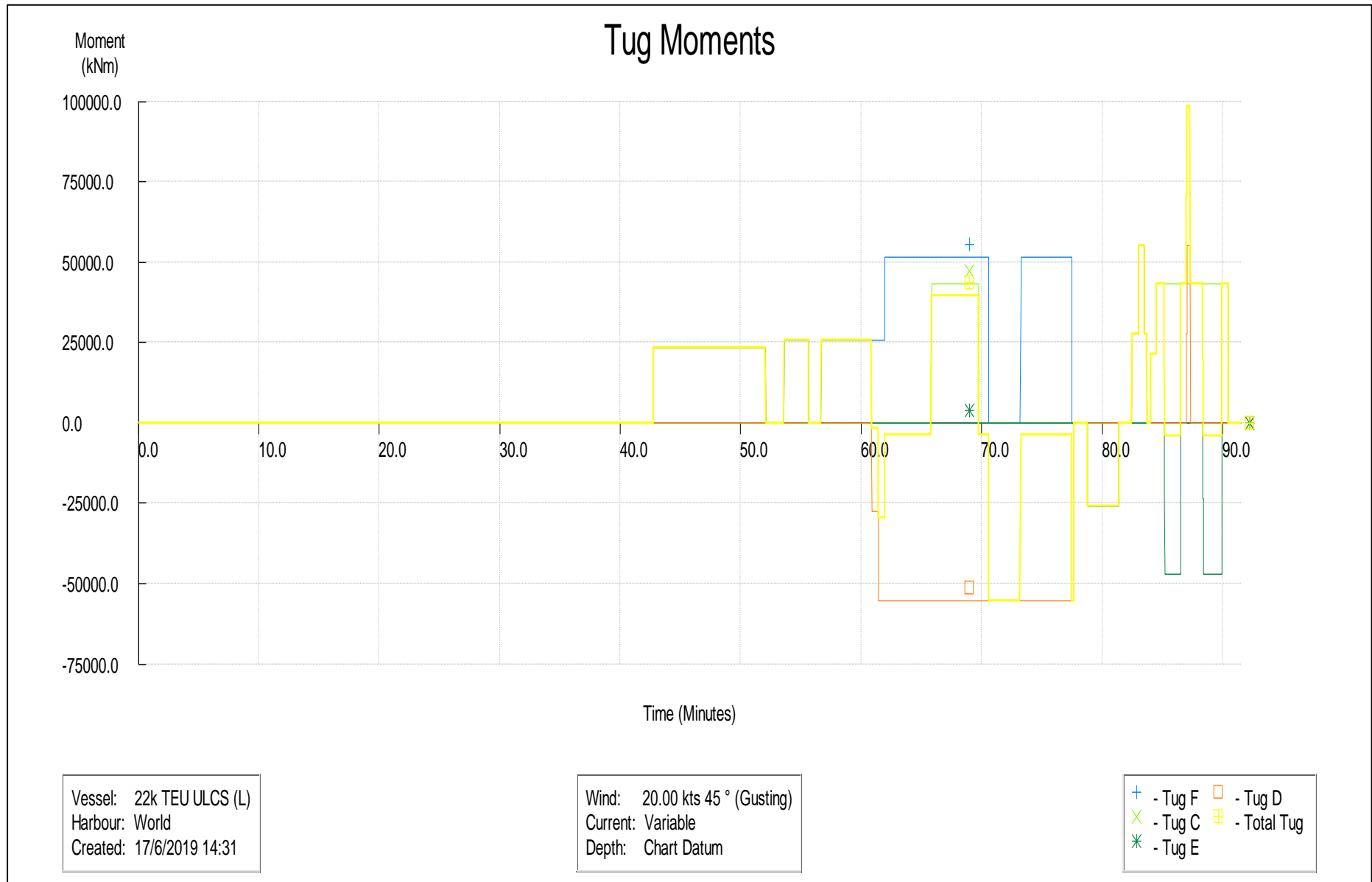
Vessel: 22k TEU ULCS (L) (+Tugs)
 Harbour: World
 Created: 17/6/2019 14:31

Wind: 20.00 kts 45 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

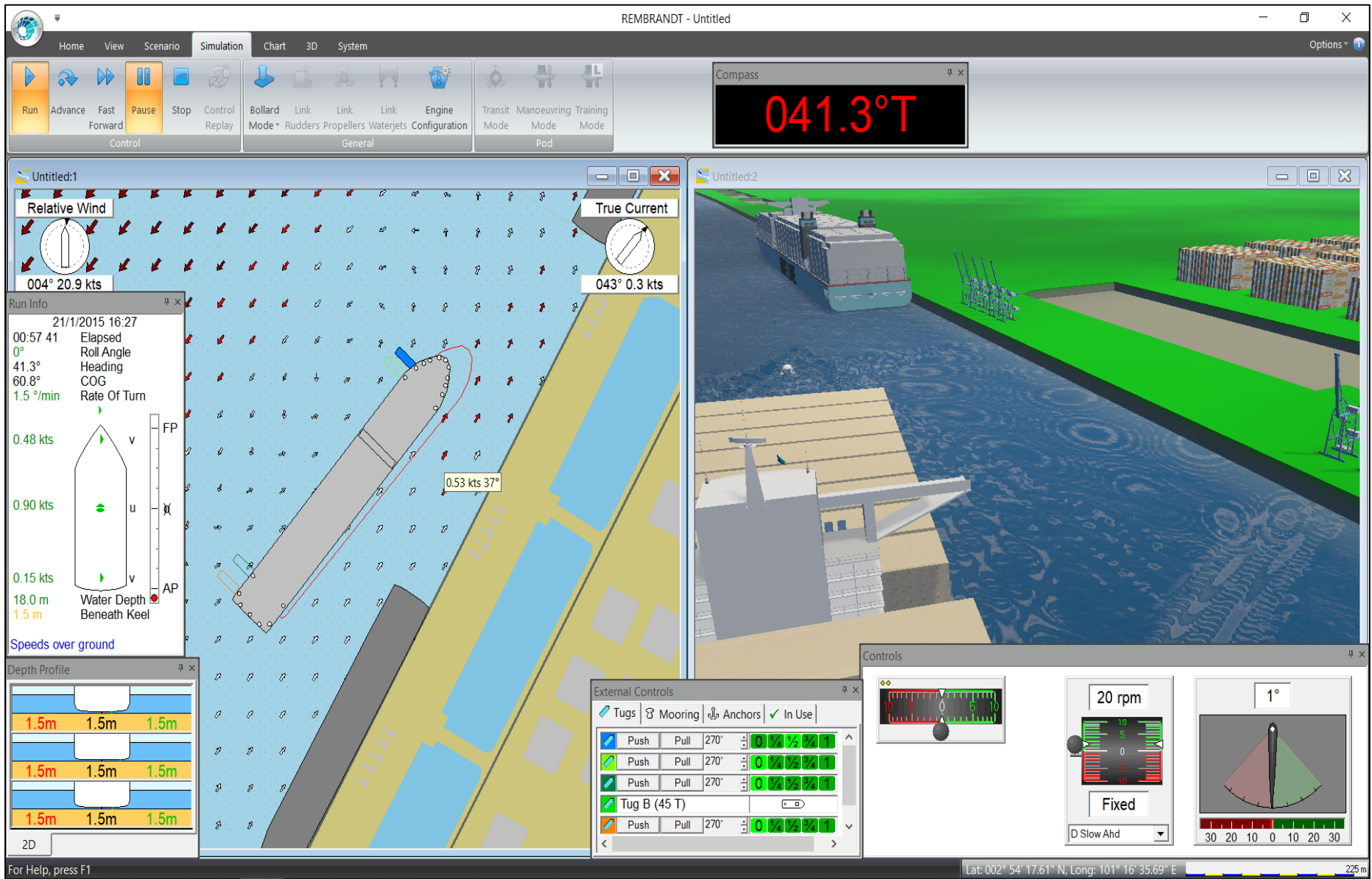
+ - Rudder Rud (°)
 X - Heading







Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
34	R34WPCT10NE20 kFId1530hT60tx4St bdArr.rmb	FId (1530h)	NE 20 k	Arrival (Stbd a/s)	F: 60t x 2 A: 60t x 2	The vessel arrived with the bow pointing away from the channel entrance. She managed to alter course to successfully enter the channel on Half Ahead. Approaching Tengah, the engine was reduced to Dead Slow Ahead and stopped when passing CT-13. Four 60 tons bollard pull tugs were made fast and assisted in berthing with only two tugs used at a maximum of Half Power. A counter current was observed at the berth during the final stage in berthing.	3/6



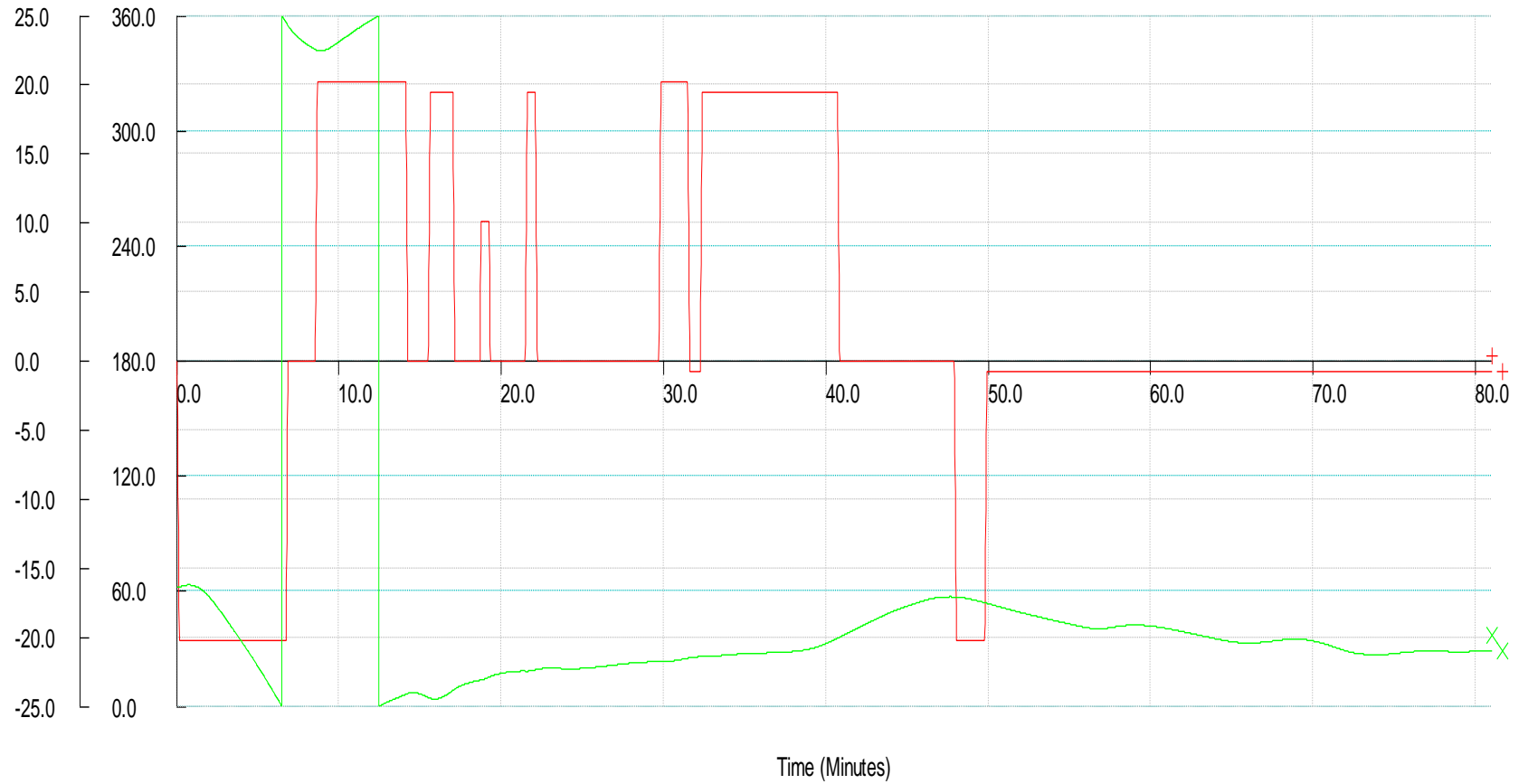
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 17/6/2019 15:27

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

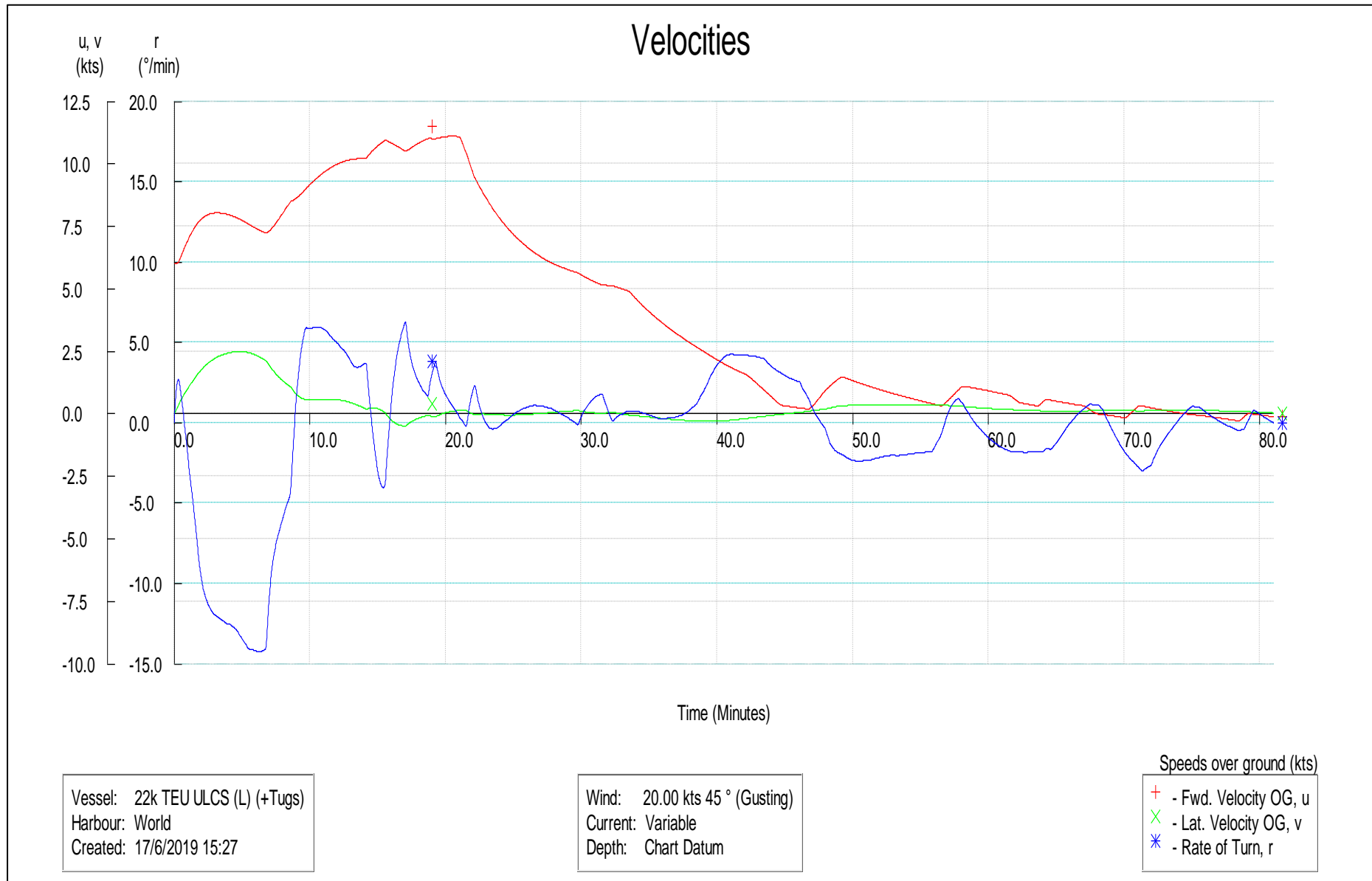
Heading and Rudder

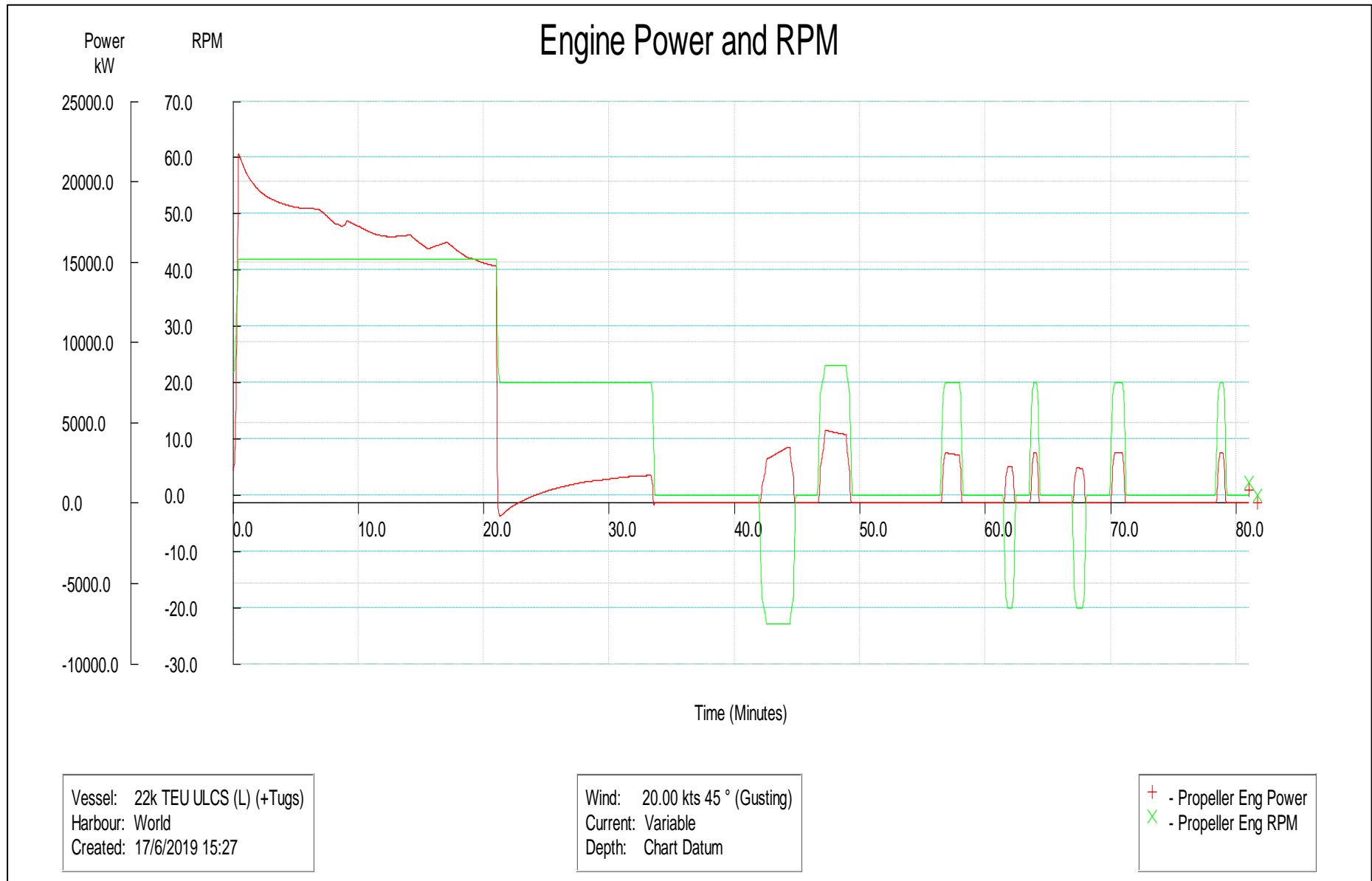


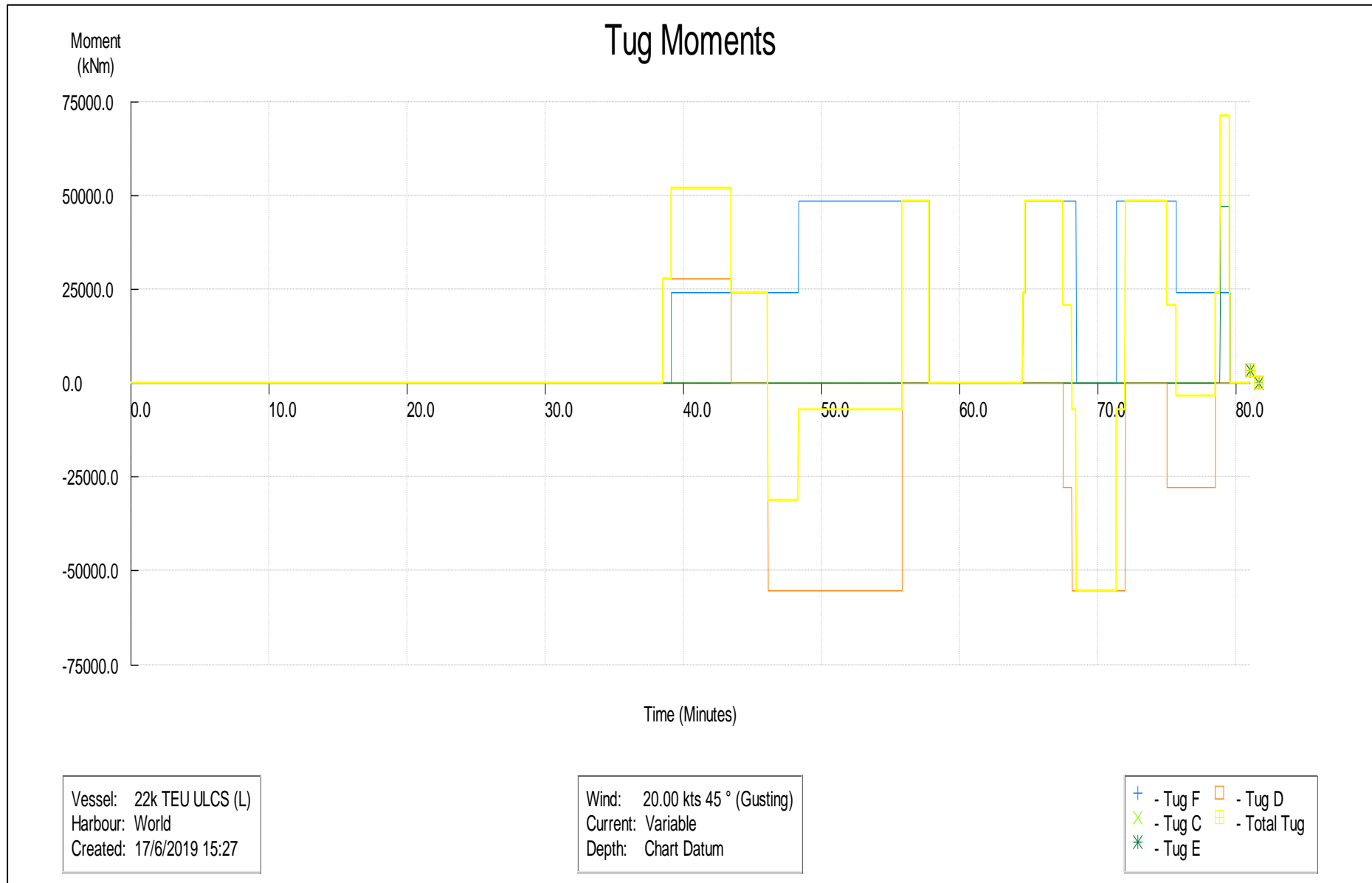
Vessel: 22k TEU ULCS (L) (+Tugs)
 Harbour: World
 Created: 17/6/2019 15:27

Wind: 20.00 kts 45 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

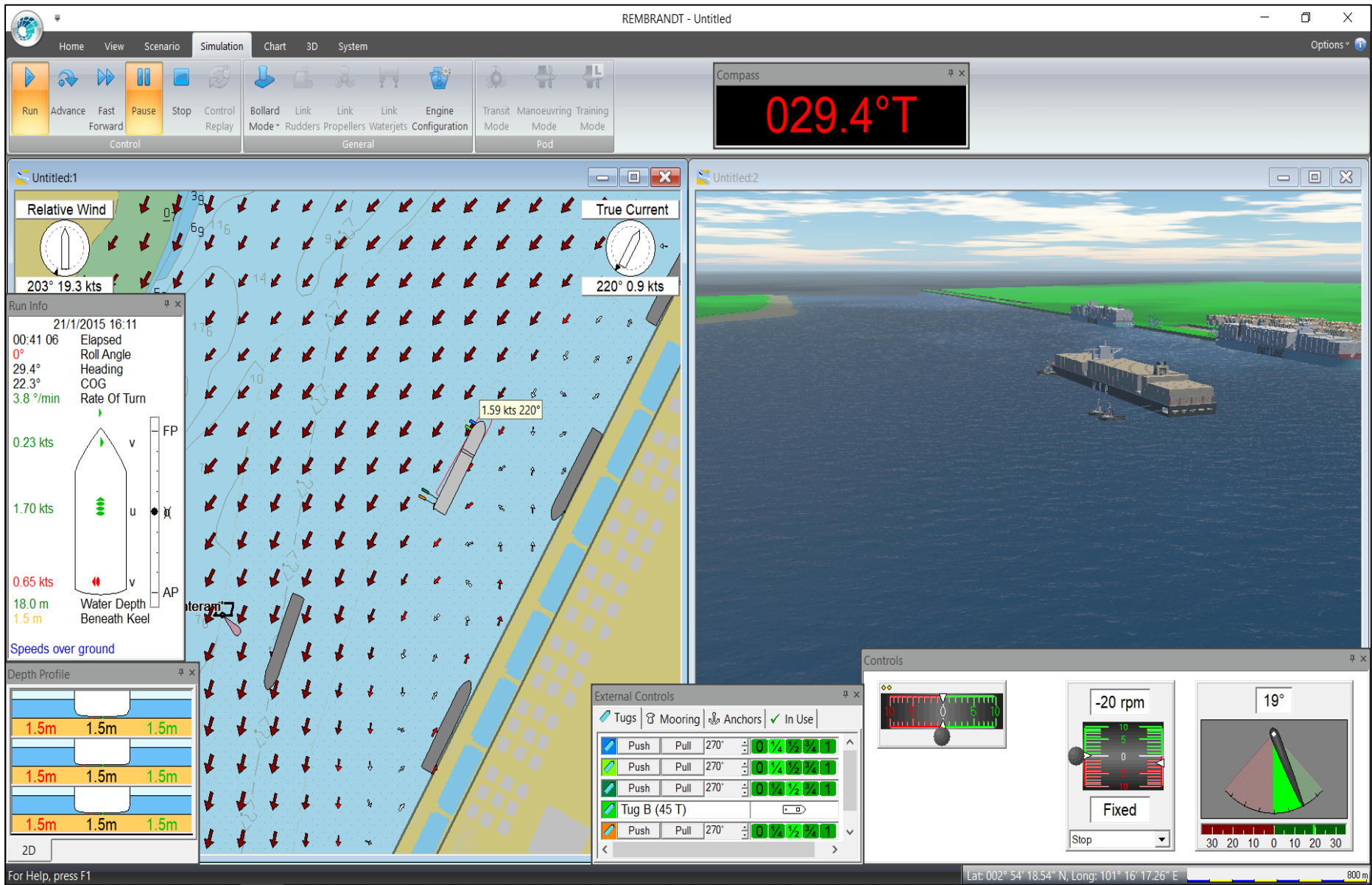
+ - Rudder Rud (°)
 X - Heading







Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
35	R35WPCT10SW20 kFld1530hT60tx4St bdArr.rmb	Fld (1530h)	SW 20 k	Arrival (Stbd a/s)	F: 60t x 2 A: 60t x 2	The vessel arrived with the bow pointing away from the channel entrance. She managed to alter course to successfully enter the channel on Half Ahead. Approaching Tengah, the engine was reduced to Dead Slow Ahead and later stopped. Approaching the berth, the bow caught the flood stream and set to port. This was corrected by pulling with the aft tugs. The four 60 tons bollard pull tugs assisted in berthing operating at a maximum of Half Power.	3/6

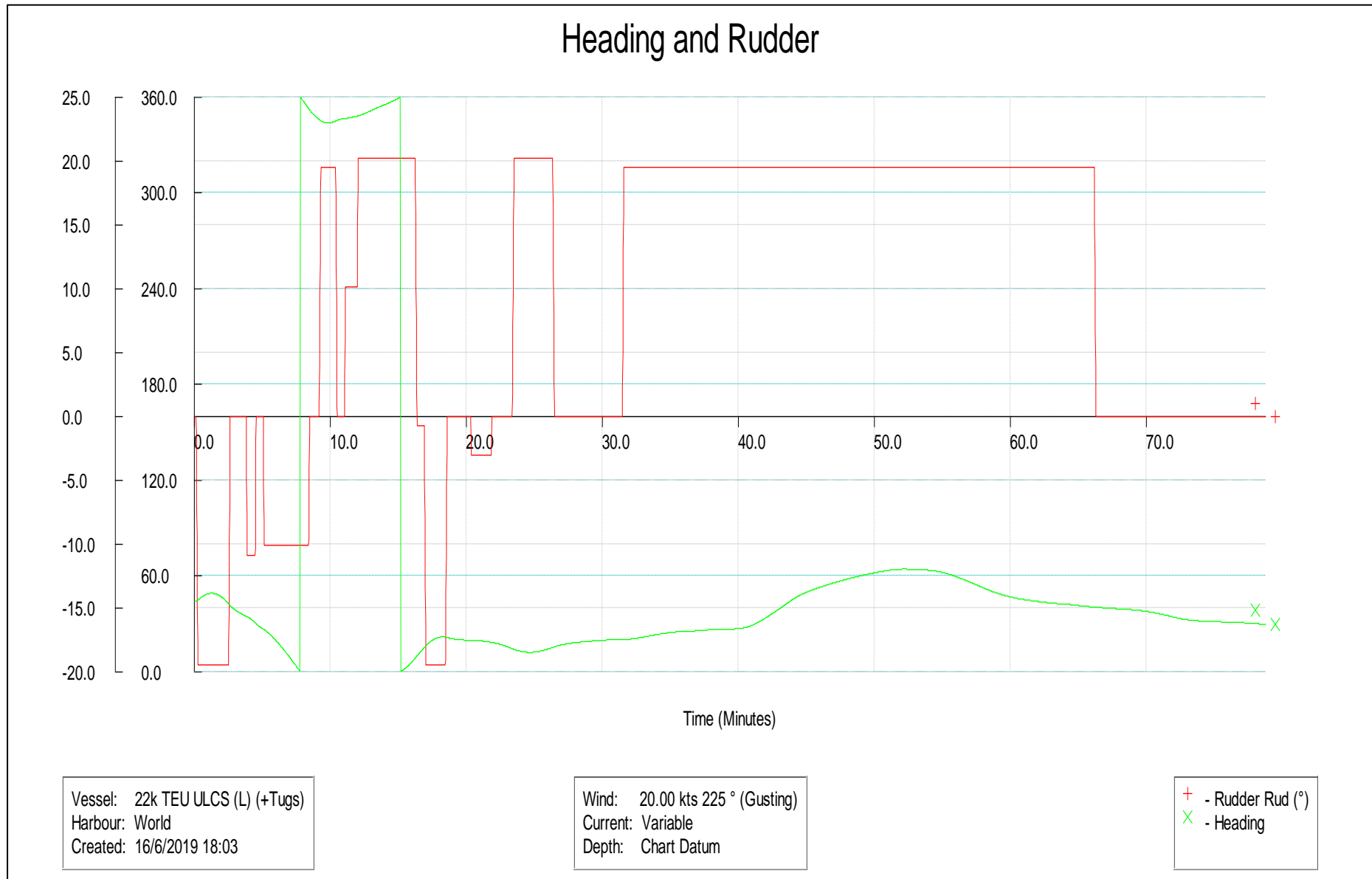


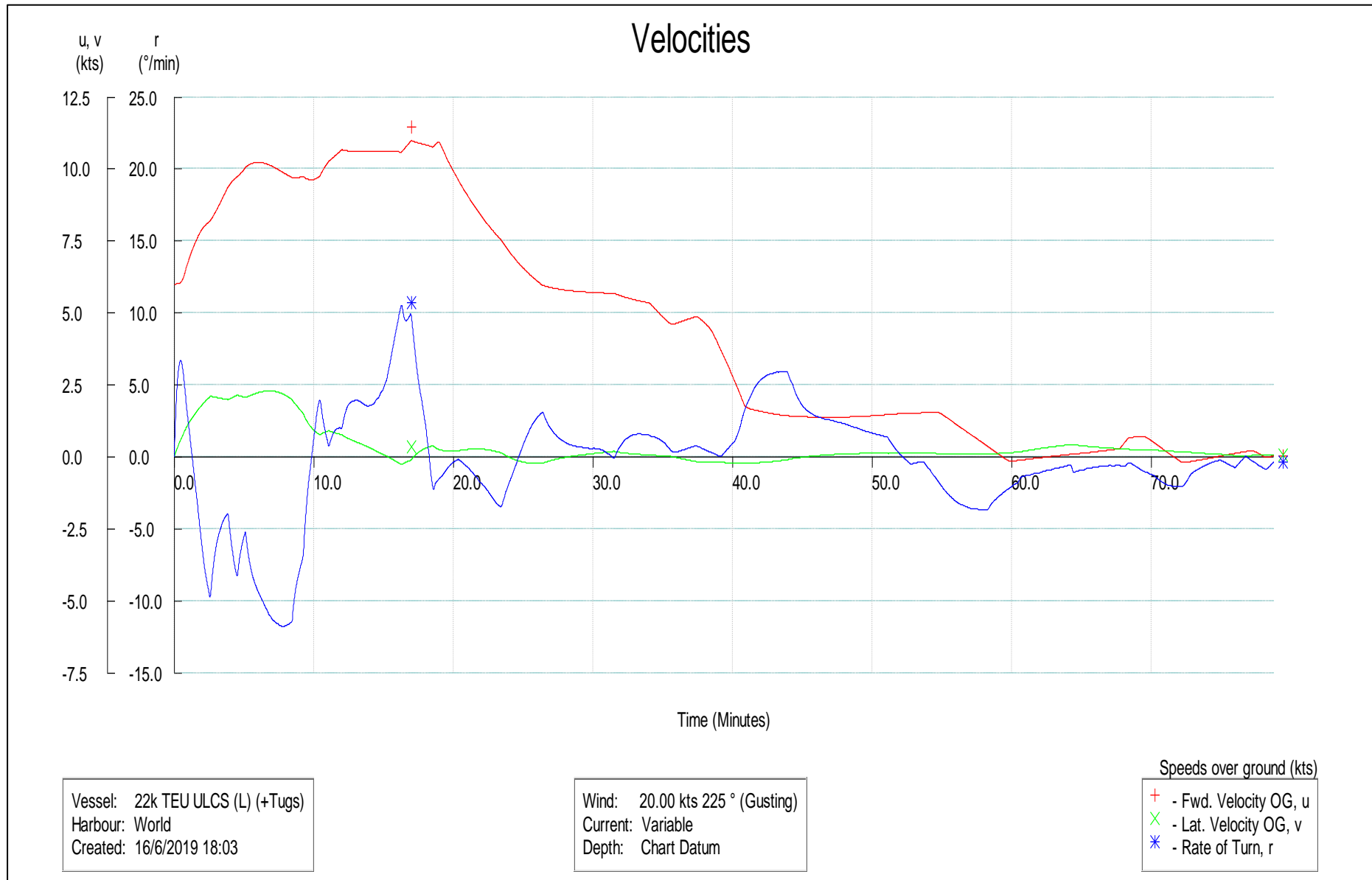
Vessel Track

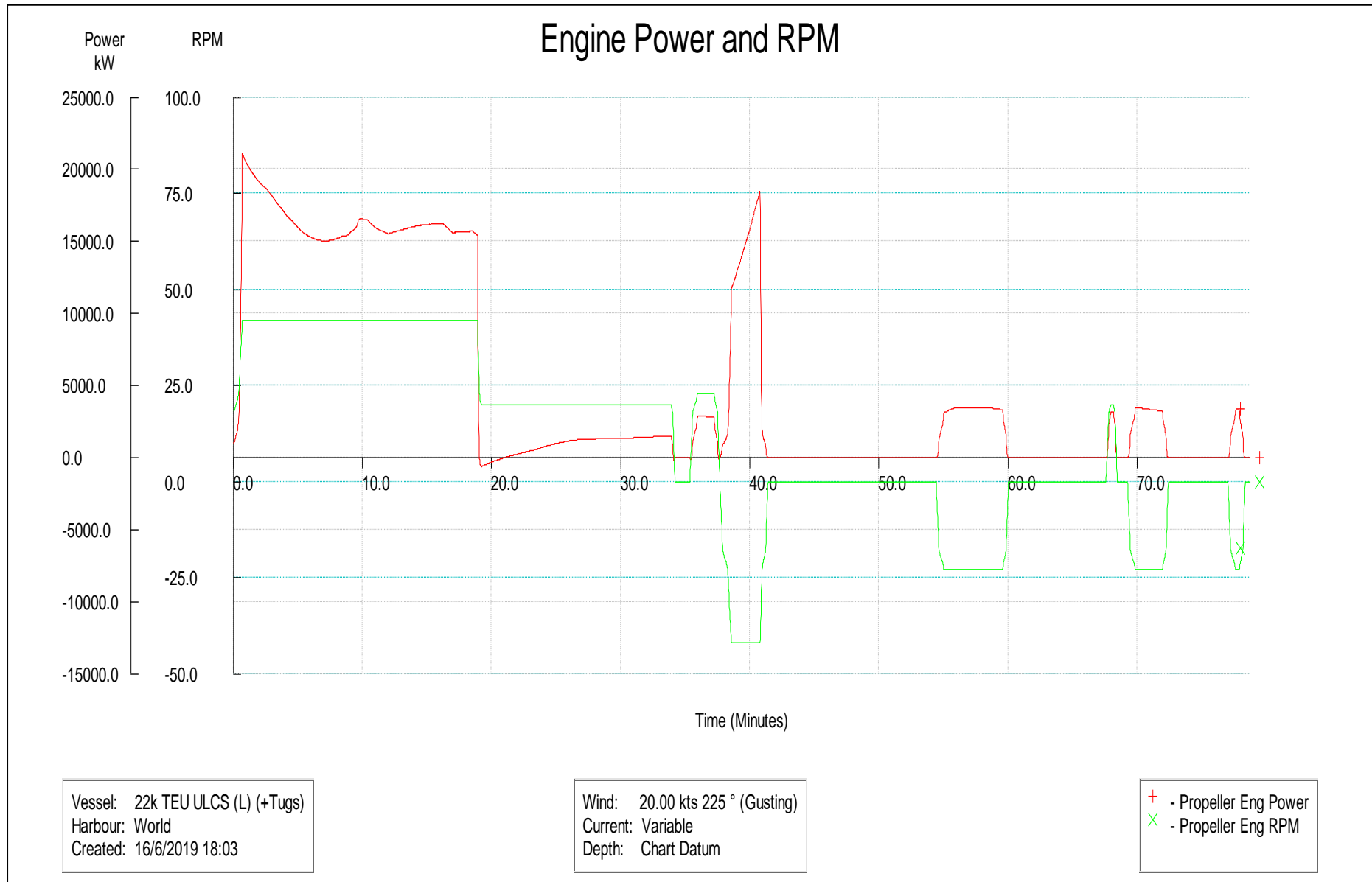


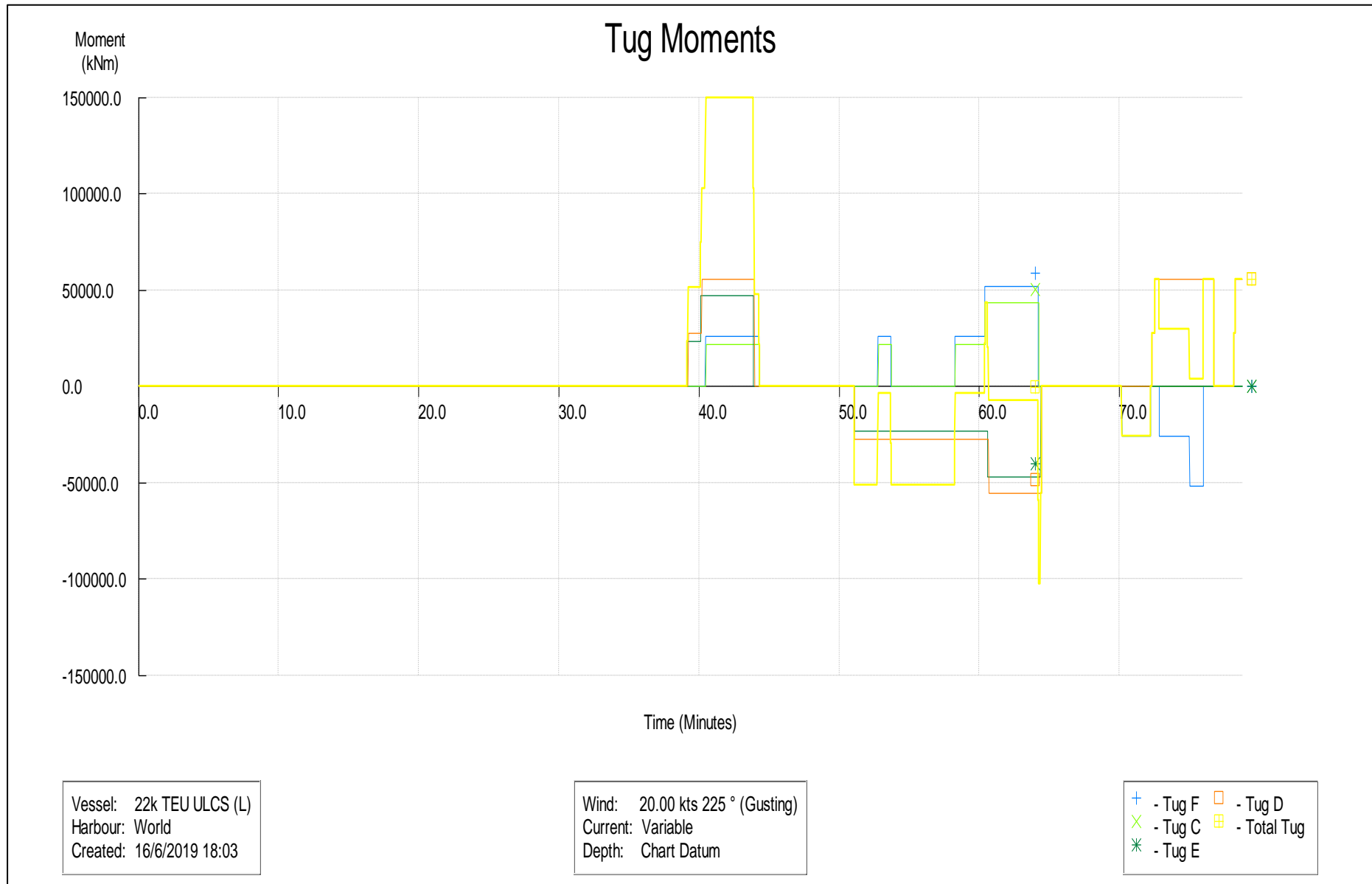
Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 16/6/2019 18:03

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

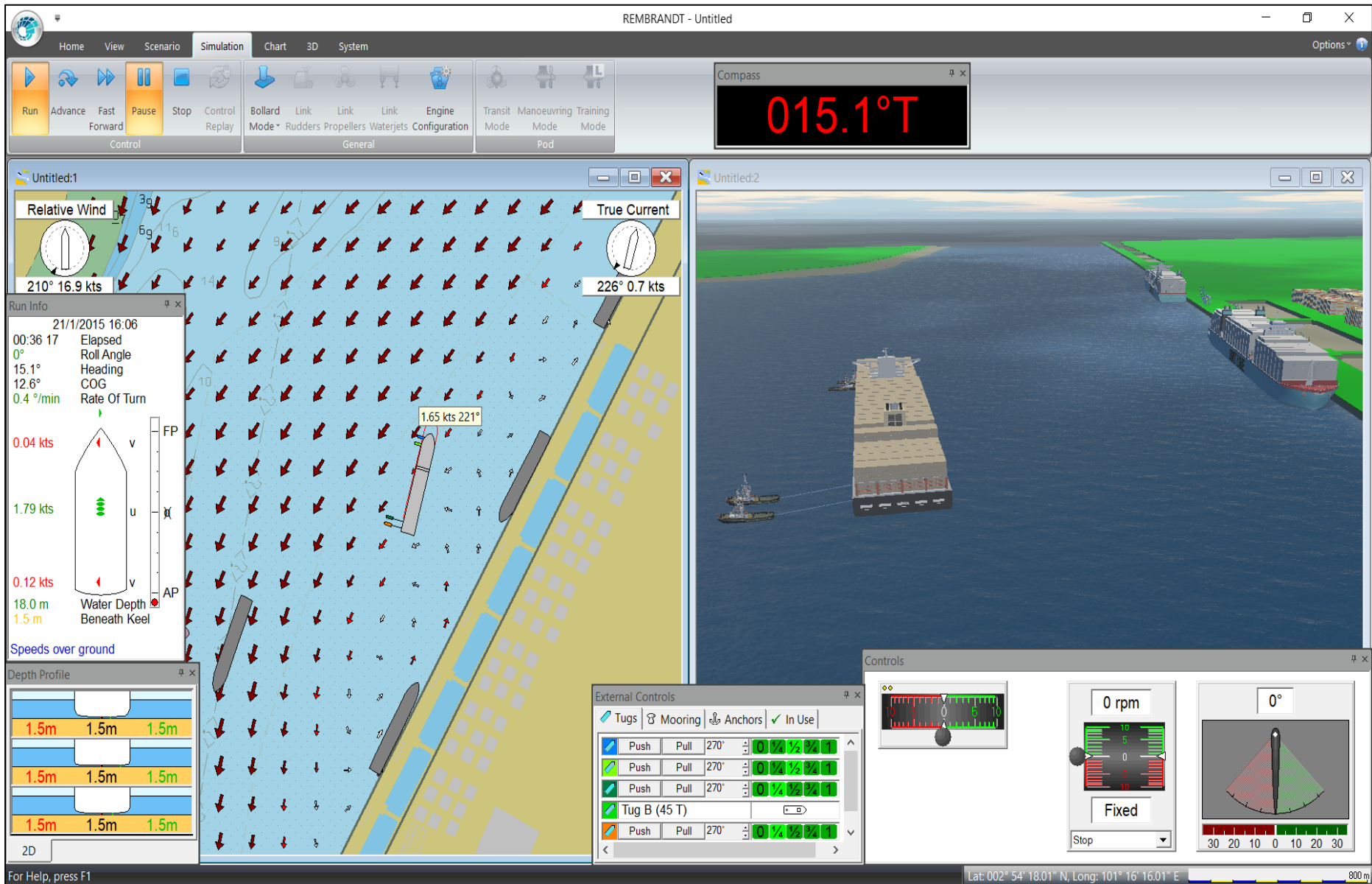








Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
36	R36WPCT10SW20 kFld1530hT60tx4St bdArr.rmb	Fld (1530h)	SW 20 k	Arrival (Stbd a/s)	F: 60t x 2 A: 60t x 2	The vessel arrived with the bow pointing away from the channel entrance. She managed to alter course to successfully enter the channel on Half Ahead. Approaching Tengah, the engine was reduced to Dead Slow Ahead and later stopped. Approaching the berth, the bow caught the flood stream and set to port. This was corrected by pulling with the aft tugs. The four 60 tons bollard pull tugs assisted in berthing operating at a maximum of Half Power.	3/6



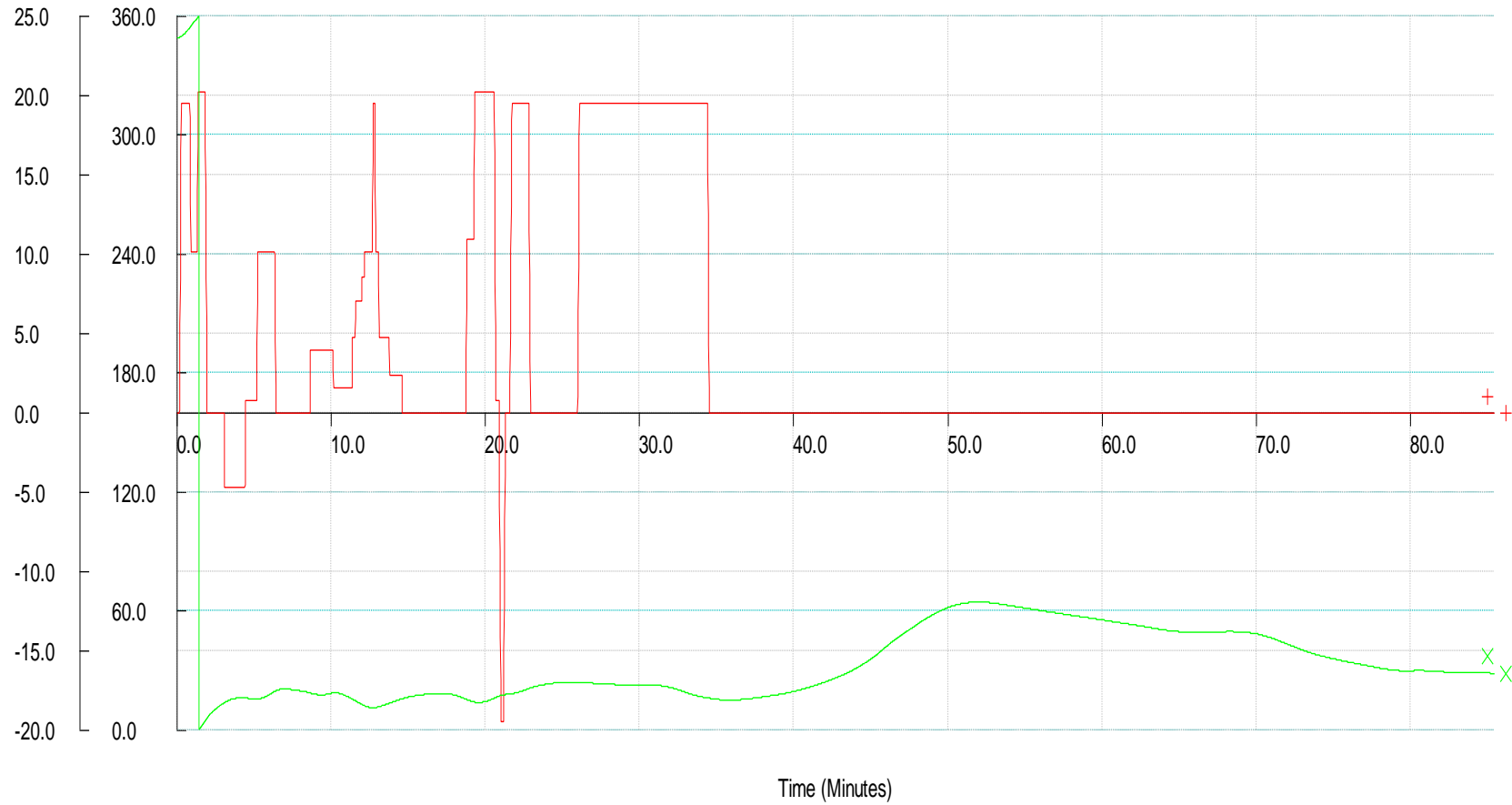
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 16/6/2019 18:56

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

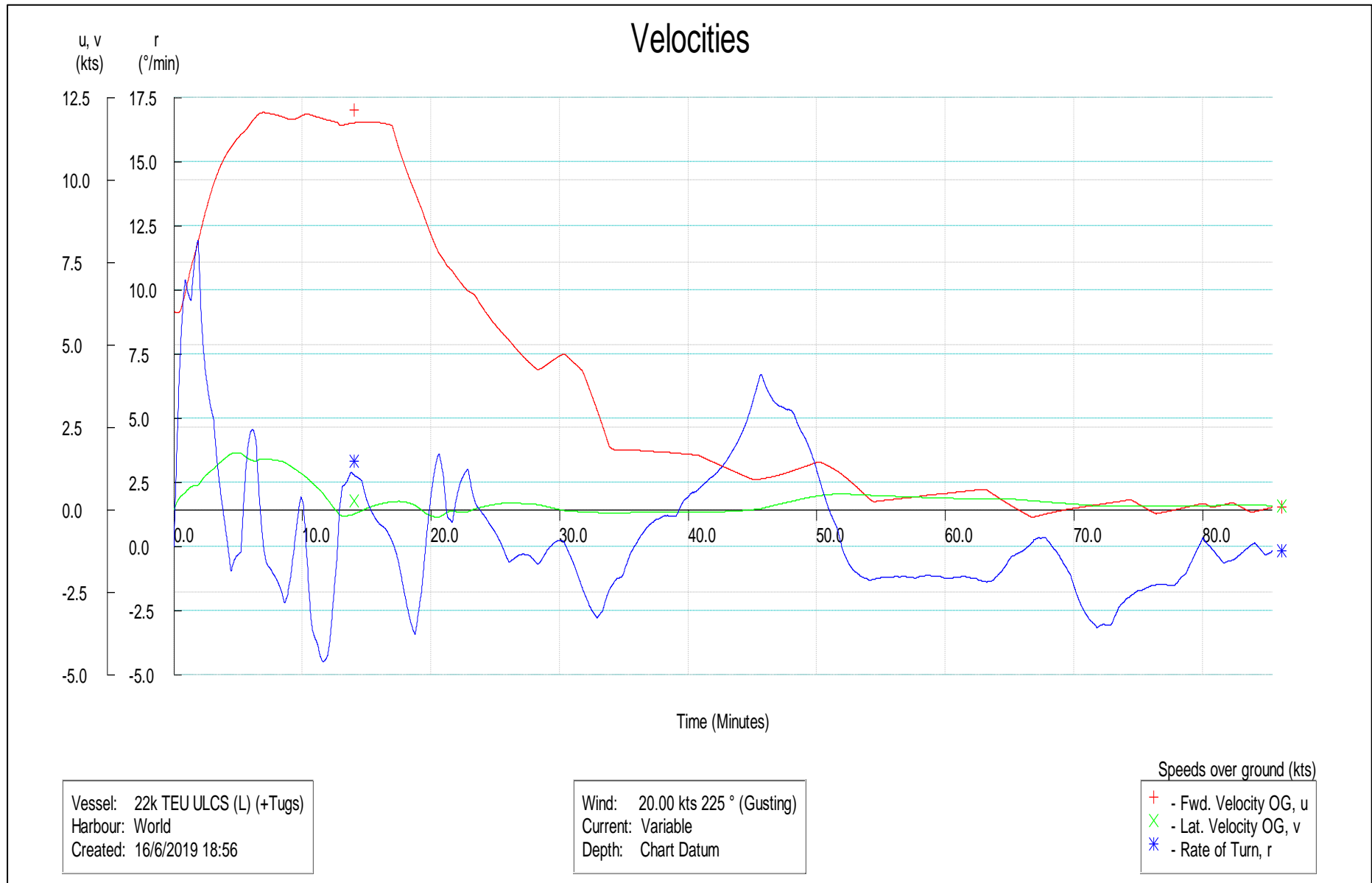
Heading and Rudder

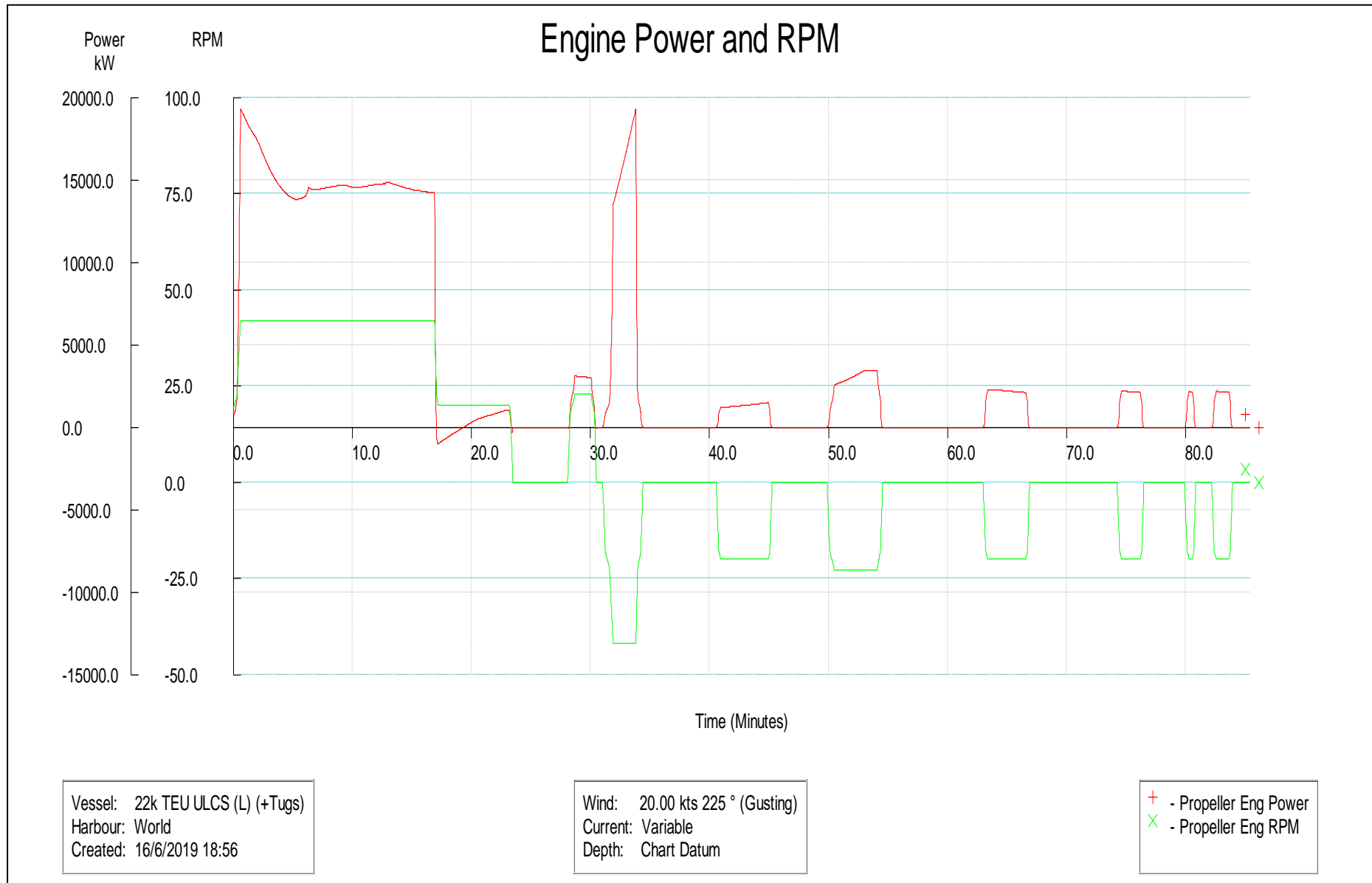


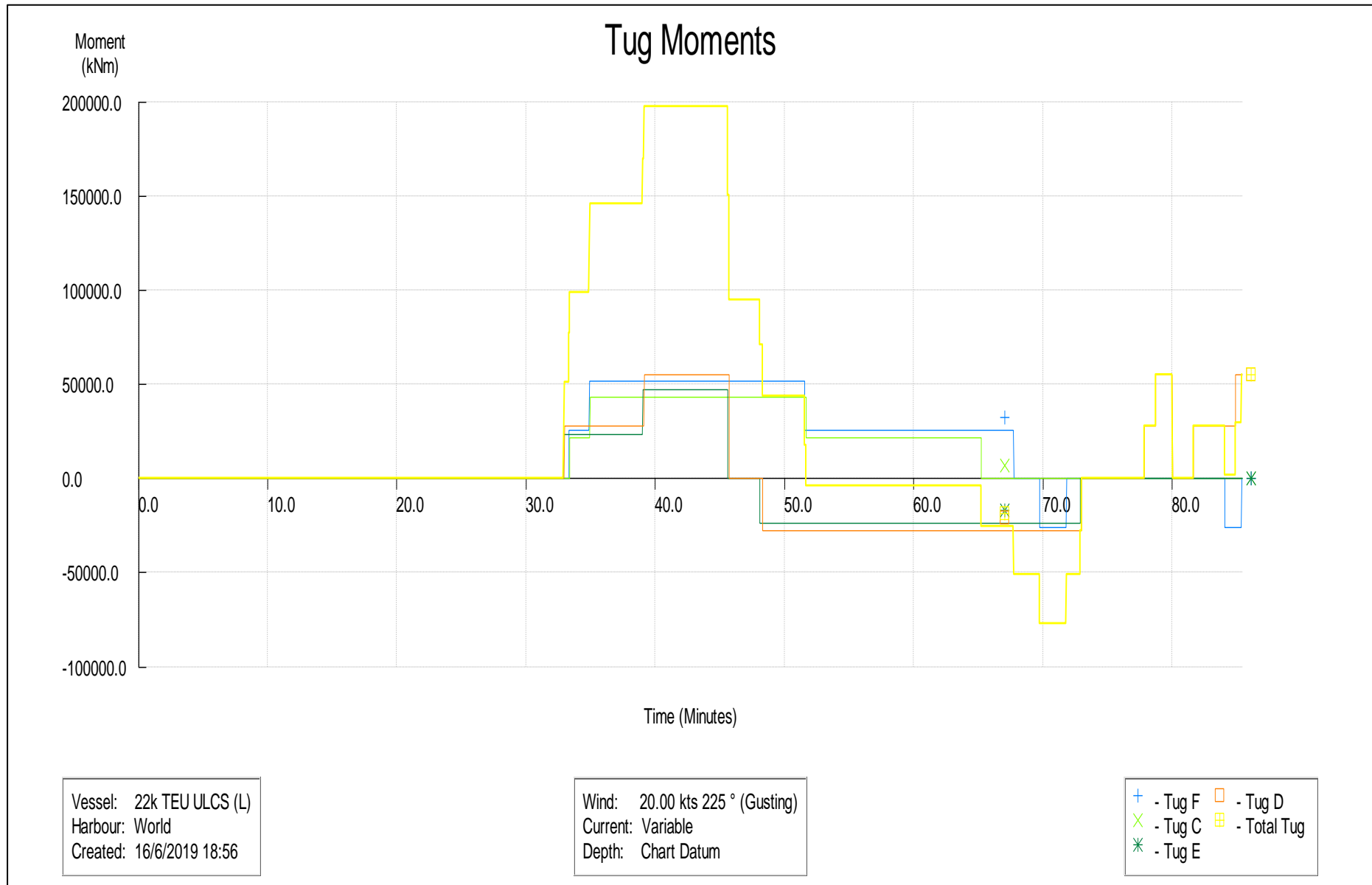
Vessel: 22k TEU ULCS (L) (+Tugs)
 Harbour: World
 Created: 16/6/2019 18:56

Wind: 20.00 kts 225 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

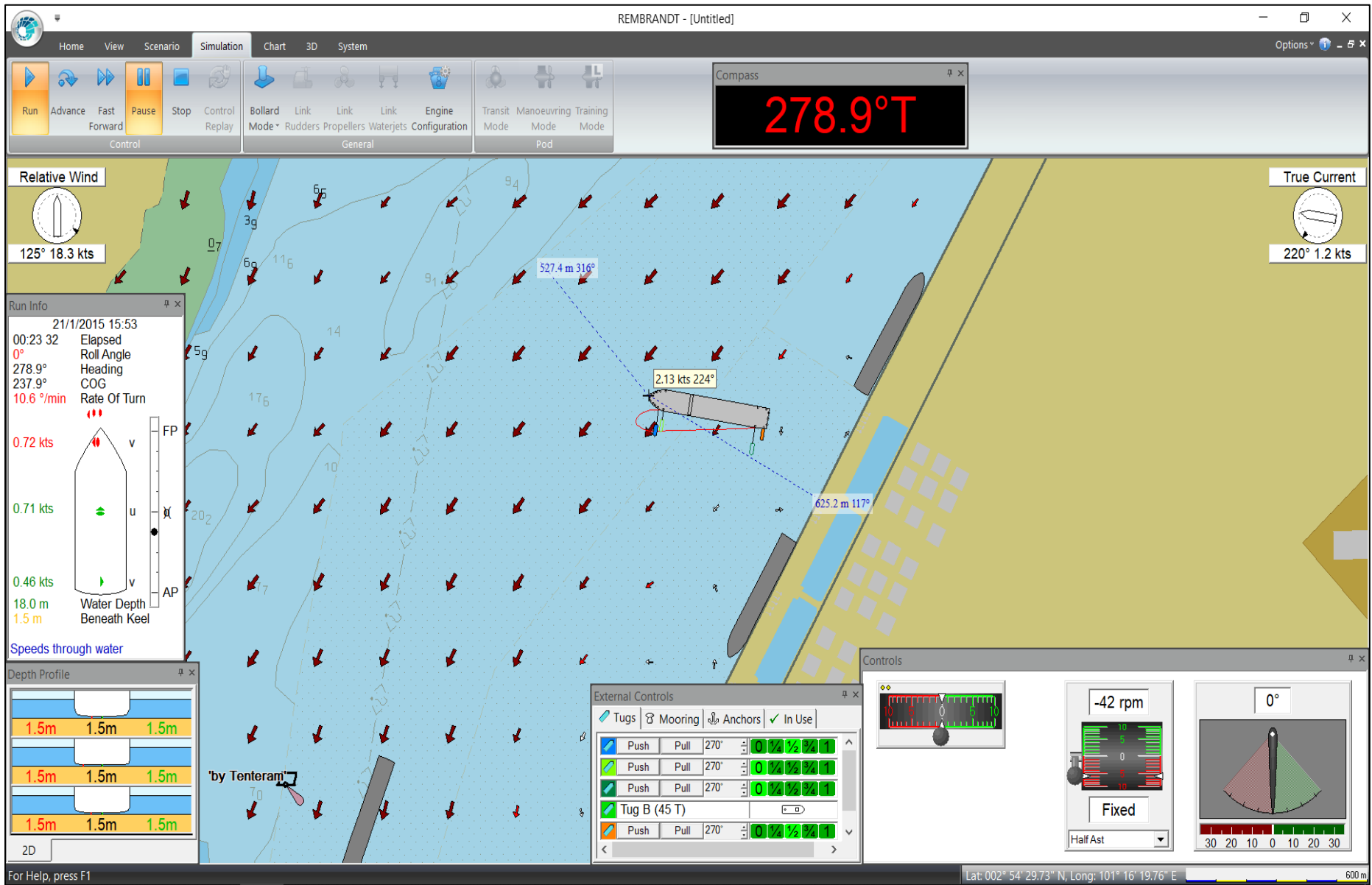
+ - Rudder Rud (°)
 x - Heading



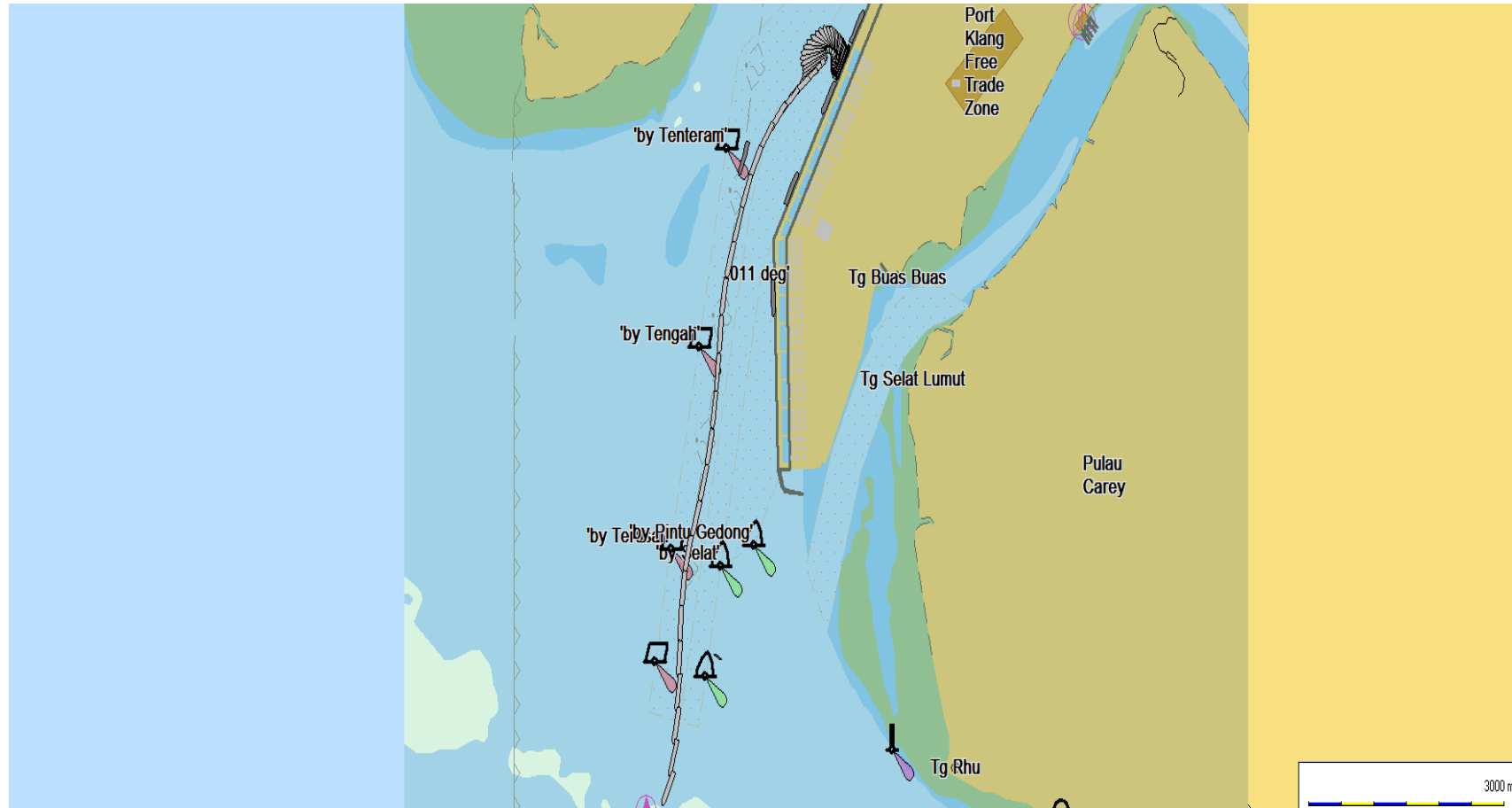




Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
37	R37WPCT10NE20 kFld1530hT60tx4St bdDep.rmb	Flood (1530h)	NE 20 k	Departure (Stbd a/s)	F: 60t x 2 A: 60t x 2	The vessel was pulled off the berth using only two of the four 60 tons bollard pull tugs. She was then swung to port keeping close to the wharf. After the swing, the tugs were cast off and the vessel proceeded to sea. Minimum available channel clearance: 525 metres.	3/6

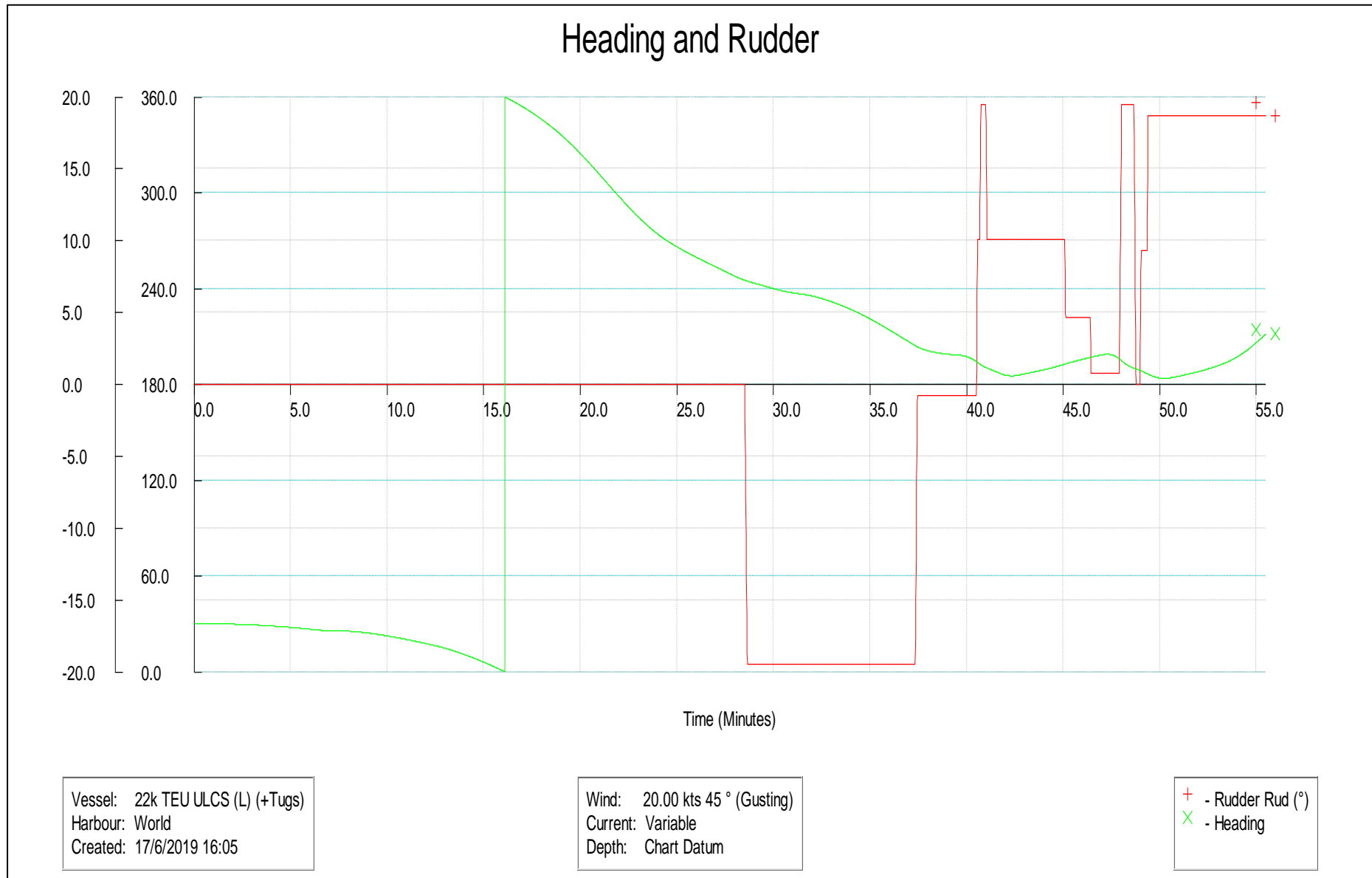


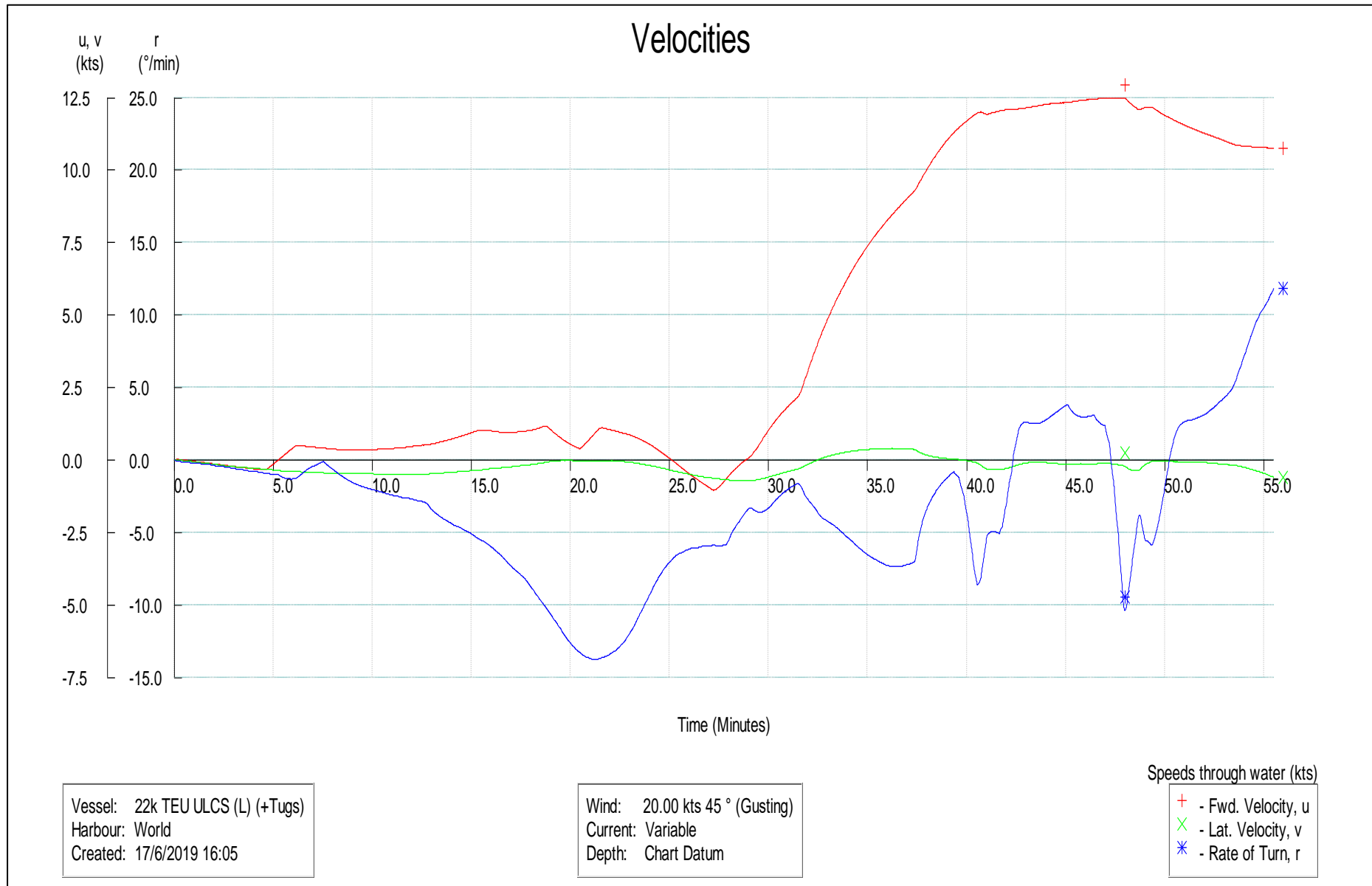
Vessel Track

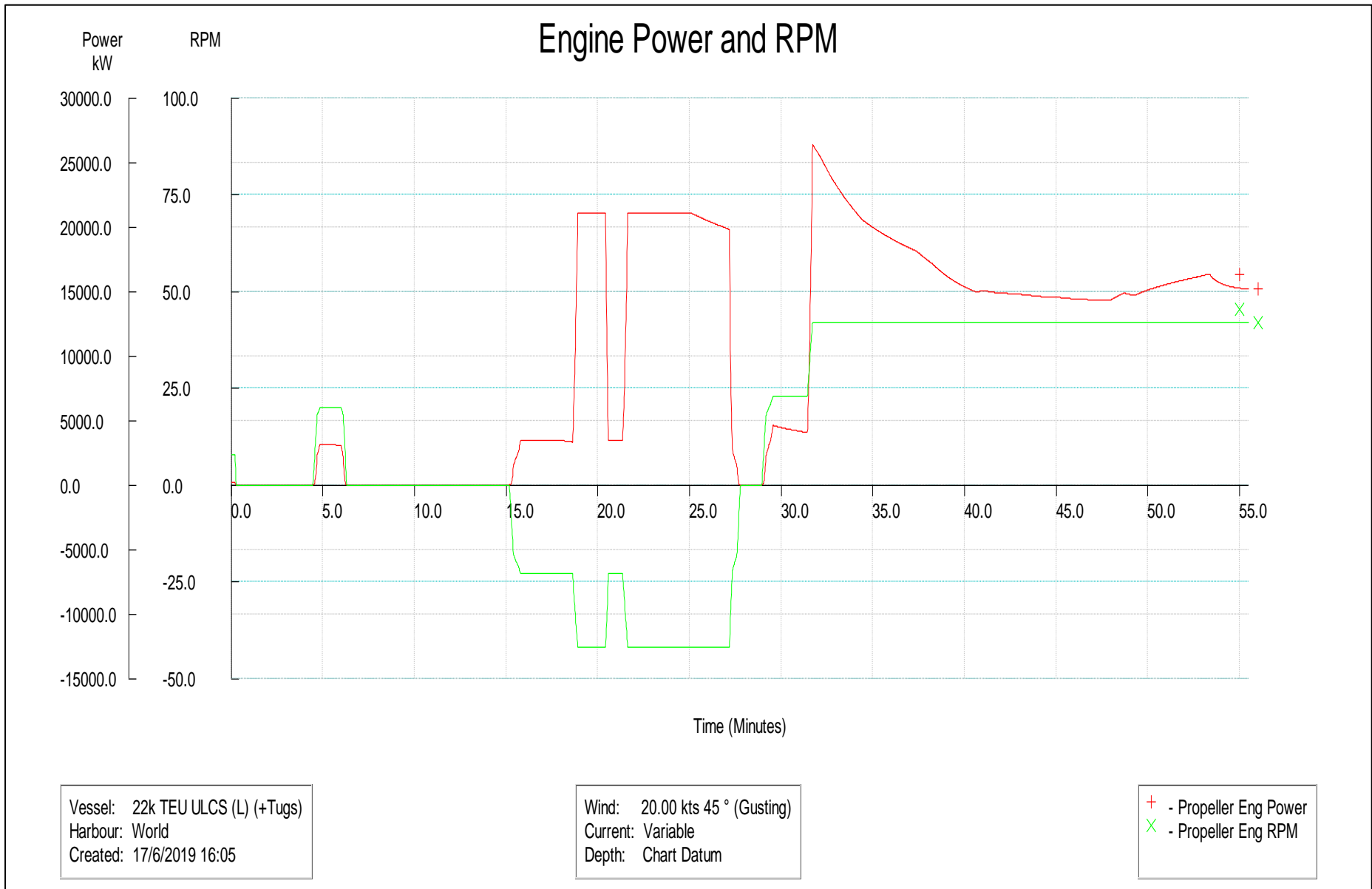


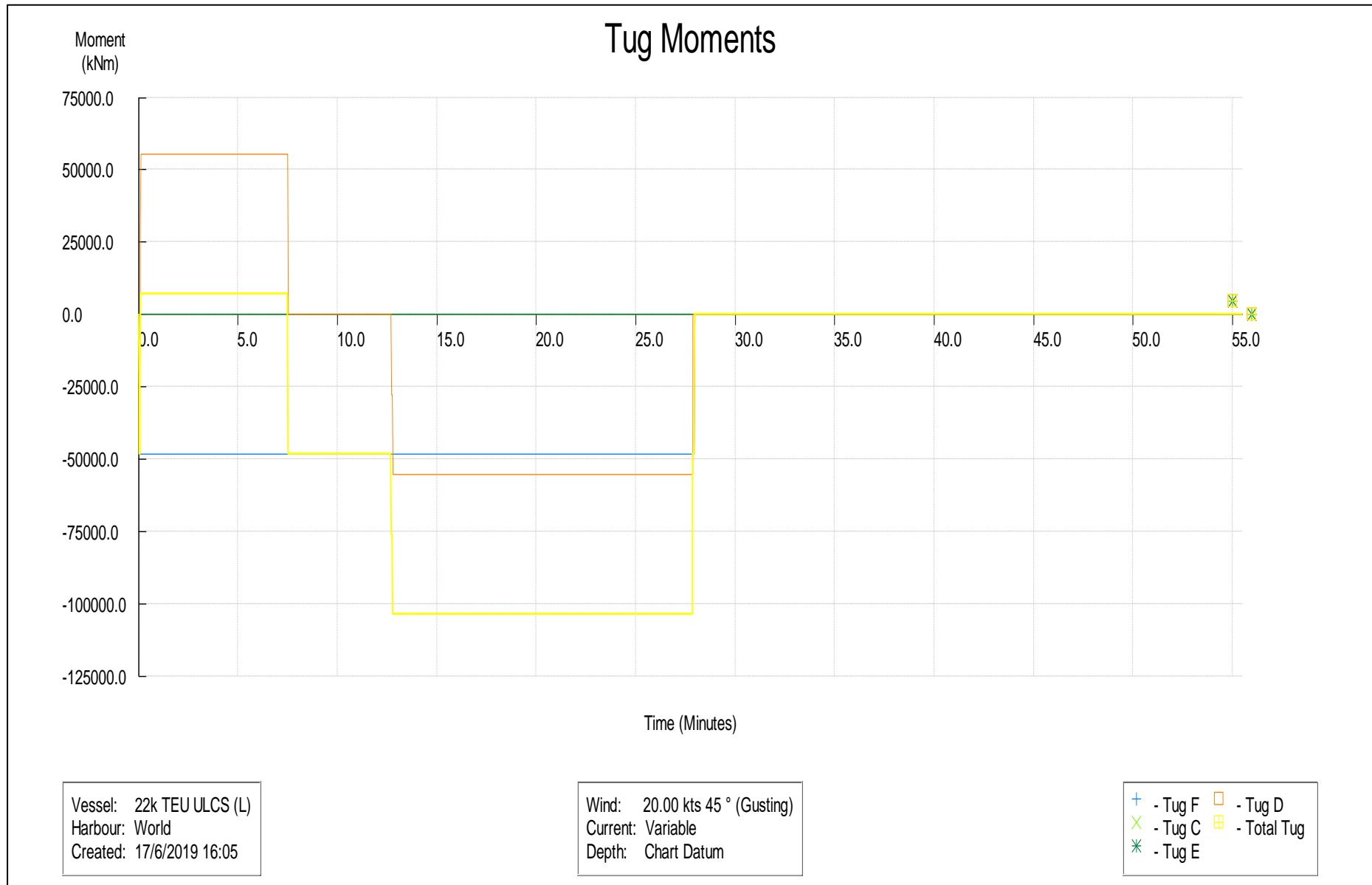
Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 17/6/2019 16:05

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

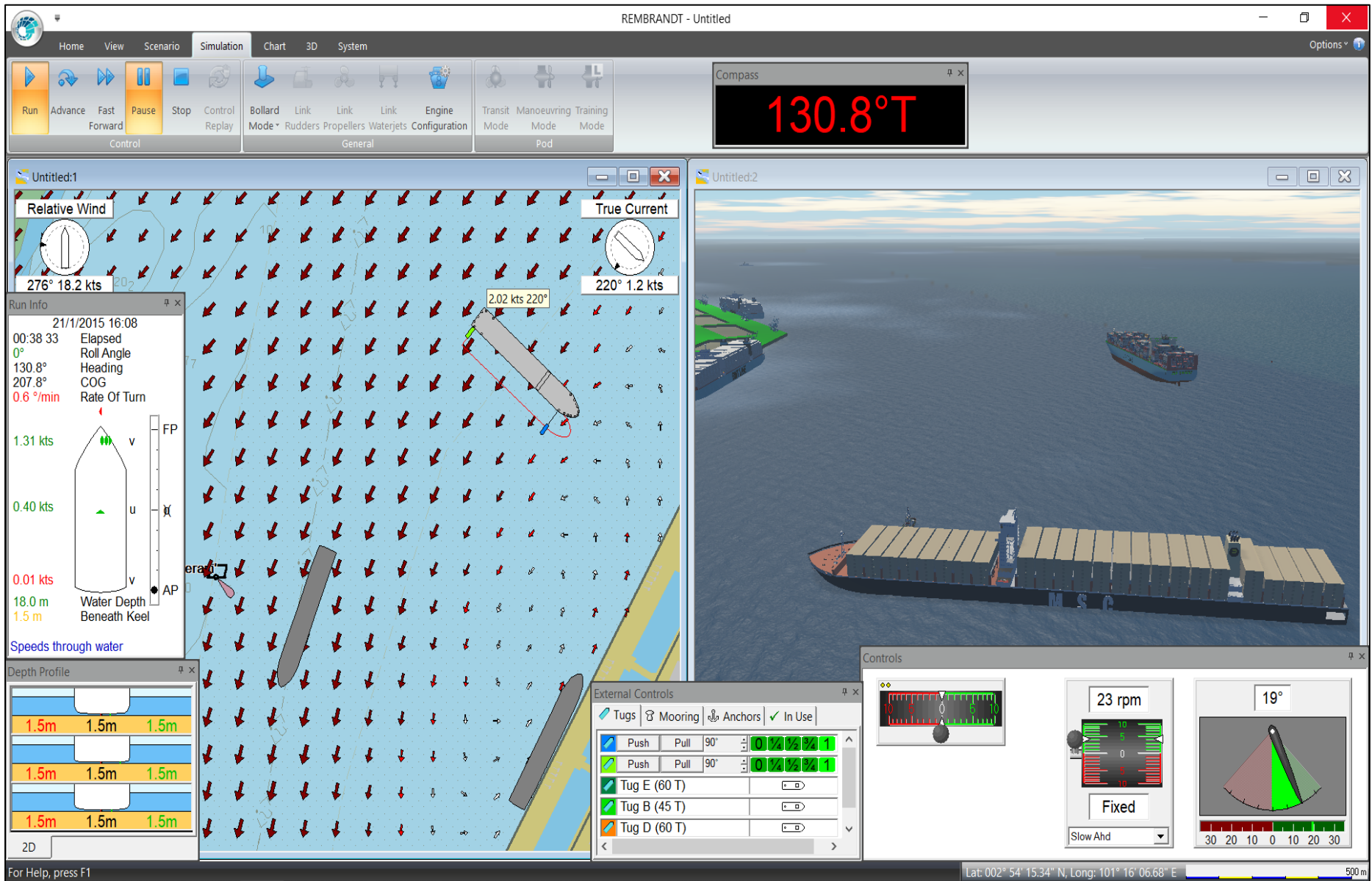




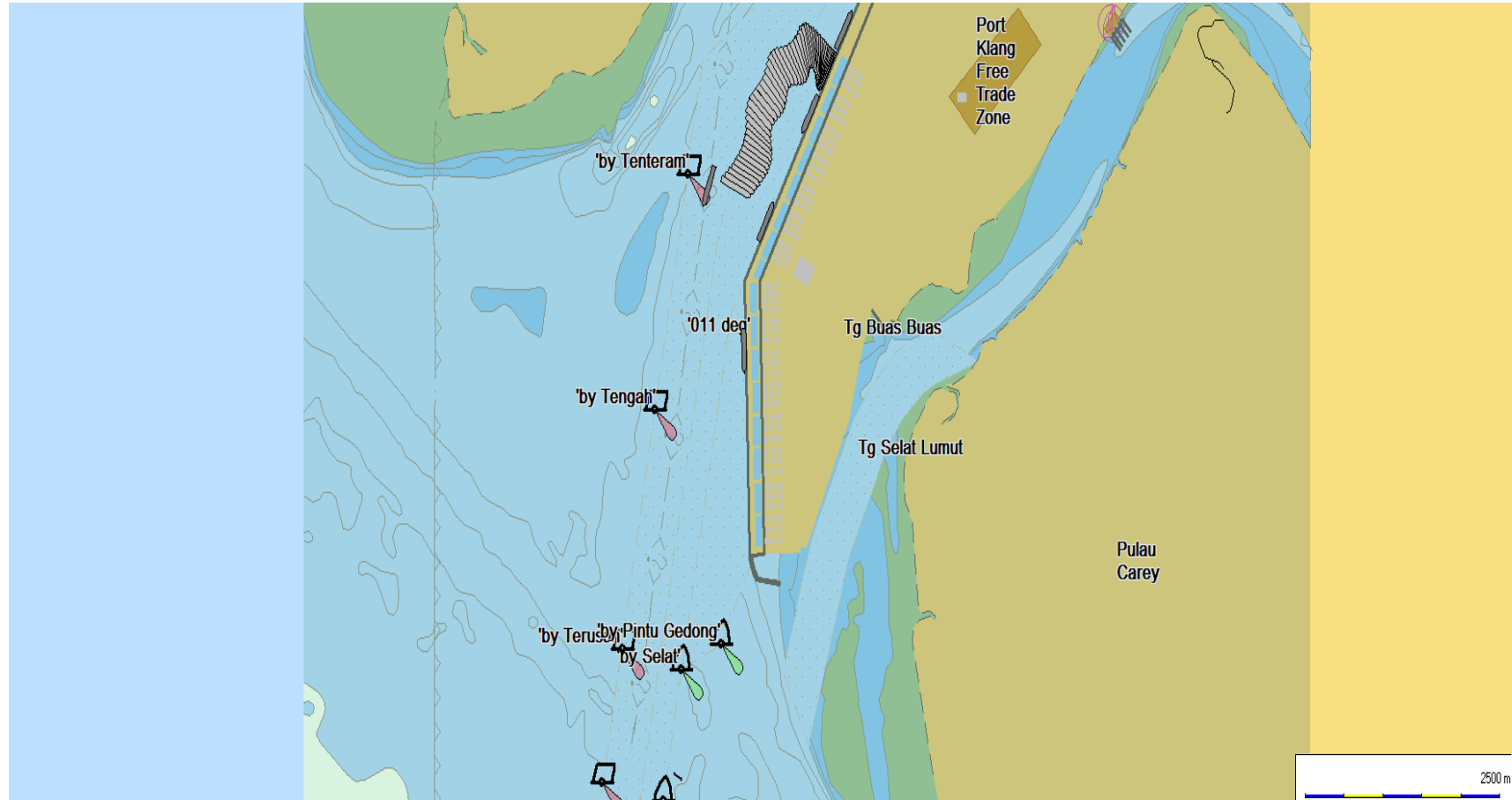




Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
38x	R38xWPCT10NE2 0kFId1530hT60tx2 PortDep.rmb	Flood (1530h)	NE 20 k	Departure (Port a/s)	F: 60t A: 60t	<p>The vessel was pulled off the berth using only two 60 tons bollard pull tugs. The stern was opened to allow the flood current to set her off the berth. The force of the flood current and the wind, acting on the port side, was however too strong for the tugs to overcome. Both tugs working at Full Power, together with helm and engine failed to 'twist' her to starboard.</p> <p>Control has to be exercised to prevent the stern from setting too far into the channel.</p>	

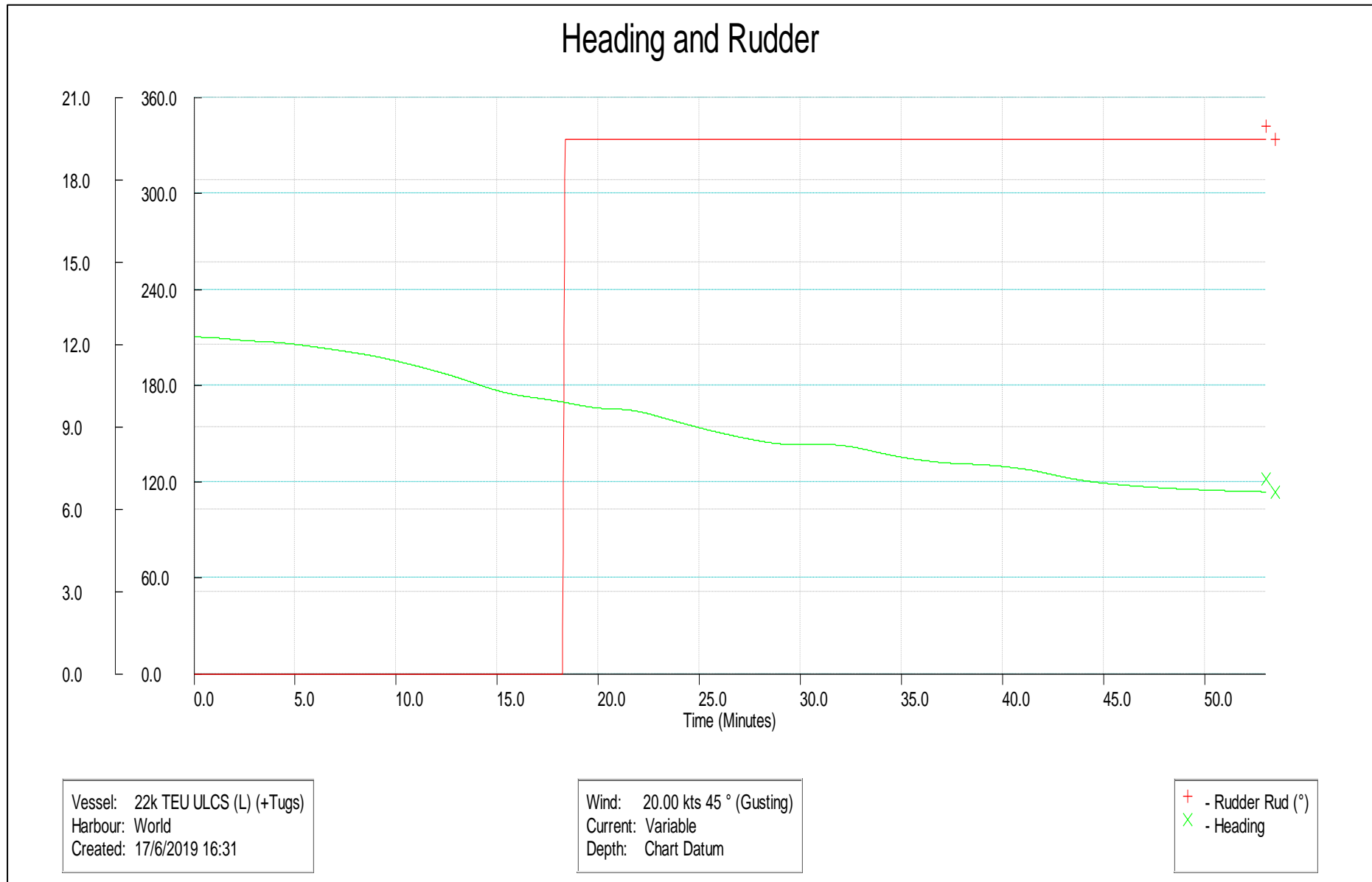


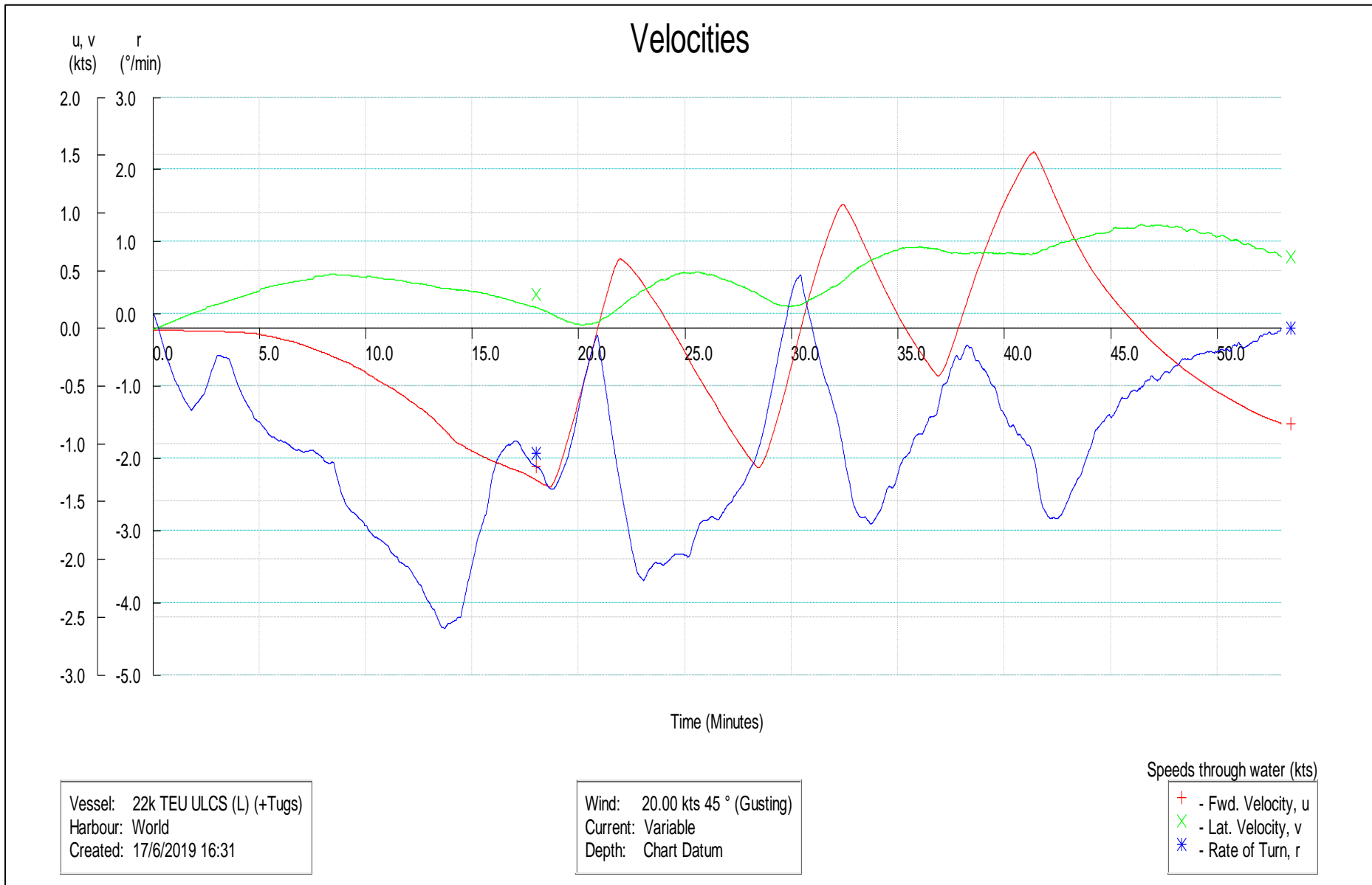
Vessel Track

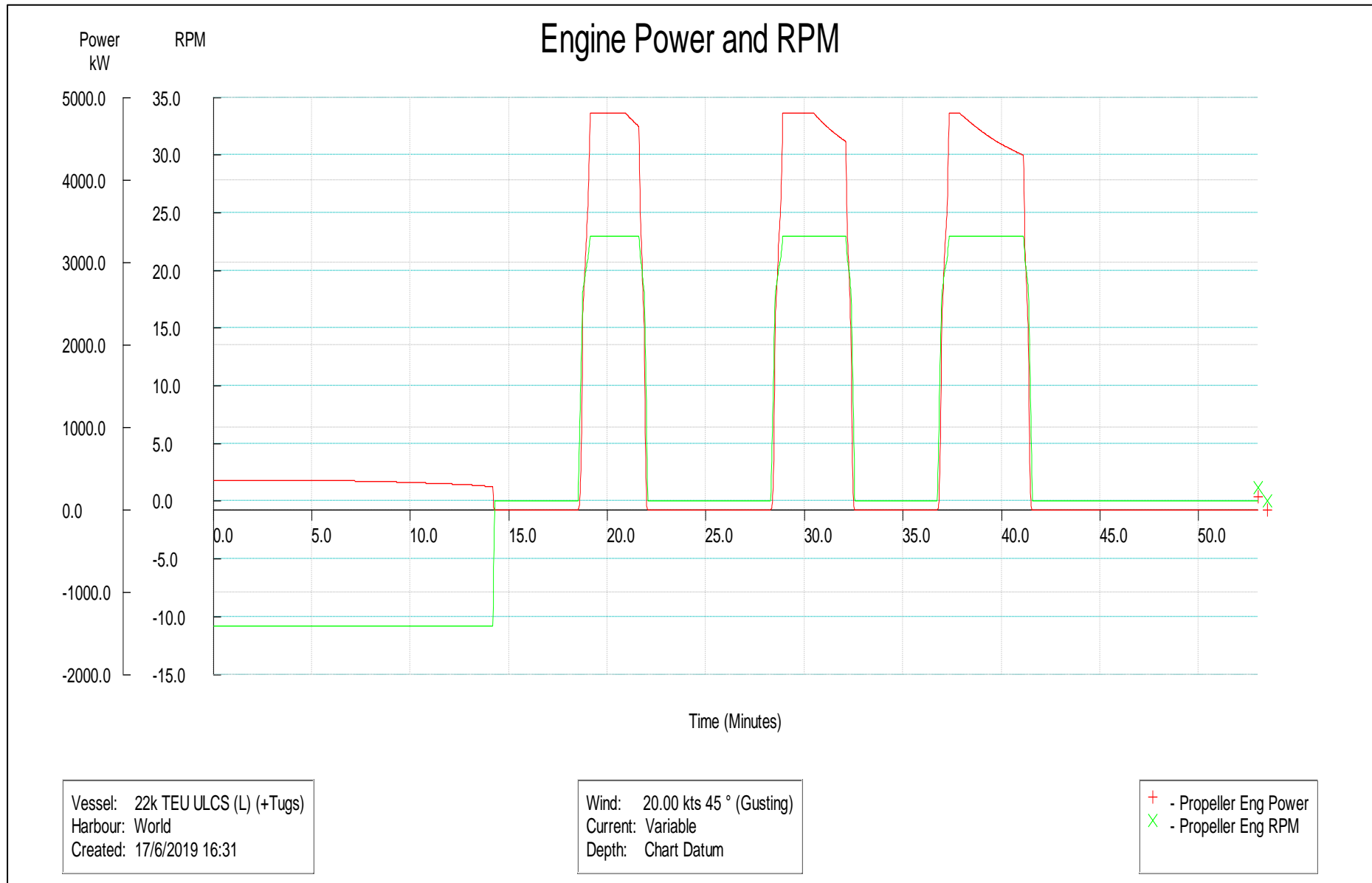


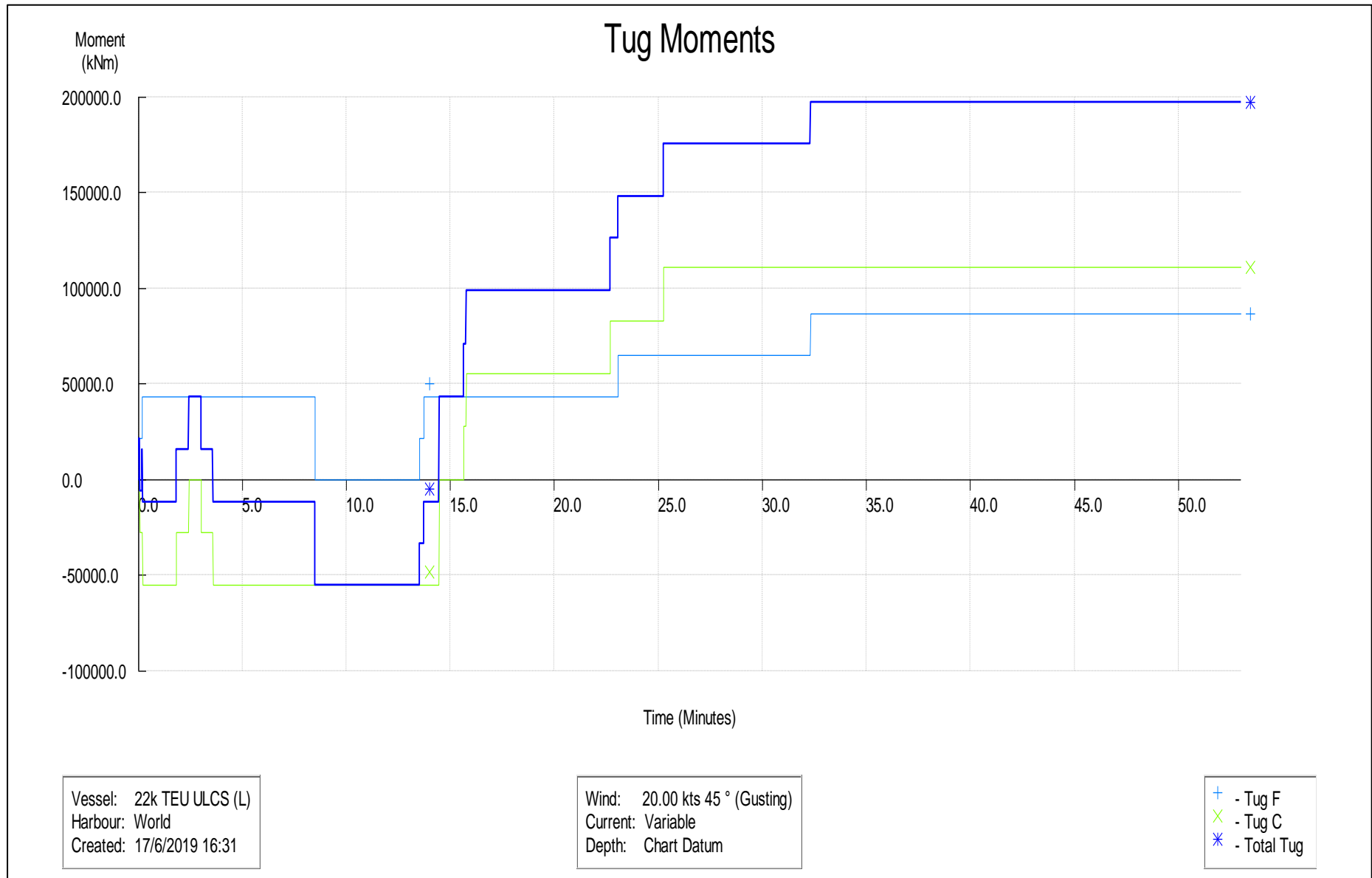
Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 17/6/2019 16:31

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

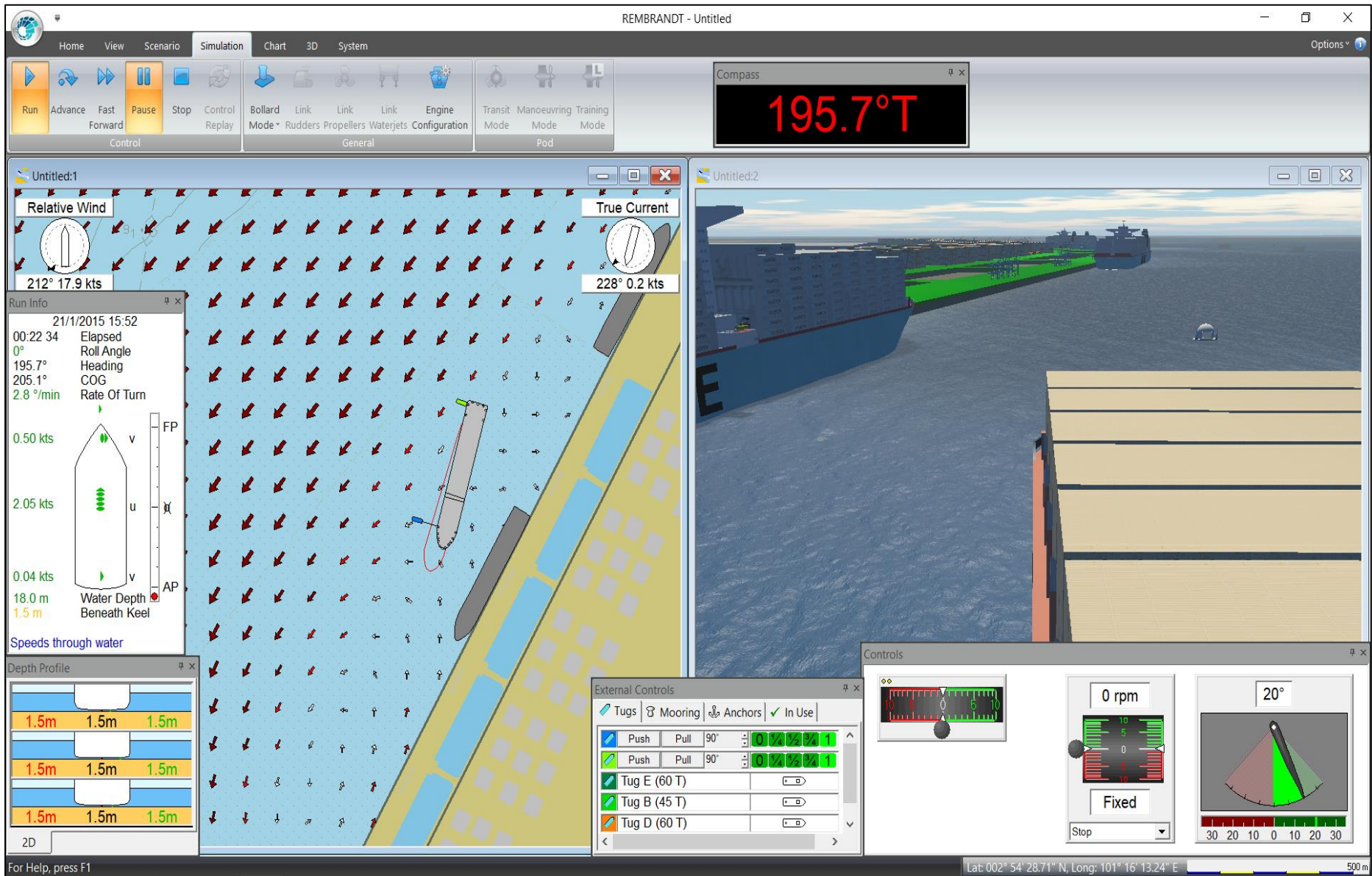




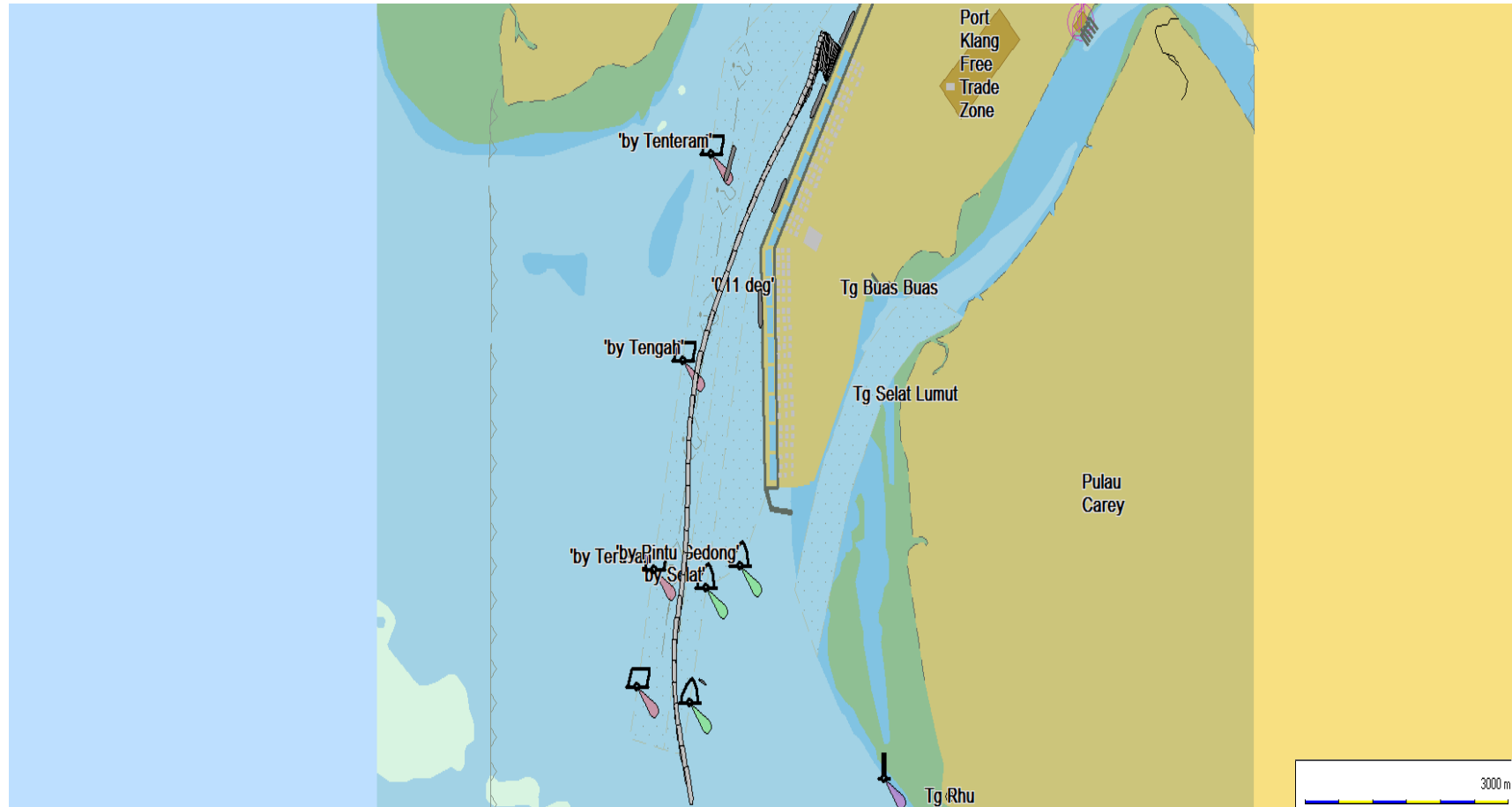




Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
38	R38WPCT10NE20 kFId1530hT60tx2P ortDep.rmb	Flood (1530h)	NE 20 k	Departure (Port a/s)	F: 60t A: 60t	This is a re-run of Run 38x. The vessel was pulled off the berth using only two 60 tons bollard pull tugs. Care was taken not to open the stern too wide to the flood current. The forward tug was used to pull the bow to starboard after the stern was opened. The rate of swing was however slow, even with the stern tug pushing and helm and engine being used. The tugs were then used at Full Power. This helped with increase the rate of turn and the vessel proceeded to sea at Slow Ahead (about 7.5 knots) after the tugs were let go. Four 60 tons bollard pull tugs will increase the factor of safety in such environmental conditions.	



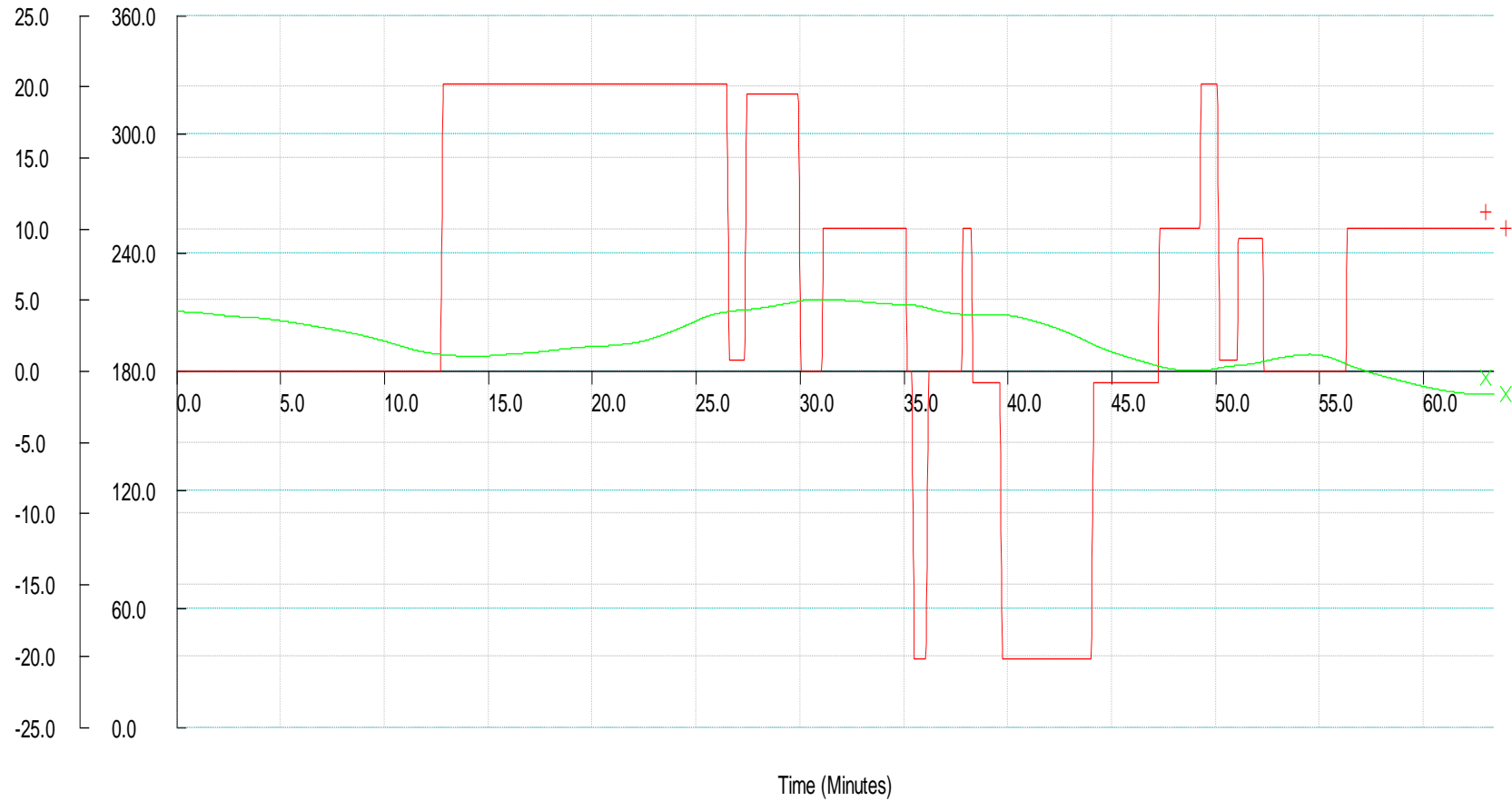
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 17/6/2019 08:48

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

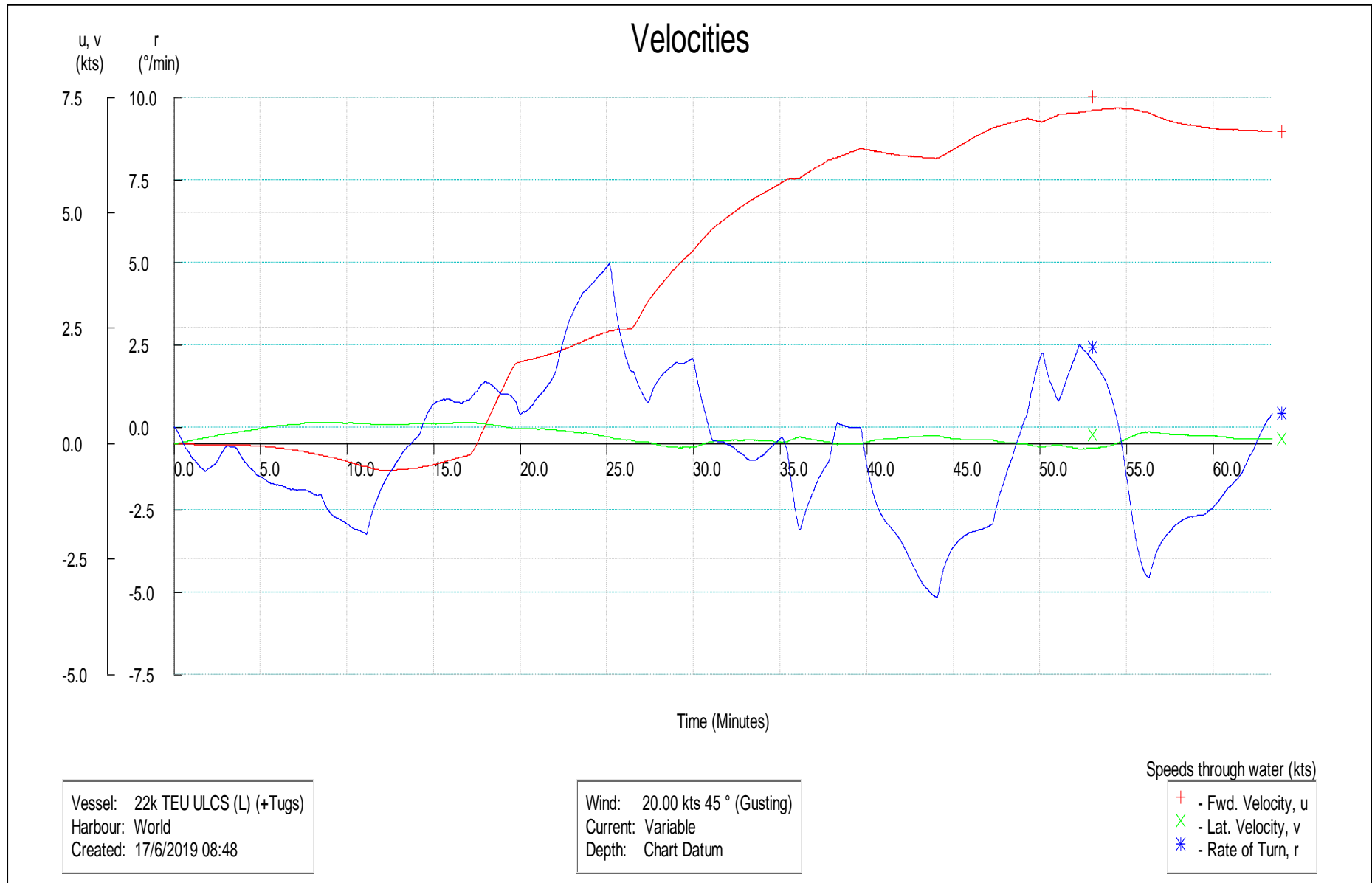
Heading and Rudder

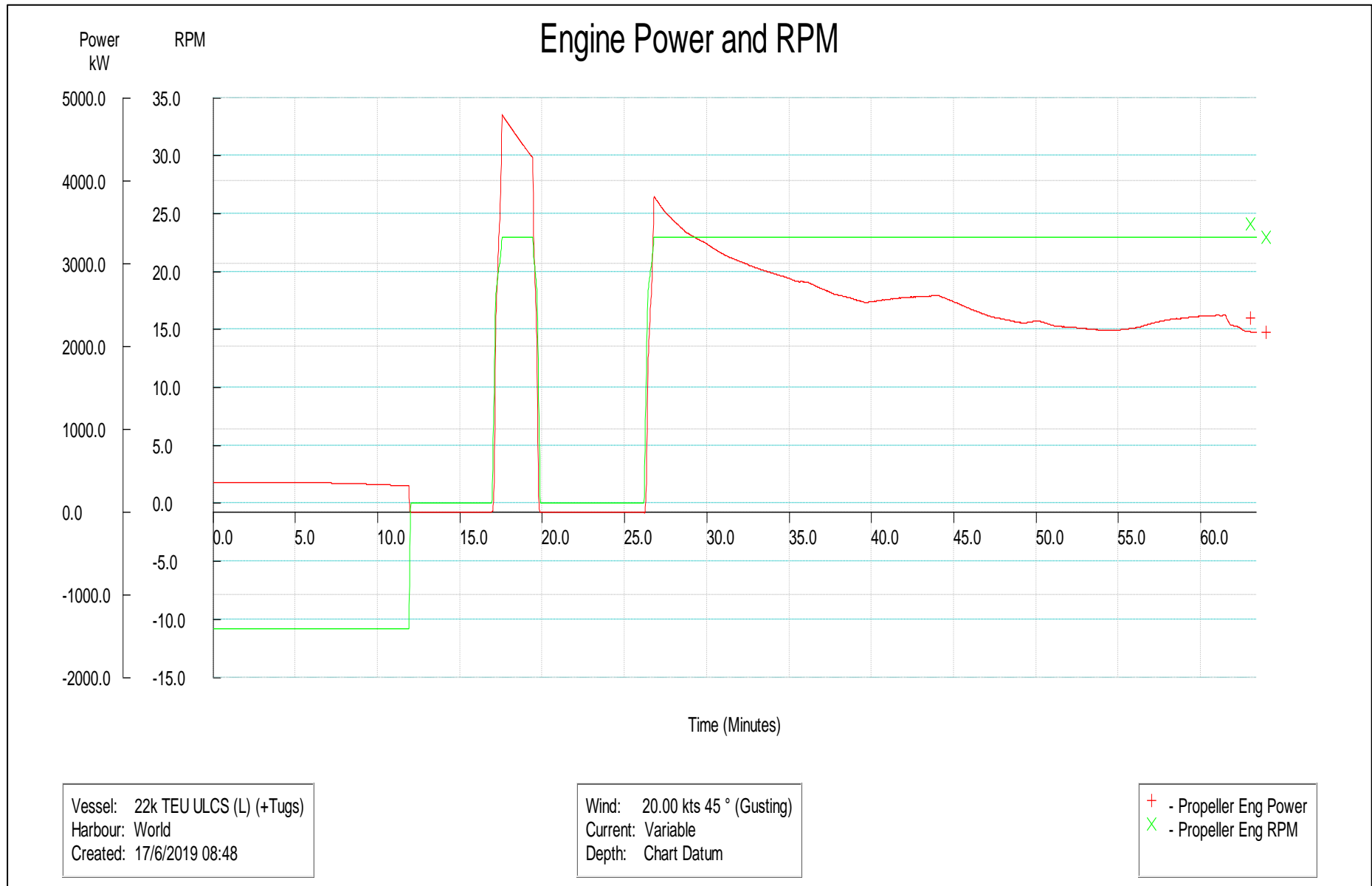


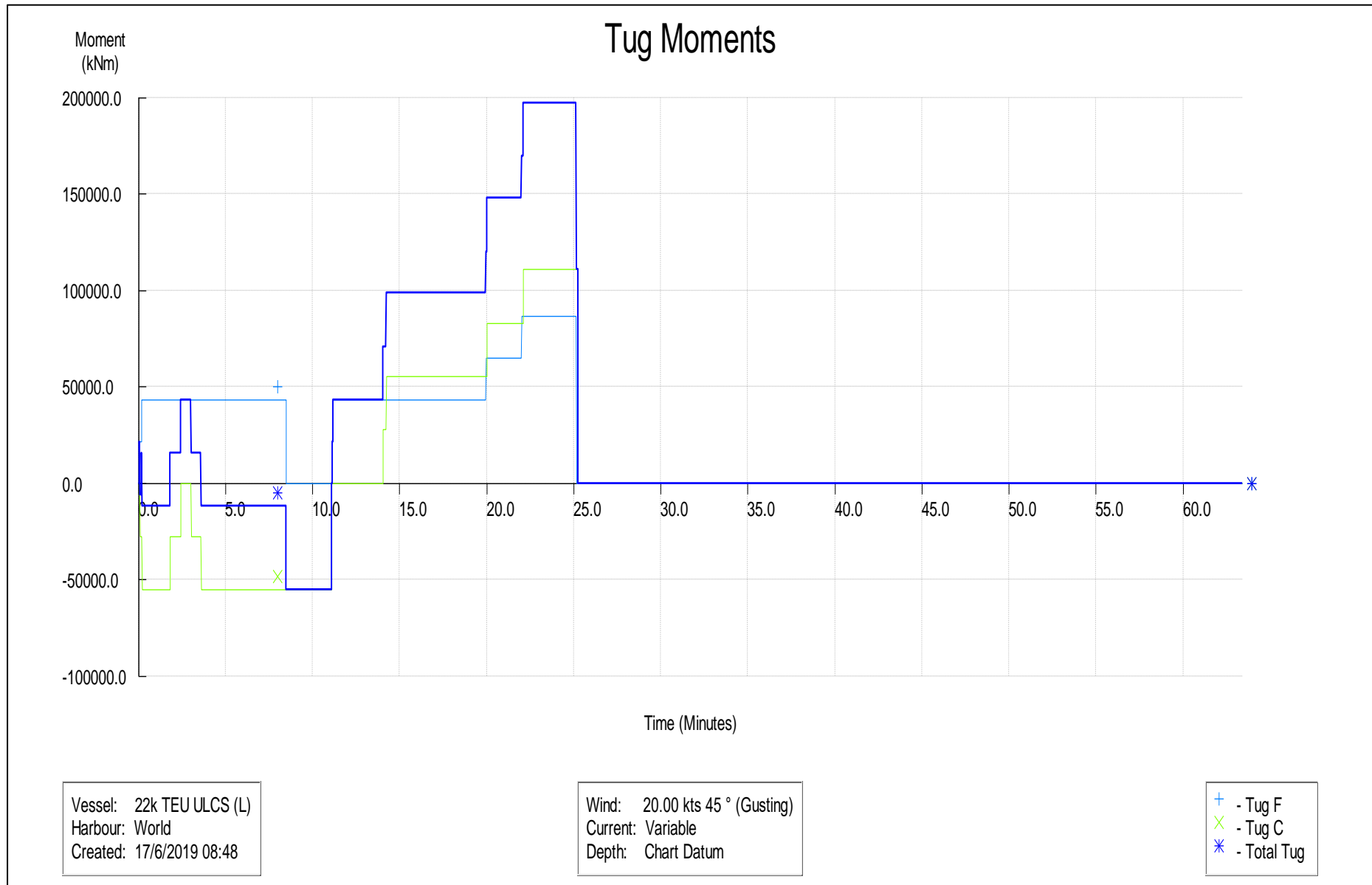
Vessel: 22k TEU ULCS (L) (+Tugs)
 Harbour: World
 Created: 17/6/2019 08:48

Wind: 20.00 kts 45 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

+ - Rudder Rud (°)
 X - Heading



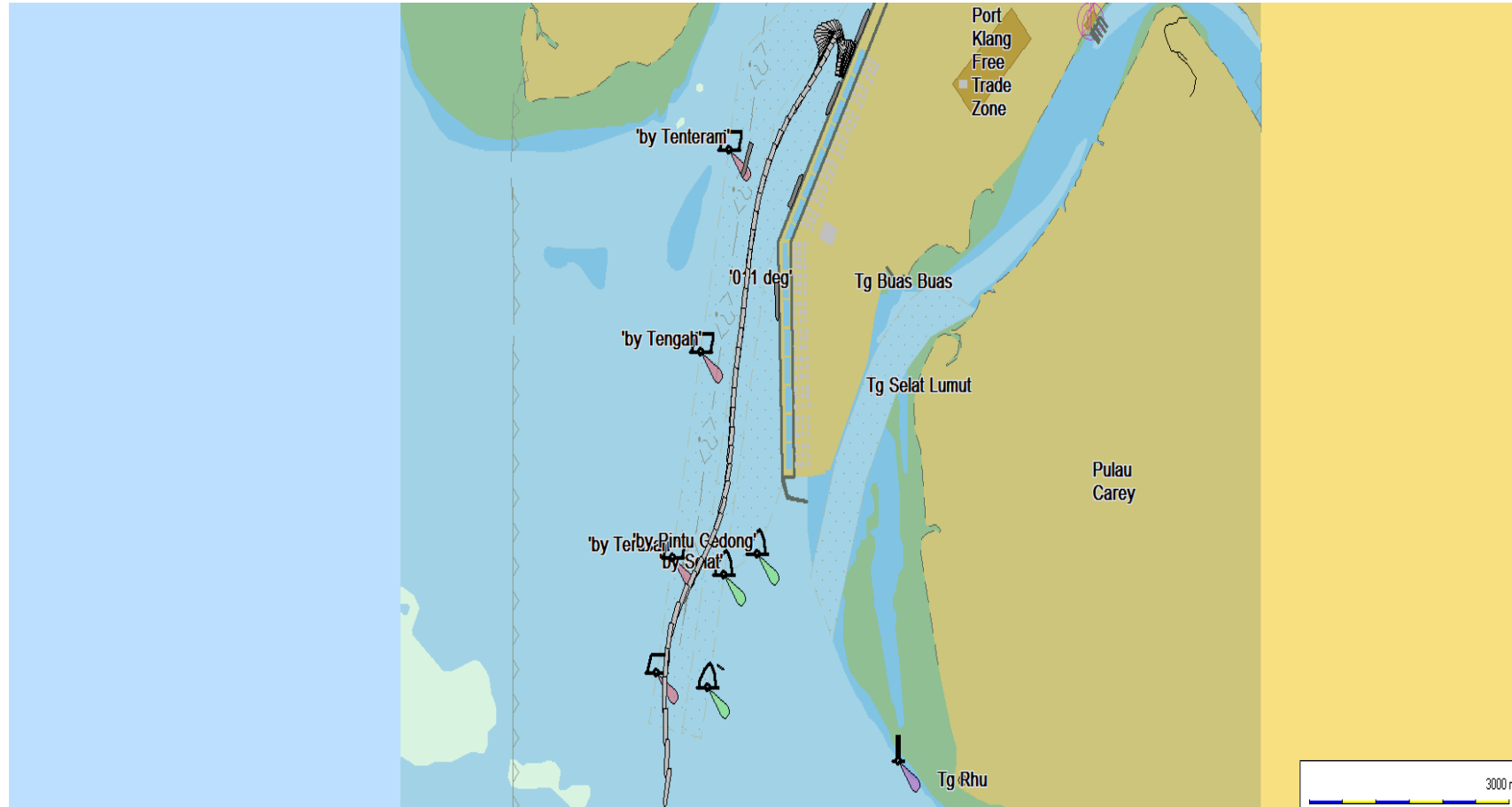




Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
39	R39WPCT10SW20 kFId1530hT60tx4St bdDep.rmb	Flood (1530h)	SW 20 k	Departure (Stbd a/s)	F: 60t x 2 A: 60t x 2	The vessel was pulled off the berth using four 60 tons bollard pull tugs. She was then swung to port keeping close to the wharf. After the swing, the tugs were cast off and the vessel proceeded to sea. She was able to maintain her transit outside the existing South Channel until Selat Buoy, after which she crossed over to keep closer to the port-hand mark. Minimum available channel clearance: 510 metres.	3/6



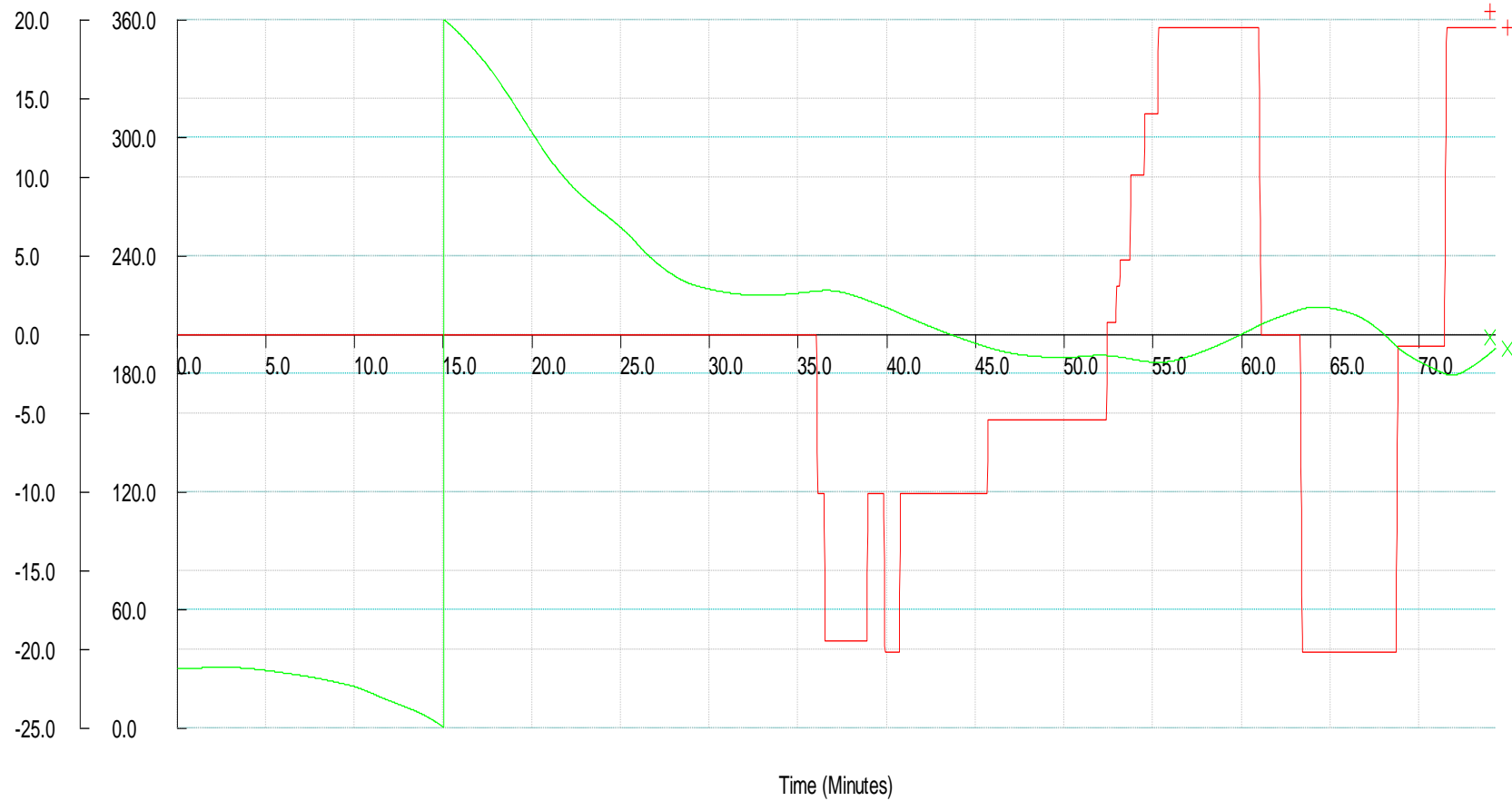
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 16/6/2019 19:43

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

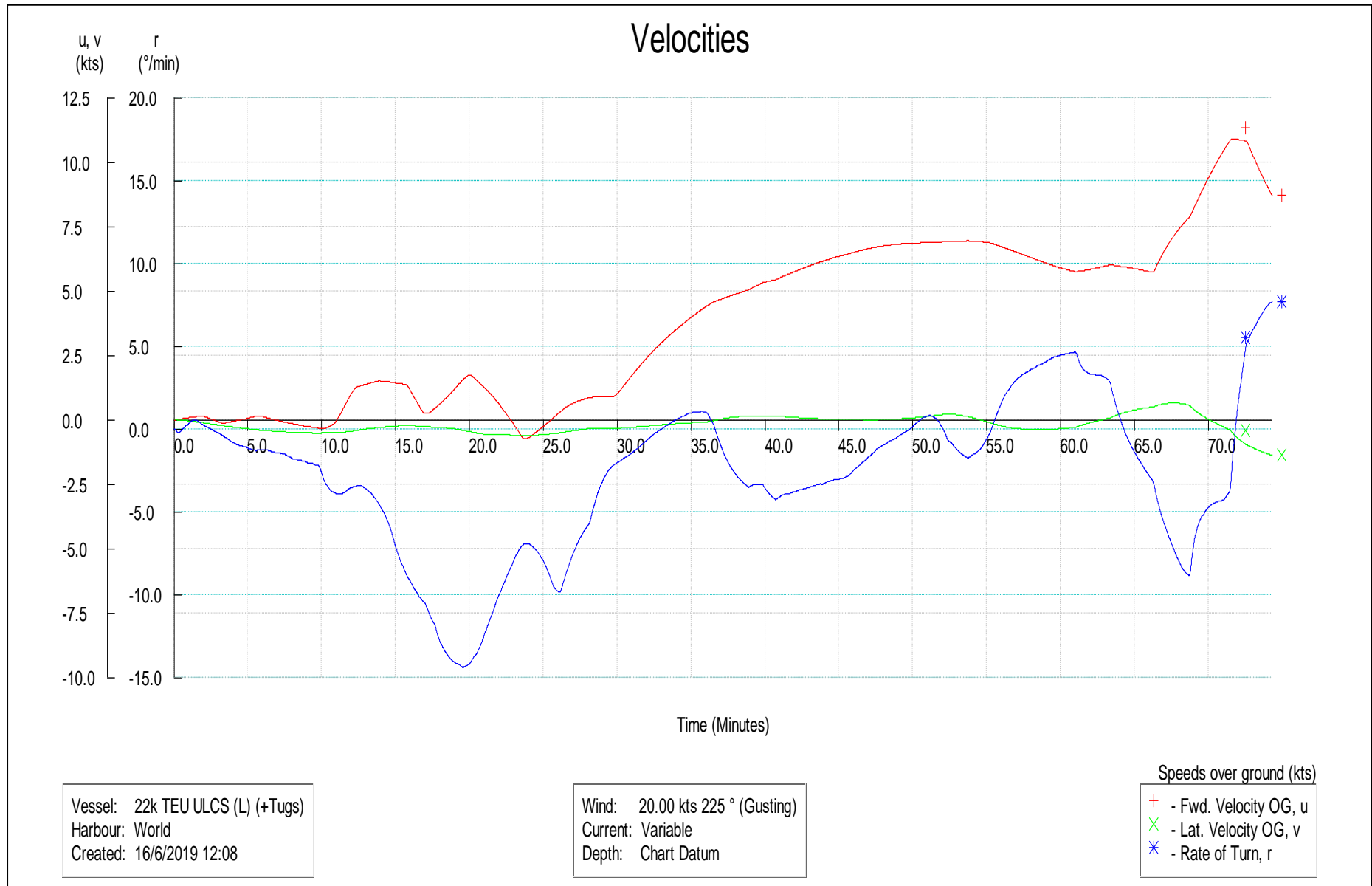
Heading and Rudder

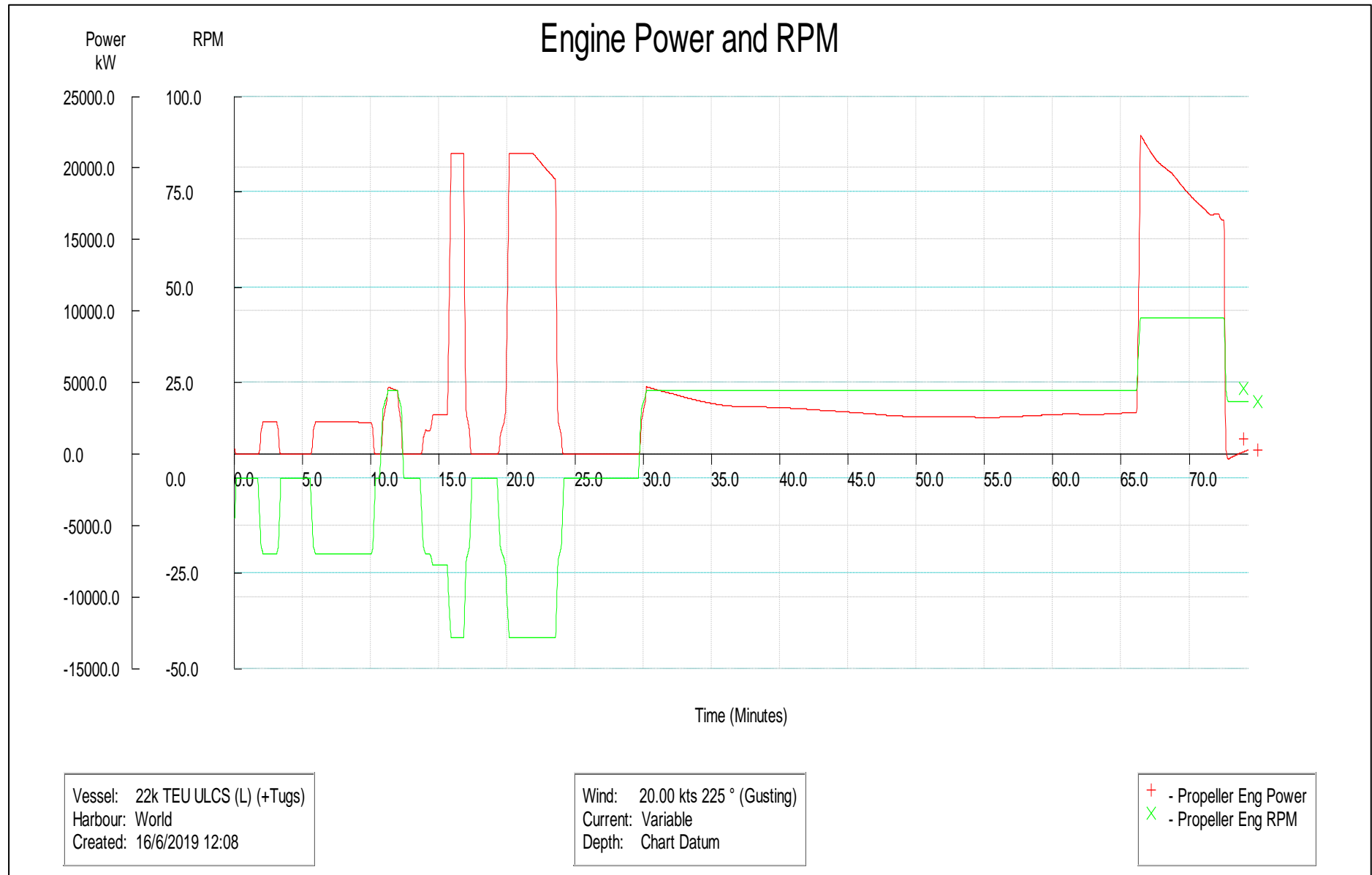


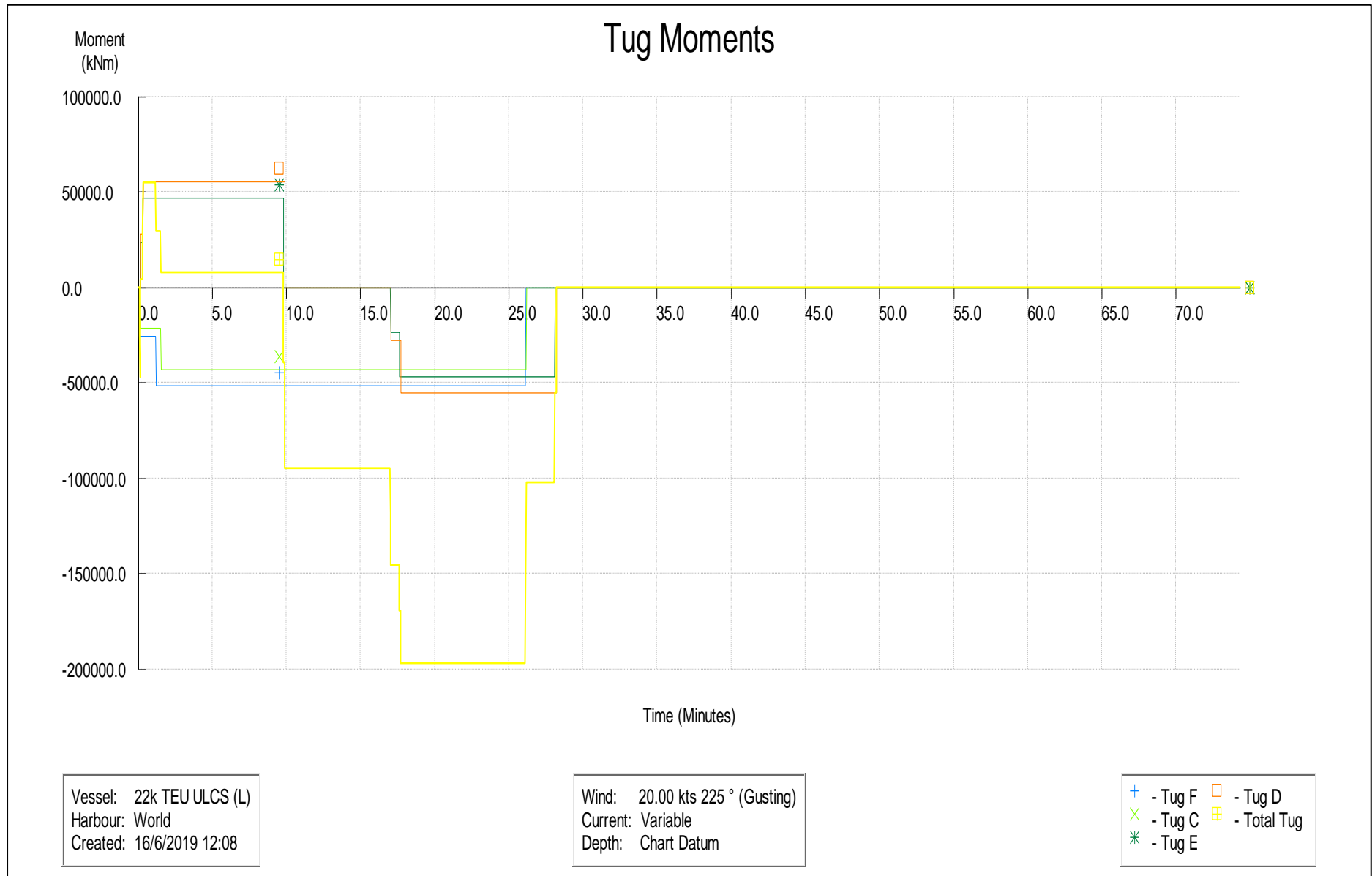
Vessel: 22k TEU ULCS (L) (+Tugs)
 Harbour: World
 Created: 16/6/2019 12:08

Wind: 20.00 kts 225 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

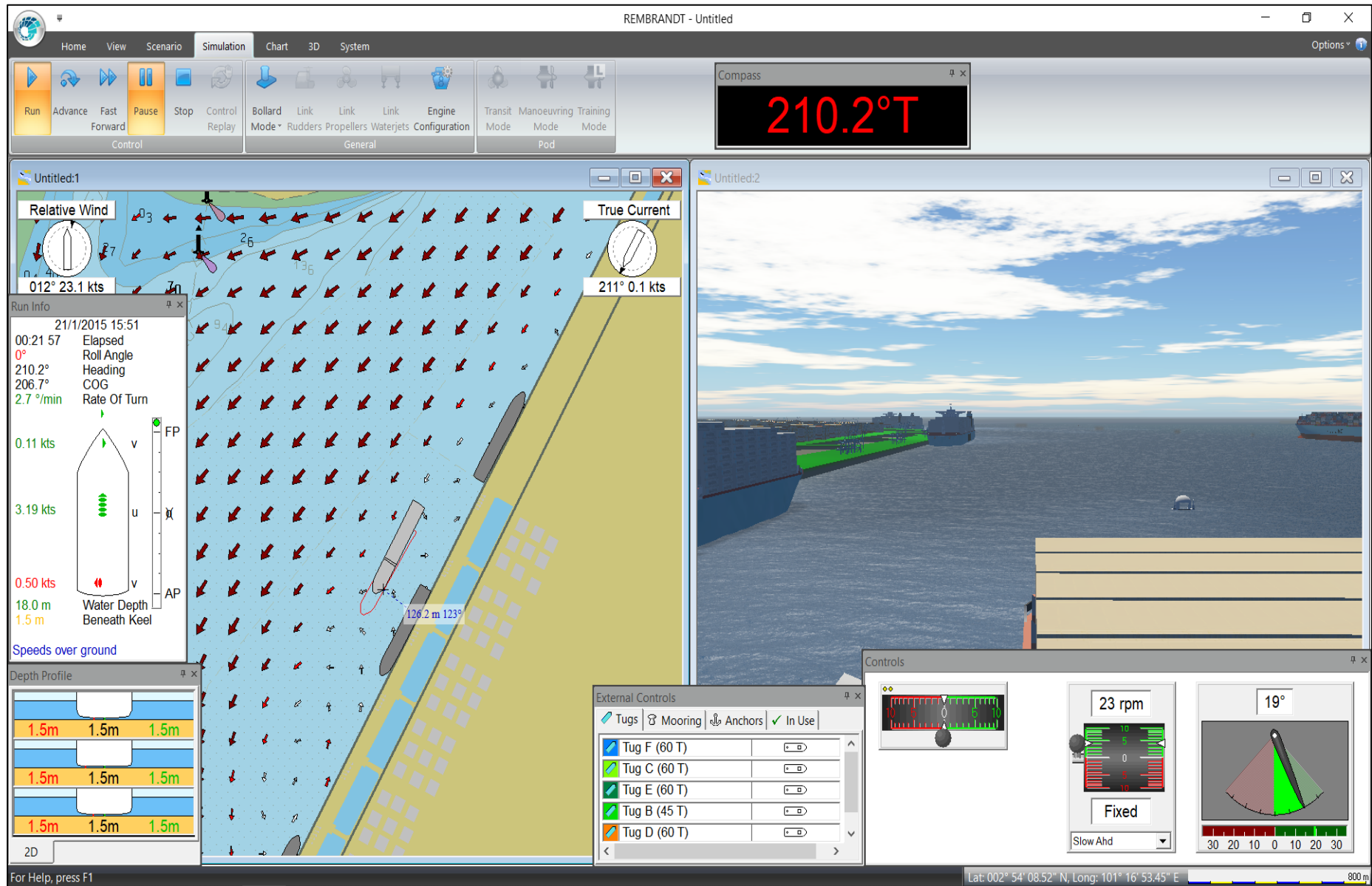
+ - Rudder Rud (°)
 x - Heading







Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
40	R40WPCT10SW20 kFId1530hT60tx4S PortDep.rmb	Flood (1530h)	SW 20 k	Departure (Port a/s)	F: 60t x 2 A: 60t x 2	The vessel was pulled off the berth using four 60 tons bollard pull tugs. The tugs were then cast off and the vessel proceeded to sea crossing the channel near Tengah Buoy and then maintaining transit closer to the port-hand marks. Channel transit speed was less than 7.5 knots (slow Ahead).	3/6



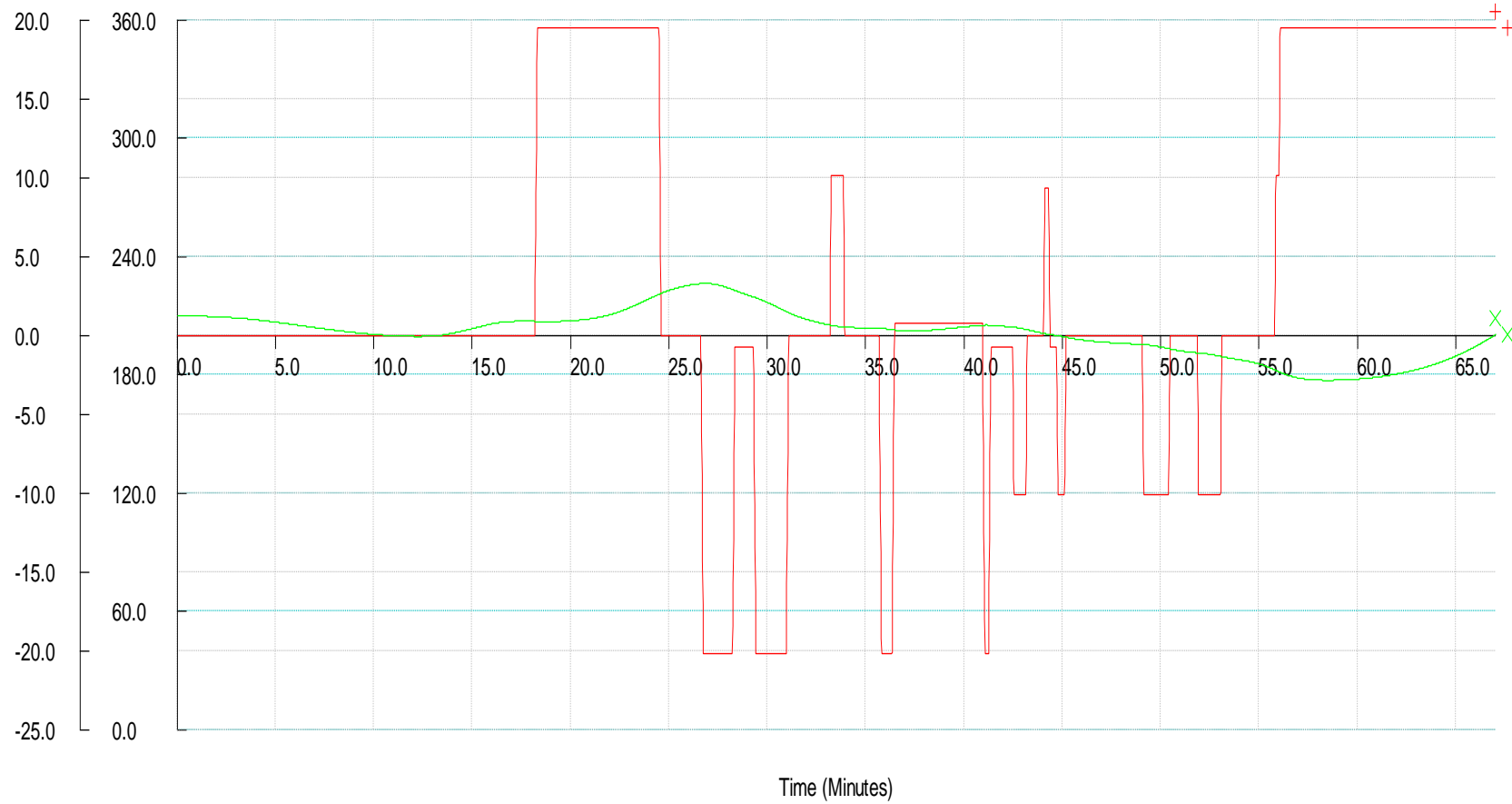
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 16/6/2019 20:20

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

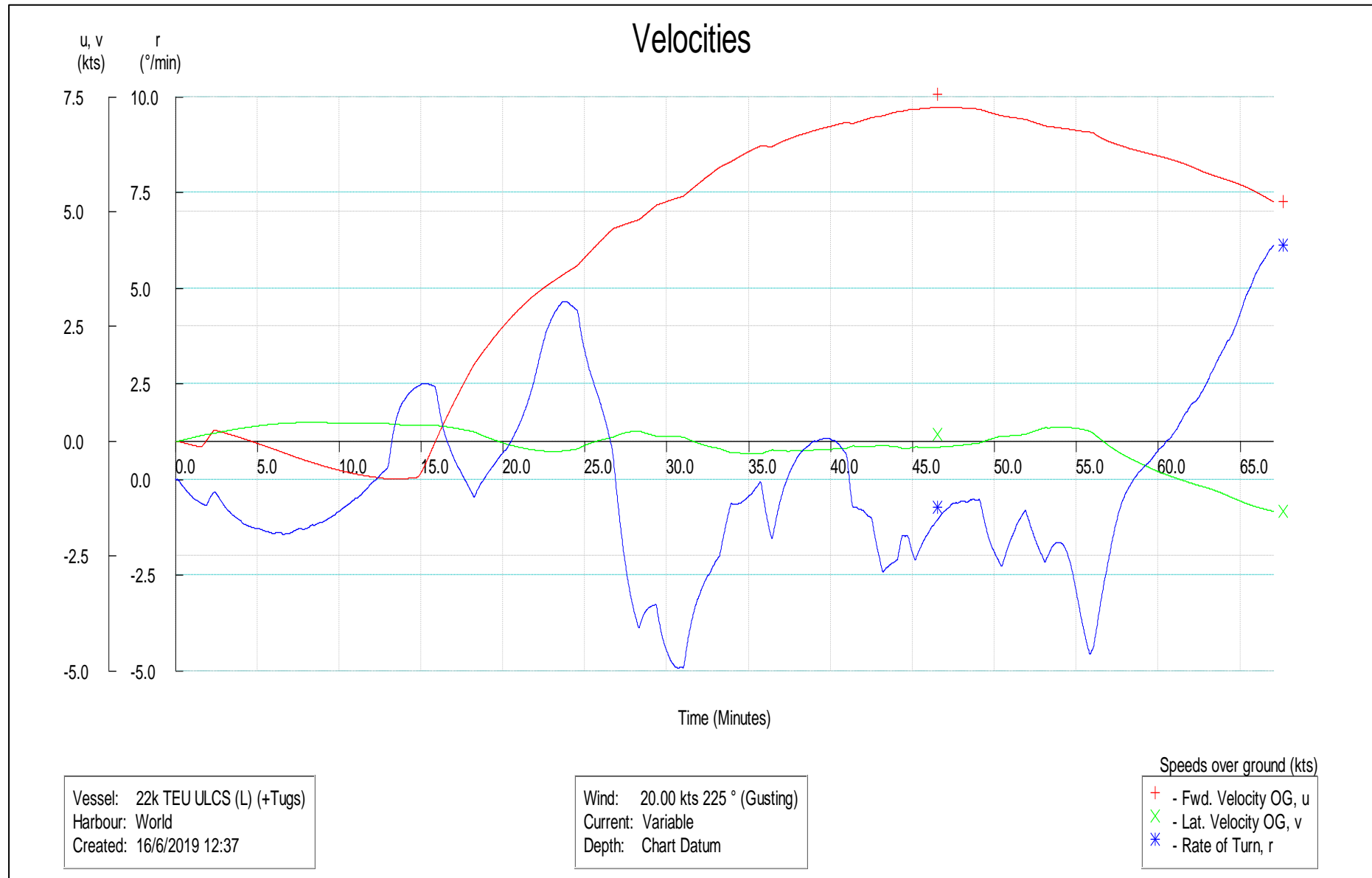
Heading and Rudder

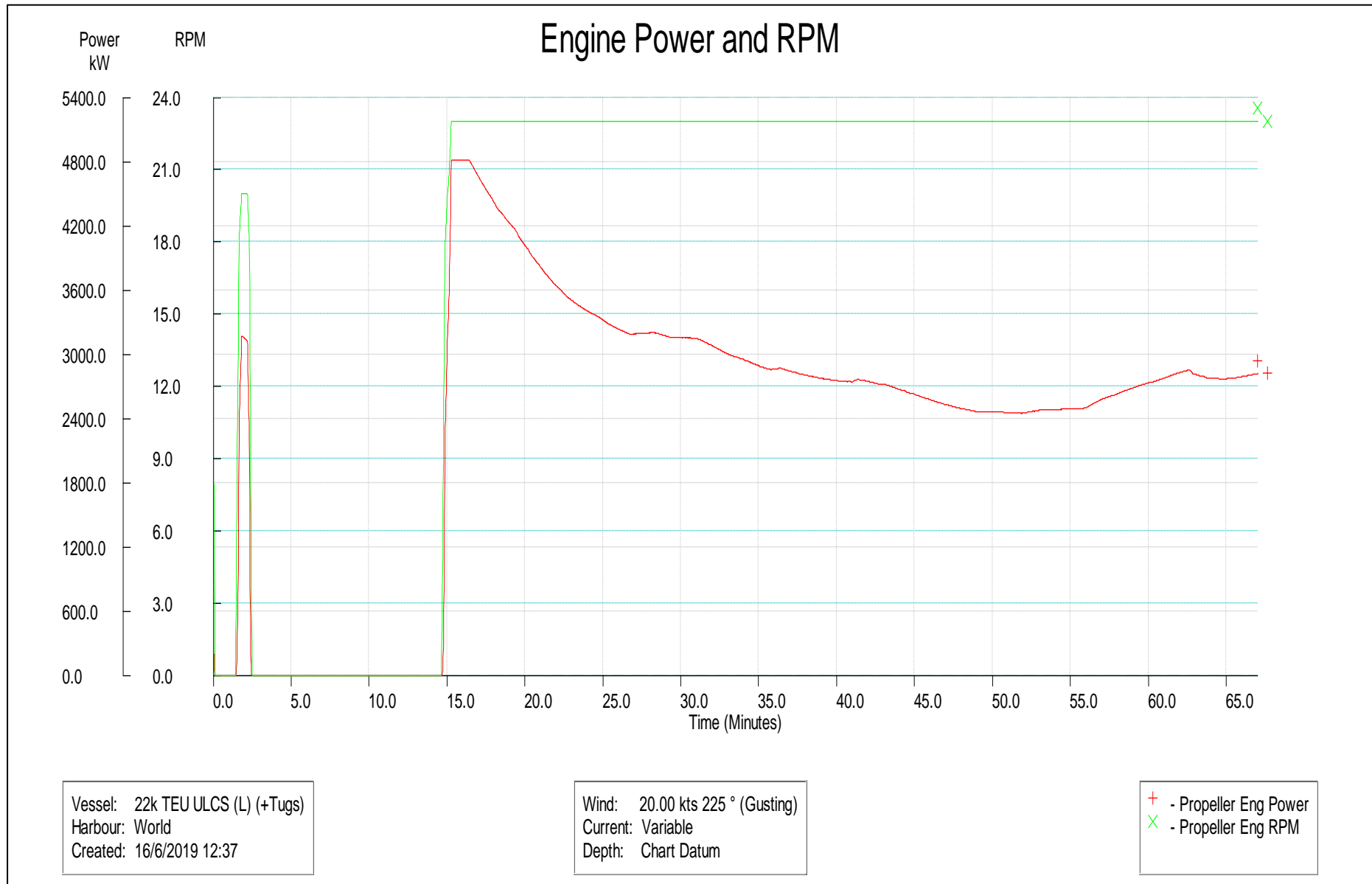


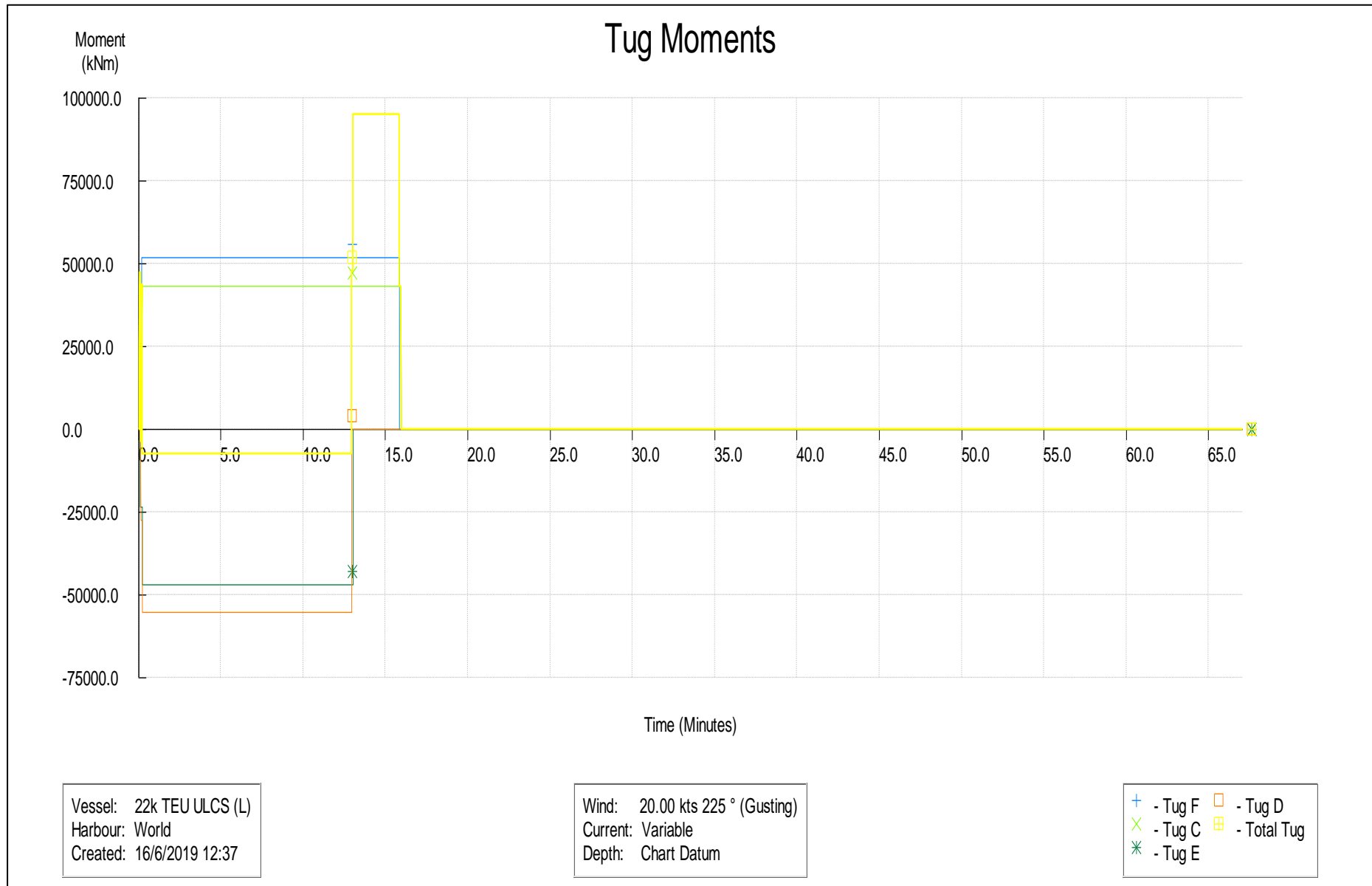
Vessel: 22k TEU ULCS (L) (+Tugs)
 Harbour: World
 Created: 16/6/2019 12:37

Wind: 20.00 kts 225° (Gusting)
 Current: Variable
 Depth: Chart Datum

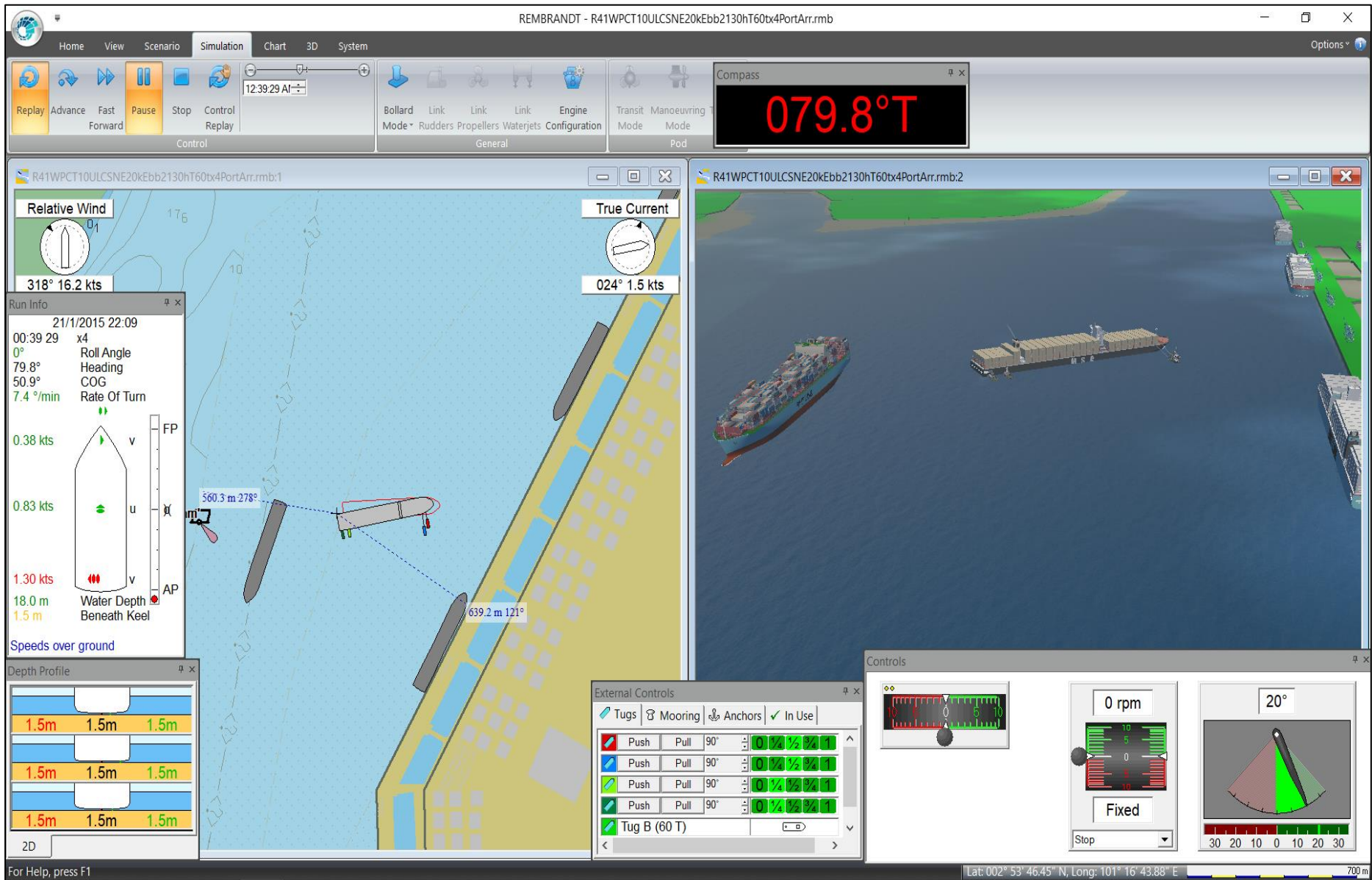
+ - Rudder Rud (°)
 x - Heading







Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
41	R41WPCT10NE20 kEbb2130hT60tx4P ortArr.rmb	Ebb (2130h)	NE 20 k	Arrival (Port a/s)	F: 60t x 2 A: 60t x 2	The vessel entered the channel at over 12 knots. She was then slowed down tugs made fast. After she moved out of the channel off CT-13, the astern engine was given to stop her before swinging to starboard. She was then backed to her berth and pushed alongside. The tugs operated at a maximum of Half Power. Minimum available channel clearance: 560m	4/6

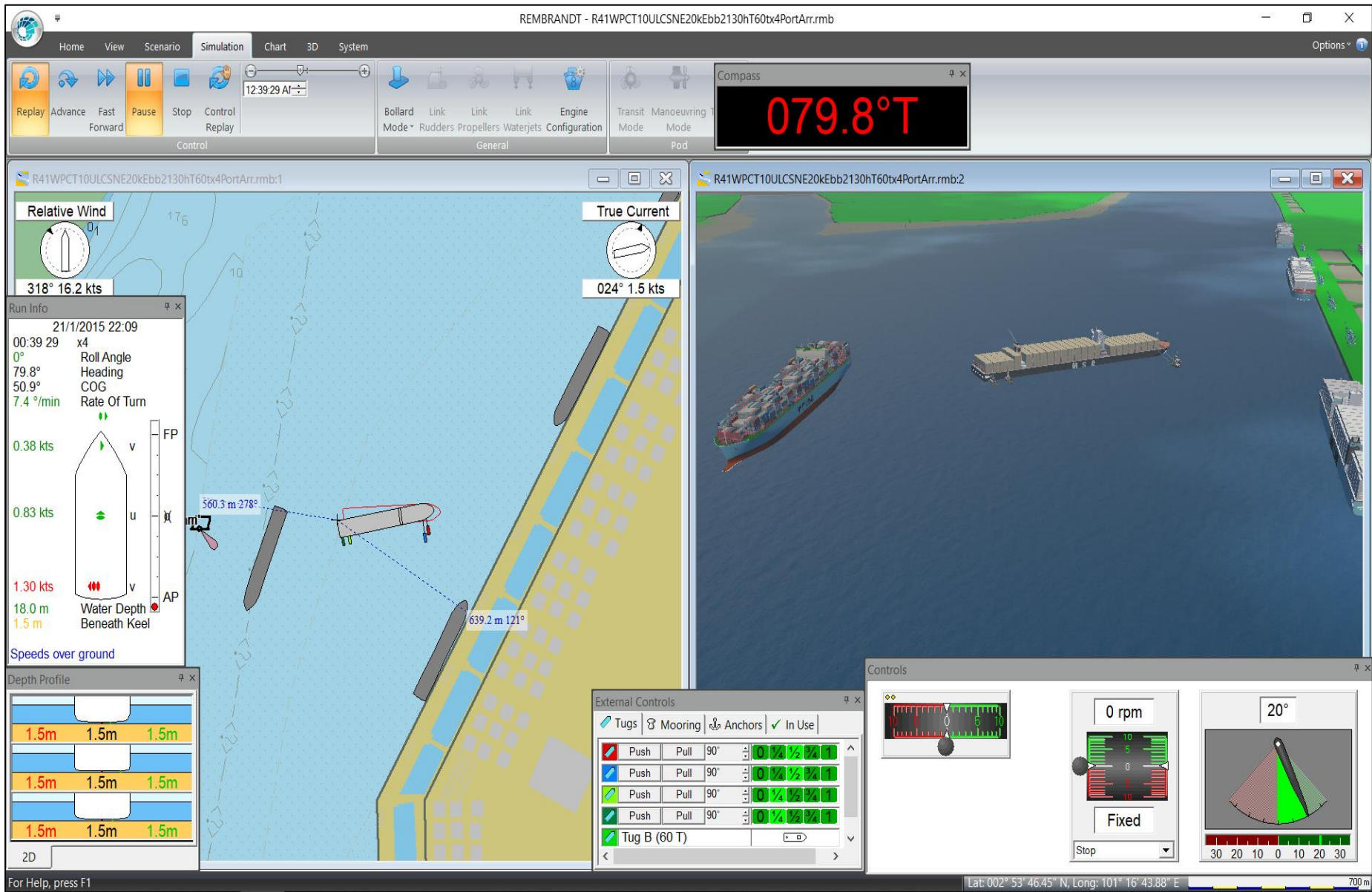


Vessel Track

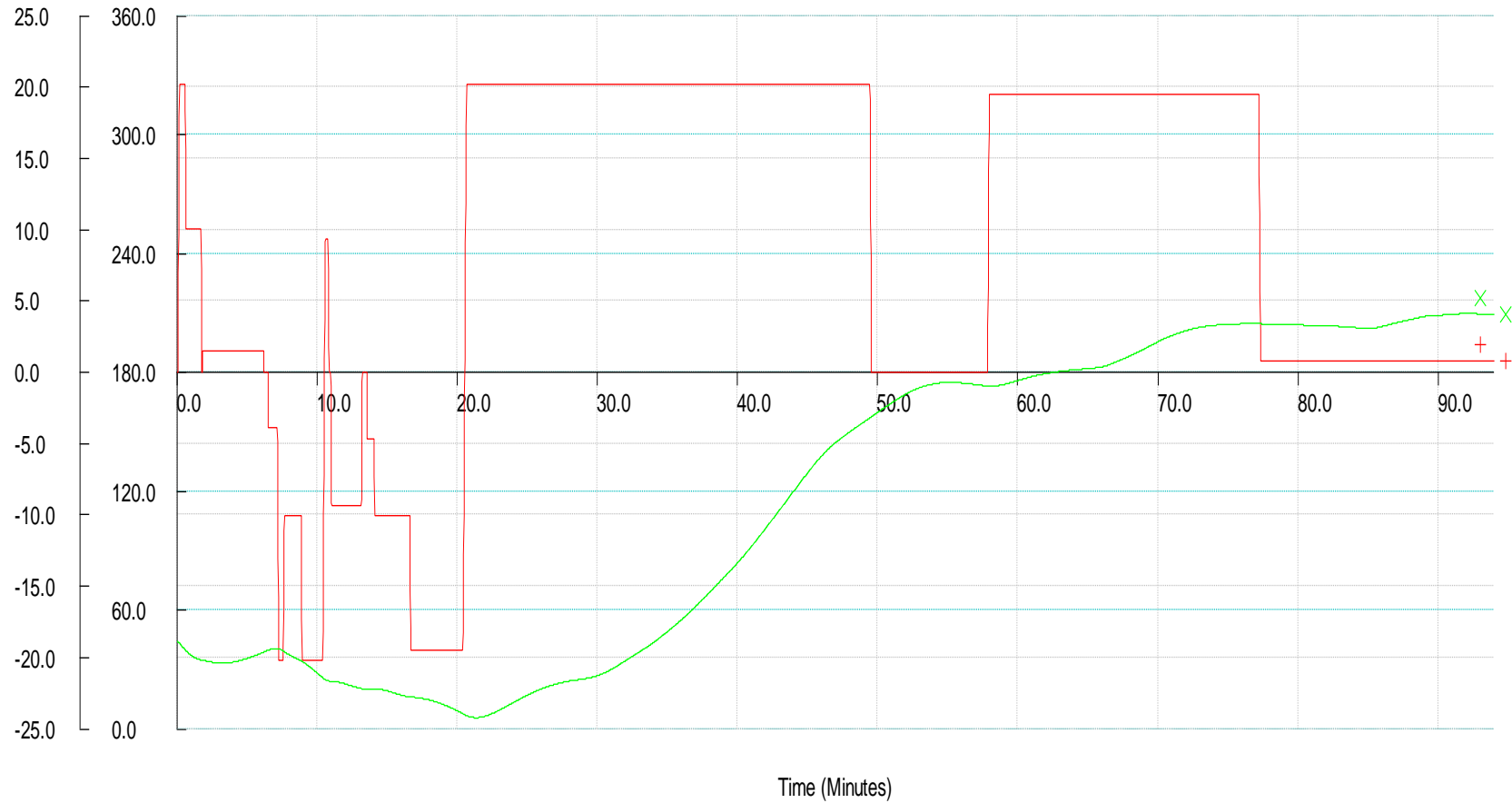


Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 7/6/2019 09:13

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum



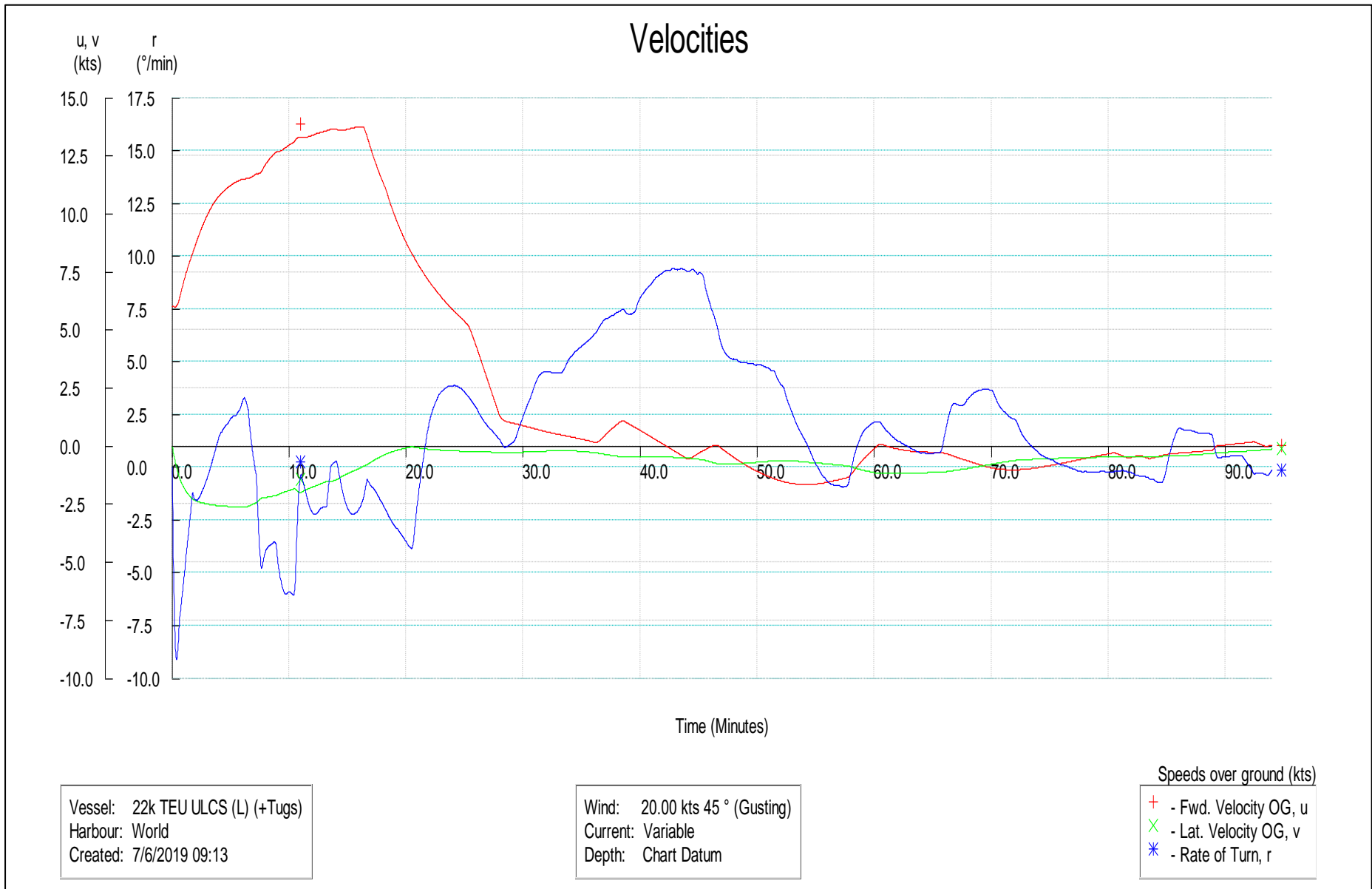
Heading and Rudder

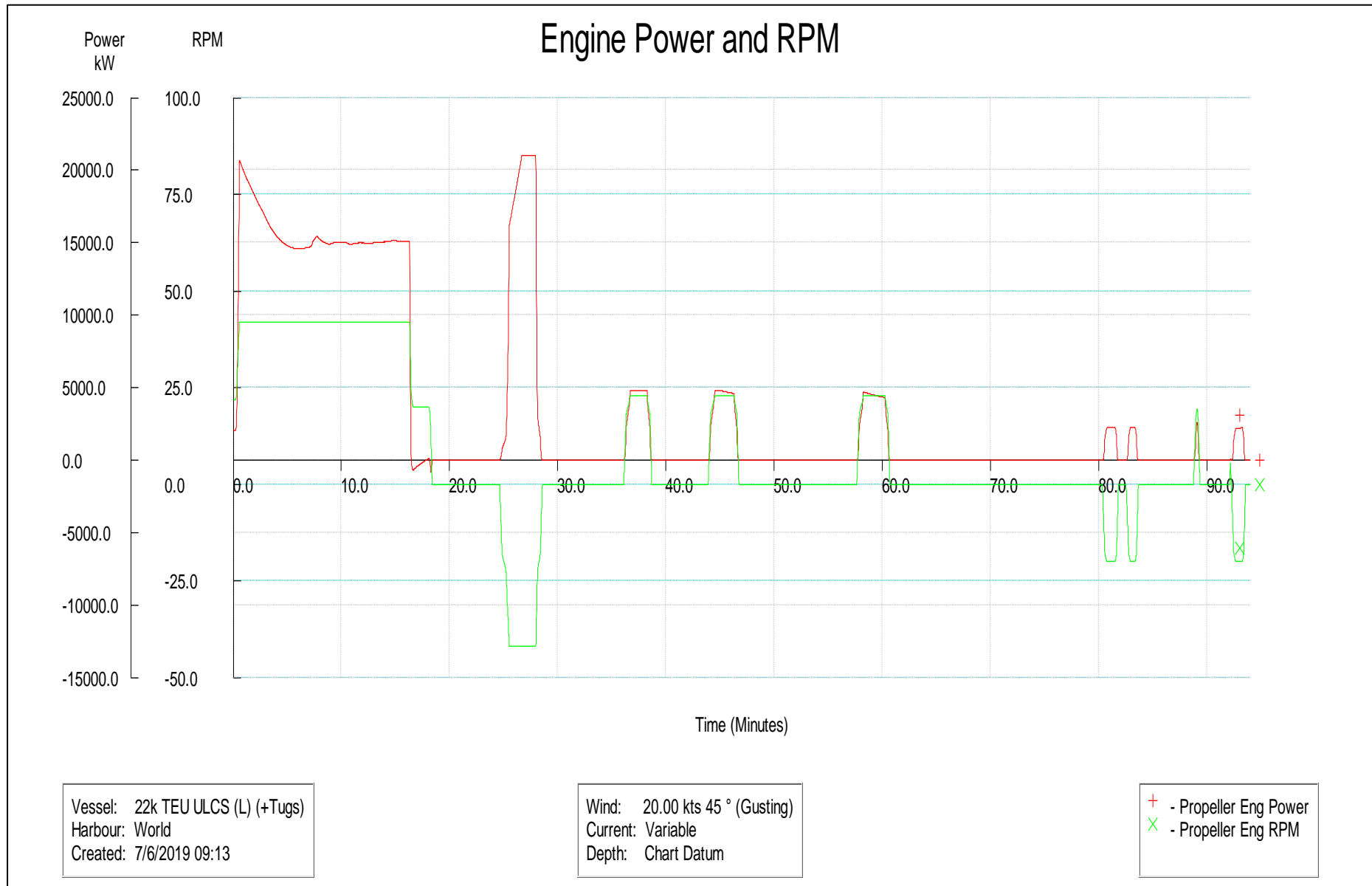


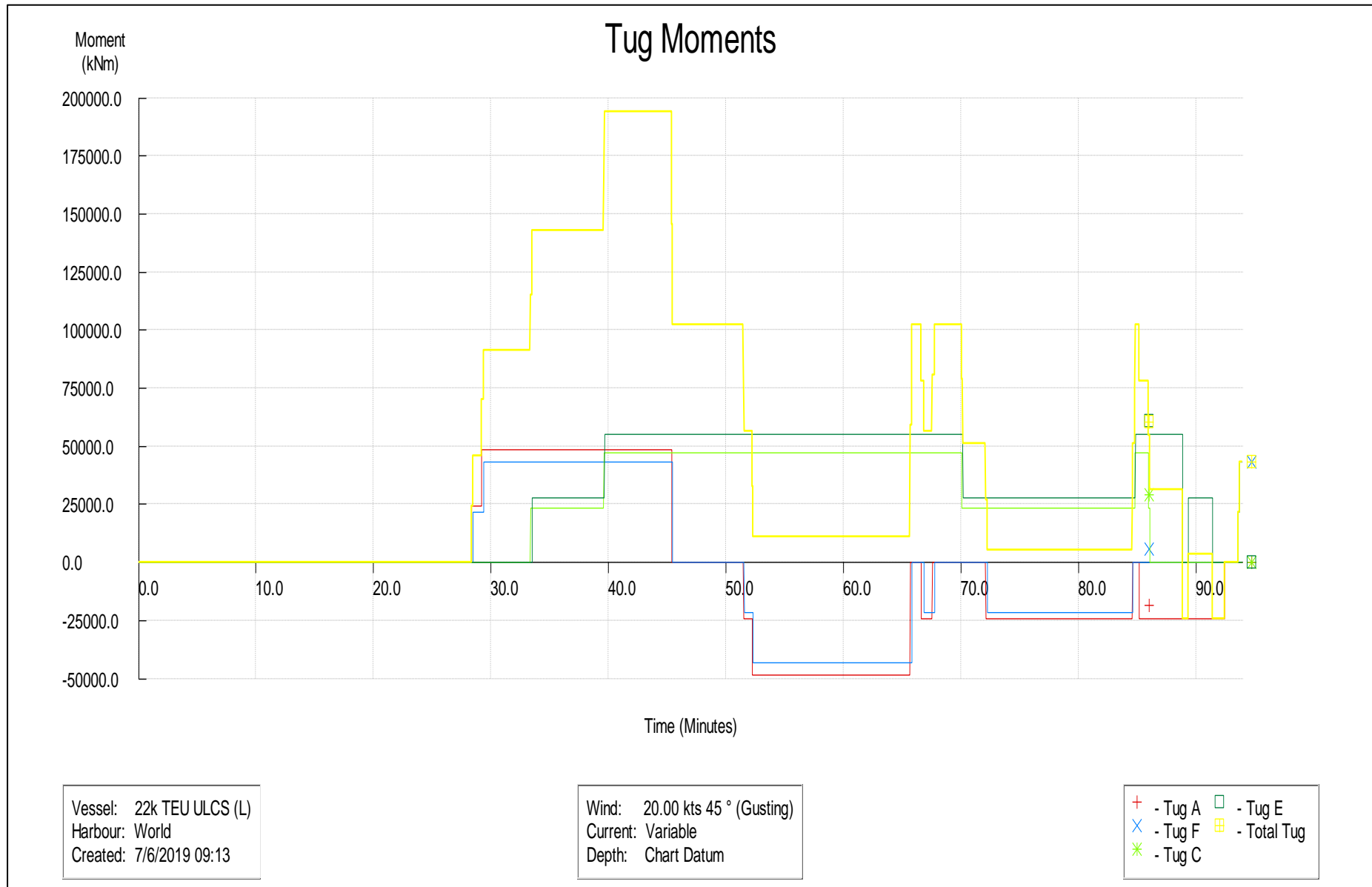
Vessel: 22k TEU ULCS (L) (+Tugs)
 Harbour: World
 Created: 7/6/2019 09:13

Wind: 20.00 kts 45 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

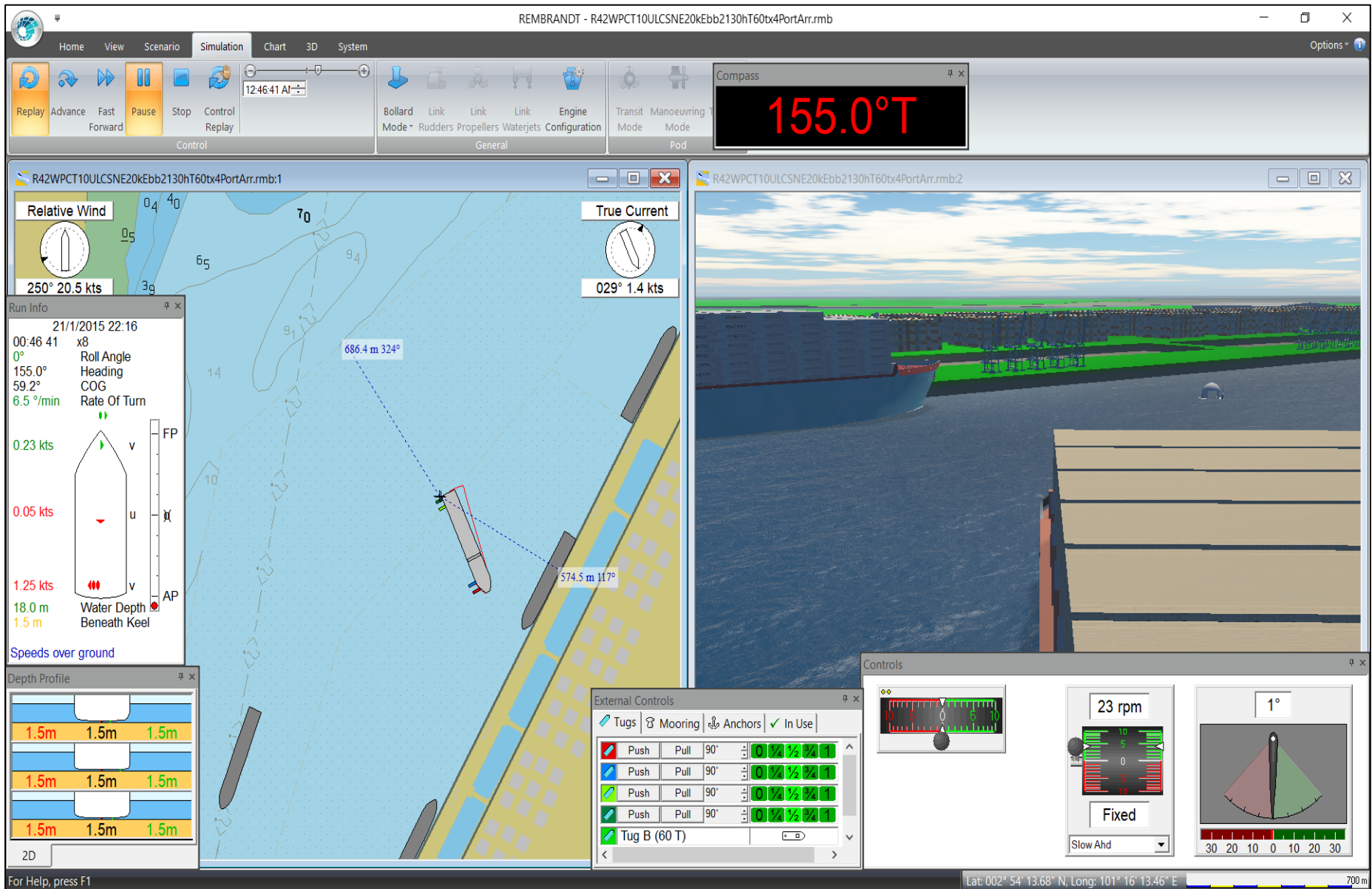
+ - Rudder Rud (°)
 X - Heading







Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
42	R42WPCT10NE20 kEbb2130hT60tx4P ortArr.rmb	Ebb (2130h)	NE 20 k	Arrival (Port a/s)	F: 60t x 2 A: 60t x 2	The vessel entered the channel at over 12 knots. She was then slowed down and four 60 tons bollard pull tugs were made fast before swinging to starboard. She was then backed to her berth and pushed alongside. The tugs operated at a maximum of Half Power. Minimum available channel clearance: 680m	4/6



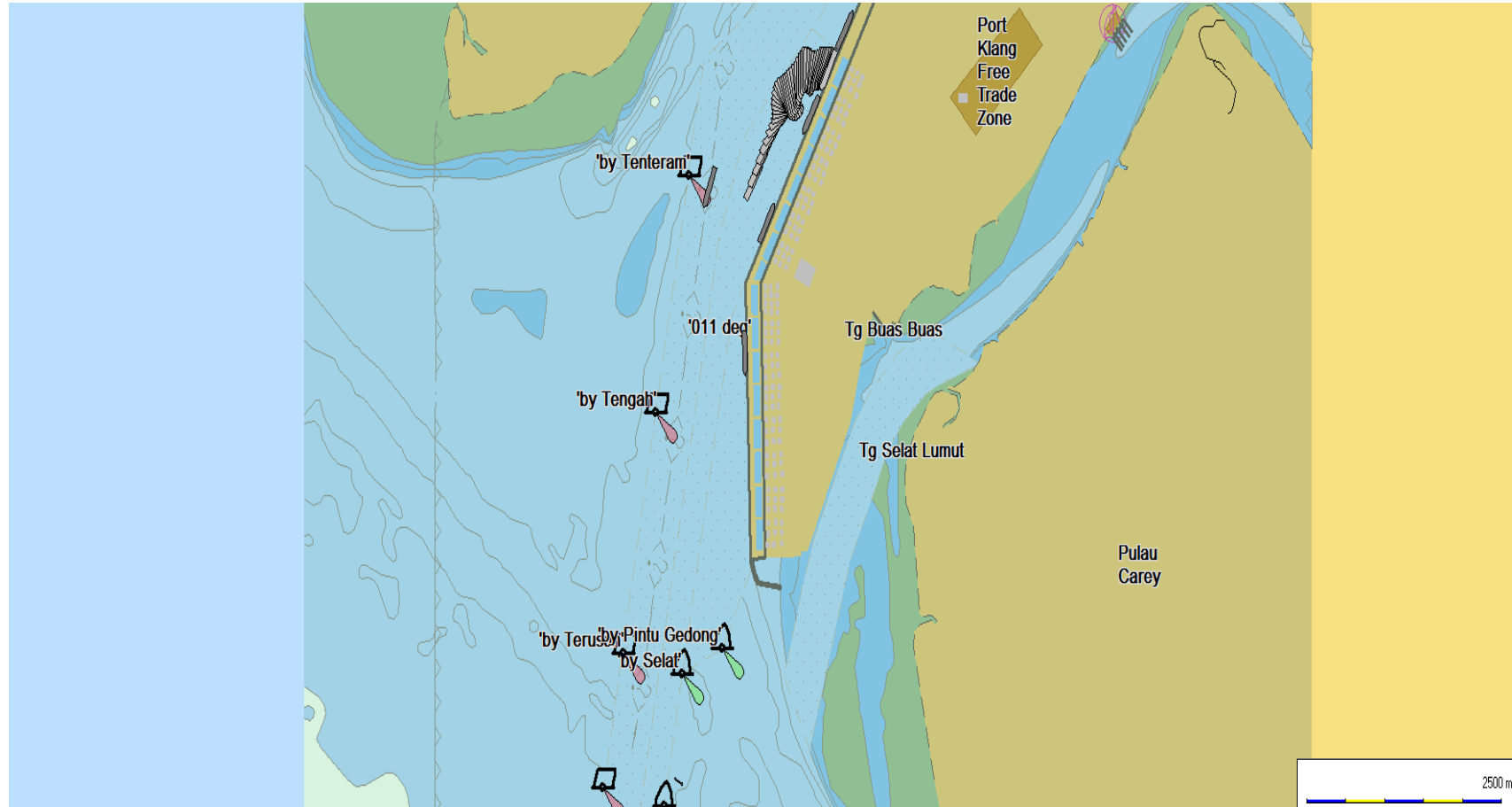
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 12/6/2019 06:47

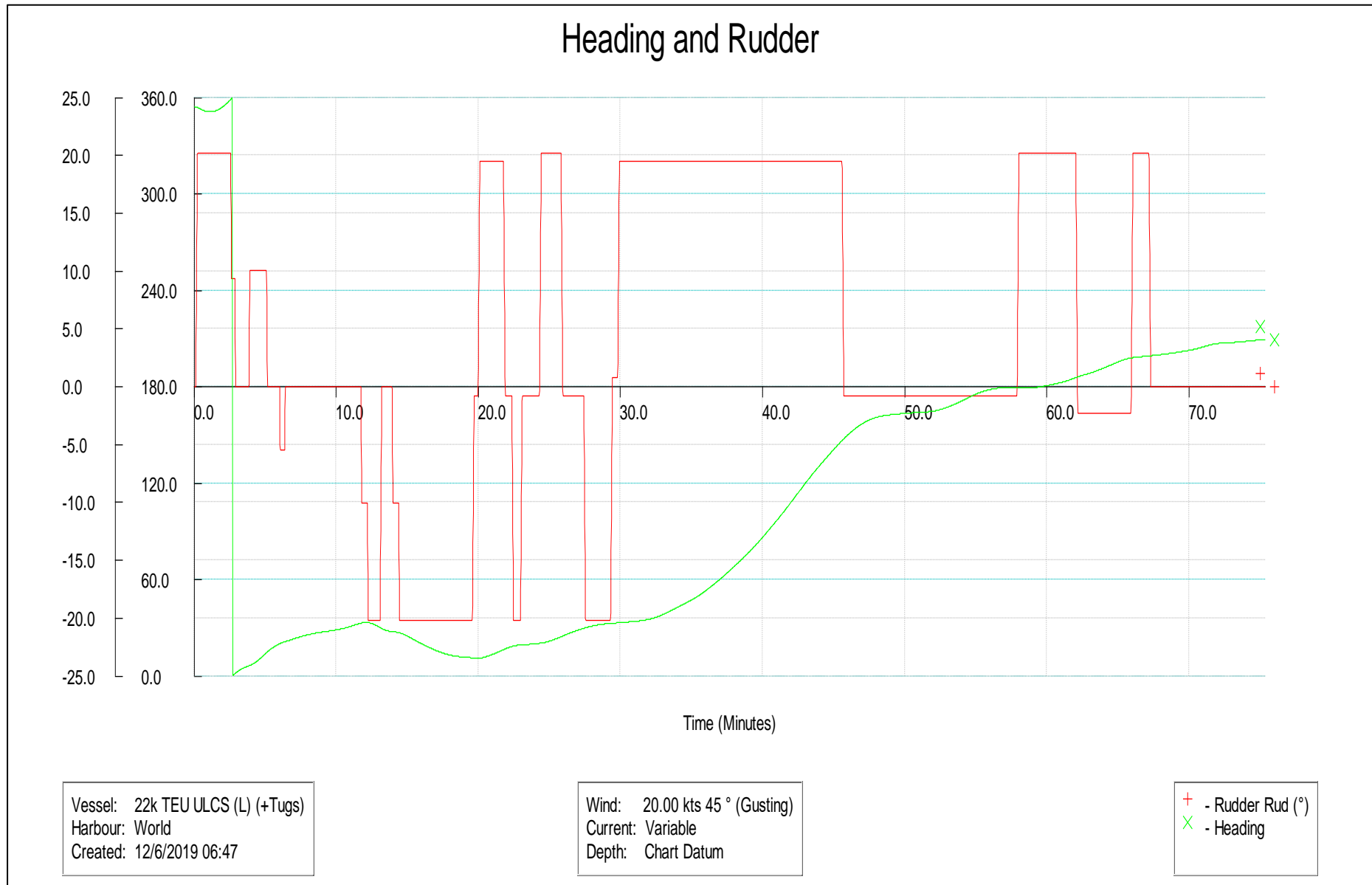
Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

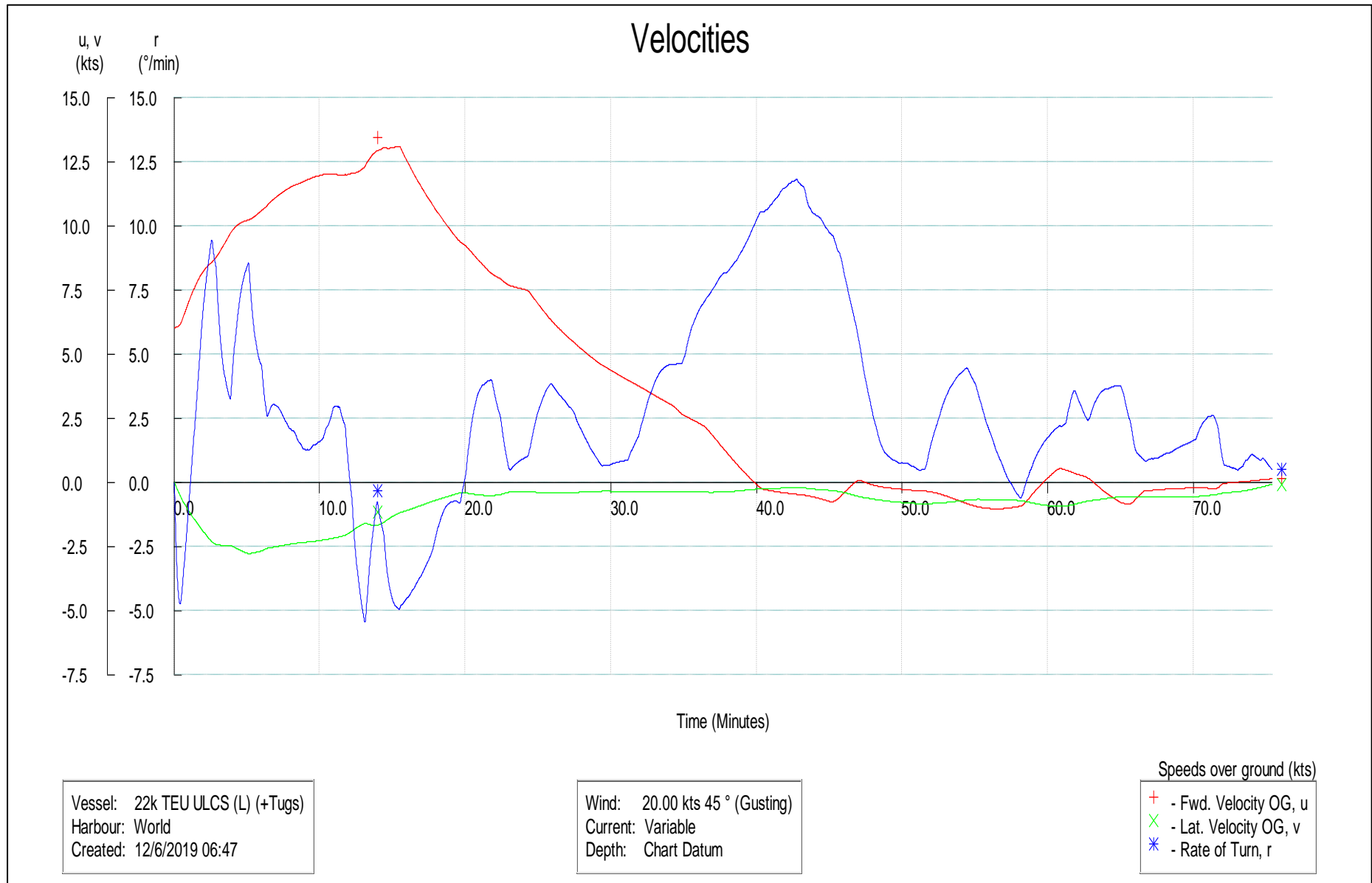
Vessel Track

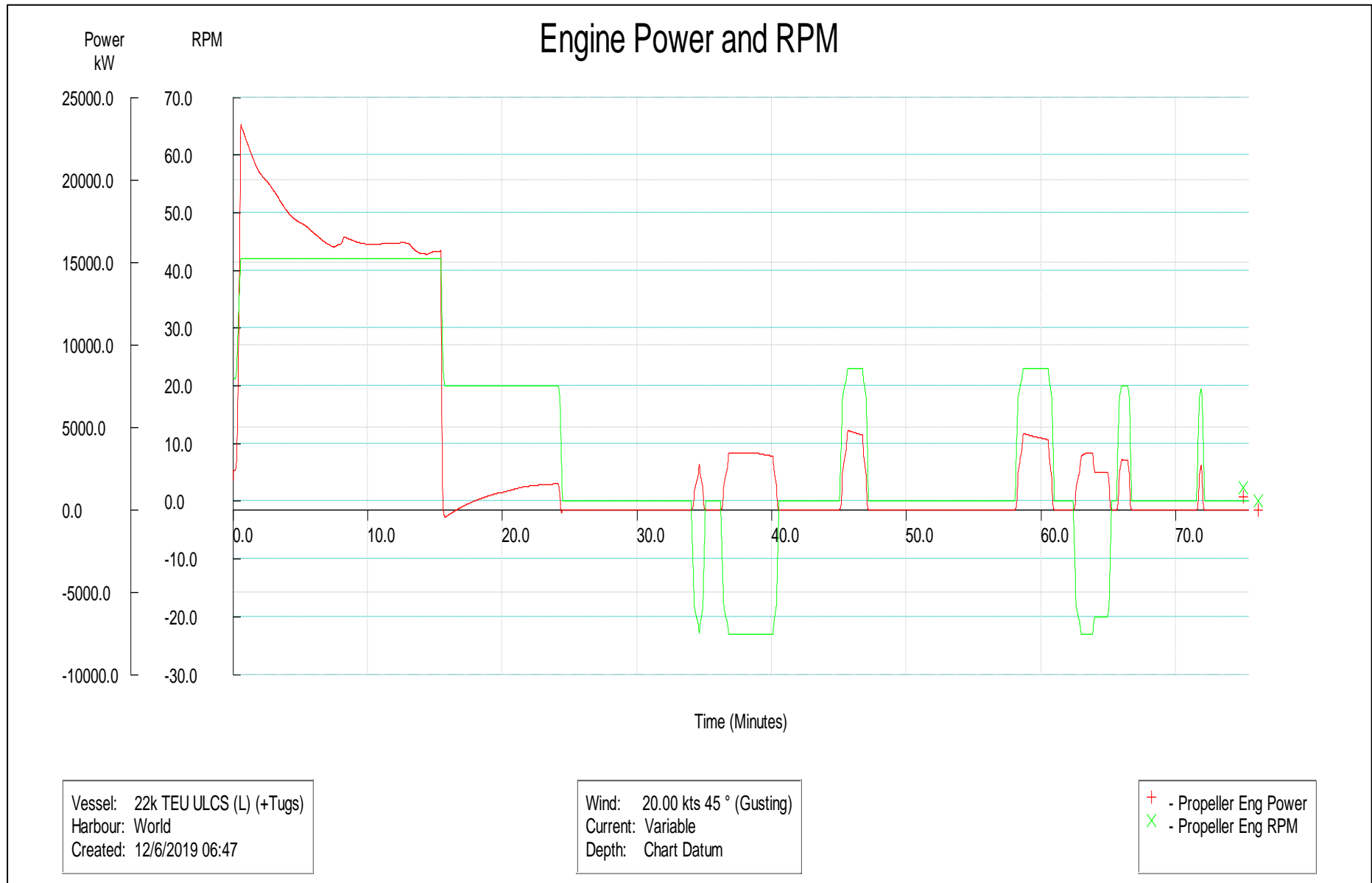


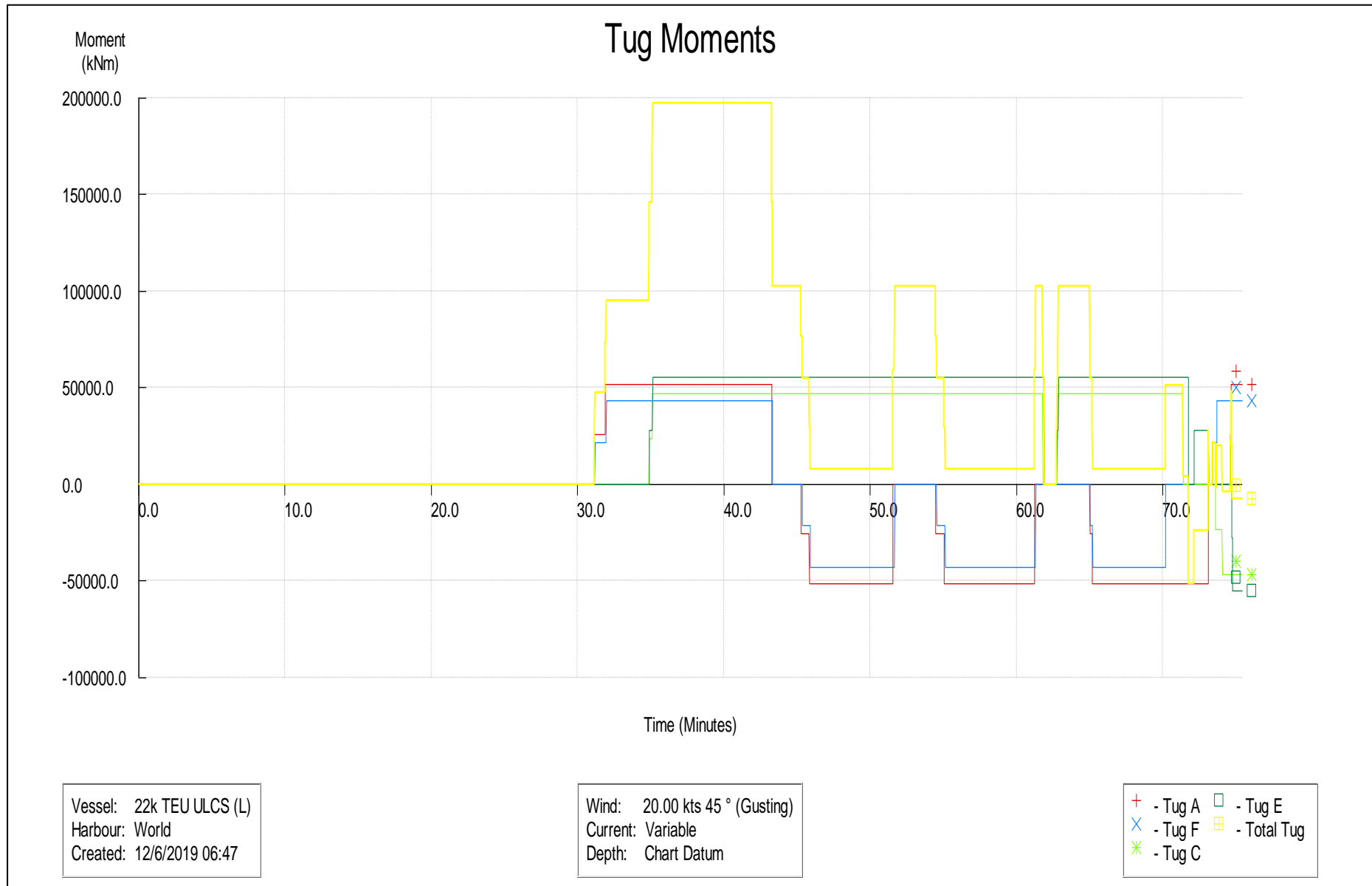
Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 12/6/2019 06:47

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

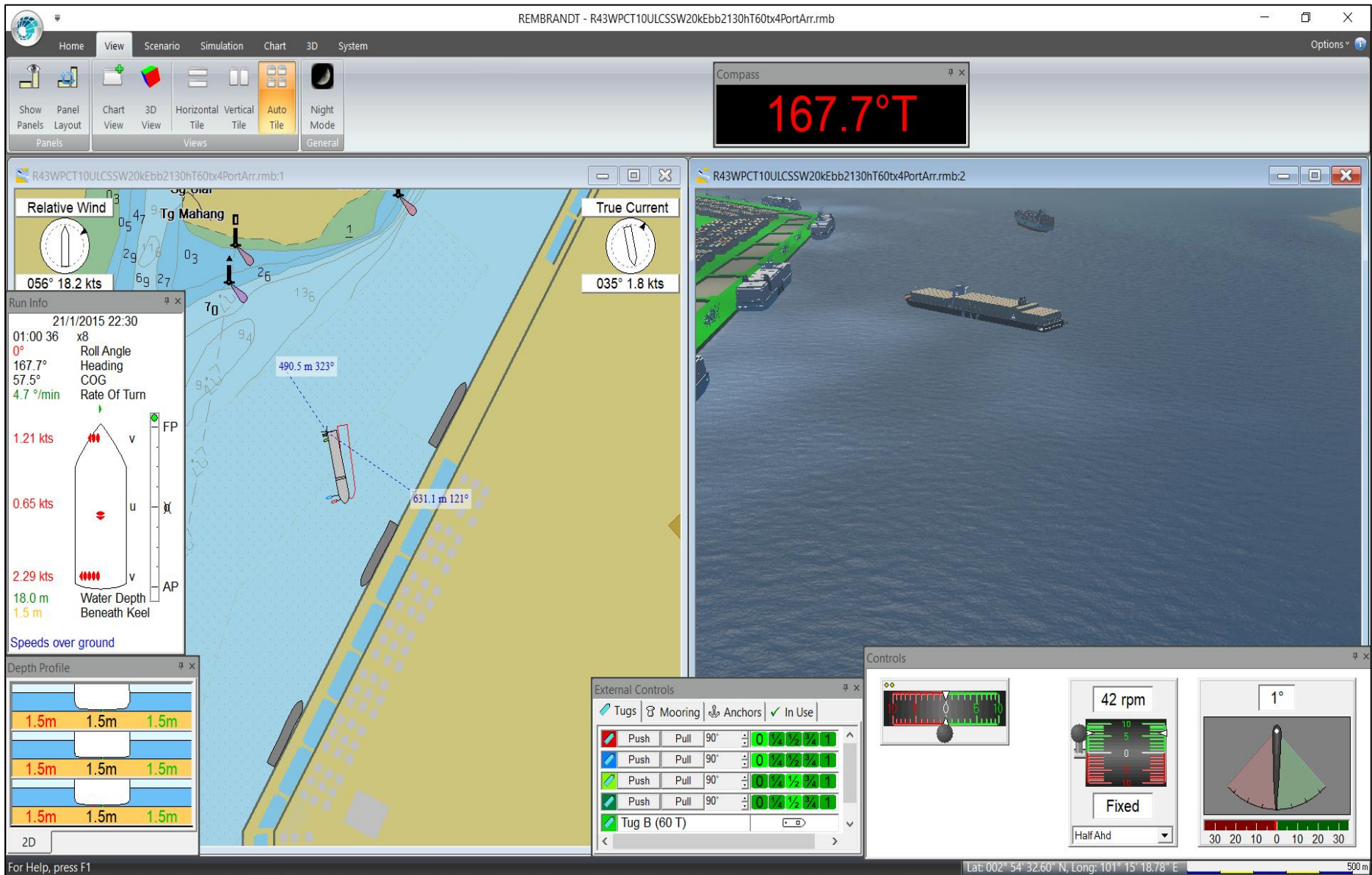








Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
43	R43WPCT10SW20 kEbb2130hT60tx4P ortArr.rmb	Ebb (2130h)	SW 20 k	Arrival (Port a/s)	F: 60t x 2 A: 60t x 2	The vessel entered the channel at over 12 knots. She was then slowed down tugs made fast. After she moved out of the channel off CT-13, the astern engine was given to stop her before swinging to starboard. She was then backed to her berth and pushed alongside. The tugs operated at a maximum of Half Power. Minimum available channel clearance: 490m	4/6



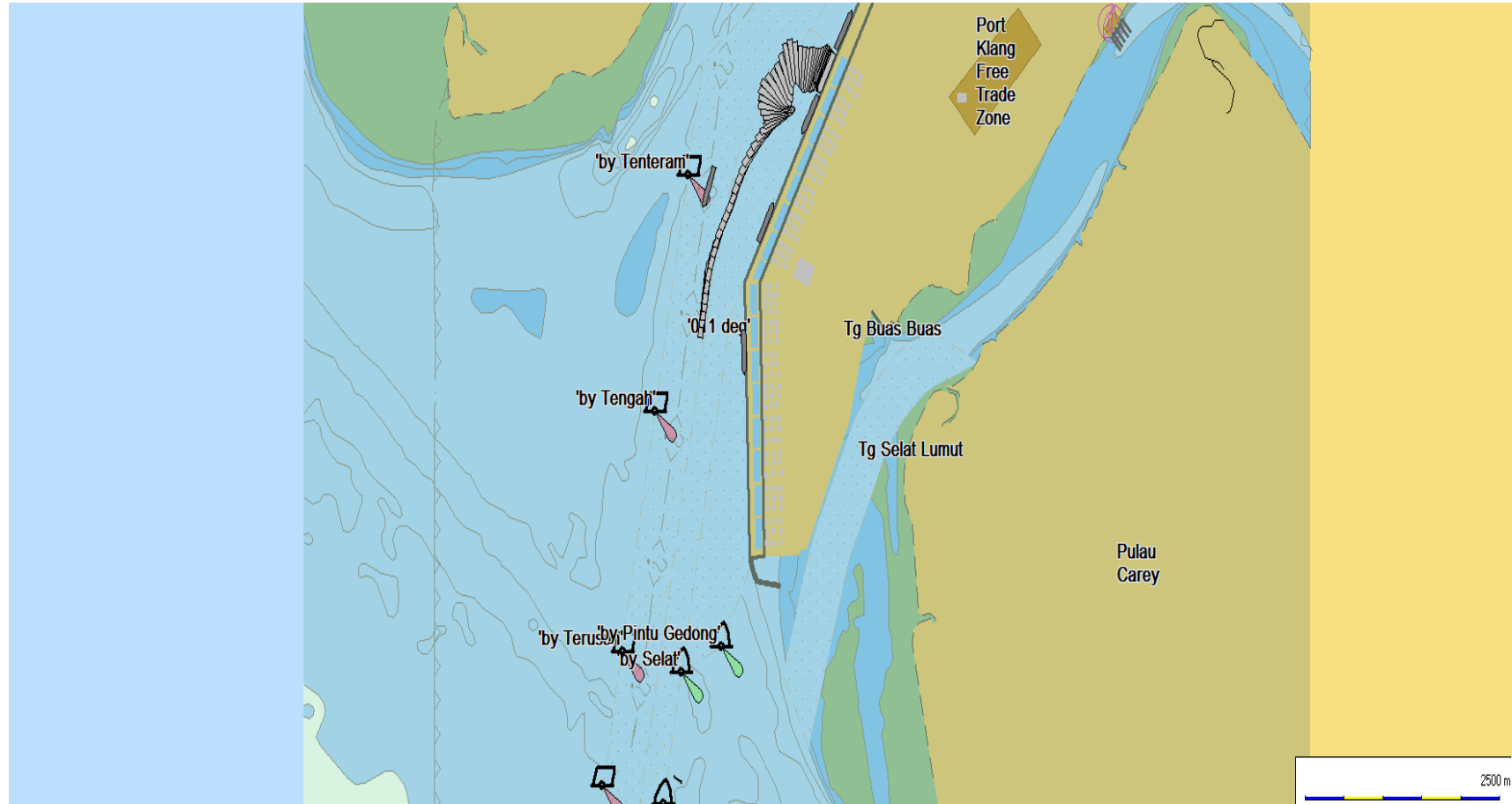
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 6/6/2019 14:50

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

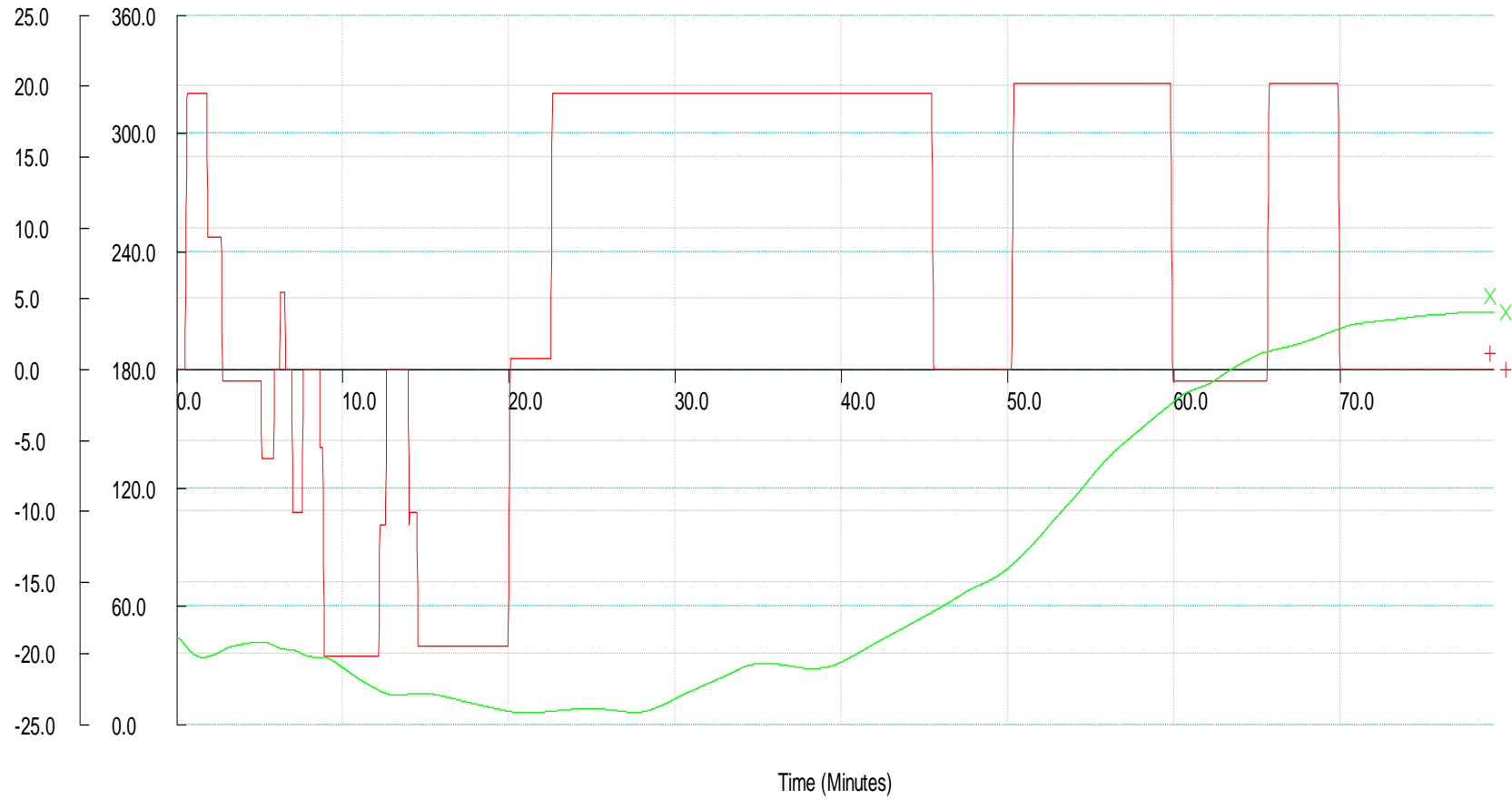
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 6/6/2019 14:50

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

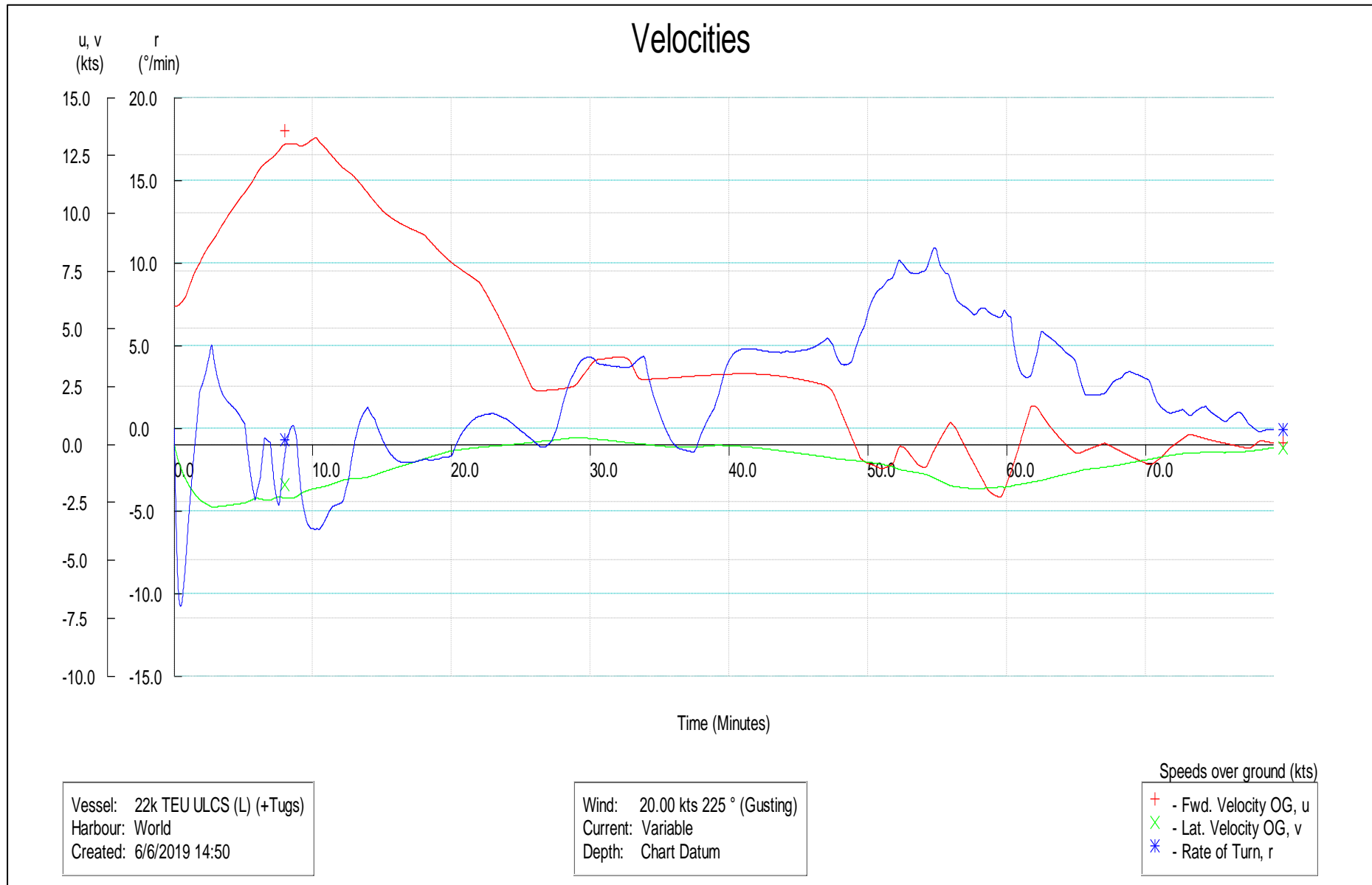
Heading and Rudder

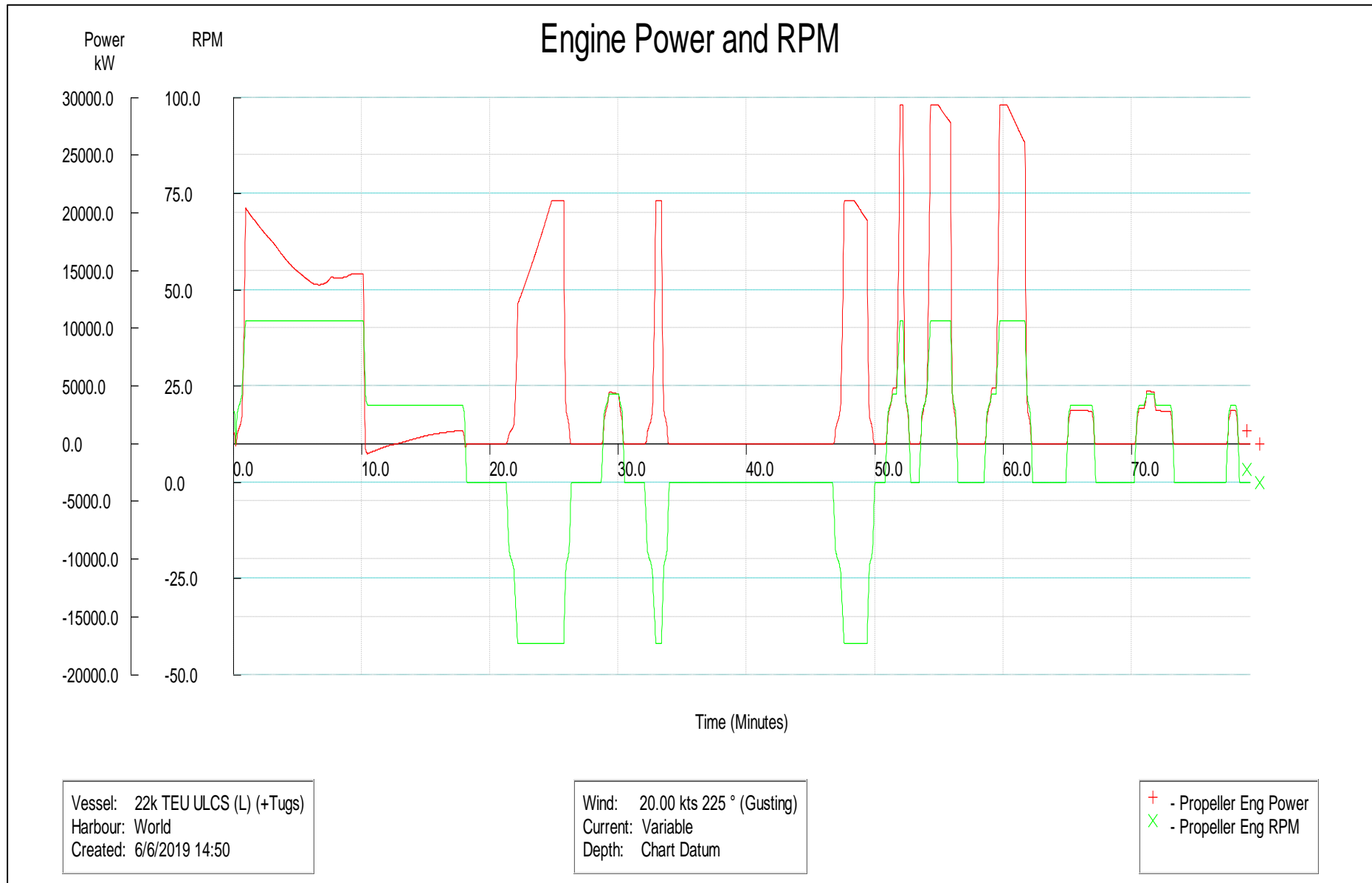


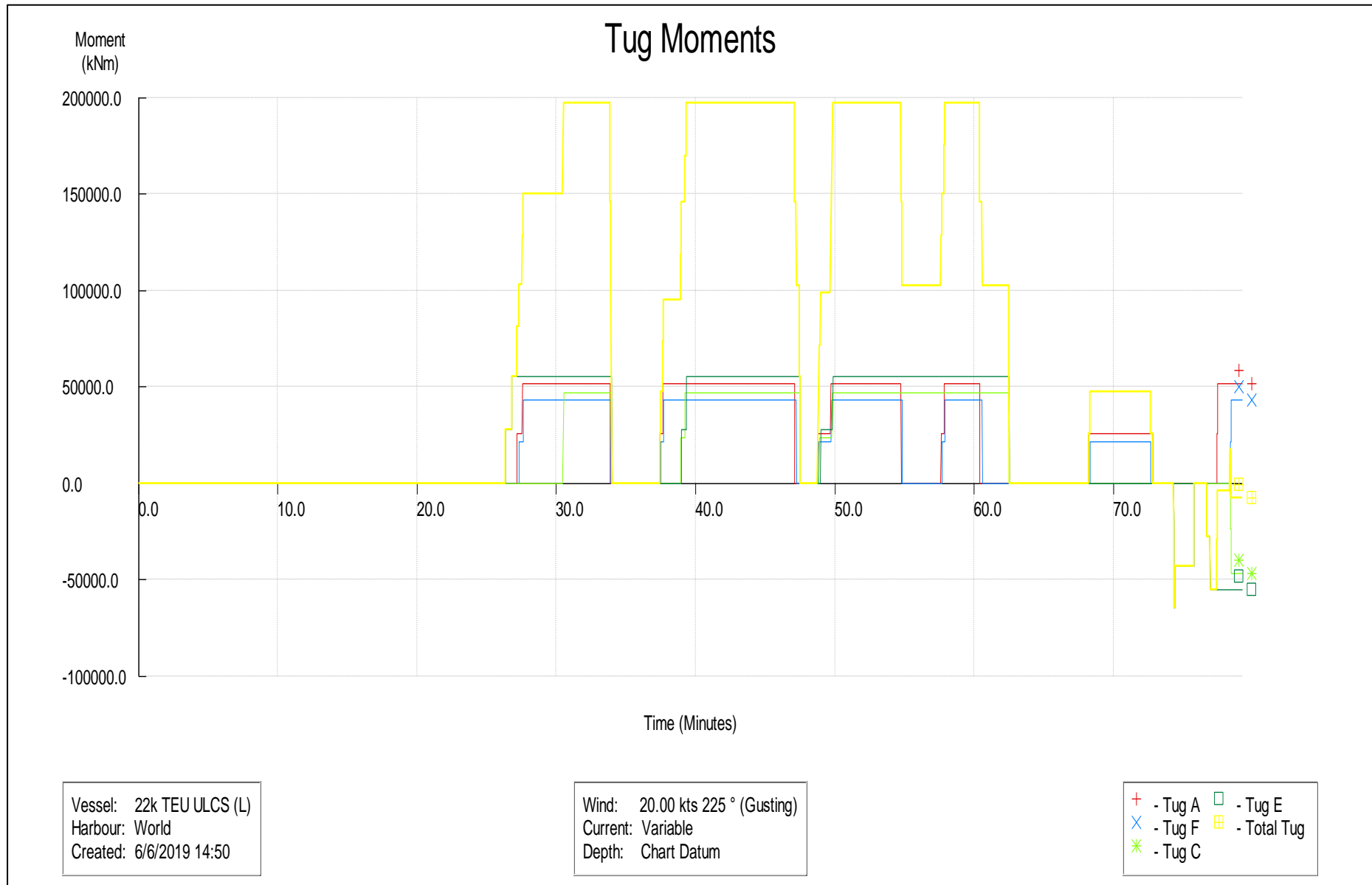
Vessel: 22k TEU ULCS (L) (+Tugs)
 Harbour: World
 Created: 6/6/2019 14:50

Wind: 20.00 kts 225 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

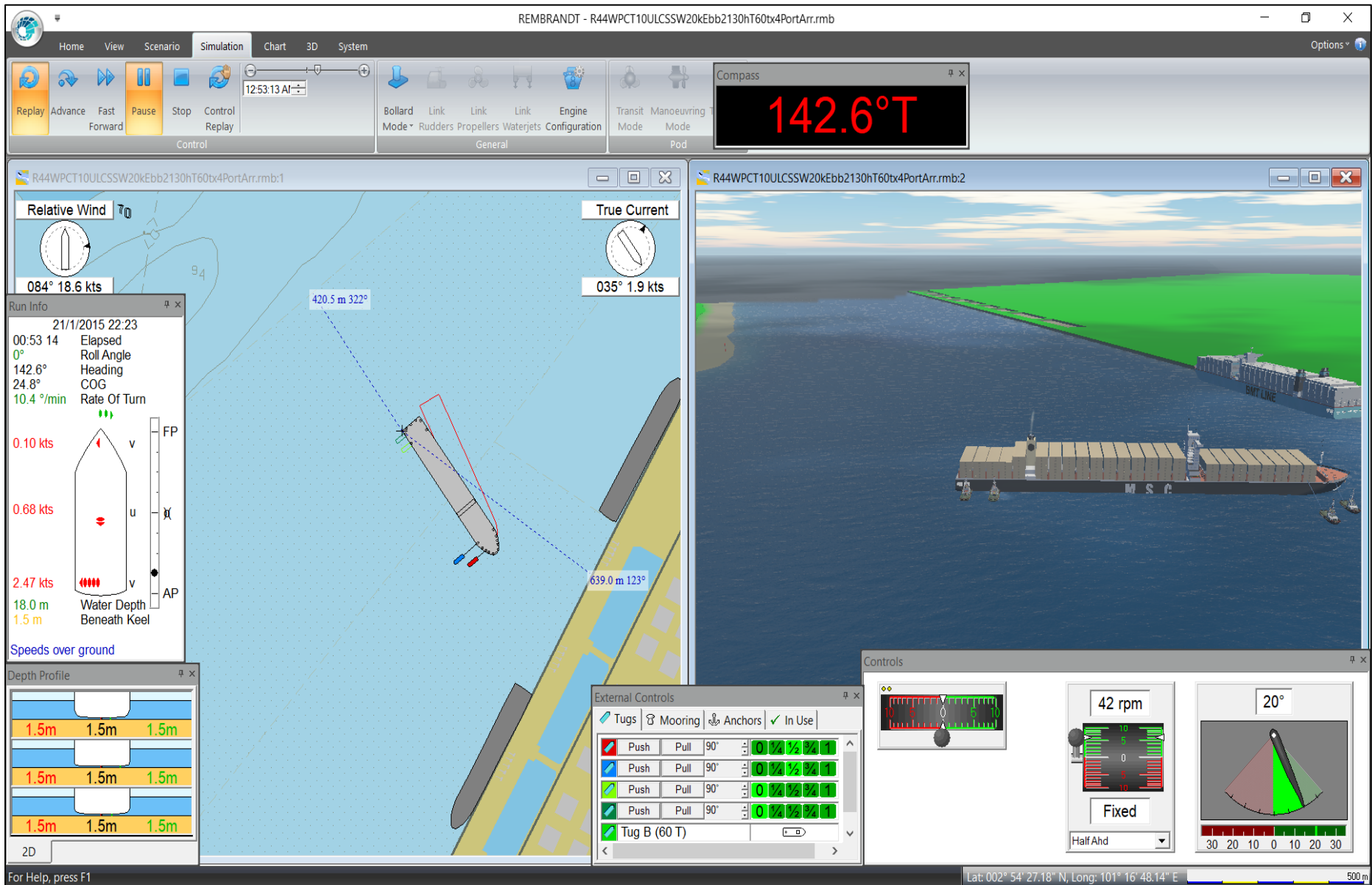
+ - Rudder Rud (°)
 x - Heading







Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
44	R44WPCT10SW20 kEbb2130hT60tx4P ortArr.rmb	Ebb (2130h)	SW 20 k	Arrival (Port a/s)	F: 60t x 2 A: 60t x 2	<p>The vessel entered the channel at over 12 knots. She was then slowed down tugs made fast. After she moved out of the channel off CT-13, the astern engine was given to stop her before swinging to starboard. After swinging $\frac{3}{4}$ of the way to starboard, she was too close to the vessel at Berth CT-9. She was then backed to clear the other vessel and to stem the current before resuming her approach to the berth. When off the berth, she was pushed alongside. The tugs had to work at a maximum of $\frac{3}{4}$ Power to hold her against the wind in the final stage of berthing.</p> <p>Minimum available channel clearance: 490m</p>	4/6



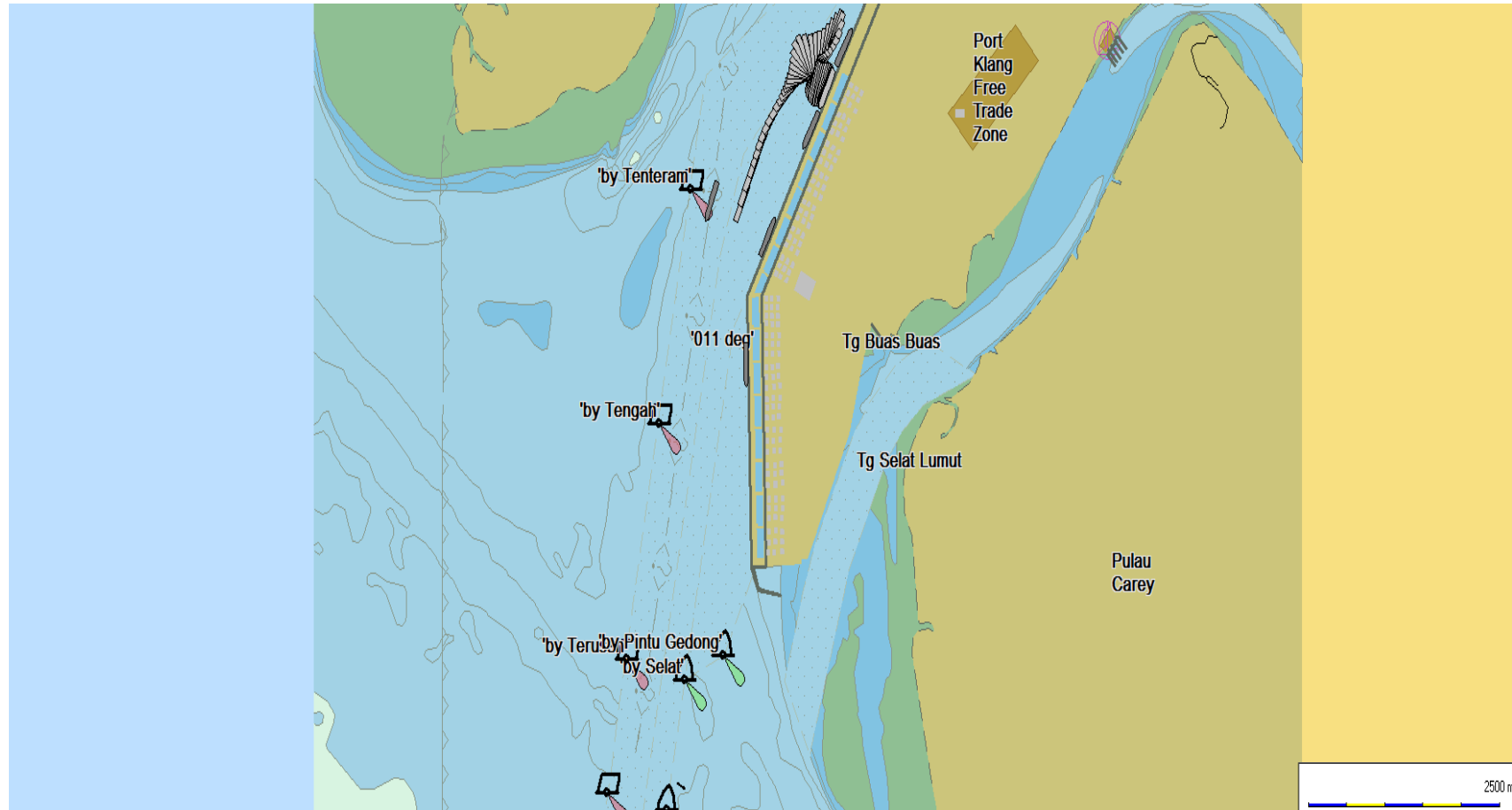
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 12/6/2019 07:41

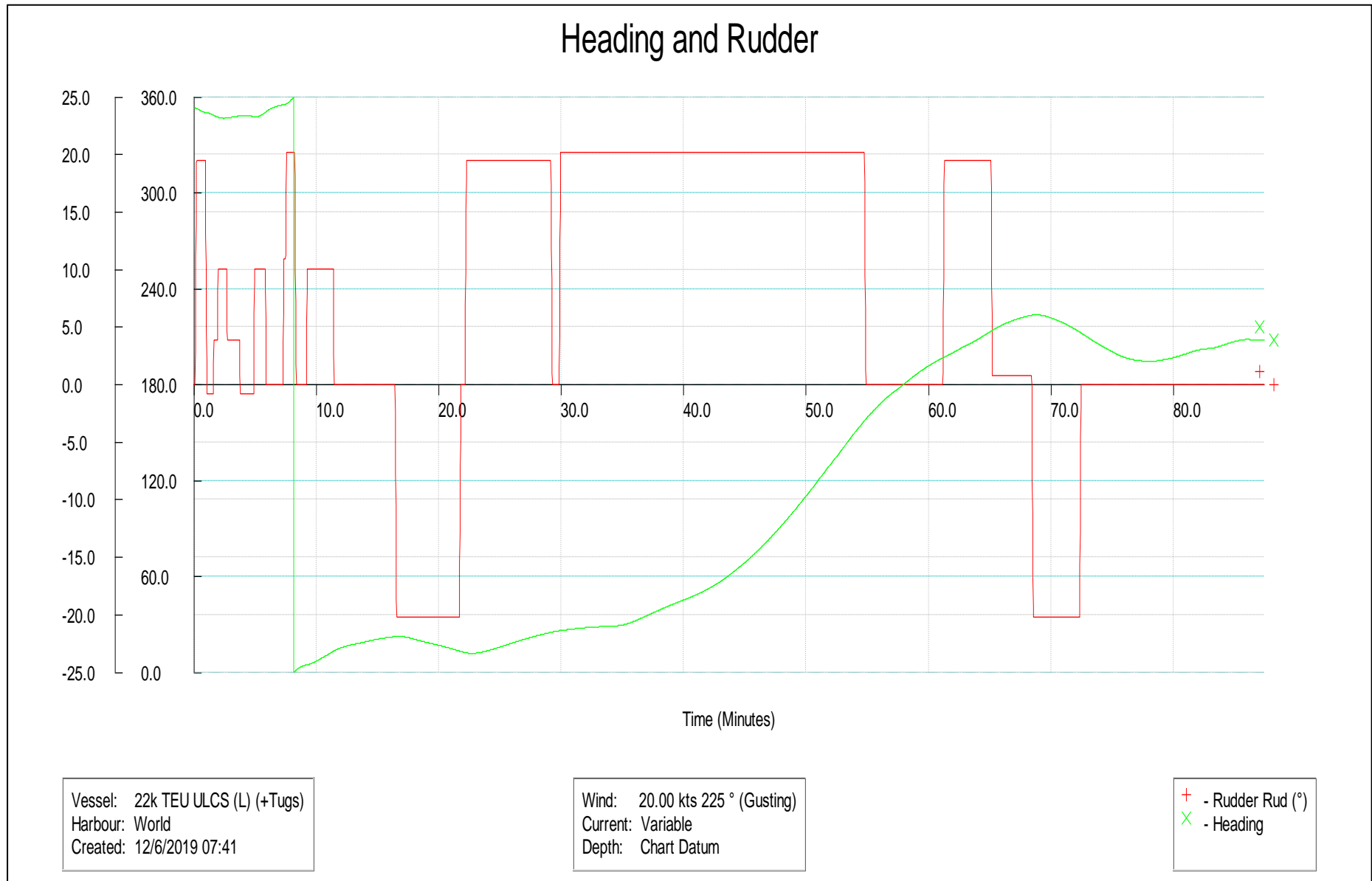
Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

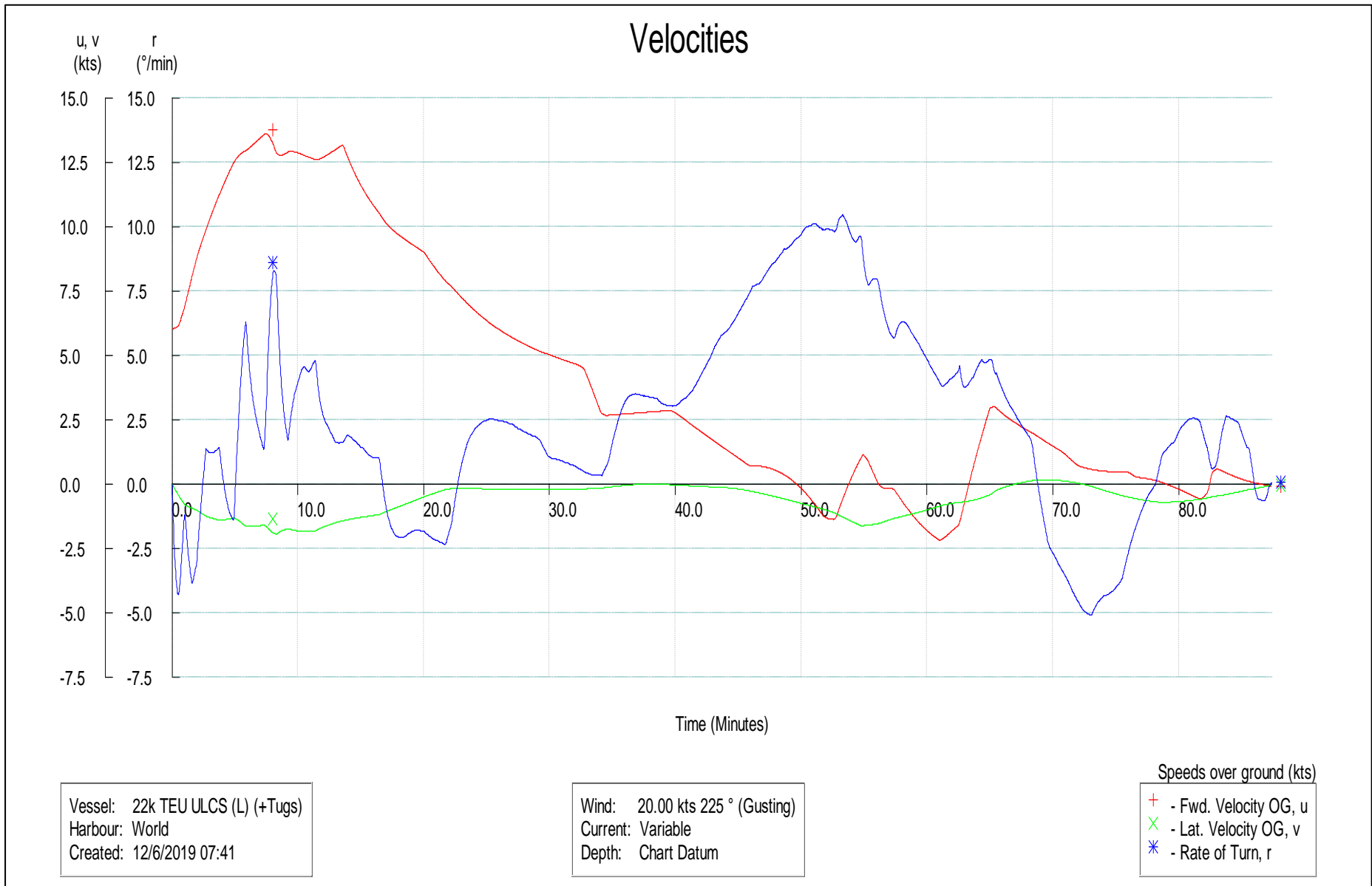
Vessel Track



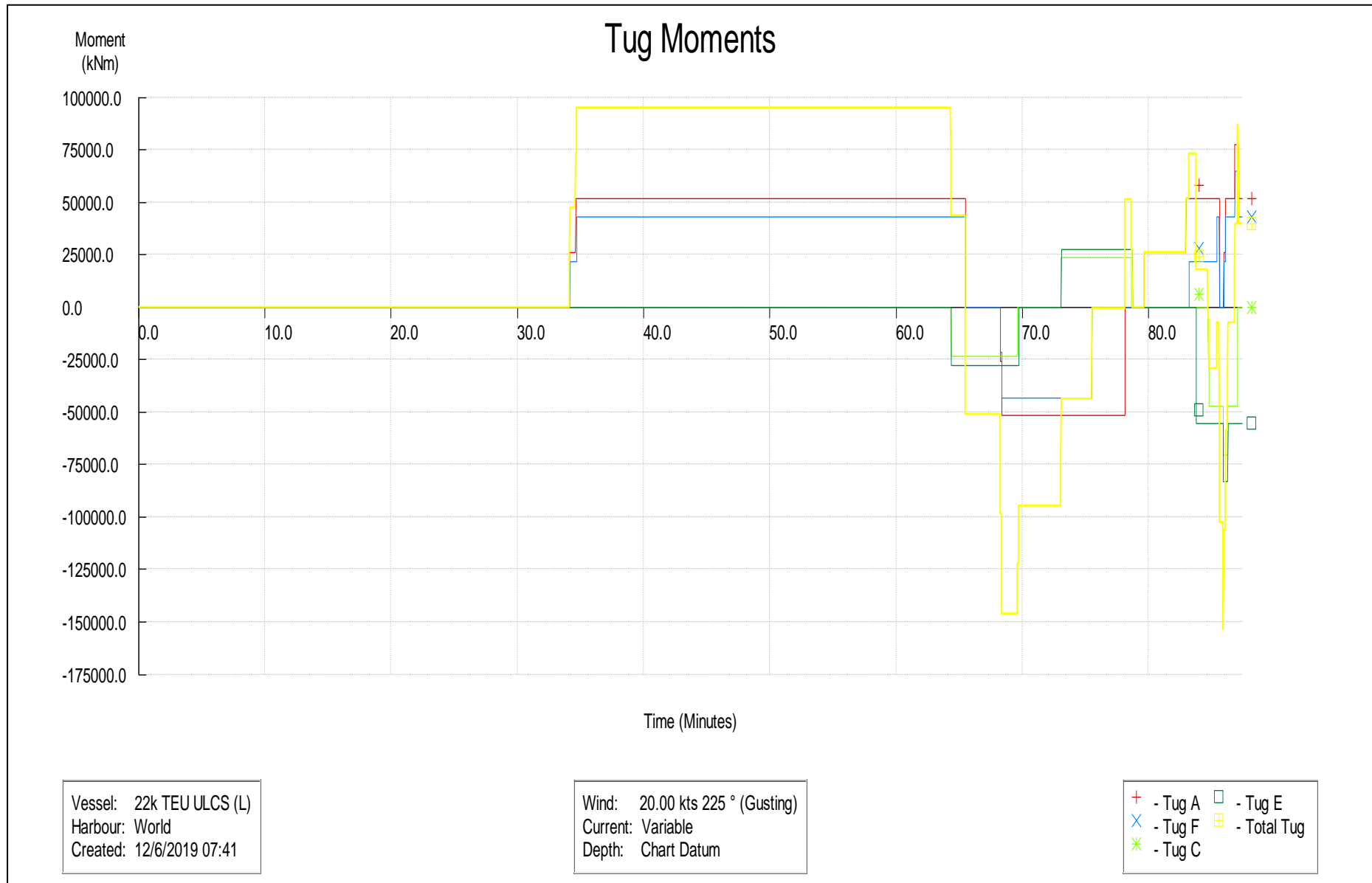
Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 12/6/2019 07:41

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

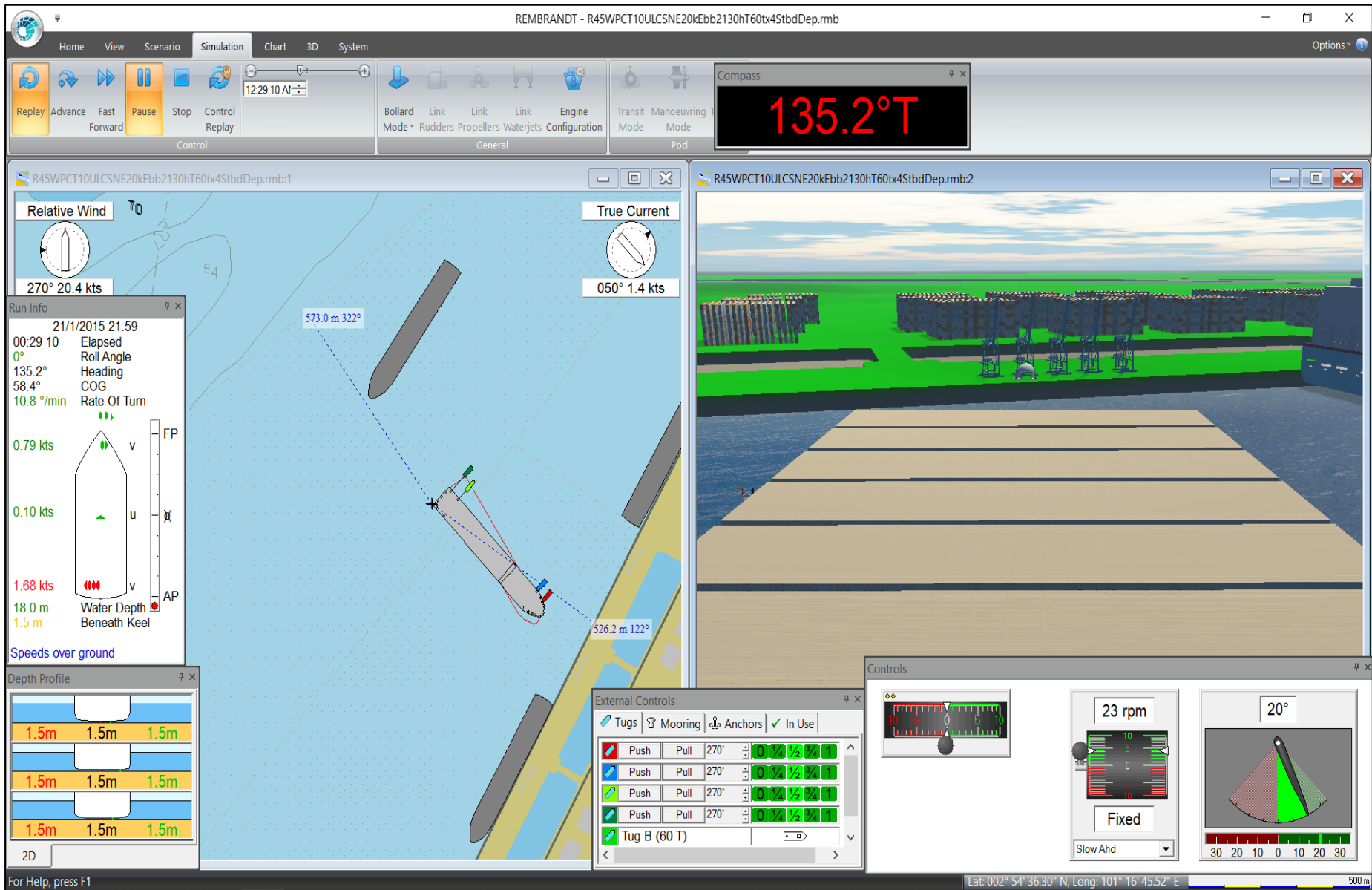








Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
45	R45WPCT10NE20 kEbb2130hT60x4S tbdDep.rmb	Ebb (2130h)	NE 20 k	Departure (Stbd a/s)	F: 60t x 2 A: 60t x 2	The vessel was pulled off the berth using four 60 tons bollard pull tugs. She was swung to starboard off the berth. The tugs were then cast off and the vessel proceeded to sea. All tugs operated at a maximum of Half Power. Minimum available channel clearance: 570m	4/6



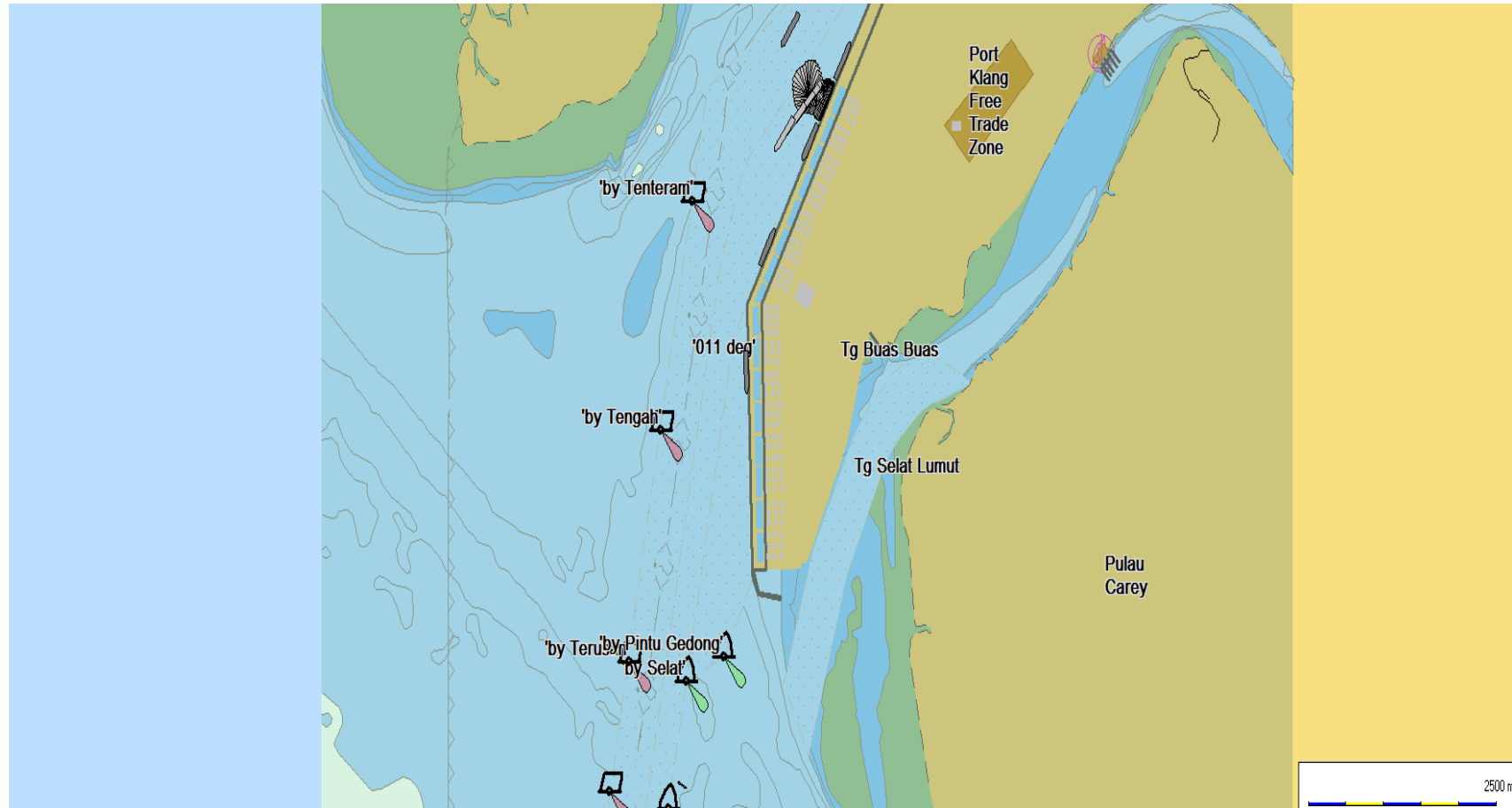
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 9/6/2019 14:02

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

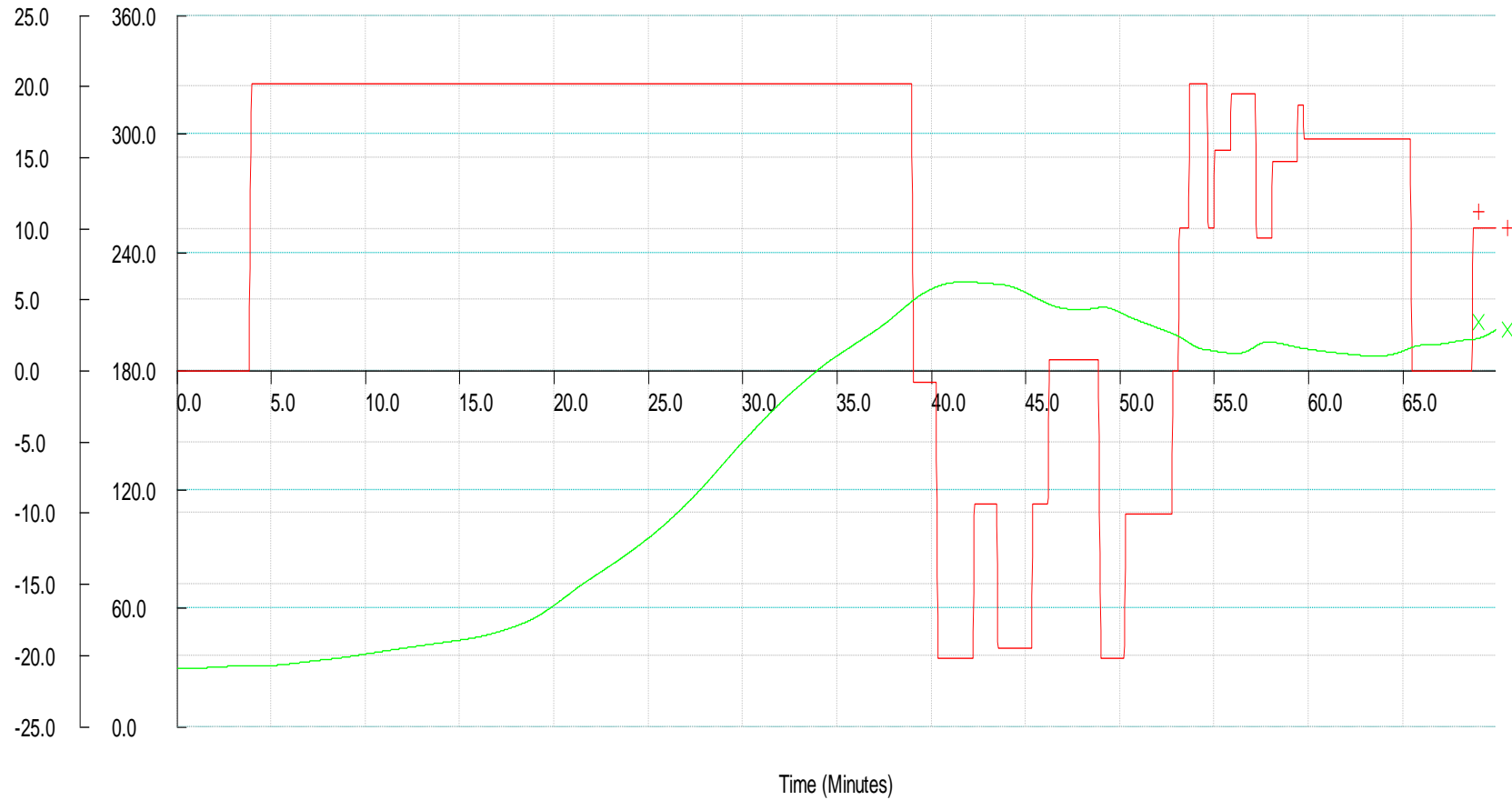
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 9/6/2019 14:02

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

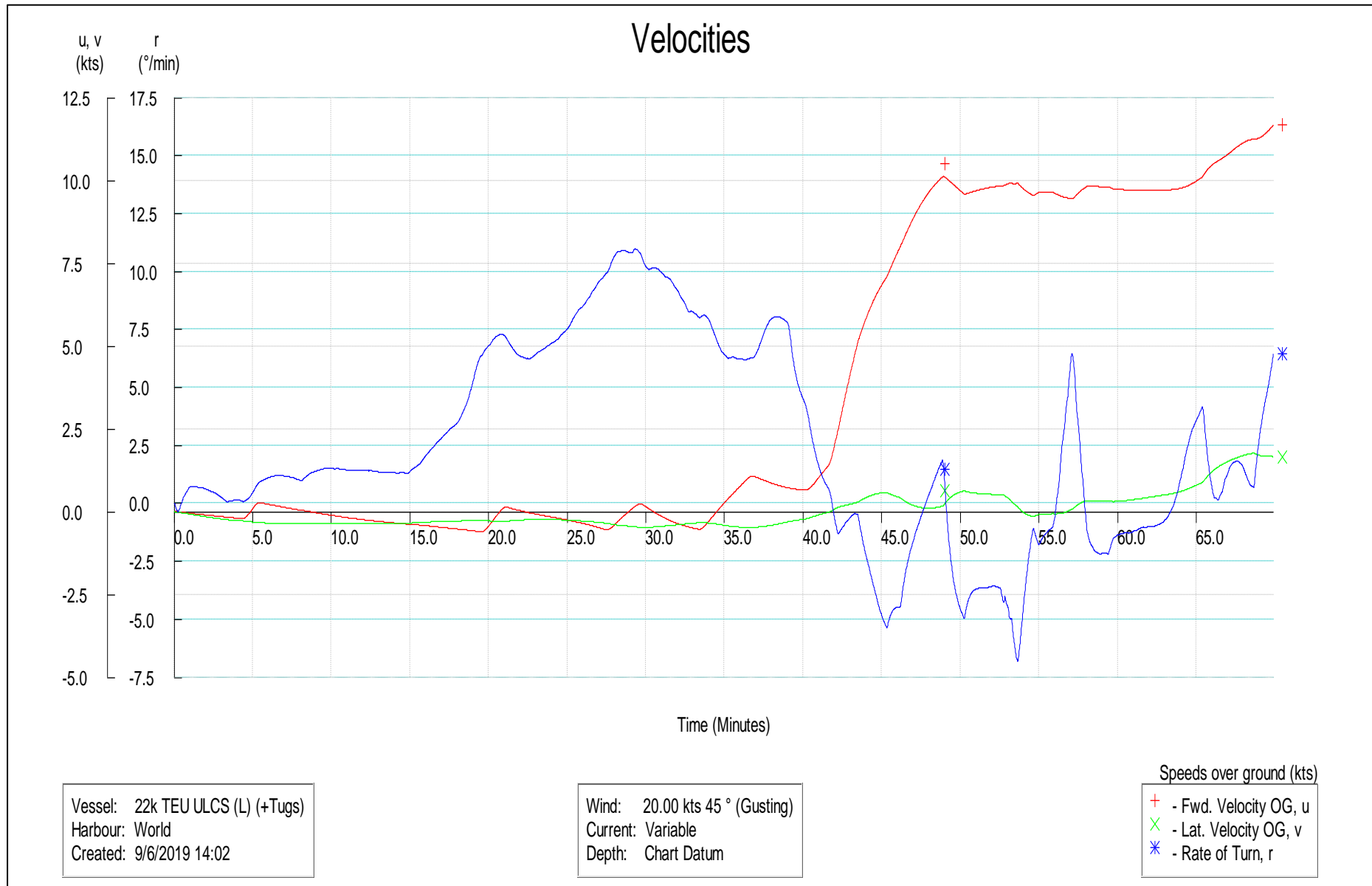
Heading and Rudder

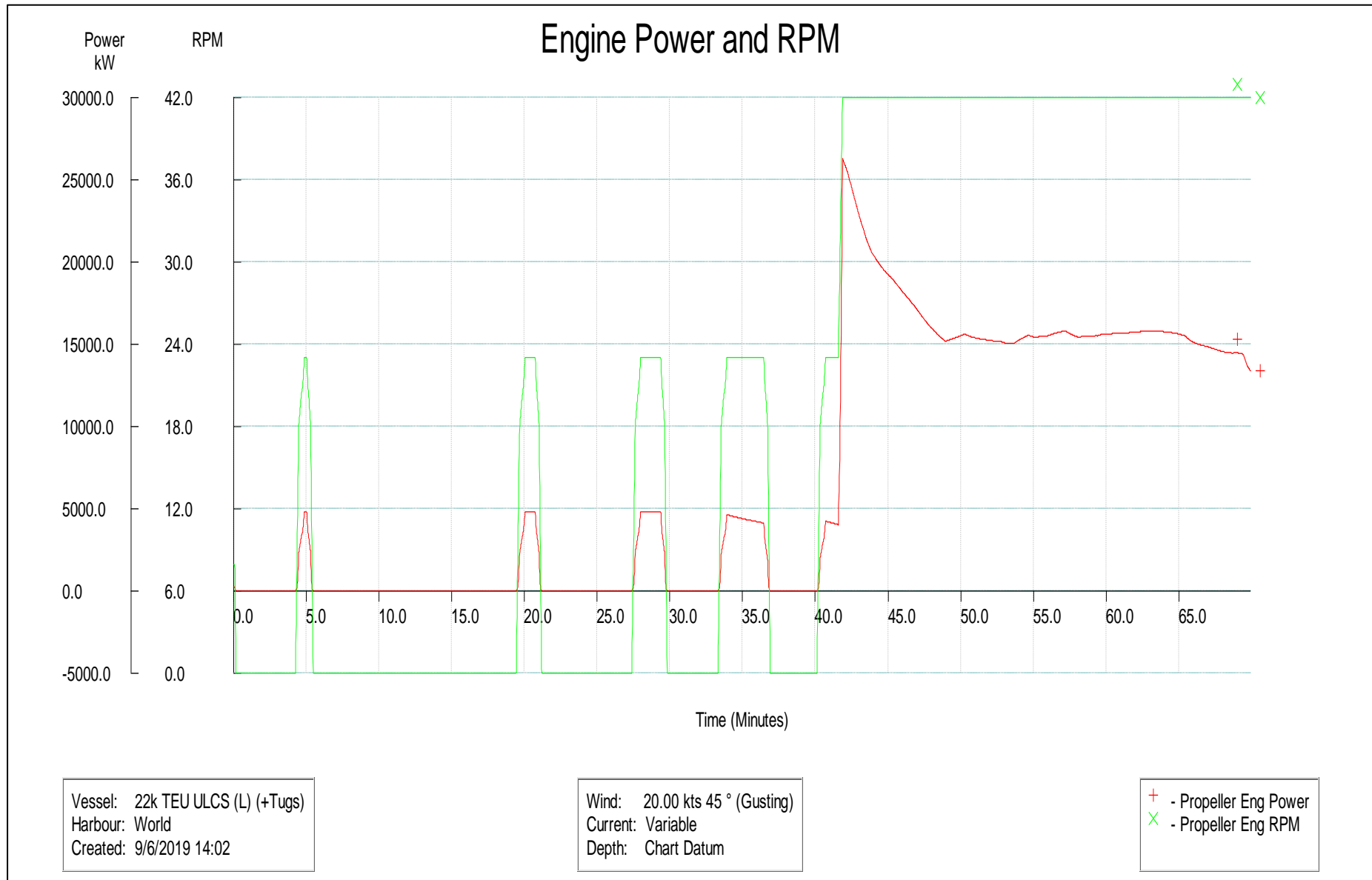


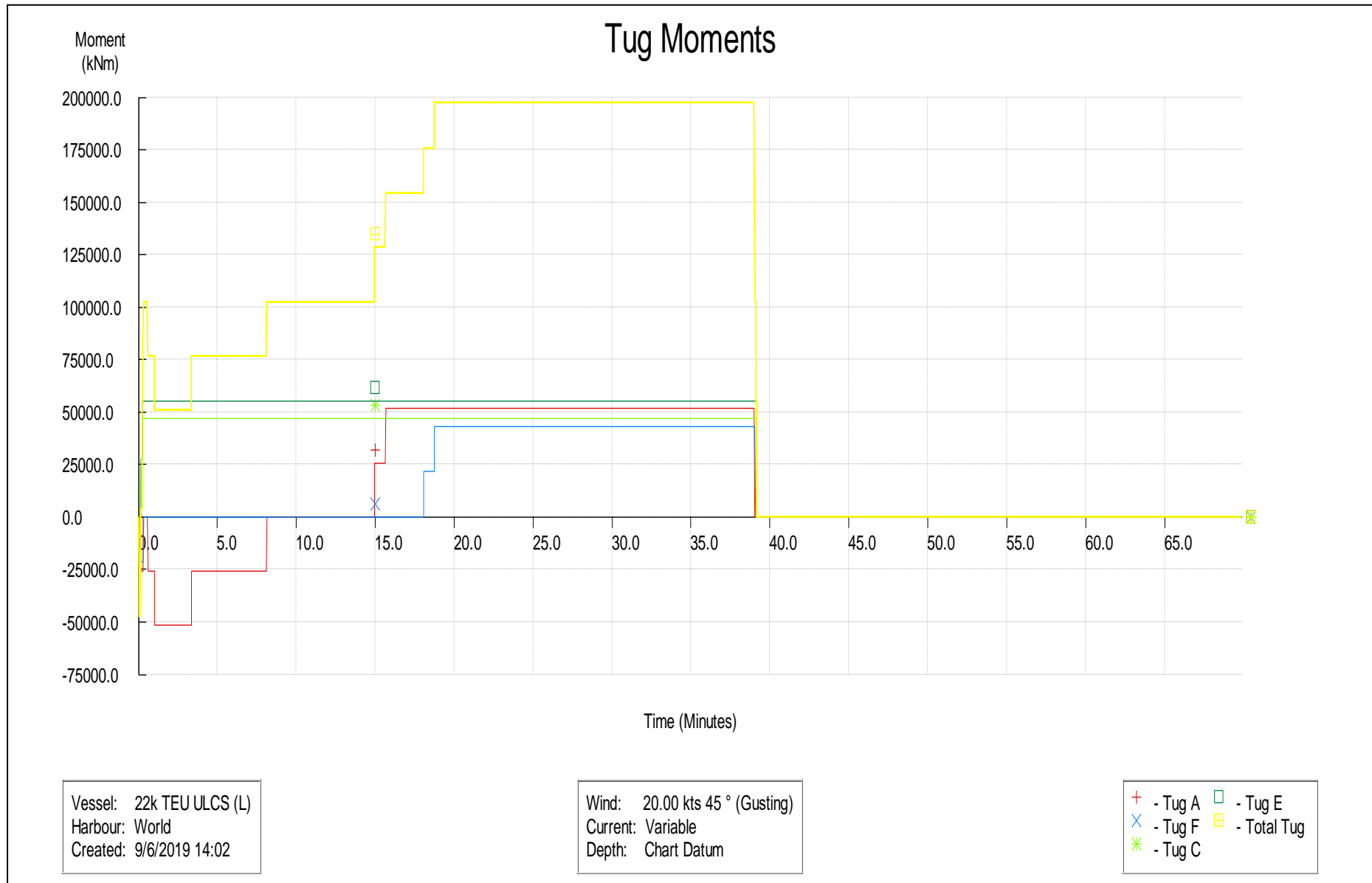
Vessel: 22k TEU ULCS (L) (+Tugs)
 Harbour: World
 Created: 9/6/2019 14:02

Wind: 20.00 kts 45 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

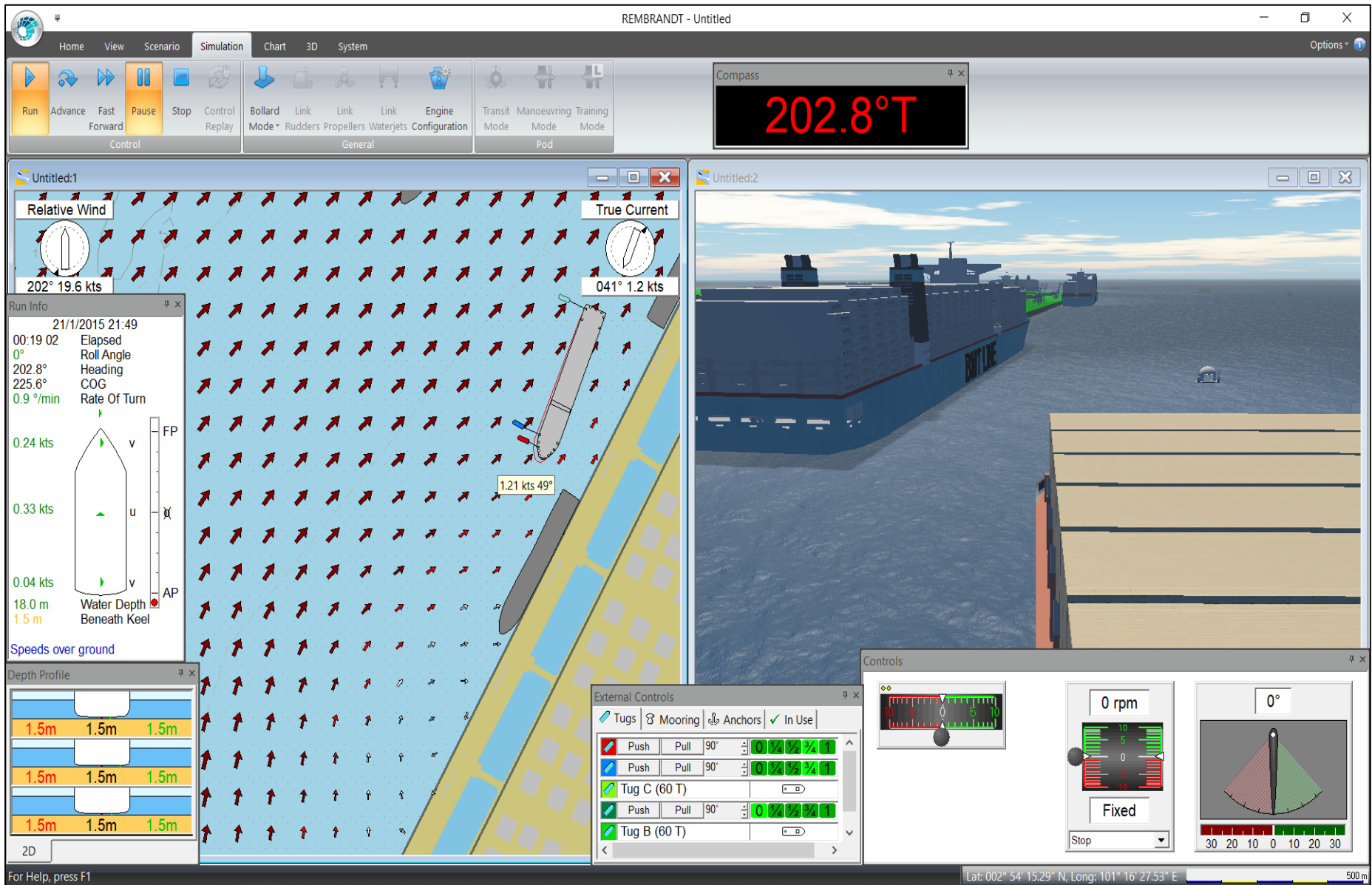
+ - Rudder Rud (°)
 X - Heading







Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
46	R46WPCT10NE20 kEbb2130hT60tx4P ortDep.rmb	Ebb (2130h)	NE 20 k	Departure (Port a/s)	F: 60t x 2 A: 60t x 2	The vessel was pulled off the berth using four 60 tons bollard pull tugs. There was difficulty in pulling the bow off the berth with the current pressing on the starboard side and the two forward tugs had to operate at $\frac{3}{4}$ Power. After releasing the tugs the vessel proceeded to sea keeping port helm regularly to counter the current pushing on the port bow.	4/6



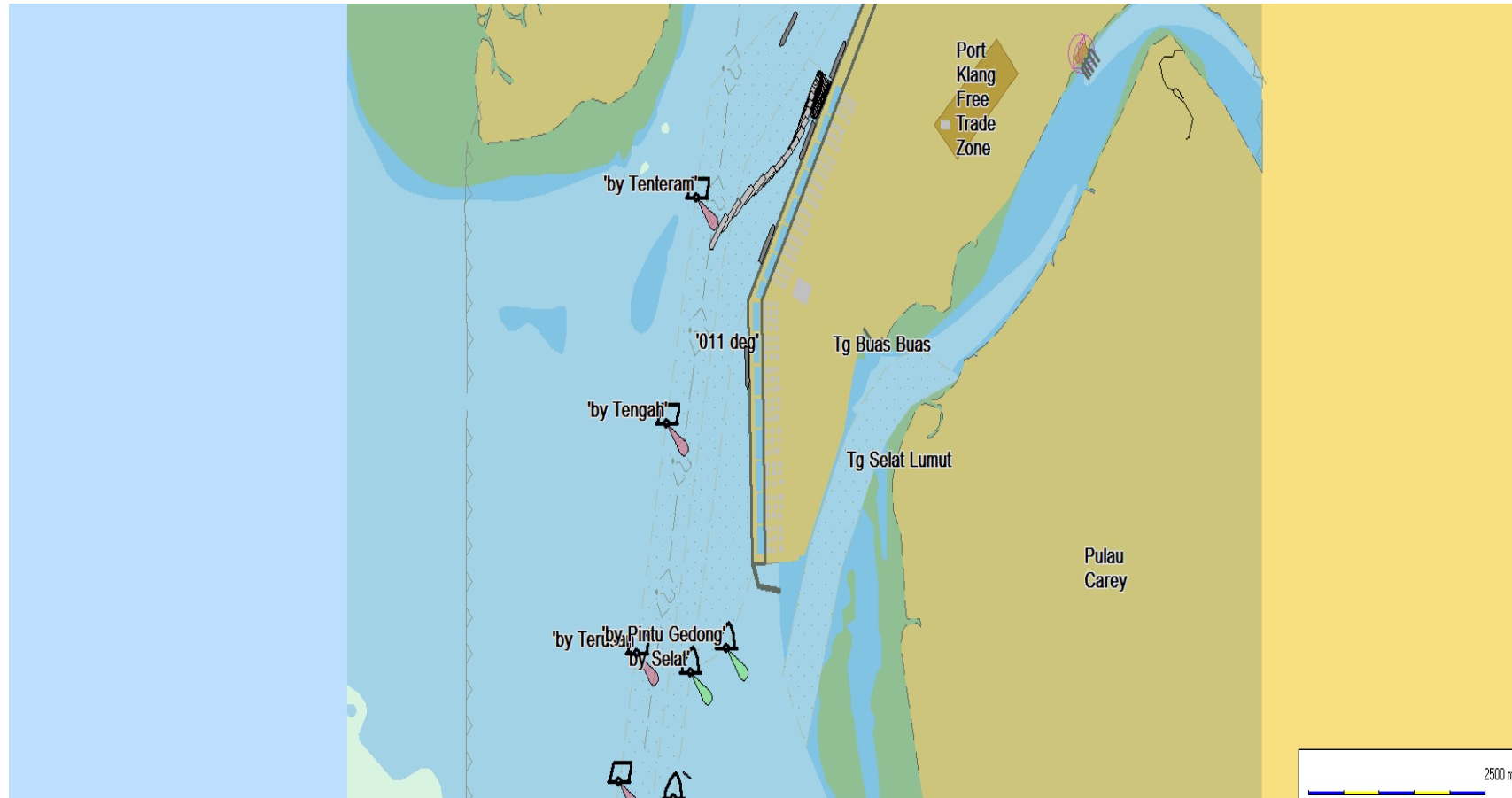
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 12/6/2019 13:20

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

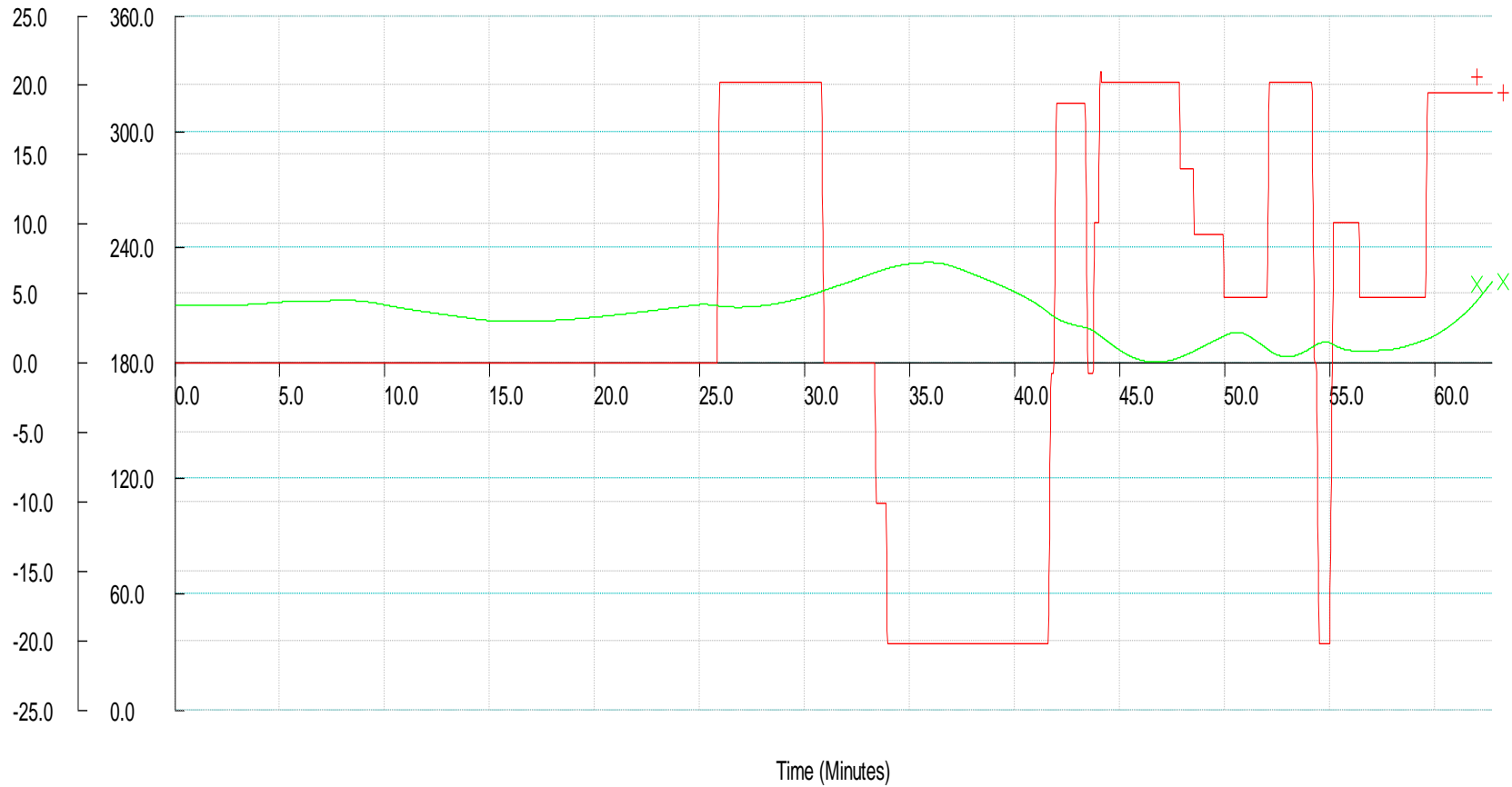
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 12/6/2019 13:20

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

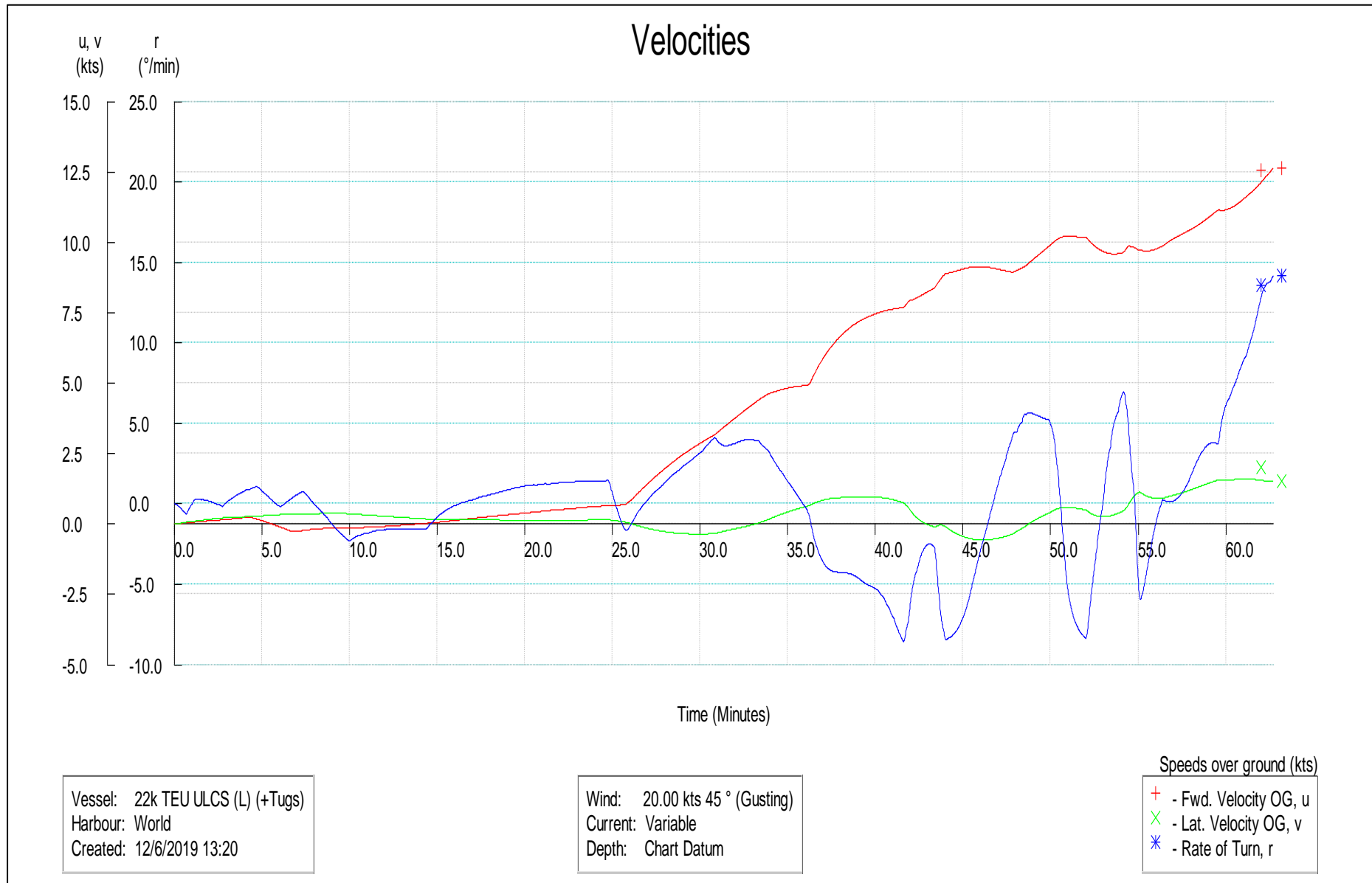
Heading and Rudder

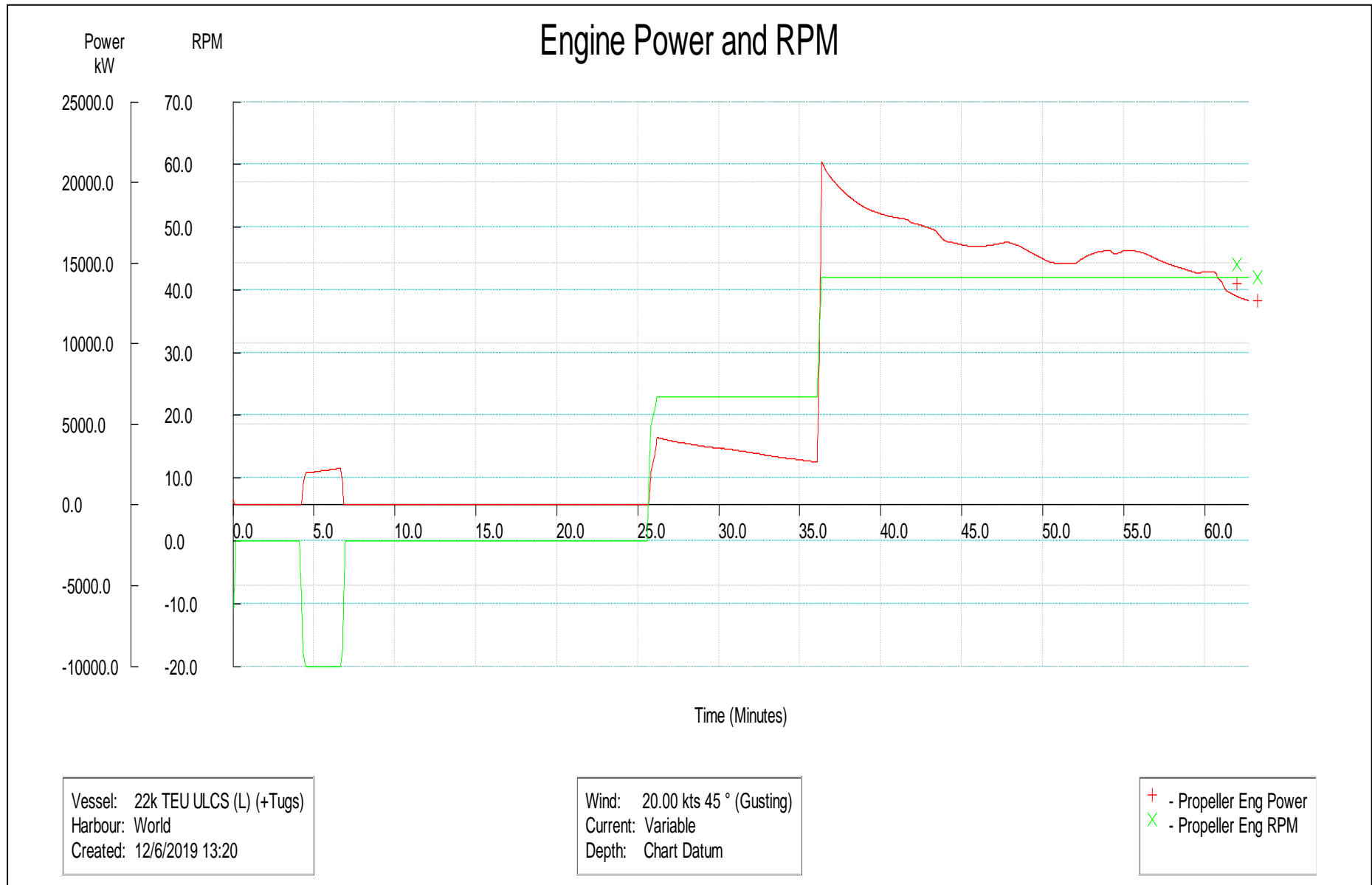


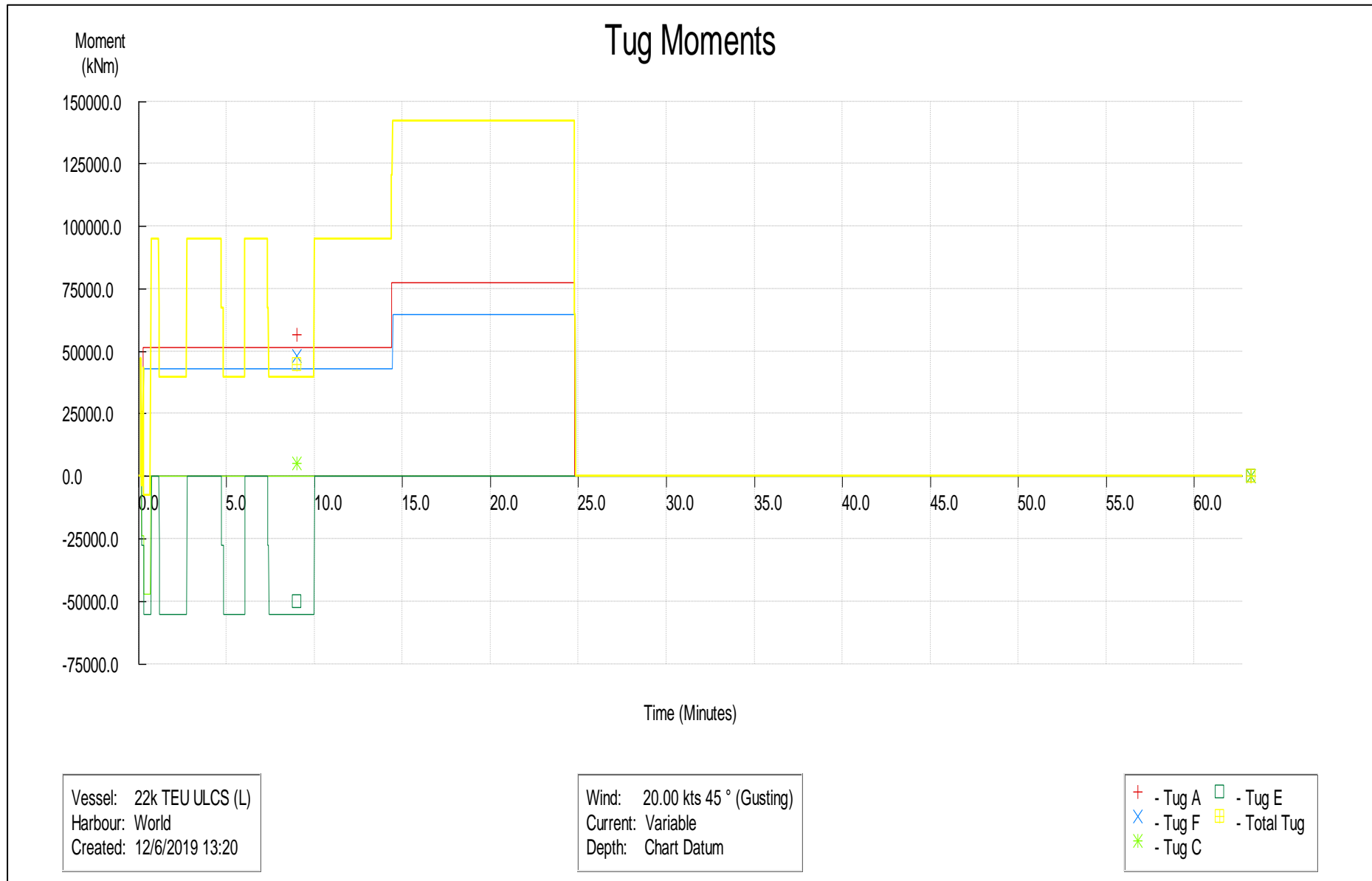
Vessel: 22k TEU ULCS (L) (+Tugs)
 Harbour: World
 Created: 12/6/2019 13:20

Wind: 20.00 kts 45° (Gusting)
 Current: Variable
 Depth: Chart Datum

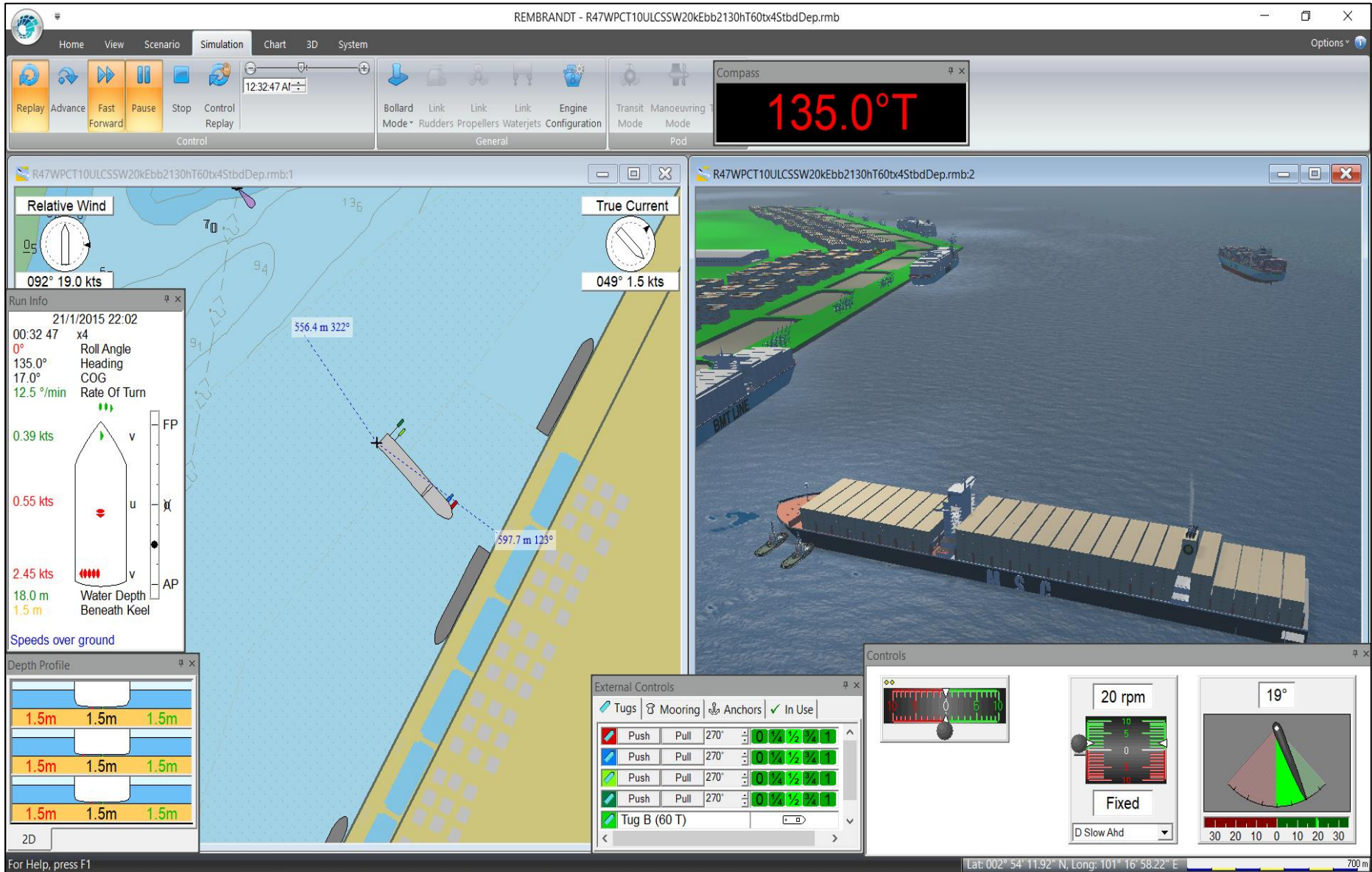
+ - Rudder Rud (°)
 x - Heading







Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
47	R47WPCT10SW20 kEbb2130hT60tx4S tbdDep.rmb	Ebb (2130h)	SW 20 k	Departure (Stbd a/s)	F: 60t x 2 A: 60t x 2	The vessel was pulled off the berth using four 60 tons bollard pull tugs. When off the berth, she was backed and swung to starboard. The tugs were then cast off and the vessel proceeded to sea. All tugs operated at a maximum of Half Power. Minimum available channel clearance: 555m	4/6



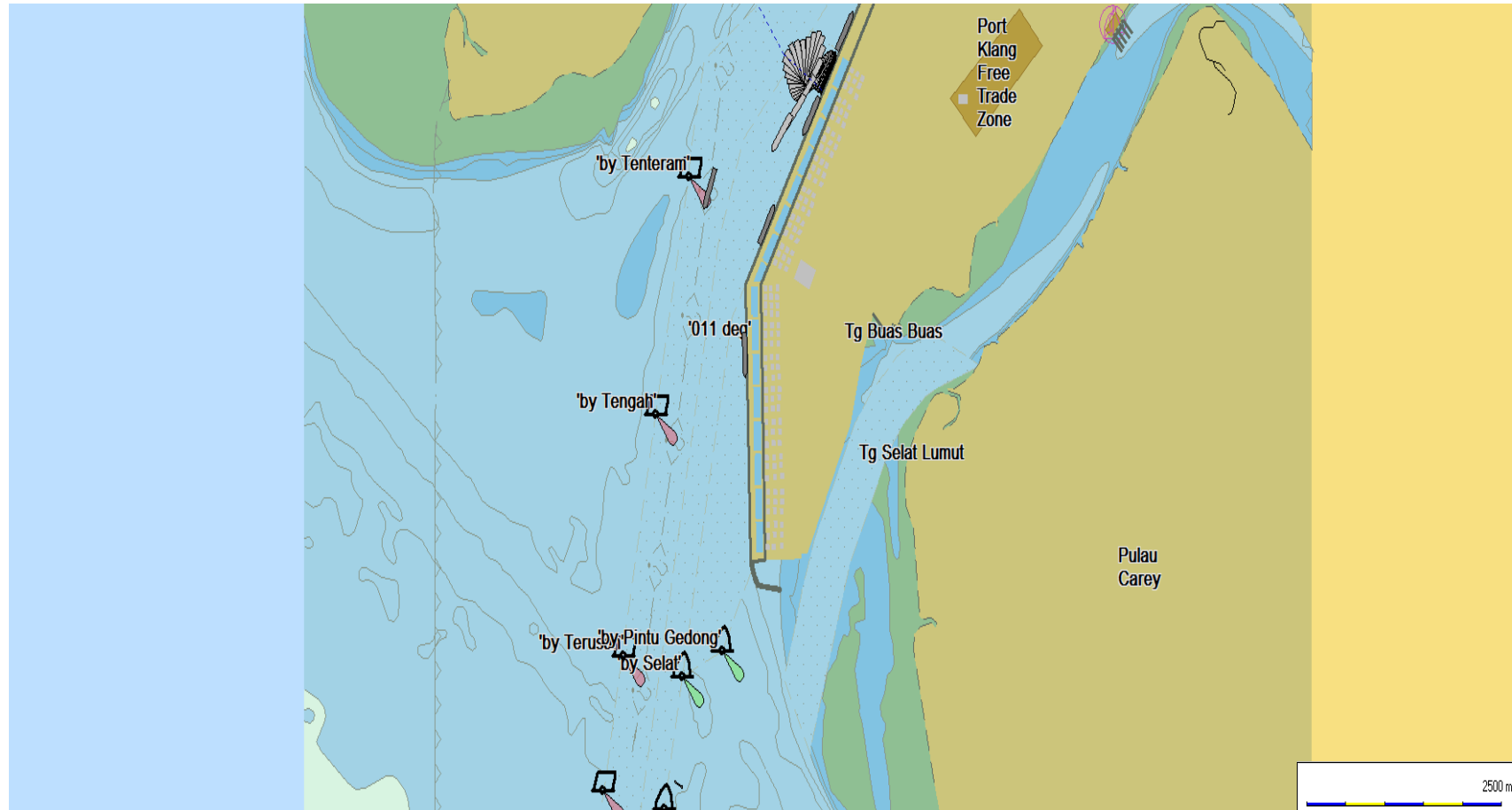
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 6/6/2019 06:28

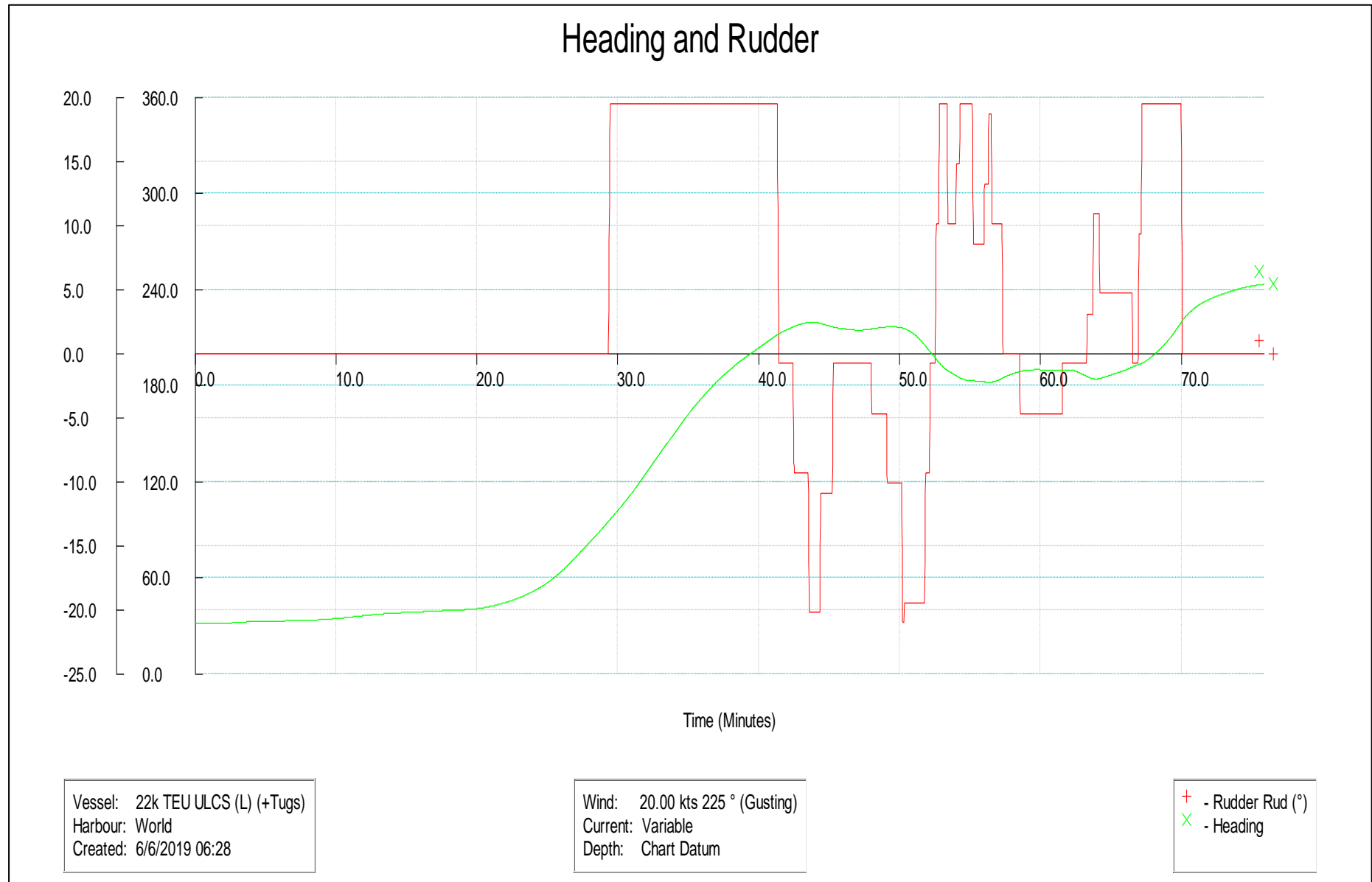
Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

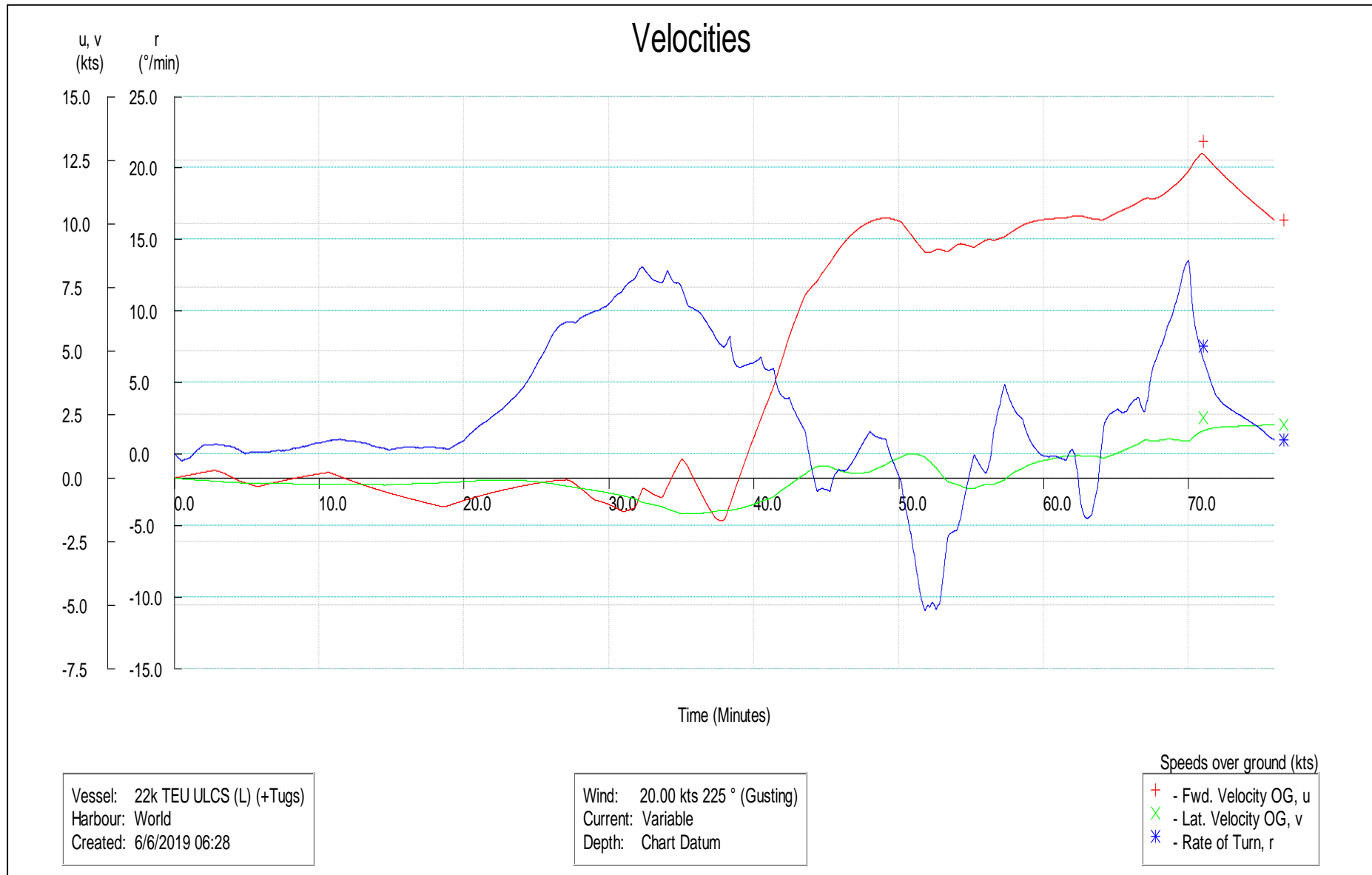
Vessel Track

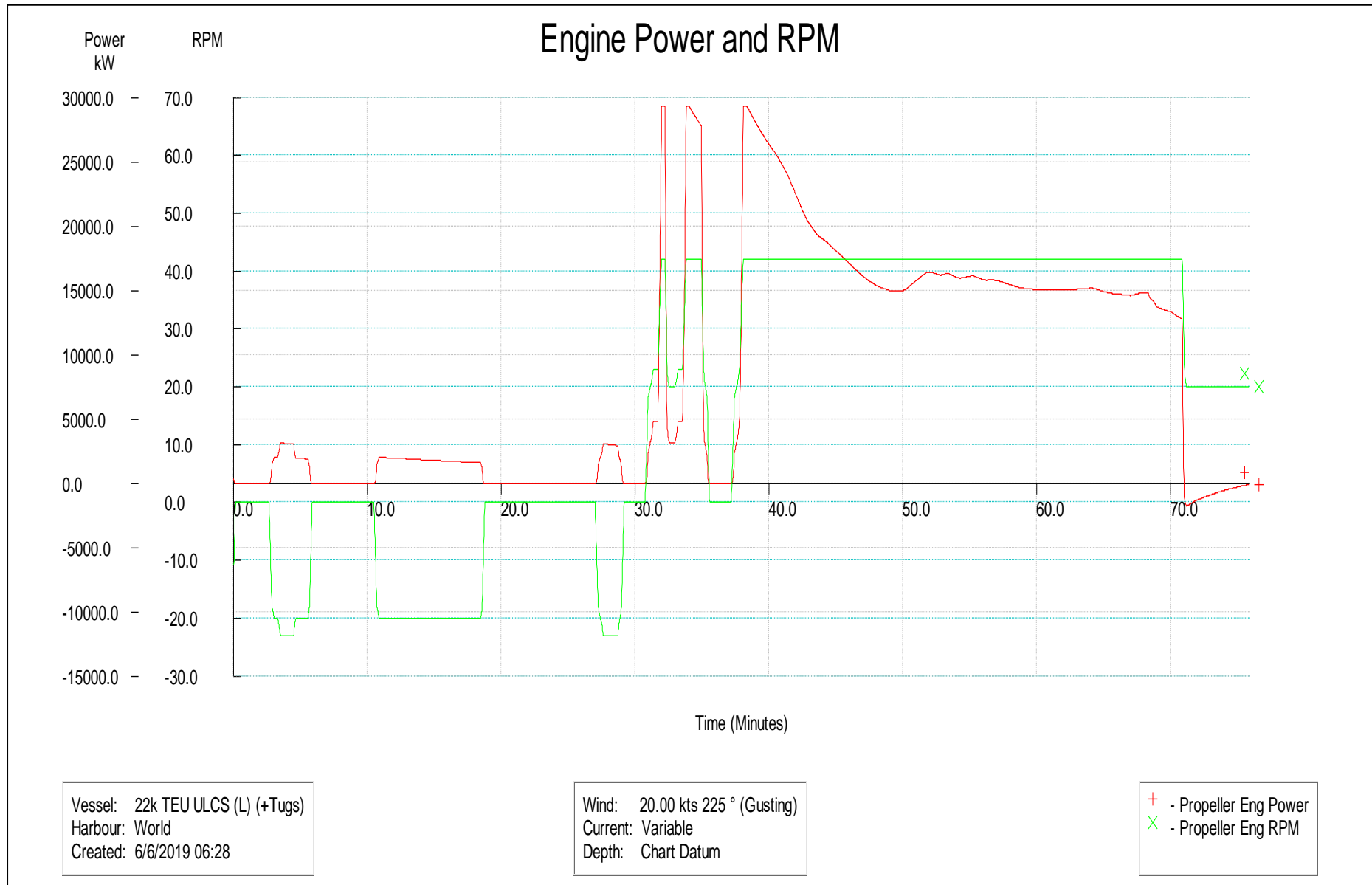


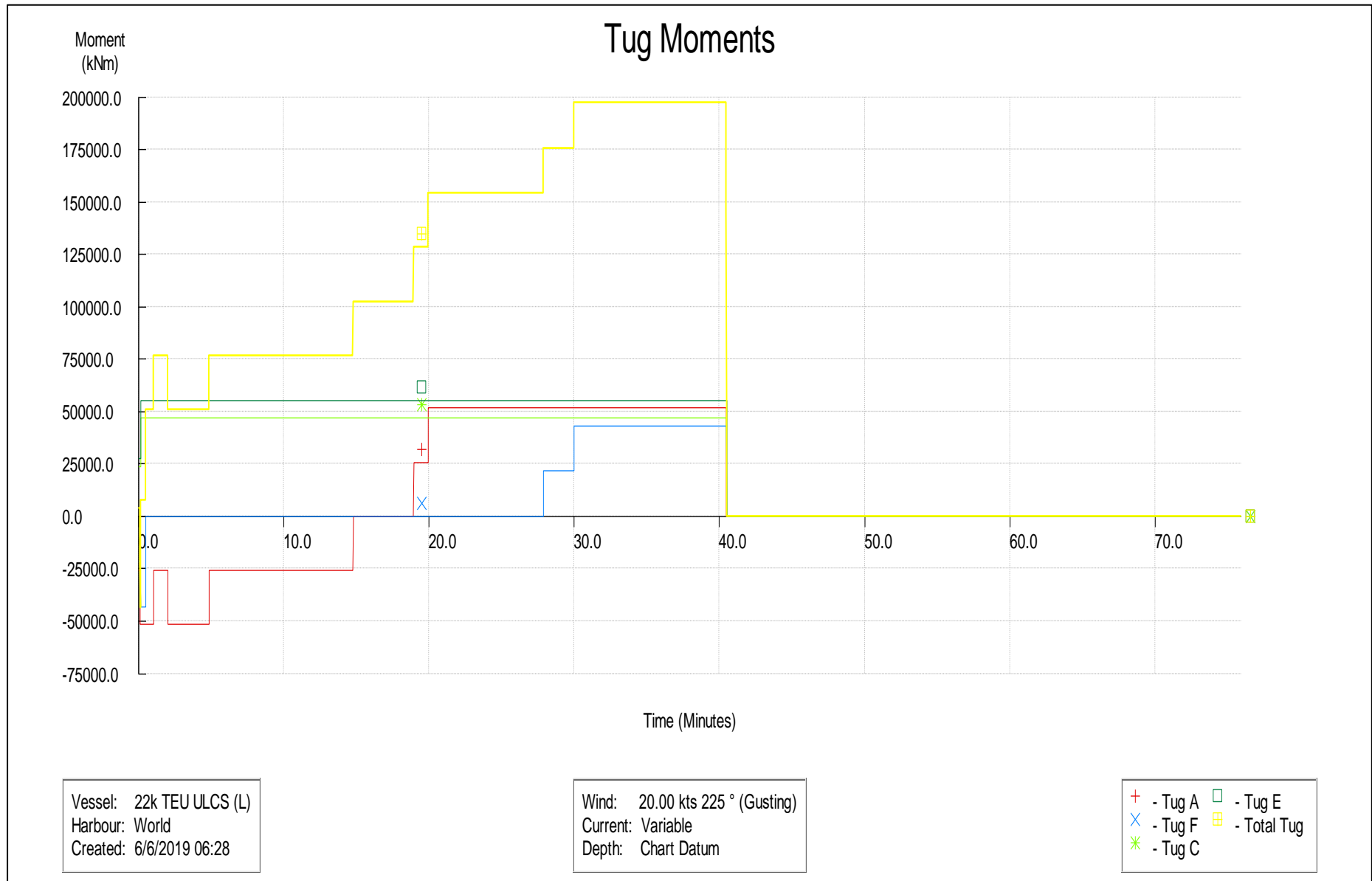
Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 6/6/2019 06:28

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

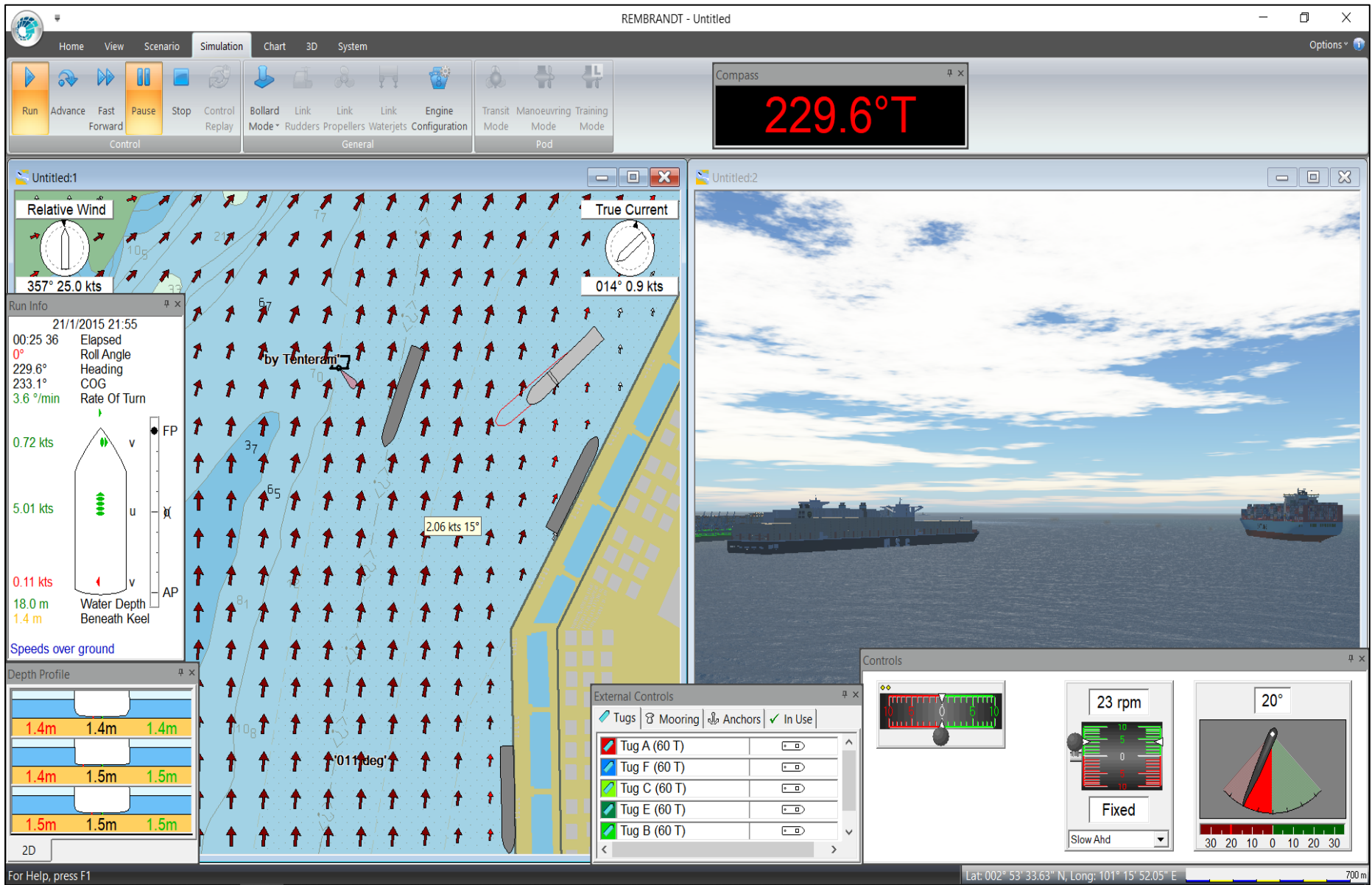




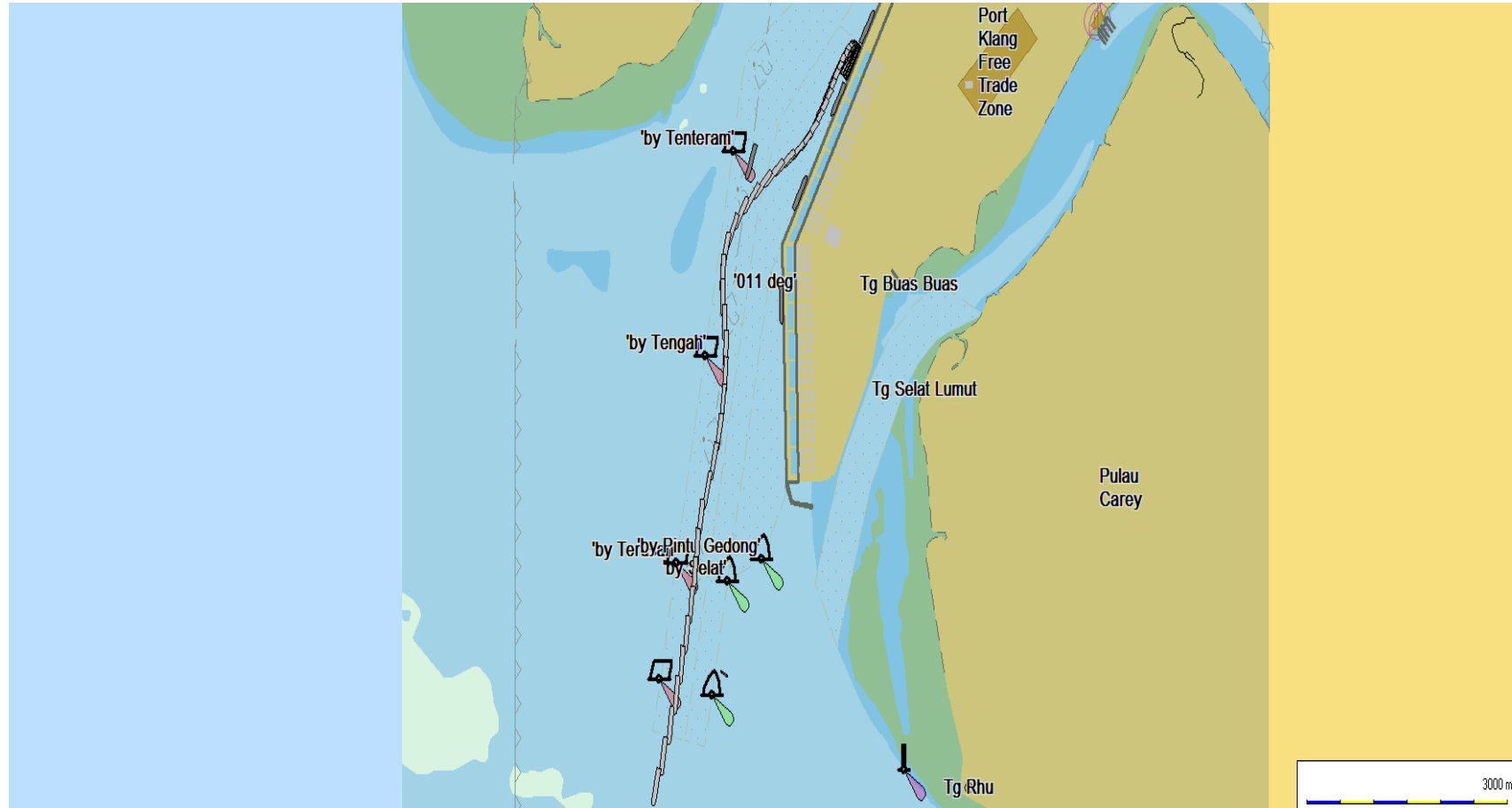




Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
48	R48WPCT10SW20 kEbb2130hT60tx4P ortDep.rmb	Ebb (2130h)	SW 20 k	Departure (Port a/s)	F: 60t x 2 A: 60t x 2	The vessel was pulled off the berth using four 60 tons bollard pull tugs. The forward tugs had to operate at $\frac{3}{4}$ Power. When off the berth, the vessel headed to sea, altering course early to limit the angle of the current, especially off the 'knuckle'. In the channel, transiting at over 10 knots, port helm had to be applied constantly to counter the set to starboard.	4/6



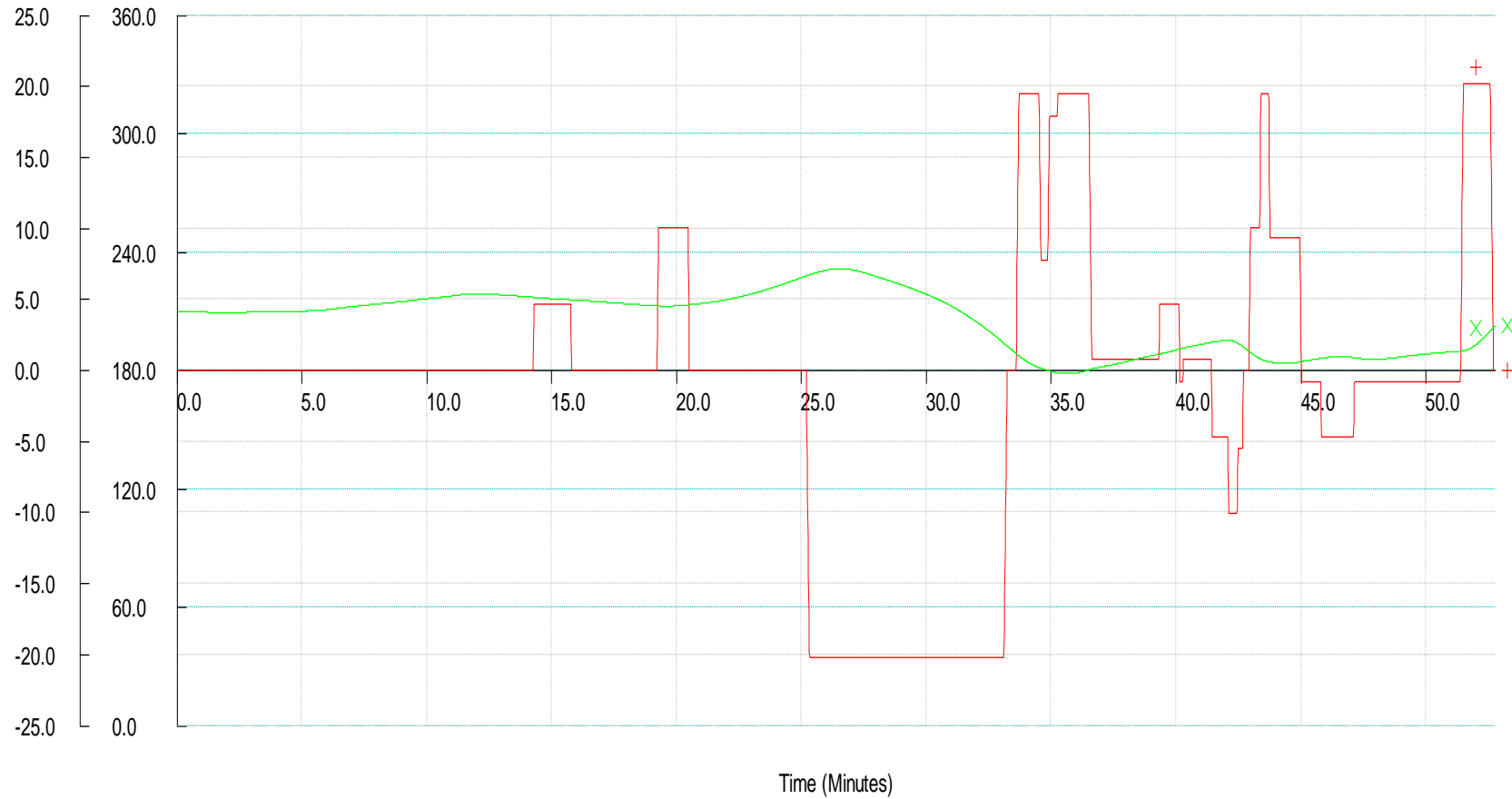
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 12/6/2019 13:58

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

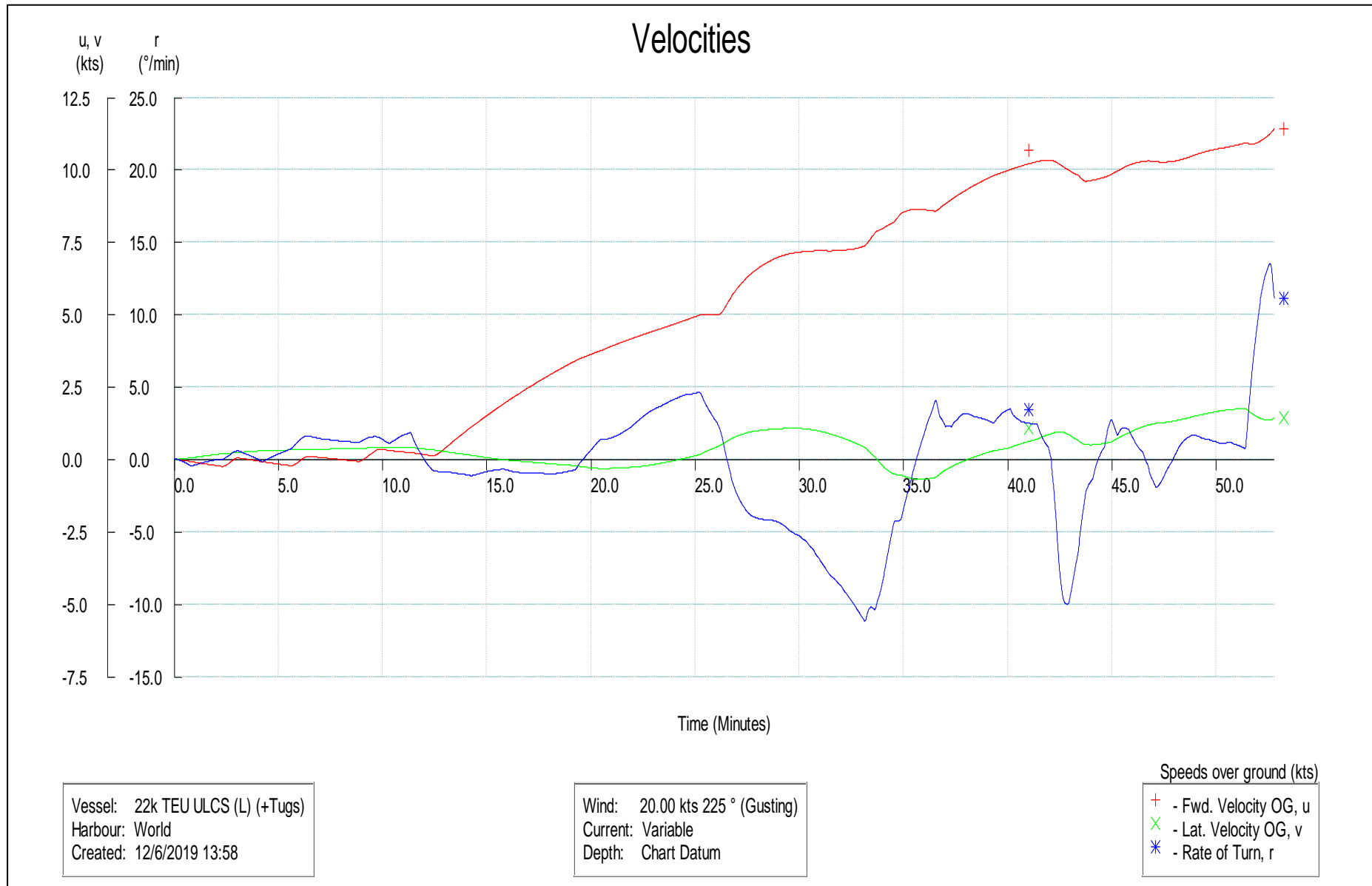
Heading and Rudder

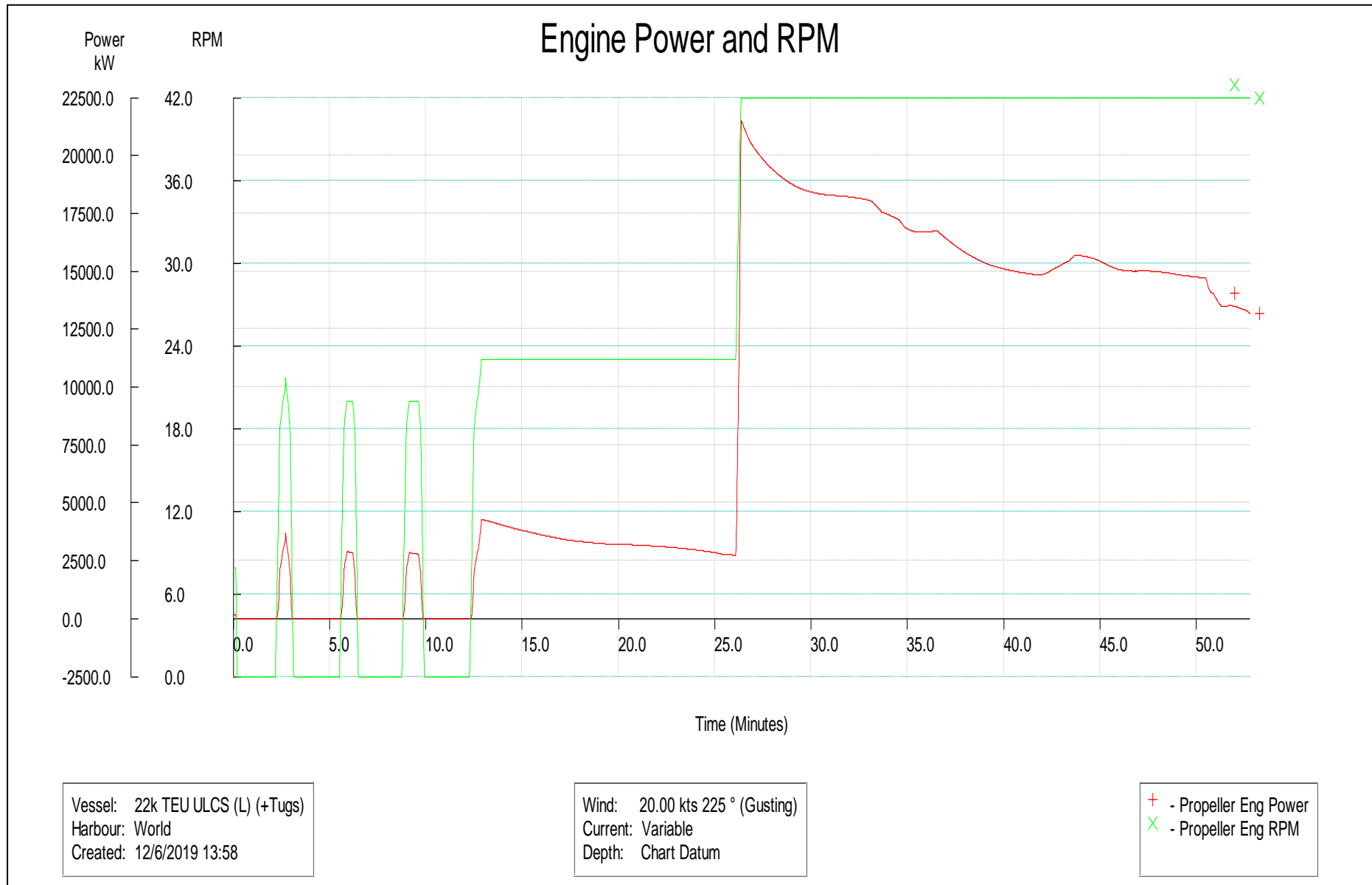


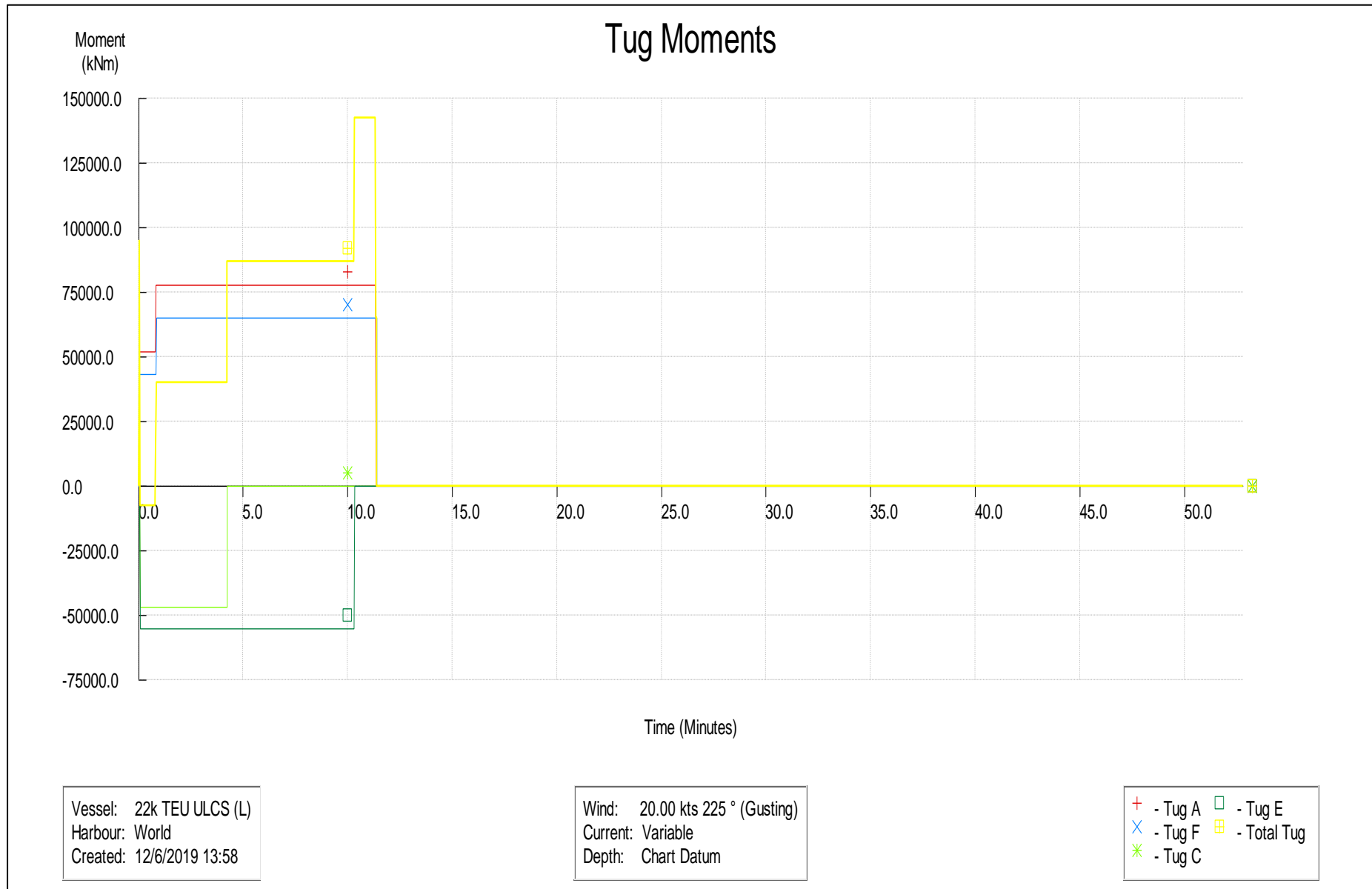
Vessel: 22k TEU ULCS (L) (+Tugs)
 Harbour: World
 Created: 12/6/2019 13:58

Wind: 20.00 kts 225 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

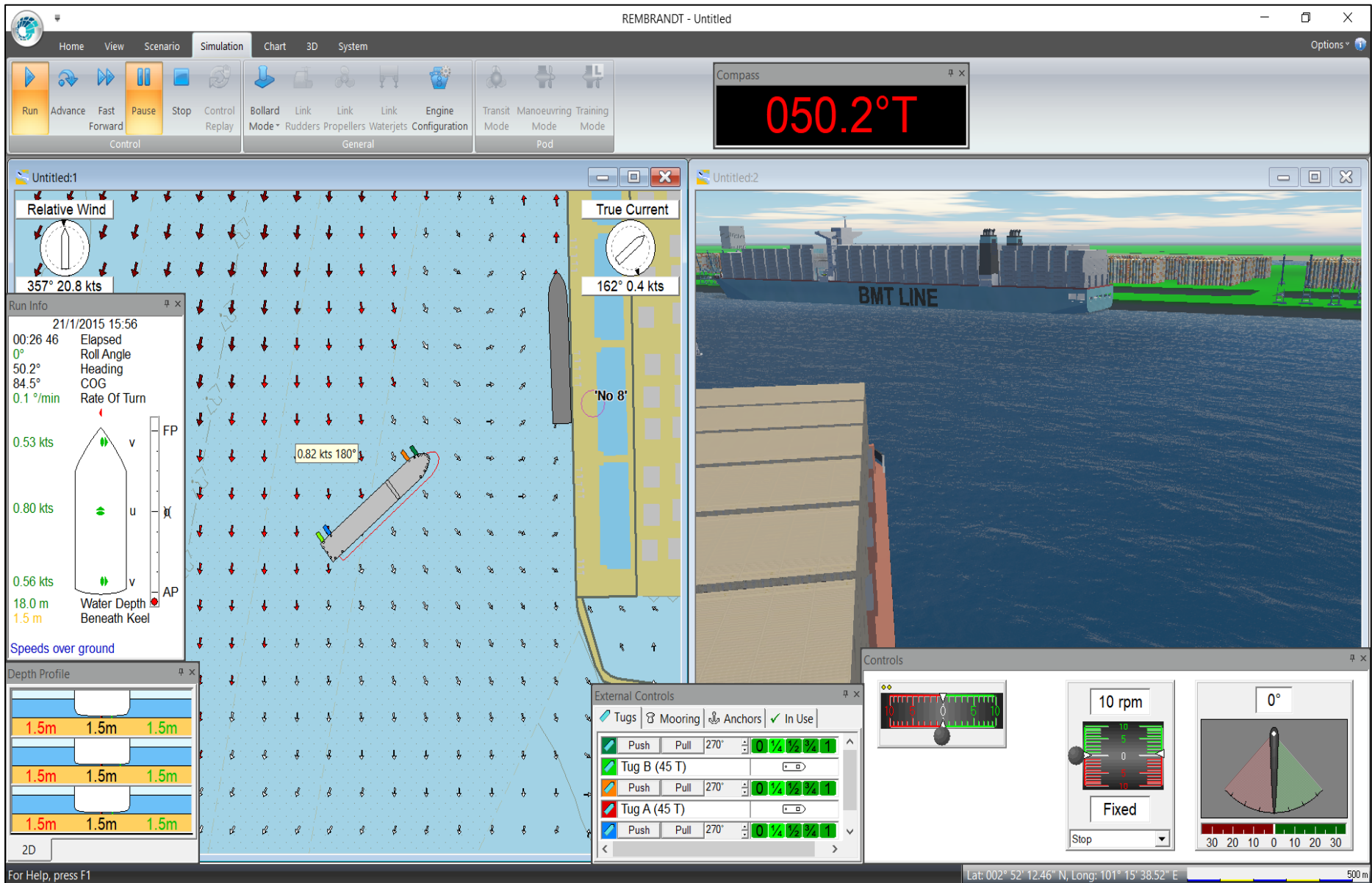
+ - Rudder Rud (°)
 x - Heading



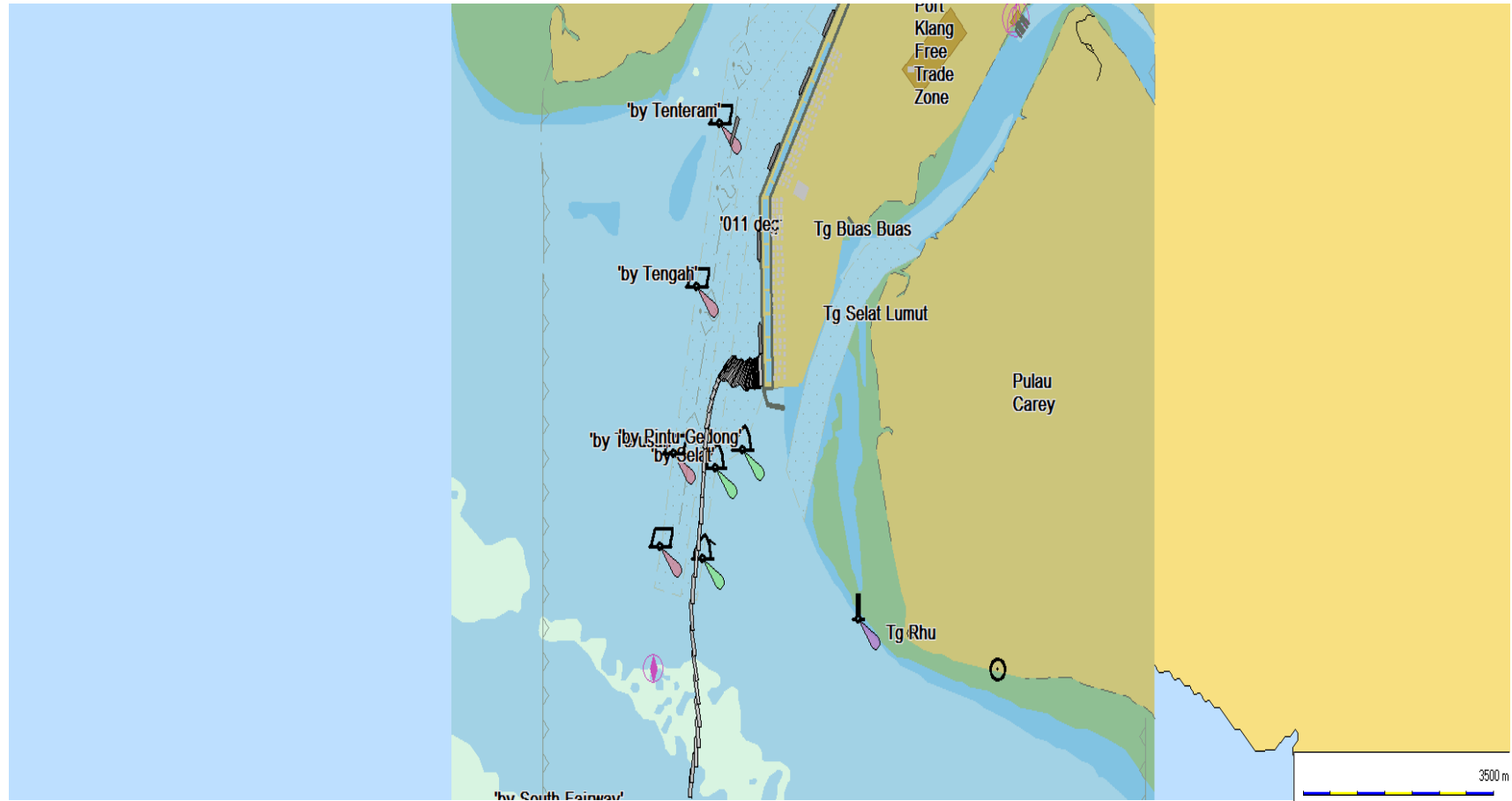




Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
49	R49WPCT17NE20 kFId1530hT60tx4St bdArr.rmb	Flood (1530h)	NE 20 k	Arrival (Stbd a/s)	F: 60t x 2 A: 60t x 2	<p>The vessel entered the channel on Half Ahead (about 11 knots). When approaching the Re-located Selat Buoy, a starboard sheer was initiated. After passing the buoy, the engine was stopped and Half Astern ordered. She pulled up about one ship's length from Berth CT-16 The tugs then assisted in pushing her alongside.</p> <p>A counter current was noticed at the wharf. This would allow portside berthing during the flood stream.</p>	4/6

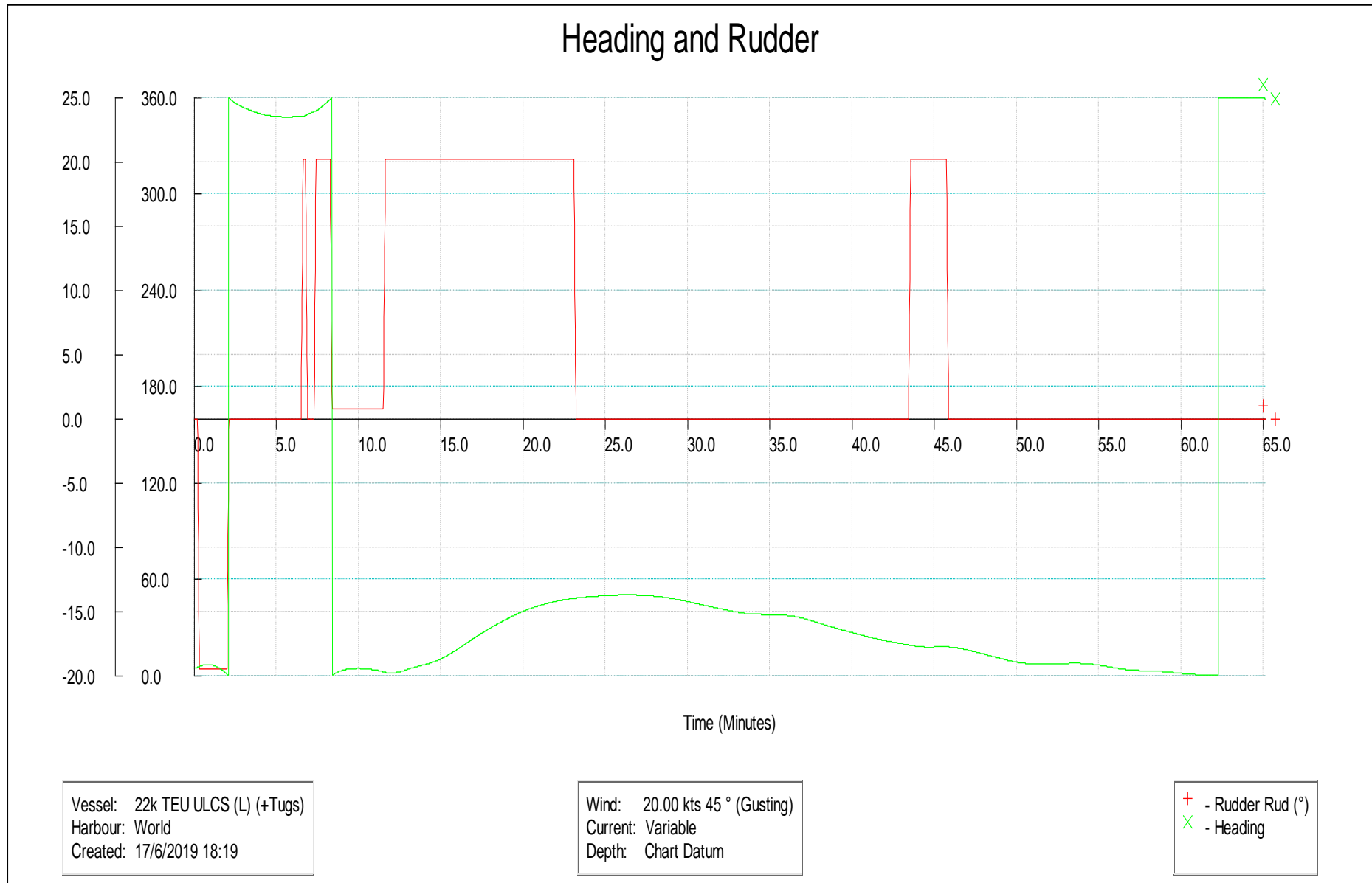


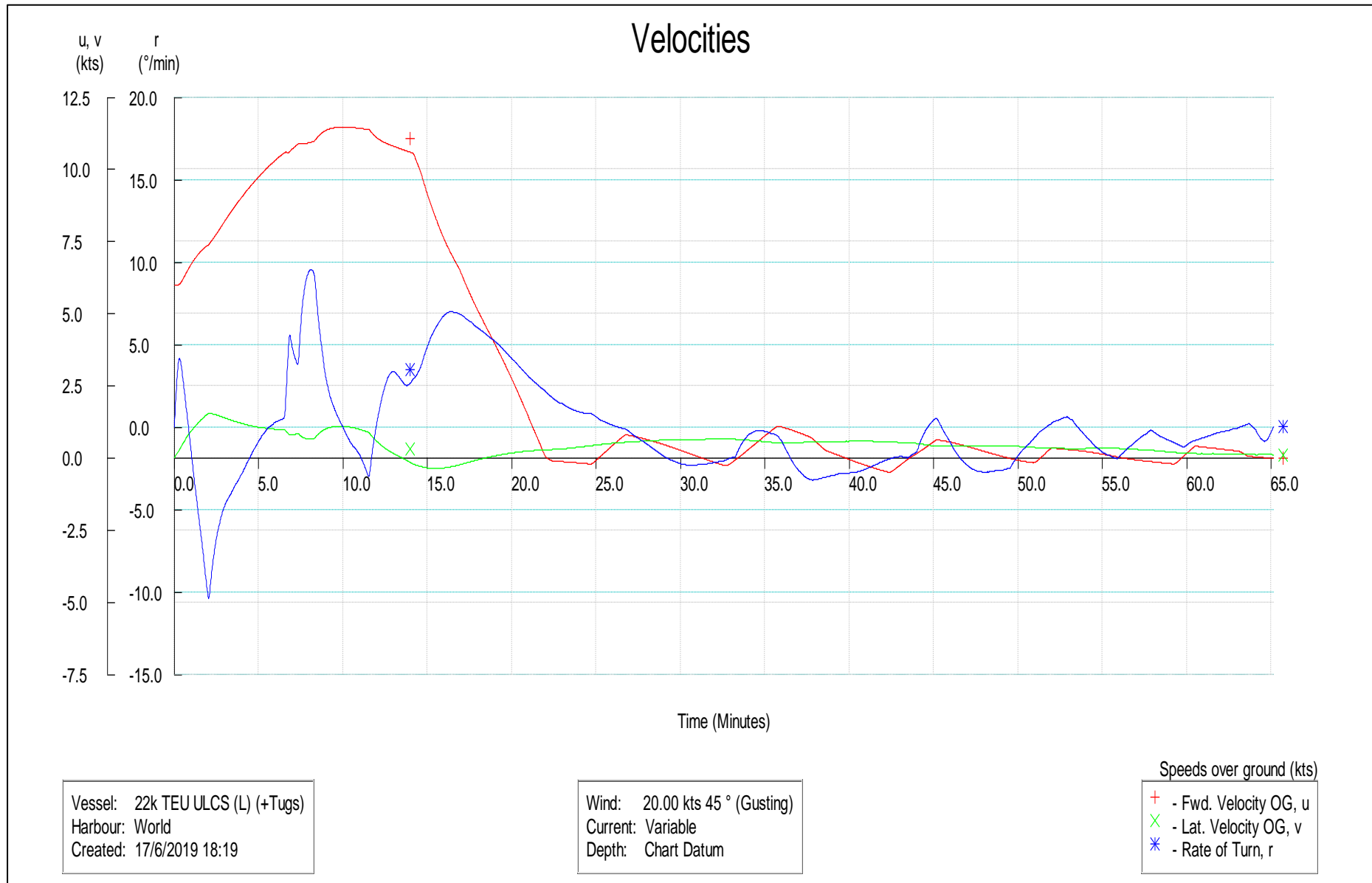
Vessel Track

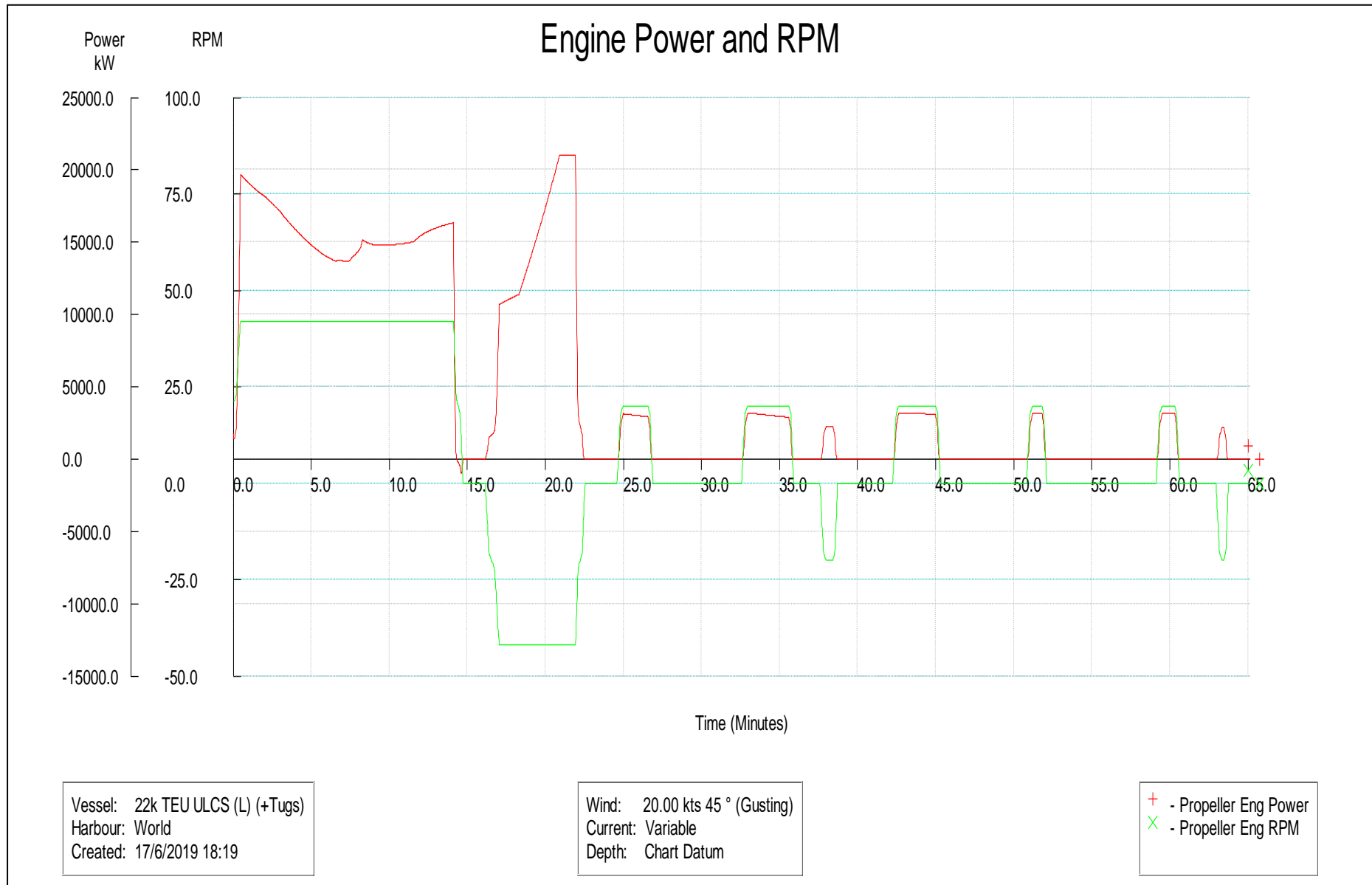


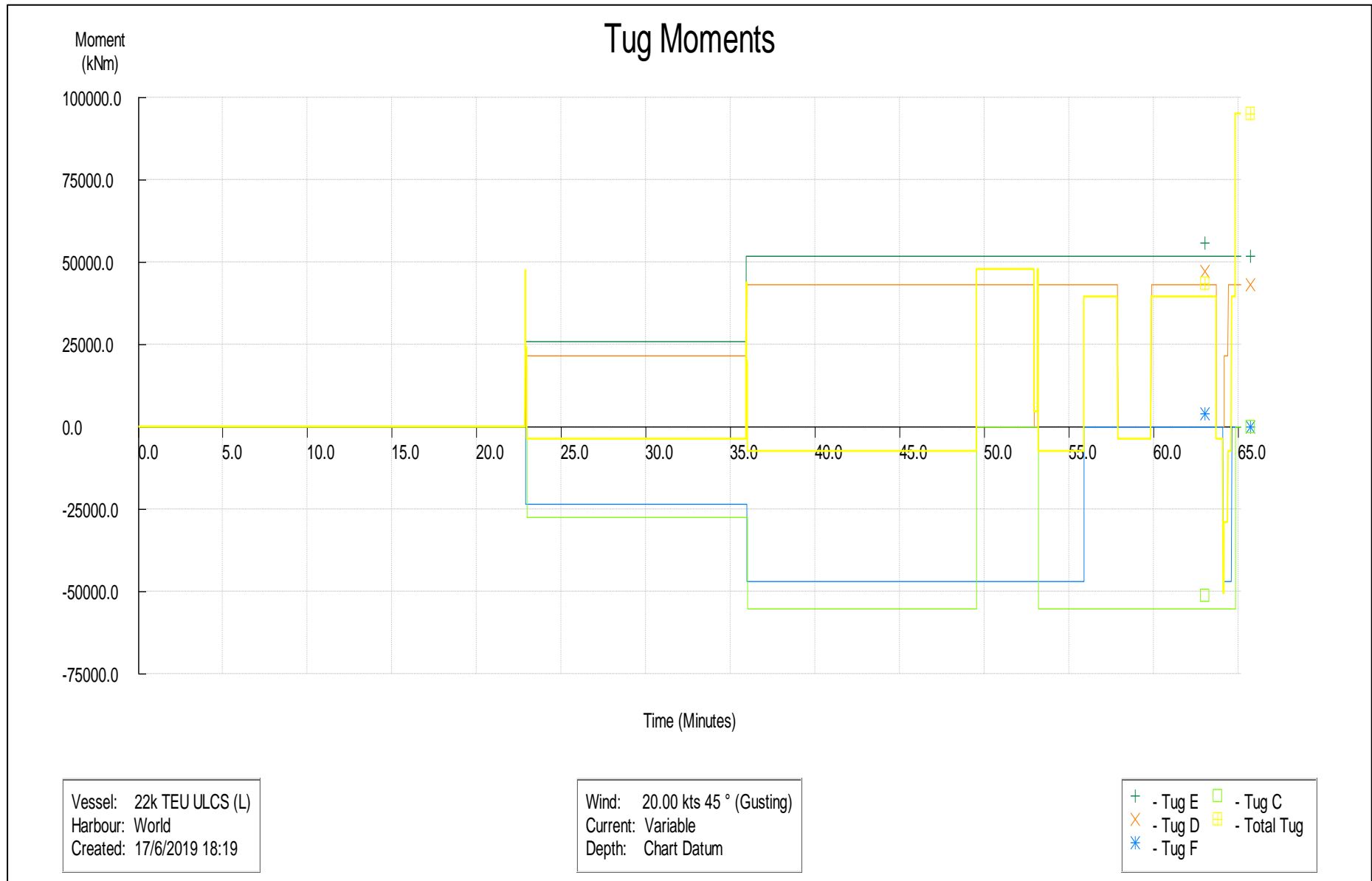
Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 17/6/2019 18:19

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

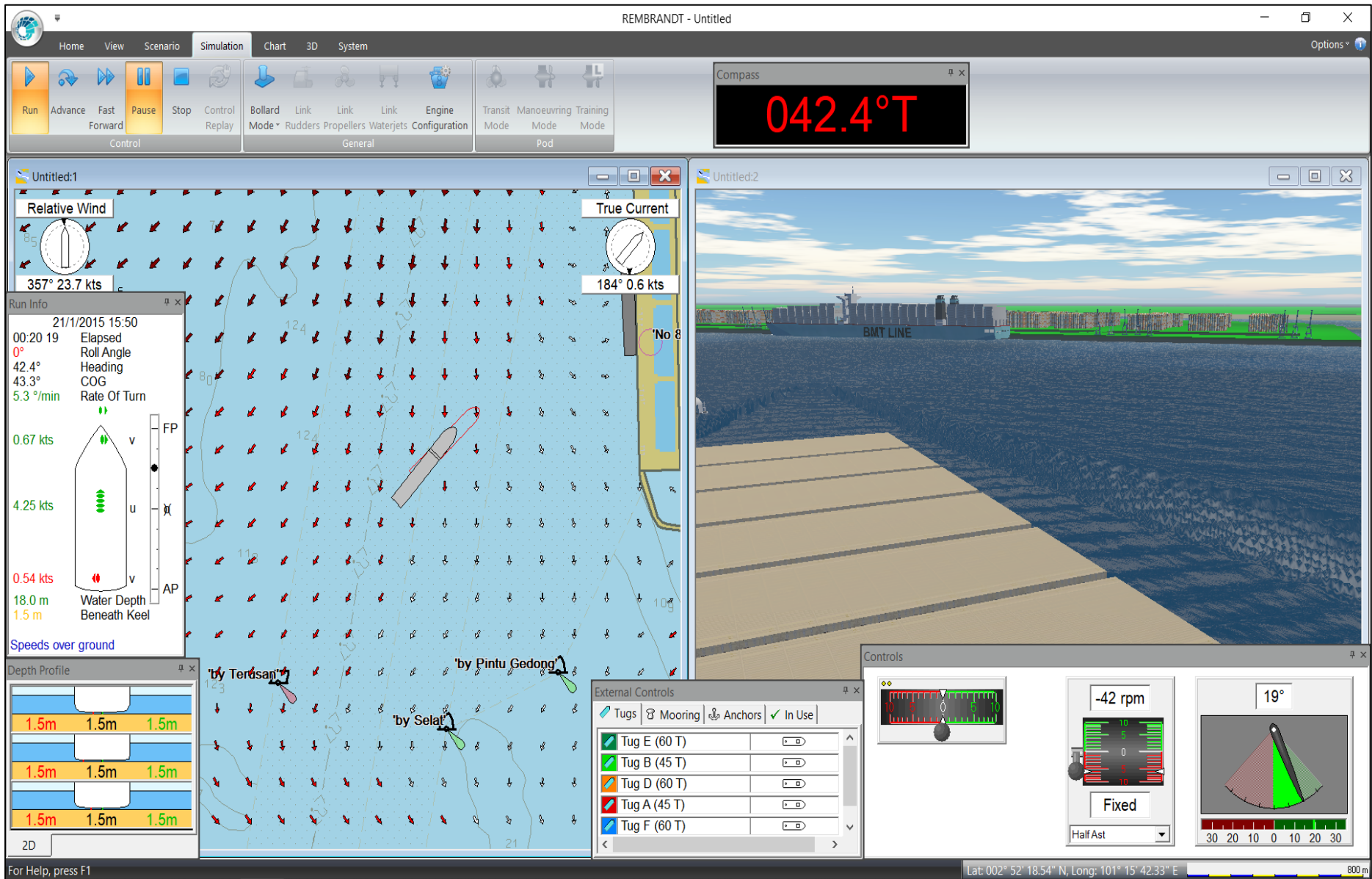








Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
50	R50WPCT17NE2 0kFId1530hT60tx 4StbdArr.rmb	Flood (1530h)	NE 20 k	Arrival (Stbd a/s)	F: 60t x 2 A: 60t x 2	The vessel entered the channel on Half Ahead (about 11 knots). When approaching the re-located Selat Buoy, speed was reduced and a starboard sheer was initiated. After passing the buoy, the engine was stopped and Half Astern ordered. She pulled up about one ship's length from Berth CT-16 The tugs then assisted in pushing her alongside.	4/6



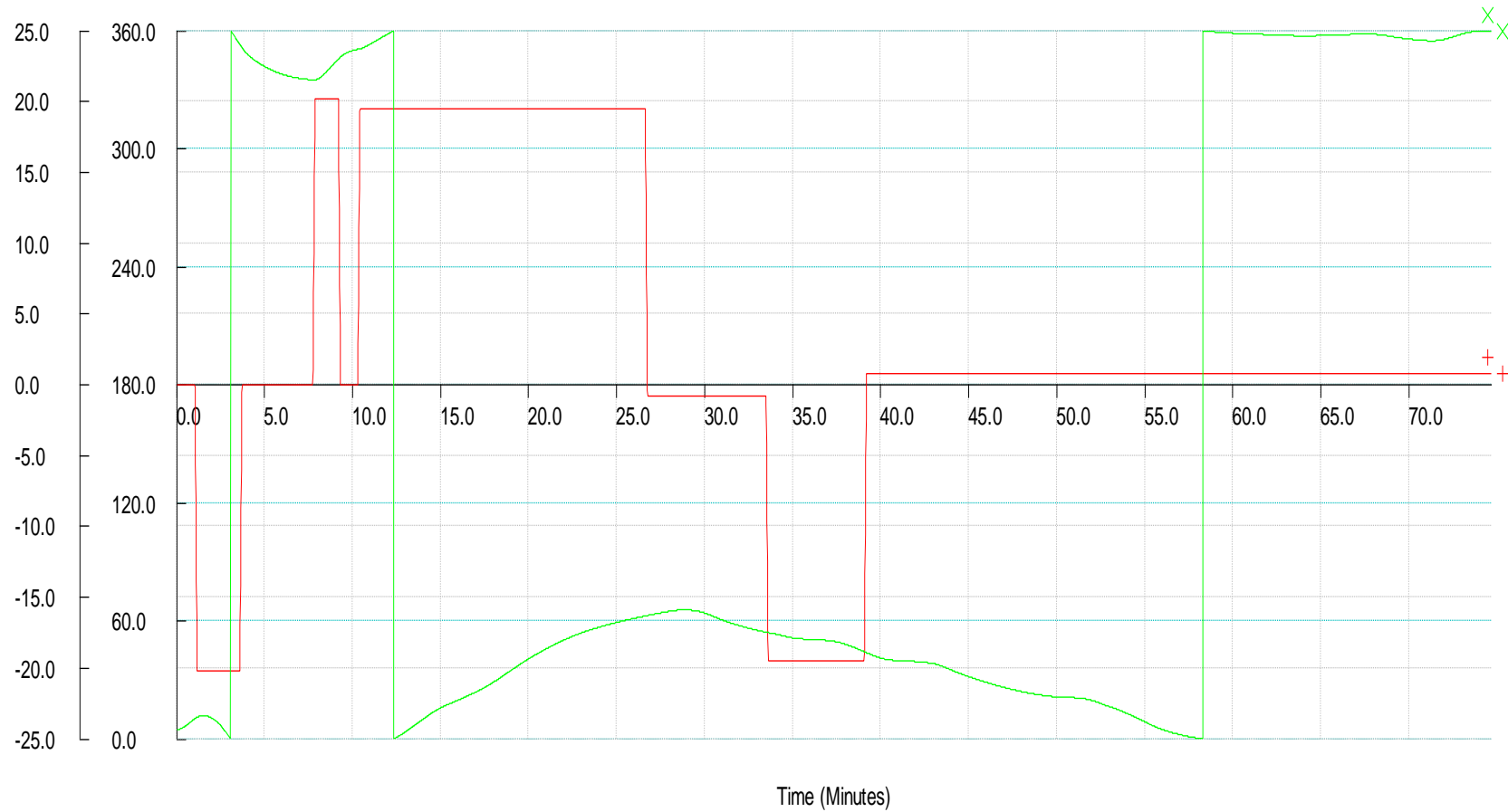
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 17/6/2019 19:32

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

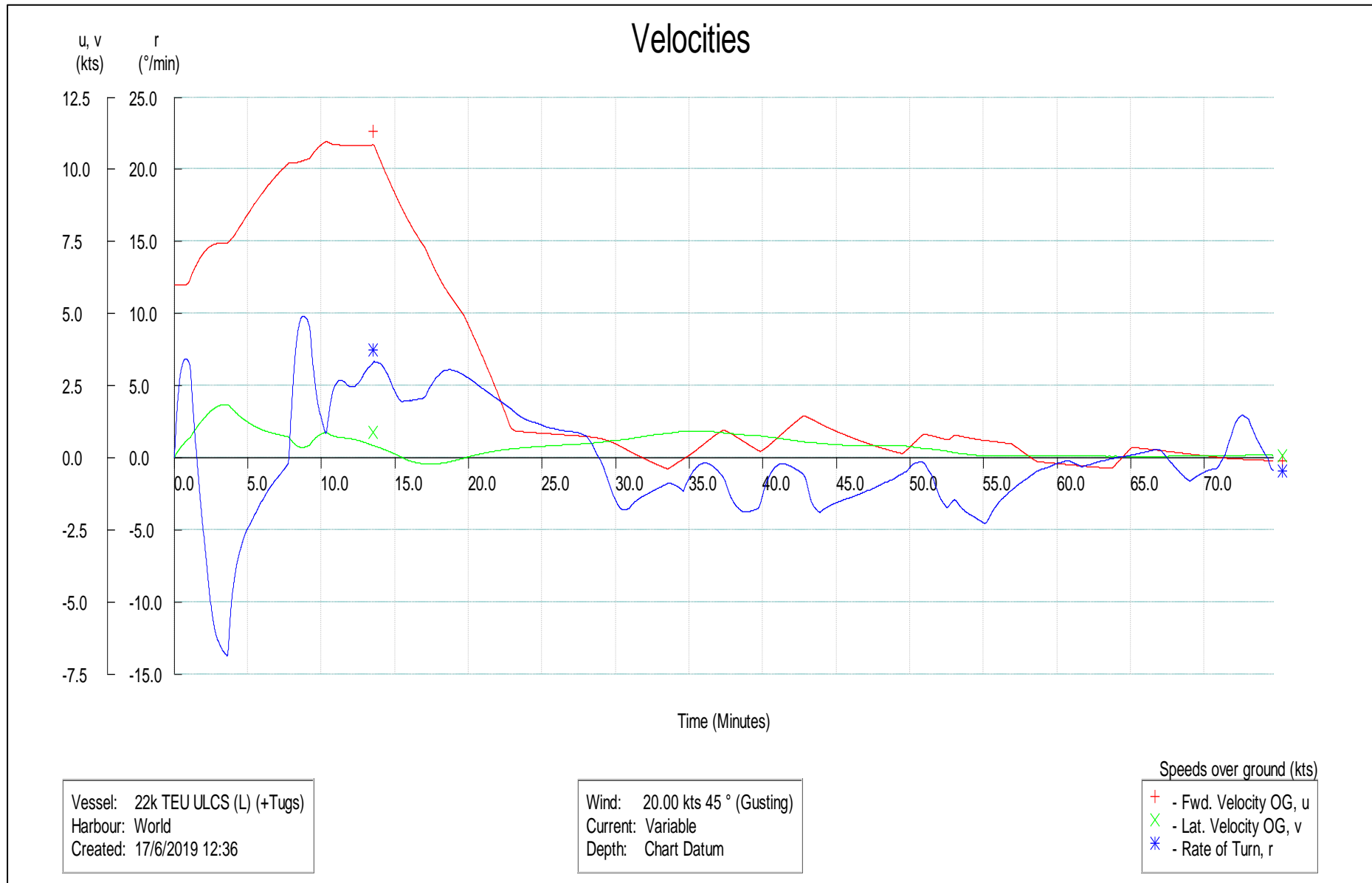
Heading and Rudder

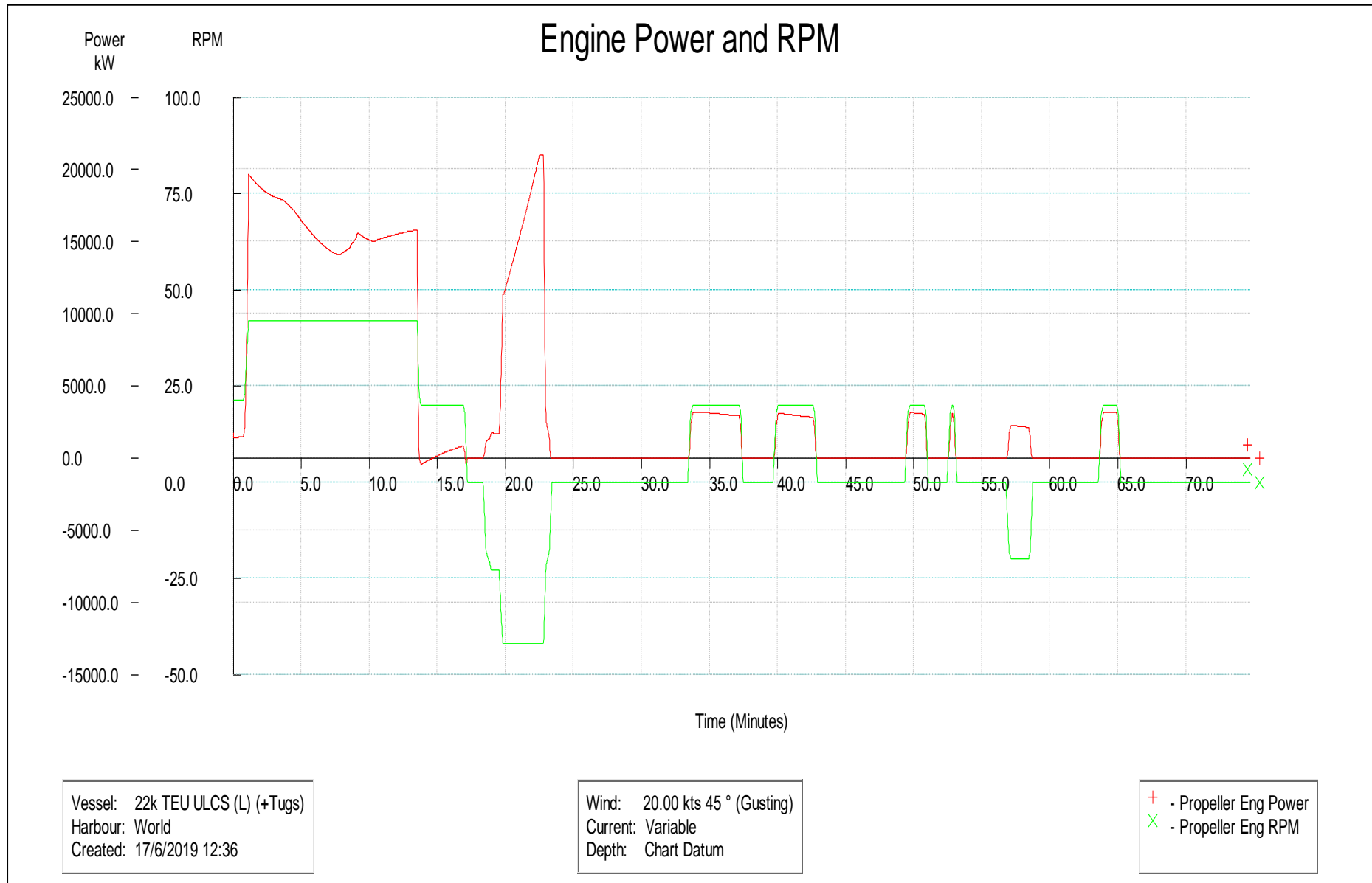


Vessel: 22k TEU ULCS (L) (+Tugs)
Harbour: World
Created: 17/6/2019 12:36

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

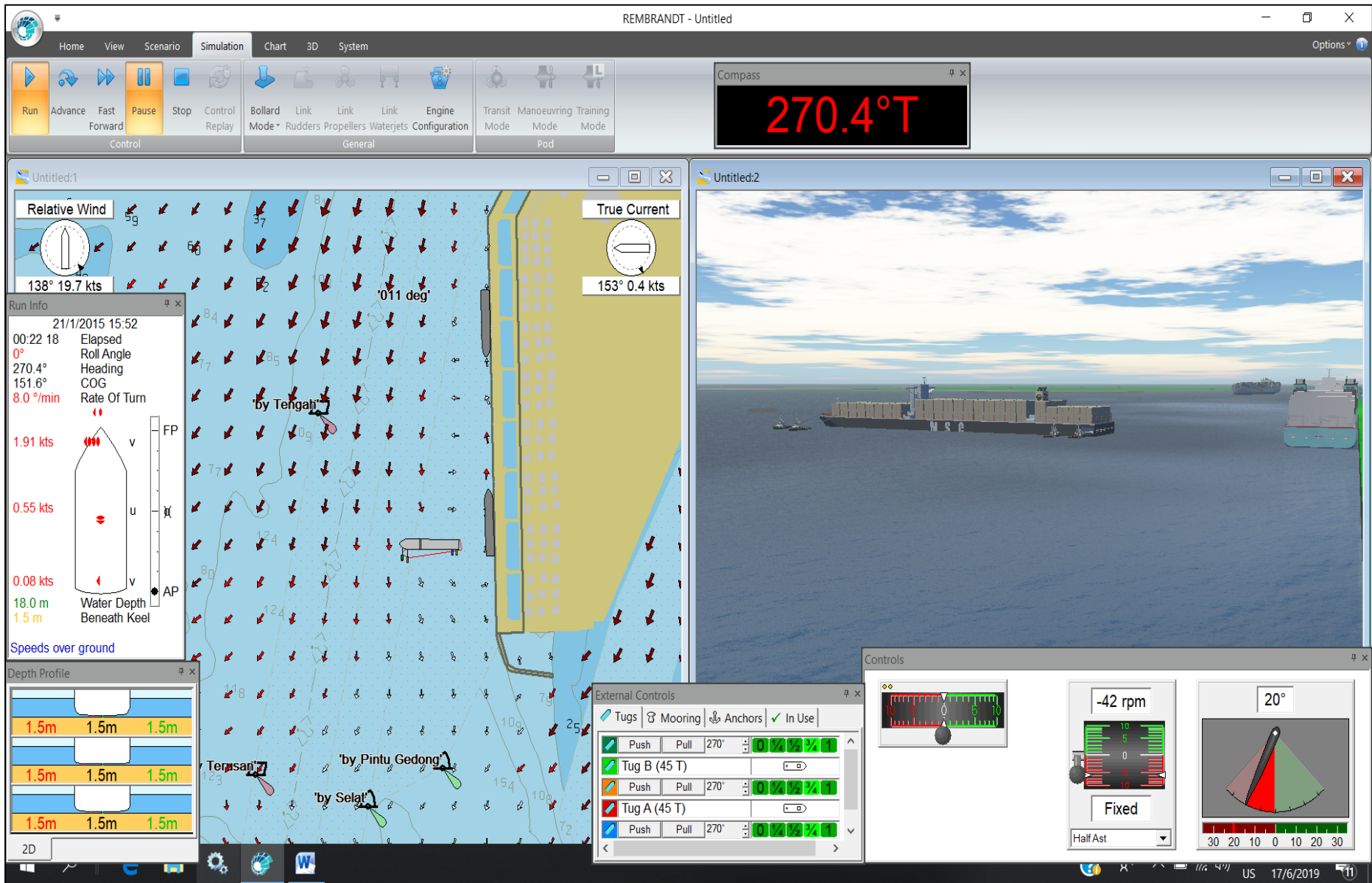
+ - Rudder Rud (°)
x - Heading



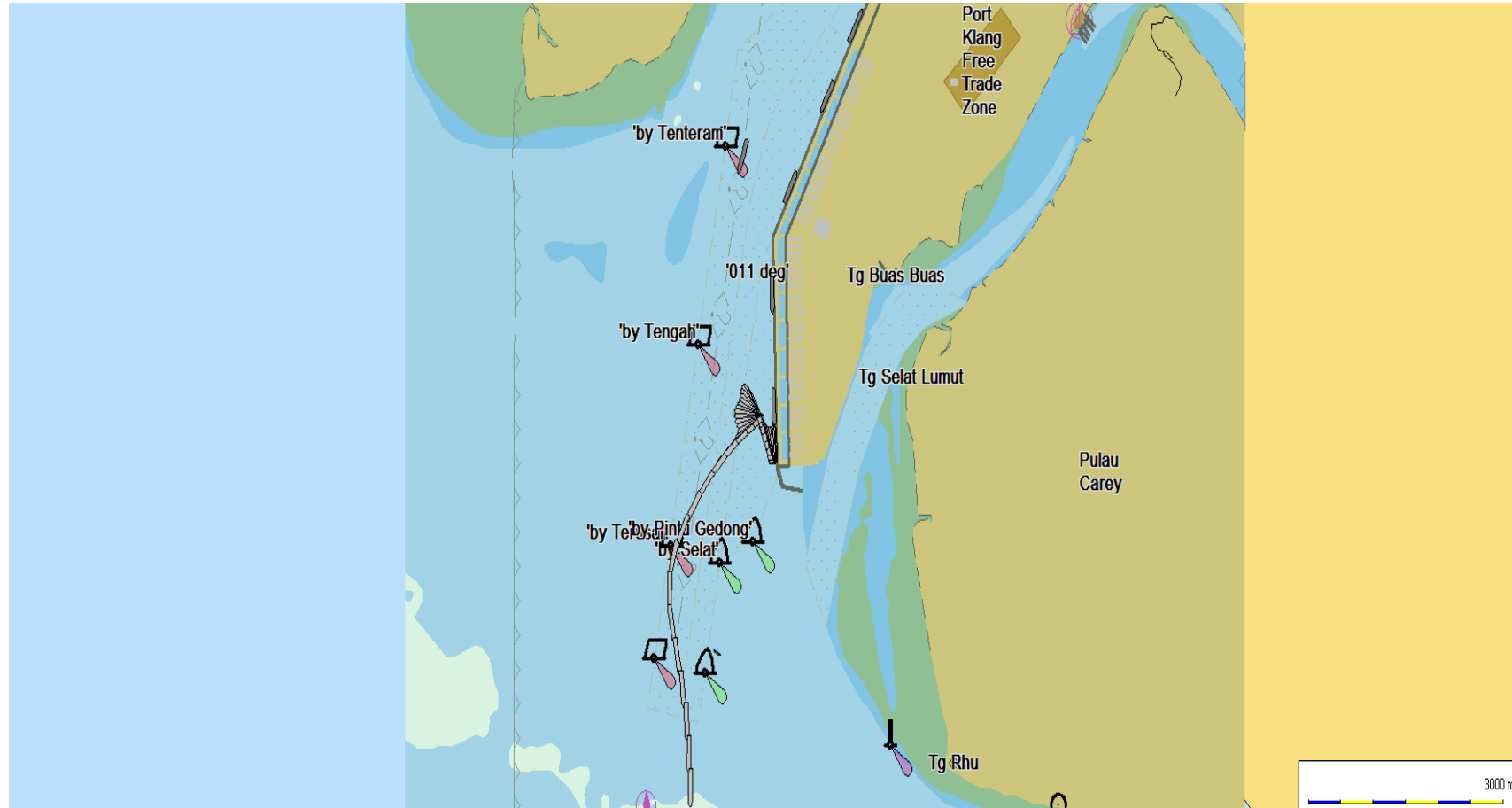




Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
51	R51WPCT17NE20 kFId1530hT60tx4St bdDep.rmb	Flood (1530h)	NE 20 k	Departure (Stbd a/s)	F: 60t x 2 A: 60t x 2	The vessel was pulled off the berth and swung to port off CT-16 using four 60 tons bollard pull tugs operating at a maximum of $\frac{3}{4}$ Power. After swinging around she cast off the tugs and proceeded to sea. The outbound passage was close to the western edge of the channel. It would be safer to continue the swing longer to reduce the angle of entry into the channel.	4/6



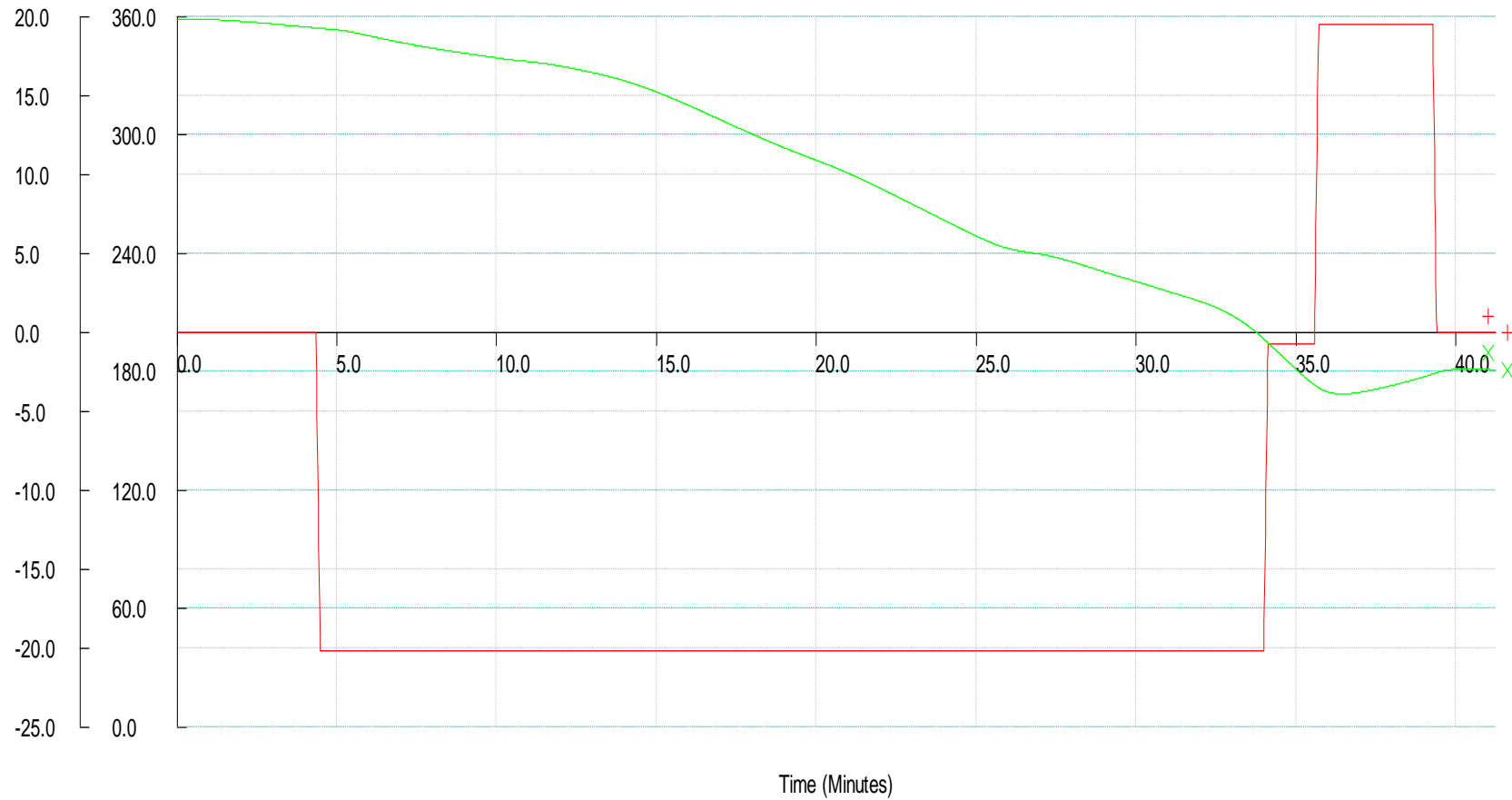
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 17/6/2019 21:23

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

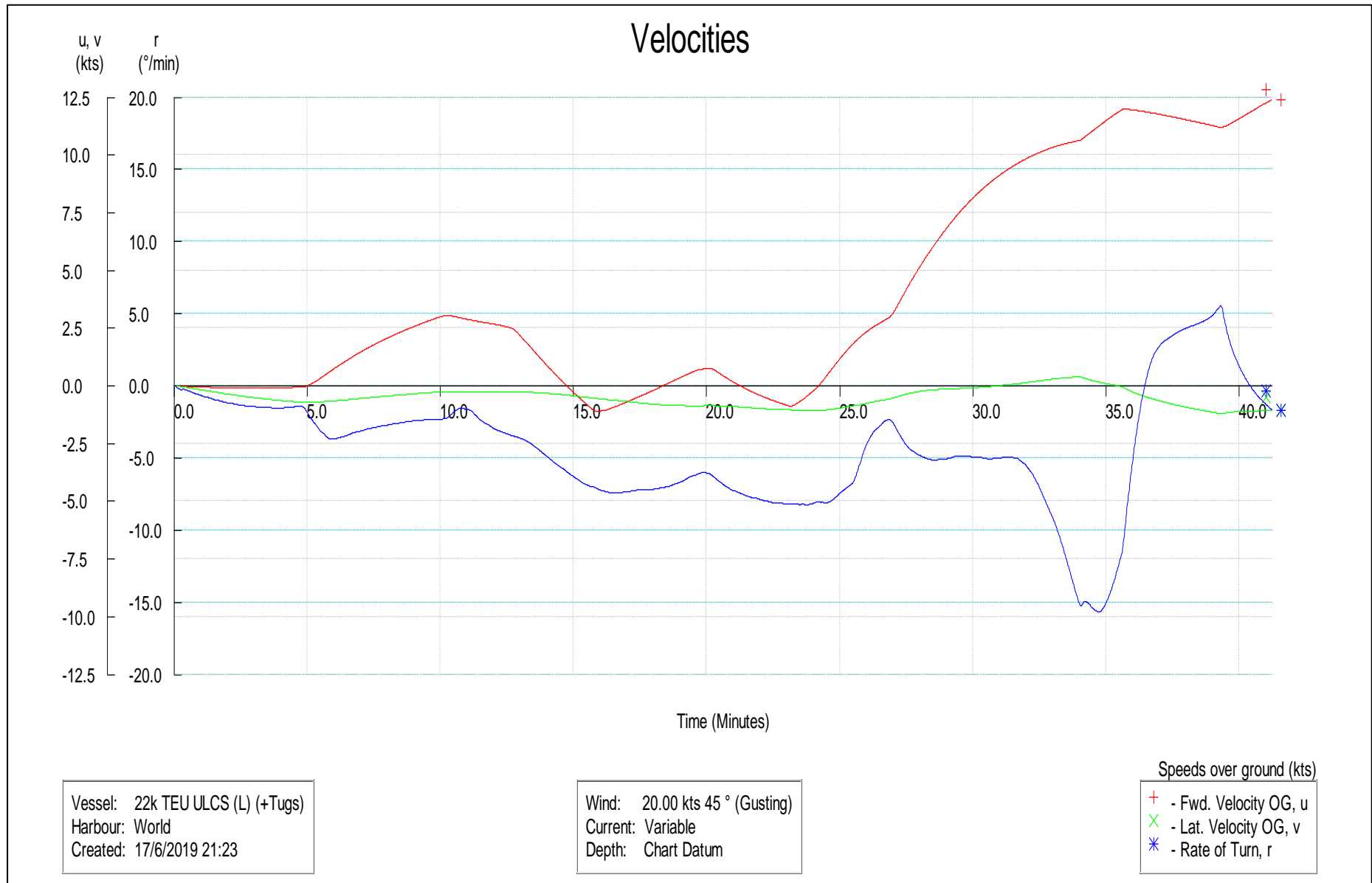
Heading and Rudder



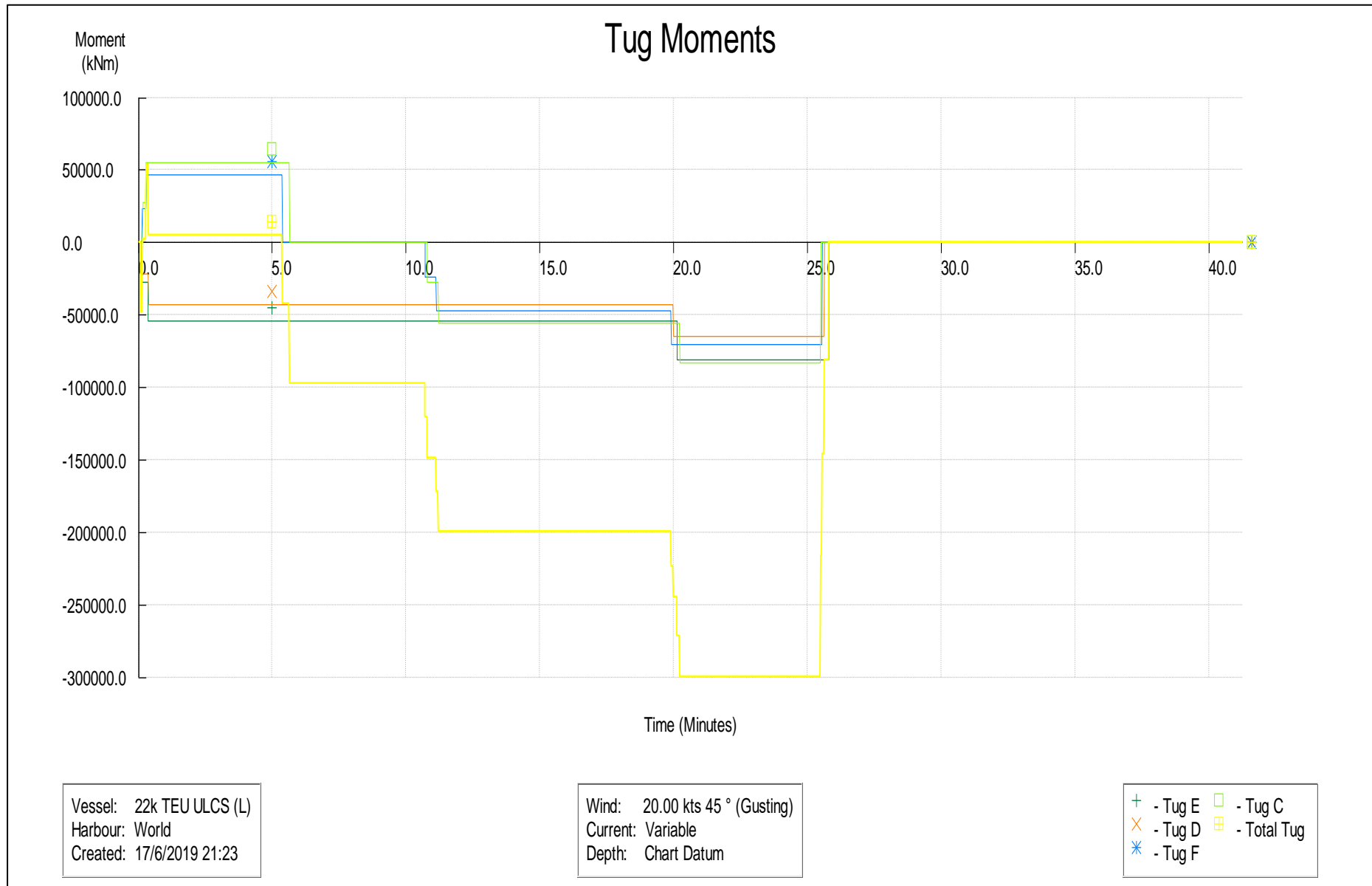
Vessel: 22k TEU ULCS (L) (+Tugs)
 Harbour: World
 Created: 17/6/2019 21:23

Wind: 20.00 kts 45 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

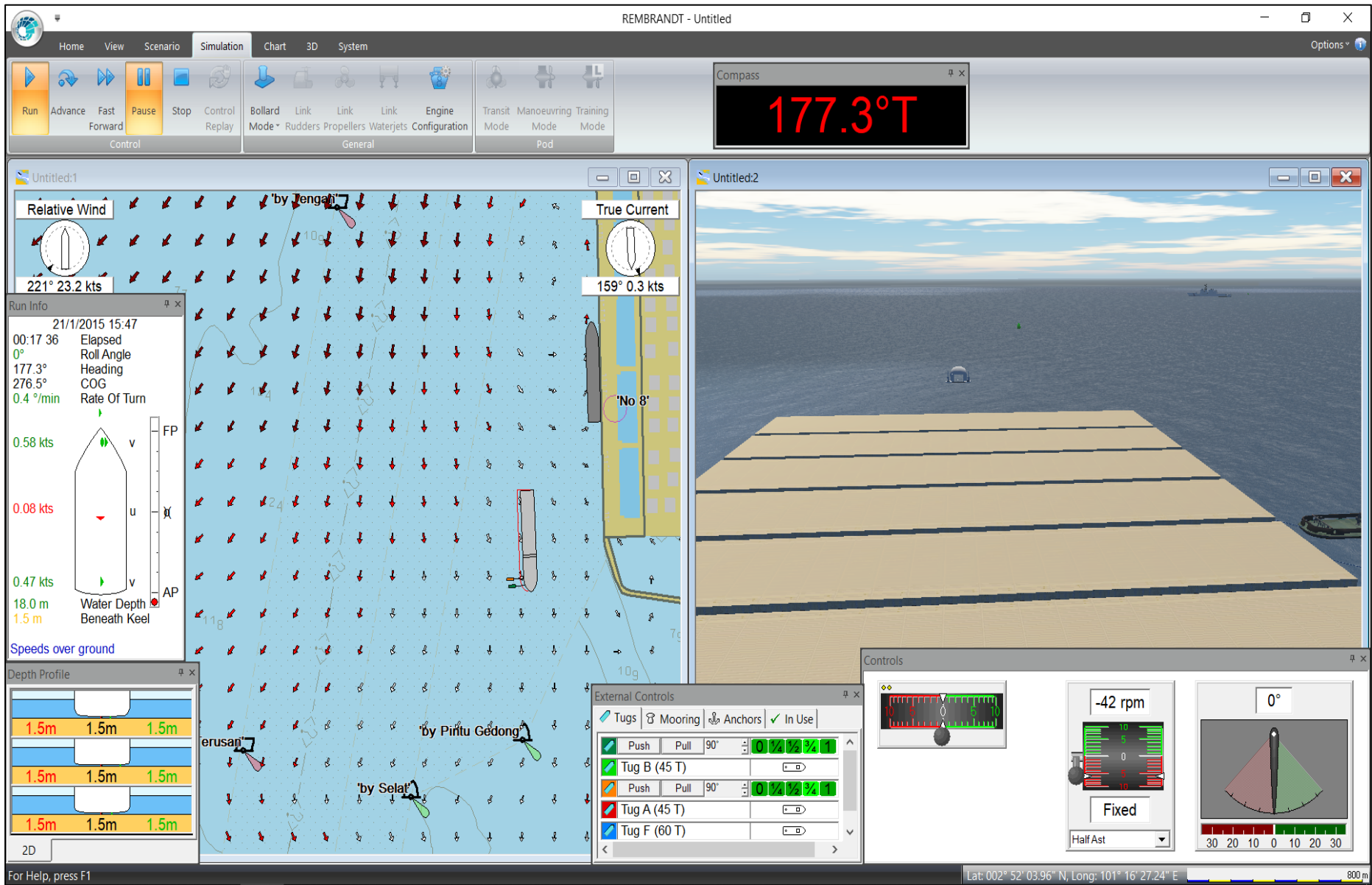
+ - Rudder Rud (°)
 x - Heading



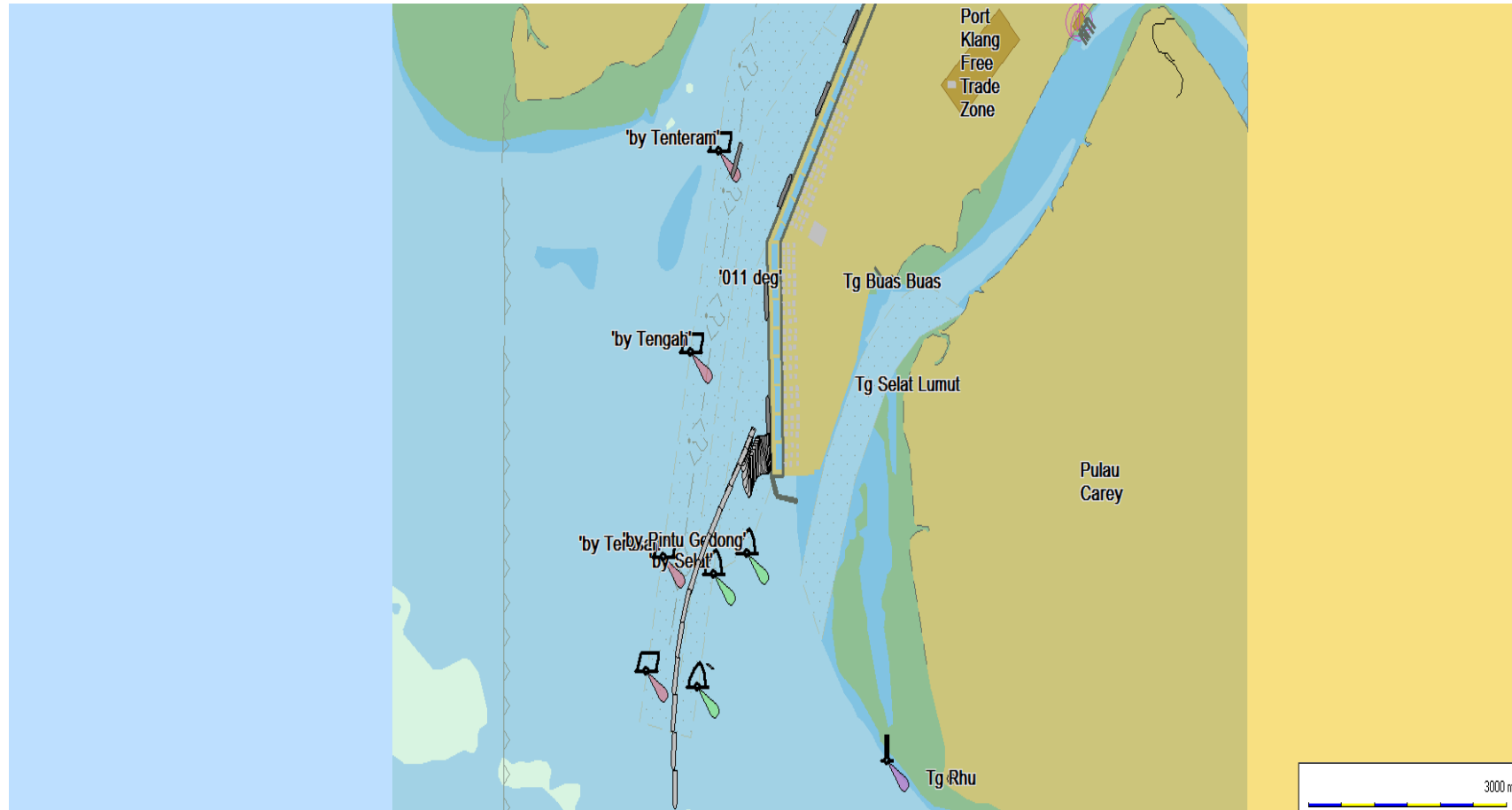




Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
52	R52WPCT17NE20 kFId1530hT60tx4P ortDep.rmb	Flood (1530h)	NE 20 k	Departure (Port a/s)	F: 60t x 2 A: 60t x 2	The vessel was pulled off the berth using four 60 tons bollard pull tugs. She was then swung to starboard to point toward the channel. The forward tugs had to operate at a maximum of $\frac{3}{4}$ Power. When the re-located Selat Buoy was on the port bow, the tugs were cast off and the vessel proceeded to sea.	3/6



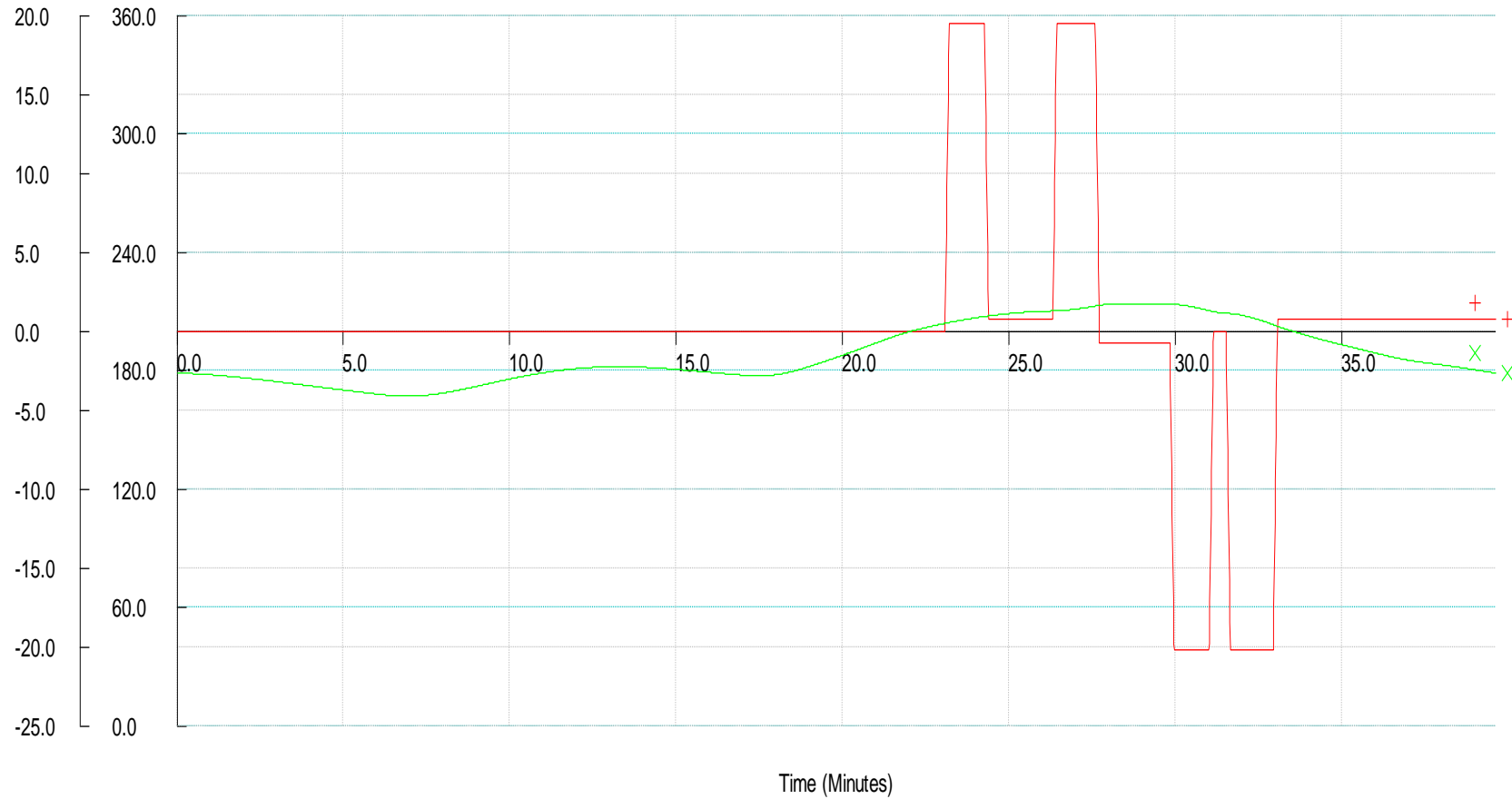
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 17/6/2019 21:45

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

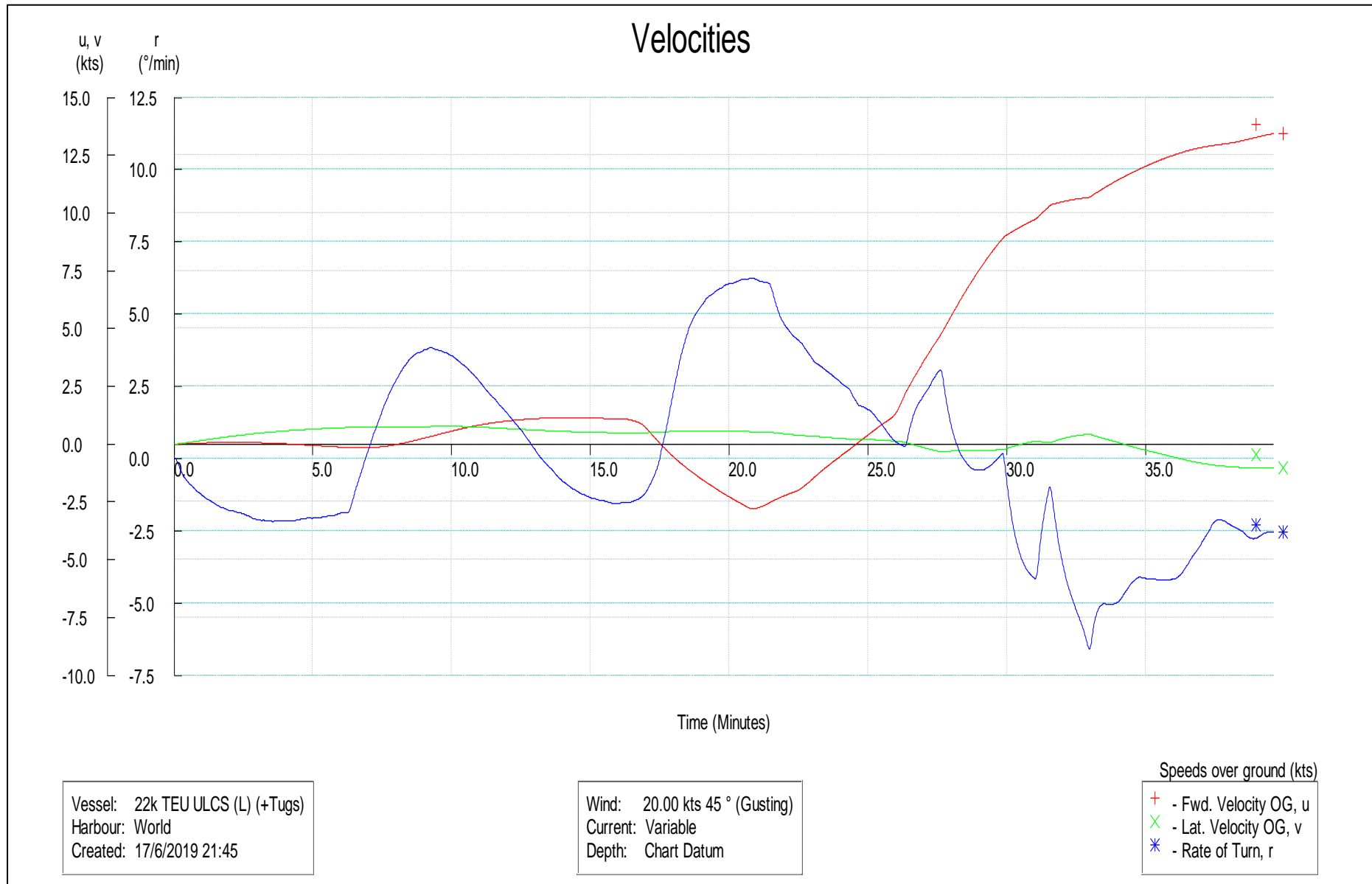
Heading and Rudder

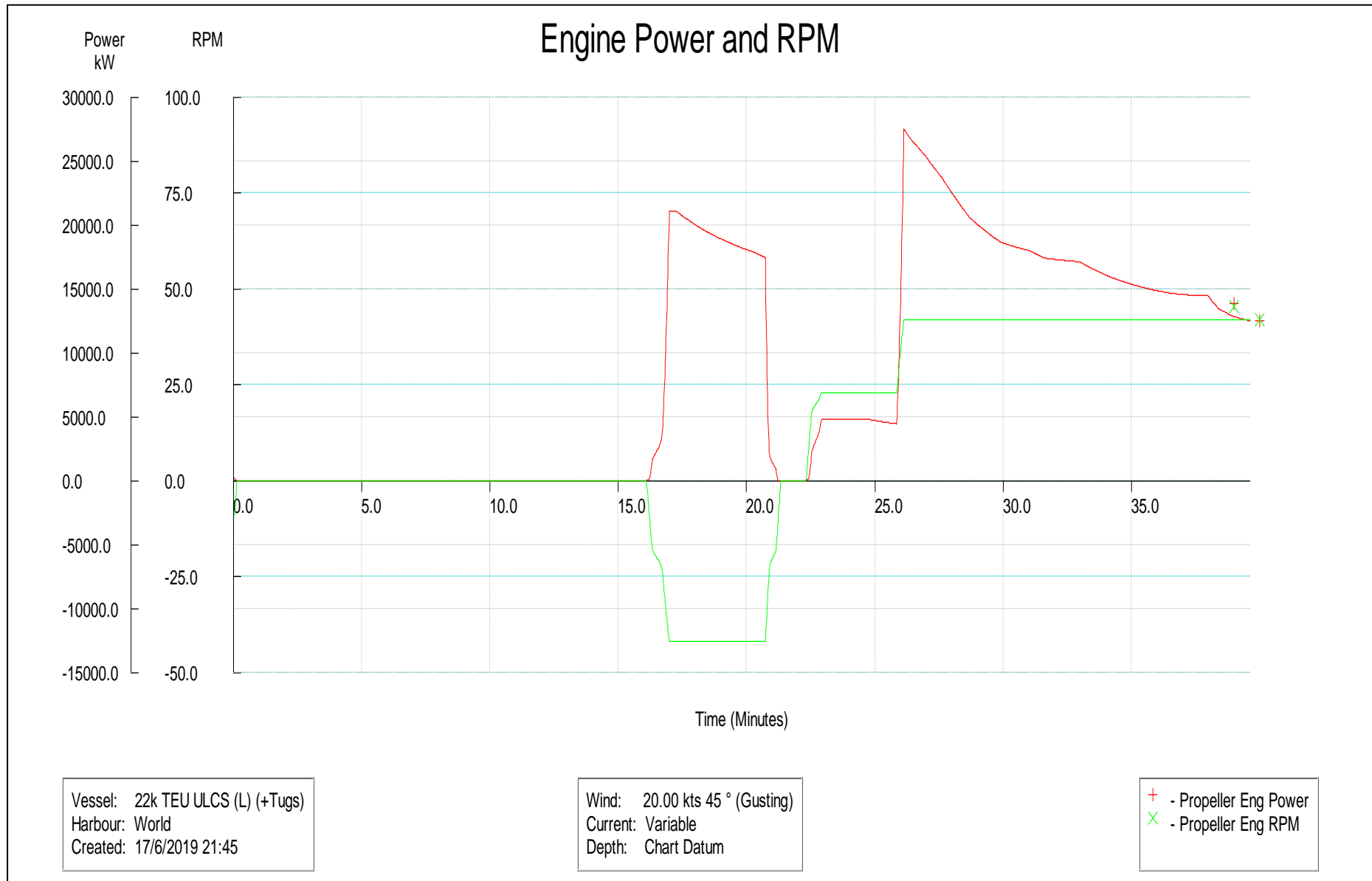


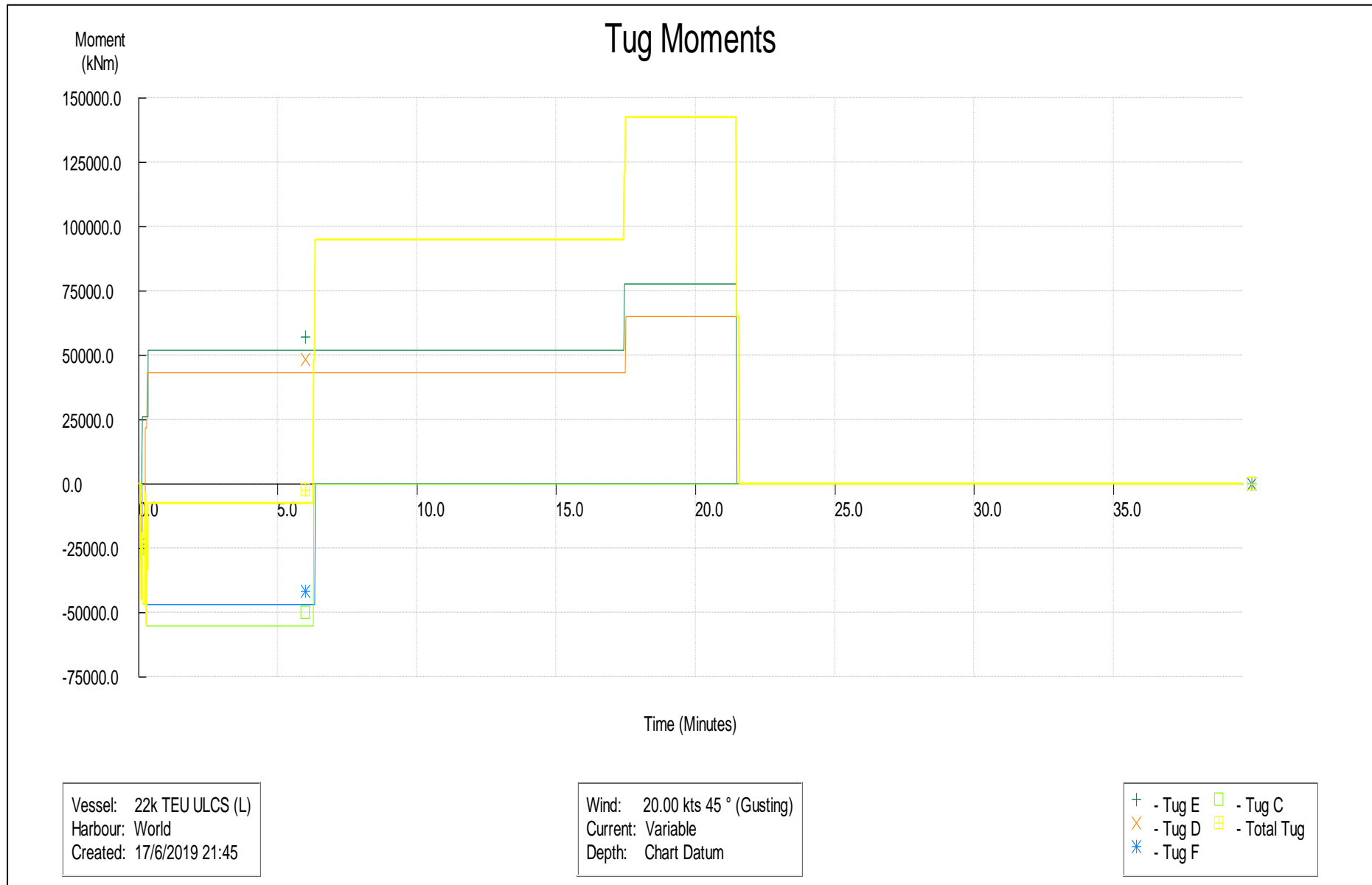
Vessel: 22k TEU ULCS (L) (+Tugs)
 Harbour: World
 Created: 17/6/2019 21:45

Wind: 20.00 kts 45 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

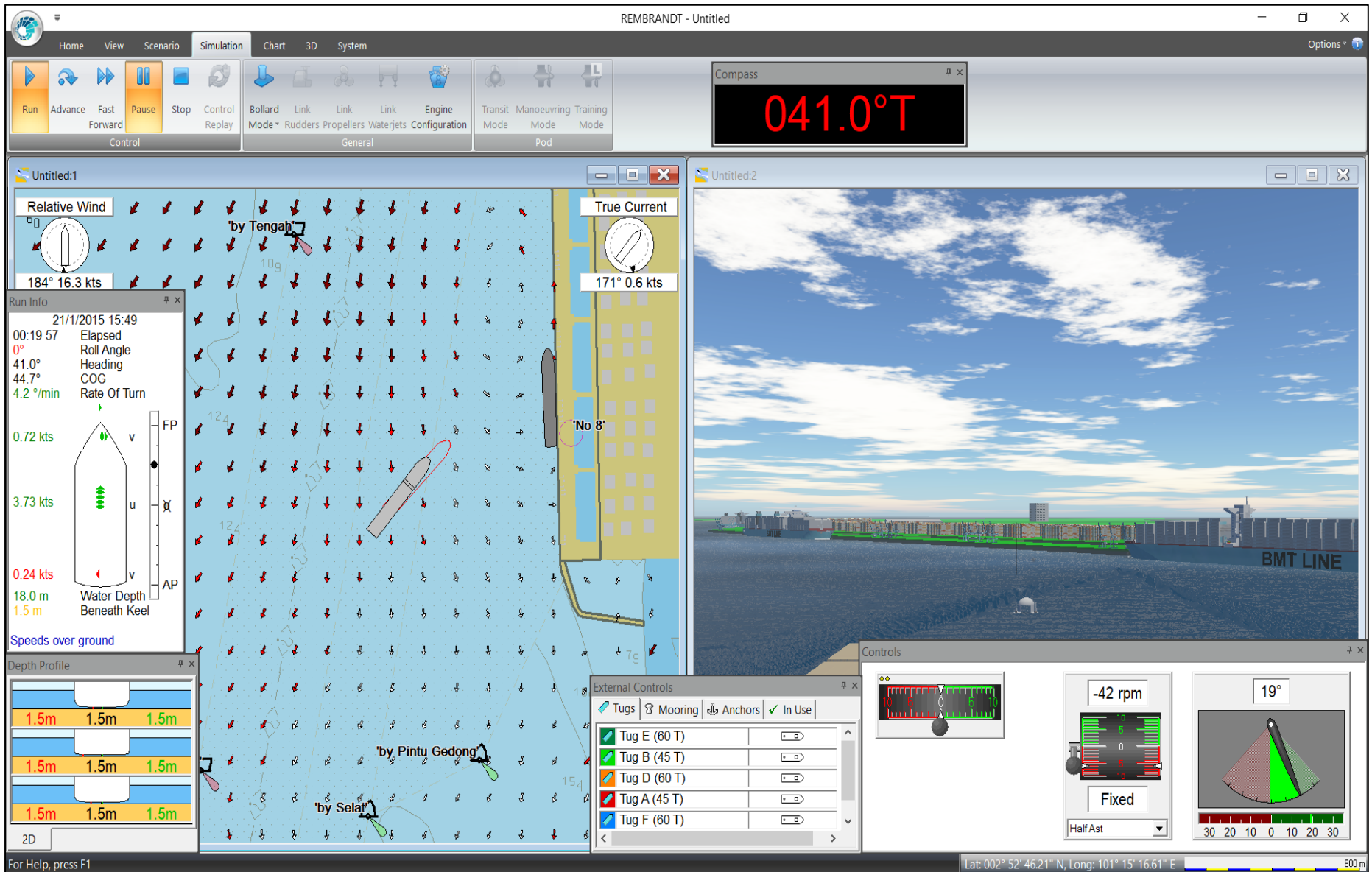
+ - Rudder Rud (°)
 x - Heading



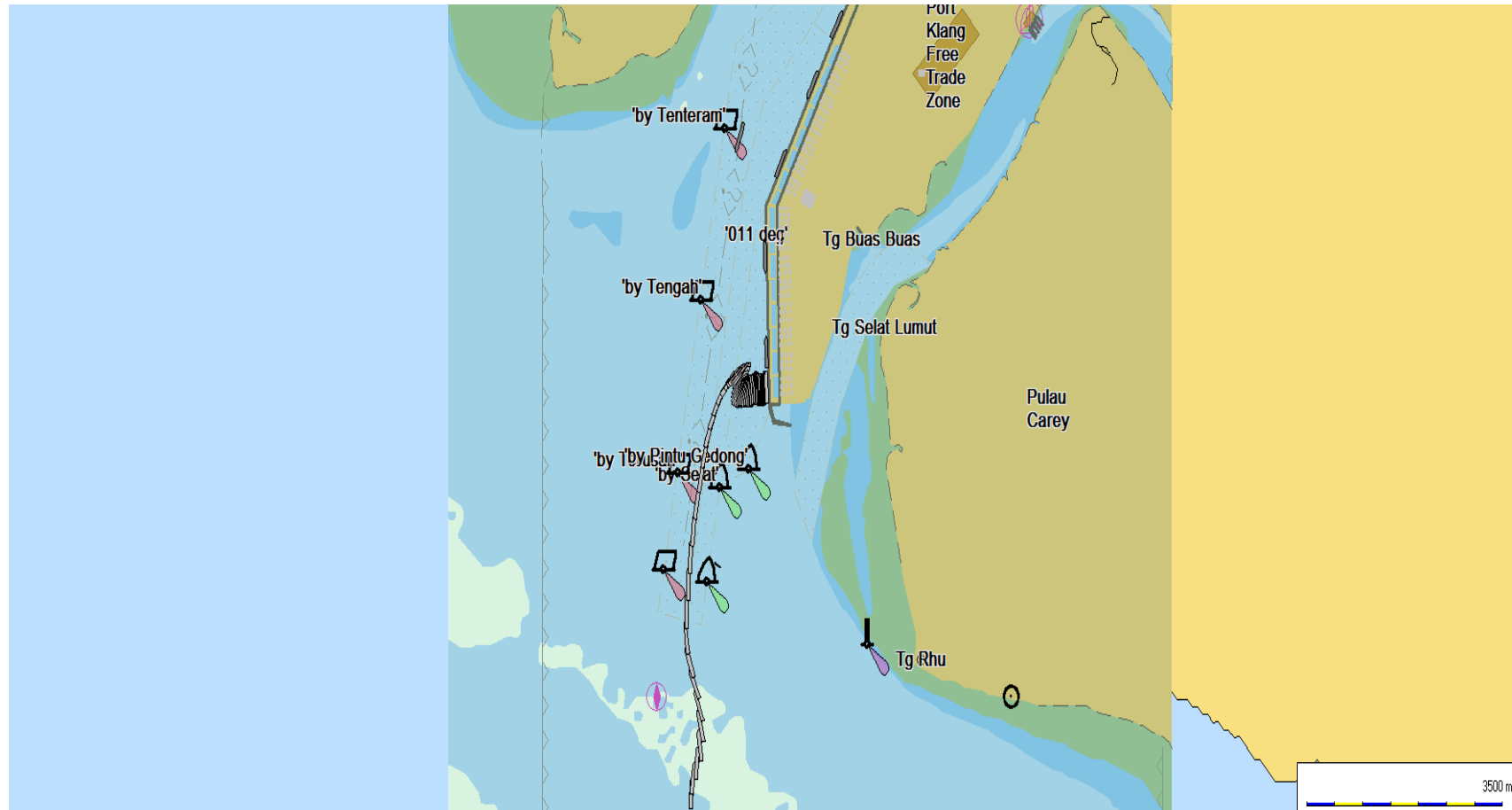




Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
53	R53WPCT17SW20 kFld1530hT60tx4St bdArr.rmb	Flood (1530h)	SW 20 k	Arrival (Stbd a/s)	F: 60t x 2 A: 60t x 2	The vessel entered the channel on Half Ahead (about 11 knots). A starboard sheer was initiated and speed was reduced. The engine was then stopped and Half Astern ordered. She pulled up about one ship's length from Berth CT-16 The tugs then assisted in pushing her alongside with the aft tugs working at ¾ Power to hold against the wind.	4/6



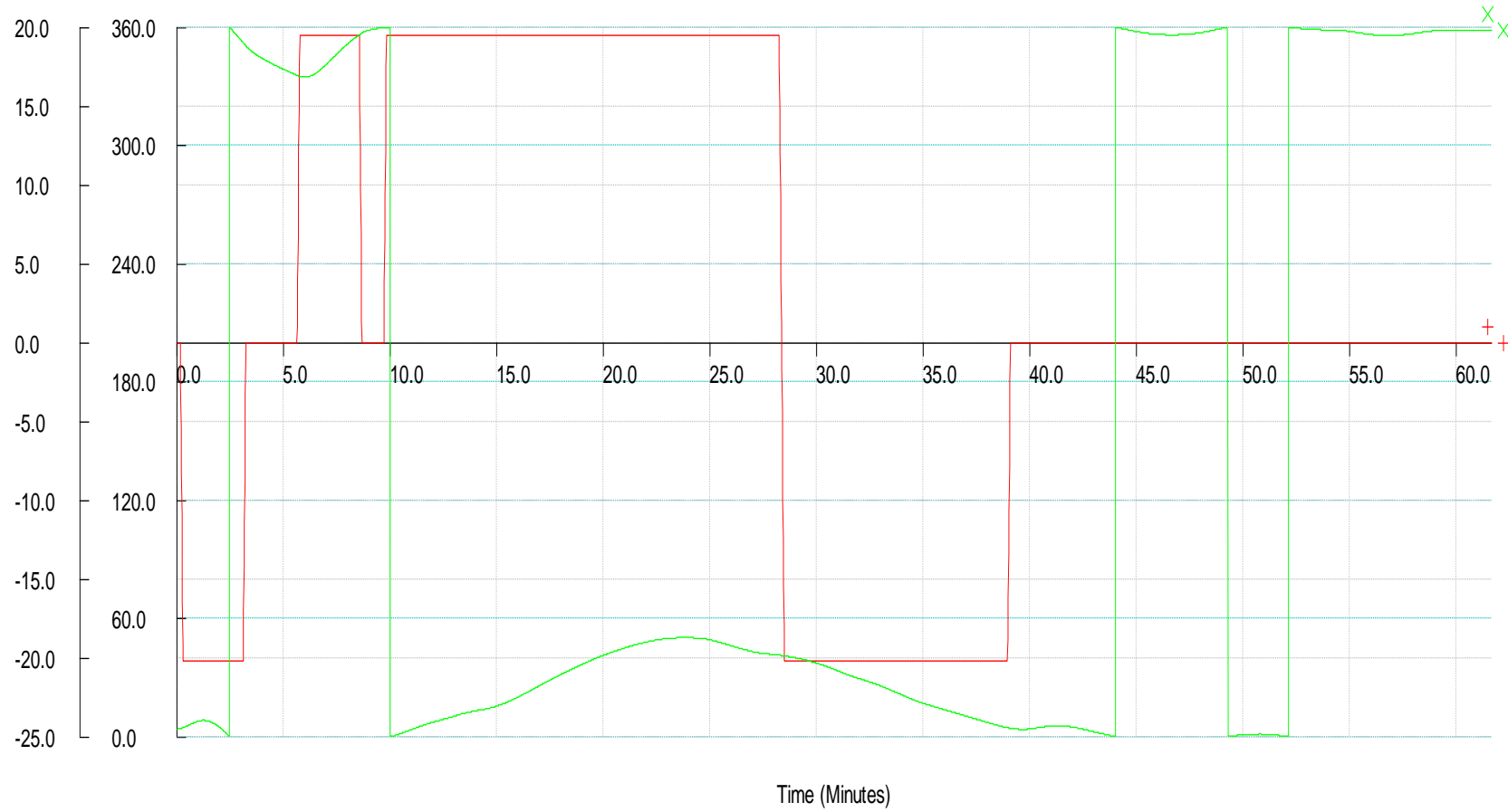
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 17/6/2019 22:06

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

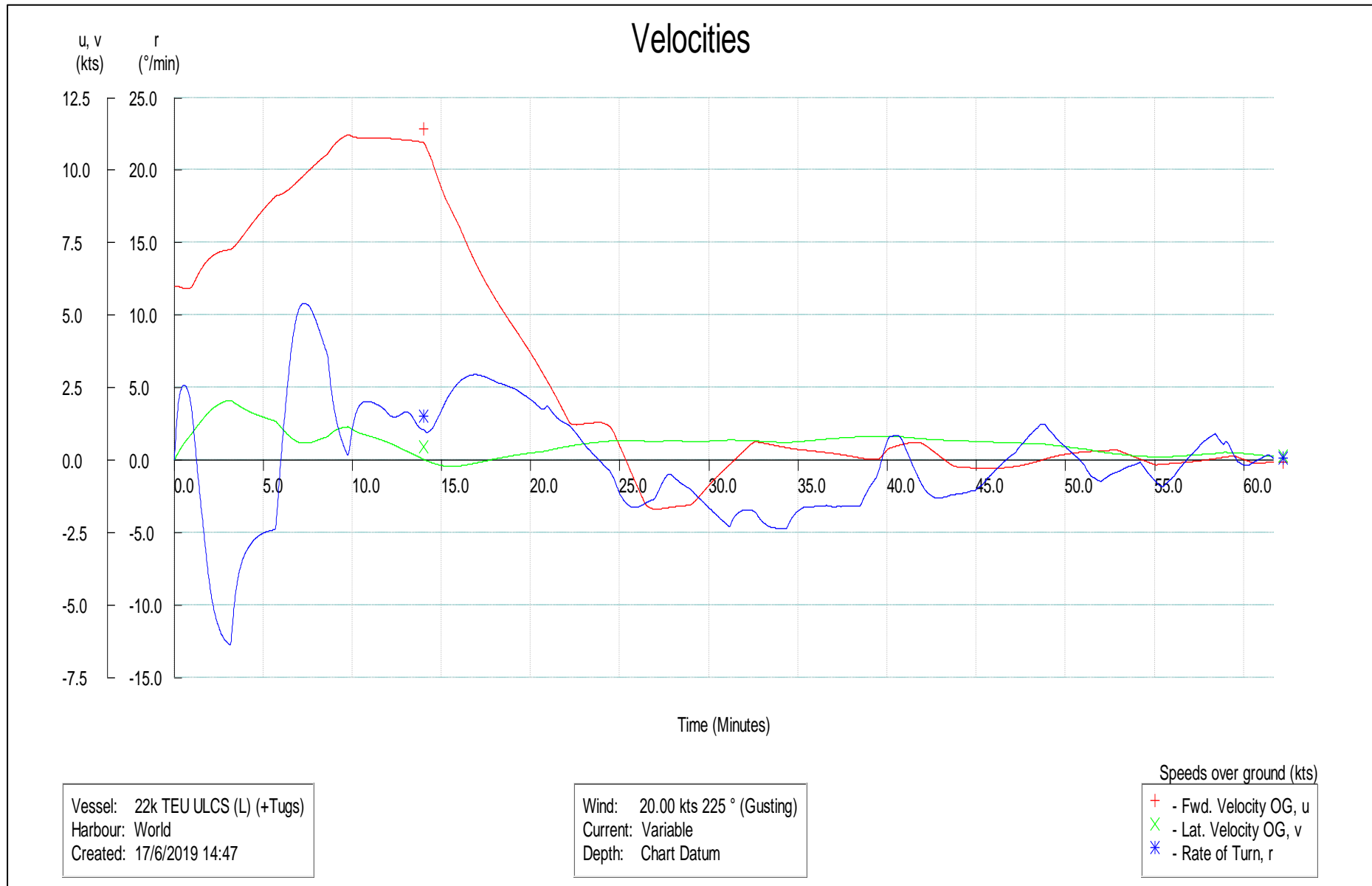
Heading and Rudder

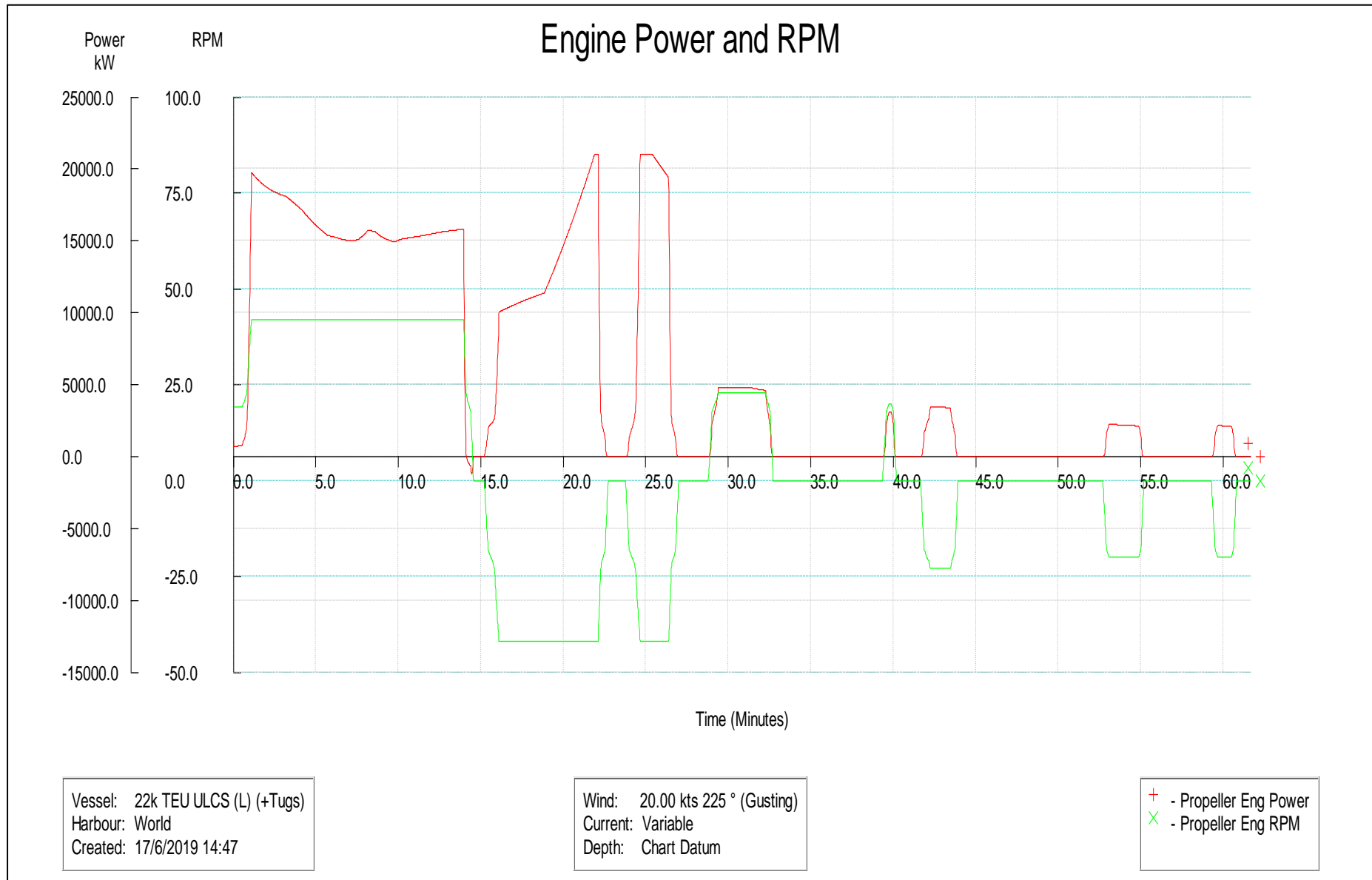


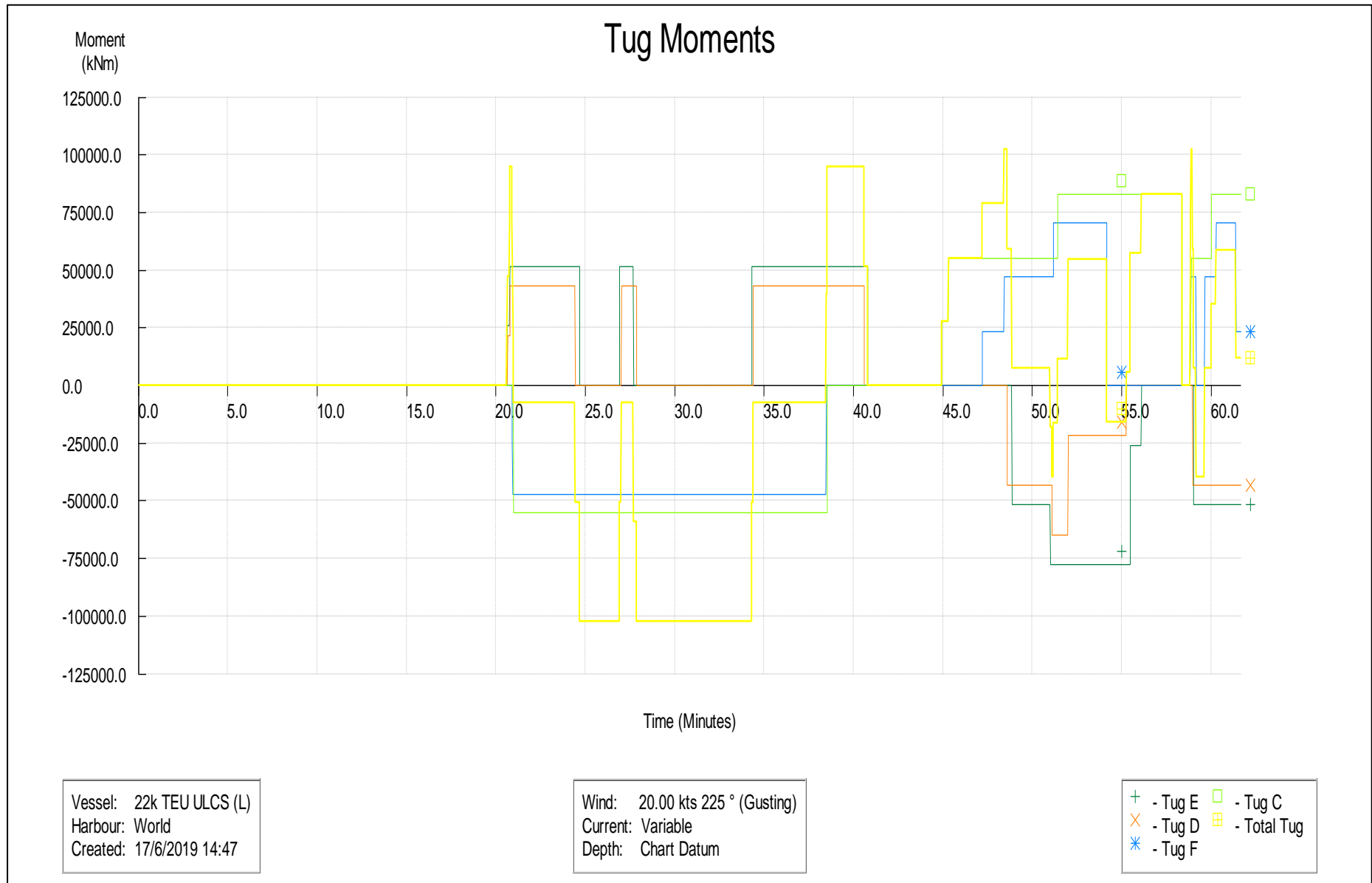
Vessel: 22k TEU ULCS (L) (+Tugs)
 Harbour: World
 Created: 17/6/2019 14:47

Wind: 20.00 kts 225 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

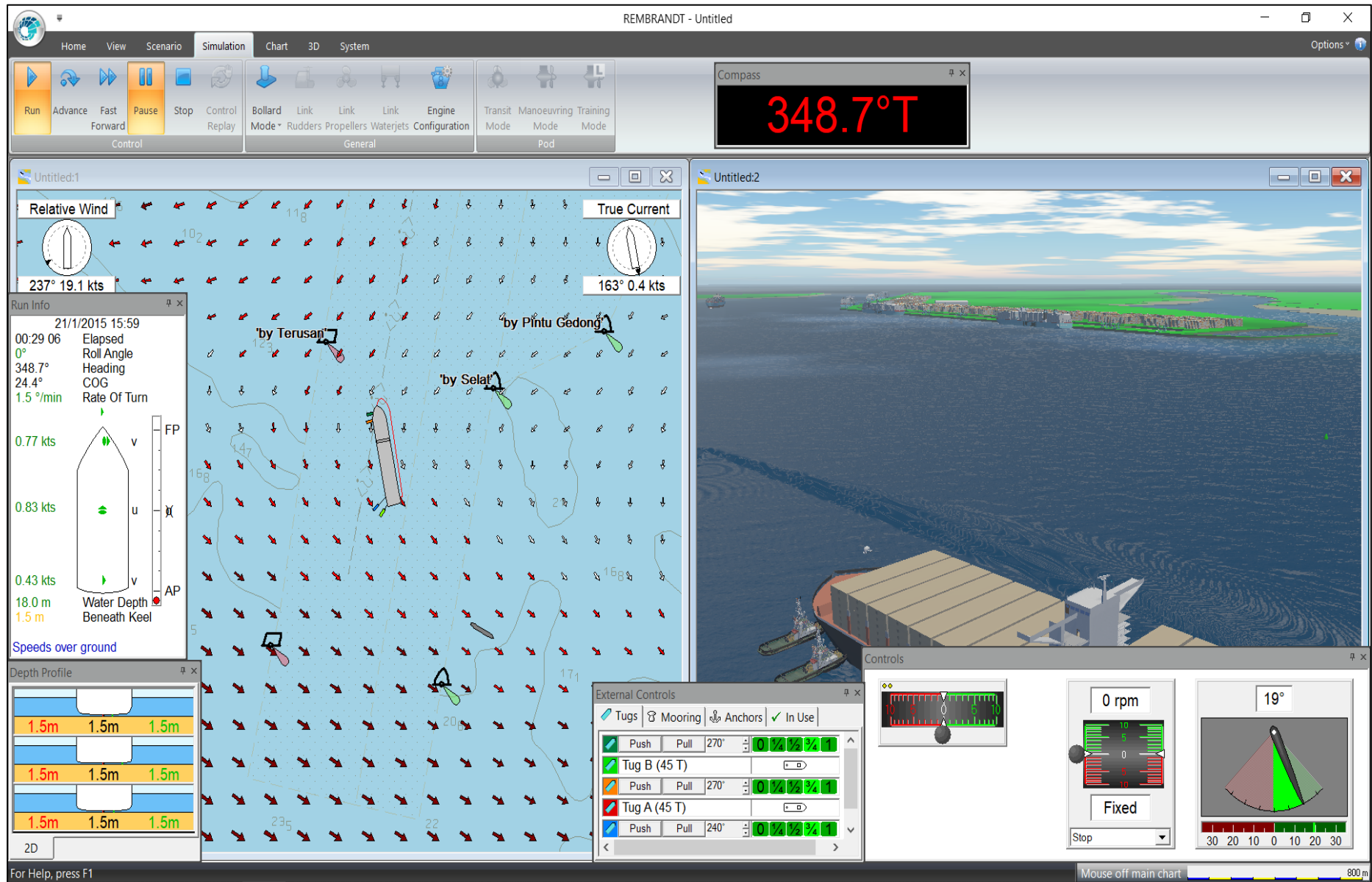
+ - Rudder Rud (°)
 x - Heading







Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
54	R54WPCT17SW20 kFld1530hT60tx4St bdArr.rmb	Flood (1530h)	SW 20 k	Arrival (Stbd a/s)	F: 60t x 2 A: 60t x 2	The vessel approached the channel on Slow Ahead. Speed was reduced to Dead Slow Ahead and tugs were made fast. She entered the channel at about 5 knots. A starboard sheer was initiated but the rate of turn was too slow. The tugs were then used at $\frac{3}{4}$ Power to swing the vessel to starboard, south of the Terusan and Selat Buoys. Helm and engine were used to assist in the swing. When headed towards the CT-16, with the turn to starboard continuing, the tugs were stopped and the vessel proceeded ahead. She was stopped about one ship's length from the berth. The tugs then assisted in holding her against the wind as she went alongside.	4/6

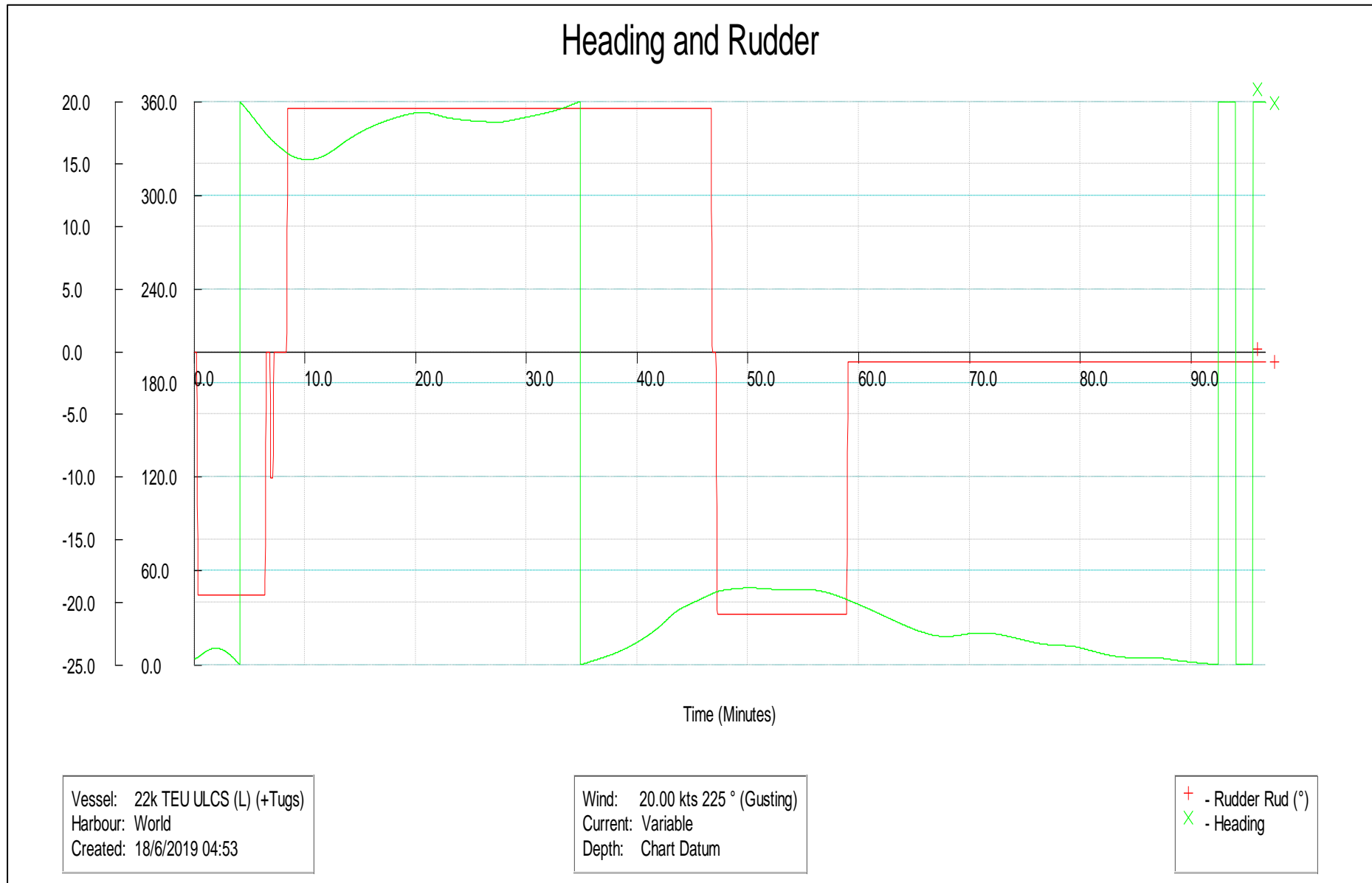


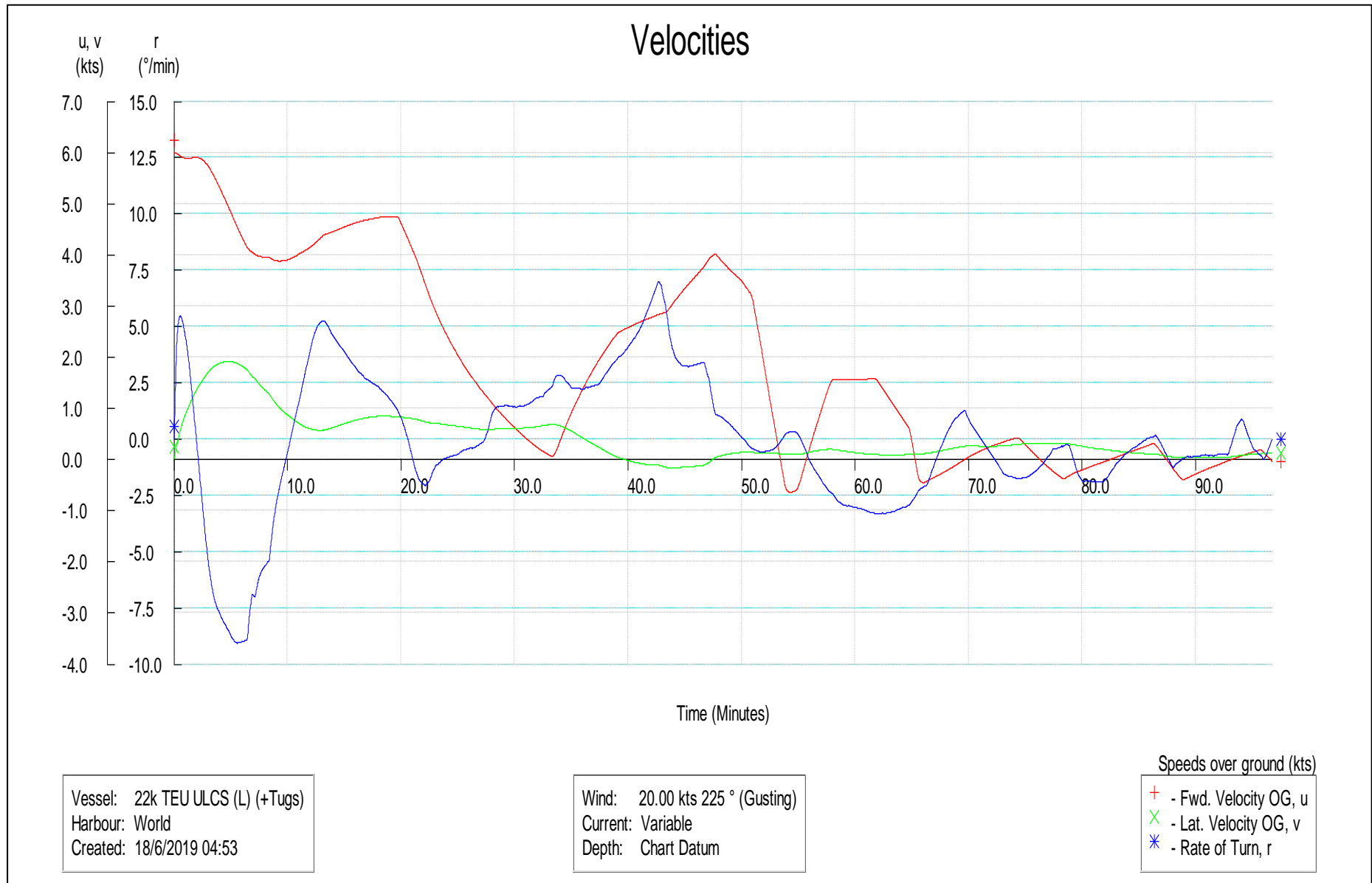
Vessel Track

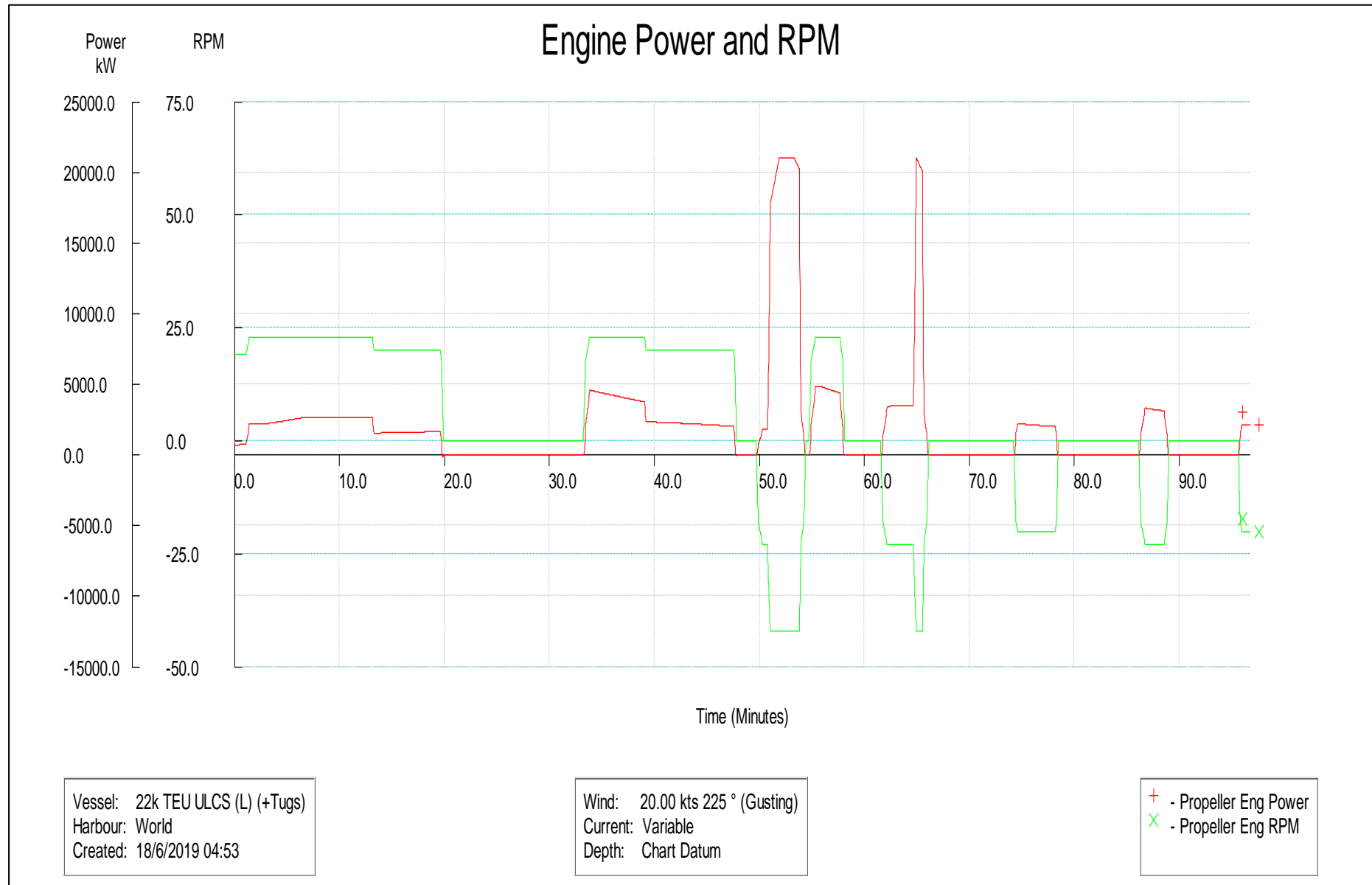


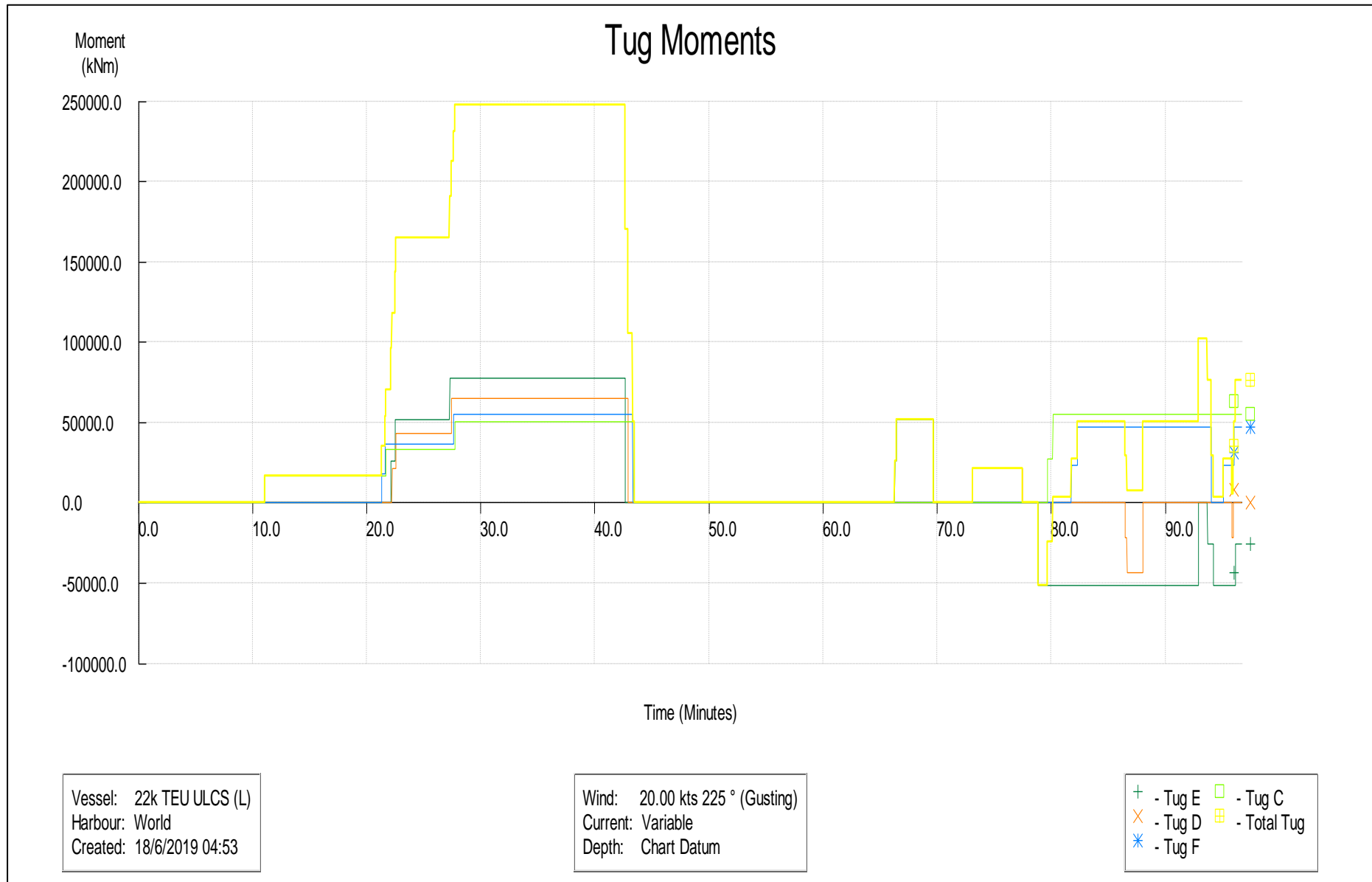
Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 18/6/2019 04:53

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

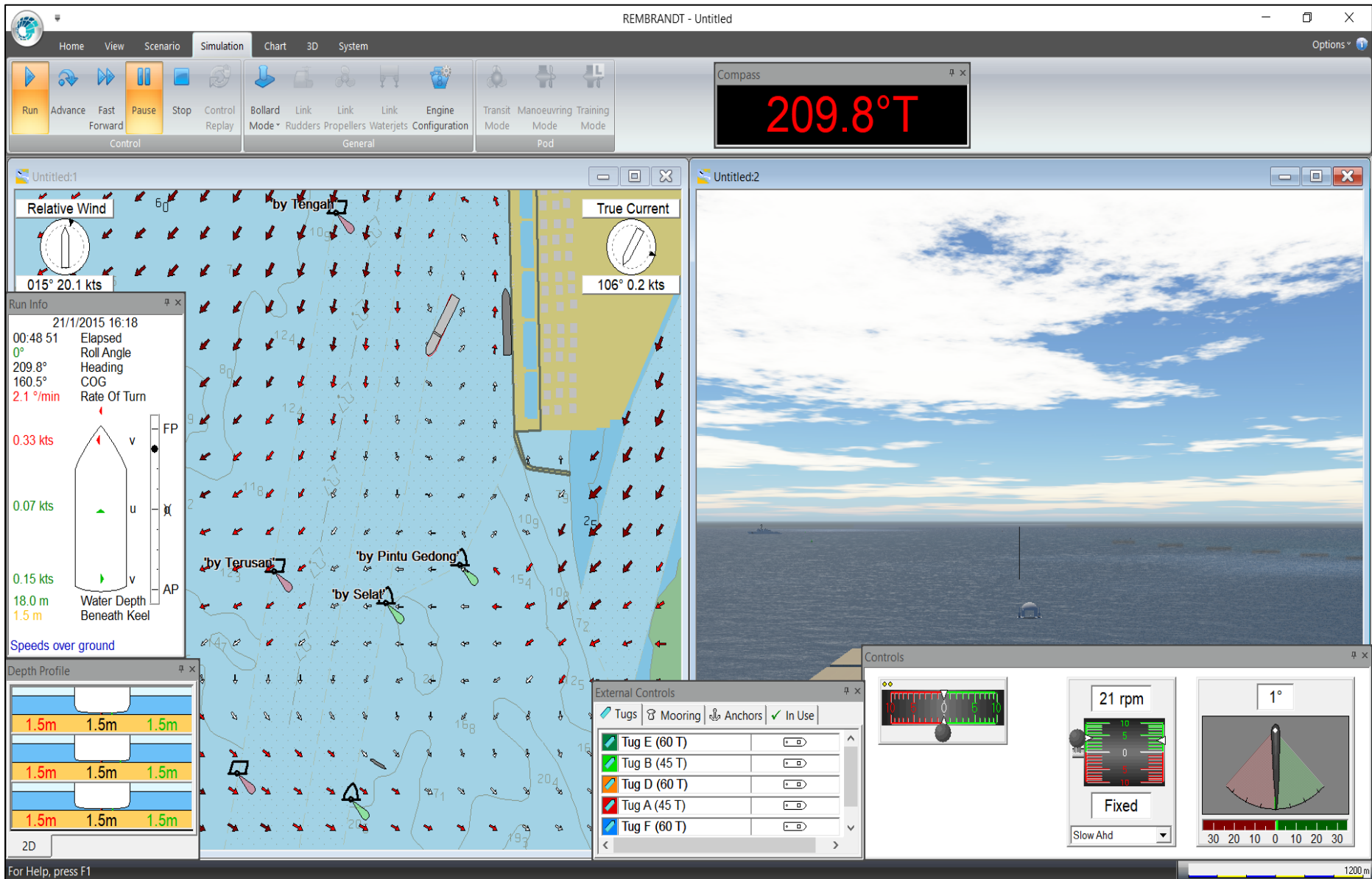




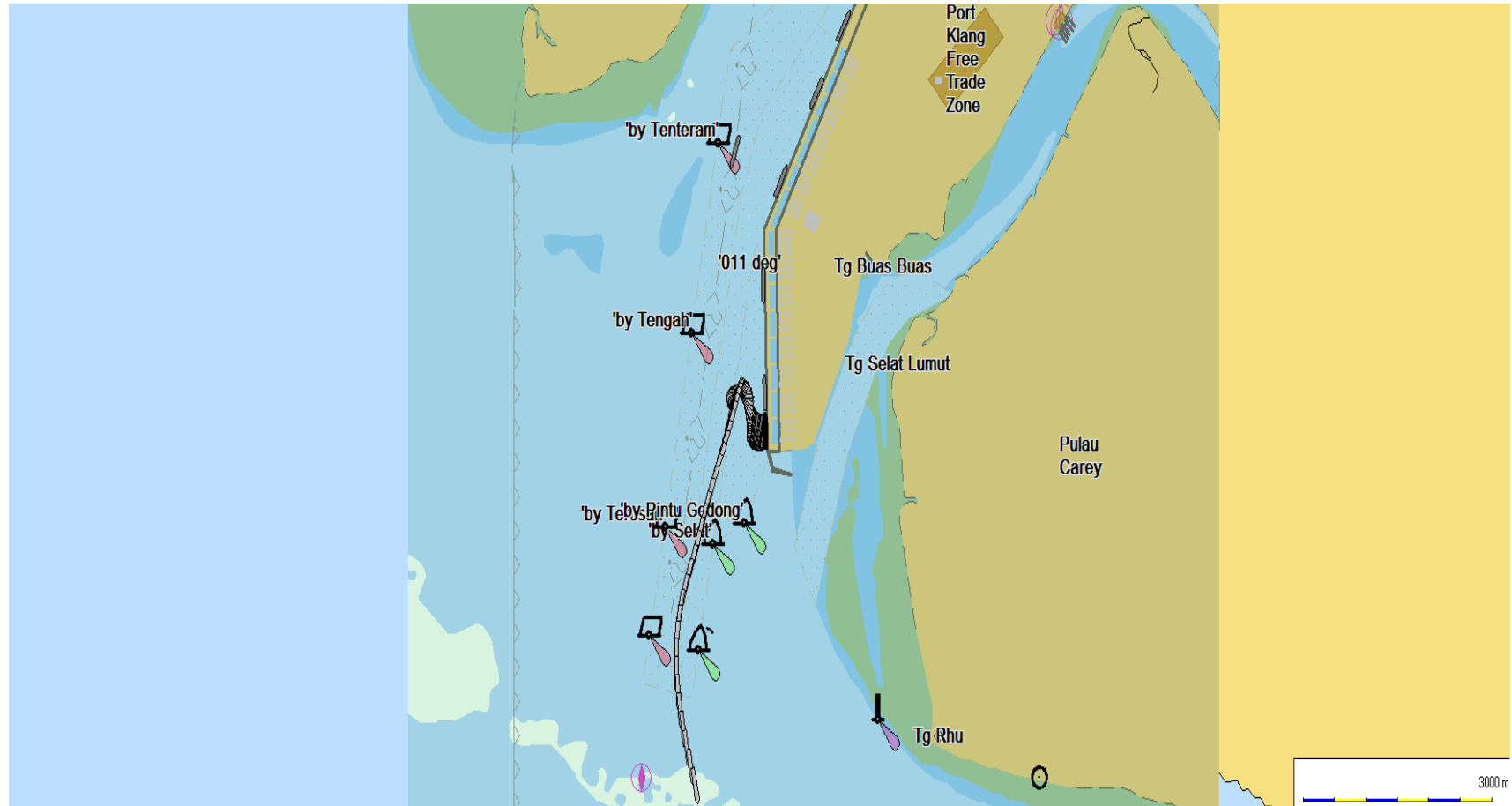




Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
55	R55WPCT17SW20 kFId1530hT60tx4St bdDep.rmb	Flood (1530h)	SW 20 k	Departure (Stbd a/s)	F: 60t x 2 A: 60t x 2	The vessel was pulled off the berth and swung to port using four 60 tons bollard pull tugs. The tugs operated at a maximum of $\frac{3}{4}$ Power. When the ship was pointed between the Selat and Terusan Buoys, the tugs were let go and the vessel proceeded to sea at Slow Ahead (about 7 knots).	3/6

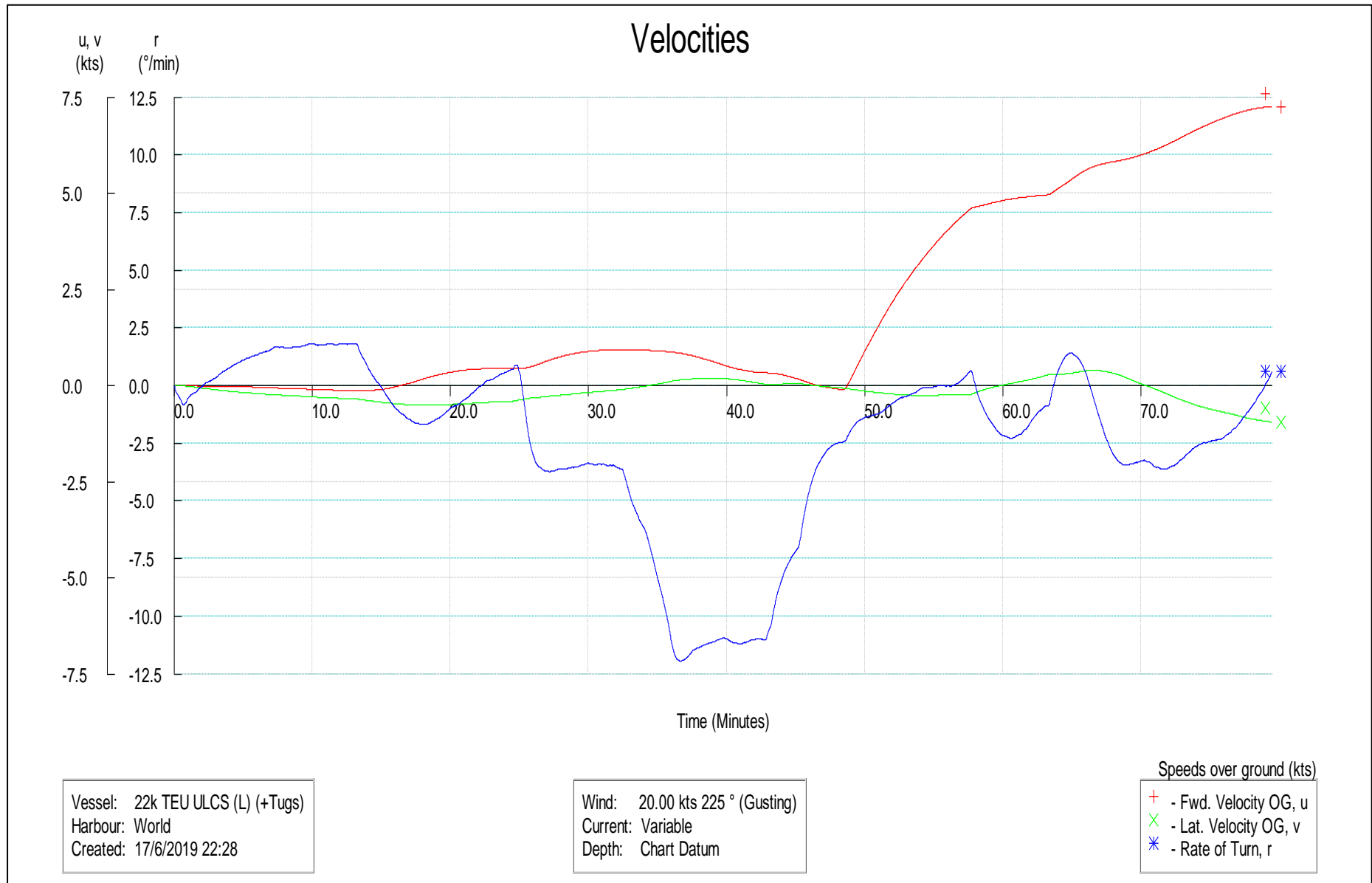


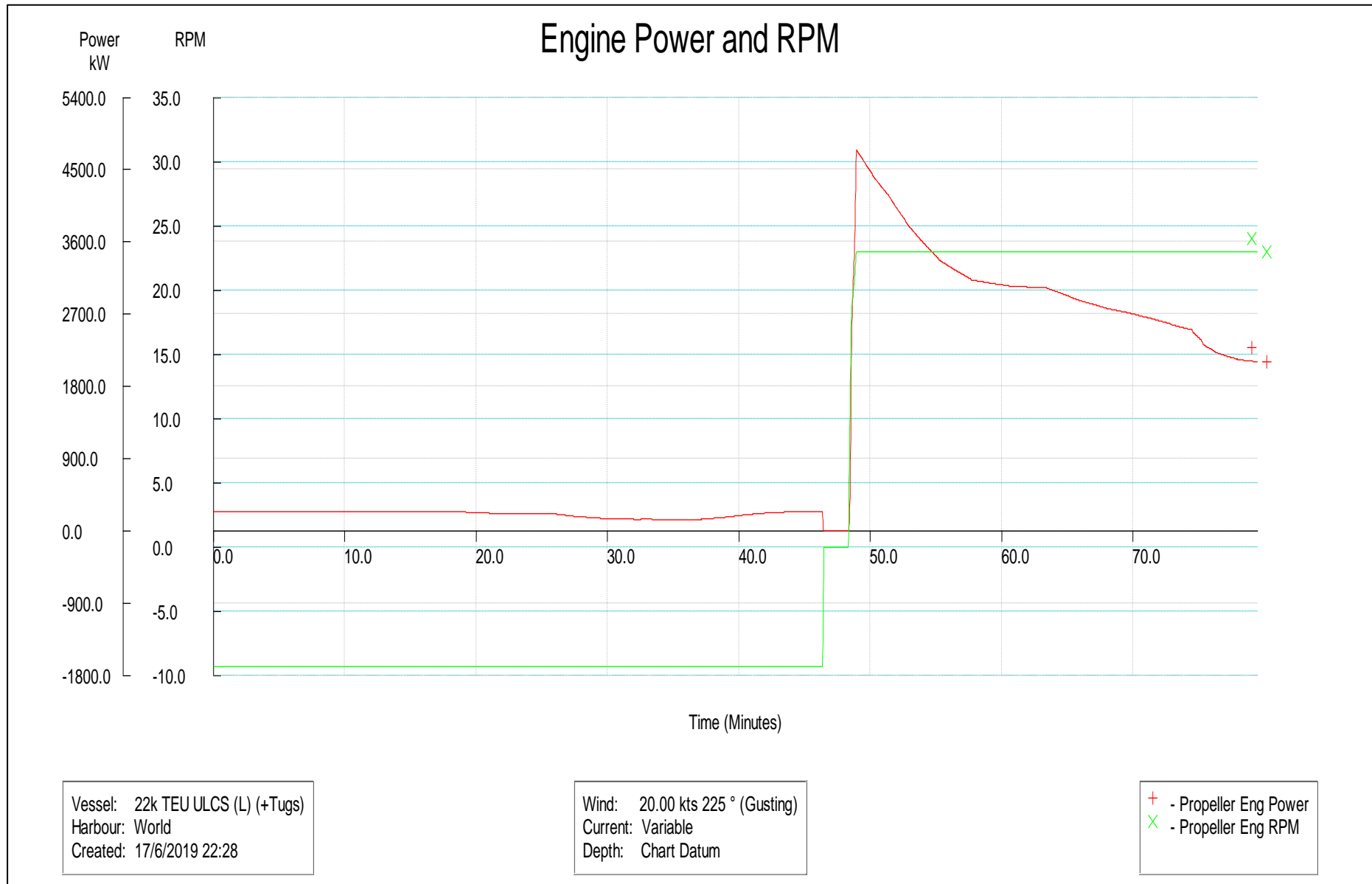
Vessel Track

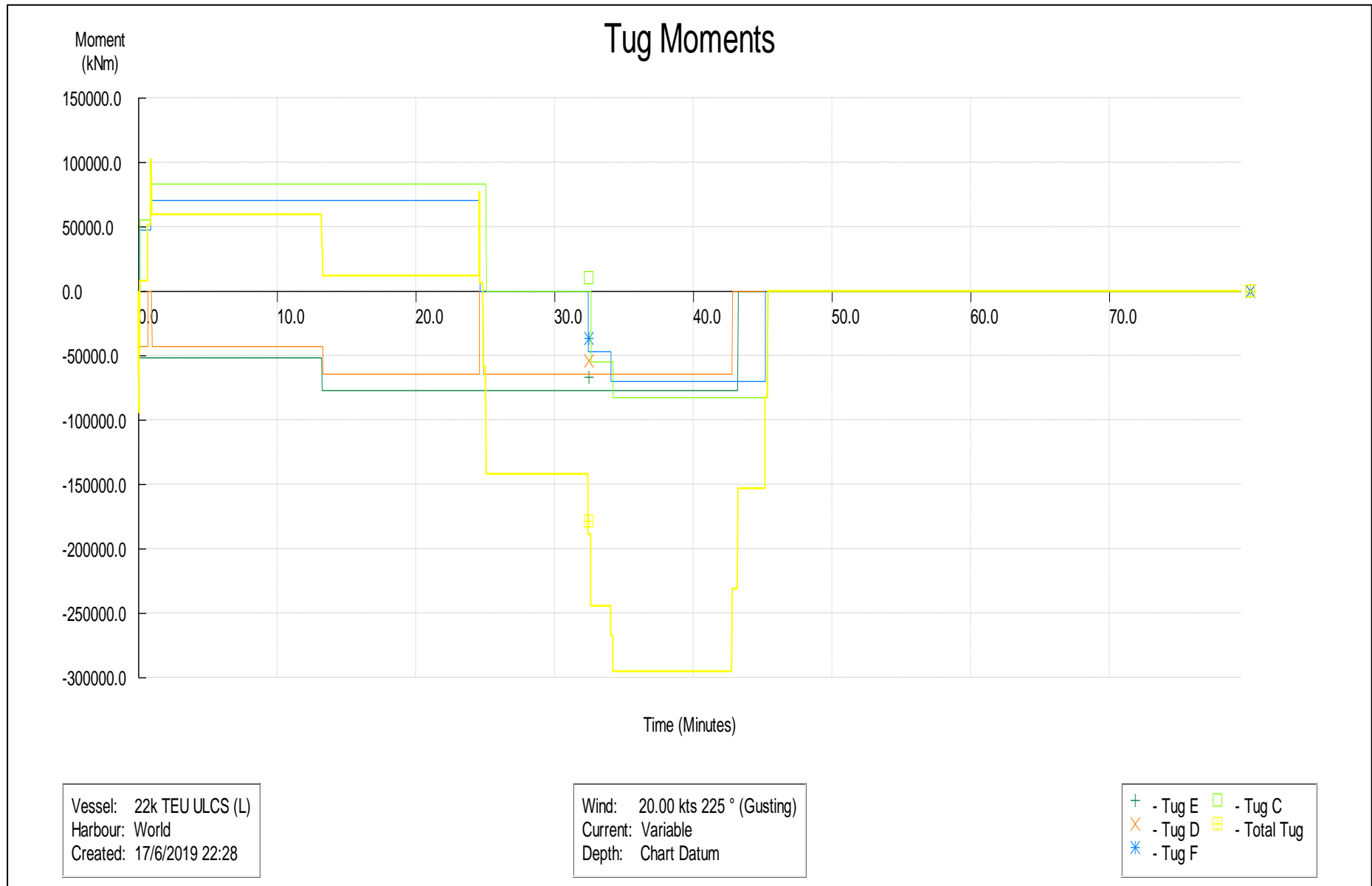


Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 18/6/2019 05:59

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum





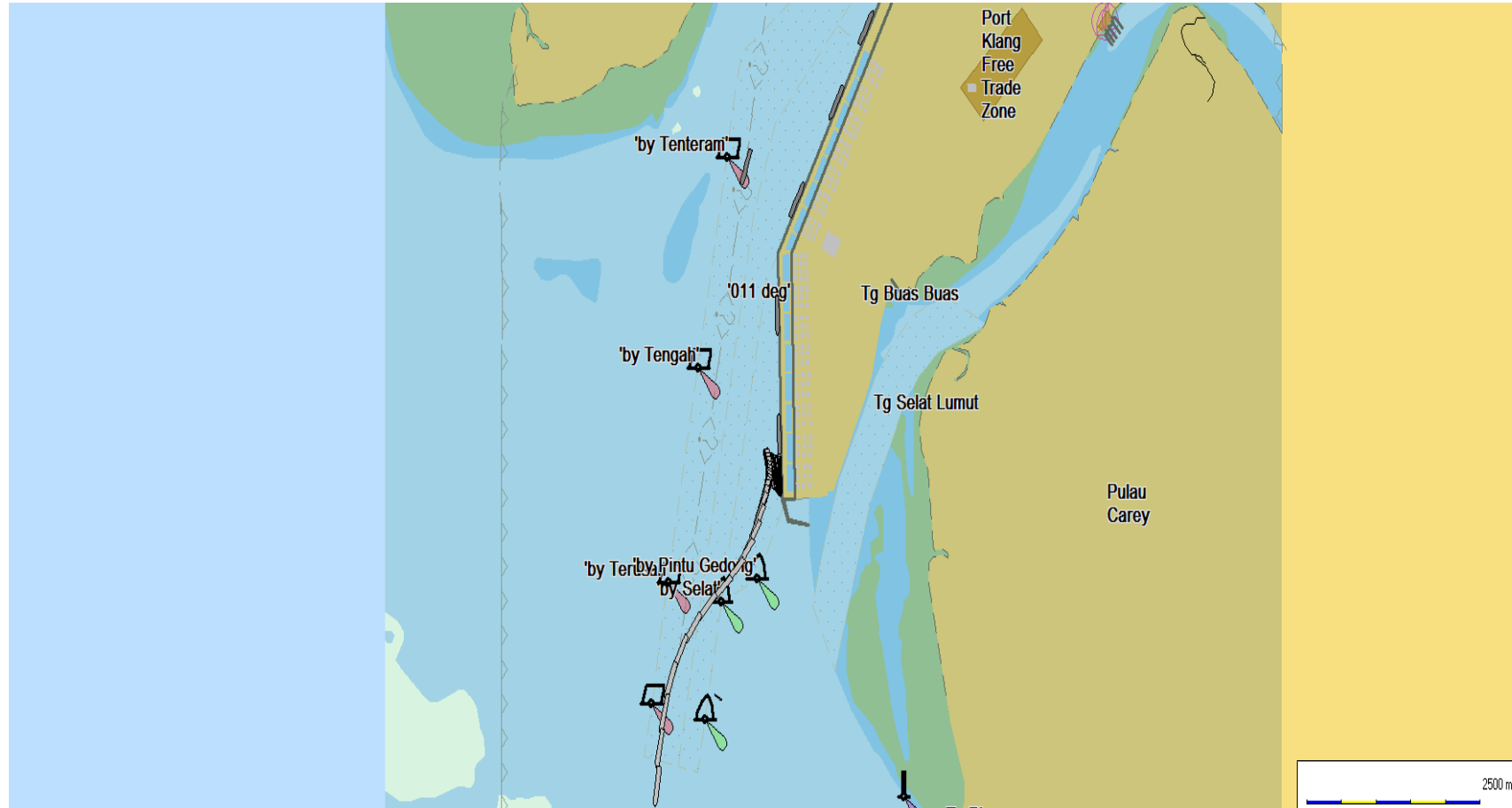


Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
56	R56WPCT17SW20 kFld1530hT60tx4P ortDep.rmb	Flood (1530h)	SW 20 k	Departure (Port a/s)	F: 60t x 2 A: 60t x 2	The vessel was pulled off the berth and headed towards the channel using four 60 tons bollard pull tugs. The tugs operated at a maximum of $\frac{3}{4}$ Power. The tugs were then let go and the vessel proceeded to sea at Half Ahead (about 11 knots).	3/6

The screenshot displays the REMBRANDT simulation software interface, titled "REMBRANDT - Untitled". The interface is divided into several functional areas:

- Top Menu and Control Bar:** Includes tabs for Home, View, Scenario, Simulation, Chart, 3D, and System. Below these are buttons for Run, Advance, Fast Forward, Pause, Stop, and Control Replay. A secondary row of buttons includes Bollard Mode, Link Rudders, Link Propellers, Link Waterjets, Engine Configuration, Transit Mode, Manoeuvring Mode, and Training Mode.
- Compass Panel:** A floating window showing a heading of **162.8°T**.
- Chart View (Untitled:1):** A 2D simulation chart showing a ship's path. The ship is oriented at 063° with a speed of 20.1 kts. Environmental data includes True Current at 149° 0.2 kts. A "No 8" marker is visible on the chart.
- Run Info Panel:** Displays simulation parameters for 21/1/2015 at 15:43. Metrics include Elapsed time (00:13:51), Roll Angle (0°), Heading (162.9°), COG (299.0°), and Rate Of Turn (1.2 °/min). It also shows speed components (0.17 kts, 0.32 kts, 0.45 kts) and water depth (18.0 m, 1.5 m beneath keel).
- Depth Profile Panel:** Shows a cross-section of the water depth with three layers, each 1.5m deep.
- External Controls Panel:** Manages tug operations. It lists Tugs B (45 T) and A (45 T) with their respective Push/Pull directions and 90° angles. A "Fixed" control is also present.
- 3D View (Untitled:2):** A perspective view of the simulation showing a large container ship being assisted by a tugboat in a harbor setting.
- Bottom Status Bar:** Shows coordinates (Lat: 002° 52' 24.44" N, Long: 101° 15' 48.70" E) and a 360m scale bar.

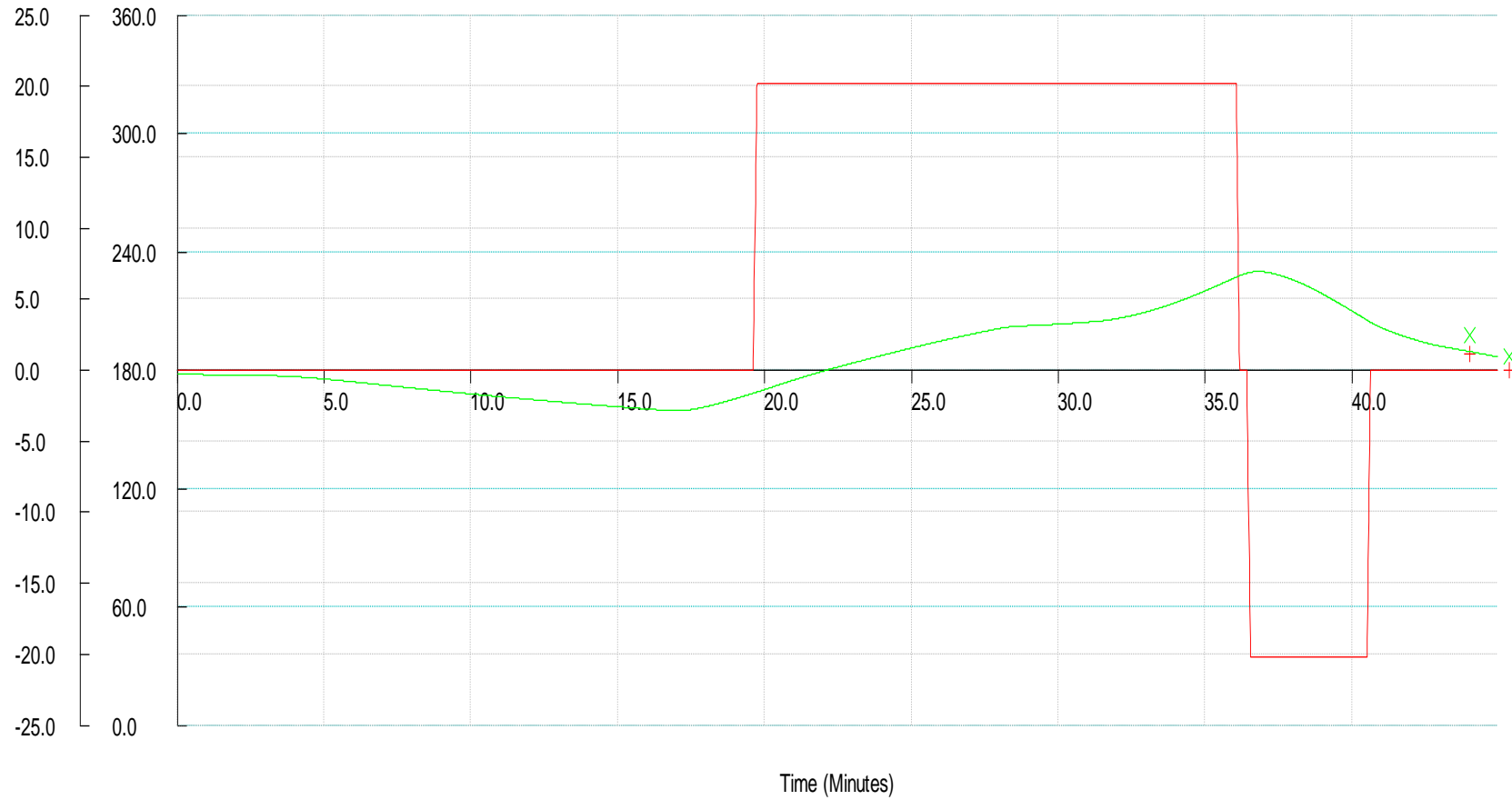
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 18/6/2019 06:37

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

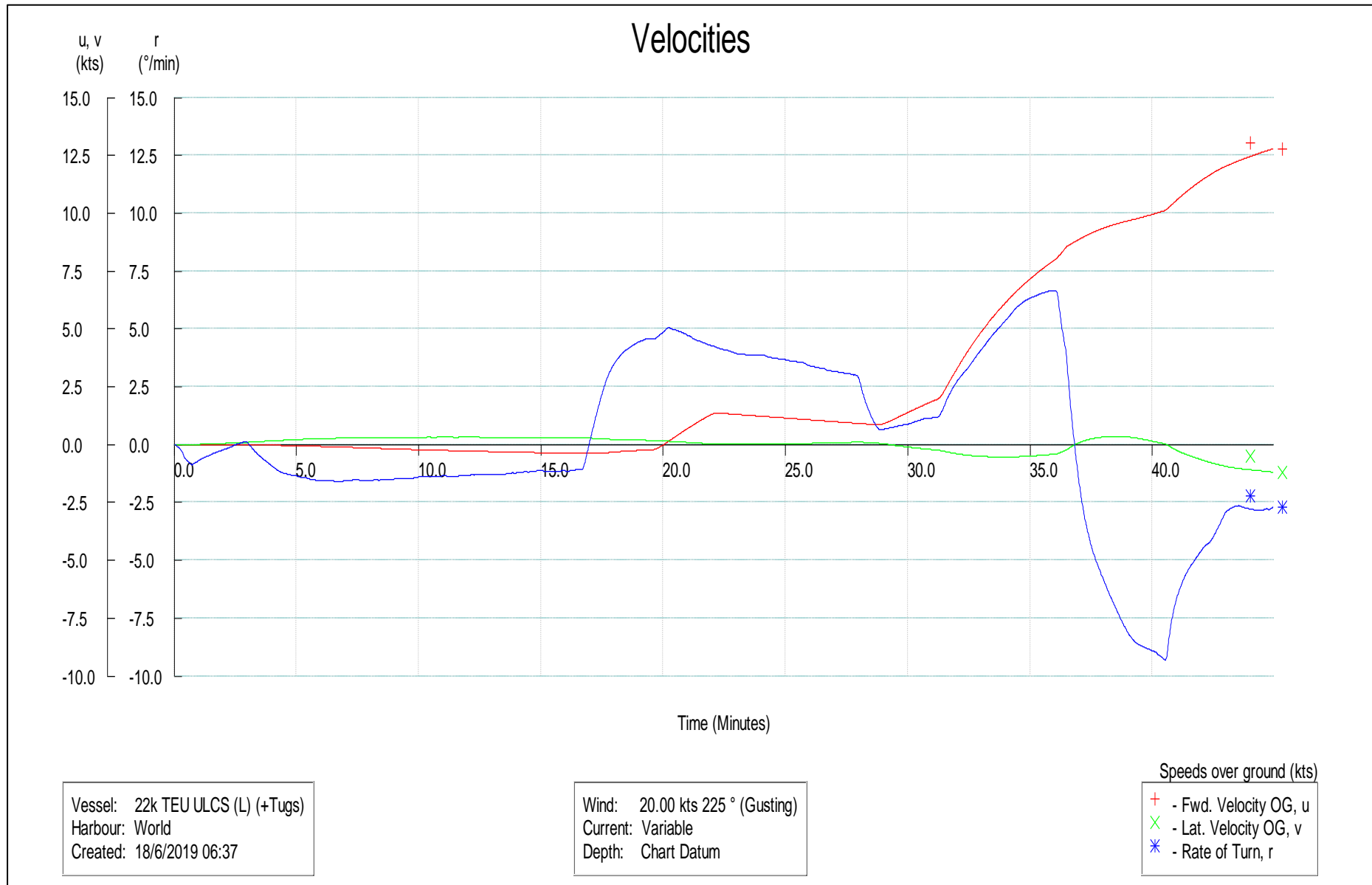
Heading and Rudder

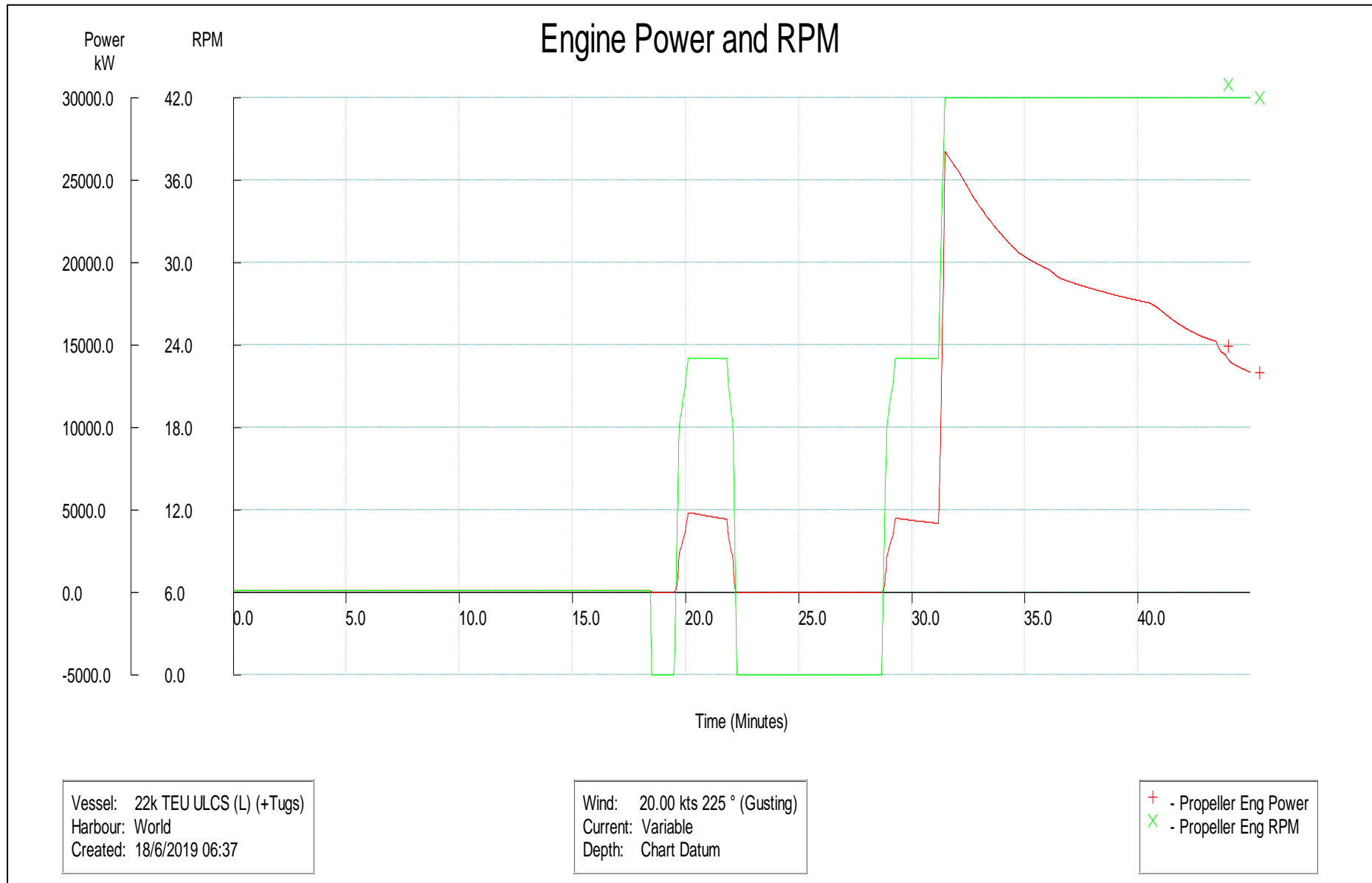


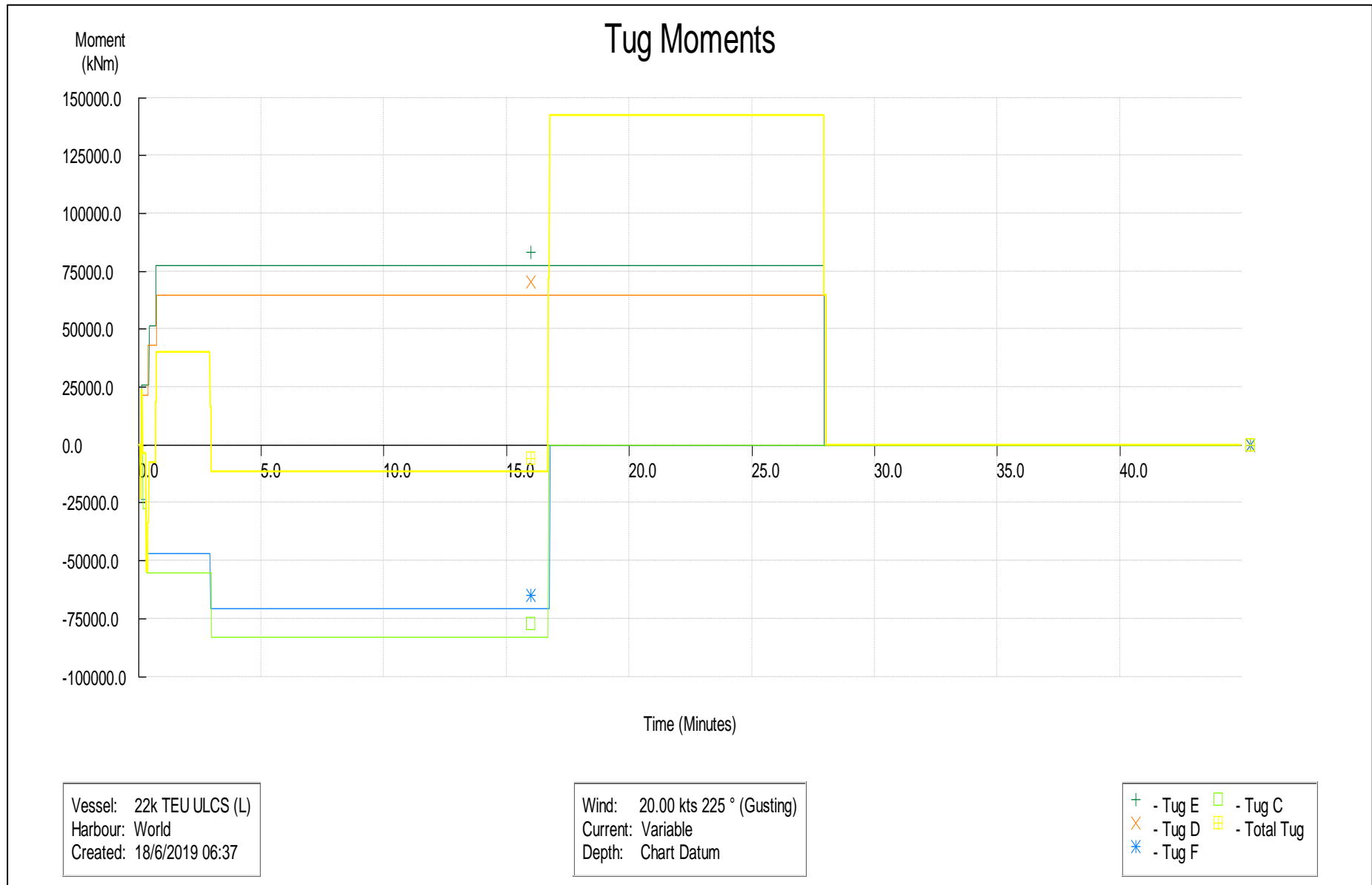
Vessel: 22k TEU ULCS (L) (+Tugs)
 Harbour: World
 Created: 18/6/2019 06:37

Wind: 20.00 kts 225 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

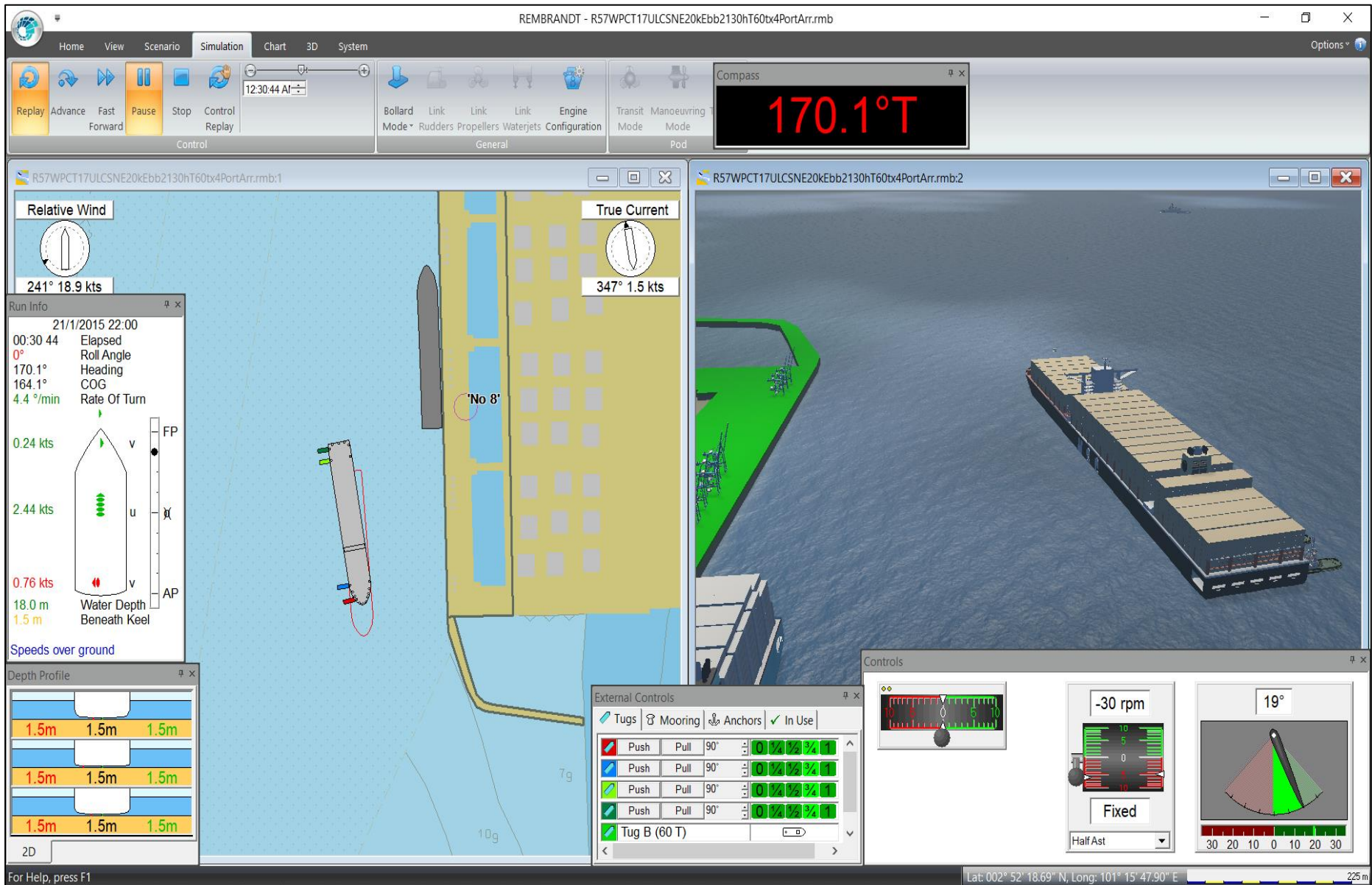
+ - Rudder Rud (°)
 X - Heading







Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
57	R57WPCT17NE20 kEbb2130hT60tx4P ortArr.rmb	Ebb (2130h)	NE 20 k	Arrival (Port a/s)	F: 60t x 2 A: 60t x 2	The vessel entered the channel at over 12 knots. When approaching the Selat Buoy, starboard helm was applied to head towards the berth and Half Ahead on engine was maintained to help turn the vessel. The engine was then stopped and put Half Astern to arrest the headway before making fast four 60 tons bollard pull tugs. The tugs then assisted in swinging the vessel to starboard with the help of helm and engine. $\frac{3}{4}$ Power was required by the tugs to effectively swing the vessel and assist in berthing. Minimum available channel clearance: 490m	4/6



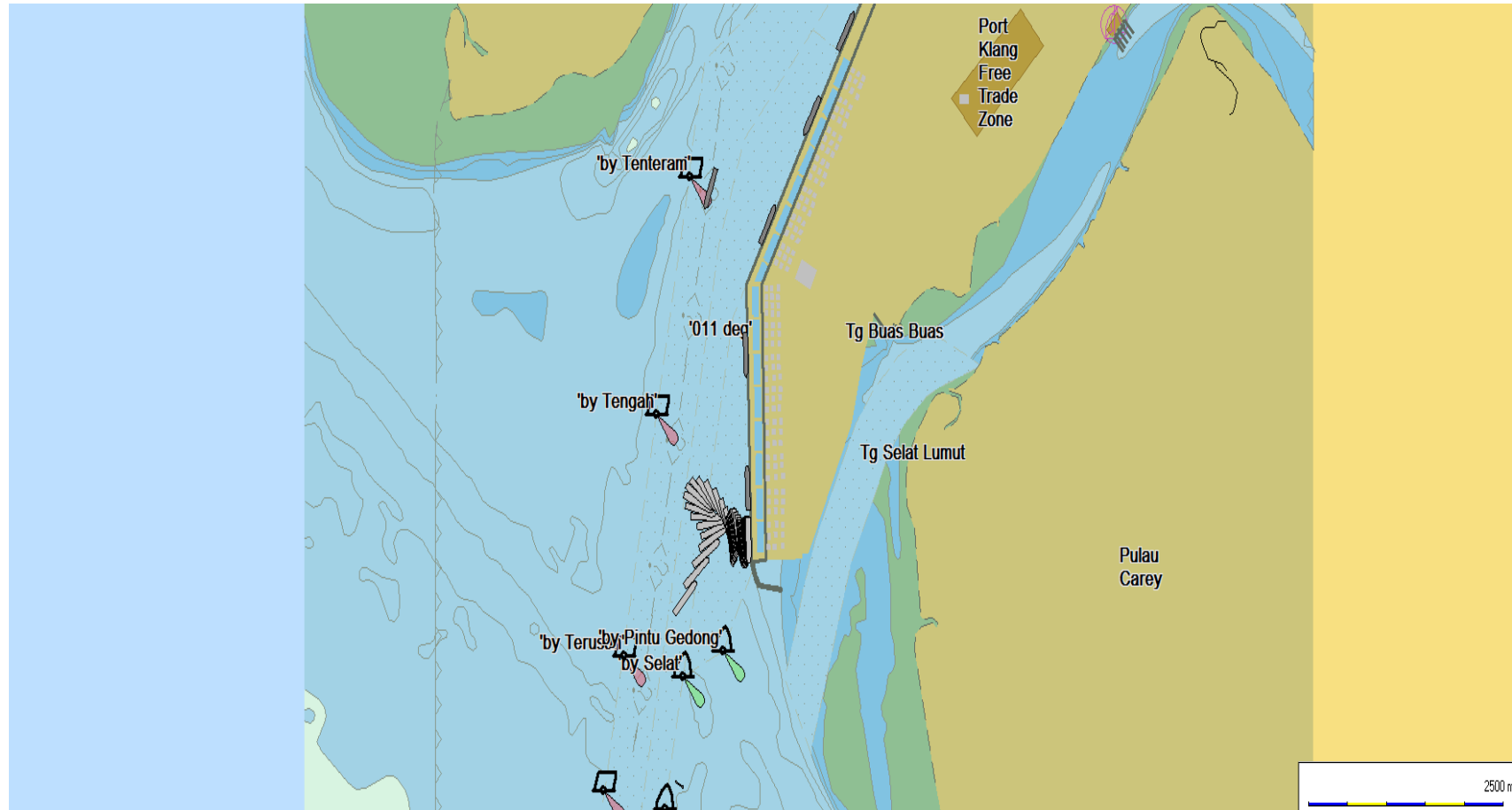
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 10/6/2019 10:48

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

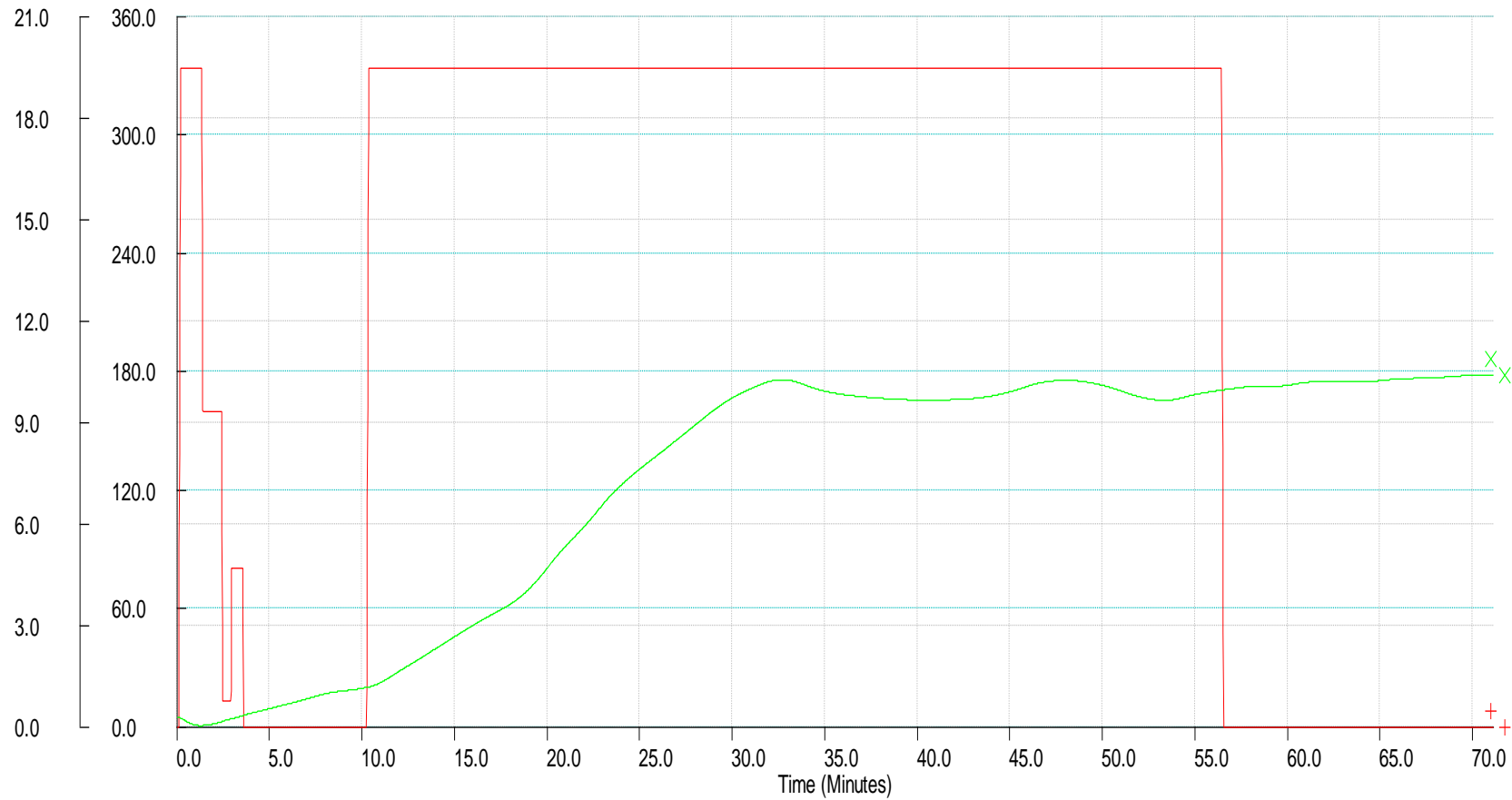
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 10/6/2019 10:48

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

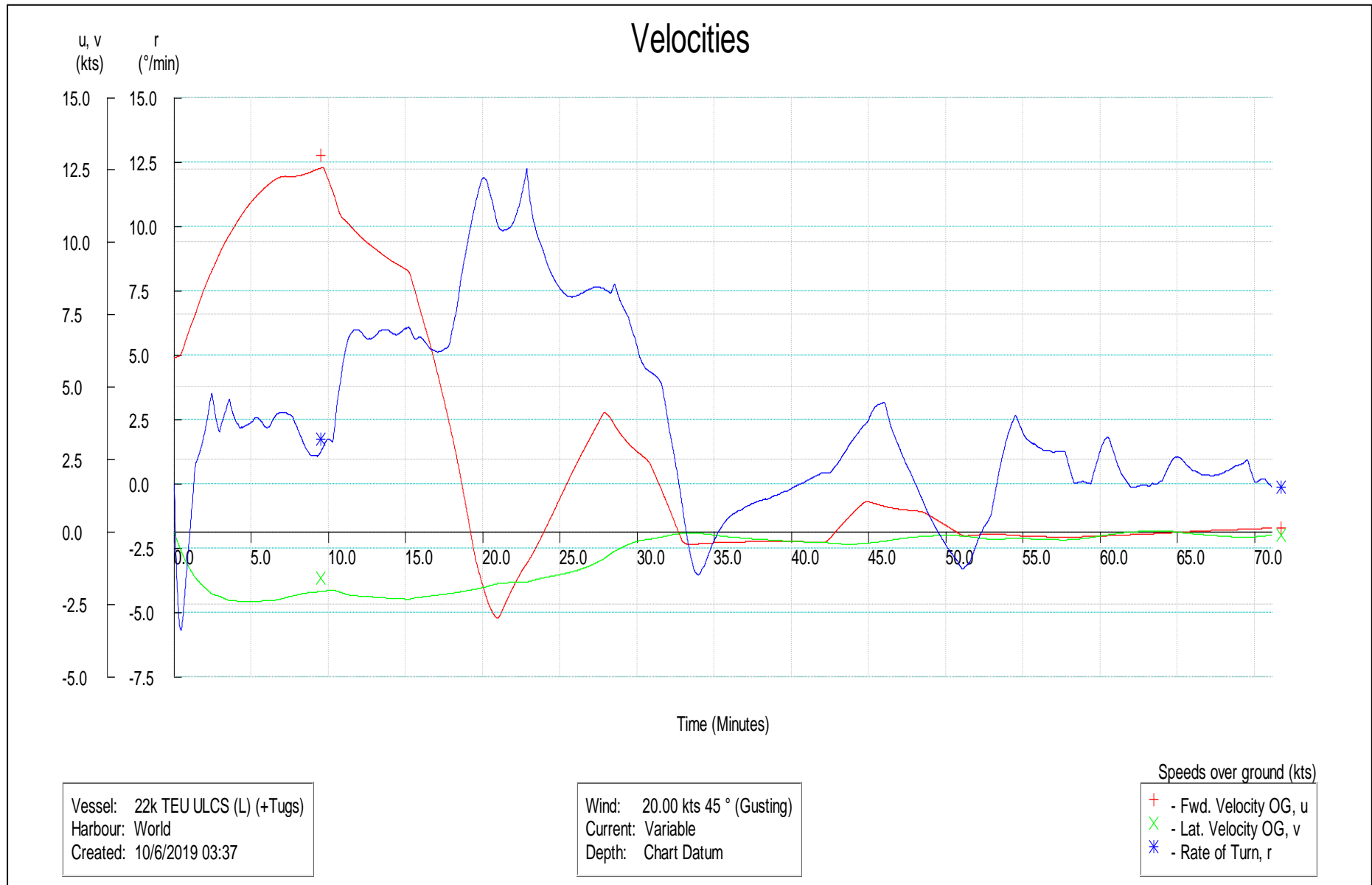
Heading and Rudder

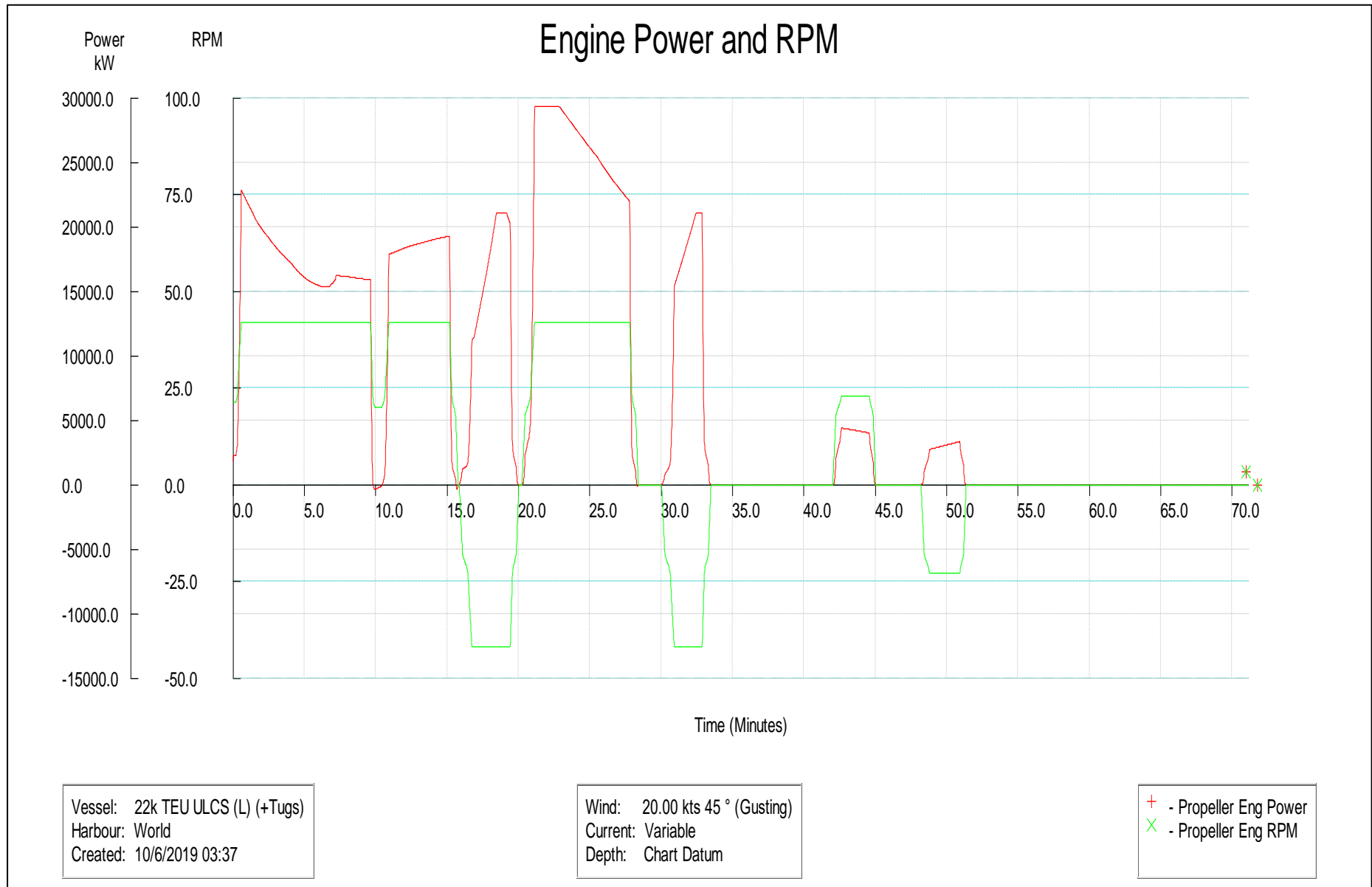


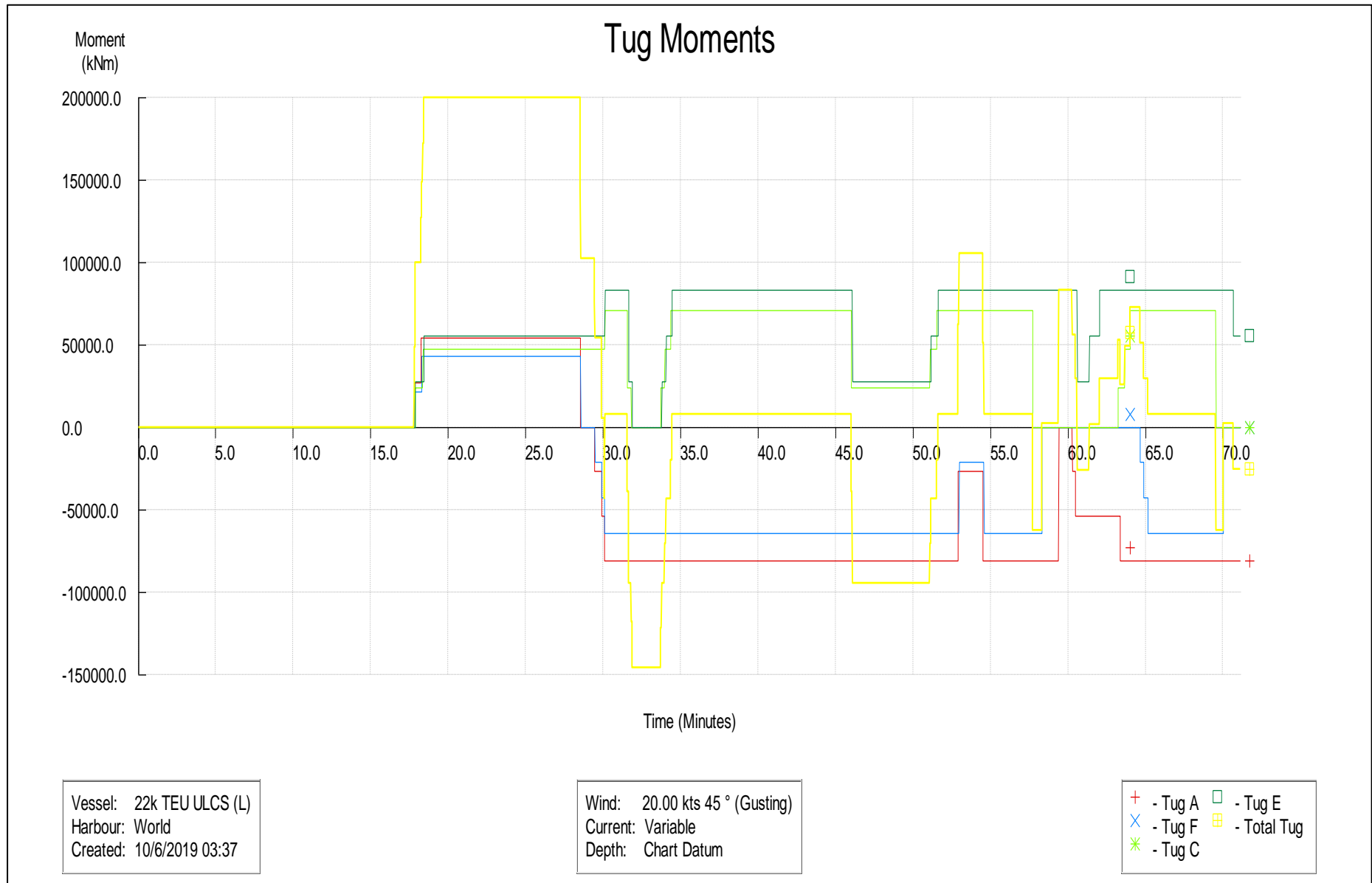
Vessel: 22k TEU ULCS (L) (+Tugs)
 Harbour: World
 Created: 10/6/2019 03:37

Wind: 20.00 kts 45 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

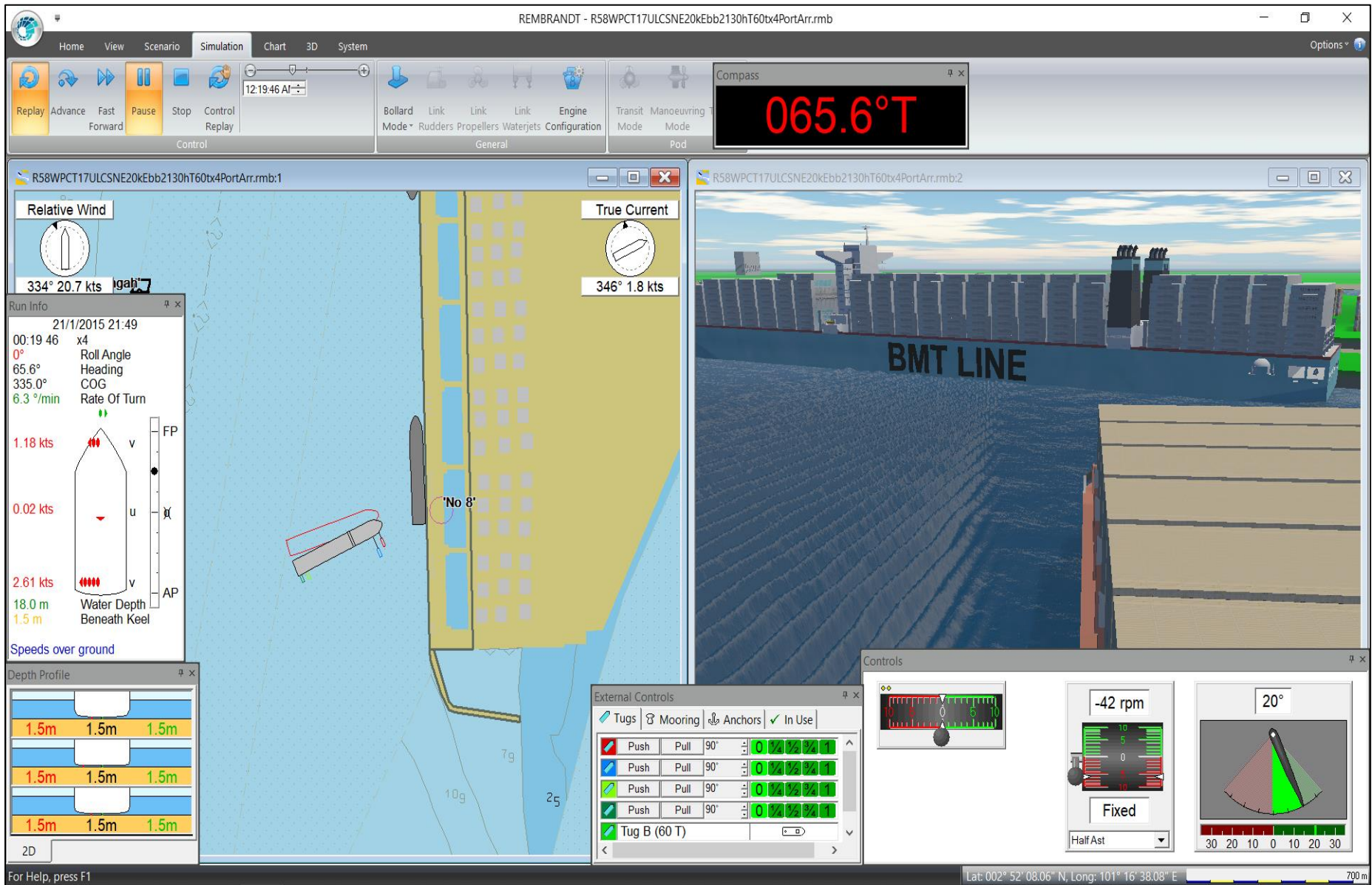
+ - Rudder Rud (°)
 x - Heading







Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
58	R58WPCT17NE20 kEbb2130hT60tx4P ortArr.rmb	Ebb (2130h)	NE 20 k	Arrival (Port a/s)	F: 60t x 2 A: 60t x 2	<p>The vessel entered the channel at over 12 knots. When approaching the Selat Buoy, starboard helm was applied to head towards the berth and Half Ahead on engine was maintained to help turn the vessel. The engine was then stopped and put Half Astern to arrest the headway before making fast four 60 tons bollard pull tugs. The tugs then assisted in swinging the vessel to starboard with the help of helm and engine. $\frac{3}{4}$ Power was required by the tugs to effectively swing the vessel and assist in berthing.</p> <p>Minimum available channel clearance: 610m</p>	4/6

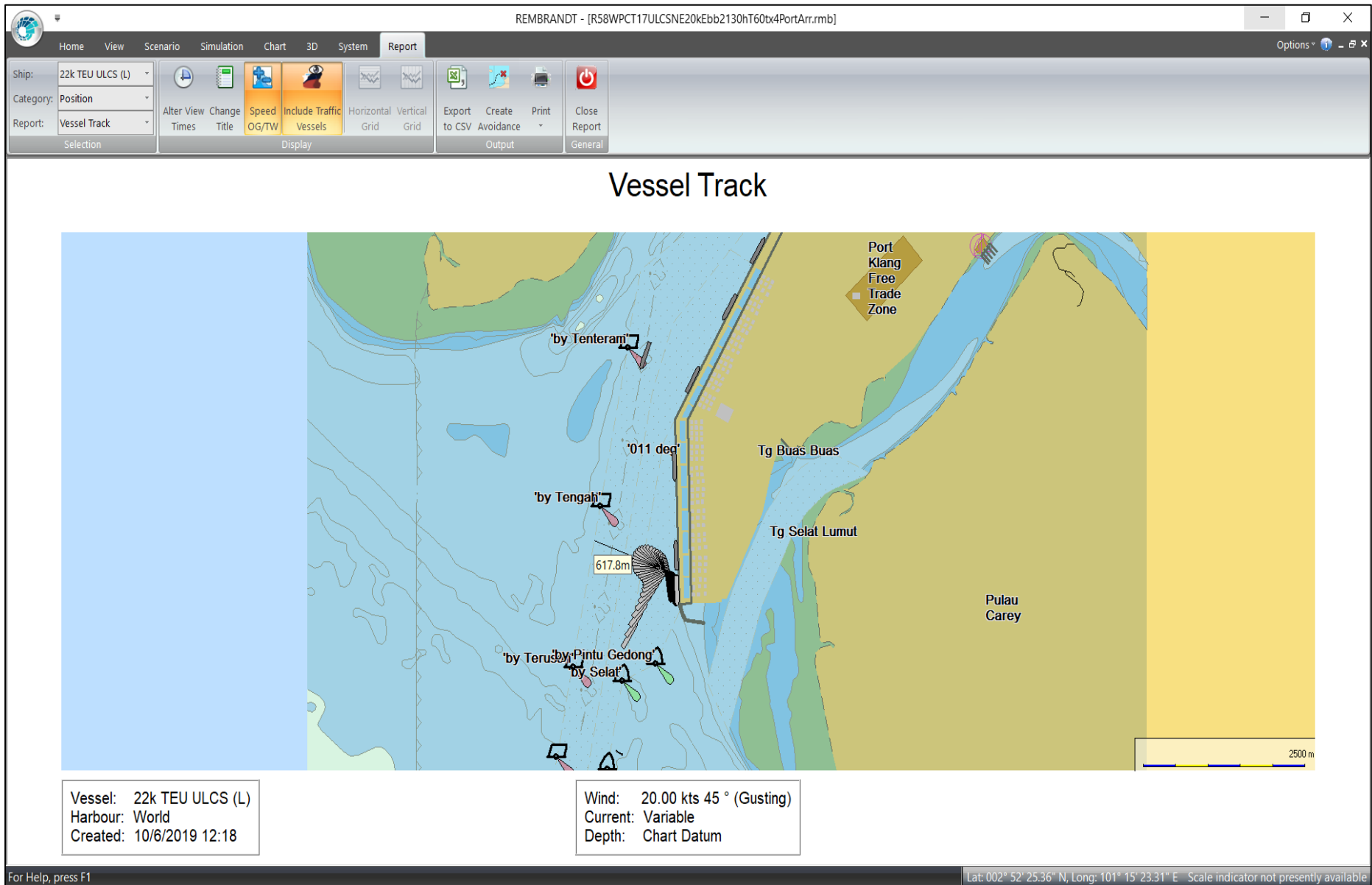


Vessel Track

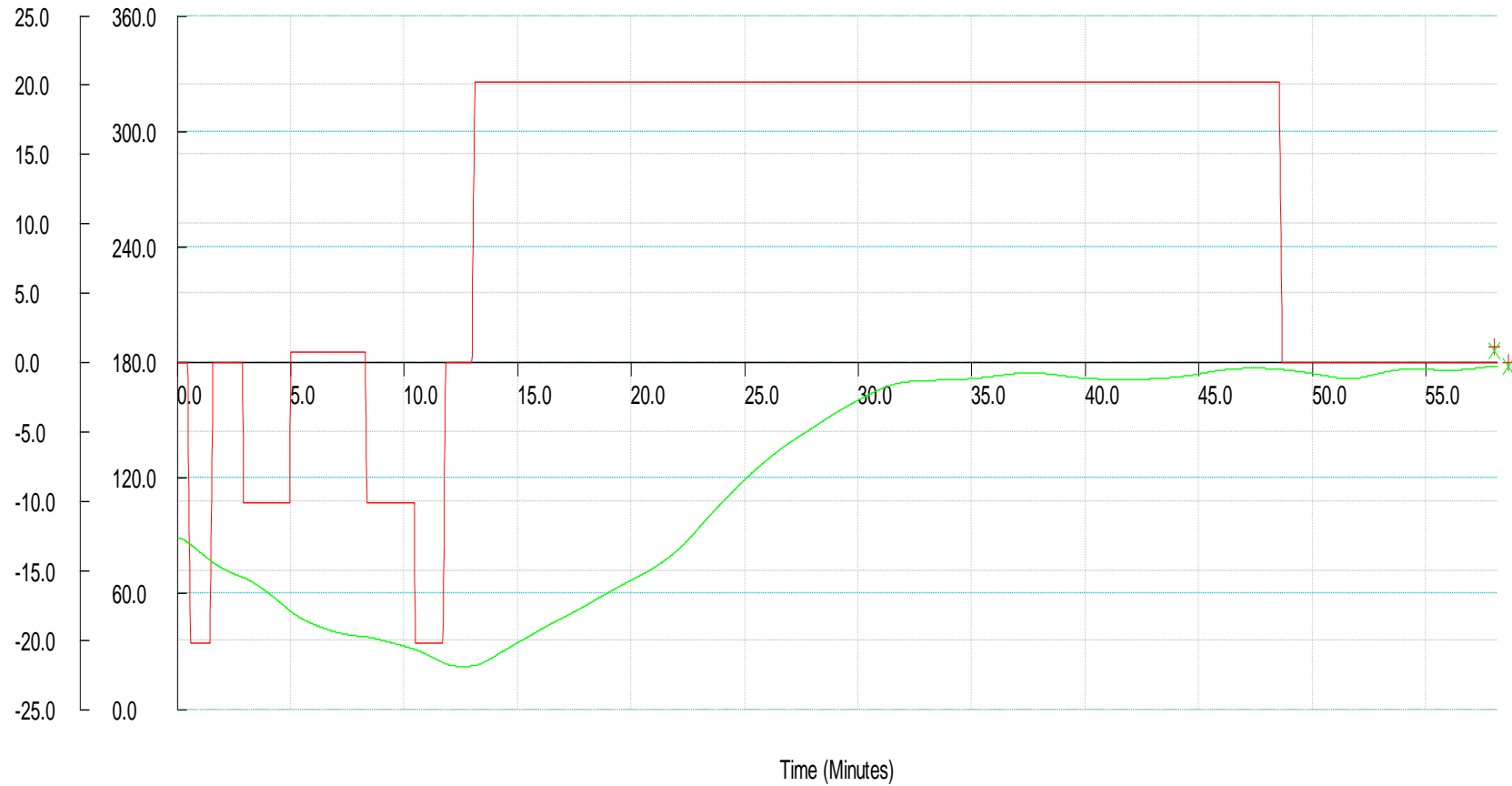


Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 10/6/2019 12:18

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum



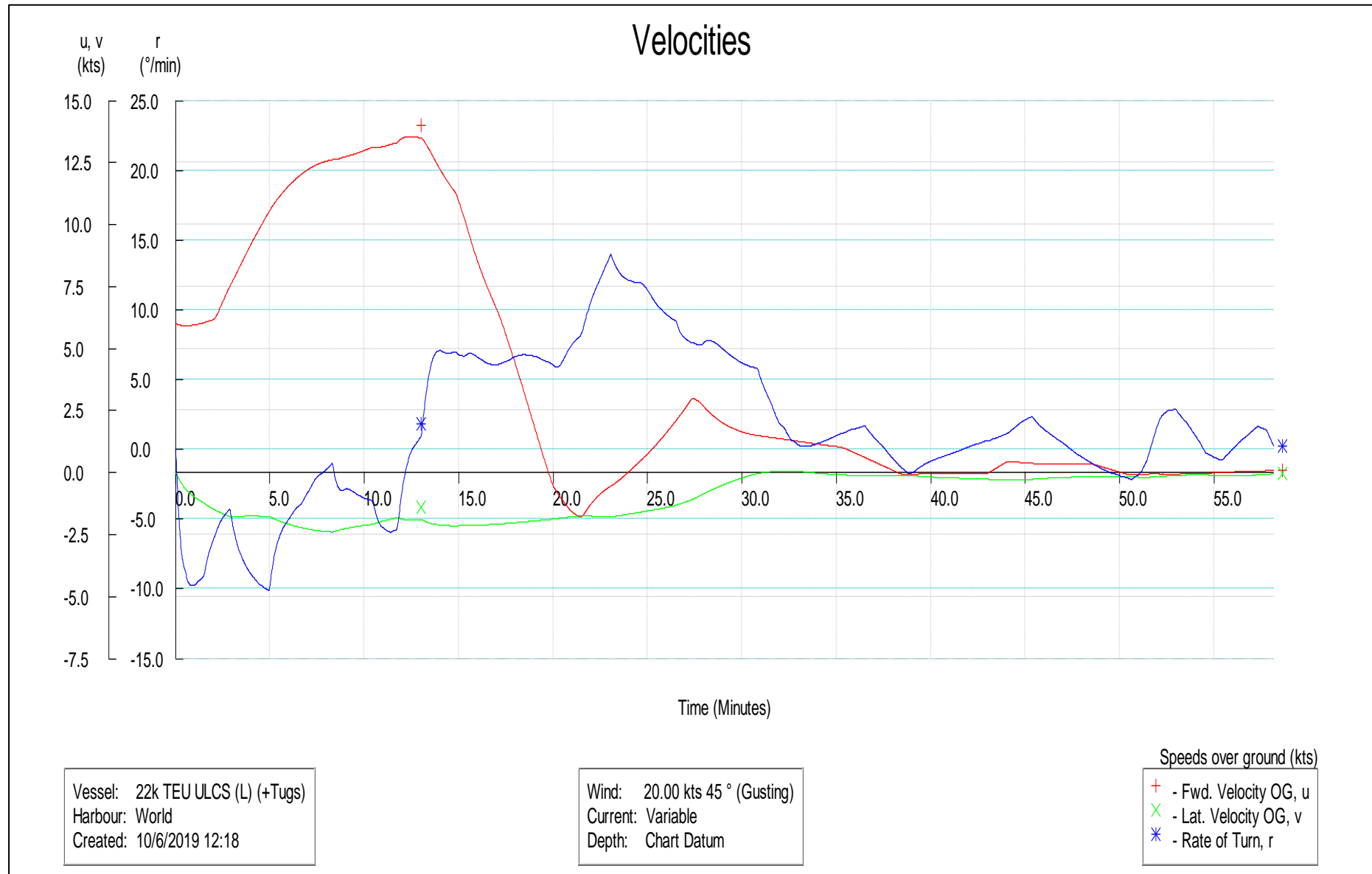
Heading and Rudder

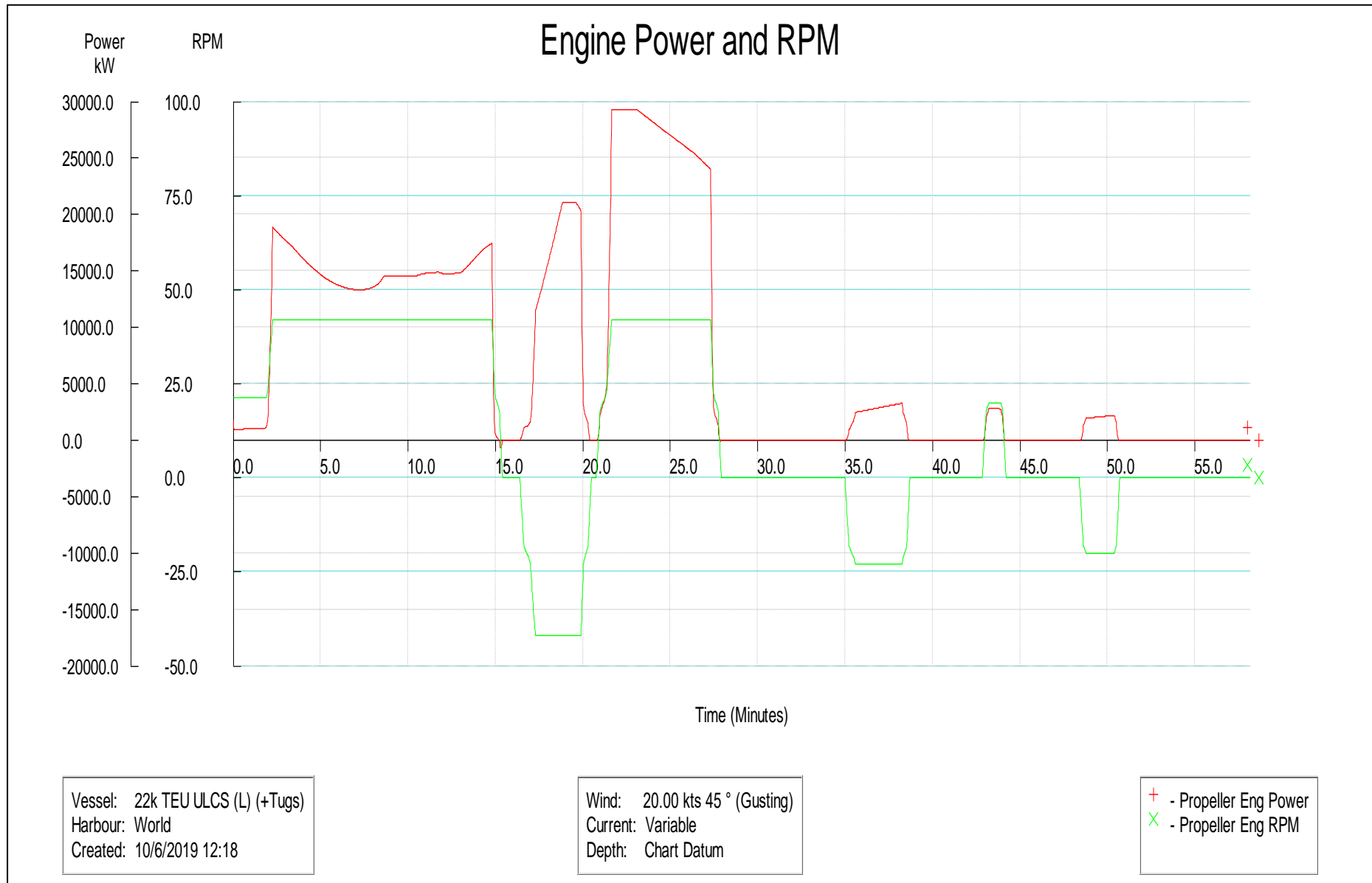


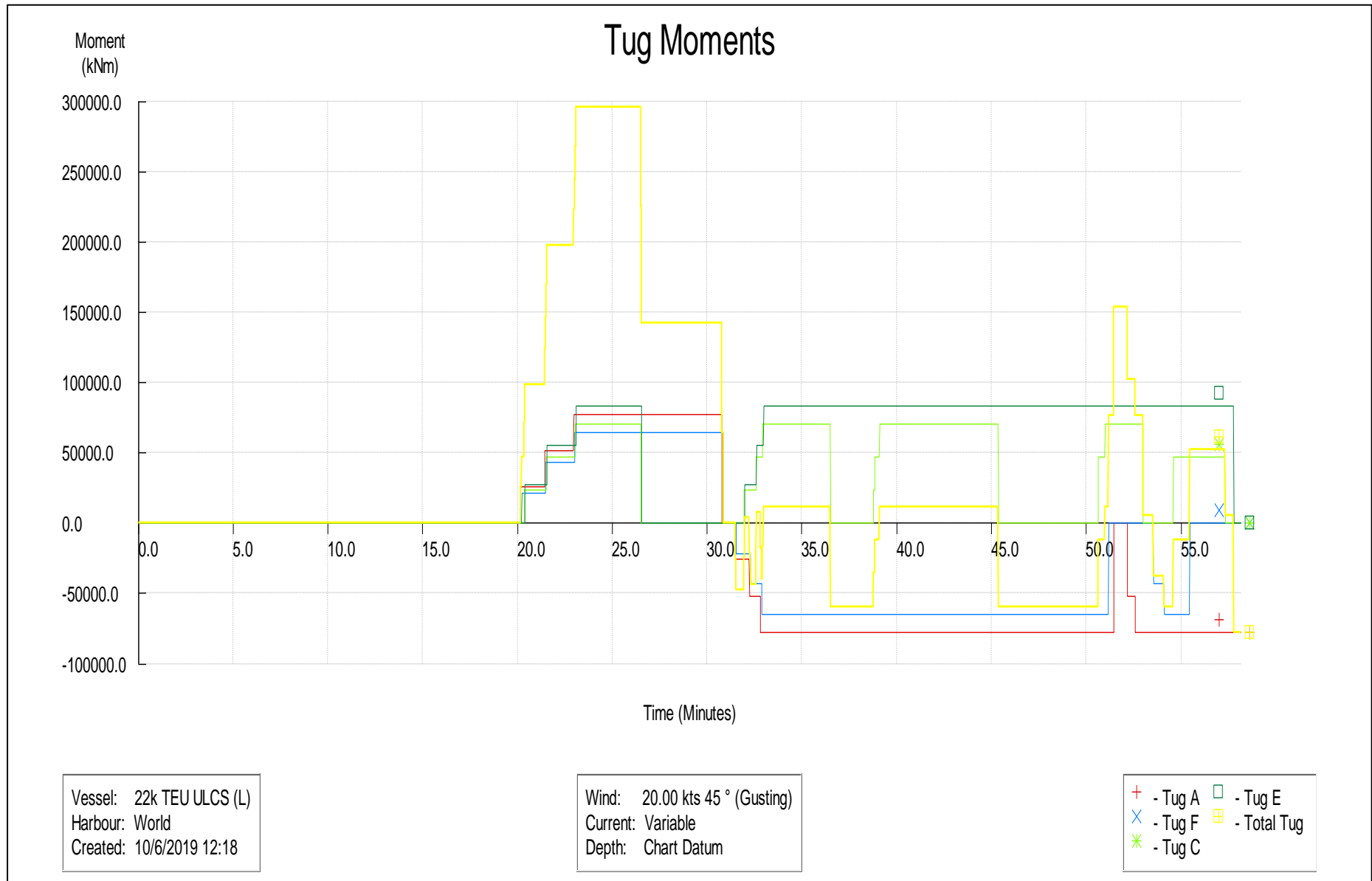
Vessel: 22k TEU ULCS (L) (+Tugs)
 Harbour: World
 Created: 10/6/2019 12:18

Wind: 20.00 kts 45 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

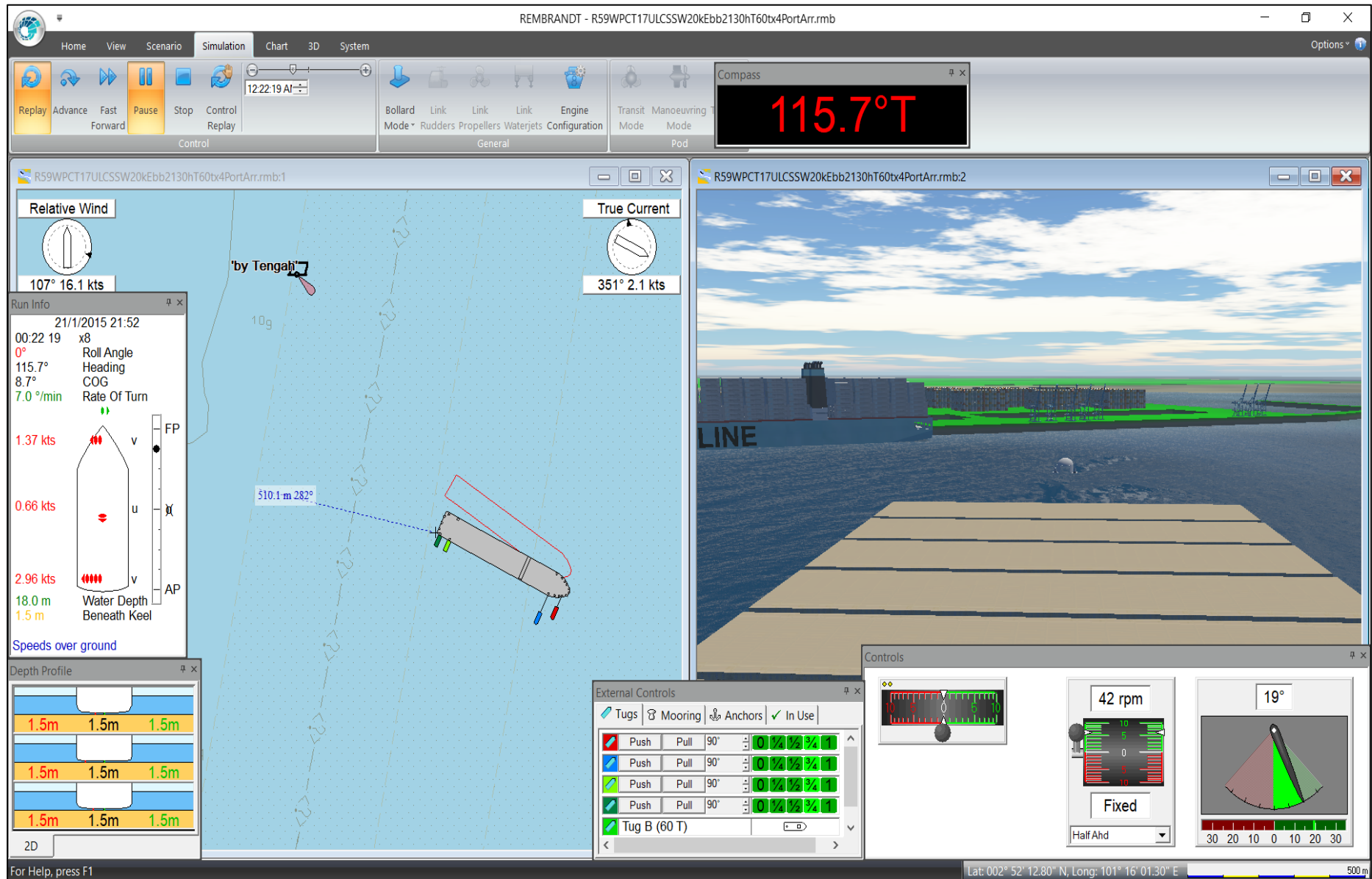
+ - Rudder Rud (°)
 X - Heading



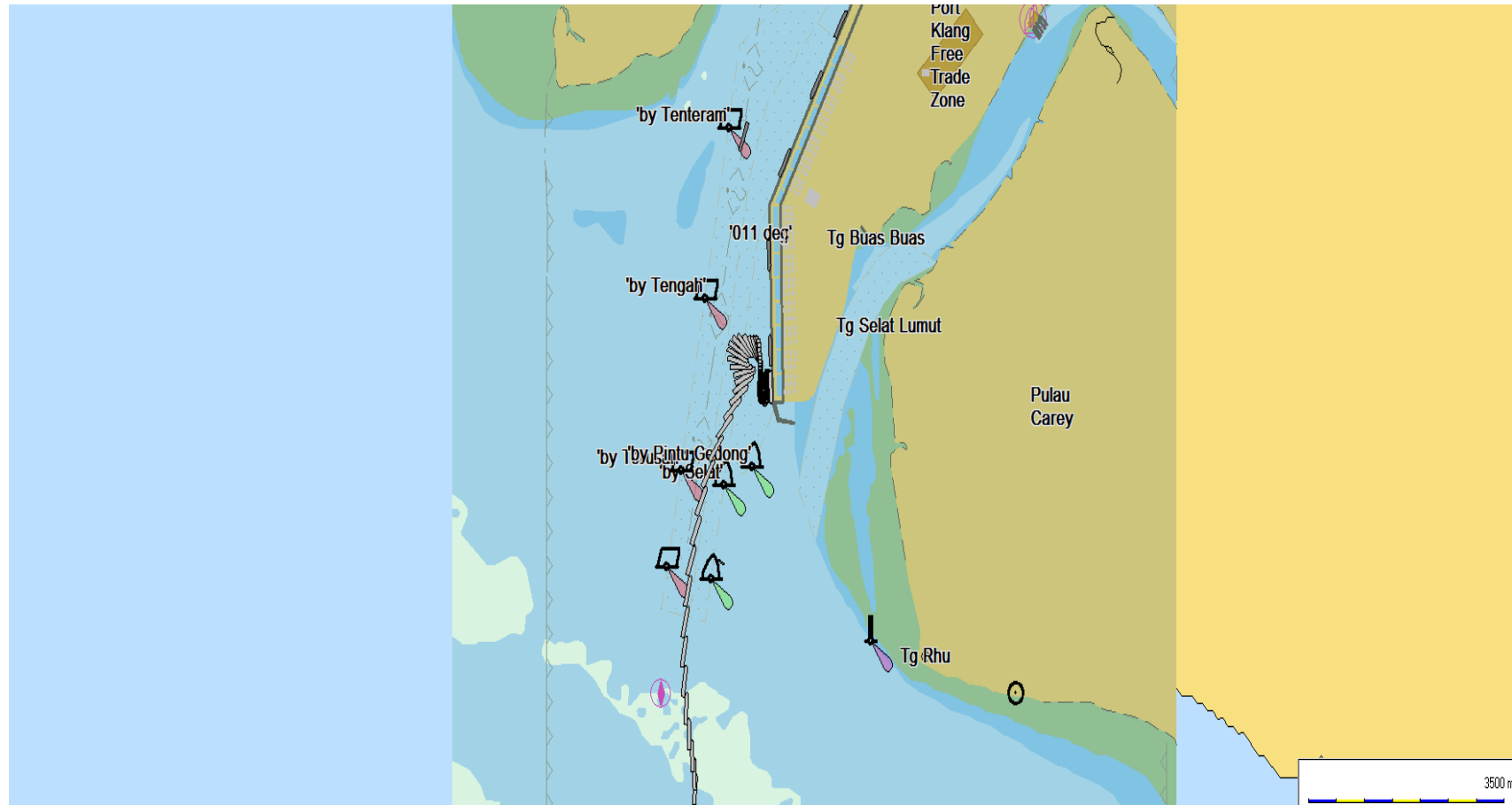




Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
59	R59WPCT17SW20 kEbb2130hT60tx4P ortArr.rmb	Ebb (2130h)	SW 20 k	Arrival (Port a/s)	F: 60t x 2 A: 60t x 2	The vessel entered the channel at over 12 knots. When approaching the Selat Buoy, starboard helm was applied to head towards the berth and Half Ahead on engine was maintained to help turn the vessel. The engine was then stopped and put Half Astern to arrest the headway before making fast four 60 tons bollard pull tugs. The tugs then assisted in swinging the vessel to starboard with the help of helm and engine. $\frac{3}{4}$ Power was required by the tugs to effectively swing the vessel and assist in berthing. Minimum available channel clearance: 510m	4/6



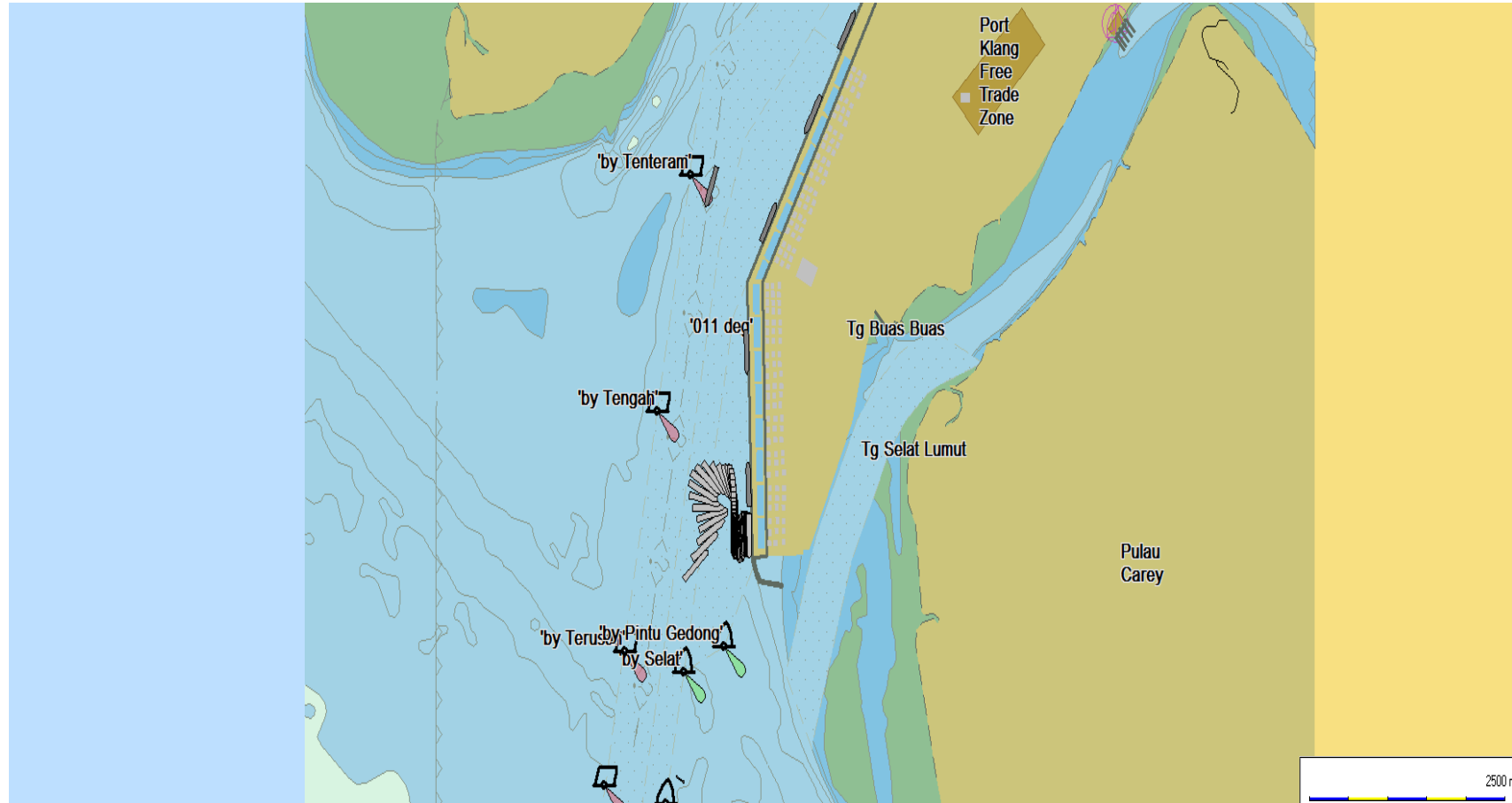
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 10/6/2019 13:14

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

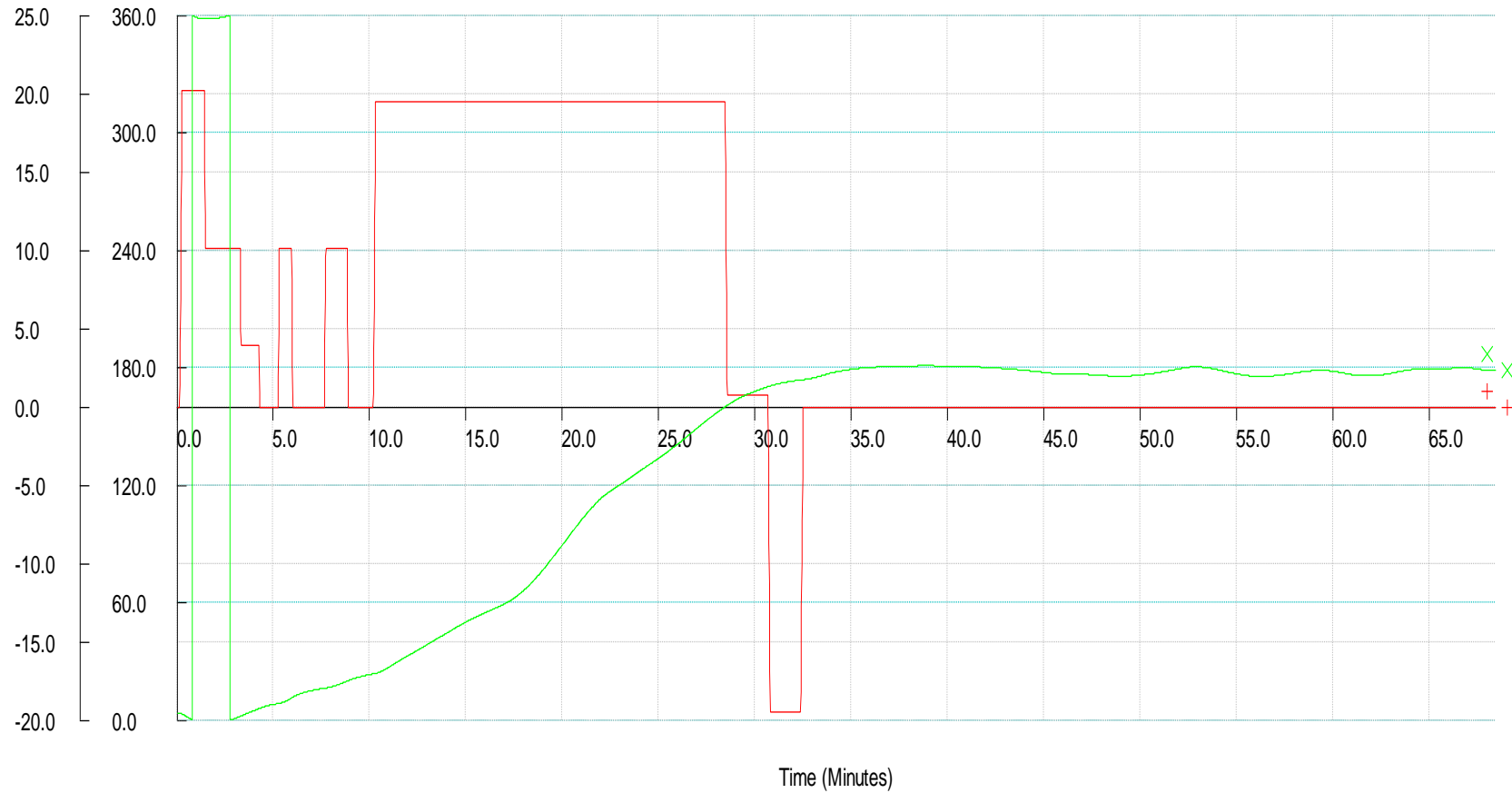
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 10/6/2019 05:43

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

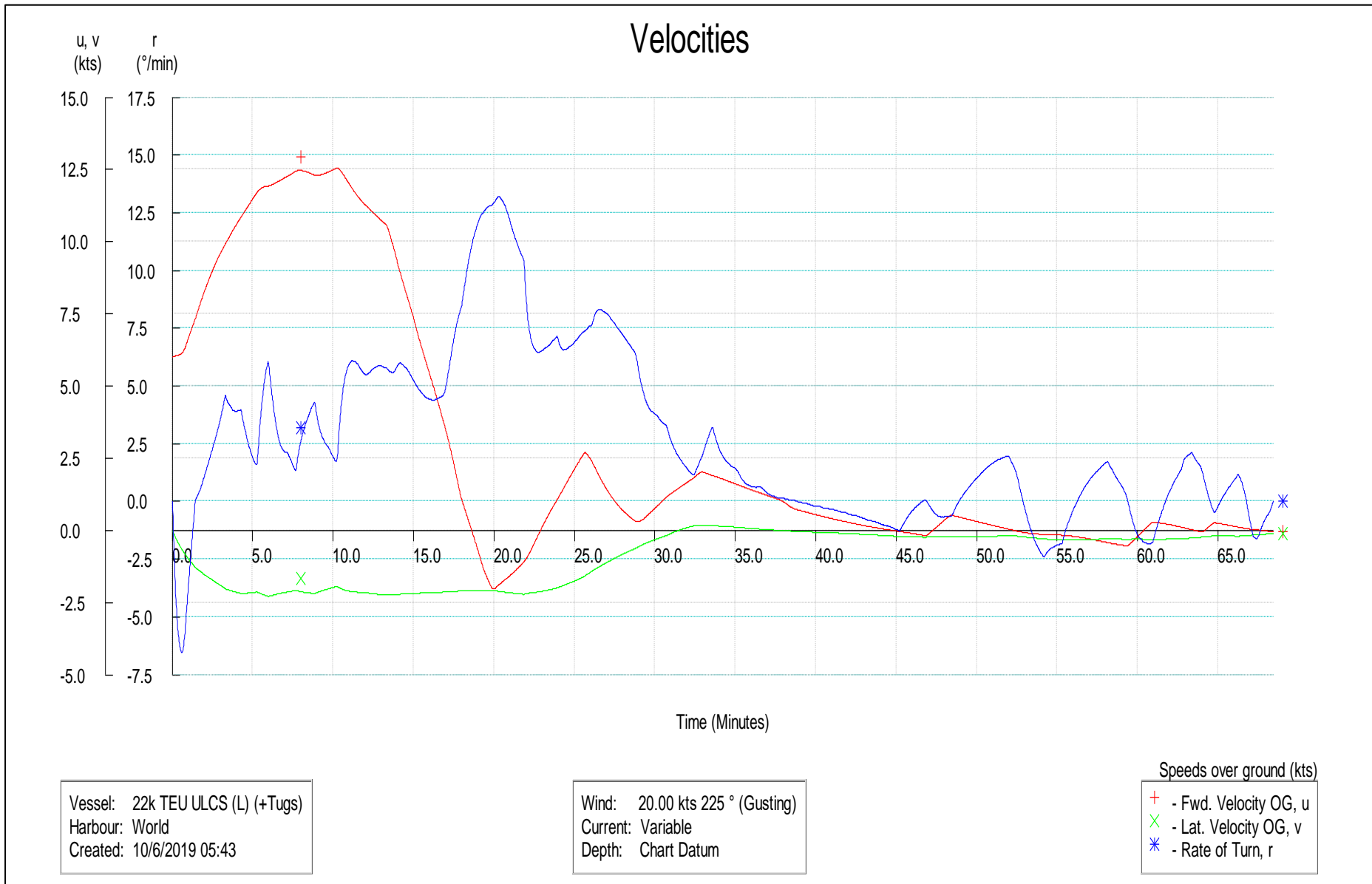
Heading and Rudder

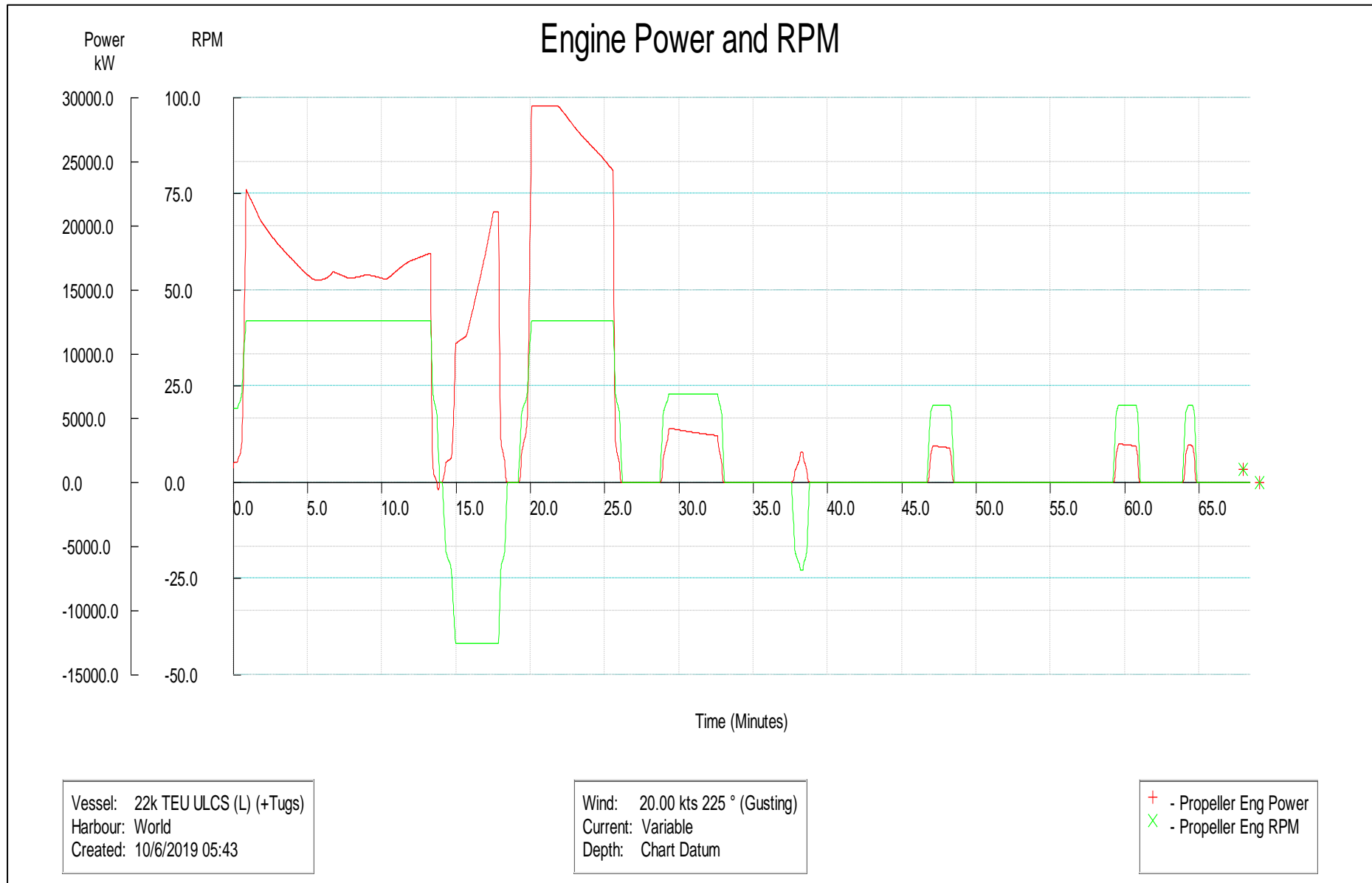


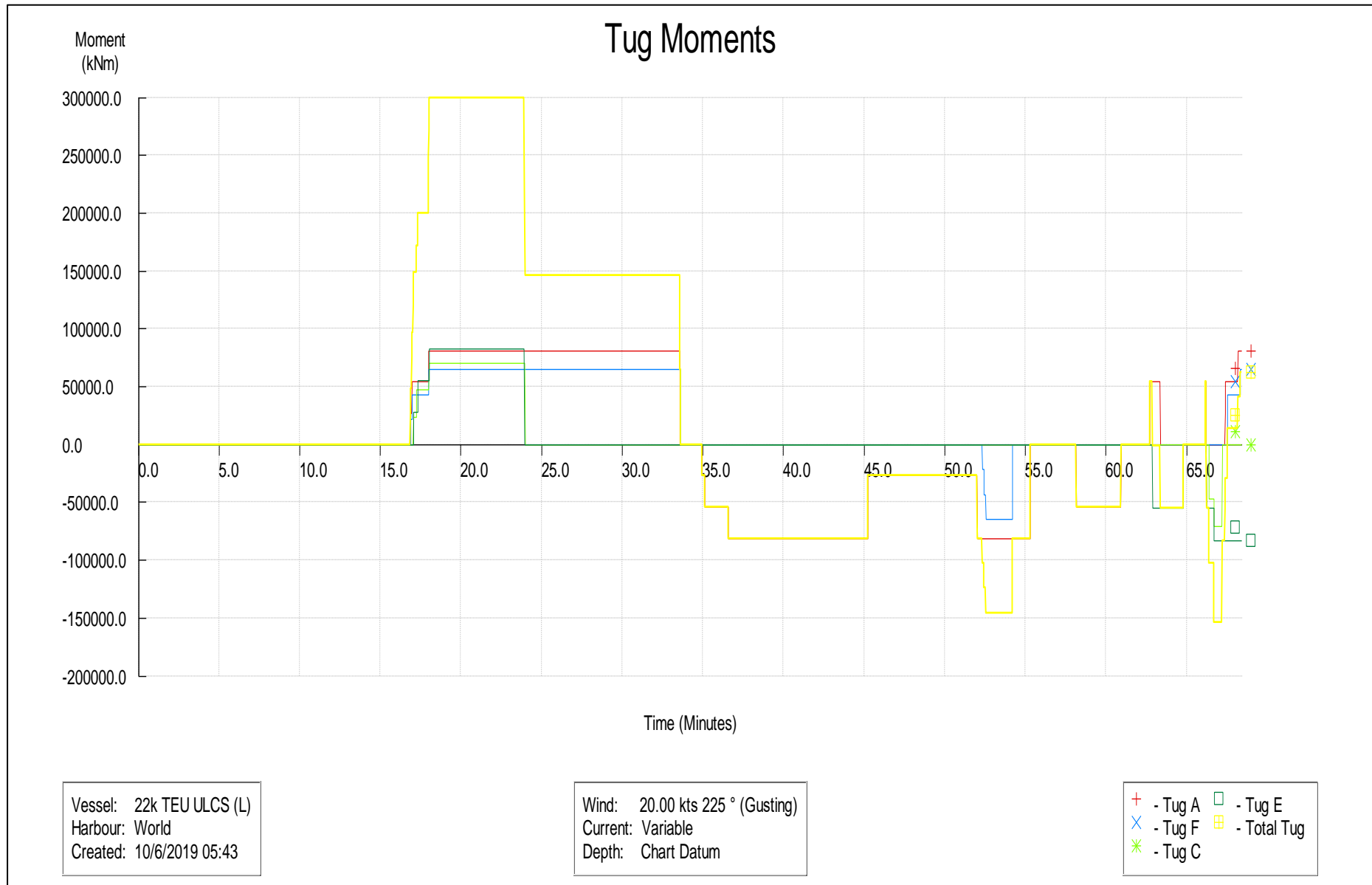
Vessel: 22k TEU ULCS (L) (+Tugs)
 Harbour: World
 Created: 10/6/2019 05:43

Wind: 20.00 kts 225 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

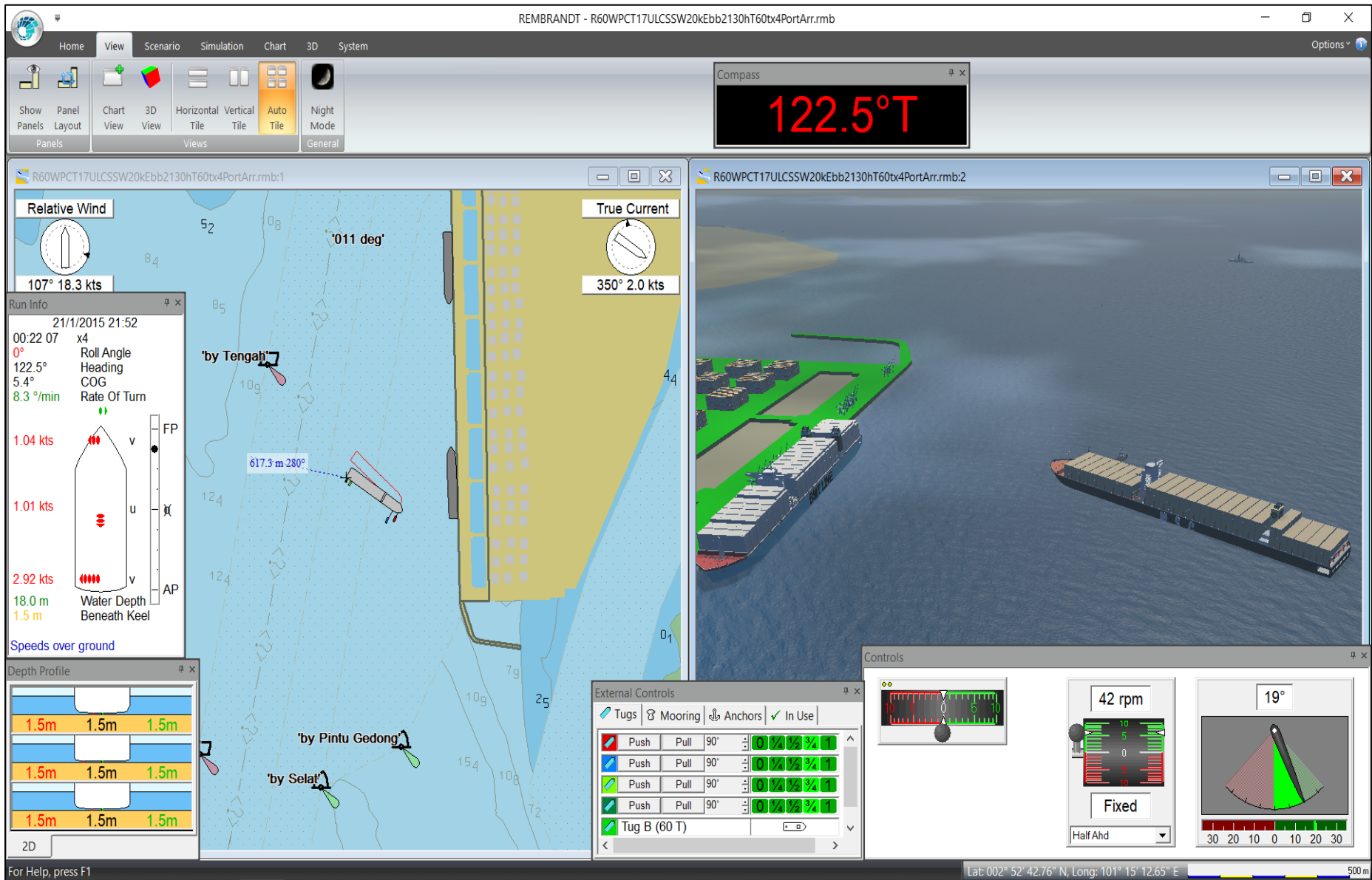
+ - Rudder Rud (°)
 X - Heading







Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
60	R60WPCT17SW20 kEbb2130hT60tx4P ortArr.rmb	Ebb (2130h)	SW 20 k	Arrival (Port a/s)	F: 60t x 2 A: 60t x 2	<p>The vessel entered the channel at over 12 knots. When approaching the Selat Buoy, starboard helm was applied to head towards the berth and Half Ahead on engine was maintained to help turn the vessel. The engine was then stopped and put Half Astern to arrest the headway before making fast four 60 tons bollard pull tugs. The tugs then assisted in swinging the vessel to starboard with the help of helm and engine. $\frac{3}{4}$ Power was required by the tugs to effectively swing the vessel and assist in berthing.</p> <p>Minimum available channel clearance: 610m</p>	4/6



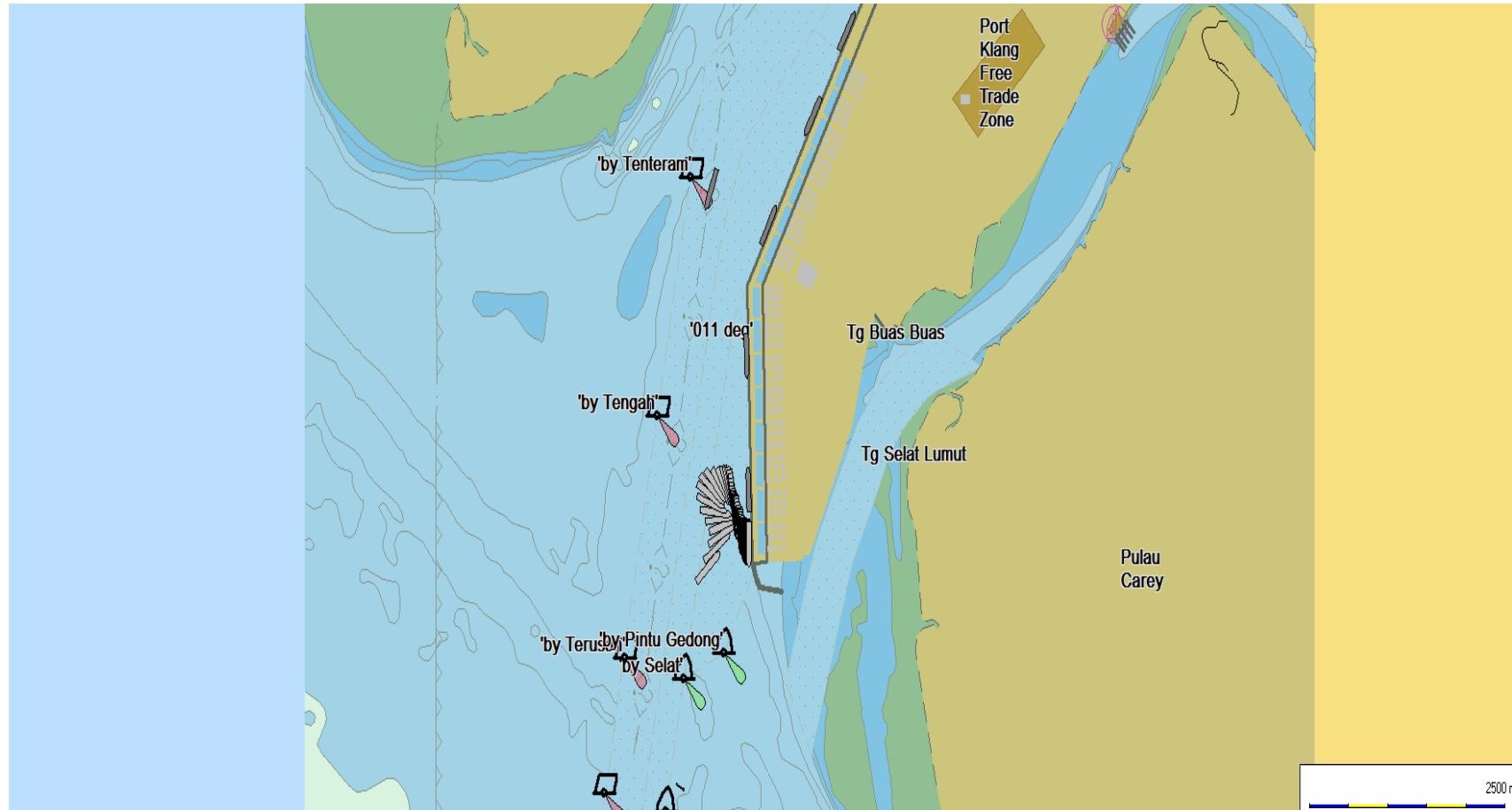
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 10/6/2019 14:02

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

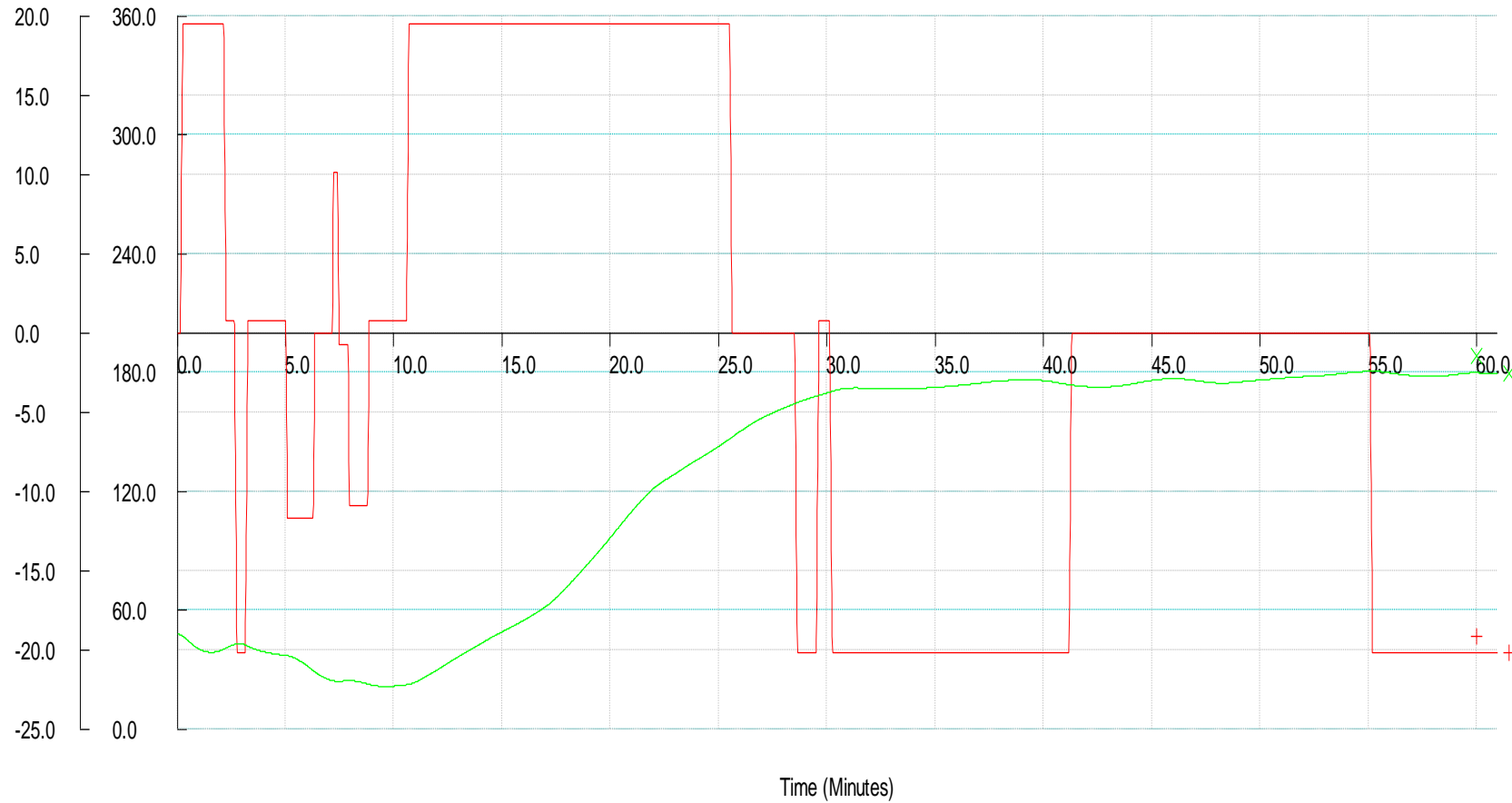
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 10/6/2019 14:02

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

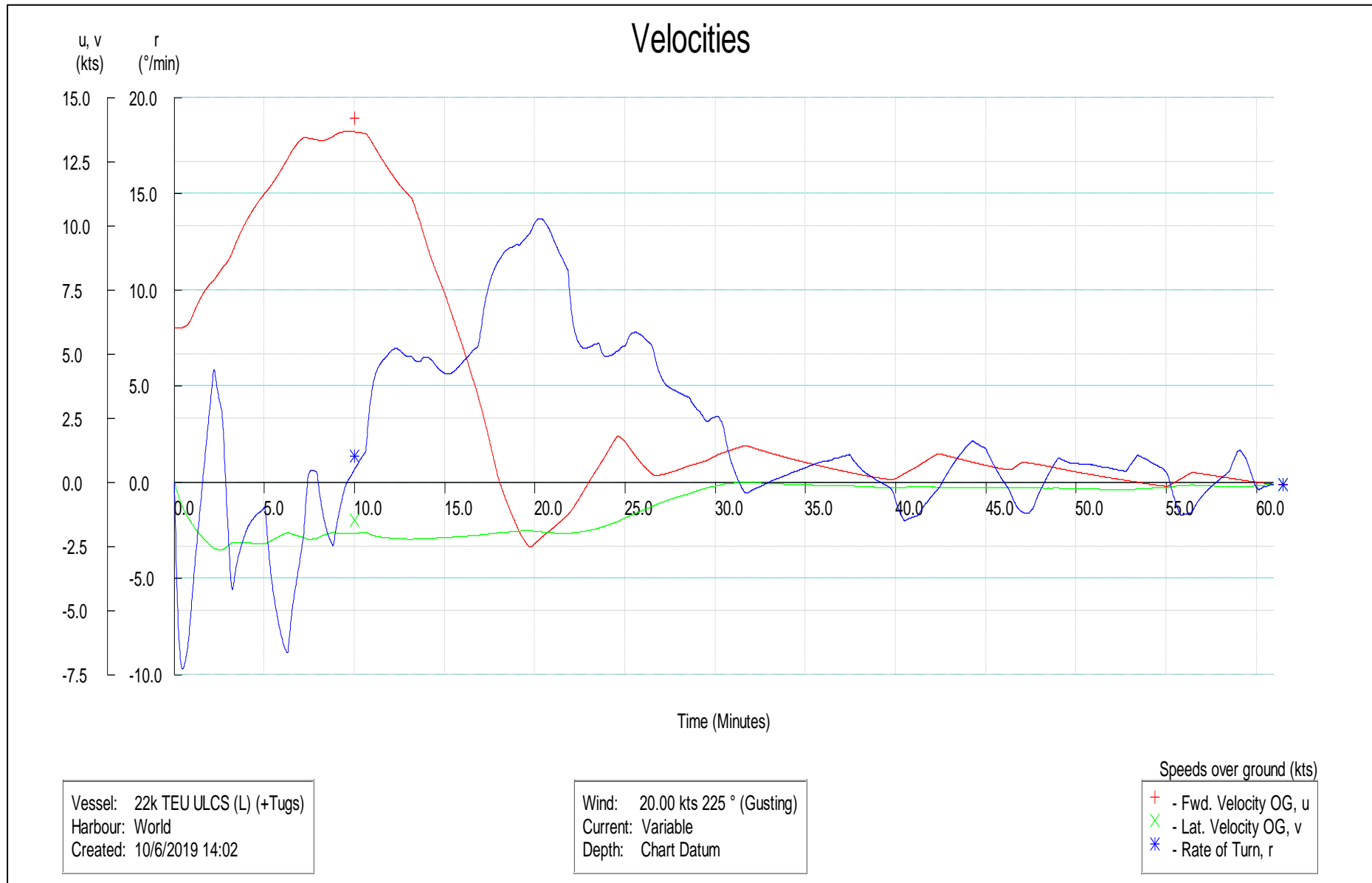
Heading and Rudder

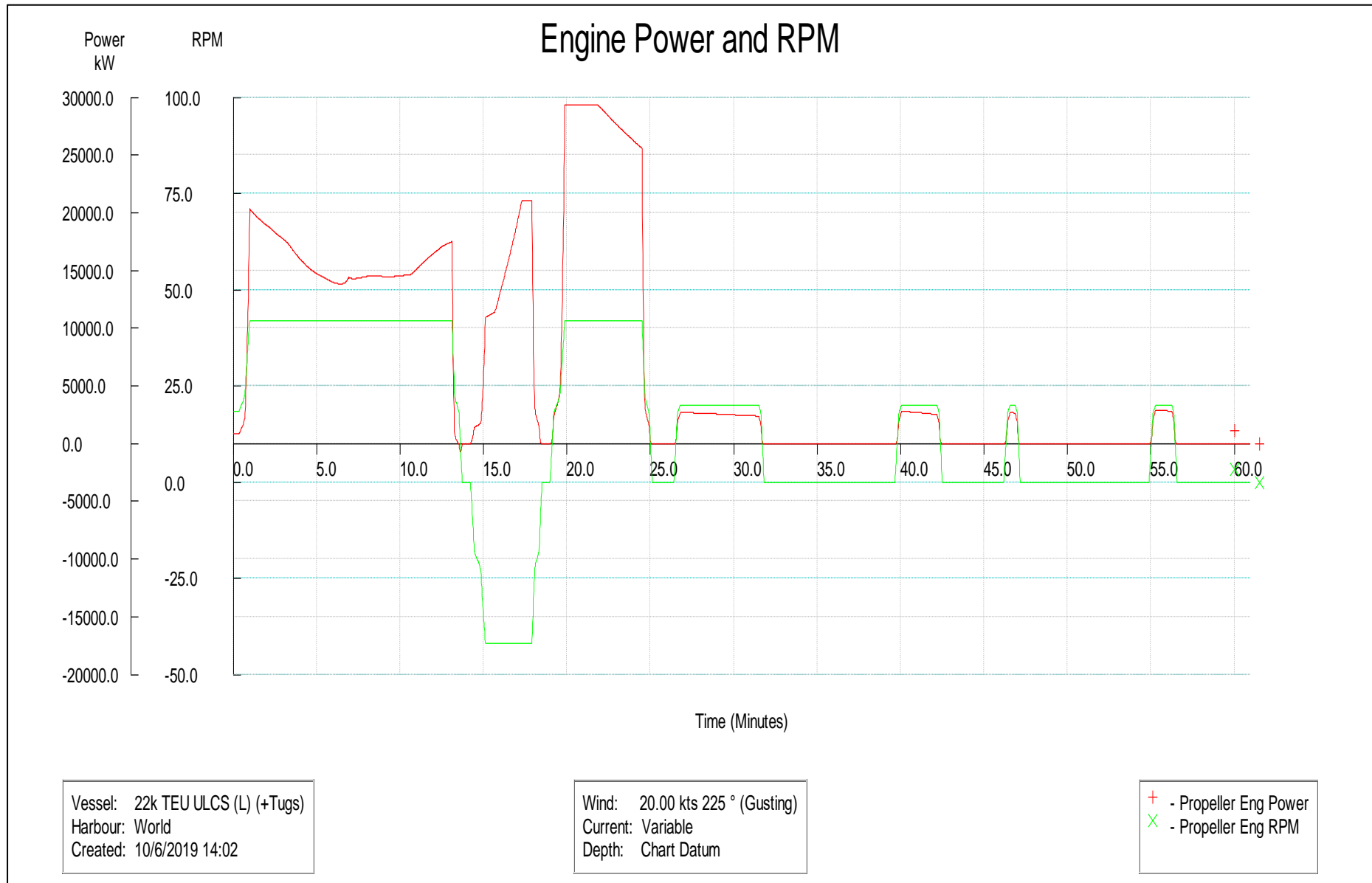


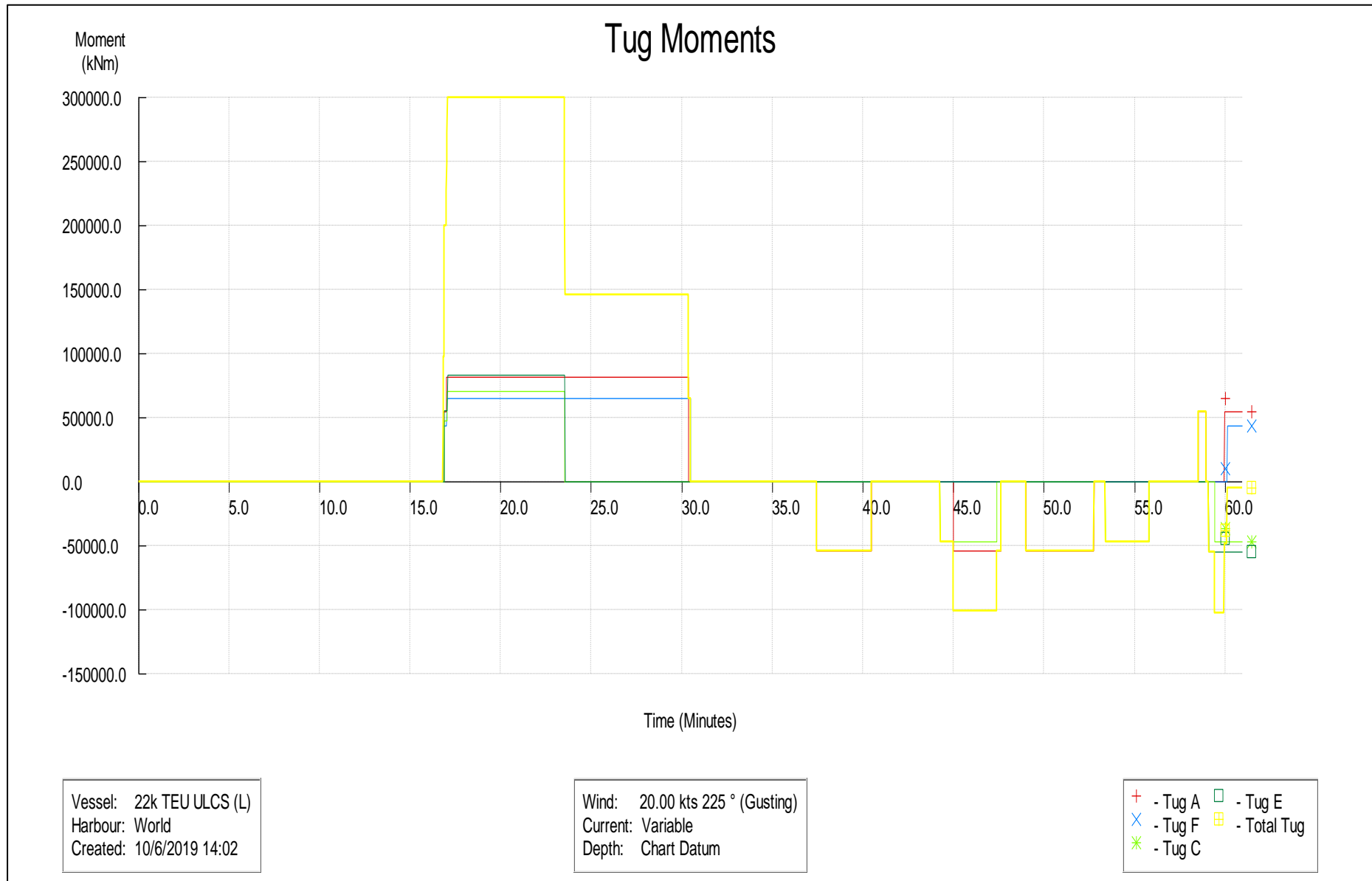
Vessel: 22k TEU ULCS (L) (+Tugs)
 Harbour: World
 Created: 10/6/2019 14:02

Wind: 20.00 kts 225 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

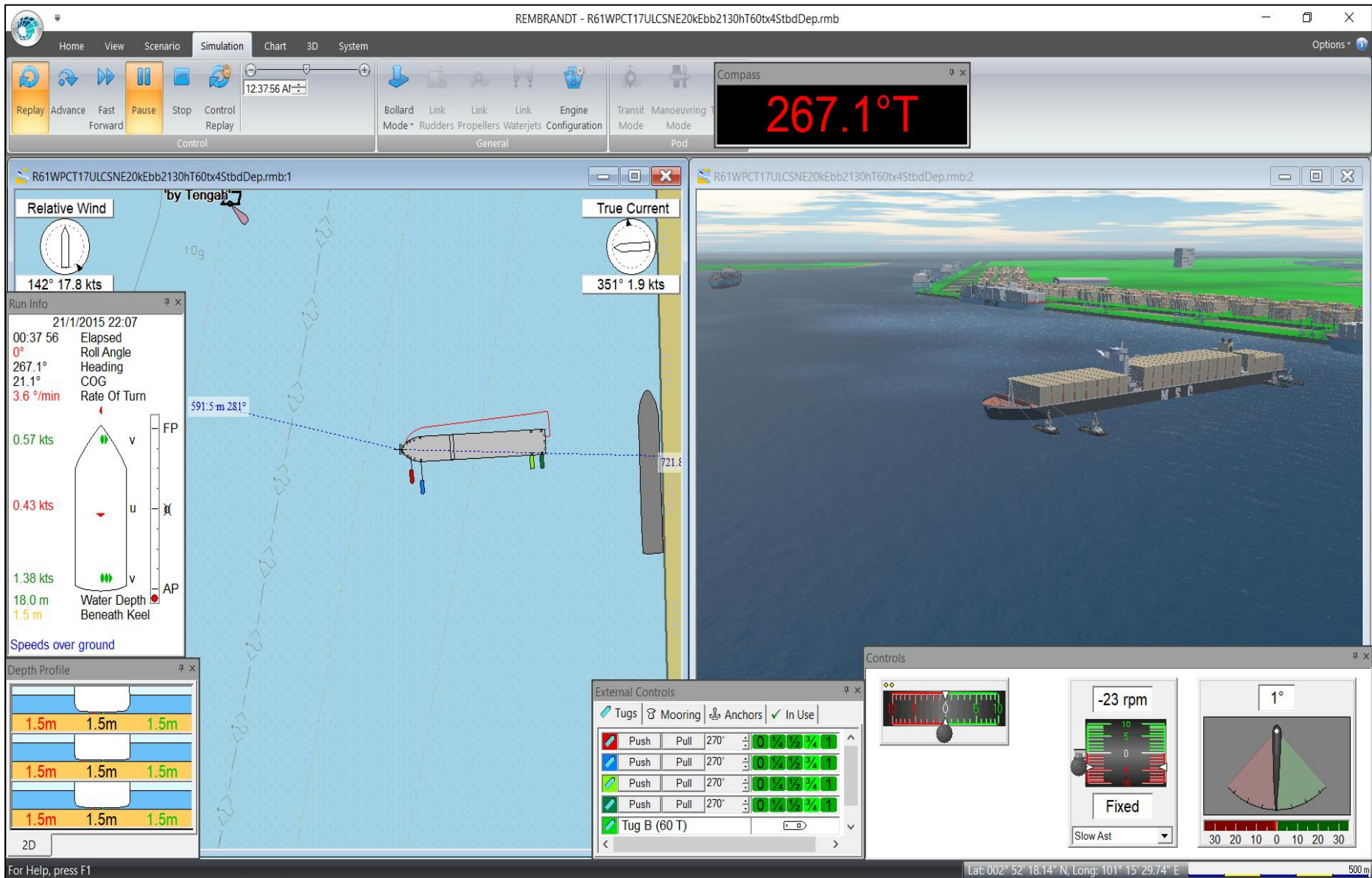
+ - Rudder Rud (°)
 X - Heading



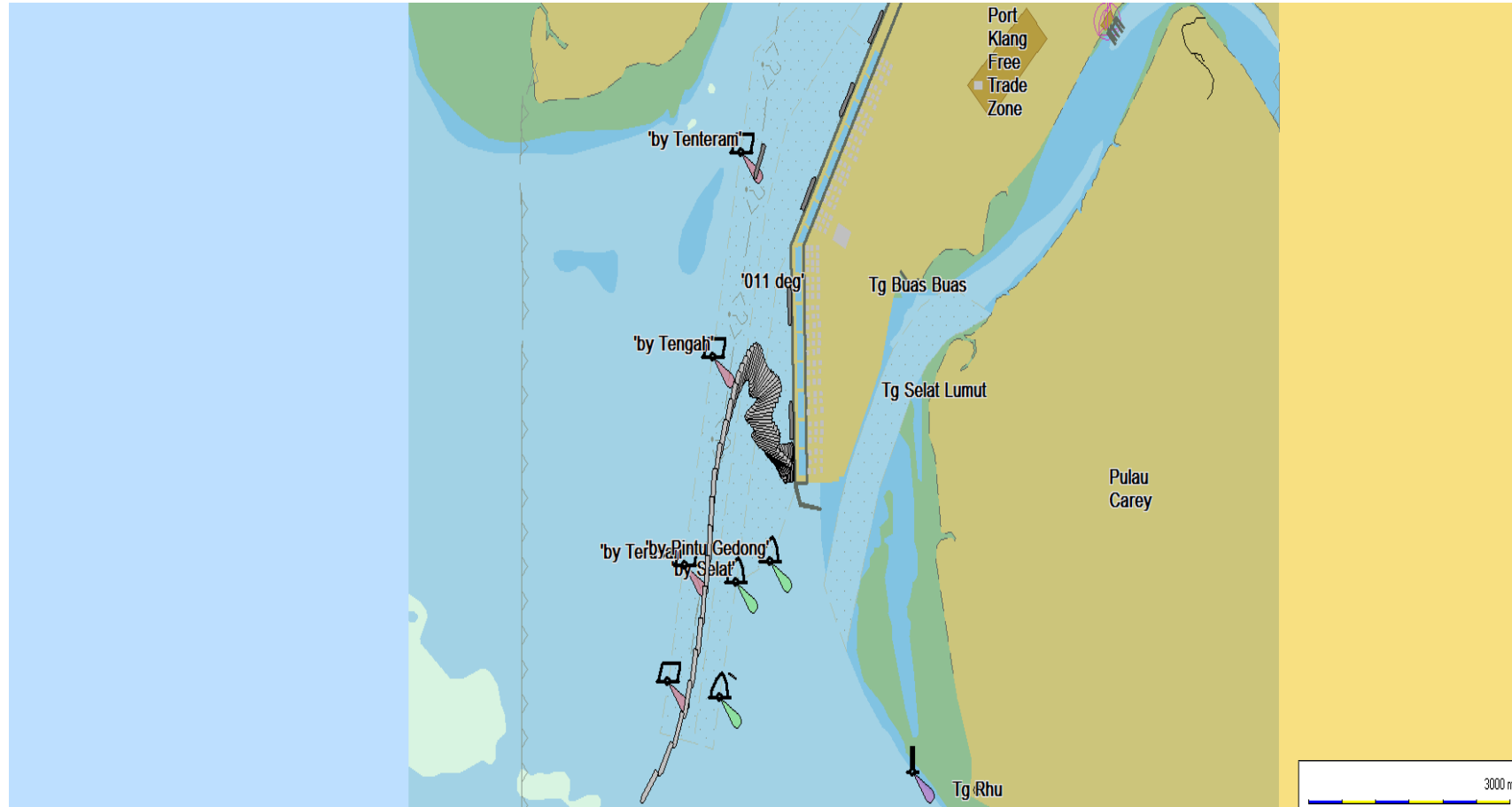




Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
61	R61WPCT17NE20 kEbb2130hT60tx4P StbdDep.rmb	Ebb (2130h)	NE 20 k	Departure (Stbd a/s)	F: 60t x 2 A: 60t x 2	<p>The vessel was pulled off the berth using four 60 tons bollard pull tugs. As the bow was falling to port, it was decided to do a port swing. The four tugs pulling at the bow and pushing at the stern at Half Power had difficulty swinging the vessels when it got further off the berth and was affected by the ebb current. As the rate of turn remained slow, the tugs were ordered to pull at $\frac{3}{4}$ and then Full Power. Finally helm and engine were needed to assist in swinging the vessel around.</p> <p>After swinging around, the vessel transited the channel to sea at Half Ahead. The wider channel provided sufficient room to counter the set of the ebb current.</p> <p>Minimum available channel clearance: 590m</p>	4/6



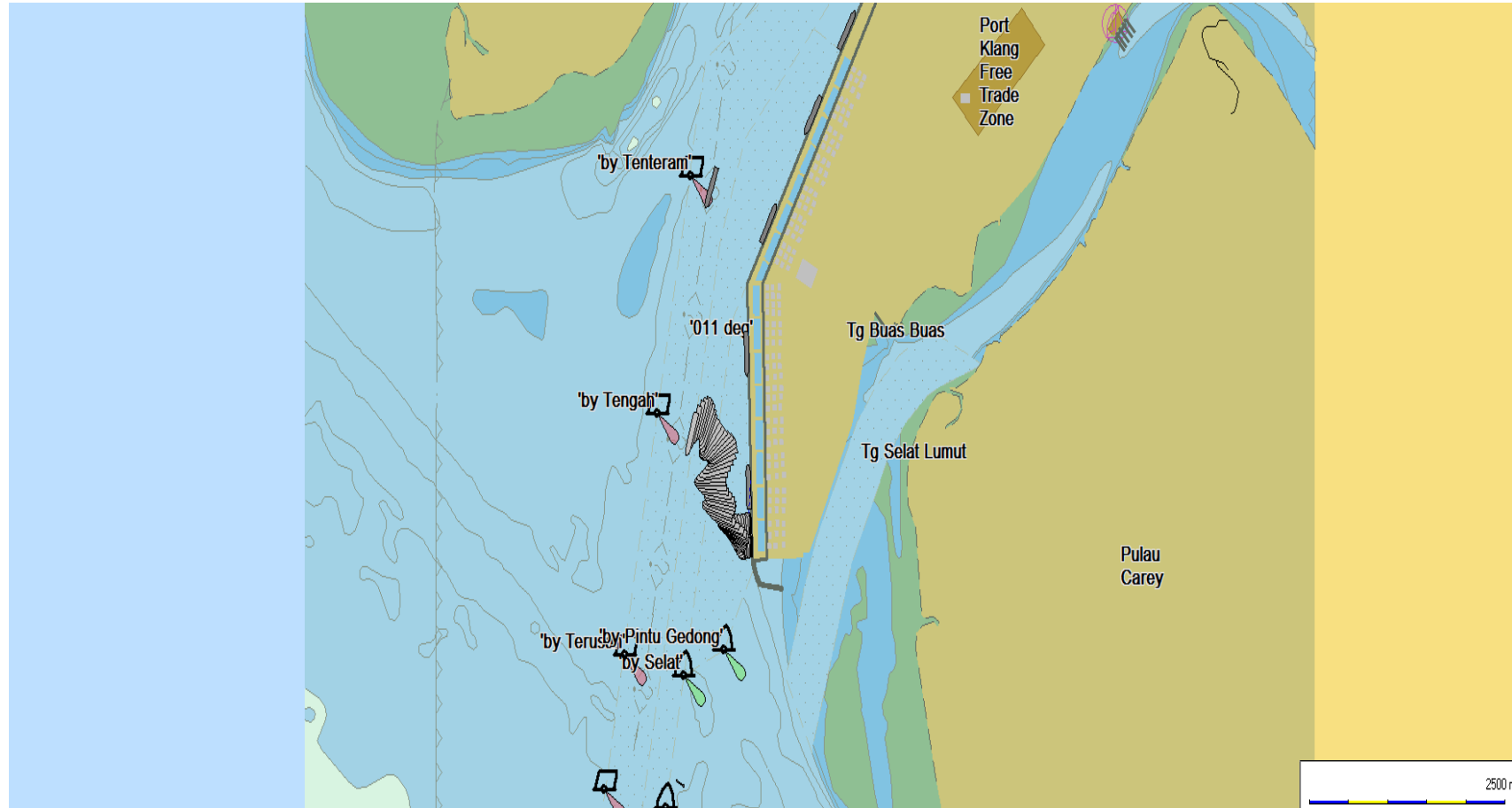
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 9/6/2019 17:08

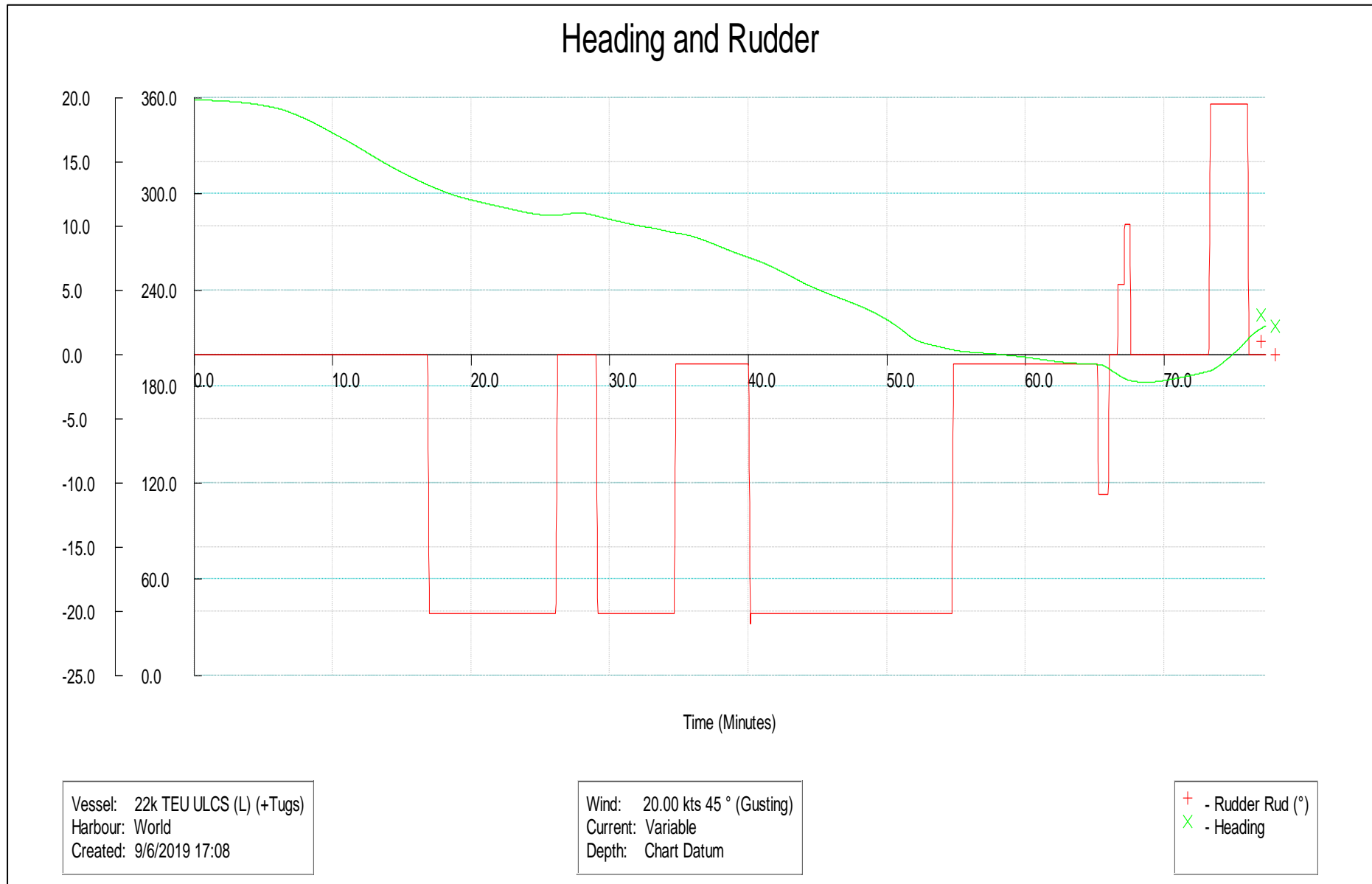
Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

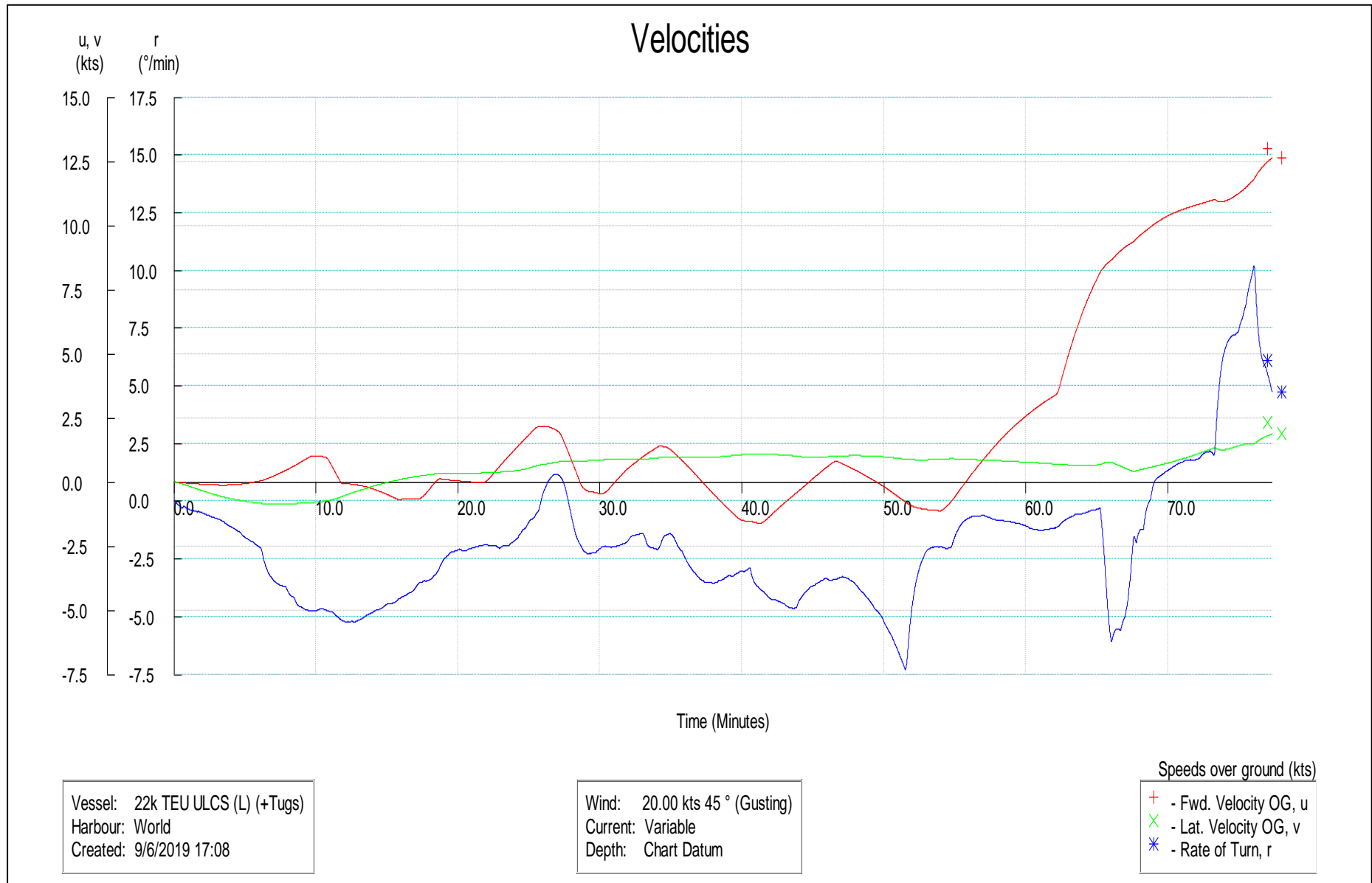
Vessel Track

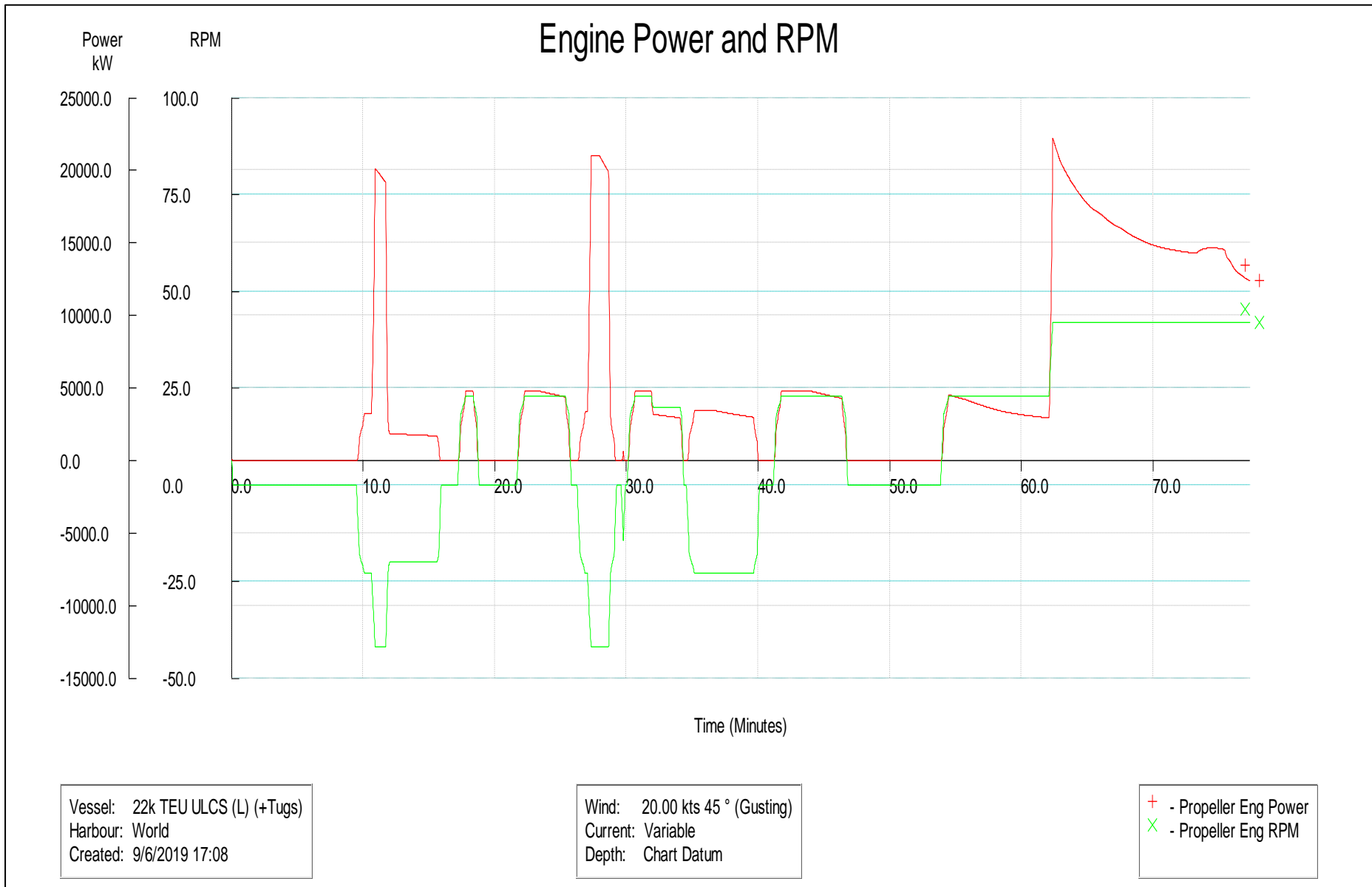


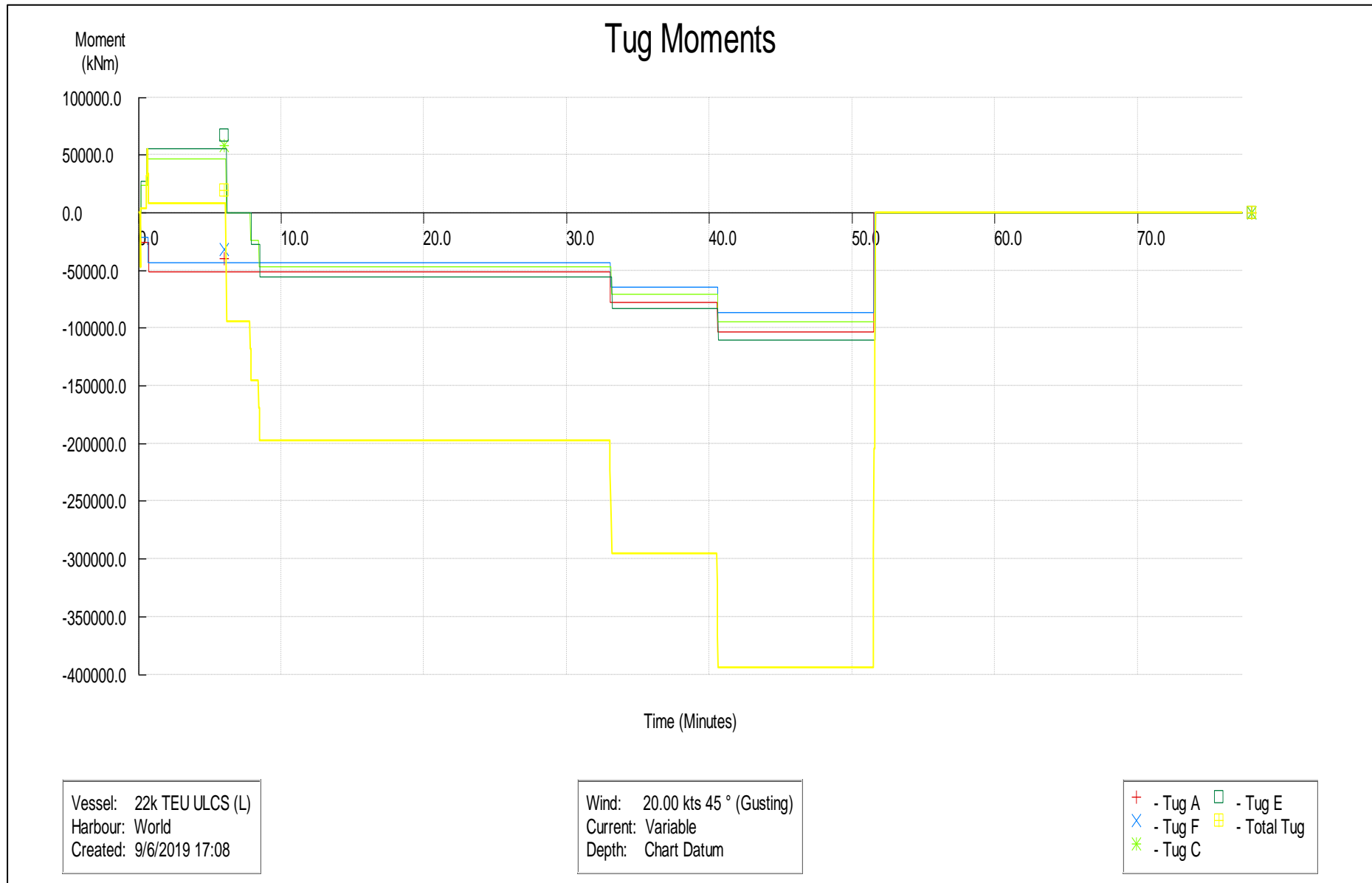
Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 9/6/2019 17:08

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

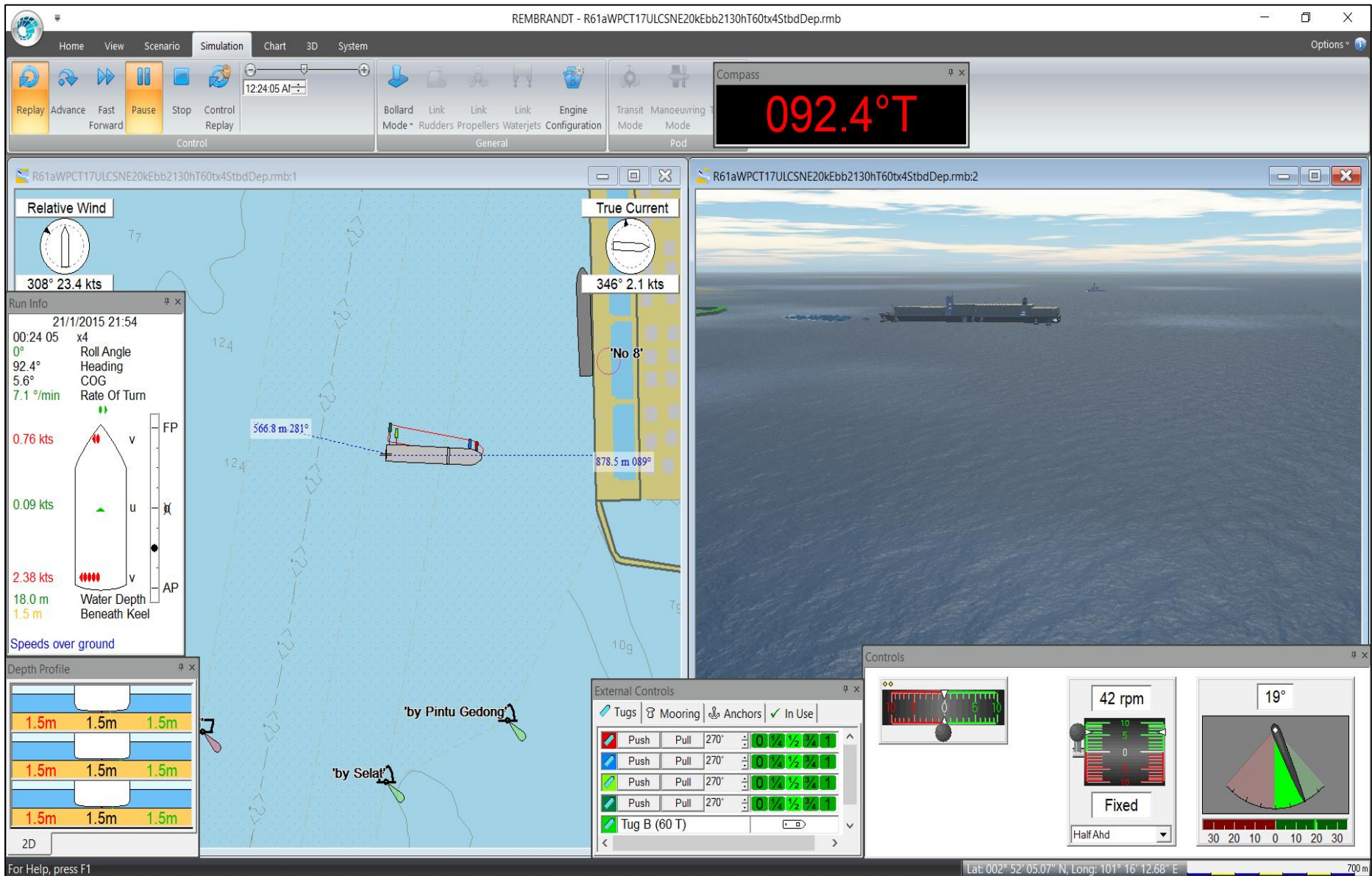




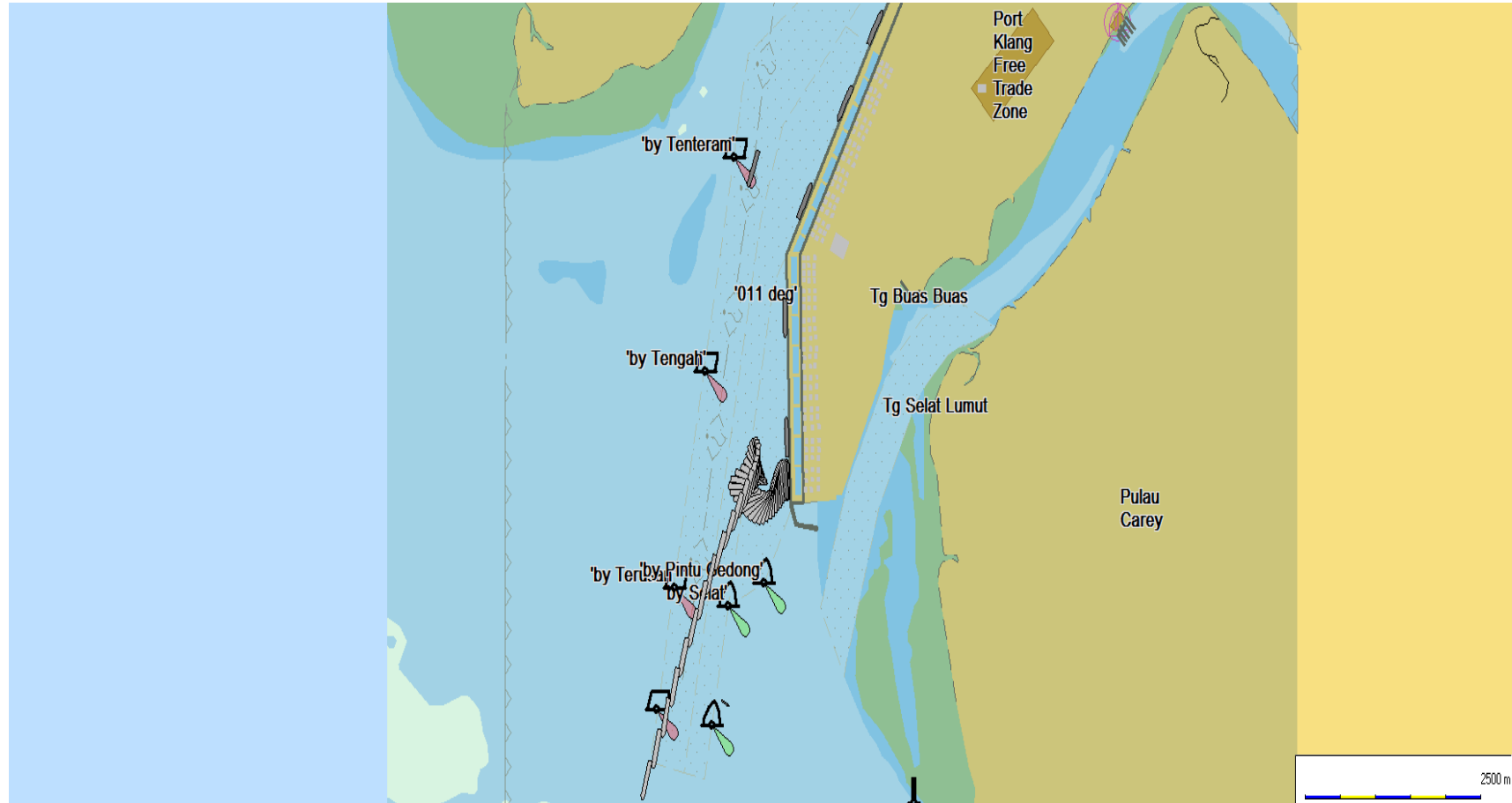




Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
61a	R61aWPCT17NE2 0kEbb2130hT60tx4 PStbdDep.rmb	Ebb (2130h)	NE 20 k	Departure (Stbd a/s)	F: 60t x 2 A: 60t x 2	<p>This is a repeat of Run 61 but with a starboard turn.</p> <p>The vessel was pulled off the berth using four 60 tons bollard pull tugs. It was decided to do a starboard swing off the berth. The four tugs pushing at the bow and pulling at the stern at Half Power had difficulty swinging the vessels until $\frac{3}{4}$ Power was used. Helm and engine were needed to assist in keeping the bow closer to the berth so that the stronger current at the stern can assist in the swing. After swinging around, the vessel transited the channel to sea at Half Ahead. The starboard swing was relatively easier to execute and took less time (40 minutes) than the port swing in the previous run.</p> <p>Minimum available channel clearance: 565m</p>	4/6



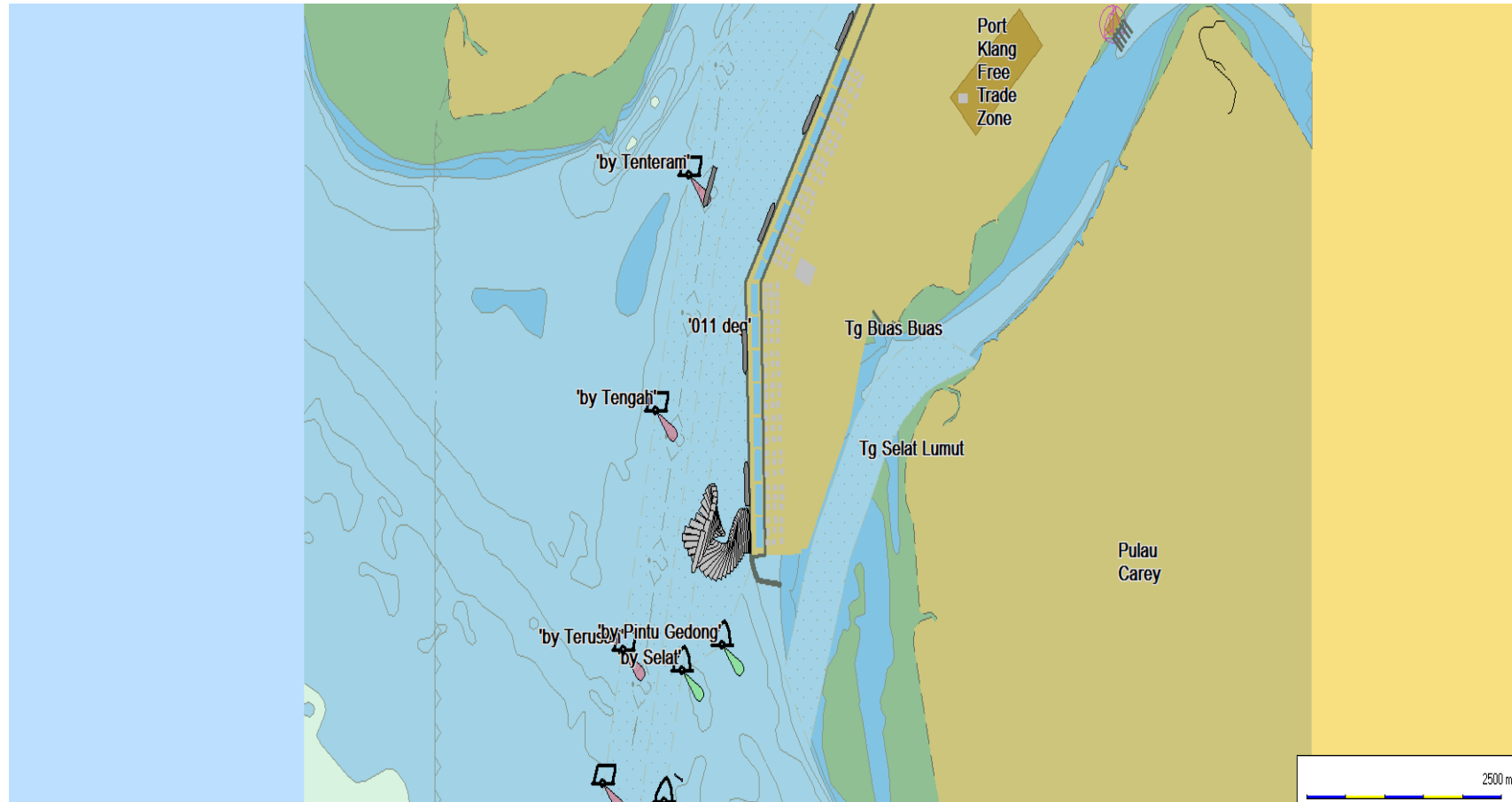
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 9/6/2019 18:23

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

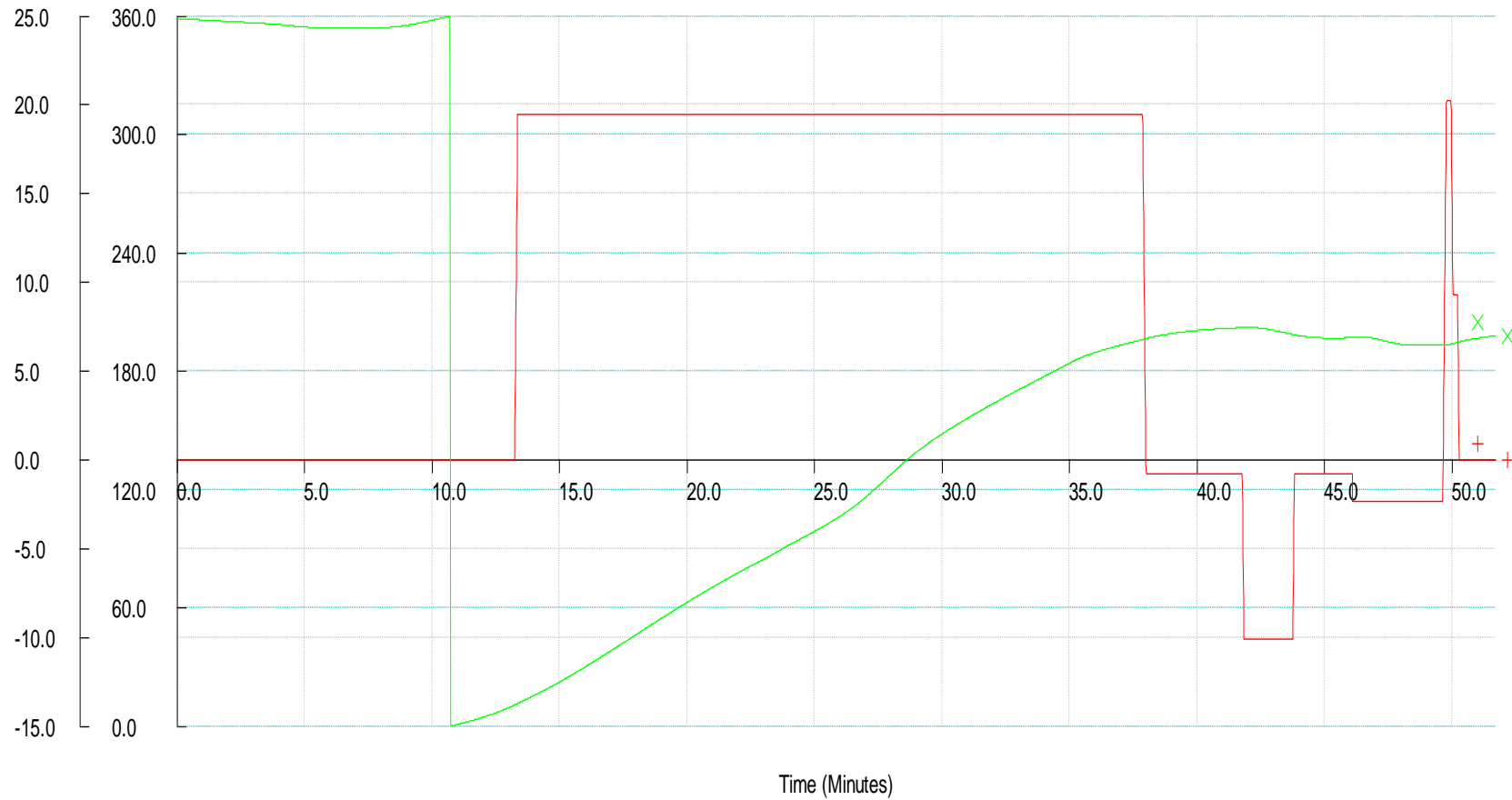
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 9/6/2019 18:23

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

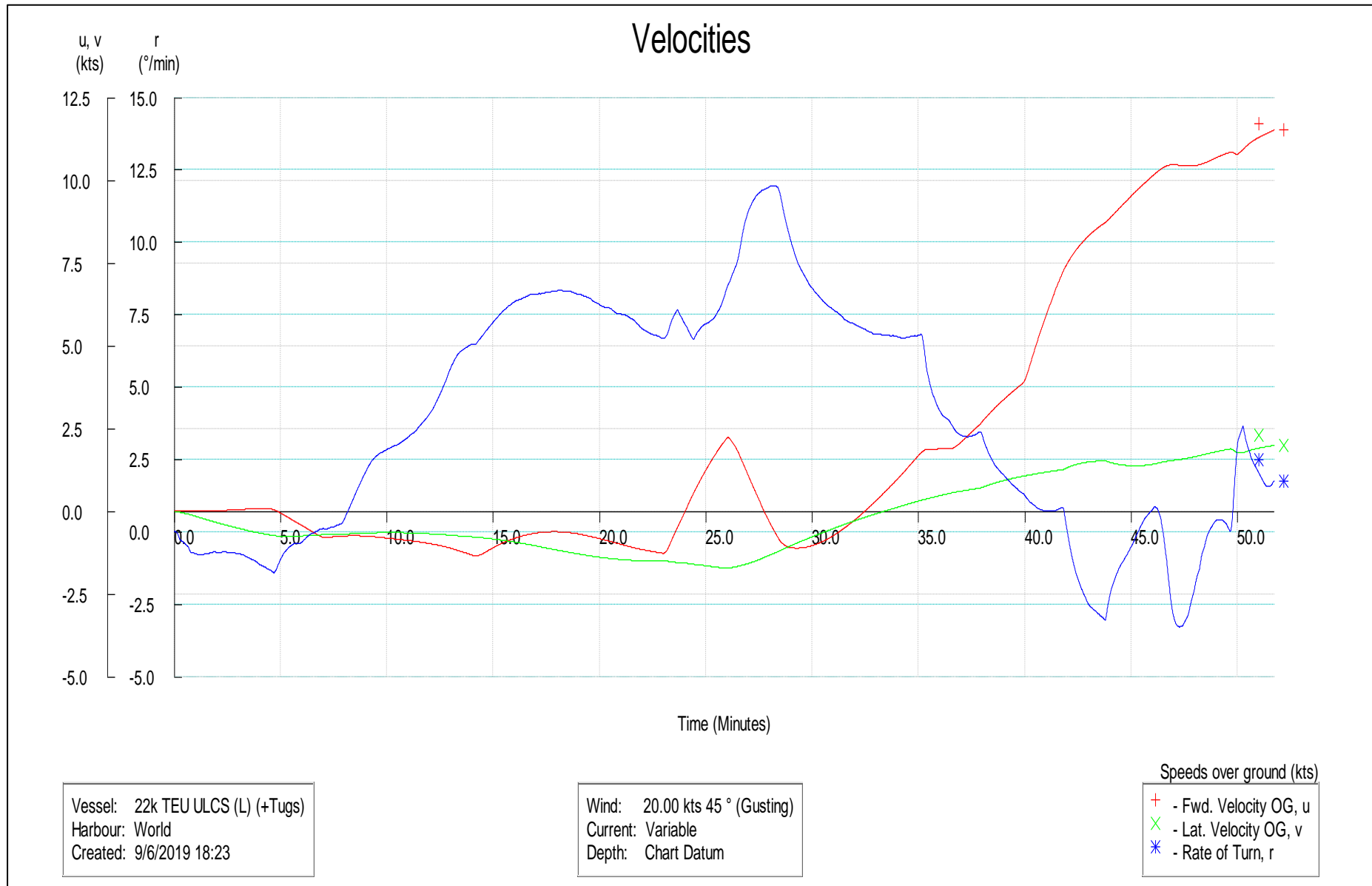
Heading and Rudder

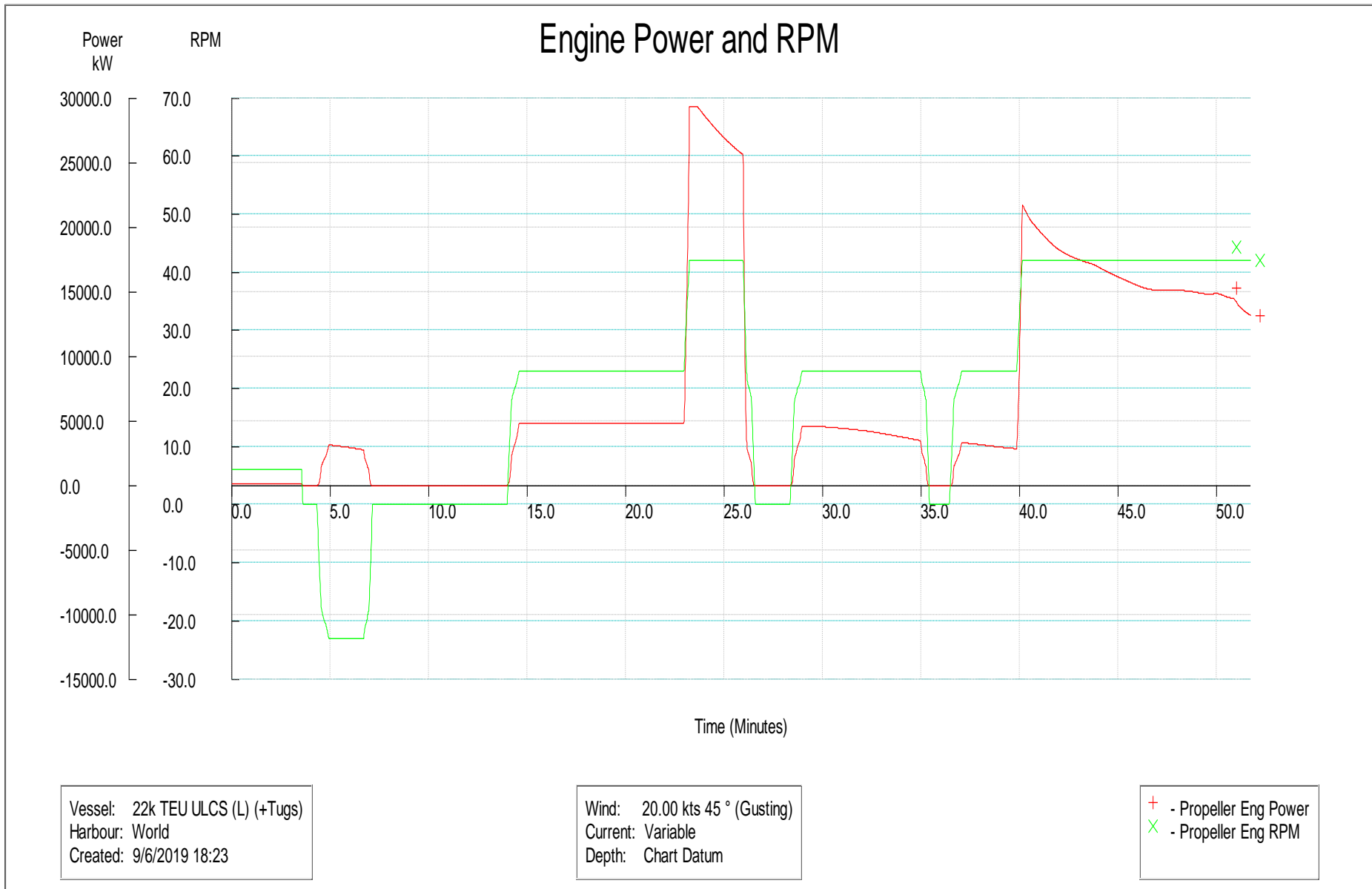


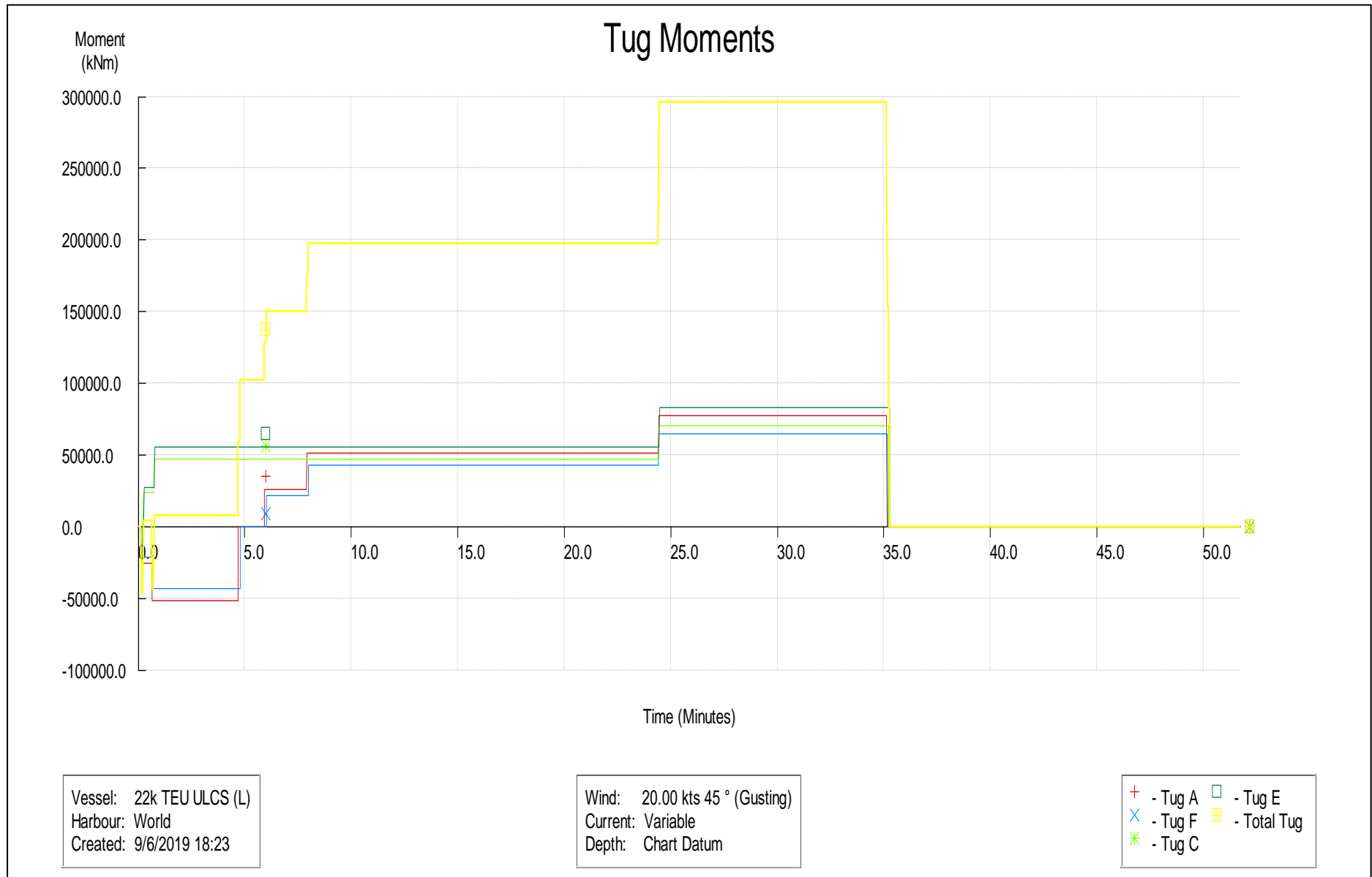
Vessel: 22k TEU ULCS (L) (+Tugs)
 Harbour: World
 Created: 9/6/2019 18:23

Wind: 20.00 kts 45 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

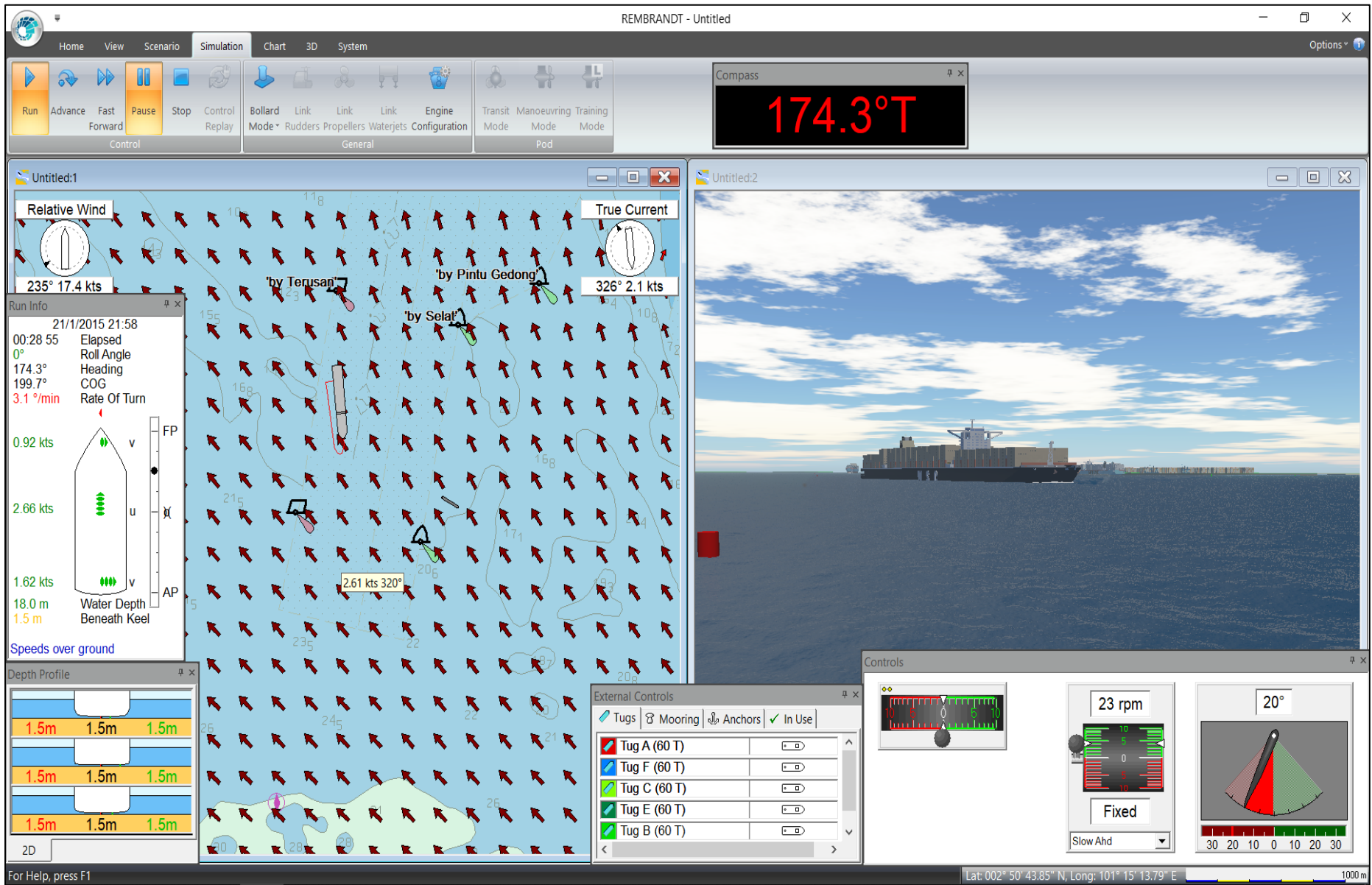
+ - Rudder Rud (°)
 x - Heading







Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
62	R62WPCT17NE20 kEbb2130hT60tx4P ortDep.rmb	Ebb (2130h)	NE 20 k	Departure (Port a/s)	F: 60t x 2 A: 60t x 2	<p>The vessel was pulled off the berth using four 60 tons bollard pull tugs. The tugs were stopped and let go when the bow was heading towards the channel. The vessel then proceeded to sea at Slow Ahead, passing the re-positioned Selat Buoy at over 4 knots. The strong set of the current required heavy port helm to correct and the speed dropped to about 2.3 knots. With the strong set and the wind on the port side, the stern cleared the edge of the channel by only about 15 metres.</p> <p>It would be prudent for slow, deeply laden vessels to keep the tugs to assist in maintaining a position close to the eastern side of the channel in such circumstances.</p>	4/6



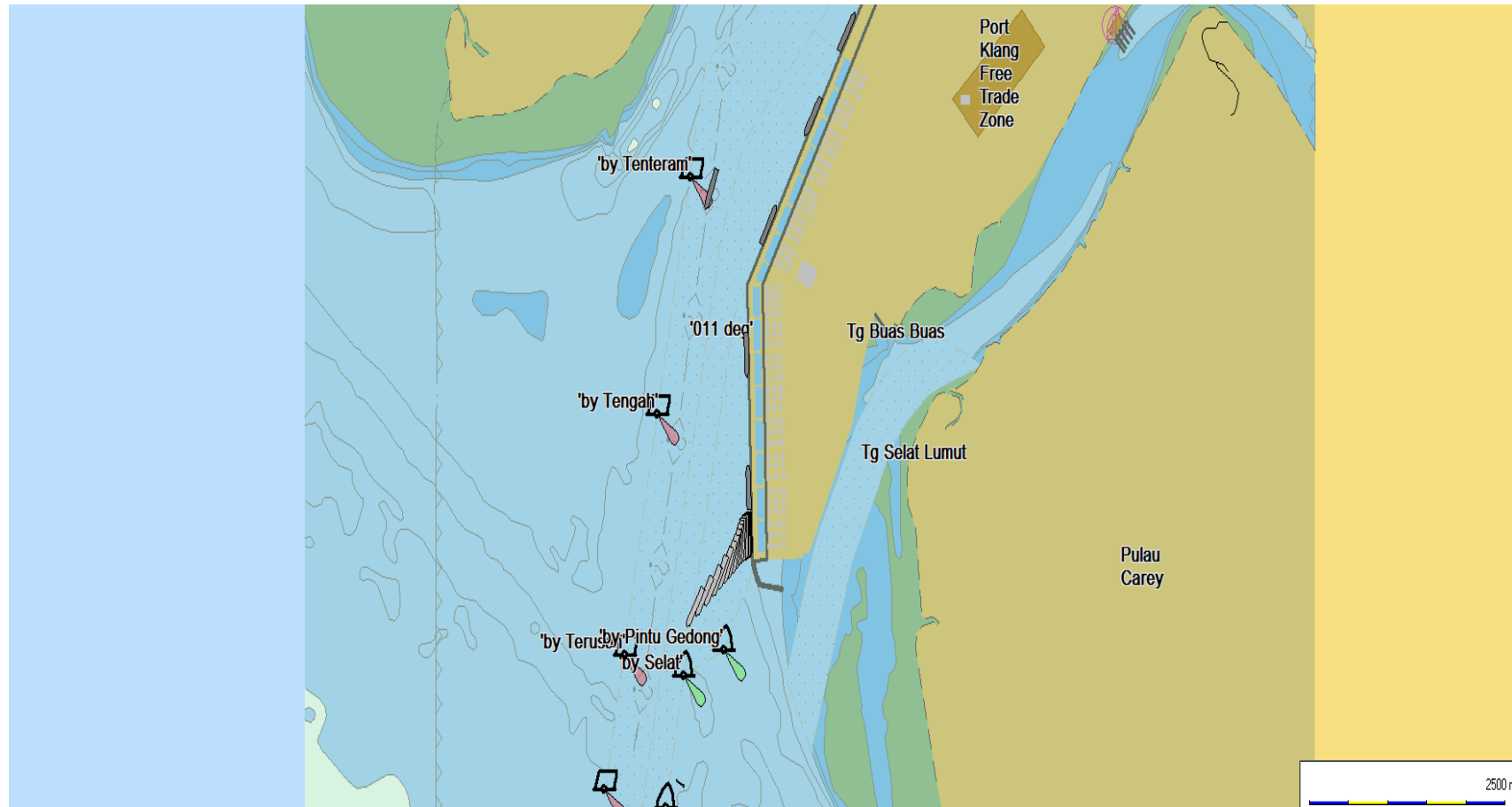
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 9/6/2019 18:51

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

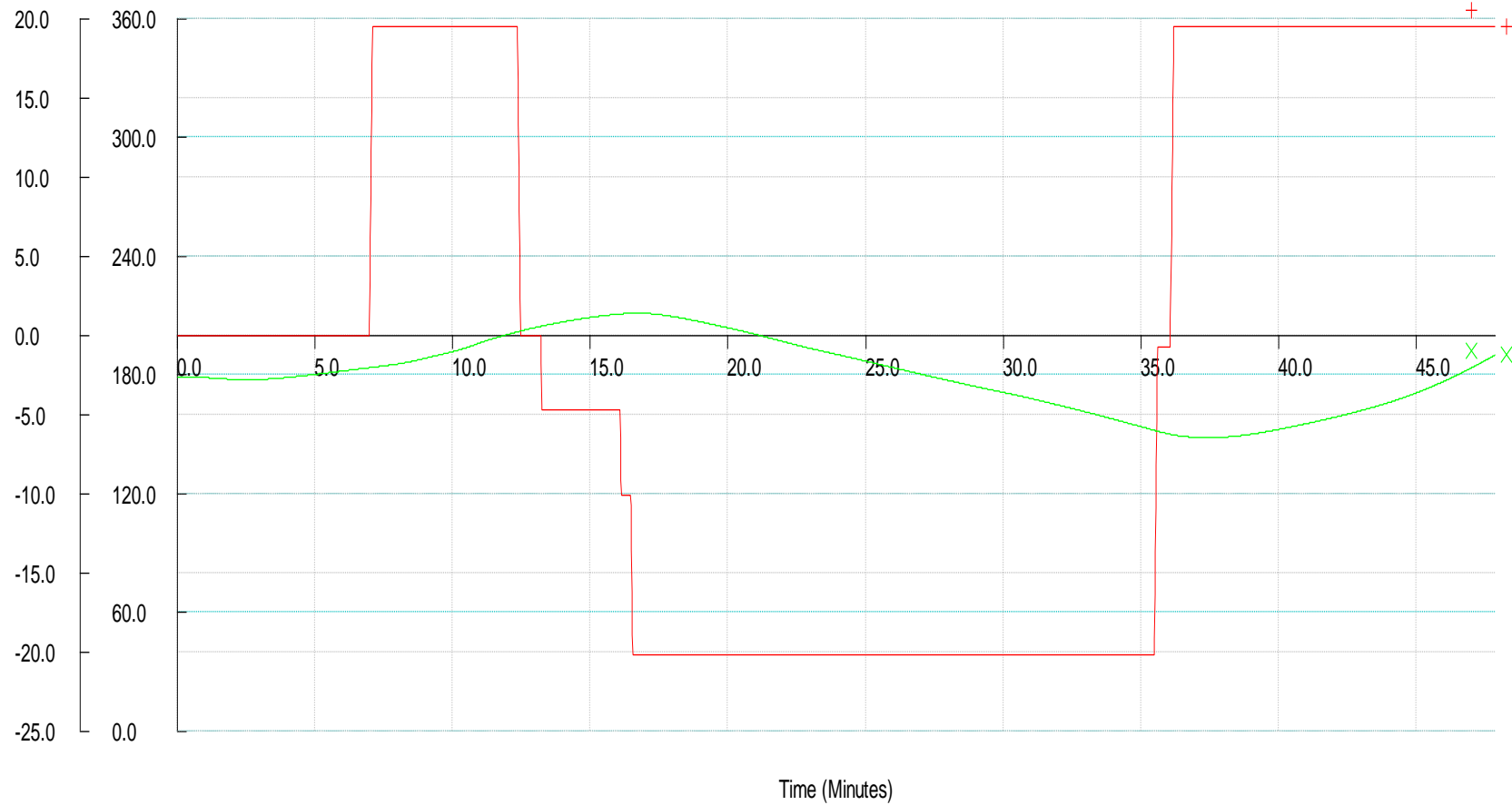
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 9/6/2019 18:51

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum

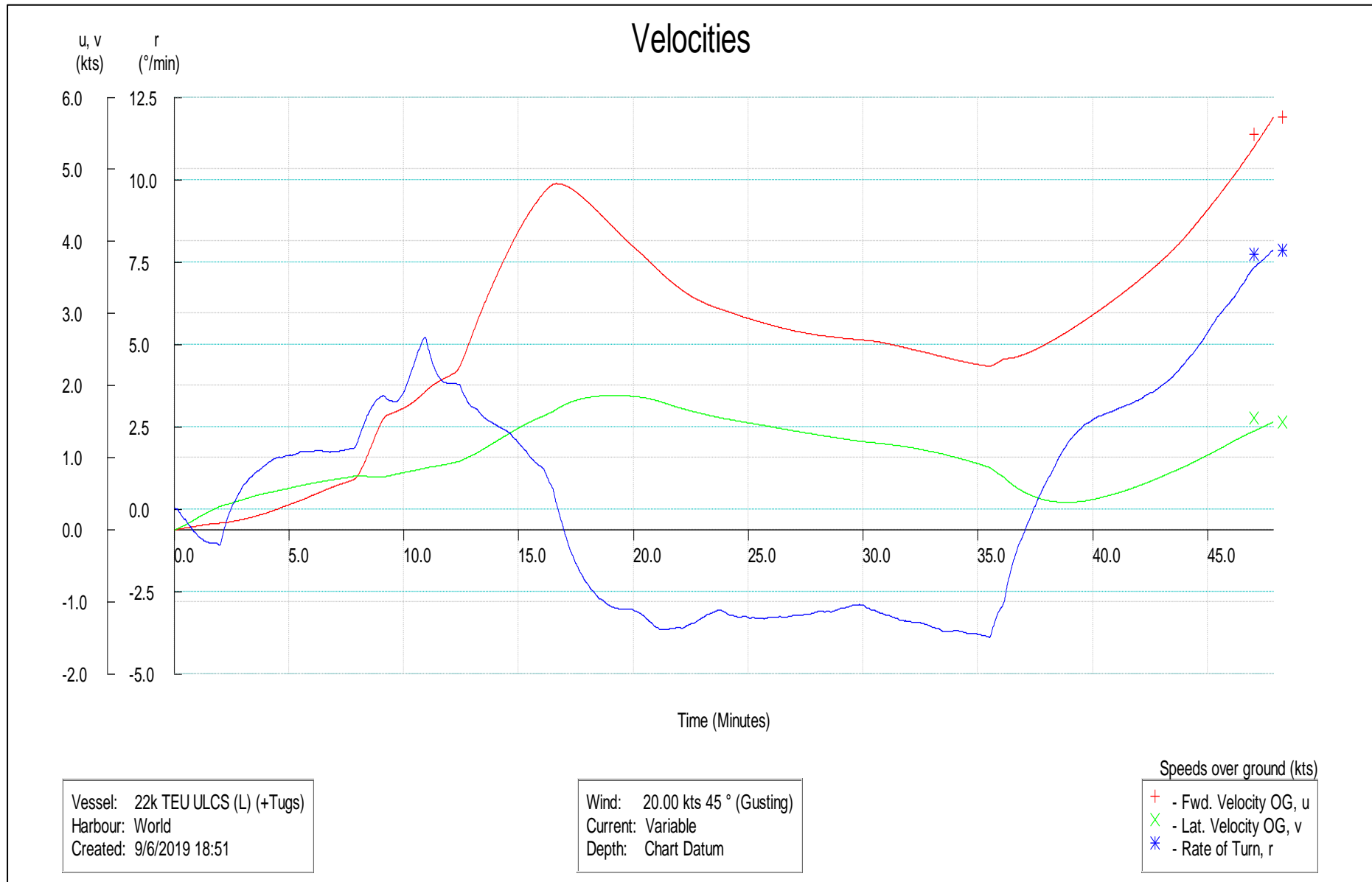
Heading and Rudder

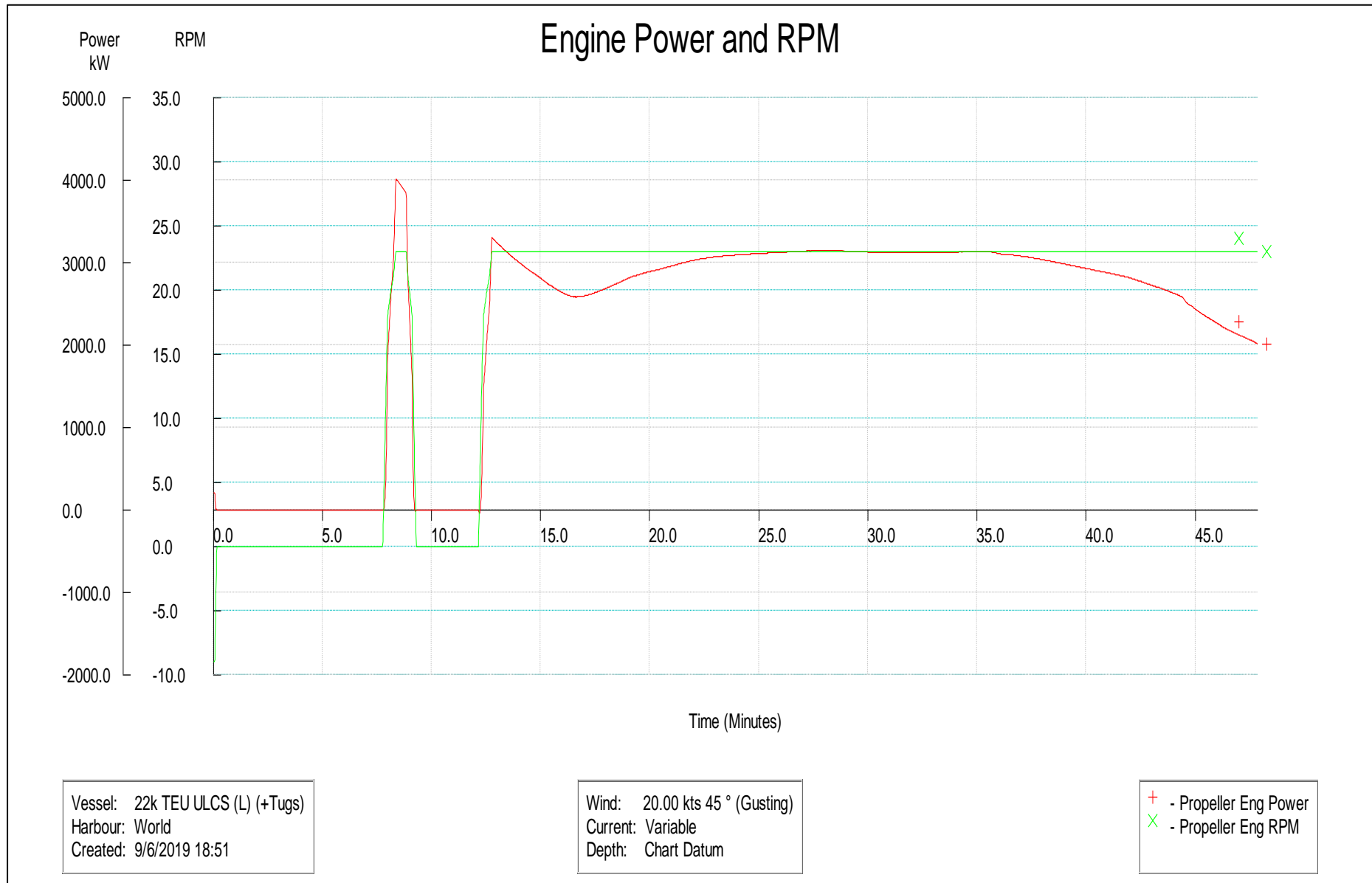


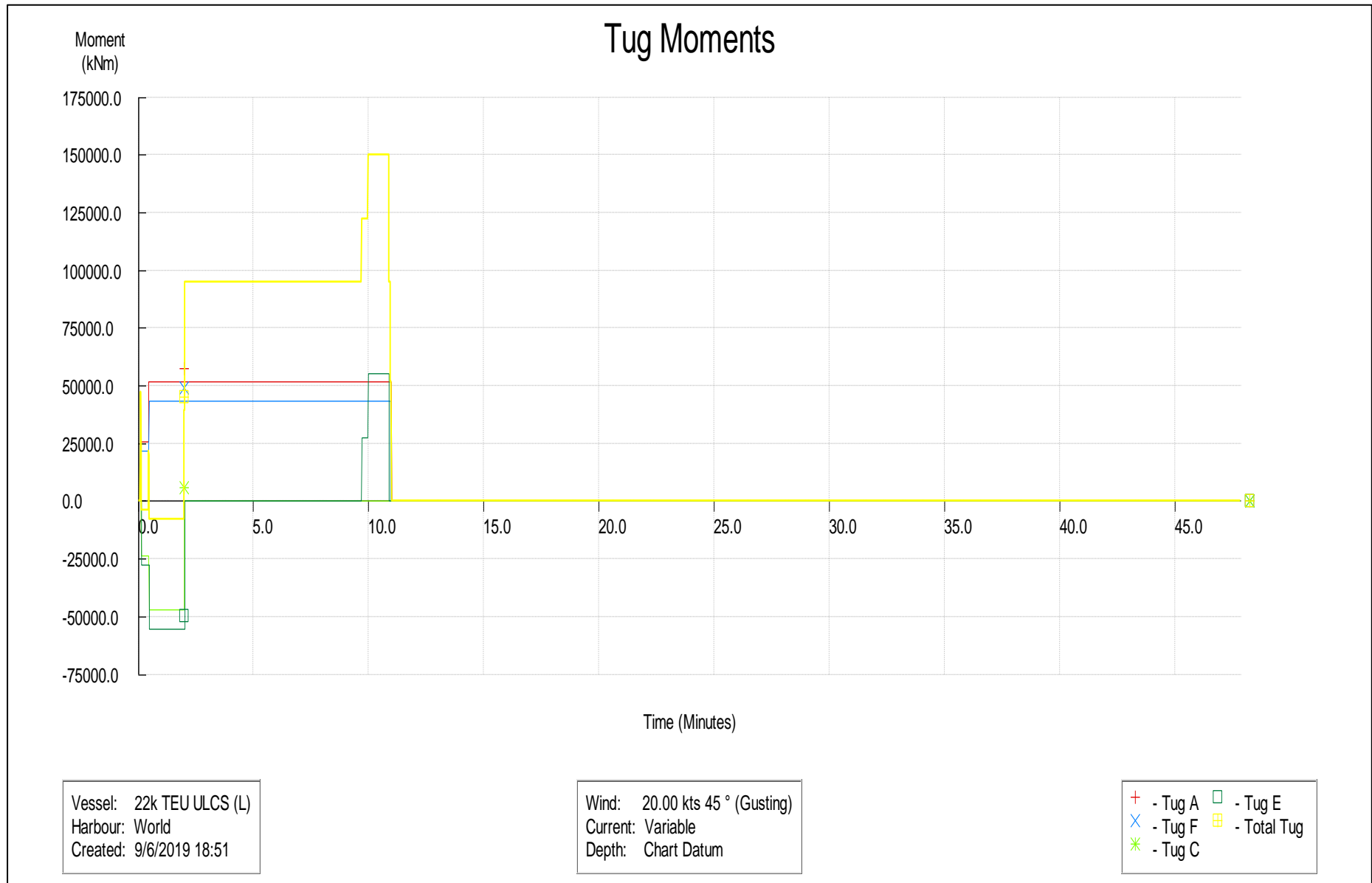
Vessel: 22k TEU ULCS (L) (+Tugs)
 Harbour: World
 Created: 9/6/2019 18:51

Wind: 20.00 kts 45 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

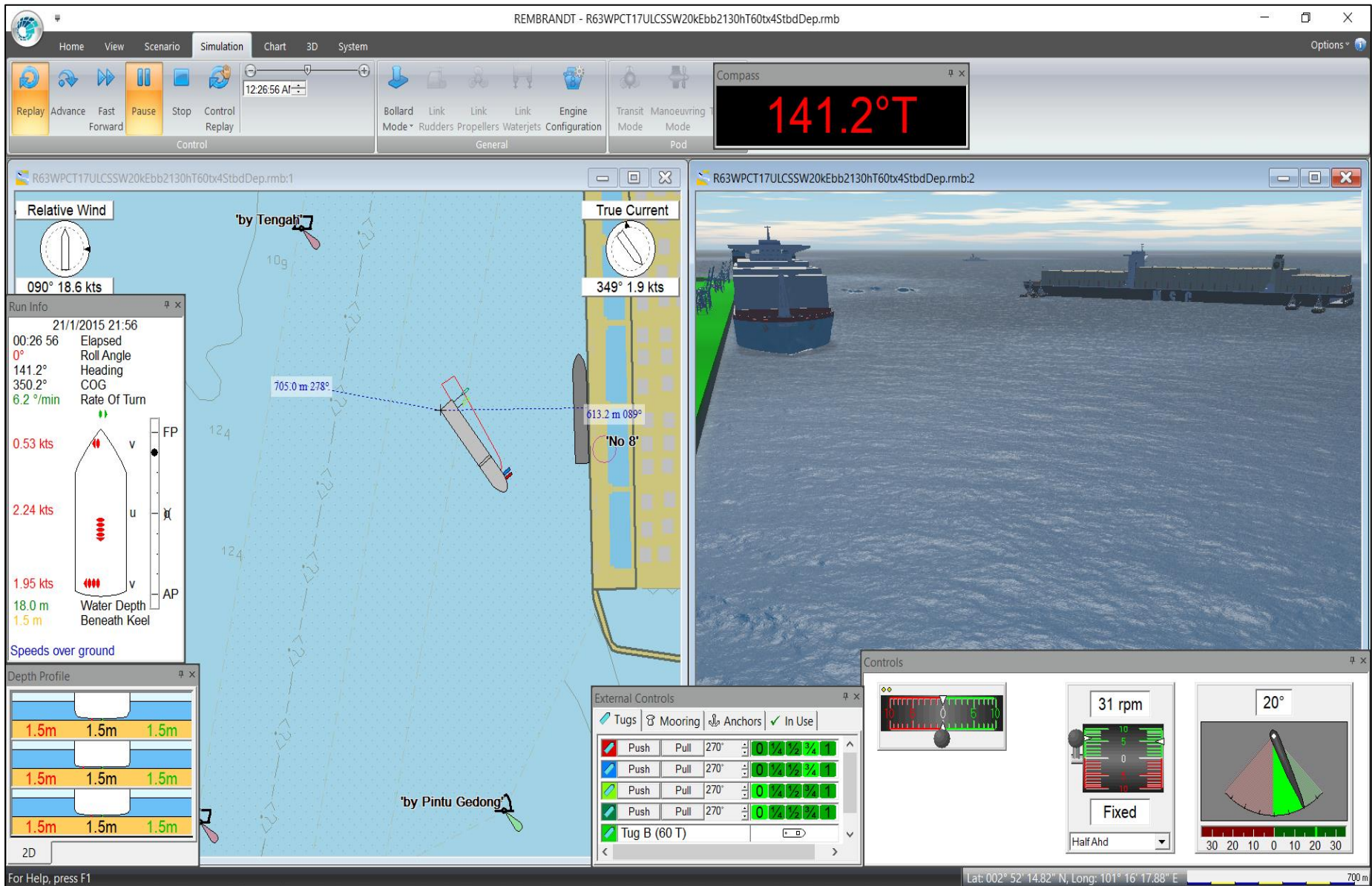
+ - Rudder Rud (°)
 x - Heading







Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
63	R63WPCT17SW20 kEbb2130hT60x4S tbdDep.rmb	Ebb (2130h)	SW 20 k	Departure (Stbd a/s)	F: 60t x 2 A: 60t x 2	<p>The vessel was pulled off the berth using four 60 tons bollard pull tugs operating at a maximum of $\frac{3}{4}$ Power. The stern was opened to the current and the forward tugs were ordered to stop and then push to starboard to execute a starboard swing off the berth. During the swing the wind and the current caused sternway. The helm and engine was then used to arrest the astern movement and assist in the starboard swing. When the wind and current were on the starboard side of the ship, the aft tugs were stopped. The forward tugs continued to push to get the pivot point as far away from the berth as possible in order to provide room for the stern.</p> <p>When the vessel was facing the channel, the forward tugs were stopped and all tugs let go. The vessel then proceeded to sea at Half Ahead. The strong set of the current was manageable at a channel transit speed of over 9 knots.</p> <p>Minimum available channel clearance: 705 metres.</p>	4/6



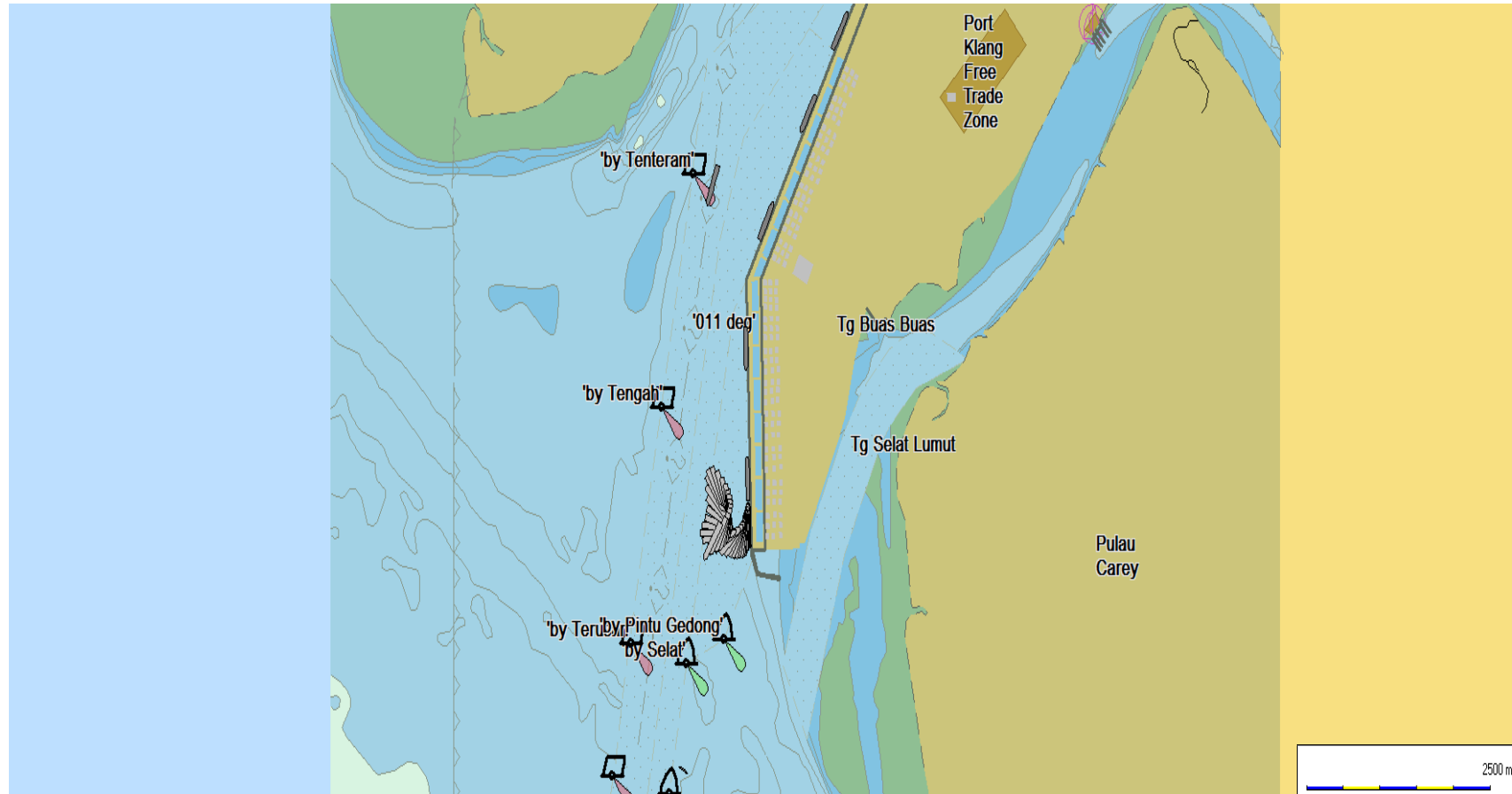
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 9/6/2019 19:28

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

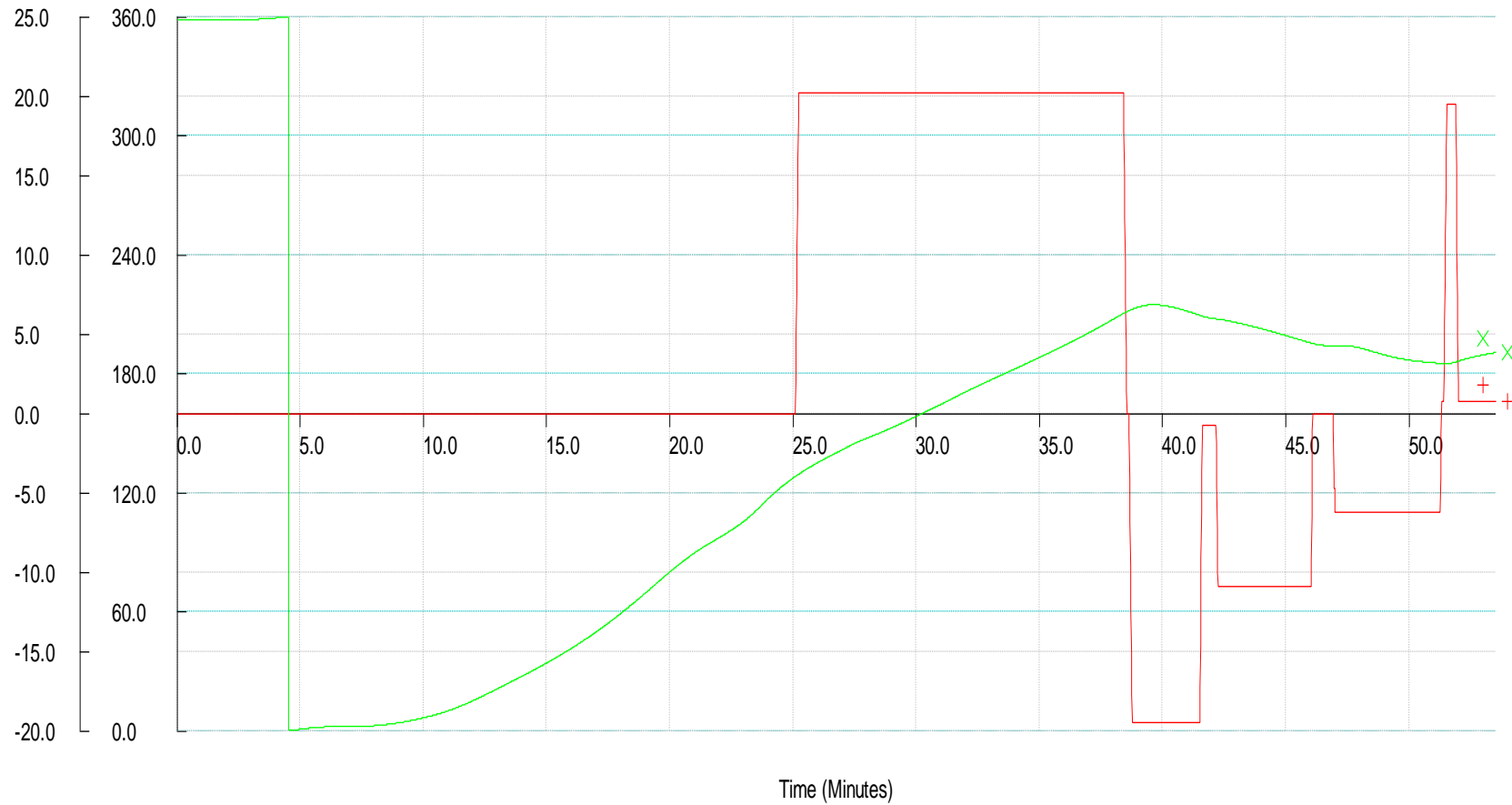
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 9/6/2019 19:28

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

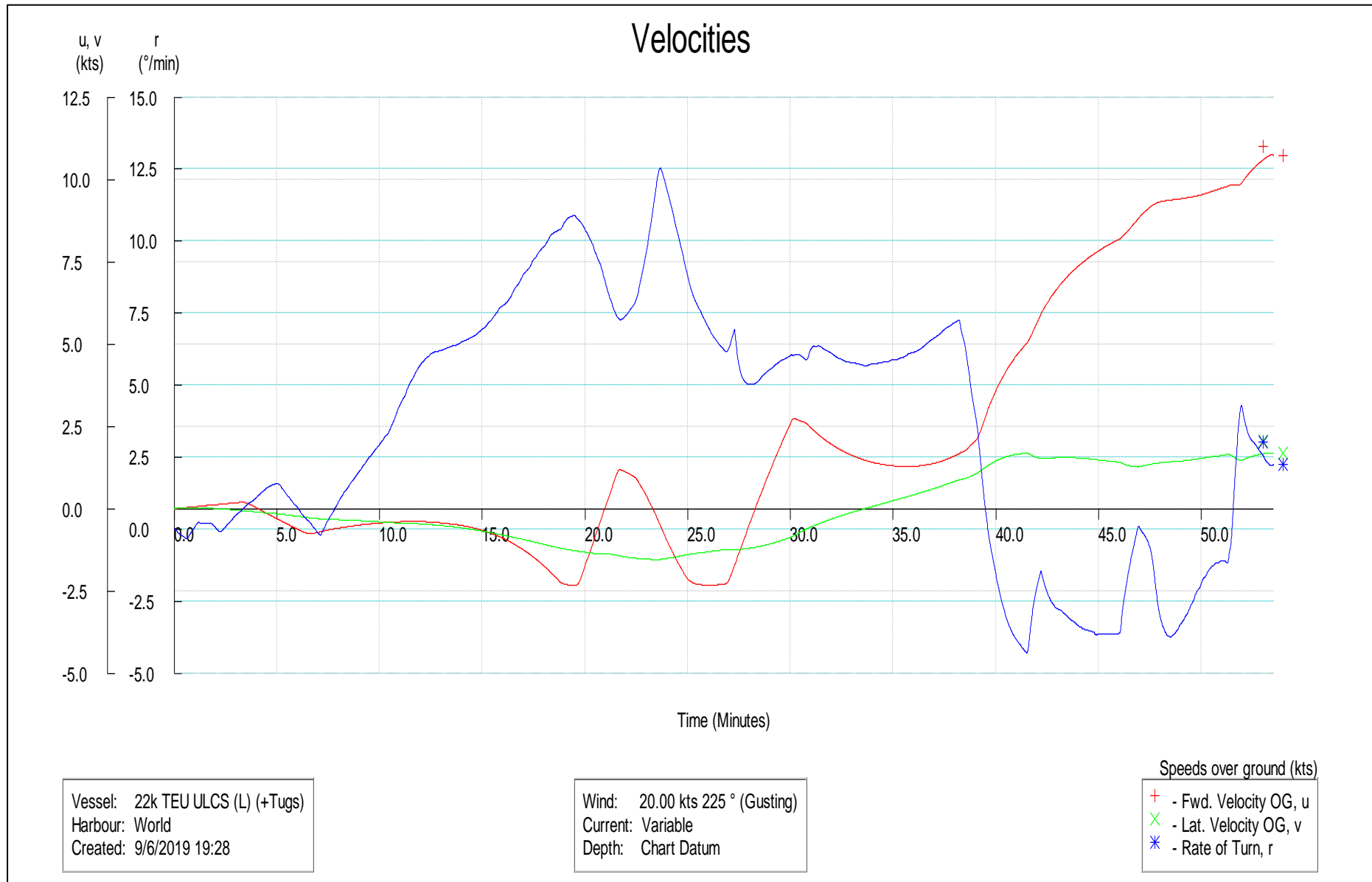
Heading and Rudder

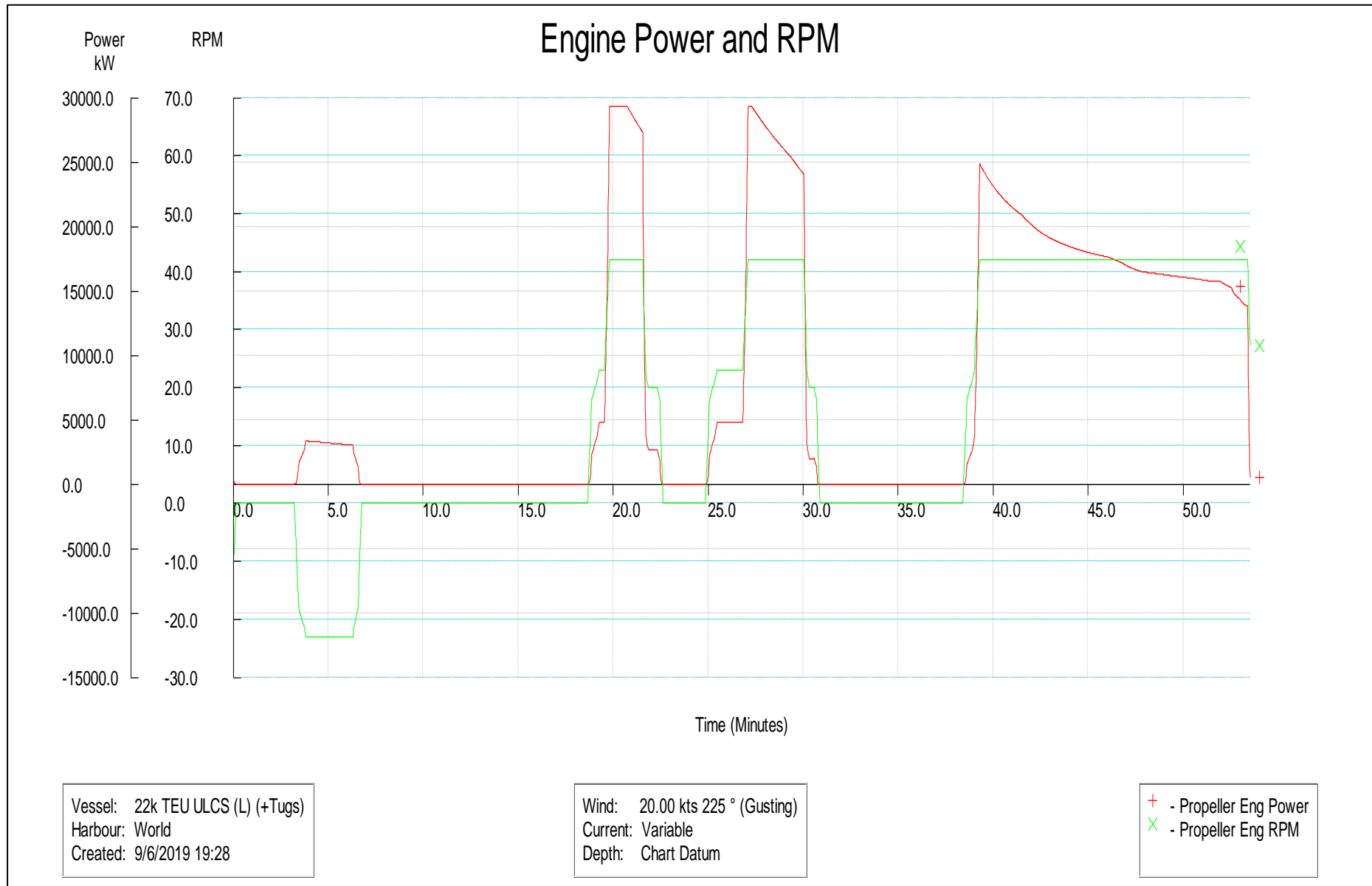


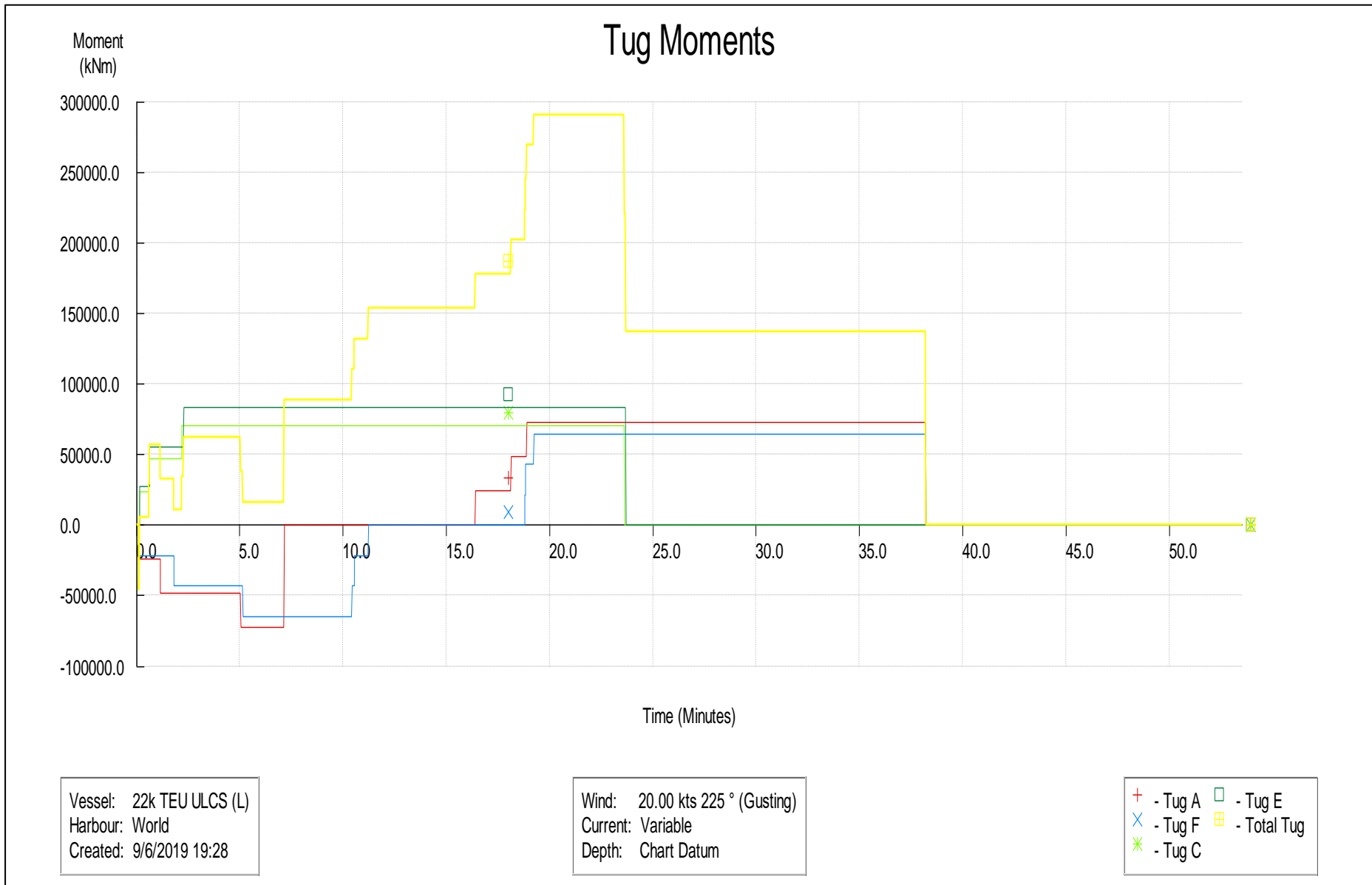
Vessel: 22k TEU ULCS (L) (+Tugs)
 Harbour: World
 Created: 9/6/2019 19:28

Wind: 20.00 kts 225 ° (Gusting)
 Current: Variable
 Depth: Chart Datum

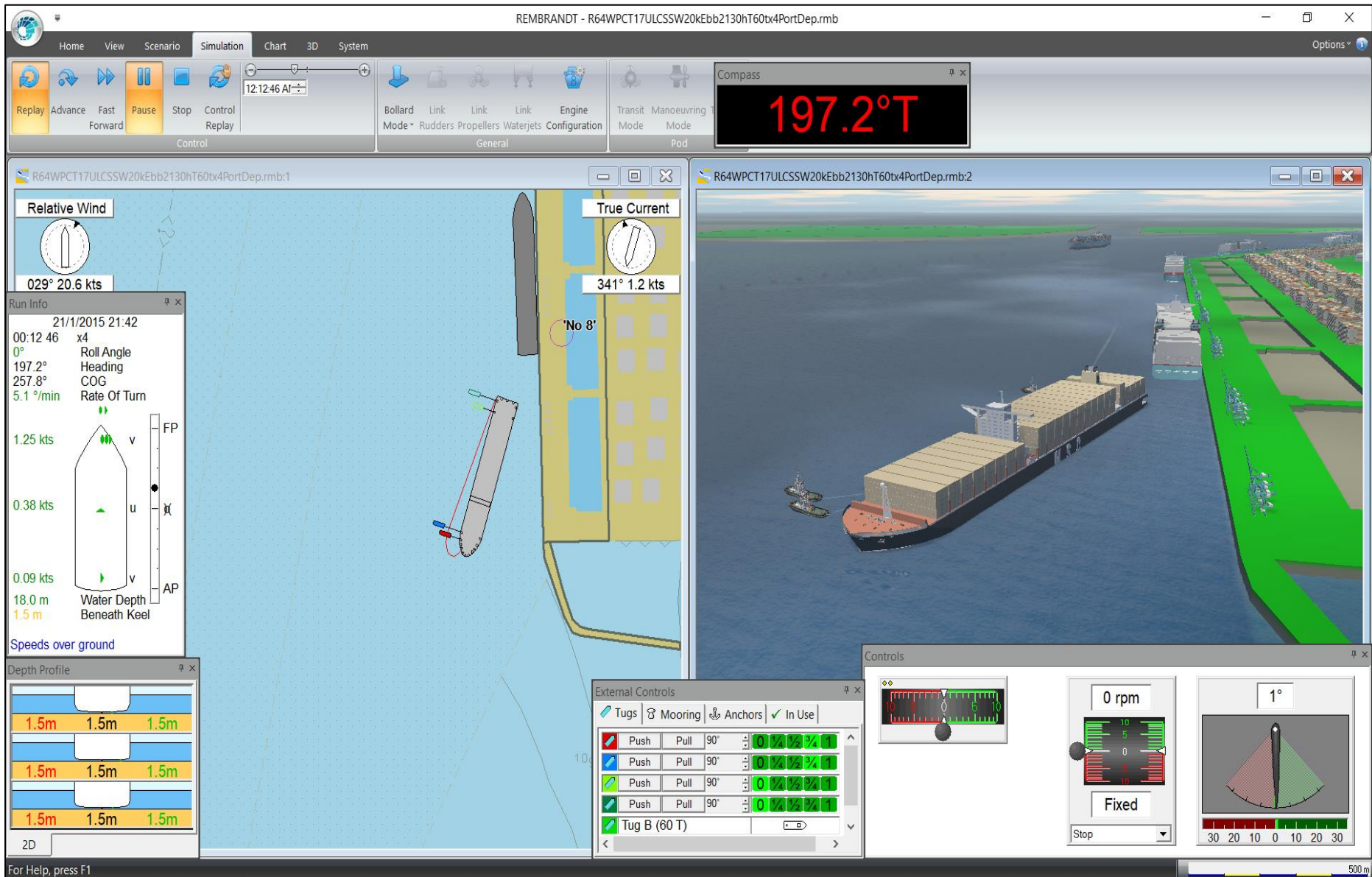
+ - Rudder Rud (°)
 x - Heading







Run No.	Run ID	Current	Wind	Movement	Tugs	Comments	Diff.
64	R63WPCT17SW20 kEbb2130hT60tx4S tbdDep.rmb	Ebb (2130h)	SW 20 k	Departure (Stbd a/s)	F: 60t x 2 A: 60t x 2	The vessel was pulled off the berth using four 60 tons bollard pull tugs operating at $\frac{3}{4}$ Power. The tugs were stopped and let go when the bow was heading towards the channel. The vessel then proceeded to sea at Half Ahead, passing the re-positioned Selat Buoy at over 7 knots.	4/6



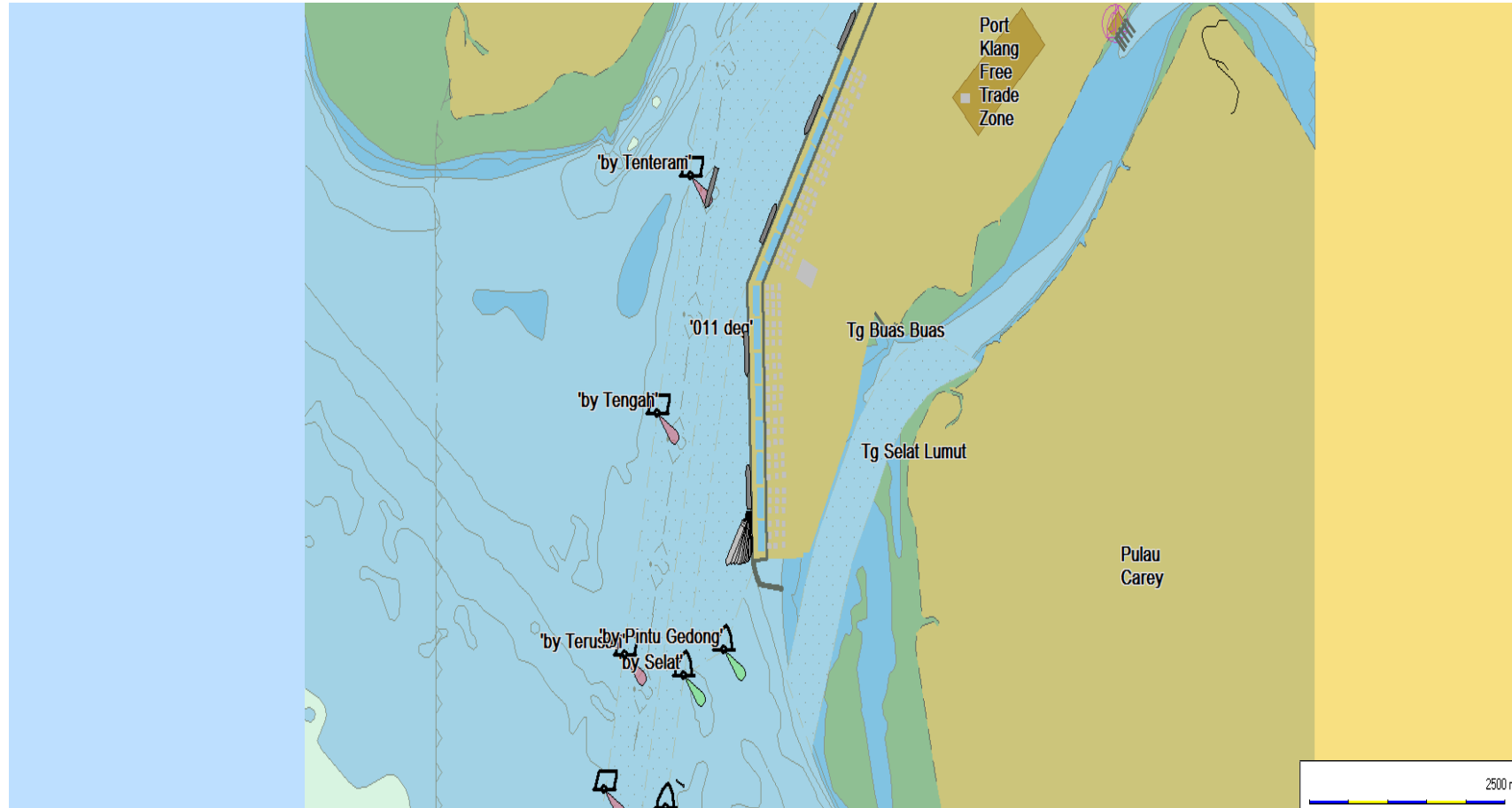
Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 9/6/2019 20:04

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

Vessel Track



Vessel: 22k TEU ULCS (L)
Harbour: World
Created: 9/6/2019 12:17

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: Chart Datum

